JAX
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JAX [JUST AN EXTENSION] SERIES

JAX : Decimator [AUDIO UNIT]
for iOS/iPadOS and macOS

MANUAL

VERSION 1.0
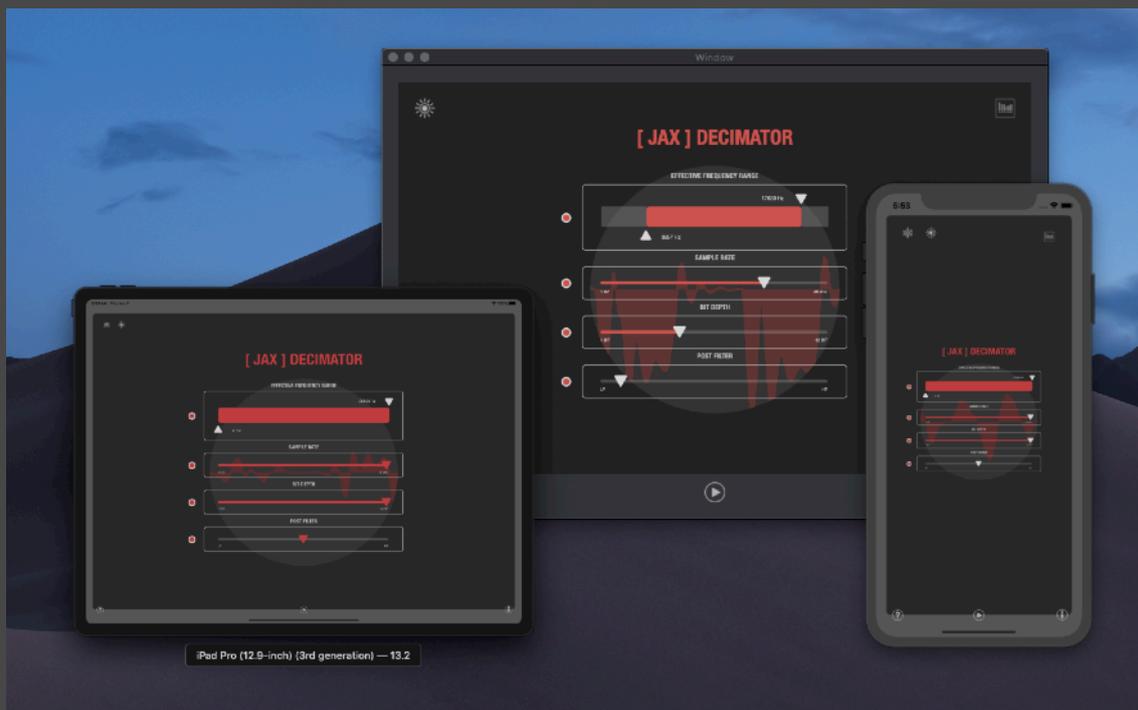
JAX Decimator continues with our [Just An Extension] series and delivers a special distortion Audio Unit (AUv3), which is expert in degrading digital audio material, controllable in realtime (also via MIDI controllers).

The Audio unit is truly "universal", because it runs on iPhones and iPads of all generations with the latest OS versions. It is also separately available on the macOS (as an AUv3). You can load it into Apples famous Audio Unit hosts like GarageBand, MainsStage and Logic Pro X on the Mac.

Currently macOS apps are strictly separate developments and so distributed separately. At the time of writing this, there is no mechanism of distributing packages that include units for both systems at ones. So the macOS and iOS versions must be downloaded and purchased separately from the different App Stores.

All the Audio Unit plugins in the JAX series are designed to be simplistic in usage but possibly complex in their internal audio processing algorithms. These plugins were initially exclusively developed for Apples touch screen devices and usage with favourite audio hosts. Audio Units are Apples preferred method of providing shared audio components for system wide usage. Unlike with old IAA (Inter-App-Audio), multiple instances can be loaded and process audio streams concurrently.

IAA on iOS is marked deprecated by Apple and we do no longer support this ancient technology.

The Host App

Audio Units are so-called App Extensions that require a distribution app as an envelope. Ones the app is installed, the plugins are registered by the system and can be used for loading into all supporting audio hosts.

Our apps are also minimal Audio Unit hosts, that can load and connect the embedded extensions directly to the audio system. There is also an inbuilt player, which plays randomly some sounds for testing the units out of the box without requiring an external host application.

The manuals, in-app-purchases and possibly other resources are available inside these distribution apps.

The Concept

Reducing resolution of audio surprisingly generates paradox sonic results due to the fact that a wide range of new overtones is produced this way. Low fidelity audio of that sort therefore is always a production secret of many professional

musicians and also mostly the only reason for the legendary characteristics of some ancient music production equipment.

With JAX Decimator you can artificially and controlled degrade your audio streams with mainly 2 fundamentally different reducing mechanisms.

The Rate Reducer

At first, there is a frequency rate reducer that can be adjusted step-less to something between the current (full) sampling rate of the audio process, usually 44,1 or 48 kHz and 4 Hz (which results in low frequency pulses). A value between reduces the sound quality gradually and adds typical characteristic noisy artefacts (audible as a kind of static ringing of certain frequency) to the sound. Sample rate reducing in realtime effectively works similar like a sample&hold effect, thus degrading the time continuity between following audio samples.

The Bit Reducer

Second, there is the bit depth reducer, that quantises the digital audio values (loudness value) of each sample to a certain number of virtual fractional bits between 16 and 1 bit. 16 bits have a large amount of possible different continuous values. The higher the bit depth, the higher the loudness resolution is. One bit finally is just either signal on or off and the lowest possible value range. So the rawest form of a bit reduction is just a screaming square wave of certain frequency, which means only 2 possible loudness values are remaining for the signal. The bit reducer is continuously adjustable, resulting in variable noisy distortion like effects, similar to raw white noise addition with certain frequency and loudness.

The step-less nature of the controllable parameters in JAX Decimator enable to create a countless number of possible combinations for dynamic sound degradation, noise effects, ringing and other interesting coloured sound effects, dependent on the characteristics of the input signal if applied (mainly) to selective audio tracks. It effectively can produce new strong overtones, initially not available in the source material and so effectively add fidelity and interesting sound effects to tracks if used creatively. The various filters add to this and can smoothen or emphasise certain sonic aspects.

The Pre Filter

The pre filter allows to select and emphasise a certain frequency range to be processed by the signal decimators. All the other frequency parts are suppressed. This way it is possible to degrade only a certain frequency spectrum of a sound and keep the rest untouched, if for instance a send effect bus is used. Send effect busses are commonly used to provide dry-wet results with any effect processor. Many host apps will provide this.

This Pre Filter can drastically improve the presence of the sound due to the fact that is effectively emphasises the selected frequency range. dull sounds can get more excited and missing bass can be adjusted with some simple tweaks.

The Post Filter

Additionally we did spend a special bidirectional cutoff filter unit for smoothing and refining the results of the digital decimation effects afterwards. This filter continuously fades between a slightly resonant low pass and high pass, whereby the middle adjustment will pass thru the degraded signal

without further changes. Always only the effective frequency range adjusted by the pre filter is affected by the post filter. All the filters are adopted from our JAF series.

As in all our JAF and JAX plugins, there are no special modulators or parameter sequencers implemented, as the focus clearly is on freely adjustable automation via MIDI or via exposed Audio Unit parameters. Controlled realtime automation of the parameters is essential for a living sound. Static modulations do often not fit the dynamic requirements of a sound very well.
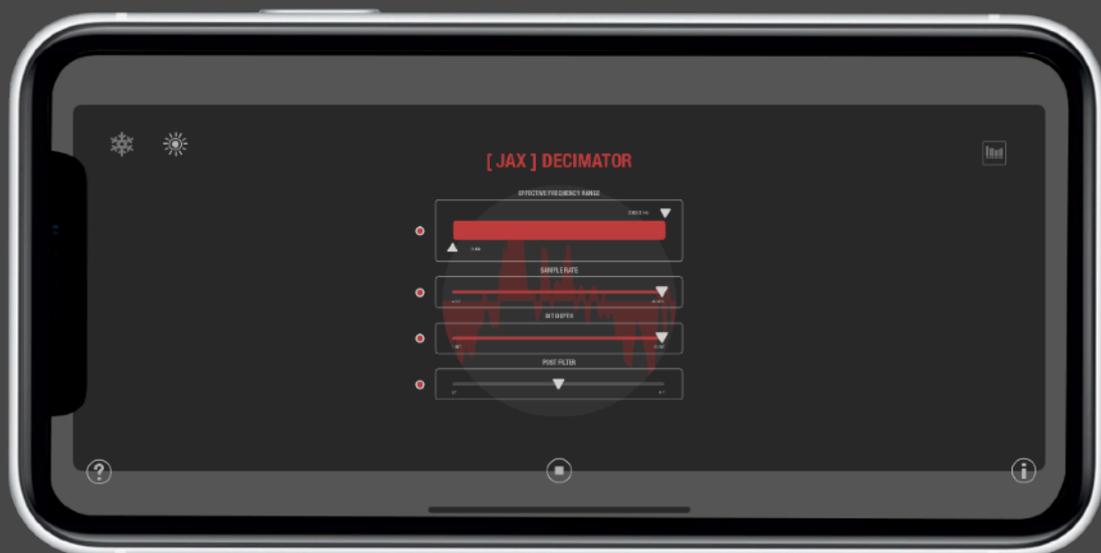
MIDI IMPLEMENTATION

The JAX series can be automated via external MIDI controllers. These possibilities are optional. The host must support this feature actively.

JAX Decimator has the following fixed controller assignment:

pre filter upper bound - CCO 003 (0 to 127, default 127)
pre filter lower bound - CCO 004 (0 to 127, default 0)

(*) please note, that it does not make any sense, if the low filter bound is adjusted higher than the high filter bound and vice versa. internally this always will be limited to a minimal possible range therefore.

rate reduce - CCO 072 (0 to 127, default 127)
bit reduce - CCO 073 (0 to 127, default 127)
post filter - CCO 074 (0 to 127, default 64)

additional (common controls - only available via common MIDI controllers)

volume - CCO 007 (0 to 127, default 127)
(reserved) expression - CCO 011 (0 to 127, default 127)
panorama - CCO 010 (0 to 127, default 64)
resonance (post filter) - CCO 071 (0 to 127, default 0)

NOTE:
There is currently a known issue when you use direct MIDI automation. The user interface will not reflect / update the parameter changes this way. The reason is, that direct MIDI automation occurs inside the core DSP kernel and there is no way to access the user interface from the kernel. Alternatively you can use MIDI to parameter assignment with your host application. But some parameters (volume, resonance, panpot) are available only with direct MIDI automation.