

PhaseThree User's Guide

Audio Damage, Inc.

Release 1.0



13 November 2018

The information in this document is subject to change without notice and does not represent a commitment on the part of Audio Damage, Inc. The software described by this document is subject to a License Agreement and may not be copied to other media except as specifically allowed in the License Agreement. No part of this publication may be copied, reproduced or otherwise transmitted or recorded, for any purpose, without prior written permission by Audio Damage, Inc.

© 2006, 2018 Audio Damage, Inc.

All rights reserved.

Credits

Software Design and Construction, Documentation

Chris Randall

Adam Schabtach

Field Testing

Eric Beam

Don Gunn

Steve Hamman

Josh Schnable

Simon-Claudius Wystrach

Made Possible By

Elle

Tracie

License Agreement

BY INSTALLING THE SOFTWARE, YOU ARE CONSENTING TO BE BOUND BY THIS AGREEMENT. IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS AGREEMENT, THEN RETURN THE PRODUCT TO THE PLACE OF PURCHASE FOR A FULL REFUND.

Single User License Grant: Audio Damage, Inc. ("Audio Damage") and its suppliers grant to Customer ("Customer") a nonexclusive and nontransferable license to use the Audio Damage software ("Software") in object code form solely on a single central processing unit owned or leased by Customer.

Customer may make one (1) archival copy of the Software provided Customer affixes to such copy all copyright, confidentiality, and proprietary notices that appear on the original.

EXCEPT AS EXPRESSLY AUTHORIZED ABOVE, CUSTOMER SHALL NOT: COPY, IN WHOLE OR IN PART, SOFTWARE OR DOCUMENTATION; MODIFY THE SOFTWARE; REVERSE COMPILE OR REVERSE ASSEMBLE ALL OR ANY PORTION OF THE SOFTWARE; OR RENT, LEASE, DISTRIBUTE, SELL, OR CREATE DERIVATIVE WORKS OF THE SOFTWARE.

Customer agrees that aspects of the licensed materials, including the specific design and structure of individual programs, constitute trade secrets and/or copyrighted material of Audio Damage. Customer agrees not to disclose, provide, or otherwise make available such trade secrets or copyrighted material in any form to any third party without the prior written consent of Audio Damage. Customer agrees to implement reasonable security measures to protect such trade secrets and copyrighted material. Title to Software and documentation shall remain solely with Audio Damage.

LIMITED WARRANTY. Audio Damage warrants that for a period of ninety (90) days from the date of shipment from Audio Damage: (i) the media on which the Software is furnished will be free of defects in materials and workmanship under normal use; and (ii) the Software substantially conforms to its published specifications. Except for the foregoing, the Software is provided AS IS. This limited warranty extends only to Customer as the original licensee. Customer's exclusive remedy and the entire liability of Audio Damage and its suppliers under this limited warranty will be, at Audio Damage or its service center's option, repair, replacement, or refund of the Software if reported (or, upon request, returned) to the party supplying the Software to Customer. In no event does Audio Damage warrant that the Software is error free or that Customer will be able to operate the Software without problems or interruptions.

This warranty does not apply if the software (a) has been altered, except by Audio Damage, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Audio Damage, (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, or accident, or (d) is used in ultrahazardous activities.

DISCLAIMER. EXCEPT AS SPECIFIED IN THIS WARRANTY, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE EXTENT ALLOWED BY APPLICABLE LAW.

IN NO EVENT WILL AUDIO DAMAGE OR ITS SUPPLIERS BE LIABLE FOR ANY LOST REVENUE, PROFIT, OR DATA, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGES HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY ARISING OUT OF THE USE OF OR INABILITY TO USE THE SOFTWARE EVEN IF AUDIO DAMAGE OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. In no event shall Audio Damage's or its suppliers' liability to Customer, whether in contract, tort (including negligence), or otherwise, exceed the price paid by Customer. The foregoing limitations shall apply even if the above-stated warranty fails of its essential purpose. SOME STATES DO NOT ALLOW LIMITATION OR EXCLUSION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES.

The above warranty DOES NOT apply to any beta software, any software made available for testing or demonstration purposes, any temporary software modules or any software for which Audio Damage does not receive a license fee. All such software products are provided AS IS without any warranty whatsoever.

This License is effective until terminated. Customer may terminate this License at any time by destroying all copies of Software including any documentation. This License will terminate immediately without notice from Audio Damage if Customer fails to comply with any provision of this License. Upon termination, Customer must destroy all copies of Software.

Software, including technical data, is subject to U.S. export control laws, including the U.S. Export Administration Act and its associated regulations, and may be subject to export or import regulations in other countries. Customer agrees to comply strictly with all such regulations and acknowledges that it has the responsibility to obtain licenses to export, re-export, or import Software.

This License shall be governed by and construed in accordance with the laws of the State of Colorado, United States of America, as if performed wholly within the state and without giving effect to the principles of conflict of law. If any portion hereof is found to be void or unenforceable, the remaining provisions of this License shall remain in full force and effect. This License constitutes the entire License between the parties with respect to the use of the Software.

Introduction

The Mutron Bi-Phase, made by Musitronics Corp. in the mid to late 70s, is the most sought-after hardware phaser in existence. Highly prized for its wide dynamic range and the liquid, subtle phasing provided by its two six-stage phasers, the Bi-Phase is the benchmark by which all other analog phasers are judged. Unfortunately, these original units are quite rare, and if one is found in good working condition, it commands a premium price.

In 2006, we created PhaseTwo, a digital recreation of every aspect of the original Bi-Phase in plug-in form. Widely praised for its accurate emulation of the sound of the vintage hardware, PhaseTwo featured two separately controllable six-stage phasers. Like the original unit, these two phasers can be routed in series or parallel, for everything from subtle stereo washes to full-blown alien attack.

Over ten years later, we bring PhaseTwo up to date with contemporary standards. In PhaseThree, we've retained all of the carefully crafted signal-processing code of PhaseTwo and added a couple of new tricks. PhaseThree retains its heritage as the pre-eminent emulation of the Mutron Bi-Phase while pleasing anyone looking for a rich-sounding, versatile phase-shifter plug-in.

New in PhaseThree

PhaseThree retains all of the carefully crafted signal processing of PhaseTwo and adds several significant enhancements:

- A new, resizable user interface, appropriate to contemporary display technologies. Yes, gone is the faux-3D cel-shaded reproduction of the hardware, replaced by a flat UI that's equally at home on screens ranging from tablets to large 5K monitors.
- Switchable twelve-stage filtering for a more modern, intense phase-shifted sound.
- PhaseThree is compatible with AAX and VST3 hosts.
- Presets use a cross-platform XML-based file format.
- PhaseThree is built with up-to-date code libraries for better host compatibility and future-proofing.
- PhaseThree is available for Apple iOS devices (as a separate purchase).

As far as your host DAW is concerned, PhaseThree is an entirely different plug-in than PhaseTwo. This means that you can install both and continue to use the older version in your existing projects. PhaseThree cannot be directly substituted for PhaseTwo and cannot read preset files created by PhaseTwo.

Also, direct MIDI control assignment has been removed. Host DAWs have progressed considerably since we created PhaseTwo and it's now appropriate to leave MIDI mapping up to them.

System Requirements

PhaseThree is provided as 32- and 64-bit VST2 and VST3, and 64-bit AAX plug-ins for Windows. On macOS, PhaseThree is provided as 64-bit AudioUnit, VST2, VST3 and AAX plug-ins.

PhaseThree is a plug-in, not a standalone application. To use it, you'll need a host application such as Ableton Live, Steinberg Cubase, Apple Logic, Avid ProTools, etc¹. Obviously you'll also need a computer capable of running one of these applications. We assume that you are familiar with using plug-ins with your host. If you have general questions about using plug-ins with your host, please refer to its documentation.

We support the use of PhaseThree under Microsoft Windows 8.1 or newer, and Apple macOS version 10.9 or newer.

Installation

We assume that you are familiar with using VST and Audio Unit plug-ins with your particular host. If you have general questions about using plug-ins with your host, please refer to its documentation. PhaseThree can process either mono or stereo signals, and can be used as an insert effect or on an effects-send channel in your host's mixer. If used in a stereo context (for example, as an insert on a stereo channel in your DAW's mixer), the left and right channels are processed independently with no summing.

¹ Product names are copyrighted by their respective owners.

Operation

By today's standards, the Bi-Phase is not a terribly complicated signal processor. It has no presets, no MIDI control, no digital displays, no memory cards, and never needs firmware updates. For the sake of historical perspective, though, we'll reproduce a passage from the introduction of the Bi-Phase's manual:

The Mu-Tron Bi-Phase is a sophisticated and versatile sound modification device which consists of two independent six-stage phase shifters. Both phasors have complete control flexibility, and this, combined with some sophisticated switching and control functions, gives the musician an extremely wide range of effects including many that are simply not possible even with two conventional phasors. However, this same total flexibility means that there are quite a few controls the user must become familiar with before he masters the operation of the Bi-Phase. The musician who takes the time to study this manual and learn the functioning of each control will be well on his way toward understanding the subtleties of the Bi-Phase.

[Yes, they used the word "sophisticated" twice in as many sentences, and yes, they assumed that all users of their products were male.] PhaseThree's controls reproduce those of the Bi-Phase almost exactly, and while PhaseThree's operation is no more (or less) complicated than that of the Bi-Phase, we will describe each of its controls below.

The Controls

PhaseThree's onscreen controls are laid out in much the same arrangement as the Bi-Phase's knobs and switches. The controls are grouped by their function, and the groups are delimited with rounded-corner boxes. Each box can be thought of as a functional unit or module within PhaseThree; the name of the unit appears at the top of the box. The units are arranged differently than on the hardware to make better use of contemporary computer displays. The modules and their controls are described below.

Sweep Generators

The Sweep Generators control the two phase shifters in PhaseThree. A phase shifter creates its distinct effect by introducing a series of notches or cancellations in the frequency content of the signal passing through it. The Sweep Generators move these notches higher and lower in frequency, producing the upward and downward "whooshing" effect usually associated with phase shifters.

The **RATE** knobs control the speed of the Sweep Generators. Rotating the knobs clockwise increases the speed. Each knob varies the speed of its sweep generator from 0.1Hz (or one complete sweep every 10 seconds) to 20Hz (20 sweeps every second).

The behaviors of the **RATE** knobs are the only respect in which we deliberately made PhaseThree differ from the original Bi-Phase. In exploring the Bi-Phase, we found that the Rate knobs do not allow precise control of the lowest sweep rates. The sweep rate jumps from its lowest frequency of 0.1Hz up to several cycles per second within only a small range of rotation of the knob. Since we at Audio Damage prefer slower phase-shifter sweeps, the **RATE** controls on PhaseThree are scaled so that the lower rates are spread over a greater range of knob rotation than on the Bi-Phase. Hence if you have used a Bi-Phase, you may find that PhaseThree's **RATE** knobs have a different feel as you rotate them and listen to the sweep rate change. We also found that while the Bi-Phase manual states that the sweep generator rates range from 0.1Hz to 18Hz, both our particular Bi-Phase and our simulations created from its schematics show that the upper rate is approximately 20Hz. We choose 20Hz as the upper limit for PhaseThree's sweep generator rates.



The **CONTROL** switch allows you to choose whether Sweep Generator 1's rate is controlled by its **RATE** knob or by the pedal control. If the switch is set to **MAN**, the Sweep Generator's rate is MANually controlled by its **RATE** knob. If it is set to **PEDAL**, the rate is controlled by the pedal control on the right of PhaseThree's window. The pedal control replaces the function of the Bi-Phase's optional foot pedal, allowing you to sweep the frequencies of the phasors and the rate of Sweep Generator 1 with a MIDI controller and/or your host's automation features. We'll describe it in more detail later.

The **SHAPE** switches allow you to choose between two different shapes for each Sweep Generator. The upper setting chooses a smoothly varying sweep up and down, producing a familiar phase-shifter effect. If the switch is set to the lower setting, the Sweep Generator jumps from one extreme to the other. The front-panel graphics of the Bi-Phase depict a sine wave and a square wave above and below the shape switch, and the manual describes the two positions as "sine-wave and square-wave sweep". These terms are somewhat misleading in that the hardware does not really produce either sine waves or square waves. When the switch is in the sine wave position, the Sweep Generator oscillator actually produces a triangle wave. When the switch is in the other position, the oscillator produces a square wave. However, subsequent filtering circuitry, and the sluggish response of the phase shifters themselves, round off the corners of the square wave fairly drastically. At higher rates the so-called square wave becomes a somewhat warped triangle wave. All of these quirks are faithfully reproduced by PhaseThree.

Phasor A

Phasor A is the first phase shifter. Its input is always connected to the plug-in's left input and its output is always connected to the plug-in's left output. (In a mono context, Phasor A is connected to the plug-in's only input and output.)

The **DEPTH** knob determines the range over which the phasing effect varies. If the **DEPTH** knob is rotated fully counter-clockwise, the effect moves through a small range of frequencies. As you turn this knob clockwise, you'll hear the phase shifter sweep up and down over a wider frequency range (if you have its **SWEEP** switch set to **GEN 1**—there's more about this switch below).

The Bi-Phase manual makes the following suggestion about setting this control:

At lower speeds, the smoothest-sounding phasing is found at about "8"; as the rate is increased, it will probably be necessary to reduce the depth somewhat to maintain a smooth-sounding phasing effect, although this is a matter of taste and what effect you are looking for.

The **FEEDBACK** knob adds a variable amount of the phase shifter's output back into its input. This produces resonant peaks in the phase shifter's frequency response, between the notches that it produces. These peaks cause the phase-shifting effect to become more pronounced and somewhat more synthesizer-like. If the knob is rotated fully counter-clockwise, no feedback is added. As you rotate the knob clockwise, the amount of feedback increases. When rotated fully clockwise, you may hear a ringing effect as the resonant peaks coincide with harmonics in the signal passing through the phase shifter.

The **SWEEP** switch allows you to choose whether the phase shifter is controlled by Sweep Generator 1 or by the pedal control. Set the switch to **GEN 1** to produce the usual up-and-down sweeping effect. Set the switch to **PEDAL** if you wish to sweep the phase shifter with the pedal control (described in detail below).



The **ACTIVE** switch reproduces one of the two footswitches present on the original hardware. If the switch is off, the phasor is bypassed and has no effect on the signal. Sometimes it is useful to turn on only one phase shifter at a time, either to create a subtler effect or to more clearly hear exactly what you're doing as you turn the knobs and flip the switches.

The **STAGES** switch departs from the Bi-Phase, selecting the number of all-pass filter stages used to create the phase shifts in the signal. If set to **SIX**, PhaseThree uses the same number of filters as the hardware. Flip the switch to **TWELVE** for twice as many filters, giving a stronger and more dramatic effect.

Phasor B

Phasor B is the second phase shifter. It has the same filters and hence the same timbral effect as Phasor A, but it has more signal-routing and sweeping options.

The **INPUT** knob allows you to choose from which of three sources Phasor B receives its signal. The Bi-Phase has two input jacks, labeled **IN A** and **IN B**. Since PhaseThree can be used in either a mono or a stereo context, the effect of its **INPUT** switch is slightly different depending on the context.

In a stereo context, Phasor B's output is always connected to the plug-in's right output and the **INPUT** switch works as follows:

- If the switch is set to **IN A**, Phasor B receives its signal from the plug-in's left input. That is, it receives the same signal that Phasor A receives. This setting can be used to synthesize a pseudo-stereo phasing effect from a mono input signal.
- If the switch is set to **OUT A**, Phasor B receives its signal from the output of Phasor A. The two phase shifters are connected in series. This setting produces an unusual asymmetric configuration, because the plug-in's left output consists of the left input signal passed through Phasor A, while the right output consists of the left input signal passed through both Phasor A and Phasor B.



- If the switch is set to **IN B**, Phasor B receives its signal from the plug-in's right input. Phasor A processed the plug-in's left input signal, and Phasor B independently processes the plug-in's right input signal. This setting produces PhaseThree's (and the Bi-Phase's) only "true stereo" processing configuration.

In a mono context, Phasor B's input and output connections vary somewhat depending on the setting of the Input switch. These connections recreate several possible ways of using the Bi-Phase with only one input signal. Recall that Phasor A always receives the input signal when the plug-in is used in a mono context. The input switch works as follows:

- If the switch is set to **IN A**, Phasor B receives the same signal that Phasor A receives. Phasor B's output is mixed with Phasor A's output, and the mixed signal is sent out of the plug-in's output. This configuration is not available in the Bi-Phase alone, and would require an external hardware mixer to add the two phase-shifted signals together.
- If the switch is set to **OUT A**, Phasor B receives its signal from the output of Phasor A. The two phase shifters are connected in series. The output of Phasor B is sent out the plug-in's output. The Bi-Phase manual describes this configuration as "the normal setting for using the Bi-Phase with one instrument and one amplifier."
- If the switch is set to **IN B**, Phasor B doesn't receive a signal at all and is effectively disconnected. Use this setting if you need a more subtle effect than that produced by combining both phase shifters.

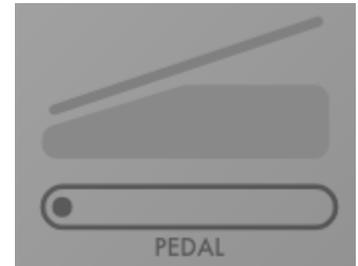
If Phasor A and Phasor B are being swept by the same source (either Sweep Generator 1 or the pedal control), the switch reverses the sweep direction of Phasor B with respect to Phasor A. That is, if the **SYNC** switch is set to **REV**, you will hear Phasor A sweeping upward in frequency while Phasor B sweeps downward in frequency, and vice versa. If the **SYNC** switch is set to **NORM**, the two phase shifters will move in the same direction. This switch's effect is most pleasing when PhaseThree is used in a stereo context, since it makes the two output channels sweep in opposite directions. (Try it when listening with headphones.)

The **SWEEP** switch works the same way as Phasor A's **SWEEP** switch but also lets you choose Sweep Generator 2 as the sweep controller for Phasor B. If you set the two **SWEEP** switches to the same source—either **GEN 1** or **CC**—then the two phase shifters will sweep together. Note that they will sweep over a different range if their **DEPTH** knobs are not at the same position. If the **SWEEP** switches are set to different sources, then the two phase shifters will move independently.

The remaining controls work the same way in Phasor B as they do in Phasor A.

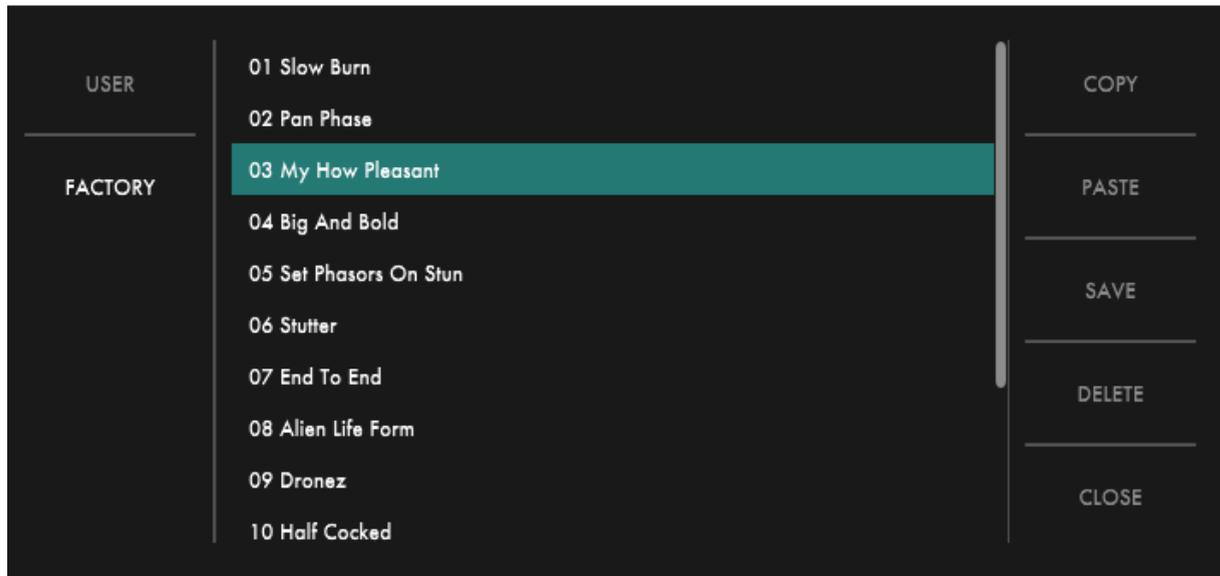
Pedal Control

The pedal control replaces the foot pedal that Mu-Tron sold as an optional accessory for the Bi-Phase. This slider, like the foot pedal, lets you to sweep the frequencies of the phasors and/or the rate of Sweep Generator 1 with a MIDI controller and/or your host's automation features. If you set one or both Sweep switches to **PEDAL** and then manipulate the pedal slider, you'll hear the phase shifters moving in response. You can also use your host's controller automation features to move the pedal control, for example, creating tempo-synchronized sweeps by drawing appropriate curves. The real fun is had by using a hardware MIDI controller such as your keyboard's Mod wheel to twiddle it.



Presets

PhaseThree includes several built-in presets to serve as a demonstration of its capabilities and inspirations for your own creations. To access the presets, click the preset name at the lower-left corner of the window to invoke the preset browser. The scrolling list on the left shows the available presets; click one of the preset names to load its settings.



To save your own presets, click the **SAVE** button. You can save your presets anywhere you like, but if you place these files in PhaseThree's own folder (located at C:\ProgramData\Audio Damage\PhaseThree\Presets\ on Windows, /Library/Application Support/Audio Damage/PhaseThree/Presets/ on OS X), your presets will appear in the scrolling list on the left when you click the **USER** button.

You can delete presets from the User list by clicking their name and then clicking the **DELETE** button.

The **COPY** and **PASTE** buttons copy the current settings to the system clipboard and paste settings from the clipboard. The settings are presented in a plain-text XML format so that you can exchange them online in forums, copy them between a Windows computer and a Macintosh, etc.

The **CLOSE** button closes the preset browser.

Automation

PhaseThree'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...

Thank you for purchasing PhaseThree. 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.