Discord User's Guide
Audio Damage, Inc.
Release 2.0

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Introduction

Thank you for purchasing Discord 2, Audio Damage's latest digital pitch shifter plug-in. Combining two pitch shifters and delays and analog-style filters in a true-stereo configuration, this plug-in is capable of accurately simulating vintage digital pitch-shift effects, as well as creating interesting sounds in its own right. In addition to the harmonizing, doubling, and chorusing effects you expect from a pitch shifter, Discord 2 can also create tempo-synced echoes and filter sweeps, ping-pong stereo delays, and much more. All of Discord 2's parameters are available for automation and MIDI control.

What's New in Version 2

If you're familiar with our previous version of Discord, here are the highlights of the new features in version 2:

- True stereo processing, with separate left and right controls for all pitch-shift, delay, LFO, and filter parameters
- Maximum delay times of two seconds
- Delays and LFOs can be synchronized to your host's playback tempo
- LFOs can modulate delay times
- Cross-channel feedback for more complex stereo effects
- MIDI control of all parameters
- Shiny new appearance

System Requirements

To use Discord, 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 Discord, 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 NT, 2000, or XP
- 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 or Intel CPU
- Display capable of "thousands of colors"

Installation

Double-click the Discord 2 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, use the included un-installer application.

Operation

Discord is a digital pitch-shifter and delay plug-in, modeled after a particular vintage unit which is still highly desired for its vocal-doubling abilities and chorusing effects. We have attempted to faithfully recreate the character of the original hardware, while adding a few modern features to take advantage of the DAW environment, such as longer delay times, parameter automation, and MIDI control.

Discord is a true stereo processor. 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. If you use the plug-in in a mono context, the incoming signal is routed to both the left and right processors and their outputs are added together.

There are independent right and left controls for almost all of the parameters. The controls in the upper half of the window affect the left channel's processing blocks and the controls in the lower half of the window control the right channel's blocks. If you turn on the **LINK L & R** switch, the left and right controls are linked together so that you can adjust both channel parameters simultaneously.

This screen shot shows Discord's user interface. The controls are described in the following paragraphs.

1. Pitch Shift Controls

The ***SHIFT*** and **FINE** knobs control the amount that the pitch of the incoming signal is raised or lowered. The value in the display indicates the amount of pitch shift, expressed in cents or hundredths of a semitone. A positive shift amount increases (or sharpens) the pitch of the signal, while a negative amount decreases (or flattens) it. For example, a shift value of +1200 raises the signal's pitch by one octave, and a value of -700 lowers it a fifth. The ***SHIFT*** knob has a range of ±1200 and the **FINE** knob has a range of ±25. The sum of their settings determines the pitch shift value. Use the ***SHIFT*** knob to set the approximate shift amount you desire and then use the **FINE** knob to tune the shifting interval precisely. If you're looking for a subtle chorusing or detuning, just use the **FINE** knob.

The ***SHIFT*** and **FINE** knobs are bidirectional. At their center "12 o'clock" setting the shift amount is zero. As you rotate the knob clockwise, the shift amount increases, and as you rotate the knob counter-clockwise the shift amount decreases.

The Shift Amount display to the left of the knobs indicates the the shifting interval. This display includes the effect of the LFOs and MIDI messages, as well as the shift-control knobs. The parameter display in the lower right of the plug-in window displays the shifting interval as determined by the shift-control knobs, without the effect of the LFOs and MIDI messages.

2. Delay Controls

The **DELAY** knobs control the amount that the pitch-shifted signals are delayed in relation to the original (dry) signal. Each delay has a range of 0 to 1999 msec, (approximately one second). The exact delay times are displayed in the parameter display in the lower right corner of the plug-in's window.

If you turn on the ***SYNC*** switch Discord uses the current tempo reported by your host to calculate its delay time. When this switch is on, the time knob sets the delay length in metrical units, that is, fractions of a beat. The range of values is $1/32^{nd}$ to 1/1 (a whole measure), with dotted and triplet times available. Watch the status display at the bottom of Discord's window as you rotate the knob to choose a delay interval—or just do it by ear. Triplet values are denoted with a "T" after the beat fraction, and dotted values are denoted with a period. For example, "1/8 ." indicates a delay time with a dotted eighth note feel. Discord will track tempo changes, saving you from having to adjust its delay time by hand when you change the tempo of your song.

Short delay times can enhance a chorusing or doubling effect created with small amounts of pitch shifting. If you set the left and right delay times to slightly different values, Discord will produce a wide stereo chorus. Long delay times create familiar echo effects. In conjunction with pitch shifting and feedback, long delays produce echoes that ascend or descend in pitch.

The **FEEDBACK** knob controls feedback level, that is, the amount of the output signal which is fed back into the pitch shifter. Note that the feedback path goes through the delay lines and the filters before returning to the pitch shifter. Extreme "dive bomb" or "barber pole" effects can be obtained with longer feedback times when the pitch shift amount is set to a value other than zero. The plug-in will self-oscillate at higher feedback settings, creating interesting noise effects.

The **CROSS** knob controls a second feedback path. As you turn this knob clockwise, some of the signal is fed to the input of the other channel. For example, if you turn up the right-channel **CROSS** knob, the right channel output signal is fed back into the input of the left channel. This cross-channel feedback can be used to create delay effects that bounce back and forth, thicker chorusing, more complex pitch-shift effects, etc.

The **LOW** and **HIGH** filter knobs set the cut-off frequency of low-pass and high-pass filters which come after the delay lines in the signal chain. These filters can be adjusted to alter the timbre of the pitch-shifted and delayed signal. For instance, you can use the low-pass filter to create a "darker" sound, or the high-pass filter to create a "thinner" sound.

Both controls set the corner frequencies of the corresponding filter. Since the filters have complementary frequency responses, the knobs in some sense operate opposite from one another. A low-pass filter attenuates signals above its cutoff frequency, passing lower-frequency signals; whereas a high-pass filter attenuates signals below its cutoff frequency, passing higher-frequency signals. As you rotate the **LOW** filter control clockwise, the corner frequency of the low-pass filter increases, allowing more of the signal to pass. On the other hand, as you rotate the **HIGH** filter control clockwise, the corner frequency of the high-pass filter increases, allowing *less* of the signal to pass. If you set the frequency of the low-pass filter to less than the frequency of the high-pass filter, you'll hear little or no output signal. The low-pass filter has a frequency range of 20 to 20,000Hz and the high-pass filter has a range of 10 to 18,000Hz.

The behavior of the filters is easier to hear than to describe in words. If you play with these knobs a little while running a signal with broad frequency content (like a bright synth pad or a drum loop with cymbals) through Discord, you'll hear their effect. It may be helpful to set the **MIX** knob fully clockwise so that you hear only the processed signal.

3. LFO Controls

Discord has low-frequency oscillators (LFOs) that can be used to change, or modulate, the amount of pitch shifting, the delay times, and the frequencies of the filters. The **RATE** knob determines how fast the output of the LFO varies over time. The LFO's rate can be set from one cycle every 100 seconds (or 0.01 cycles per second, abbreviated 0.01 Hz) to 14 cycles every second (14 Hz).

The ***SHAPE*** knob and ***WAVE*** buttons work together to control how the LFO's output varies over time. The ***WAVE*** buttons let you choose one of four waveforms, with sawtooth, rectangular, sinusoidal, and randomly determined shapes. The ***SHAPE*** knob changes the basic waveform in different ways, depending on which waveform is chosen with the ***WAVE*** buttons.

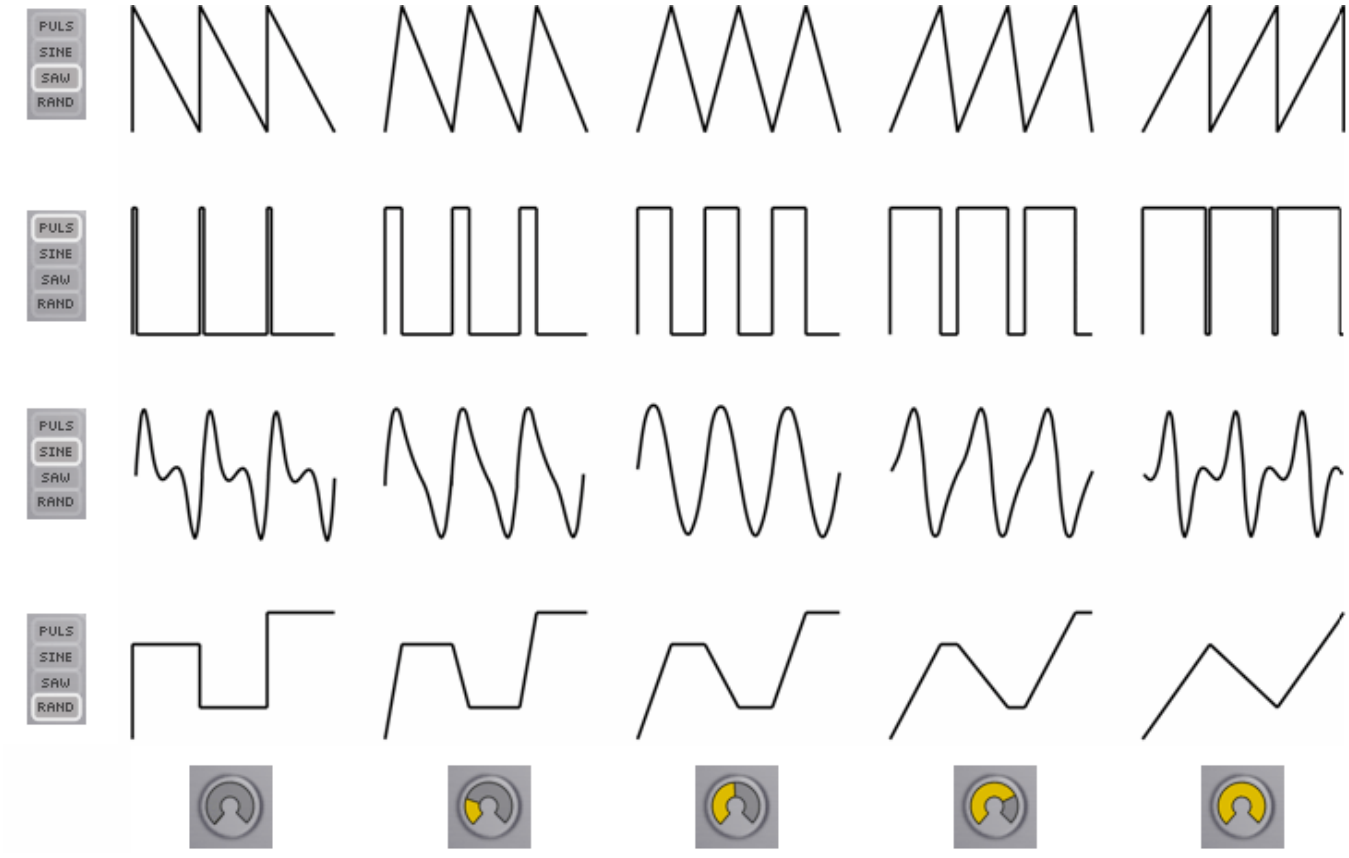
- If the sawtooth wave is selected, and the ***SHAPE*** knob is set to the middle of its range, the output of the LFO rises and falls evenly between its lowest and highest values, creating a symmetric triangular wave. If you rotate the ***SHAPE*** knob to the left, the LFO output rises more quickly and falls more slowly. If you rotate the ***SHAPE*** knob to the right, the LFO rises more slowly and falls more quickly.

- If the rectangle wave is selected, and the ***SHAPE*** knob is set to the middle of its range, the output of the LFO jumps between its lowest and highest values, staying for an equal period of time at both values. If you rotate the ***SHAPE*** knob to the left, the output stays at its highest value for a shorter period of time. If you rotate the ***SHAPE*** knob to the right, the output stays at lowest value for a shorter period of time. In engineering terms, the ***SHAPE*** knob varies the duty cycle of the rectangular wave.

- If the sine wave is selected, and the ***SHAPE*** knob is set to the middle of its range, the output of the LFO varies smoothly between its lowest and highest values. The difference between a sine wave and a triangle wave is that the triangle wave abruptly changes direction when it reaches its highest and lowest values; whereas the sine wave gradually slows down, stops, and speeds up again when it changes directions. Turning the ***SHAPE*** knob warps and skews the sine wave without creating any sharp corners in its shape. Its effect is far easier to hear than to describe.

- If the random wave is selected, and the ***SHAPE*** knob is turned all the way to the left, the output of the LFO jumps to a random value, changing at a rate determined by the rate knob. As you rotate the ***SHAPE*** knob to the right, the output moves more slowly from one random value to the next.

The diagram on the next page illustrates the different modulation signals generated by different settings of the shape and wave controls.



4. Routing

The knobs in this section control the amount that the LFO affects the pitch shifter, delay line and/or filters. Each knob determines how much the LFO changes the corresponding parameter, and in which direction. If the knob is set to its middle "12 o'clock" position, the LFO has no effect on the associated parameter. If you rotate the knob clockwise, the LFO will increase the parameter's value from its current value. For example, if you rotate the routing ***SHIFT*** knob clockwise, the LFO will increase the amount of pitch shift. If rotate the knob counter-clockwise from the middle position, it will decrease the value of the associated parameter. Note that

you may not hear any change if the parameter is already set to one end or the other of its range. For example, if the high-pass filter's knob is rotated fully counter-clockwise, and you rotate the routing HPF knob counter-clockwise from its center position, you won't hear any difference in the output signal, since the high-pass filter's frequency can't be made any lower.

If you use the LFO (or automation, or a MIDI controller) to modulate the delay time, you will hear a change in pitch also. This is separate from the pitch change created by the pitch shifter, and an inherent side-effect of dynamically changing the time of a delay. (Delay effects of lesser quality than Discord make nasty clicking sounds rather than altering the pitch of the delayed signal, which is why you may not have noticed that changing delay times affect pitch.)

5. Master Knobs

The **MIX** knob varies the relative amounts of the original (dry) signal and the processed (wet) signal in the plug-in's output. The **MIX** knob is bidirectional. At its center position equal amounts of the wet and dry signal are sent to the plug-in's output. As you rotate the knob clockwise from the center position, the amount of wet signal is increased and the amount of dry signal is decreased. Rotating the knob counter-clockwise from the center has the opposite effect. If you rotate the knob fully clockwise or counter-clockwise, the plug-in's output will have only the wet or dry signal, respectively.

The **OUTPUT** knob controls the overall output level (volume) of the plug-in. As you rotate the knob clockwise, the output becomes louder. The knob has a range of -80dB, which turns the signal off for all practical purposes, to +3dB, to provide a small amount of boost for weak signals. In most cases you'll probably just leave this knob at its default setting of 0dB, or unity gain.

6. Master Switches

The **LINK L & R** switch, when turned on, links the operation of each control to its counterpart on the other channel. When you manipulate a control on the left channel the corresponding control on the right channel will move also, and vice-versa. Turn this switch on if you are setting parameters to the same value on both channels. Note that turning this switch on does not immediately change any of the plug-in's parameters, nor does it cause the channels to process audio any differently. You won't lose any of the plug-in's current settings when you turn this switch on or off. In other words, it's not the same as the channel-link control found on some stereo compressors. It merely provides a convenient way to set the parameters of both channels to the same values when you manipulate their controls.

The **SMOOTH SHIFT** switch slightly alters the pitch-shifting algorithm used by Discord. When **SMOOTH SHIFT** is turned on, Discord's pitch shifters have a slightly smoother overall sound, at the expense of some loss of

crisp response to transient signals like drums. If you're a long-time user of Discord, the characteristics of version 1.0 of Discord are reproduced when this switch is turned on, and those of version 1.5 are reproduced when the switch is turned off.

The ***MIDI TO PITCH*** switch engages or disengages MIDI control of the shift amount. If the ***MIDI TO PITCH*** switch is turned on, the ***SHIFT*** and ***FINE*** knobs are disengaged and incoming MIDI note and pitch-bend messages set the shift interval. Pressing a note on your MIDI controller and/or manipulating the pitch bend wheel will set the pitch shifting effect accordingly, enabling you to play the pitch shifter as if it were an instrument. Middle C (MIDI note 60) sets the pitch shifter at zero, or no shifting. The range is one octave below middle C to one octave above middle C. The left and right pitch shifters are set to the same interval. Note: Different hosts have different ways of allowing MIDI information to be routed to effects plug-ins. In some hosts, it is not possible to send MIDI information to effects plug-ins. Consult the documentation for your host if you are unsure about its MIDI routing capabilities.

MIDI Controllers

The VST version of Discord 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 Discord's parameters.

The VST version of Discord has a simple "MIDI Learn" mode for assigning its knobs to MIDI controllers. To assign a knob to a MIDI controller:

1. 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 knob. 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.

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

3. The white square will disappear. Now the Discord's knob will move when you manipulate the MIDI controller.

Discord 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 Discord recognizes the controller and assigns it to the desired knob.

- 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 Discord'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.

Discord's MIDI controller assignments are stored with the plug-in's preset data. If you use MIDI controllers frequently, you may find it helpful to store a template preset that contains the controller assignments that you usually use. Use this template preset as a starting point when making new presets so that you do not have to reassign the MIDI controllers every time.

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 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.

And Finally...

Thanks again for purchasing Discord. 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.