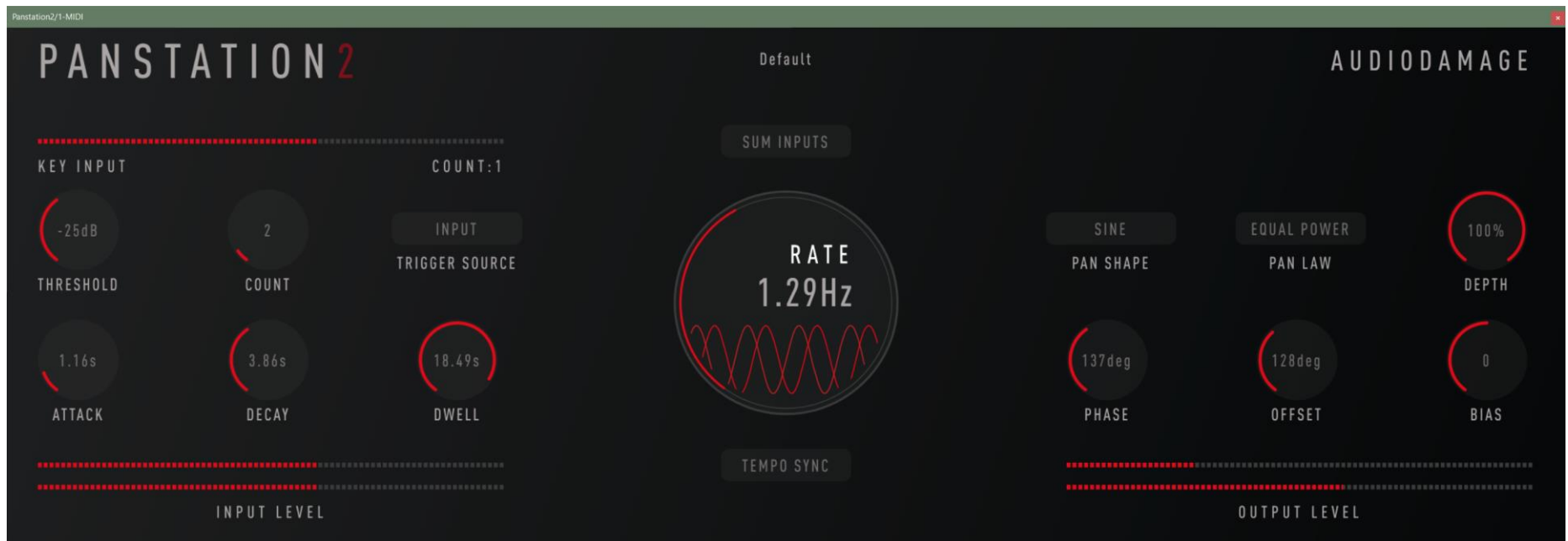


# Panstation User's Guide

Audio Damage, Inc.

Release 2.0



7 April 2020

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## Introduction

Once upon a time, before the advent of computer-based recording, when the mere act of recording more than two channels of audio involved specialized hardware costing tens of thousands of dollars, panning effects were difficult. Dynamic panning meant someone had to twiddle the pan pots on the mixing desk, usually at mixdown time since track counts were finite. Typically the mixing engineer was busy with the level faders, so panning effects were rare, and modern effects like tempo-synced panning were out of the question. Expensive signal processors called *auto-panners* were created to produce automated panning effects. Two of the most renowned auto-panners were the Drawmer M500 dynamics unit and the Audio & Design PanScan. These units are still highly prized in professional recording circles and change hands for twenty times the price of the plug-in you just bought, or more.

At Audio Damage, we've often been sorely disappointed by the quality and feature set of the auto-panners available in the plug-in market. We took it upon ourselves to create the most sophisticated auto-panner/tremolo plug-in there is. With a feature set borrowing liberally from the M500 and the PanScan, Panstation is a complete professional toolbox of panning and tremolo effects behind an easy-to-understand and simple-to-program user interface.

## System Requirements

The following table summarizes the operating system requirements and provided formats for Panstation:

Operating System	Minimum Version	Formats
macOS	10.11	AudioUnit, VST2, VST3 and AAX
Windows	8.1 x64	VST2, VST3 and AAX
iOS	iOS 11 or iPadOS 13	AUv3, standalone app with IAA

To use Panstation, you'll need a host application such as Ableton Live, Steinberg Cubase, Apple Logic, Avid ProTools, etc<sup>1</sup>. We assume that you are familiar with using plugins with your host. If you have general questions about using plugins with your host, please refer to its documentation.

The iOS versions of Panstation require an iPad; newer models will provide better performance.

## Demonstration Version

We encourage you to download and try the demonstration version of Panstation before purchasing it. The demo version of Panstation is the same as the regular version, but has the following limitations:

- Presets cannot be saved, nor can parameter values or other settings. This includes the information usually stored by your host DAW. If you save a DAW session with an instance of the demo version of Panstation, Panstation will revert to its default state when you reload the session.
- Panstation will cease to process audio at all 20 minutes after you add it to your DAW session. You can remove it and add it again, but it will revert to its default state.

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<sup>1</sup> Product names and plugin format names are copyrighted by their respective owners.

## How It Works

While the notion of an automatic panning plug-in may seem simple enough, Panstation adds a number of special tricks which bear some explanation. Since Panstation's roots go back to studio hardware processors of yesteryear, we'll explain Panstation's operation in the context of a hardware mixing desk.

Imagine if you plugged the same instrument—a synthesizer, for example—into two adjacent input channels on a mixer, and turned the pan pots on the two channels to the far left and far right respectively. If you moved the gain sliders on both channels up to the same level, the synthesizer sound would appear to be placed at the center of the stereo field, because its sound would be equally loud in both the left and right channels. Now, if you moved the left slider down, the sound would seem to move to the right because it would be louder in the right channel. If you pushed the left slider back up to its original position and pulled the right slider down, you'd hear the sound move to the left. If you repeatedly moved the sliders in opposite directions—one up and the other down, alternately—the sound would move back and forth.

Obviously you could control the motion of the sound with the motion of your fingers on the faders. Move your fingers slowly and the sound would move slowly; move them quickly and the sound moves faster. Make small motions with your fingers and the sound wouldn't move far from the center of the stereo field, but yank the sliders all the way up and down and the sound would jump back and forth from one far side to the other.

You might be wondering why we're imagining doing this with a pair of level faders on two channels and not just the panning knob on one channel. The answer is flexibility. Suppose you move the faders together, in the same direction, rapidly up and down. Since the loudness of the sound will change by the same amount in both channels, rather than panning effects you'll hear tremolo effects, since tremolo is simply a repeated change in a sound's loudness.

If you actually did this rather than imagining it, you'd probably grow tired of moving the faders and it would certainly be difficult to create the same exact effect more than once. This is why auto-panners—and Panstation—were invented. Panstation is like a pair of magic fingers on your imagined mixer faders. Panstation's controls let you move those fingers rapidly or slowly, over small distances or large ones, in opposite directions or together.

To put it in technical terms, Panstation uses a pair of low-frequency oscillators (LFOs) to control the gain of the left and right audio channels. By varying the frequency, amplitude, wave shape, and relative phase of the two LFOs, Panstation lets you quickly create a variety of panning, tremolo, and gating effects that would be difficult and tedious to create by other means.

## Operation

Panstation can be used in a mono-in/stereo-out or stereo-in/stereo-out context. Since Panstation's *raison d'être* is creating stereo panning effects, it won't work in a mono-in/mono-out context.

Most of Panstation's onscreen controls are circular dials, with their value shown graphically with an arc as well as with a textual display in the center. Click and drag either vertically or horizontally to change their value. Press the ALT or Command key on your computer's keyboard while dragging to make fine adjustments. Double-click the dial to return it to its default position.

Other parameters use popup menus, represented by an oval labeled with text.

Panstation has a few different modes of operation; not all of its controls are relevant to all modes. If a control isn't useful in the current mode, it is greyed out and won't respond to mouse clicks.

In the following pages we'll describe each of Panstation's controls. Panstation is not a terribly complex plug-in, but some of its controls are interrelated and explaining one necessarily involves referring to others. Hence you will find that sometimes we refer to a control in passing before later describing it in detail.

## Sum Inputs

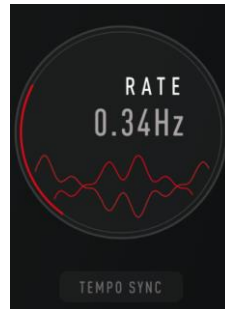
Panstation is a stereo-in/stereo-out plug in; the two channels of audio are processed independently. If you click the **SUM INPUTS** switch, the left and right input signals are added together, creating a mono input. This can be handy if you're processing material with complete channel separation, since for example panning a left-only signal to the hard right will produce silence.

SUM INPUTS

## Rate and Host Sync

The **RATE** control determines how fast Panstation's low-frequency oscillators change the levels of the two audio channels, and thus the speed of the panning or tremolo effect. The **RATE** control operates either in time units—the number of cycles per second—or in metrical units, depending on the setting of the **TEMPO SYNC** switch.

If the **TEMPO SYNC** switch is off, Panstation's LFOs run at whatever rate you set with the **RATE** control. In this mode, the LFOs can run as slowly as 0.01Hz (one cycle every 100 seconds) to 50Hz.

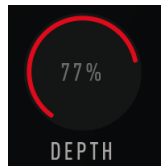


If the **TEMPO SYNC** switch is on, Panstation's LFOs synchronize to the tempo and position of your host DAW's transport. The **RATE** control operates in metrical units, expressed as fractions of a measure. For instance, if the **RATE** control is set to  $\frac{1}{4}$ , the LFOs will complete four cycles every measure. The **RATE** control has a range of  $\frac{1}{32}$  to  $\frac{2}{1}$  (one cycle every two measures). Dotted and triplet values are indicated with a **D** and **T** respectively.



## Depth

The **DEPTH** control sets the amount that the low-frequency oscillators vary the gain of the two audio channels, and hence the overall effect of Panstation. The **DEPTH** control has a range of zero to 100%. When set at zero, Panstation has no effect on the audio passing through it (unless you have the **SUM INPUT** switch turned on). As you increase the setting of the **DEPTH** control, the change in gain increases and the sound will start to move back and forth, and/or rise and fall in volume. At 100% the sound will move from one side of the stereo field to the other or change in loudness from full volume to silence.



## Phase

The **PHASE** control sets the starting position of the LFO's wave form, i.e. its phase, when it begins a cycle in response to a trigger, or at the beginning of a measure when **HOST SYNC** is turned on. Phase is expressed in degrees and ranges from 0 to 360. The exact effect of the **PHASE** control varies depending on which **PAN SHAPE** you're using. For instance, if the Sine shape is active, and **PHASE** is set to zero, the panning position will be at the center of the stereo field at the beginning of a measure. If **PHASE** is set to 90, the panning position will be at the far right at the beginning of a measure, and at the far left for a setting of 270. In tremolo applications, changing the **PHASE** changes the peaks and valleys of the tremolo relative to the position of the beat.

## Bias

The **BIAS** control makes Panstation's effect greater on one channel or the other. At its default center setting of zero, the levels of the two channels are modulated equally and the **BIAS** control has no effect. Rotating the dial left of center (showing negative values in the control) reduces the amount of modulation on the right channel, causing the panning effect to be greater on the left channel. Settings to the right of center (showing positive values) work the other way around, causing the panning effect to be greater on the right channel.



## Offset

The **OFFSET** control determines whether Panstation creates tremolo effects, panning effects, or a combination of the two. This control sets the relative phase between the two LFOs. Like the **PHASE** control, the offset control works in units of degrees, from zero to 360. If **OFFSET** is set to zero, the waves of the LFOs are exactly in phase. If **OFFSET** is set to 180, the waves have opposite phase. Thinking back to our imagined manipulations of the faders on a mixing desk, an **OFFSET** of zero would mean moving your fingers together in the same direction, while an **OFFSET** of 180 would mean moving your fingers in opposite directions. An **OFFSET** of 180 produces straightforward back-and-forth panning, while an **OFFSET** of zero or 360 produces tremolo. Settings in between these values can create panning that sounds “circular” or tremolo with a hint of stereo movement.

## Pan Law

Borrowing its name from mixer-design terminology, the **PAN LAW** popup menu selects one of several panning laws. A panning law determines exactly how a signal’s amplitude is changed as it moves from one side of the stereo field to the other. A slightly silly amount of thought has gone in to designing different panning laws for different situations and effects<sup>2</sup>. Within the context of Panstation, however, all you need to know is that choosing a different panning law affects the apparent loudness and distance of the sound as it moves back and forth. Since Panstation is intended for creating special effects, none of its pan laws is necessarily better than the others. Try different settings in different situations and let your ears choose.

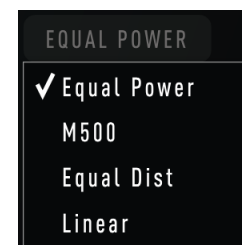
The following panning laws are available:

**Equal Power** – this setting uses a panning law similar to the panning controls on hardware mixers and software mixers present in DAWs. It varies the amplitude of the signal as it moves from one side to the other so that its perceived loudness stays approximately constant.

**M500** – this setting uses a panning law reproduced from the Drawmer M500. The M500’s panning law makes the signal seem louder at the extreme left and right positions, attenuating it fairly sharply at the center of the stereo field. This emphasizes the motion of the auto-panner and typically produces the most dramatic results among the **PAN LAW** settings.

**Equal Distance** – this setting varies the loudness of the signal so that its apparent distance from the listener’s head stays constant as the signal moves back and forth. It’s similar to the Equal Power setting but can produce slightly more interesting results in some contexts.

**Linear** – this setting uses a mathematically simple panning law that varies the relative amplitudes of the left and right channels in a linear (straight-line) manner. A linear panning law typically isn’t used for mixing purposes since it tends to produce the “hole in the middle” effect, i.e. the sound is quieter when placed at the center of the stereo field than when placed at either side. In Panstation, however, it’s useful as an intermediate setting whose effect is somewhere between the Equal Power and M500 settings.



If you have the **OFFSET** control set near zero or 360 to create tremolo effects rather than panning, the **PAN LAW** control will have some effect on how the loudness of Panstation’s output rises and falls. The Linear setting usually creates the most obvious results but try other settings as well.

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<sup>2</sup> See for example Craig Anderton’s article at <https://www.harmonycentral.com/articles/recording/the-truth-about-panning-laws-r501/>

## Pan Shape

The Pan Shape popup menu selects one of several wave shapes for the low-frequency oscillators. Different wave shapes create different panning or tremolo effects, making the sound seem to move back and forth in different trajectories. The available shapes are:

**Sine** – a sinusoidal wave which rises and falls smoothly with no corners or sudden jumps. Use the Sine shape to create basic back-and-forth panning effects or smooth tremolo.

**Duo Sine** – a combination of two sinusoidal waves of different frequencies, one faster than the other. Like the Sine wave, this shape moves the sound back and forth smoothly but gives it an extra wobble as it approaches either side.

**Tri Sine** – like the Duo Sine shape, but the extra wobble is faster.

**Triangle** – a wave which moves up and down in straight lines, rising at the same speed that it falls. The audible difference between the Triangle wave and the Sine wave, when used for panning, is that the Triangle wave makes the sound change direction immediately when it reaches either side; whereas the Sine wave makes the sound seem to slow down as it approaches either side, pausing briefly before it moves back in the opposite direction.

**Steps** – a wave with a series of flat lines, like a small staircase. Use the Steps wave to make the sound jump through a series of fixed positions in the stereo field. The Steps wave is also useful for creating twitchy-sounding tremolo effects.

**Ramp** – a linear wave which makes the sound move from left to right smoothly, then jump back to the far left. Note that the Offset parameter must be set to 180 for this wave to have that effect.

**Saw** – just like Ramp but the sound moves smoothly from right to left and jumps back to the far right.

**Wide Square** – a simple square wave which makes the sound jump from one side to the other when used for panning, or gates the sound on and off when used for tremolo.

**Square** – similar to the Wide Square setting, but with an extra flat spot in the middle so that the sound seems to jump from the center of the stereo field to one side and back, then jump from the center to the other side and back.

**Diverge** – somewhat similar to the Ramp shapes, the Diverge shape makes the sound move smoothly from the center to one side, jump back to the center, move smoothly to the other side, and jump back to the center. When used for tremolo effects, the Diverge shape makes the sound fade out to silence then jump back to full volume.

**Converge** – like the Diverge setting, but the sound moves smoothly from one side to the center, jumps to the other side, and moves smoothly back to the center. When used for tremolo effects, the Converge shape makes the sound fade smoothly up to full volume then jump back to silence.

Aside from the Diverge and Converge shapes, all of the wave shapes are modeled on those found in the Drawmer M500.





## Triggered Operation

We haven't yet mentioned one of Panstation's more interesting features: triggering. Panstation can delay its panning/tremolo effects until is triggered either by the incoming audio signal or a MIDI Note-On message. Panstation can also count the number of triggers it receives, up 16, and fire on whichever trigger you designate. Once Panstation is triggered, a simple envelope generator controls the intensity and duration of the panning/tremolo effect.

The following controls all relate to Panstation's triggered operation.

### Trigger Source

The Trigger Source popup menu selects one of several operational modes in Panstation. These modes are as follows:



**Free** – probably the most obvious mode, Free means that Panstation runs continuously, without requiring a trigger to start. It starts as soon as you insert it into your host and keeps going like an overused ad campaign. Most of the trigger-related controls are disabled in this mode since they are not relevant.

**Input** – this setting means that Panstation's LFOs will not start oscillating until the plug-in receives an audio signal (on either channel) that exceeds the TRIGGER THRESHOLD setting. Once Panstation is triggered, subsequent audio signals will not retrigger it until the envelope generator completes its cycle.

**Sidechain** – same as the Input setting, but signals arriving at the plugin's auxiliary or sidechain input trigger the envelope generator.

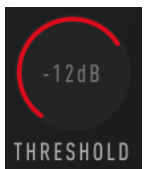
**MIDI Note Trigger** – This setting causes Panstation to be triggered by any MIDI Note-On message it receives, regardless of pitch or MIDI channel<sup>3</sup>. Contrary to the Audio Trigger Source, a subsequent MIDI Note-On message will retrigger Panstation. The idea is that while you may not have exact control over the levels of the audio material entering Panstation, you can exert exact control over the MIDI notes you send to it.

**MIDI Note Position** – In this mode, MIDI Note-On messages completely determine Panstation's panning. If a middle-C note is received, the signal is placed at the center of the stereo field. Higher-pitched notes move the sound to the right, lower pitches move it to the left. The LFOs and envelope generator have no effect, so all controls associated with them are disabled.

**MIDI Pan Controller** – Like the MIDI Note Position setting, but MIDI Continuous Controller Pan messages (controller #10) control Panstation's panning. (Yes, you can probably already do this with your DAW, but it seemed silly to not put in this feature.)

### Trigger Threshold

The THRESHOLD control sets the level of the audio signal at which Panstation will trigger. The threshold is expressed in decibels relative to full scale, with a range of -40 to zero. When the input signal rises above the threshold, Panstation triggers its envelope generator.



Note that for Panstation to trigger on separate audio events, it needs to wait for the input signal to fall back below the threshold before it can be triggered again. You may find that increasing the threshold produces better results; raising the threshold means that only the loudest peaks of the signal will be detected as triggers.

If you can't get exactly the triggering response you want, use the MIDI Note Trigger mode and place MIDI notes to trigger Panstation precisely.

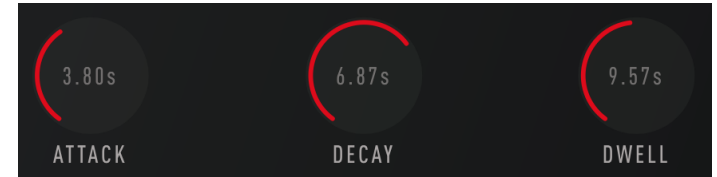
<sup>3</sup> Different host DAWs have different conventions for routing MIDI information to effects plug-ins. We won't attempt to explain all of these conventions here; consult the manual for your favorite host if you haven't done this before.

## Trigger Time, Attack and Decay

Once Panstation is triggered, a synthesizer-style envelope generator controls the intensity of the panning/tremolo. You can use the envelope generator to make panning effects that grow in width and stop abruptly, tremolo that starts instantly and fades out, and so on. The maximum effect of the LFOs is still controlled by the **DEPTH** control.

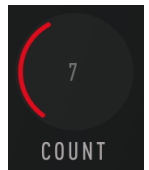
The **ATTACK** control determines how quickly the effect starts after being triggered. It has a range of 1 msec to 10 seconds. The **DWELL** control sets how long the panning continues after the attack phase. It has a range of 1 msec to 20 seconds. If you increase the value above 20 seconds, the value switches to "INF" for infinity, and the panning effect will continue indefinitely. Finally, The **DECAY** control determines how quickly the effect fades out; it has a range of 100msec to 10 seconds.

If either MIDI Note Position or MIDI Pan Controller is the active trigger source, the **ATTACK** control has a different function. For these trigger sources **ATTACK** sets the response time of a lag processor applied to the MIDI data. As you raise the **ATTACK** setting, Panstation responds more slowly to changes in the MIDI data. Use relatively small settings of a few milliseconds to provide fast response with some smoothing of sharp jumps, and long settings to create panning effects that move slowly from one fixed position to another.



## Trigger Count

The **COUNT** dial sets the number of triggers necessary to start Panstation's envelope generator. For example, if you set the **COUNT** dial to 4, four audio triggers or MIDI Note-Ons (depending on the **TRIGGER SOURCE**) must be received before the panning starts. The number below the right end of the **KEYINPUT** level meter displays the number of triggers received.



## Meters

Panstation has several horizontal level meters which display the level of the input signals, the key or sidechain input if connected, and the level of the output signals. The scrolling lines inside the Rate control display reflect the levels of the two LFOs, showing you their shape and relative phase (as set by the Offset dial).

## Presets

Panstation includes a number of presets to serve as a demonstration of its capabilities and inspirations for your own creations. To access the presets, click the name of the current preset (at the top center of the window) to open the preset browser. Click the **CLOSE** button near the lower-right corner of the preset browser to dismiss it.

The browser displays two lists of presets, one for presets included with Panstation, and another for presets that you save. Click a preset name to load the preset. Yes, this irretrievably erases Panstation's current settings, so if you have created a sound that you want to use again, save it as a new preset before loading another preset. To save your own presets, click the **SAVE** button. Panstation will prompt you to enter a name for the preset with a standard system file dialog box.

Preset files are plain-text XML files so that you can exchange them online in forums, copy them between a Windows computer and a Macintosh, email them to your friends, etc.



The presets in the browser correspond to files within Panstation's own folder on your storage device (i.e. your computer's hard drive or SSD). This folder is located at `C:\ProgramData\Audio Damage\Panstation2\` on Windows, and `~/Music/Audio Damage/Panstation2/` on macOS. Theoretically you can save your presets anywhere you like, but in order for them to show up in Panstation's User list they must be placed in the Presets folder within Panstation's folder.

You can delete presets from the User list by clicking their name and then clicking the **DELETE** button. Panstation will give you a chance to confirm this action or cancel it. If you confirm, the preset's file will be removed from your storage system and is gone for good.

The **COPY** and **PASTE** buttons copy the current settings to the system clipboard and paste settings from the clipboard. You can use the copy and paste commands to transfer settings between two instances of Panstation or paste the settings into an email message or text editor. When copied to the clipboard, presets are presented in the same XML text as used in preset files.

## **Automation**

All of Panstation'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 Panstation. We make every effort to ensure your satisfaction with our products and want you to be happy with your purchase. Please write [info@audiodamage.com](mailto:info@audiodamage.com) if you have any questions or comments.