

# ECHOBODE

*Frequency*

*Shifter*

*Delay*



SONICCHARGE

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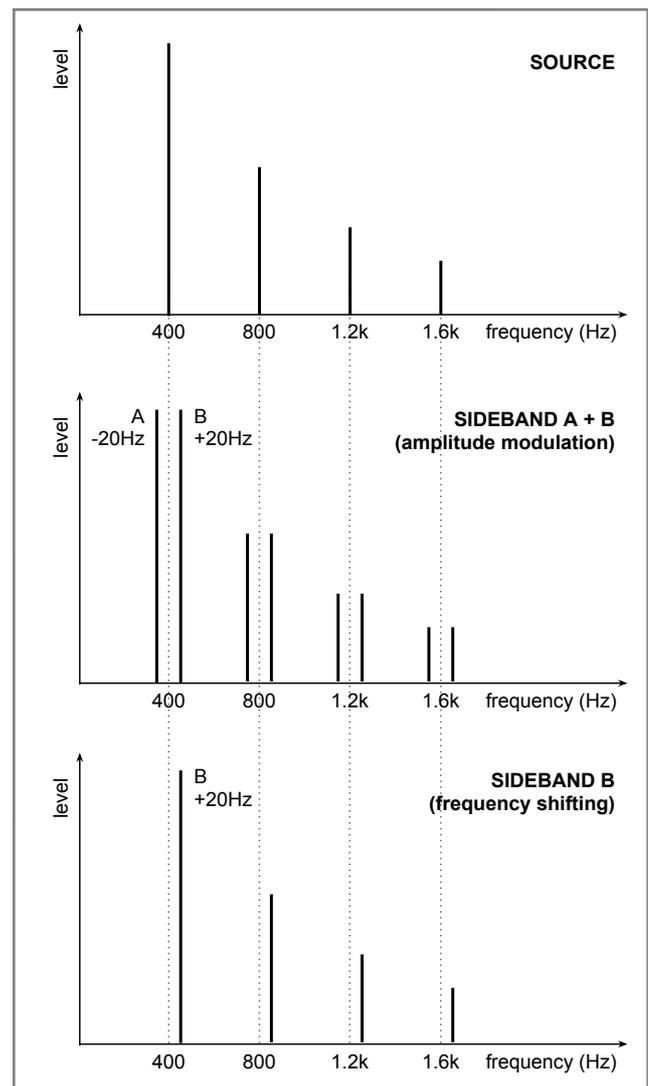
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## INTRODUCTION

**Echobode** is a delay effect with a frequency shifter placed inside the feedback loop. The frequency shifter algorithm is inspired by the classic Bode Frequency Shifter (*named after its inventor Harald Bode*). The difference between a frequency shifter and a pitch shifter is that it shifts the audio spectrum linearly. E.g., an overtone series of 100, 200, and 300 Hz can be shifted by 50 Hz to 150, 250, and 350 Hz, making the overtones inharmonic. This effect is great for creating metallic bell timbres, but putting it inside a delayed feedback loop opens up many other possibilities.

When a frequency shifter processes audio, two “sidebands” are generated, one shifted upwards and one downwards. The challenge in creating a good frequency shifter lies in suppressing one of these sidebands (*otherwise, the effect sounds like a regular amplitude modulator*). We are proud to say that **Echobode** features excellent suppression over the range of 40 Hz to 20 kHz. If you want less suppression, there is a “sideband mix” parameter that you can adjust, allowing you to create amplitude and ring modulation effects.

**Echobode** features a unique “anti-reflection” stage that removes “negative” frequencies (*frequencies that are shifted down beyond 0 Hz and would otherwise bounce back into the audible spectrum*). This stage also eliminates frequencies that are shifted up over half the sample rate (“Nyquist”).



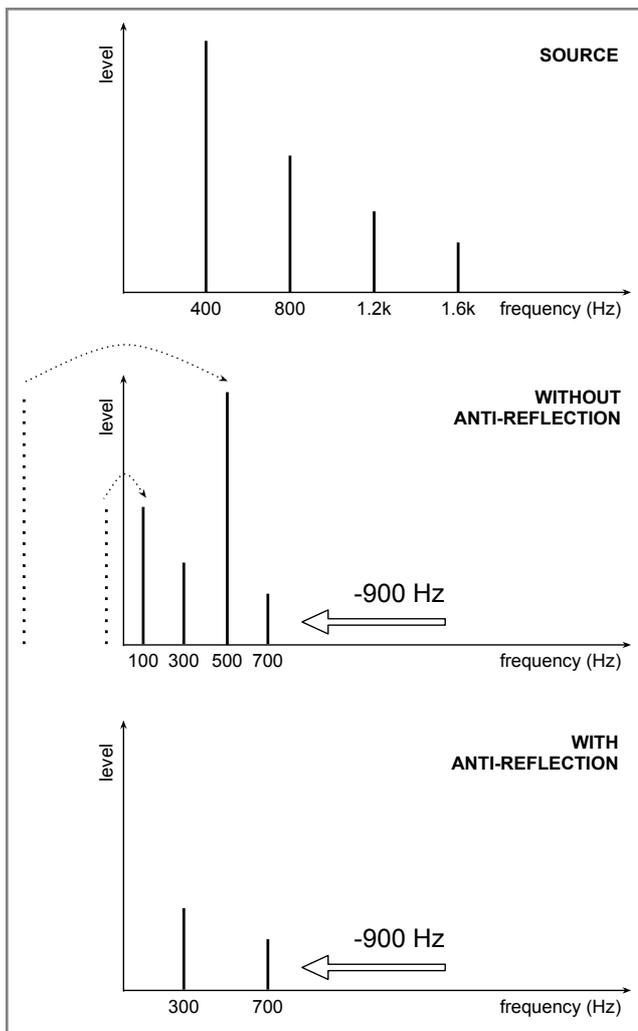
Mixing a slightly shifted signal with the source signal creates phaser-like “beatings”, and applying feedback (*with a very short delay time*) emphasizes this sound. The sideband suppression technology introduces additional “phase shifting” that adds further to this effect.

The delay time can be synchronized to tempo and modulated to create chorus-type effects. The delay uses an “all-pass interpolation” technique that is low on aliasing and will preserve all the high-frequency energy of your source signal.

Inside the delay feedback loop, you will also find a “smear” section that enables **Echobode** to produce reverb-like effects.

A built-in LFO can be routed to modulate the frequency shifting amount, the phase shift, the low-pass filter cutoff, or the delay time. The LFO can be tempo synchronized and put into a stereo mode to generate inverse modulation for the right audio channel. Even in synchronized mode, rate changes are smooth and will not cause sudden jumps.

**Echobode** has virtually no latency and has a consistent sound on all supported sample rates. It is CPU friendly and automatically “suspends” itself, taking 0% CPU when its inputs and outputs are silent.



# User Interface



## Main Menu

The “Main Menu” button (*far left*) contains functions to undo/redo the last operation, zoom the interface, load, save, copy and paste patches and create new random patches (*amongst other things*).

**TIP** You can shift-click the main menu button to repeat the last chosen menu. It is handy for quickly performing multiple undo/redo or repeatedly creating new random patches.

## Patch Selector / Browser

**Echobode** ships with a broad range of patches in various categories; use the Patch Selector to browse them. Patches are stored as files on your hard drive (*with the file extension “.echobode”*). The *Previous* and *Next* buttons, flanking the patch name, load files in the same directory as the currently loaded patch.

To open files in another directory, click the patch name and choose *Browse Patches...* from the popup menu.

**TIP** You can preview patches directly from the browser window without opening them. Select a “.echobode file”, and you will hear the effect immediately. Click OK to load the selected file into **Echobode** or Cancel to return to your former patch.

## RANGE

Defines the behavior of the **FREQUENCY SHIFTER** knob (*aka The Big Knob*).

**FINE** Frequency shifting amount range from -200 Hz to 200 Hz.

**WIDE** Frequency shifting amount range from -20 kHz to 20 kHz.

**SYNC** Frequency shifting amount is synchronized to the host tempo. This mode is useful when creating AM or phaser effects with short feedback delays. The **FREQUENCY SHIFTER** knob lets you choose the synchronized rate with which a full cycle completes. (*Use the **SIDEBAND** knob to control the direction of the sweeping effect.*)

**MIDI** In this mode, **Echobode** will listen to MIDI input (see [MIDI Routing in Popular Hosts](#)) and change the shifting amount according to the MIDI notes it receives. Use the **FREQUENCY SHIFTER** knob to transpose the shifting.

## FREQUENCY SHIFTER

The big center knob around which everything revolves: the amount of frequency shifting. Notice that turning the knob clockwise shifts frequencies up if **SIDEBAND** is turned towards **UP** and down if it is turned towards **DOWN**, and vice-versa when you turn the knob counter-clockwise. Even with zero frequency shifting, the “phases” of the input signal frequencies will be distorted (*as you will notice if you mix **Echobode** with the source signal*).

## ANTI REFL(ection)

Harmonics shifted downwards below 0 Hz or upwards above half the sample rate will bounce back into the audible spectrum. The **ANTI REFLECTION** stage uses proprietary technology by **Sonic Charge** to eliminate these harmonics with the same excellent quality as the sideband suppression.

**NOTE ANTI REFLECTION** introduces additional phase shifting inside the delay, and turning the switch off and on will affect the timbre of phasing effects.

## PHASE

When the frequency shifter is at 0 Hz or synchronized to the beat, this knob is useful for adjusting the phase distortion precisely. You can use it to tune the spectral “notches” and “peaks” produced when using **MIX** or **FEEDBACK**.

## SIDEBAND

Lets you blend the two frequency-shifted sidebands. At extreme settings, you will have the cleanest frequency shifting. In between, you will obtain a more or less attenuated tremolo/amplitude modulation effect.

## DELAY

Lets you adjust the delay time between 0.02 ms and 1 second when delay **SYNC** is off or 1/128 to 1/2 measures when delay **SYNC** is on. Changes to the delay time are smooth, like on analog delays. The delay is implemented with a proprietary “all-pass interpolation” filter that preserves the source signal’s high-frequency energy. Modulate the delay with the **LFO** to create flangers, choruses, or outer space madness.

**TIP** If you shift-click this knob while **SYNC** is enabled, it will be turned off, and the **DELAY** knob will be positioned so that the synchronized delay time is preserved. You can then fine-tune the delay time precisely.

## **SYNC** (delay)

Turn this on to make the delay time follow the song tempo.

## FEEDBACK

Apply **FEEDBACK** to send some of **Echobode**’s output back to its input. With very short delays (*up to a few ms*) and little or no frequency shifting, you will achieve a distinct phasing effect. If you turn up the delay time, the effect turns into a comb filter (*flanger*), and eventually, you will start hearing distinct echoes.

## CROSS

This switch swaps the left and right input channels (*before the output and feedback*). Depending on the **Echobode** settings and audio source, this can have a dramatic effect. E.g., an echo effect on a source that is hard-panned to the left will result in the echoes bouncing back and forth between the speakers.

## HIGH-PASS

This controls the cutoff frequency of the high-pass filter applied between the smearing and the frequency shifting. Setting ranges from 20 Hz to 2000 kHz.

## LOW-PASS

This controls the cutoff frequency of the low-pass filter applied between the smearing and the frequency shifting. It goes from 100 Hz to 40 kHz (*yes, that is not a typo*).

## SMEAR

Turn up this knob to create reverb-style effects by smearing the phases of the signal spectrum through a section of all-pass delays. Notice that the smearing section is located inside the feedback path and that it introduces additional delay time. This time is compensated for when **DELAY SYNC** is enabled.

## MIX

Mixes the wet and dry signal to your liking. Because of the phase distortion of **Echobode**, even a frequency shifting of 0 Hz will affect the sound, although it is exceptionally subtle if you do not mix it with the dry signal. If you mix it, you will hear the typical spectral “notches” and “phases” that you associate with a phaser effect.

# LFO Section

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## SHAPE

The LFO offers four shapes: **SINE**, **SAW** (*down-sweeping*), **SQUARE** and **RANDOM**. The **RANDOM** mode is unique because it provides a continuous random signal when **SYNC** is off, and a stepped random signal when **SYNC** is on.

## RATE

The rate of the **LFO**: 0 to 100 Hz if **SYNC** is off and 8 measures to 1/64 if **SYNC** is on.

## SYNC

Turn this on to synchronize the **LFO** to the song’s position and tempo. The **LFO** will follow the song position when the sequencer is running so that things will sound the same every time. However, if you change the synchronized rate when playing, the **LFO** is still adjusted smoothly, and it will never jump abruptly.

## AMOUNT

Sets the amount of **LFO** modulation on the designated target. This is a bipolar knob with negative/inverted modulation on the left-hand side and positive modulation on the right-hand side. Straight up, the knob snaps to zero amount and effectively disables the LFO.

## STEREO

Enable **STEREO** to invert the modulation of the right audio channel (*meaning it will go down when the left channel goes up and vice versa*).

**NOTE** If you have enabled **CROSS** and lots of **FEEDBACK**, this stereo separation will be less prominent but still affect the stereo image.

## TARGET

The built-in **LFO** can affect **FREQUENCY** shifting amount, **PHASE** adjustment, **LOW-PASS** filter cutoff, or **DELAY** time. When modulating the delay time, “pre-integrated” LFO shapes will be used rather than the standard ones. This causes the LFO to determine the rate of change on the delay time rather than the absolute delay time. In effect, the LFO will modulate the pitch-shifting quality of the delay.

**DID YOU KNOW?** If you set **RATE** to 0 Hz and **SHAPE** to anything but **RANDOM**, the **LFO** will output a steady high level. By turning on **STEREO**, you can use the **LFO** to achieve different settings for the left and right audio channels of the designated **TARGET**. E.g., having different delay times for the left and right channels.

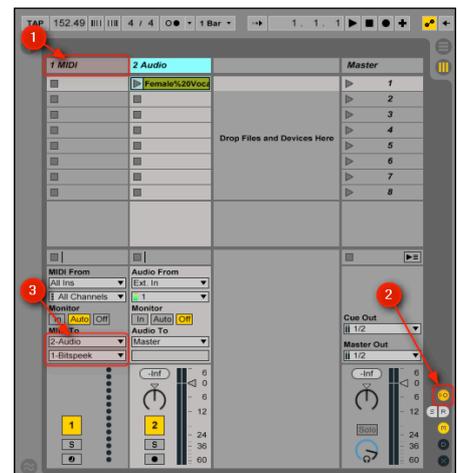
# MIDI Routing in Popular Hosts

Here are a few quick instructions on how to set up MIDI routing in some popular hosts. The procedure is the same for **Echobode** as for **Bitspeek**, used in the screenshot examples.

## Ableton Live

(Add Echobode to the effect chain on an audio or instrument track.)

1. Create a MIDI track.
2. Bring up the I-O parameters if they are hidden.
3. Assign “MIDI To” to the audio track that contains **Echobode** and make sure “MIDI To” is assigned to the **Echobode** effect and nothing else.



## Apple Logic Pro X

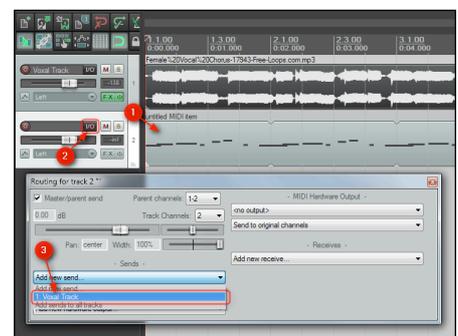
1. Create a new instrument track.
2. Click the “Plug-In” button and select **Echobode** under MIDI-controlled Effects.
3. Select your audio track from the Side Chain menu in the top right corner of the plug-in window.
4. You can mute the audio track output since it is now already passing through the instrument track.



## Cockos Reaper

(Add Echobode to the effect chain on an audio or instrument track.)

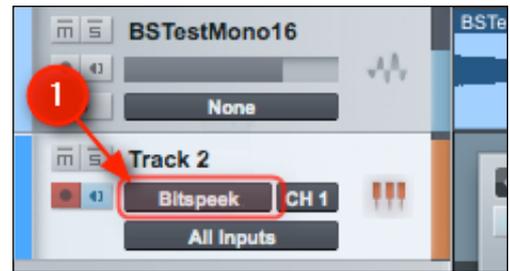
1. Insert a new track and then add a “New MIDI item”.
2. Click the “I/O” button for the MIDI track.
3. In the Routing window, choose “Add new send...” and select the track with the **Echobode** effect you wish to control.



## Steinberg Cubase

(Add Echobode to the effect chain on an audio or instrument track.)

1. Create a new MIDI track.
2. Select **Echobode** as the MIDI destination for the new track.



## PreSonus Studio One

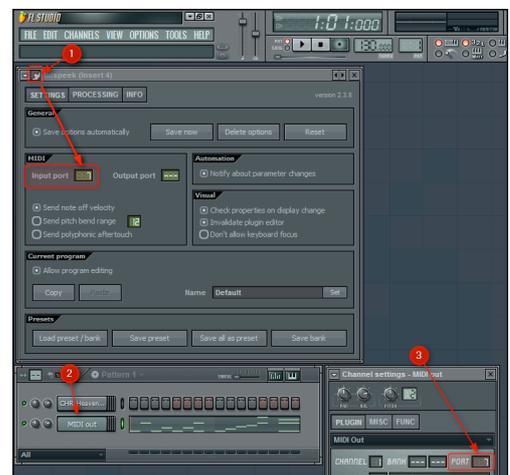
(Add Echobode to the effect chain on an audio or instrument track.)

1. Add an Instrument track and select **Echobode** as the destination for the new track.

## Image-Line FL Studio

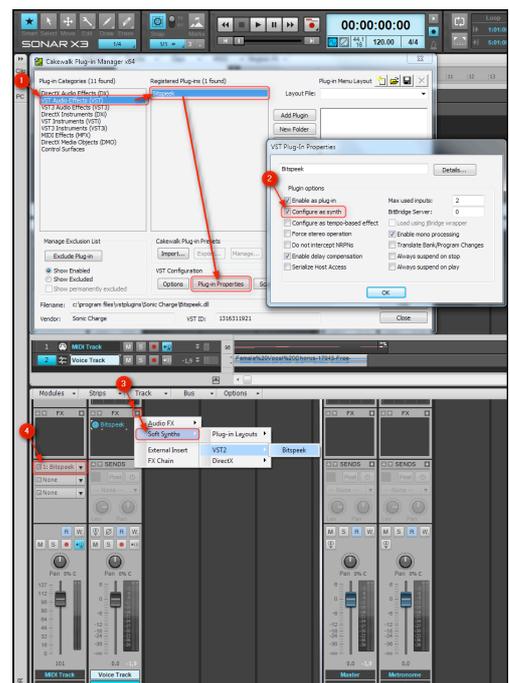
(Add Echobode to the effect chain on an audio or instrument track.)

1. Select a free input port under the MIDI section in the plug-in settings.
2. Add a "MIDI Out" channel.
3. Select the same port number in the channel setting as you did for **Echobode**.

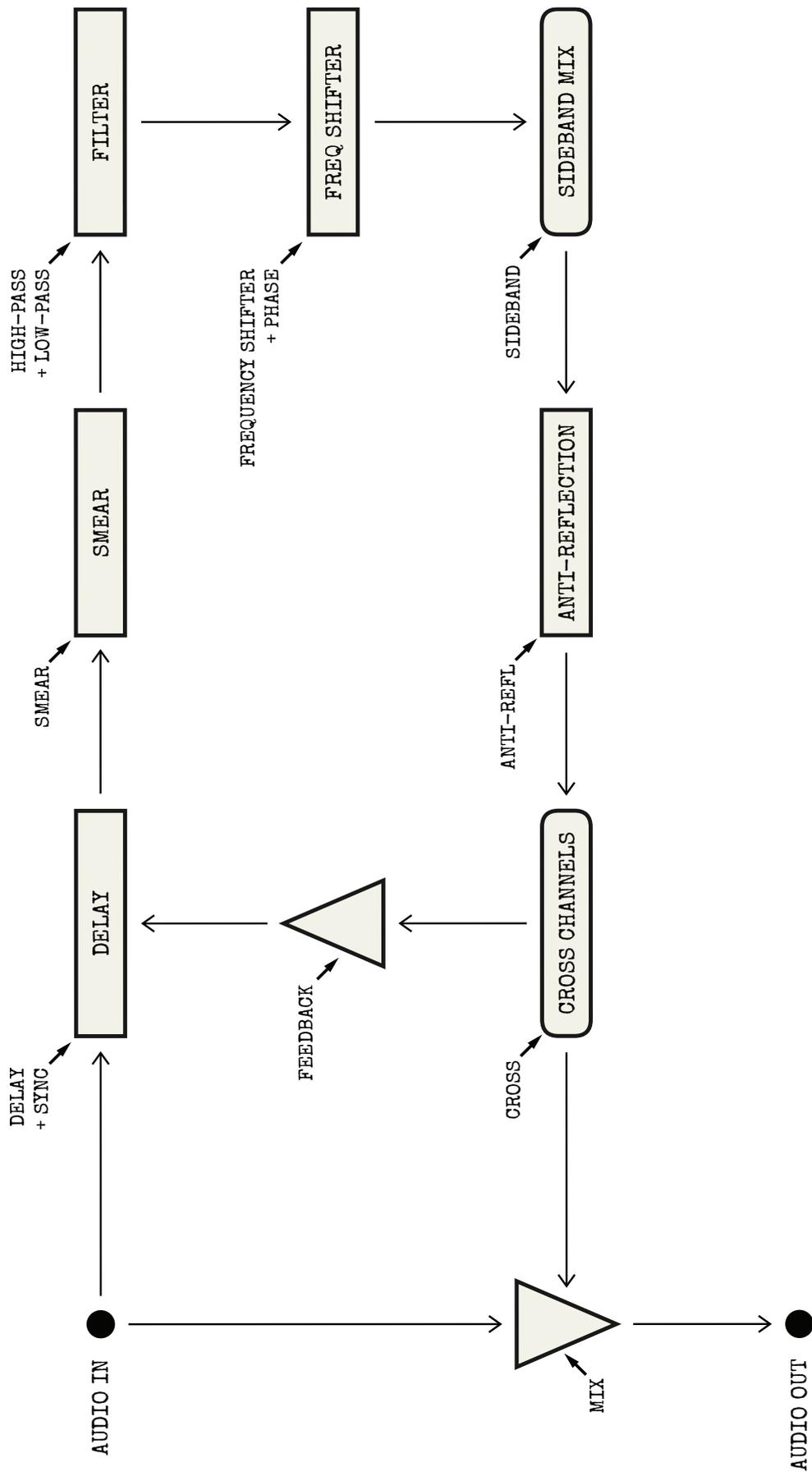


## Cakewalk

1. Enter the Cakewalk Plug-in Manager, select **Echobode**, and click "Plug-in Properties".
2. Turn on "Configure as synth" and click OK. **Echobode** should now show up under VST® Instruments.
3. Insert **Echobode** in the FX chain as a "Soft Synth" instead of an "Audio FX".
4. Insert a MIDI track and select **Echobode** as output for the new track.



# Signal Flow Chart



# Requirements

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The minimum requirements for installing and running **Echobode** are:

- Microsoft Windows 7  
A host that supports 64-bit VST 2.4, or VST3 plug-ins
- macOS High Sierra (10.13)  
A host that supports 64-bit VST 2.4, VST3, or AudioUnit 2 plug-ins

# Change History

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## **Version 1.2** (2022-11-07)

- VST3 support.
- Increased resolution of graphic resources.
- Support for MIDI controller mapping.
- Supports program switching with MIDI Program Change messages or MIDI notes.
- *(Windows)* Deprecated 32-bit support.
- Bug and compatibility fixes.

## **Version 1.1.2** (2022-02-16)

- *(Mac)* Native support for Apple Silicon.
- Bug fixes, “under the hood” maintenance, and improvements.

## **Version 1.1.1** (2020-08-24)

- Added support for time-limited licensing.
- Made a workaround to handle a rare Windows problem with generating a unique machine-id.
- Fixed a bug where, under some extremely rare circumstances, the big knob would not draw correctly, and an error message was generated.

## **Version 1.1** (2020-03-04)

- Scalable GUI and retina support.
- New algorithm for the “system unique identifier” used for authorization. Hopefully fixing the problem where the plug-in became unregistered spontaneously.
- Fixed a bug that could leave temporary files behind when saving and replacing files.
- *(Mac)* Solved a compatibility problem with DAWs that are built with recent Apple SDK’s, e.g., Cubase 10.5.
- *(Mac)* Notarized installer for Catalina.
- *(Mac)* New 64-bit compatible uninstaller.
- *(Mac)* “Go to folder” buttons in browser now work in Catalina.

- (Mac) 64-bit Audio Unit no longer depends on the “Component Manager”. This means you should not need to restart after installation.
- (Mac) Preferences and registration data is now shared with “sandboxed” DAWs like GarageBand (*meaning Authenticator works with these DAWs too*).
- (Mac) Fixed a problem where under certain conditions the preferences data could stay locked if the DAW crashed, requiring a full system restart.
- (Windows) No longer fails showing the file popup if there are more than 1000 files in the directory (*file popups are however limited to 500 entries*).
- Lots of other minor bug and compatibility fixes.

## Credits and Contacts

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**Echobode** v1.0 — v1.2 (2015-2022)

Created by:

**Magnus Lidström**

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**Fredrik Lidström**

Sound design:

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**GJ** Grymmjack (*Rick Christy*)  
**KD** Koshdukai (*Marco C.*)  
**NEJ** Nils-Erik Johansson  
**SC** Sonic Charge  
**SM** Stephan Muesch (*Rasmus7*)  
**ST** Solidtrax  
**TA** TONAL AXiS (*Richard Hider*)

**Sonic Charge** website:

<https://soniccharge.com>

Thanks to all our fabulous beta testers, and a special thanks to Andrew Simper for the brilliant parameter smoothing algorithm.

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SYMBIOSIS

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