Produced by Impact Soundworks in collaboration with OverClocked ReMix
Version 1.0 (August 30th, 2017)

Introduction

We created the original Super Audio Cart library with the intent of reproducing and remixing some of the most legendary sounds from classic video game consoles and handheld systems. However, we only sampled a single personal computer – the Commodore 64 – despite that millions of people have been using computers to play games since the 1970s. With **Super Audio Cart PC**, we sought to capture the tones of those beautiful, blocky machines so many of us grew up with.

This virtual instrument includes over 1,000 authentic sounds from 8 classic computer sound chips; the glassy, metallic timbres of the AdLib sound card, the lo-fi goodness of the Amiga and early music tracker software, the thick pulse waves of the Atari ST's POKEY, and much more. All sounds have been painstakingly recorded **directly through the original hardware**, not with emulations or reproductions, to fully capture all the grit and character of each computer.

Our goal in this project, even more so than with Super Audio Cart, is just as much about preservation of classic sounds. Computer systems from decades past are notoriously unreliable, and it is nearly impossible to integrate them into a modern music production setup. With **Super Audio Cart PC**, all of their sounds can be accessed in VST, AU, and AAX form in an incredibly powerful 4-layer synth and modulation engine, just like with the original Super Audio Cart.

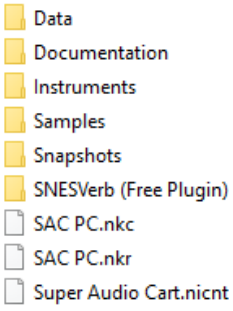
We hope you find these sounds as inspiring as we do, and that you will enjoy our collection of modern and reimagined snapshot presets which breathe all new life and character into these classics!

Installation: Super Audio Cart Owners

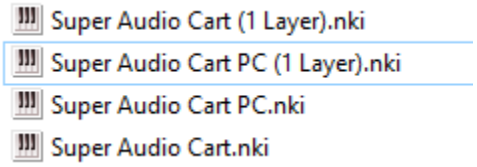
If you **already own the original Super Audio Cart**, installation is simplified as SACPC is loaded within your existing installation.

Once you have downloaded and unpacked the Super Audio Cart PC files, merge the contents of your Super Audio Cart PC folder into your existing Super Audio Cart folder. When prompted, **Overwrite** existing files.

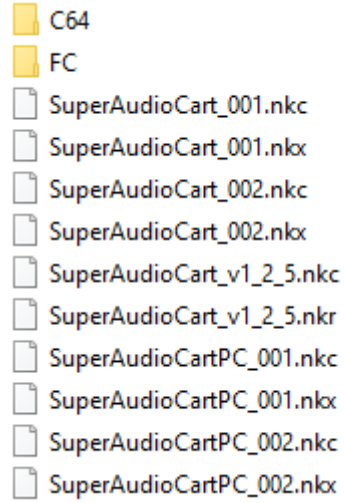
The resulting folder should look like this (example shown is Windows, but OSX would look the same)



Within Instruments, you should see the following.



And within Samples:



Installation: New Owners

Super Audio Cart PC requires a copy of Kontakt Player or the full version of Kontakt already installed on your computer. If you do not have Kontakt Player, you can download and install it from here:

http://www.native-instruments.com/en/products/komplete/samplers/kontakt-5-player/

STEP 1: Download both of the RAR files for Super Audio Cart PC from your order email, ISW account page, or using our downloader app. Check that the file sizes are correct:

Part 1 = 2 gigabytes
Part 2 = 1.4 gigabytes

STEP 2: Using an application like WinRAR (PC), 7-Zip (PC), UnRarX (Mac), or Keka (Mac), extract the Super Audio Cart PC.part1.rar file. This will create a folder called Super Audio Cart. **You do not need to extract part 2 - it unpacks automatically from part 1.**

STEP 3: Move the Super Audio Cart PC folder to the desired location on your computer. An internal hard drive is recommended; if you must use an external drive, we recommend USB3.0 or Thunderbolt to ensure speedy load times.

STEP 4: Open Kontakt, and make sure the Browse panel is open on the left side. Click the Libraries tab, and select "Add Library". Navigate to the extracted Super Audio Cart folder and select it.

STEP 5: You will be prompted to Activate the library in Native Instruments Service Center. Use the serial number provided via email.

STEP 6: You're ready to use the library!

Troubleshooting

PROBLEM: Kontakt says "No Library Found" when I try to add it.
Make sure you are selecting the Super Audio Cart PC folder that contains the file "Super Audio Cart.nicnt". This file is what Kontakt uses to connect the library. If you don't see that file at all, or if the library still will not activate, it's possible your download was not complete: double-check the size of your RAR files.

PROBLEM: I get a "Missing Samples" error when I load the library.
Your download did not complete. Make sure the RAR files are the correct sizes and redownload any that are smaller than they should be. Then, re-extract Part1.

PROBLEM: Error message saying my Kontakt version is too old.
You can update Kontakt in Service Center. Run the update to get on version 5.5.2 and you'll be fine.

PROBLEM: The library takes a long time to load.
If you are using antivirus software, including Windows Defender installed by default on all PCs, make sure to add exclusions for the file types: NKX, NKC, WAV, and NCW. Load times can also be improved by moving the library to an internal hard drive - ideally a solid state drive - or to an external drive connected via USB3 or Thunderbolt.

PROBLEM: Sometimes I play notes and they don't trigger.
There is a bug with Kontakt's "Daft LP" filter on some systems. Check the layers Advanced pages (A-D tabs) to see if any of them are using this filter. If so, try changing it to Ladder LP2 or Ladder LP4 as a good alternative.

PROBLEM: I get pops and crackles during playback.
This can happen for several reasons. One would be that you are trying to run too many things (plugins & effects) at too low of a latency for your audio interface & CPU to handle. Disabling unnecessary FX plugins or increasing your audio buffer in your DAW/interface can help with this. However, there is also a bug in Kontakt's convolution reverb effect that affects some systems. Try disabling any reverbs in the FX racks to see if that helps.

Systems

ADLIB
One of the first standards for the digital music scene, the Canadian sound card is powered by Yamaha's YM3812 sound chip, which used FM synthesis to produce multitimbral instruments and sound effects. After the game King's Quest IV broke the card out of obscurity with highly-praised music and sound effects, it gained popularity because of its versatility and ease of use, finding its way into most retail stores by 1990.

AEGIS
A software synth for Amiga, Aegis Sonix was a cutting edge digital replication of a hardware synth with various capabilities that were fairly new for the time. It sports one oscillator and one LFO, and gives the user the ability to draw custom oscillator and LFO waveforms. It also contained an adjustable ADSR envelope and low pass filter, the ability to add 2nd and 3rd order harmonics to your waveforms, and gritty phase distortion.

AMIGA
The spiritual successor to the Commodore 64, the Amiga 500 was released in 1987. Although it was popular with hobbyists due to a low price tag, it was most commonly used for gaming, with high-end graphics and audio capabilities for its time. It was eventually discontinued in 1992 and was replaced by the Amiga 600 and 1200, but neither product gained as much popularity as the 500, as the market shifted away from typical home computer models.

This computer uses the Original Chip Set (OCS) that was found in many late- 80's Amiga models. It used 4 hardware- mixed PCM channels of 8-bit PCM audio, up to a sample rate of 28 kHz. It also shipped with a software controllable low-pass filter.

C64
One of the most widely-used home computers of the 1980s, and in fact the most popular single computer model ever released. The C64 was ubiquitous particularly in Europe, with a huge range of games and other software available. Its audio was driven by the famous MOS 6581 SID chip, capable of a wide range of tones. It featured three independent oscillators, four waveforms, volume envelopes, ring modulation, oscillator sync, and a multi-mode filter. Many of these capabilities were not to be found even in dedicated synthesizers of similar price.

MSX
The starting point for many successful Eastern video game franchises, such as Metal Gear and Bomberman, the MSX was very popular in Japan as well as Europe, but never achieved much popularity in America. Microsoft created it with the vision that it would set a standard for how computer hardware was made, but never reached that vision due to the systems' lack of western popularity.

The sound chip in the MSX is the AY-3-8910, a 3- voice PSG (Programmable Sound Generator) developed in 1978 by General Instrument that produced square wave tones. It is commonly used in various arcade games, gaming consoles, and a plethora of home computers, including the MSX. The PSG generates base frequencies of up to 125 kHz, granting high resolution and pitch accuracy not seen on many sound chips of the era.

The MSX could include additional sound chips via expansion cartridges, such as the MSX-Audio (Y8950) and MSX-Music (YM2413) chips, offering additional FM synthesis timbres. These were also sampled for this project.

POKEY
The Atari ST line of home computers, released in 1985, was Atari's last line of home computers, focusing on gaming consoles after its discontinuation in 1993. Due to its built- in MIDI ports, it was a widely renowned system by many electronic musicians for use as a controller or running sequencer software. The digital audio workstations Cubase and Logic Pro were both originally made for the ST.

Found in many Atari computers and arcade games from the 80's, the Pokey sound chip in the Atari ST we sampled has a thick sound, characterized by a detuning of individual sound channels in the system as well as having multiple forms of distortion available for processing.

SCC
A custom collaboration between Konami and Yamaha, the Sound Creative Chip is a wavetable sound chip with 128 bytes of wave samples. It was used to expand the capabilities of the MSX, which only generated square waves, as the wave samples in the SCC could be used to build waveforms much more complex than anything the PSG could accomplish.

TRACKER
Once one of the most popular forms of PC- based sequencers, music trackers such as Famitracker and Deflemask are some of the most popular tools utilized by chiptune musicians.

The term “Tracker” was coined by the first tracker program, Ultimate Soundtracker. They feature number based interfaces that allow the user to program audio playback by entering codes into specific parts of a grid of timeslots.

We sampled an Amiga tracker from the late 80's, which was the first platform for which trackers were developed. Step sequenced audio sampling software only otherwise existed on the Fairlight CMI workstations at this time. These early trackers featured four pitch and volume modulated channels of 8- bit PCM samples, and used the 8-bit Sampled Voice (8SVX) format.

WINGROOVE
Developed by Hiroki Nakayama in 1995, WinGROOVE was a PC application that enabled higher-quality playback of MIDI files. It came with its own sound set of WAV samples rather than using synthesis – unlike sound sources such as SoundBlaster/AdLib cards. Though the software has not been distributed officially for a long time – and indeed, it is not supported by modern versions of windows – we worked with the creator to retrieve the source files and loop data to provide THE authentic sound set in Super Audio Cart PC!

User Interface (Main Page)

TIP: Clicking the Super Audio Cart PC logo will display the current version number. This is useful to make sure your version is up-to-date when future patches are released!

Layer Strip Controls

VOLUME: Controls the output level for this layer. This adjustment is applied **after** any Layer FX, but **before** the global FX.

SYSTEM: Shows the system the sound source was recorded from. Clicking this, or the sound source name, will open up the sound browser.

MUTE/SOLO: Mute disables the layer from being output without unloading it from RAM, while Solo excludes other layers from processing.

SOUND SOURCE: Shows the current sound source loaded into memory. This can be clicked to open the sound browser.

SOUND SOURCE UP/DOWN: These arrows cycle through available sound sources belonging to the selected system.

PAN: Controls panning for this layer.

PITCH: Controls coarse tuning for this layer. Each step of the knob is 1 semitone (half note). Note that this does not transpose MIDI input, but actually re-tunes the waveform entirely.

CUTOFF: Controls the filter cutoff for this layer. Will not do anything if the filter is not enabled.

ARP TOGGLE: Turns the arpeggiator/sequencer on or off.

RAW: Toggles RAW mode for this layer. In RAW mode, all FX are bypassed, and the playback range of the sound source is limited to the range of the recordings. The volume and pitch envelopes, along with the filter, will also be bypassed. This is the best way to get a truly, 100% authentic and unprocessed sound out of each source.

FX TOGGLE: Bypasses all FX for the layer.

OUTPUT: Selects the Kontakt audio output for the layer. This is useful if you want to route each layer to different stereo channels in your host mixer.

LAYER POWER: Toggles the entire layer on or off. When a layer is powered off, it is unloaded from memory (unless another layer is using the same samples!)

Global Controls

Control Link: When control link is enabled, making changes to a single layer (anything except FX) will affect other linked layers. For example, selecting layers A+B and enabling control link, then moving the cutoff on Layer A, will set Layer B's cutoff to the same value. However, if Layer C is not selected, then moving Layer C controls will not affect the other layers (and vice versa).

NOTE: Even with Control Link disabled, you can hold **alt** while dragging or clicking on any control to affect all layers simultaneously!

Global FX Toggle: When disabled, all global FX are bypassed (this does not affect layer FX).

Randomizers: Clicking any of the colored die will randomize parameters for either a single layer (with the dice colors corresponding with the layer strip colors), or all layers at once.

Undo Button: Resets the current patch to right before the last randomization.

Sound / FX / ARP: Toggles randomization of certain parameters.

> **Sound**: Sound source / console selection will be randomized, along with volume ADSR and sample offset.
>
> **FX**: All FX parameters will be randomized.
>
> **ARP**: The arpeggiator will be enabled and a random arp, seq, or gate preset will be loaded**.**

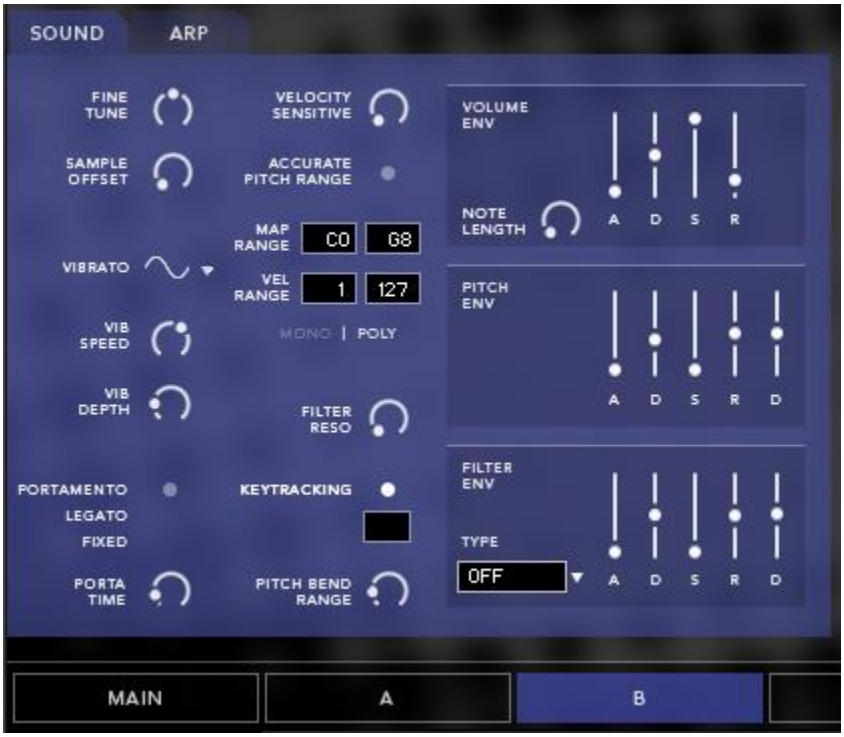
XY Pad: This flexible controller can be mapped in the Mod Matrix (see later in the manual for more details). All snapshots have at least one routing for the X axis and one for the Y axis. You can MIDI learn each axis by right clicking on the white triangles to the immediate left and bottom of the XY Pad.

Layer Blend: When enabled, the XY Pad will crossfade between all layers. This happens in addition to any Mod Matrix functionality.

User Interface (Advanced)

Clicking any of the tabs labeled A-D along the bottom of the Main UI script will load the Advanced editing controls, which are further split into two tabs: Sound and Arp.

Sound Tab



Fine Tune: Adjusts the layer's tuning +/- 200 cents (2 semitones).

Sample Offset: Sets the amount of sample playback offset; for example, with a value of 15ms, samples on this layer will be played back at a position of 15ms into the sample. This is very useful for 'cutting' transients out of a percussive sound, or making a slower sound more percussive. It can also be used to simulate free-running oscillators; see the "Tips & Techniques" section for more detail.

Velocity Sensitive: Controls the degree to which MIDI velocity affects layer volume. A value of 6dB for example means that there will be a 6dB difference between the volume level at velocity 1 vs. velocity 127. Note that this never **increases** the overall volume of the layer, it only scales the volume **down** at velocities lower than 127.

Accurate Pitch Range: When enabled, sound sources on this layer will play back at their naturally recorded range. Depending on the system and source, this can significantly reduce the playable range of the layer… but it IS more authentic this way!

Vibrato Waveform: Switches the waveform used for vibrato (pitch modulation).

Vibrato Speed: Sets the frequency of vibrato for this layer.

Vibrato Depth: Sets the maximum depth (intensity) of vibrato for this layer. Note that the **current** amount of vibrato can be mapped to anything in the Mod Matrix, with CC1 being a common choice for most snapshots. For example, if CC1 is mapped to vibrato amount, and CC1 is at 127, the total vibrato depth will be equal to this control. If CC1 is at 0, no vibrato will be heard.

Map Range: Sets the playable range of this layer. Limiting this range is useful for creating keyboard split patches, where different layers are mapped to different areas of the keyboard.

Vel Range: Sets the velocity range where this layer triggers. Notes played outside this velocity range will not trigger the layer. Using this feature, you can create 'multisampled' instruments with elements coming in at different velocities!

Mono | Poly Toggle: When monophonic mode is enabled, the layer will only play one voice at a time. If multiple keys are held, the most recently pressed note will be played and the previous note(s) will be quickly faded out.

Filter Reso: Controls the amount of resonance at the cutoff point of the filter, if a filter is enabled.

Portamento Toggle: Enables portamento (gliding) when two overlapping notes are played.

Legato: Softens the transition from note to note when Portamento is enabled.

Fixed: When enabled, the time it takes to glide from note to note is the same regardless of note distance. When disabled, greater distances will result in longer glide times.

Porta Time: Sets the speed modifier for portamento / glide.

Keytracking: When disabled, the pitch of the layer will not follow the MIDI note played. Instead, the fixed note (displayed underneath the Keytracking LED) will be played. This is particularly useful with drum kits, menus, and FX which have different samples for each key.

Pitch Bend Range: Sets the max amount of pitch bending processed when the pitch bend controller is used.

Volume Env: Controls the attack time, decay time, sustain level, and release time for the layer.

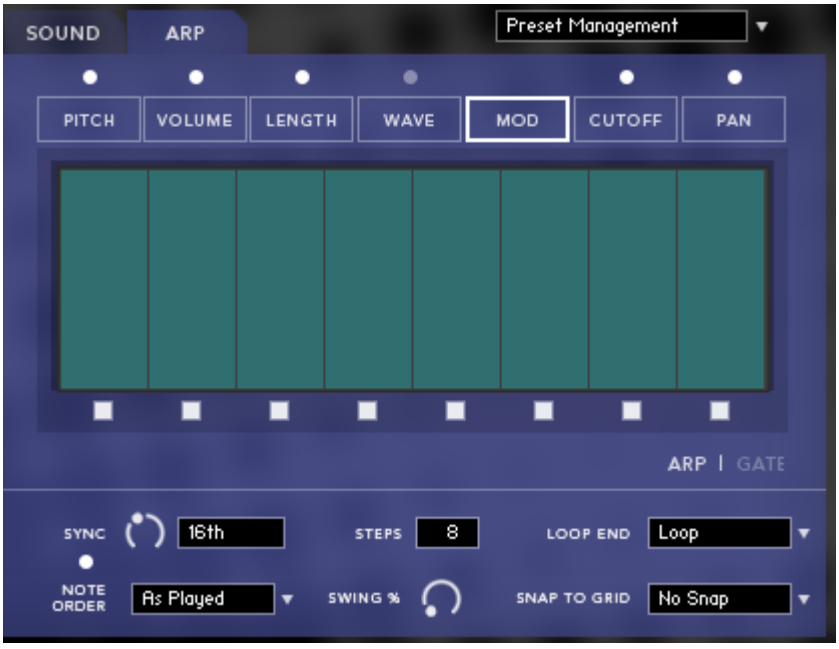
Note Length: For values above 0, this sets the total length, or hold time, of each note. Setting to "0" means the note will last as long as the key is held. This operates independently from the volume envelope. For example, with a note length of 100ms, the note will play for 100ms and cut out, regardless of what stage in the envelope the sound is in.

Pitch Env: When "D" (depth) is set above 0, the pitch envelope applies changes in pitch every time a note is pressed. The ADSR parameters control the shape of this pitch change.

Filter Env: When a filter is enabled and "D" (depth) is set above 0, this envelope controls modulation of the filter cutoff each time a note is pressed.

Filter Type (Menu): Selects the desired filter type for the layer. "LP" filters are Lowpass, removing high frequencies. "HP" are highpass, removing low frequencies. "BP" are bandpass, removing both high and low frequencies. "Notch" are inverted bandpass filters, removing a narrow range of frequencies. Each filter type offers a different sound - try them out to see which works best for you!

Arp Tab



Super Audio Cart PC features a very powerful poly-arpeggiator, sequencer and gate per layer. Almost all controls per layer are totally independent, with the exception of **Sync** and **Snap to Grid**. In version **1.2**, multiple new features were added to make this rhythm section even more powerful.

Pitch, Volume, Length, Wave, Cutoff, Pan LEDs: The lights above each arp table enable or disable the respective table - see below for what they do!

Pitch Table: When **enabled**, the arpeggiator becomes a sequencer. Each note pressed will create a sequence of pitches, which can be drawn in this table. When the pitch table is **disabled**, the arpeggiator will cycle through all currently held notes.

Volume Table: When **enabled**, the volume of each step of the arp is modified by the values in the table. When **disabled**, the volume of the arp steps is based on the velocity of the notes played.

Length Table: When **enabled**, the length of each step in the arp is modified by the table - the maximum value is 100% length (i.e. at 16th note sync, each note sustains for a 16th note). Length does not do anything in **Gate** mode.

Wave Table: When **enabled**, the waveform selected for the layer will cycle based on the values in the table. This only works if the layer console is NOT SNES or Genesis, and is set to either a noise waveform or tonal waveform. It does not work on percussion or menus. Also, the wave table does not do anything in **Gate** mode, or when the **Pitch** table is disabled.

Mod Table: This table is always enabled. Each step of the table sends a modulation value to the **modulation matrix**. Each layer has its own unique mod table, making a total of four unique modulators (Mod Table A, B, C, and D).

Cutoff Table: When **enabled**, the cutoff of the layer is changed for each step in the arp. This operates independently of other modulation that may be assigned to the layer's filter cutoff.

Pan Table: When **enabled**, the panning of the layer output is changed for each step in the arp.

Arp | Gate Toggle: In **Arp** mode, new notes are triggered for each step of the arpeggiator. In **Gate** mode, the tables modify notes currently being held. For example, if Gate mode is enabled and the **Volume** table is also enabled, each step of the table will change the volume of all currently held notes.

Hold Step Buttons: Each layer has its own set of hold buttons beneath each step of the arp. When a button is disabled, that step will not trigger; instead, the previous step will be held. For example, turning off every other step in a 16^{th} sync arp will effectively create an 8^{th} sync.

Sync Knob: Sets the length of each step in the arpeggiator. This is synced with the host BPM if the **Sync LED** directly below this knob is enabled. If the LED is disabled, the sync time is set to a millisecond value independent of host BPM.

Steps: Sets the number of steps across all tables for this layer. After the maximum number of steps is reached, the **Loop End** behavior will trigger. In “Loop” mode, the arp will loop back to

the first step. “Hold” will sustain the last step of the table, and “Stop” will simply stop the layer until a new note is pressed.

Swing %: Sets the amount of swing (offset of every other step) in the arp.

Snap to Grid: When enabled, the arp/seq will activate only when the host transport (playback position) reaches the selected subdivision. For example, if “Bar” is selected, the arp will not begin until the playback hits a new bar line, even if the note is pressed before then.

FX Rack

Super Audio Cart PC includes five custom FX racks: one for each layer, and one for the global insert bus, which all layers are routed to by default. Each of these racks is completely independent: you can enable an EQ on Layer A with different settings than Layer B, or enable a Delay on Layer C but not on the Global rack, and so forth.

Note: While the FX controls can be MIDI learned from the Kontakt interface, these MIDI connections affect only the currently selected rack (or last viewed rack, if the FX tab is closed).

It is recommended that you instead **use the mod matrix** to create custom MIDI CC links to specific FX on specific layers.

Preset Management: Allows you to initialize the current rack (clear all settings), save, and load custom FX rack presets.

FX Rack Lock: When enabled, the current FX rack settings will not change when changing snapshots.
EQ: A four-band, analog-modeled parametric EQ. All four bands have controls for gain (+/-20dB) and frequency range. The low-mid frequency band (LMF) and high-mid (HMF) also have controls for the width (or "Q") of each band. A lower Q value means the band is narrower and affects a smaller range of frequencies, while higher Q values can affect multiple octaves worth of frequency content.

COMPRESSOR: An analog-modeled, SSL-style compressor that can be used for both subtle and extreme processing. All controls are standard to compressors; the Mix knob can be used for phase-accurate blending of the dry (uncompressed) and wet (compressed) signals.

BITCRUSHER: A key effect that can reduce the bit depth and sampling rate of the audio output in real time. Great for adding even more grit and crunch to any sound. The Noise knob introduces *constant* line noise, while Noise Color filters this noise.

SCREAM: A distortion unit based on the 'Tube Screamer' guitar pedal. Tone filters the high frequencies out of the signal, while Drive boosts the distortion effect. Bass and Bright push more low or high frequencies, while Mix blends the dry & wet processing; do note that even at 0%, this effect does still have a mild impact on the sound.

DELAY: An all-purpose, tempo-synced delay unit. For Layers A-D, the MIX knob blends between the dry and wet (echoes) signals. However, on the Global FX bus, the MIX knob is additive - it does not affect the Dry signal. Damping, when turned up, dampens (lowpasses) the high frequencies from the echoes. Pan increases the amount of 'ping pong' L/R in the echoes.

On the Global FX bus, the Mod Matrix can be used to modulate the delay SEND amount, as opposed to the delay mix. For example, if you want an echo to ring out but turn off the delay for subsequent notes, the SEND should be modulated and not the MIX.

SNESVERB: Modeled after the echo of the S-DSP chip in the SNES, this is essentially a very short delay that is not tempo synced. It can be used to add width and space to a sound without using true reverb, and is particularly useful when emulating SNES soundtracks.

REVERB: A convolution reverb with a large collection of custom impulse responses (IR) created by Impact Soundworks. HPF and LPF filter the reverb signal, while Size changes the length of the IR. Note that this effect is somewhat CPU-intensive and, on some older computers, may not be suitable for real-time use. Also note that the HPF, LPF, and Size knobs are not processed in real-time and thus are not automatable. As with Delay, the Reverb SEND can be modulated using the Mod Matrix.

LIMITER: A simple brickwall limiter. Good for taming unruly patches and FX blends with minimal CPU usage.

Mod Matrix

Overview

The mod matrix allows for highly flexible routing of modulators, such as generated LFOs and MIDI CCs, to almost any control in Super Audio Cart PC. Mod matrix setups can be easily saved and loaded from the built-in Preset Management menu, or cleared with the **Initialize** function within that menu.

All modulation within the matrix uses the **base value** of controls throughout the interface. The **base value** can be changed anytime by moving the knob or slider to be modulated. This might seem obvious, but active modulation will visibly change the value of the control. The displayed value of the control when it is being modulated is **not** the base value, but the **modulated** value.

In short: even if a knob is currently being modulated (for example, by an LFO) you can always click on it and move it to the desired base value. After a brief pause, the visible modulation will continue.

Modulators

To create a modulation routing, first click the dropdown menu on the left side (set to [none] by default) and select a **modulator**.

Note that all modulators have a **Mod Depth** parameter which controls the intensity of the modulation. A depth of 0% means no modulation will occur. 100% depth means the modulation will span the entire range of the control: for example, if the destination control is Filter Cutoff and that control is set to 0 (minimum), a 100% modulation depth means the modulation will push up to maximum value.

Conversely, a negative modulation depth reacts inversely to the value of the modulator. For example, if the **Velocity** modulator normally increases the control at higher velocities, a negative modulation depth will **decrease** the control at higher velocities.

Modulator Types

LFO: An inaudible, low frequency oscillator that changes the destination control continuously according to the selected waveform. LFOs are **bipolar**. This means the modulation goes both above the base control value and below it.

LFOs have a number of unique parameters:

> **LFO Shape**: Switches the LFO waveform between sine, cosine, triangle, square, saw, and random shapes. Note that for the **Saw** waveform, the ramp moves **upward** when mod depth is **positive**, and **downward** when mod depth is **negative**.
>
> **LFO Freq:** Sets the frequency of the LFO. For example, a value of 1Hz means that the LFO waveform will complete its cycle every second (1 Hz = 1 second).
>
> **Tempo Sync**: When enabled, the LFO Freq knob changes to LFO Sync, which corresponds to the host tempo.
>
> **Trigger Free|Note**: In **Free** mode, the LFO is 'free running', meaning that each time a note is pressed the phase of the LFO will be different. In **Note** mode, the phase of the LFO resets each time a note is pressed, as long as there are no currently active voices.

LFO Unipolar: Functions much like bipolar LFOs, but the modulation only happens in one direction (positive if the modulation depth is above 0%, or negative if the depth is below 0%).

CC: Links the value of MIDI CC to the destination control. Creating a CC modulator will prompt you to select which MIDI CC will be assigned as the modulator.

Velocity: Changes the destination control based on the velocity of the last MIDI note pressed. For positive mod depth values, higher velocities will result in higher modulation values.

Key: Changes the destination control based on the note # of the last MIDI note pressed. For positive mod depth values, higher MIDI notes will result in higher modulation values.

Pitch Bend: Links the value of the pitch bend MIDI controller to the destination control. This is separate from the CC modulator, as the pitch bend controller is not technically a MIDI CC.

Mono AT: Changes the destination control based on the last aftertouch value pressed. Note that not all MIDI controllers support aftertouch, so this will not be useful unless your controller has support for it. Also, this control is strictly based on mono aftertouch - keyboards that send poly aftertouch will only be read as single aftertouch values.

Mod X/Y: Changes the destination control based on the positions of the X or Y axes in the X/Y pad on the Main page of the UI.

Random Uni/Bi: Generates a random value every time a note is pressed and uses this value to modulate the destination control. Unipolar will only generate positive values, while bipolar will generate both positive and negative values.

Constant: Sends a constant value to the destination control. This value is simply the position of the Mod Depth knob.

ADSR Env: Acts just like the previously described Volume, Filter, and Pitch ADSR envelopes, except it can be routed to any destination control. All 4 values (Attack, Decay, Sustain, and Release) can be defined. The **Trigger** LED, when enabled, will re-trigger the envelope each time a new note is pressed.

Keyswitch: Sets a keyswitch note to toggle the destination control. You can select both the **Keyswitch Note** and whether it should **Latch** or not. In **Latch** mode, pressing the keyswitch will toggle the control regardless of whether you continue holding the keyswitch note. When **Latch** mode is off, you must hold the note.

> NOTE: Keyswitches will only modulate certain 'binary' destinations (controls with ON/OFF or ENABLED/DISABLED as possible values).

CC Range: Toggles the destination control based on current MIDI CC values. You can specify the MIDI CC to use, and what value range that CC must be for the toggle. As with the Keyswitch modulator, this can only be used for certain binary destinations.

Vel Range: Toggles the destination control based on the most recently played velocity value. You can specify the velocity range. As with CC Range, this can only be used for certain binary destinations.

Key Range: Toggles the destination control based on the most recently played MIDI note. You can specify the key range. As with CC & Vel Range, this can only be used for certain binary destinations.

Mod Table A-D: Sends modulation values for each step of the arpeggiator in layers A-D (respectively). Note that the arp must be turned on for the given layer in order for this modulator to work!

Destinations

The mod matrix operates “one-to-many", meaning the same modulator (like CC1) can be used to modulate multiple destinations. However, it does not operate “many-to-one", meaning once a destination control is being modulated, that control cannot be modulated by any other modulators.

A, B, C, D, Global: Selects which layer the modulator will process. If global is selected, the same modulation will be sent to all 4 layers - or in the case of Global FX, to the global FX rack instead of the individual layer FX racks.

Destination Categories

Most controls are self-explanatory: notes are provided below for less intuitive destinations.

General

Tune [Fine]: Fine tuning (+/- 200 cents) of the layer(s).
Tune [Ext.]: Coarse tuning (+/- 36 semitones) of the layer(s). Doesn't affect Pitch knob.
Offset: Sample offset of the layer(s).
Vibrato Amount: Current vibrato amount (as % of max vibrato depth) of the layer(s).
Pitch [Coarse]: Coarse tuning (+/- 36 semitones) of layer(s), affecting the Pitch knob.

XY: This destination category appears only for the Global destination. This is a particularly powerful routing: you can assign X/Y as modulators themselves, and then modulate them with something else, like an LFO. However, you cannot modulate X/Y with themselves.

Filter: The Attack, Decay, Sustain, Release, and Depth controls refer to the filter envelope. If there is no filter active, these will not do anything.

Pitch: These destinations refer to the pitch envelope.

Delay & Reverb:

Send: Appears only for the Global destination and controls the **Send** amount of the delay or reverb effect, whereas **Mix** controls the output volume of the effect. The difference is relevant if, for example, you want to turn off delay for a few notes without muting previous echoes (this would be done with **Send**, not **Mix**).

Binary Destinations: Some destinations are only available when binary modulators (Keyswitch, CC Range, Vel Range, Key Range) are used. These destinations have only ON and OFF values.

For example, Vel Range is selected as modulator, and set to velocities 100-127. The destination is Arp Layer A, set to Enabled. With this setup, playing at 100-127 will **enable** the Arp on Layer A.

Tips & Techniques

“Free Running” Oscillators
Since the waveforms in Super Audio Cart PC are sampled, they will always play back from the same position each time. If you move the “Sample Offset” knob on the Advanced UI page, you can change this playback position - great for sound design purposes, as it can remove the attack / transient portion of a sound.

However, when trying to achieve a unison / ensemble sound with multiple layers it may be desirable to have random start points to simulate “free running” oscillators (random phase). To do this in Super Audio Cart PC, create **four Random Unipolar modulators** in the mod matrix. Assign each one to a separate layer - NOT global - ensuring the **mod depth is turned all the way up**. Then set the target for GENERAL > OFFSET.

Now, every time you hit a key, the sample offset for each layer will be changed independently!

Creating Drum Patterns
By turning off Keytracking for a layer with drum sounds, that layer will play back the same fixed pitch every time a note is pressed. **MIDI note 36 (C1)** is the starting point for our “Drumkit” patches.

With Keytracking OFF, the Arpeggiator ON, and the Pitch table ON, the pitch table becomes a great tool for creating custom drum patterns. For this, you'll actually want to set the fixed note to **48**. This way, the minimum pitch in the table (-24 semitones) will hit the lowest pitch of the kit (36 - kick drum, typically) and up to two octaves above that. This way, you can create drum patterns using the arpeggiator, and even do different patterns for each layer.

Widening Your Sounds
Most samples in Super Audio Cart PC are mono, since most sound chips sampled were themselves mono. However, there are a few easy ways of getting a wide stereo sound.

1. Load the same sound source on two layers, then pan each layer opposite each other. Change the fine tuning on these two layers by a small amount, for example -4 cents for one layer and +4 for the other. Also try introducing a mild sample offset to one layer, but not the other. This makes each channel (left/right) different enough to be perceived a wide stereo image.

2. Use the SNESVERB effect, turning down the mix and sync/time to make it sound almost like a very short-tail reverb as opposed to the ‘slapback’ effect common on the SNES. Make sure to turn up the PAN knob of course! This can also be done with the Delay effect, but it's a little easier with SNESVERB.
   In the mod matrix, set an LFO (not unipolar) to the layer of your choice with at least 50% depth, and set the destination to Pan. Change the speed as desired. If you want to do this on multiple layers, be sure to use different waveforms or frequencies for each LFO.

Transposition
The Pitch knob on each layer does not actually transpose incoming MIDI, but instead re-tunes the sound up to 3600 cents (36 semitones) in either direction. This is useful for some purposes, but may introduce artifacts to some waveforms (like the NES triangle) at high values. In these cases, you may want to transpose the sound instead.

A quick and dirty way to transpose a sound is enable the arpeggiator for the Layers you want to edit. Then, reduce the # of steps to 1, turn ON the Pitch table, and turn OFF the other tables. Set the loop end mode to HOLD and set the first (and only) step of the table to the desired transposition amount. Boom, you're done!

Simulate Velocity Layers
Although you already have the "velocity sensitivity" knob at your disposal, you can also simulate a softness or hardness to a sound at varying velocities. This is especially useful if you design a preset using organic sound sources like pianos or mallet instruments.

Route the Velocity parameter in the mod matrix to a particular layer, choose the FILTER > CUTOFF mod destination, and put a positive mod depth. Don't forget to turn on the filter for each layer you want to affect! Let's say you pick the Sv LP4 filter model (though other LPF models are also suitable).

Lower the cutoff frequency for each layer to, say, 40~60% (adjust accordingly, based on the sound source you are working with). This will be your initial cutoff at velocity 0. Adding on the mod depth will give you the maximum cutoff at velocity 127.

As a result, your lower velocities will generate softer notes, and vice versa - for the more organic sound sources, this can approximate actual softer/harder playing. Or, even better - combining this trick with "free running" oscillators can additionally simulate 'round robins' via the phase differences.

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Troubleshooting and Feedback

Have you used **Super Audio Cart PC** in a project recently? Got an awesome track you'd like to share? Drop us a line (admin@impactsoundworks.com) and we might post it on our website! Or, tell the world at our Facebook page here: http://www.facebook.com/ImpactSoundworks

We encourage all our users to share and promote their work. Word of mouth is the #1 way people find our samples, so it also helps us to produce more great libraries for you!

For any technical support issues regarding the library, don't hesitate to email support@impactsoundworks.com.

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