

# Grind User's Guide

Audio Damage, Inc.

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## Introduction

Thanks for purchasing Grind, our aggressive distortion and sound-shaping plug-in. While Grind can, with care, produce subtle distortion and plain-vanilla filtering effects, such pedestrian tasks are not its forte. Grind excels at altogether trashing your audio, turning even the most meek and innocent signals into something loud and wild. At its core is a wavetable-based wave-shaping processor. While most wave-shaping plug-ins use a single curve (or shape) to do their work, Grind uses a series of wavetables, rather like the sets of wavetables found in synthesizers made by PPG, Waldorf, and others. These tables were extracted from a broad range of samples, then hand-picked in listening tests to create a wide range of effects and distortions. Grind also employs these tables in an unusual manner. Rather than using the wavetable as a fixed transfer curve, Grind provides phase and window controls to vary which region of the wave is used. Both of these parameters, as well as the wavetable itself, can be changed and automated, creating evolving sound transformations and dynamic destruction of any source sound.

Grind also sports a second, more traditional shaping stage for additional saturation and distortion. The two shapers are followed by a high-quality filter with a number of response modes and personalities. Waveshaping generally adds high-frequency content to the signal, so a filter is useful for either taming down the high frequencies or emphasizing a particular tonal area.

While all of Grind's parameters can be controlled with your host's automation features, Grind also provides a low-frequency oscillator (LFO) for producing rhythmic changes. The LFO can control either the wavetable index or the filter frequency, or both, and can be synchronized to your host's tempo or cycle independently.

Finally, Grind's user interface includes a dynamic display of its wavetable, showing you the curve used to remap signals and providing you something to gaze upon with wonder as you listen to Grind reduce your precious audio to rubble.

## System Requirements

Grind is provided as 32- and 64-bit VST2 and VST3, and 64-bit AAX plug-ins for Windows. On OSX, Grind is provided as Universal Binary Audio Unit, VST2, VST3, and AAX plug-ins.

To use Grind, you'll need a Steinberg VST-compatible host application which conforms to the VST 2.0 or VST 3.0 specifications, and a computer capable of running it. For the Audio Unit version of Grind, you'll need an application capable of hosting Audio Unit plug-ins, and an Apple computer with an Intel CPU capable of running it.

We support the use of Grind under Microsoft Windows 8 or newer, and Apple OS X version 10.8 or newer.

## Installation

To install Grind, double-click the Grind Installer icon, and follow the instructions. You can choose which plug-in formats to install and, for some formats, the plug-in destination folder.

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/Audio Damage`, and your Audio Units folder, which is located at `/Library/Audio/Plug-Ins/Components/`. To un-install from Windows, delete the file named `Grind.dll` from your VST folder(s). The presets are stored in separate files which you can also delete, although they occupy very little space. On OS X, they're in `/Library/Application Support/Audio Damage` . On Windows, they're in the hidden folder `C:/Program Data/Audio Damage/` .

## Operation

Grind can be used in either a mono or stereo context. You'll probably want to use it as an insert effect to apply it to specific instruments or tracks, but there's nothing preventing you from using it as a send/return processor.

Grind provides a number of presets to demonstrate its capabilities. We suggest that you give Grind a try right away by dropping it into one of your current projects and flipping through the presets. Once you've heard what Grind can do, come back to this manual when you'd like to read about how to tailor Grind to your musical needs.

## Wavetable Shaper

The wavetable-based shaper has the following controls: **WAVETABLE**, **WINDOW**, **PHASE**, and **WAVE ON**. The wavetable is displayed in the center of Grind's window, so you'll immediately see the influence of these controls.

### *Wavetable*

The **WAVETABLE** knob sets the wavetable index, that is, it chooses which of the 15 wave forms will be used for the wavetable-based shaping section. This index can have a fractional value (for example, 3.14 rather than just 3) which means that the index is in between two waves. The resulting wave is a blend of the two neighboring waves. Turning the knob smoothly fades from one wave to the next, creating a smooth change in the resulting sound. Of course, if you move the knob abruptly, you'll hear an abrupt change.



The wavetable index can also be varied with the LFO, which we'll describe later.

### *Window*

The Window knob controls how much of the wavetable is used to shape the signal. At the full setting of 100%, all of the wavetable is used. As you reduce the window size, a smaller portion of the wave is used. Essentially the Window control provides another dimension of control over the shape of the wave used to transform the signal.



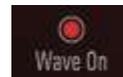
## Phase



The Phase knob adjusts the starting point in the wavetable. If you think of the wavetable as a curve that maps samples of the input signal to output samples, Phase adjusts the point along that curve that is used for samples with a value of zero. Like the Window knob, this control provides additional control over the manner in which the signal is shaped by the wavetable.

## Wave On

This switch simply turns the entire wavetable shaping section on or off. You can turn off the wavetable shaper if you'd like to use Grind's filter or algorithmic shaper in isolation for less catastrophic effects.



## Algorithmic Shaper

Grind's wavetable-based shaper is followed by a second shaping stage, called the Algorithmic Shaper. By "algorithmic" we mean that a mathematical function is used to reshape the signal. The Algorithmic Shaper has three controls: **ALGORITHM**, **ALGO AMOUNT**, and **ALGO ON**.

### Algorithm

This popup menu selects one of a number of mathematical processes which the Algorithmic shaper uses to reshape the signal. Most of these choices create different varieties of soft-saturation and hard-clipping distortion, but Sine Drive and Cubic provide more complex transformations that completely reshape the signal. Also worth special mention is FuzzPlus, which uses the core distortion function of our world-famous FuzzPlus stomp-box emulation plug-in.



### Algo Amount

Generally speaking, this knob adjusts the intensity of the algorithmic shaper. In most cases, turning it up makes the sound more distorted. For some of the algorithms, such as Cubic, changing Algo Amount will produce changes in timbre more complex than simple distortion.



## Algo On



This switch turns the algorithmic wave shaper on and off. If it's off, the algorithmic wave shaper (and its controls, **ALGORITHM** and **ALGO AMOUNT**) have no effect on the signal.

## Filter

After passing through the two shapers, the signal enters the filter. The filter has three controls: **FREQUENCY**, **RESONANCE**, and **FILTER TYPE**.

### Filter Type

Grind's filter comes in a variety of flavors, chosen with the Filter Type popup menu. The type names give you a general idea of the filter's response, following the usual conventions for synthesizer filters. That is, "LP", "BP", "HP" stand for Low Pass, Band Pass and High Pass respectively, and the number of "poles" (either two, three, or four) generally describes the steepness or intensity of the filter's response. That said, some of the filters have unusual characteristics which we'll describe here.



- 2 POLE LP, 2 POLE HP – plain-vanilla 2-pole filters. If you're looking for somewhat milder-sounding filters, these are your best bet.
- 3 POLE LP – this filter started life as an emulation of the filter in the TB-303, and has some of its squelchy sound.
- 4 POLE LP – Audio Damage's own 4-pole low-pass filter. Loosely based on the famous Moog filter, this is the one to use for overtly electronic-sounding filter effects.
- 4 POLE HP – a high-pass filter with a steeper cutoff slope than its 2-pole counterpart. If you want to kill the bass in your sound, this will do the job.
- LP20, HP20 – emulations of the low-pass and high-pass filters found in the Korg MS-20 analog synthesizer. These filters have more personality than the 2 POLE LP and 2 POLE HP modes.
- 4 POLE BP – a bandpass filter which lops off the high and low frequencies, allowing what's left in the middle to continue onwards.
- NOTCH – this filter removes a narrow range of frequencies. The width of that range is influenced by the Resonance knob; a higher setting makes the range narrower.
- 914 BP – the bandpass filter from Audio Damage's 914 filter bank plugin. An accurate recreation of the filters in Moog filter bank modules, this is a bandpass filter with distinctive phase response characteristics.

- **FILTERPOD** – the filter from one of Audio Damage’s first products, Filterpod. It’s essentially a low-pass filter with an odd hump near its cutoff frequency, and some unusual resonance and overdrive characteristics.
- **BYPASS** – this choice simply turns off the filter altogether, letting the signal pass unaltered.

## Frequency

The **FREQUENCY** knob sets the operating or corner frequency of the filter. You probably guessed that, didn’t you? This control has a range of 20Hz to 15000KHz. The filter’s frequency can also be controlled with the LFO, as described below.



## Resonance



The resonance knob has different effects depending on the filter type, but in general turning it up causes the filter to emphasize or boost frequencies around the frequency set with the Frequency knob. Turning it down to zero and using one of the simpler filter types will give you a gentler-sounding filter, suitable for just rolling off the highs or lows without drawing attention to itself.

This knob has an arbitrary range of 0 to 1.

## Low-Frequency Oscillator (LFO)

The LFO provides a modulation signal to the wavetable shaper and filter. It has a number of controls: **LFO SHAPE**, **LFO SKEW**, **LFO RATE**, and **FREQ** and **WAVE** sliders.



### LFO Shape and Skew

The **LFO SHAPE** popup menu and **LFO SKEW** knob work together to control how the LFO’s output varies over time. The **SHAPE** menu lets you choose one of four waveforms, with sawtooth, pulse, sinusoidal, and randomly determined shapes. The **SKEW** knob changes the basic waveform in different ways, depending on which waveform is chosen with the **SHAPE** menu. The following illustration shows how the **SKEW** knob changes the LFO’s shape.

Sawtooth



Pulse



Sine



Random



## LFO Rate and Sync

The **RATE** control determines how fast Grind's LFO oscillates. The **LFO RATE** control operates either in time units—the number of cycles per second—or in metrical units, depending on the setting of the **LFO SYNC** switch. If the **SYNC** switch is off, Grind's LFO runs at whatever rate you set with the **RATE** control. In this mode, the LFO can run as slowly as 0.01Hz (one cycle every 100 seconds) up to a brisk 100Hz. If the **SYNC** switch is on, the LFOs synchronizes to the tempo of your host DAW's transport. The **RATE** control then operates in metrical units, expressed as fractions of a measure.



For instance, if the **RATE** control is set to 1/4, the LFO will complete four cycles every measure. The **RATE** control has a range of 1/32 to 1/1 (one cycle every measure). Dotted and triplet values are indicated with a . and **T** respectively.



## LFO Depth Sliders

The LFO's signal can do two things: vary the frequency of the filter, and/or vary the wavetable index. The two vertical sliders at the upper right of Grind's window control how much influence the LFO has over the filter and the wavetable. These sliders are bidirectional; if they're placed at their center position, the LFO will have no effect. (You can double-click these sliders to quickly return them to center.) If the sliders are moved upwards, the LFO will increase the filter frequency or wavetable index as its signal increases. Move the sliders downward and the LFO will have the opposite effect.



## Noise Gate

Since Grind can transform signals in unexpected ways, making quiet signals loud and vice-versa, there is a simple noise gate at Grind's input. You can use this gate to make Grind process only the louder parts of your source material. The noise gate has two controls, **GATE THRESHOLD** and **GATE ON**.

### Gate Threshold

This knob sets the loudness level at which the gate will open, allowing signals to enter Grind for sonic destruction. Signals quieter than this level won't open the gate, leaving Grind's input silent. The noise gate comes after the **INPUT GAIN** knob, so that knob will also affect when the gate opens and closes.

Grind's gate obviously has a fixed attack and decay time. If you're curious, both are set to an aggressive 1msec. Grind is not about subtlety.



## Gate On

This switch bypasses or engages the noise gate. If you turn it off, the gate is bypassed and the Gate Threshold knob has no effect.



## Gain and Mix Controls

To wrap up the package, Grind provides several controls for adjusting the input and output levels and the mix of the processed and unprocessed signals.

### Input Gain

The **INPUT GAIN** adjusts the loudness or amplitude of the input signal. This control has a range of -60dB, which will silence all but the loudest signals, to +15dB, which boosts the signal substantially. Grind's transformation on the input signal is very dependent on the amplitude of the signal. You'll find that changing the **INPUT GAIN** can produce dramatic changes in the output's timbre.



### Output Level



The **OUTPUT LEVEL** knob controls the loudness or amplitude of the processed signal. Rotating it clockwise makes the signal louder, rotating it anti-clockwise makes it softer. The gain of this control is shown in decibels below the knob. Note that this gain stage comes before the **MIX** control (described below), so this knob affects only the processed signal and not the overall output level of the plug-in.

### Mix

Finally, the **MIX** knob varies the relative amounts of the original (dry) signal and the processed (wet) signal in the plug-in's output. The percentage displayed below the knob reflects how much of the wet signal is present in the output. At 100%, the output is entirely the processed signal; at 0%, the output is the input signal without alteration. A setting of 50% will give you equal amounts of both, and so on.



The unprocessed signal is unaffected by the Input Gain and Output Level controls.

## Presets

Grind comes with a number of presets. Since Grind's effect is highly dependent on the sound which it is given, these presets are intended to demonstrate Grind's capabilities in general, rather than producing a particular result from a particular source sound.

The name of the current preset appears in the top center of Grind's window. You can flip through the presets by clicking the arrows on either side of the name.

You can also click the name itself to invoke a popup menu with a number of handy features. The menu lists all of the factory-installed presets. There is a Save As command for saving your settings in individual files. If you place these files in Grind's own folder (located at `C:\ProgramData\Audio Damage\Grinder\Presets\User` on Windows, `/Library/Application Support/Audio Damage/Grinder/Presets/User` on OS X), your presets will appear on this menu.

There are also commands for copying the current settings to the system clipboard, and pasting settings from the clipboard. The settings are presented in a plain-text XML format so that you can exchange them online in forums, add them as enigmatic footnotes in your next sci-fi novel, etc.

## Automation

All of Grind'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 Grind. 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.