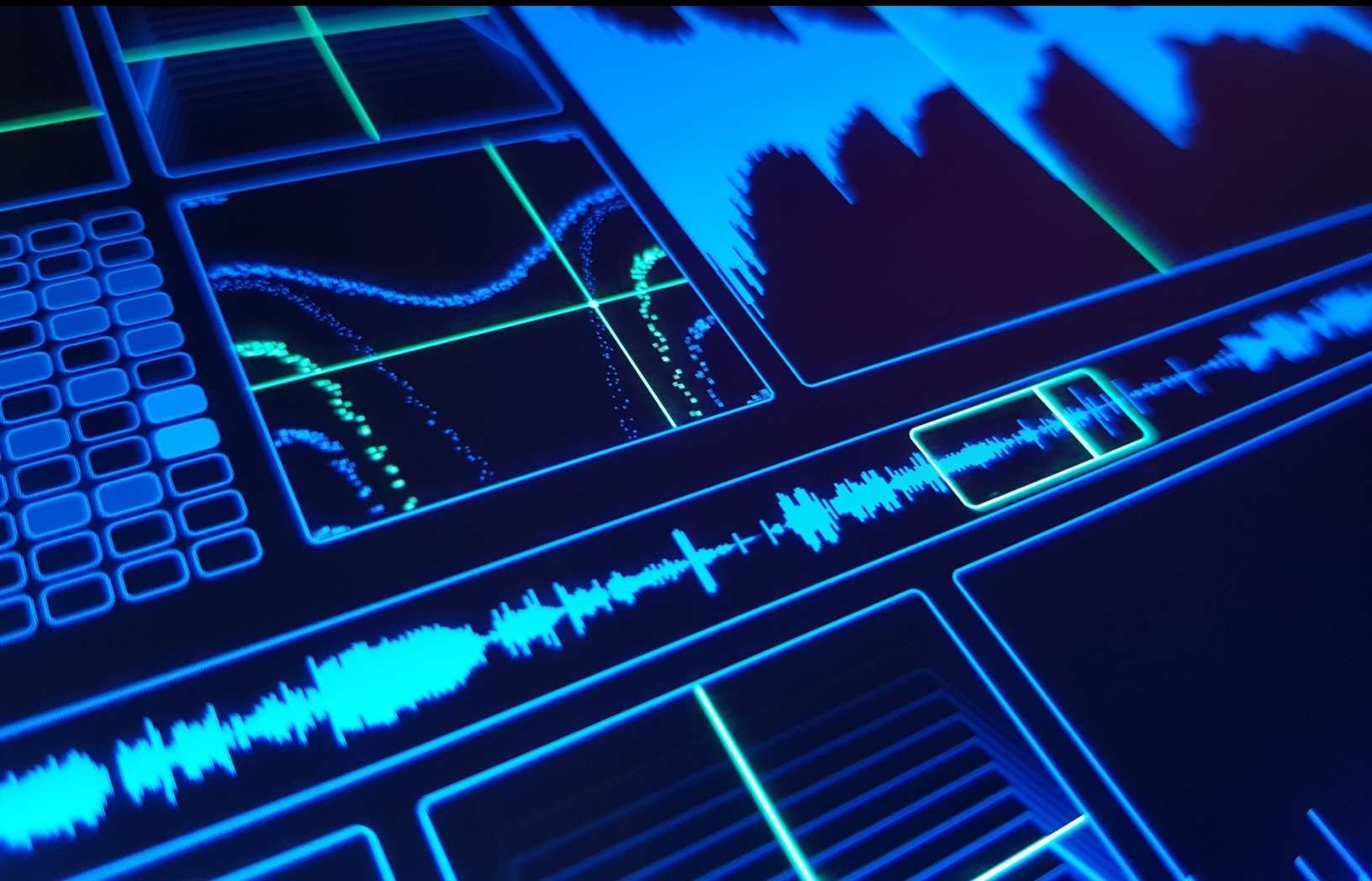


SpaceCraft Granular Synth



User Manual V1.01



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1 INSTALLATION

1.1 Desktop

Before downloading the installer, either start a trial or purchase SpaceCraft via the following link:

<https://www.tracktion.com/products/spacecraft>

If you do not already have a Tracktion account, one will be created for you.

To authenticate the product simply start-up SpaceCraft, click Unlock and enter your Tracktion account username and password.

The trial is 30 days and fully featured.

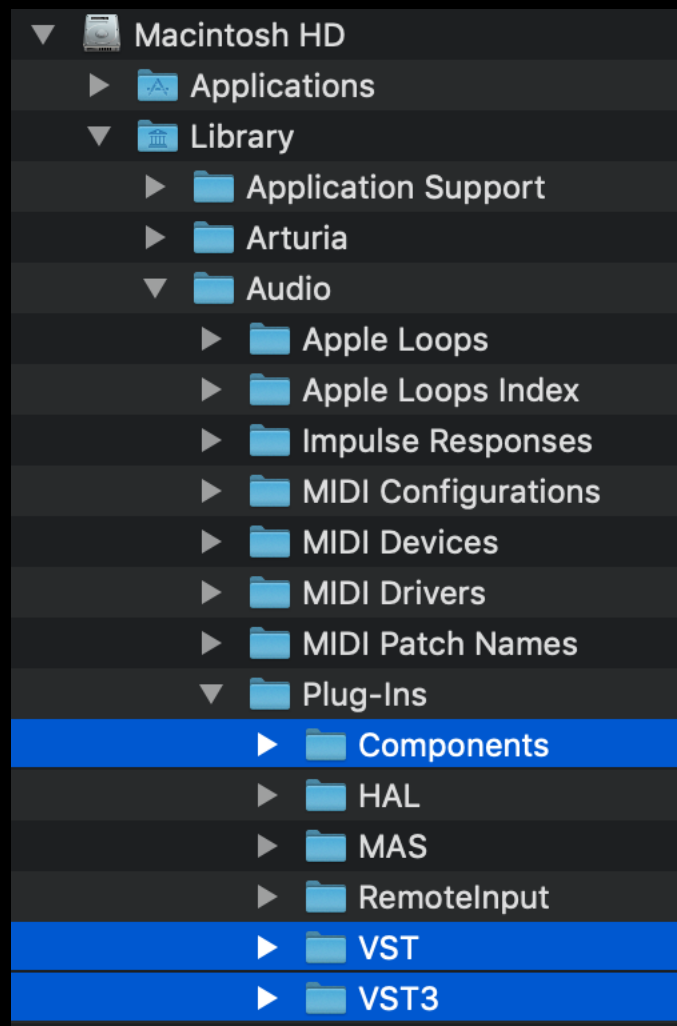
SpaceCraft is available as Instrument or Effect (FX) for each plugin

<i>Format</i>	<i>Windows</i>	<i>Mac</i>
AU	✗	✓
AU (FX)	✗	✓
VST2	✓	✓
VST2 (FX)	✓	✓
VST3	✓	✓
VST3 (FX)	✓	✓

The Instrument and FX versions are functionally identical; both are provided to ensure maximum compatibility across DAWs as the ability to load instrument on certain tracks is DAW-dependent.

1.1.1 Mac Installation

After installing the *.pkg downloaded from the Tracktion website, the AU, VST2 and VST3 files will be placed in the following locations (highlighted folders):



Note that the files in the 'Components' folders are the Audio Unit plugins. To uninstall SpaceCraft please delete these files directly (both SpaceCraft.* and SpaceCraftFX.* files in each folder).

The license file created when unlocking SpaceCraft after start-up be installed in the following location:

/Users/<username>/Library/Application
Support/DeltaVAudio/SpaceCraft/SpaceCraft.xml

NB: to reset the authentication, delete the .xml file and you will be prompted to unlock upon restarting SpaceCraft.

The user and factory audio and presets are stored in a different location to the plugin files, refer to Section1.3.

1.1.2 Windows Installation

After installing the executable, the files will be located in the following default locations:

C:\Program Files\Common Files\VST2

C:\Program Files\Common Files\VST3

If they are not already, add these paths to your DAW VST locations and re-scan plug-ins.

The plug-in files can be uninstalled via the uninstaller executable which can be accessed from 'Apps' in windows settings. Note that the uninstaller will remove only the plug-in files and not the user audio and presets data which must be deleted manually.

The user and factory audio and presets are stored in a different location to the plugin files, refer to Section1.3.

1.2 iOS

Simply purchase on the iOS app store (search on the app store for 'SpaceCraft Granular Synth') and SpaceCraft will be available as a standalone app. Additionally, IAA and AUv3 formats will be available which can be used in compatible host applications (refer to Section11.2).

1.3 Location of User Audio / Preset files

1.3.1 Desktop (Windows and Mac)

On desktop the factory and user presets and audio files can be found via explorer/finder for windows and mac respectively. The paths to the files are

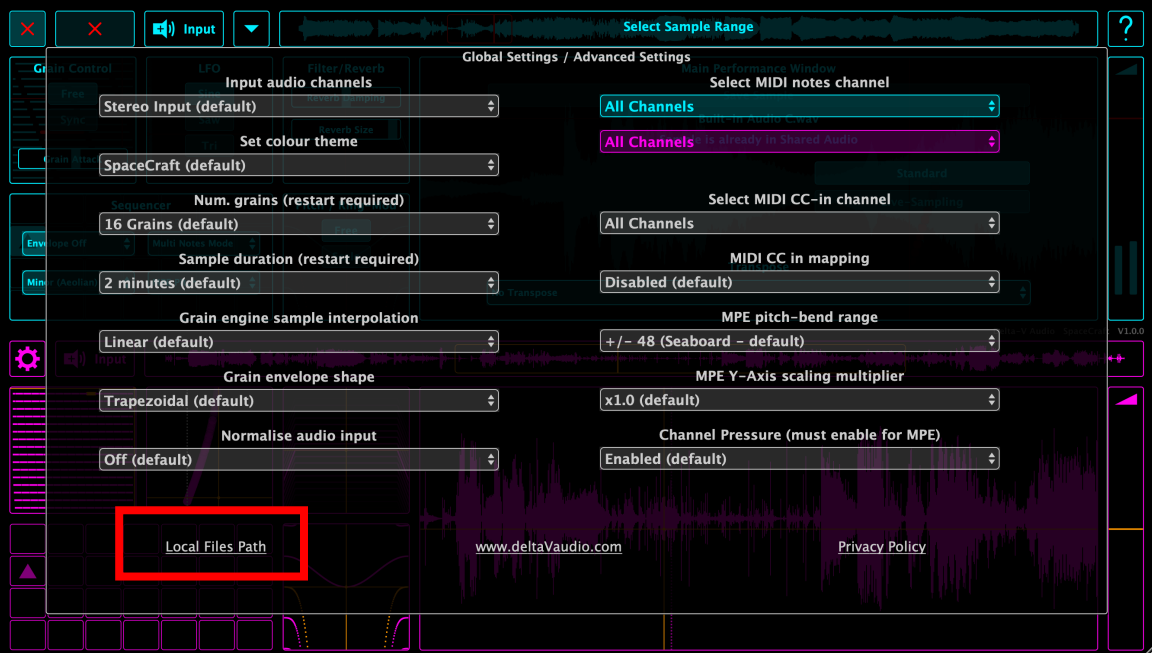
Mac:

`/Users/markwatt/Documents/SpaceCraft`

Windows:

`C:\Users\<username>\Documents\SpaceCraft`

A link to these folders can be found in the Global Settings panel in SpaceCraft the SpaceCraft GUI. Global Settings can be located by clicking the settings icon in the top left and then clicking 'Global' button which appears to the right of the settings button.



Note that the SpaceCraft folder is automatically generated by the plug-in the first time you start up SpaceCraft. You can back-up your SpaceCraft folder by simply making a copy of it. It is possible, and often convenient, to access and

manipulate the user preset and audio files directly in explorer/finder. Audio and preset files can be added or removed with the following constraints:

1. Only add/remove files within the 'User' folders
2. Do not change the structure of the folder (i.e. do not add or remove folders) as this may change the behaviour of SpaceCraft

As an alternative to using explorer/finder, SC GUI can be used to import audio or preset files into SpaceCraft (refer to Section7).

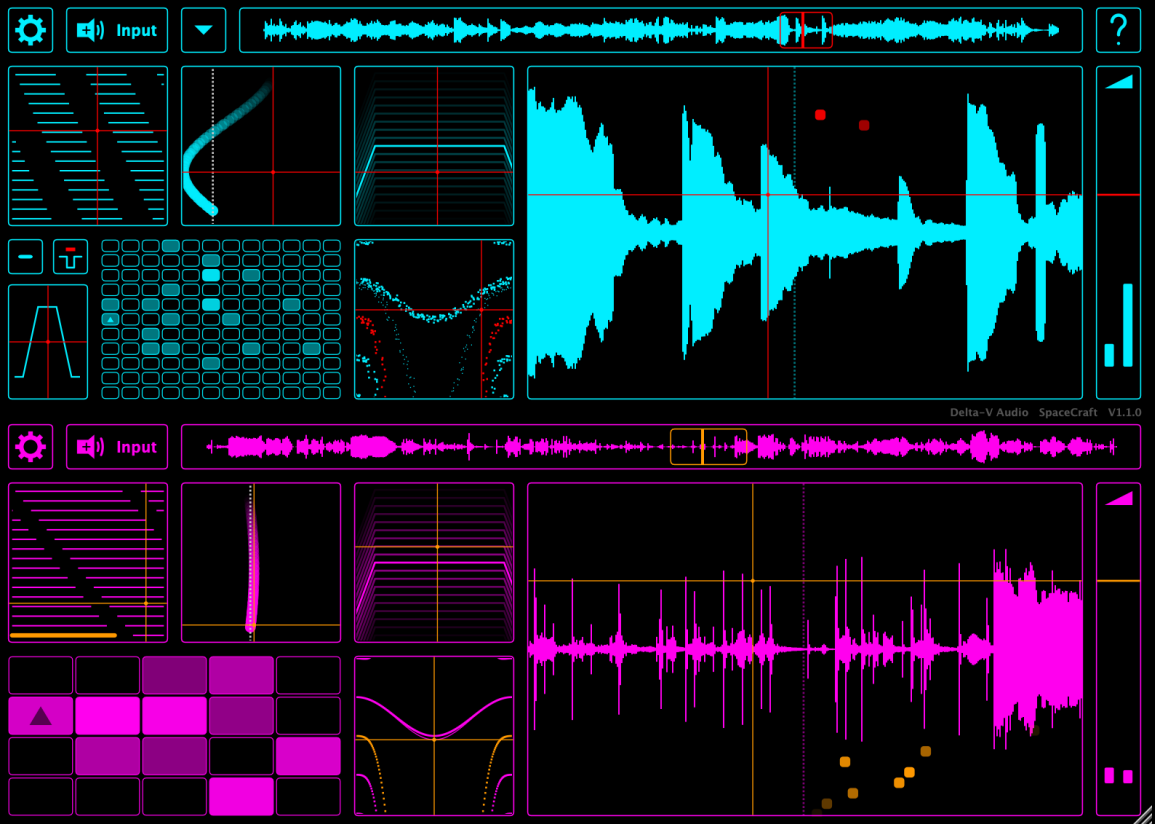
1.3.2 iOS

Due to AUV3 iOS security constraints, it is not possible to access directly the equivalent SpaceCraft folder from the iOS Files App. In order to add/remove user preset and audio files from SpaceCraft the user must import/export files using the SC GUI only (refer to Section7).

2 INTRODUCTION

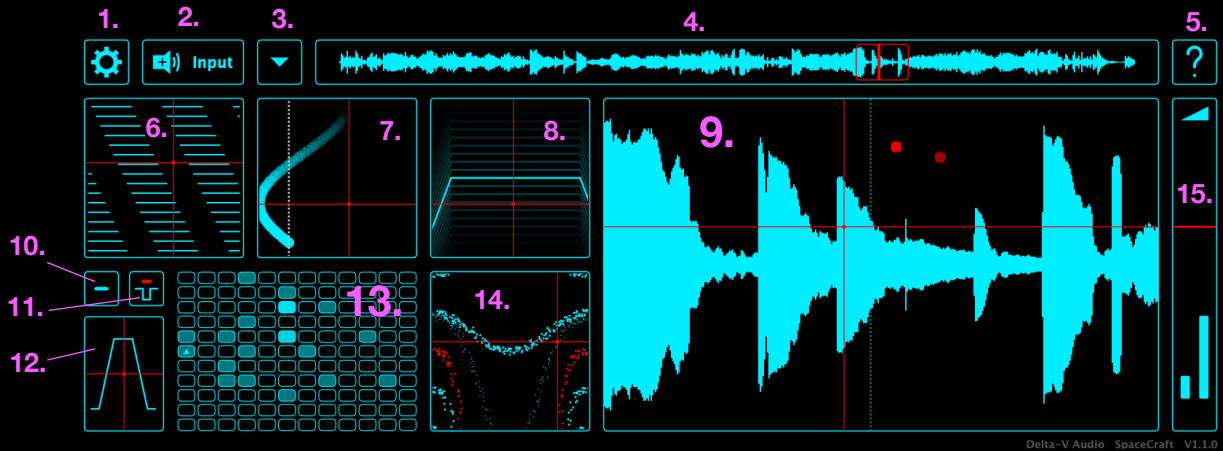
The mission statement of SpaceCraft is simple: to be instantly playable, intuitive and inspiring.

SpaceCraft predominantly uses the technique of Granular Synthesis: this involves capturing many tiny fragments of audio and combining them together to create a cloud of sound. The grains can be played back at various pitches, timing, volume etc. to produce different sounds. Using an instrument such as SpaceCraft makes it possible to turn any audio sample into a playable instrument which retains the essence of original sample.



SpaceCraft can perform classical granular synthesis but depending on how the grain frequency, duration and note sequencers are configured, it can also perform sample layering and arpeggiated rhythmic effects, all of which can be seamlessly morphed between.

2.1 Overview of the interface



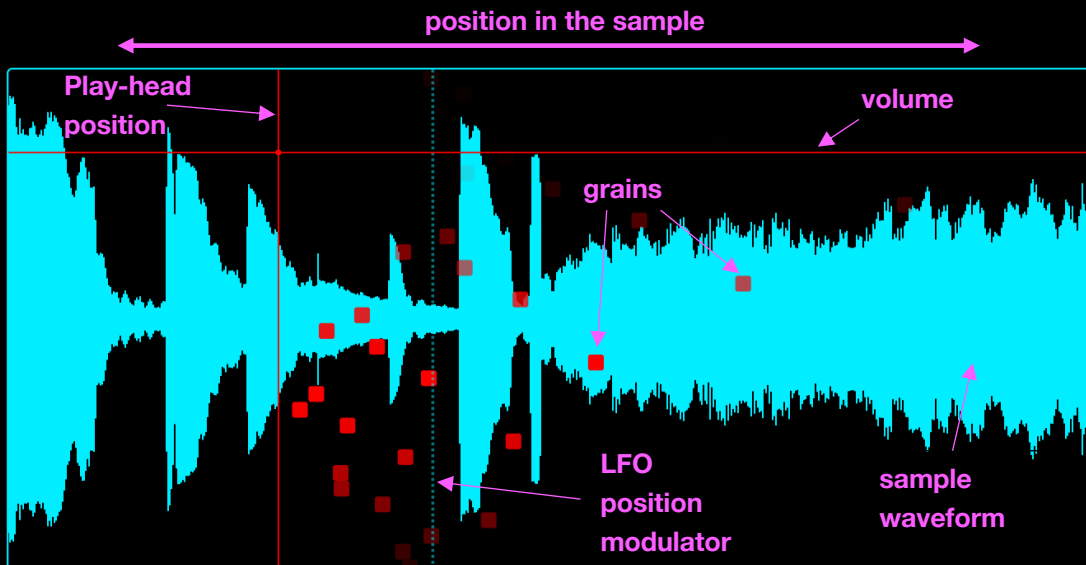
1. Settings Button
2. Audio input (record from mic/DAW input or load audio file)
3. Preset/Audio panel button (tap this to load/save presets and audio files)
4. Sample range (select which region of the sample is shown in the main performance window (9.))
5. Tutorial panel button (gives a brief description of the interface components)
6. Grain control panel (control grain length/frequency)
7. LFO panel (control grain position modulation LFO)
8. Reverb/Filter panel
9. Main Performance panel (control position in the sample at which grains fire and grain volume)
10. All notes off button (shown when envelope mode is active)
11. MIDI notes latch/sustain button (shown when envelope mode is active)
12. Envelope panel (control note attack/release – shown when envelope mode is active)
13. Note grid (notes in the grid corresponds to pitch of the grains)
14. Pitch/Ring Modulation panel
15. Amplitude control (allows control of grain volume without impacting play-head position)

3 X/Y-PANELS DETAILED DESCRIPTION

3.1 Main Performance Panel

The main performance panel contains the play-head (the vertical red line of the crosshairs). Move the 'play-head' (left-right) to determine the position in the sample from where the grains will play.

The red squares in motion represent the grains. The horizontal position of the red squares represents the location in the sample that each active grain is currently playing. Note that the vertical position of the grains is simply for visualisation purposes and has no relevance to the actual sound produced.



Additional vertical lines can be observed in certain conditions representing the following modulators:

- LFO position modulation (dotted line): see Section3.3
- MPE position modulation (transparent lines): see Section8

These modulators alter further with the position in the sample where the grains fire with respect to the play-head position. The actual position that the grains fire from at any given time is calculated as follows:

$$\text{pos_fire} = \text{pos_playhead} + \text{pos_LFO_modulation} + \text{pos_MPE_modulation}$$

Move the crosshairs up/down to change the volume of the grains that are being fired. In particular, this dictates the peak volume of each grain (each grain has its own individual attack/release envelope). Note that the peak volume is only allocated at the start of the grain firing; once a grain has been fired it will retain its allocated (peak) volume until it has completed its assigned duration (or is prematurely replaced by a new grain).

If a MIDI or MPE device is used to play notes, the volume of the grains is further modulated by the velocity (or pressure) of the note being played. In this case, the volume crosshairs level dictates the volume of the MIDI/MPE notes when played at maximum velocity. It is recommended to use a volume above 50% when using MIDI/MPE.



In some rare cases, setting the volume crosshairs too high can result in clipping if too many grains are playing on a high gain region of the sample

3.1.1 Main Performance Panel Settings

The ‘Save Sample’ button allows the user to save the audio data currently loaded in memory as a wav file located in the User Audio folder (see Section7). If the sample is already present in the folder (based on file name) this will be greyed out as shown below. Note that audio recorded into SpaceCraft will automatically be saved in the user audio folder either when saving a preset or saving the DAW project. This button simply provides an alternative means to save current audio data.



The Standard/Live-sampling option allows the user to choose the live recording method; both methods are described in Section9.

Sample pitch tuning can be performed via the Coarse Tune and Fine Tune sliders. This facilitates alteration of the global pitch of the sample playback, as follows:

- Coarse Tune:
 - Range = +/- 12 semitones (i.e. +/- octave)
 - Resolution = 1 semitone
- Fine Tune:
 - Range = +/- 1 semitone
 - Resolution = 1 cent (1/100th of a semitone)

This allows the user to change the key of input audio globally; note however, that the pitch of the grains is further influenced by the note pitch (via the notes grid), pitch control panel and MPE pitch modulation.

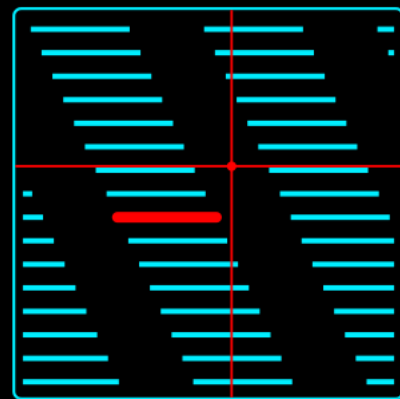
The coarse and fine tune sliders can be useful when samples in each engine are in different keys, or if a sample is out of tune in general.

Note that this feature is intended to be used as a utility rather as a performance feature; to control pitch in a performance context, refer to the Pitch/ring-mod panel (section 3.5).

3.2 Grain Panel

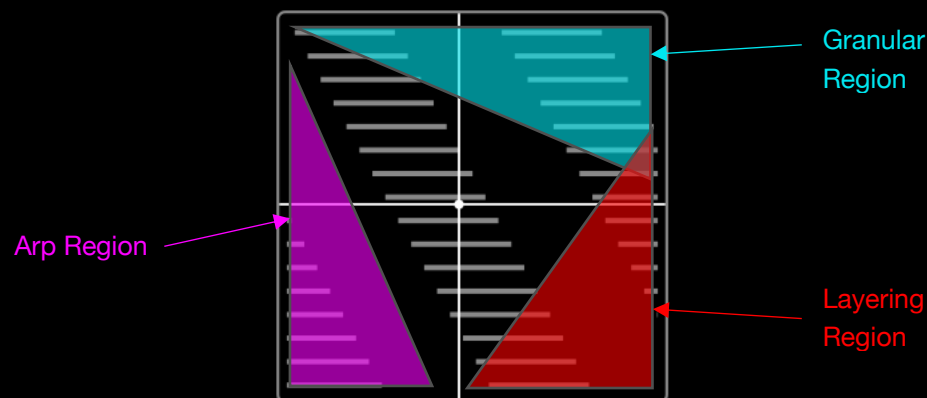
After the Main Performance Panel, the Grain Panel is the most important of the X/Y panels. It facilitates control over the frequency (crosshairs up/down) and length (crosshairs left/right) of the grains being played.

The visualisation illustrates the grain frequency and duration and illustrates a highlighted grain each time a new grain firing occurs.

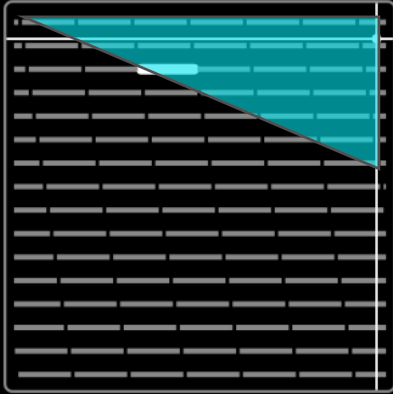


3.2.1 Grain Panel Regions

SpaceCraft is first and foremost a granular synth; however, it can also venture into non-granular territory depending on the region of the Grain Panel. There are three characteristic regions of the grain panel: 'Granular Region', 'Layering Region' and 'Arp Region'.



3.2.1.1 Granular Region (top-right)



In the top edge of the grain panel, the grains fire at highest frequency (high frequency grain firing is typically characteristic of granular synthesis). The upper right corner is special as it also provides the maximum possible overlap between the grains. This allows for smooth continuous textures where the grains appear to blend together into an homogeneous sound. This region is ideal for smooth pad sounds.

If more than one note is played at once, the pitches are shared equally between the grains, thus forming a chord. In this way, especially when playing notes via MIDI and MPE, chord progressions can be played.

Beware that if a large number of notes are held down simultaneously, the frequency of grains of any particular pitch reduces (as the grain firings are shared, in sequence, between the active notes) and the sound can become less smooth.

To achieve even smoother granular results the user can increase the number of grains per engine (Mac/Windows only, see Section 10.1) at the cost of CPU. The benefit of using more grains is particularly noticeable in this top-right granular region.

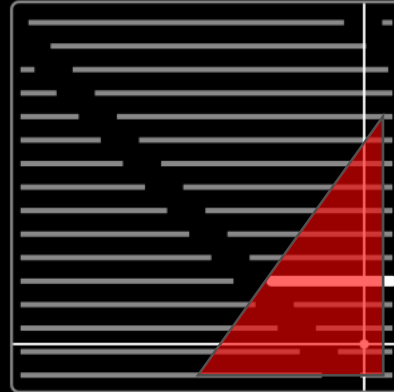
▲ *A sweet-spot for achieving the smoothest sound in general is often achieved (depending on the nature of the sample) at the location of the far-right edge and just below the top. Those in pursuit of smoothness should also try increasing the number of grains (Desktop only)*

3.2.1.1 Layering Region (bottom-right)

Towards the bottom right of the grain panel the grain duration increases to the order of seconds. In fact, with such long duration grains we are technically no longer in the realm of granular synthesis; however, some excellent musical results can be achieved in this region.

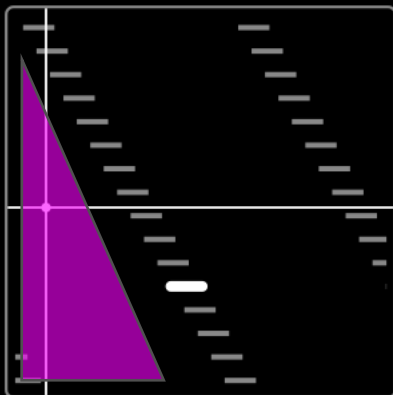
In this region the grains essentially act more like a typical sampler which overlaps audio whilst following the pitch sequence determined by the notes grid. This can create lush, complex soundscapes.

Note that as the frequency is reduced (towards bottom of the panel), the grain length grows to the extent that a large proportion of the sample will be played. This can sometimes result in a part of the sample being played which has different pitch/textures/key compared with the region of the sample located at the play-head position.



Experiment with layering notes of different octaves to build up the sound whilst retaining the key. Adding different note intervals can also result in interesting harmonies/dissonance when used in this region.

3.2.1.1 Arp Region (mid-left)



The Arp region is characterised by short, non-overlapping grains which can be played over a wide range of frequencies to generate fast/slow arpeggiated sequences. In this region, the active notes become arpeggios that follow the order in which the notes were played/added to the notes grid.

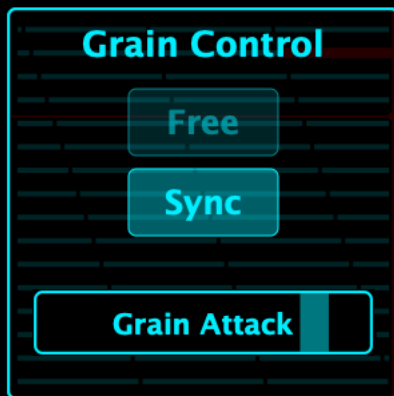
This region is most effective when played in Sync mode (see the next section).



Complex polyrhythms can be created with both engines in sync mode by setting up different frequency Arpeggios on the upper and lower granular engines with differing number of notes in the sequence (for example, the combination of 7 and 9 notes)

3.2.2 Grain Panel Settings

The Free/Sync option determines the timing logic of the grain firing. In Free mode (default), the grains will fire at a frequency that is not synced with the tempo of the DAW. Using free mode, a smooth sweep of the frequencies is possible when moving up/down.



If Sync mode is enabled, the timing of the grains is synced to multiples of the host tempo. This is achieved in discrete rows of frequency ‘bands’ which are highlighted as the user drags the crosshairs up/down. This mode is particularly useful when playing in the Arp (mid-left) region for tempo synced rhythms.

Note that in sync mode, the **upper-most band** is treated similarly to Free mode; this is to allow

fine control over the grain timing at very high frequencies which is important for achieving smooth sounding granular blending. As a result, in free mode it is possible to seamlessly transition from arpeggiated sounds (mid-left) to smooth granular (top-right).

The Grain Attack slider determines the attack duration of the local grain envelope (this is the volume envelope assigned to each individual grain). Note that grain attack is only applicable to **short duration grains** (i.e. when playing in the left-region of the grain panel). Shorter attack gives the grains a more percussive sound. As the crosshairs are moved to the right the grain envelope is forced to have equal attack/release durations (equivalent to setting the grain attack slider to far-right).

3.3 LFO Panel

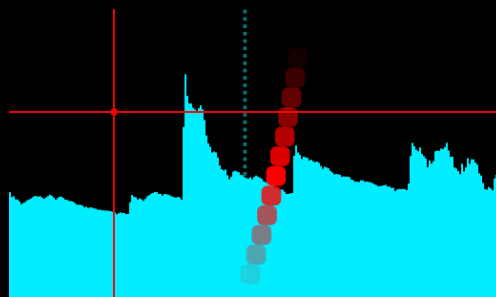
The LFO is mapped to control the modulation of grain firing position with respect to the play-head. Moving the cross-hairs left/right controls the distance of the position modulation, and up/down controls the frequency of the LFO. The LFO is synced to DAW tempo with different frequencies in each row (frequency band), in a similar fashion to sync mode of the grain panel.

The LFO can be used to provide movement in the sound by continually changing where the grains start in the sample. In order to disable the LFO simply move the crosshairs to the far-left. In this scenario, all grains will fire from the position of the play-head (the crosshairs) which will generally produce a more 'static' sound.

A choice of sinusoid, saw, and triangle wave LFO shapes can be selected in the settings of this panel.

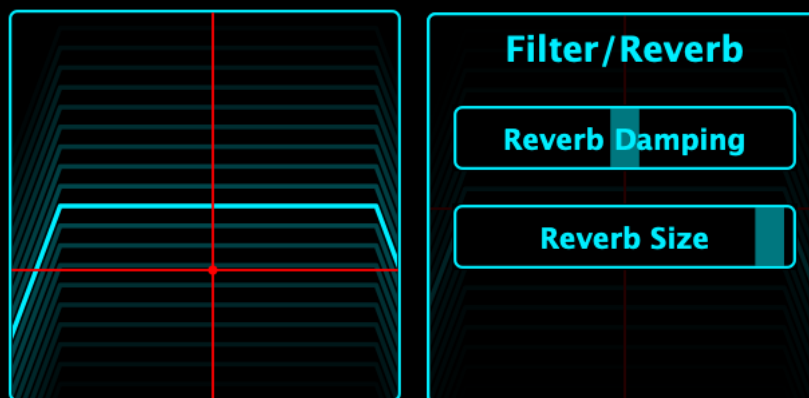


Note that the dashed vertical line visually represented in the LFO panel is related to the similar dashed vertical line shown in the main performance panel.



3.4 Reverb/Filter Panel

This panel provides a clean stereo reverb (up/down) and low-pass & high-pass filter (left/right). Move the left/right position of the cross-hairs to centre in order to completely bypass the filter: when the crosshairs are to the left of centre, the filter acts only as a low-pass filter, if the crosshairs are right of centre, the filter acts only as a high-pass filter. Note that this filter does not act as a band-pass filter.

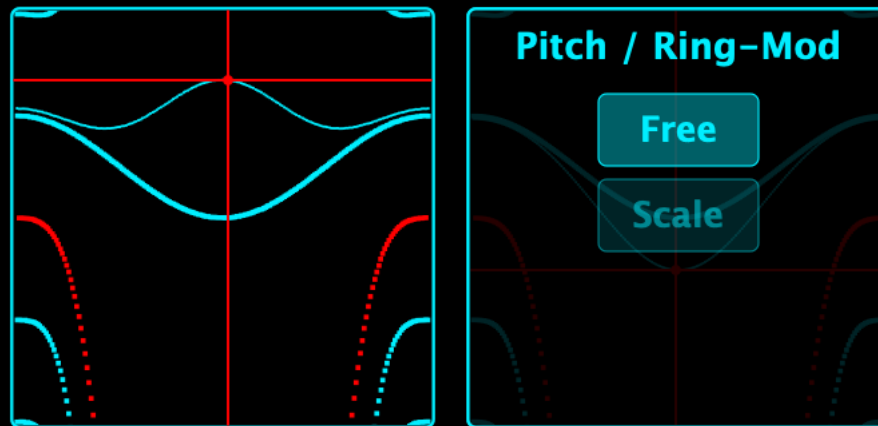


Double-tap the panel to reset to centre.

The settings of this panel allow control of the reverb damping (move to the right for a darker sounding reverb) and the reverb room size (move to the right for larger space).

3.5 The Pitch/Ring-Modulation Panel

This panel is intended for pitch control from the perspective of performance rather than utilitarian tuning of the sample (for tuning of the sample, it is recommended to utilise the Coarse Tune/Fine Tune found in the settings of the main performance panel!).



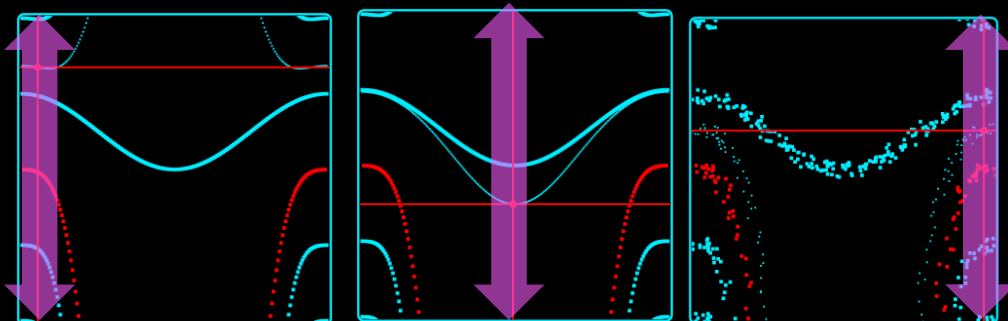
Consider the pitch panel as three separate zones: left, centre and right.

In the centre, fine control of the pitch is achieved when moving crosshairs up/down (with a range of approximately ± 2 semitones).

Left: coarse
pitch control

Middle: fine
pitch control

Right: ring-
modulation



At the far left, the pitch control range becomes larger when moving the crosshairs up/down. This covers a pitch range of up to +1 octave above nominal pitch both forwards (above the red contour) and reverse (below the red contour). Refer to Section 3.5.1 for a more detailed description of the contours.

At the far right, the pitch control panel morphs into a ring/modulation effect. Moving the crosshairs up/down changes both the audio pitch and the sinusoidal ring-modulation carrier frequency.

The settings of this panel allow the choice of Free Mode (the default, with continuous pitch control) and Scale Mode which quantises the pitch to the intervals of the scale selected in the Notes Grid (see Section 4).

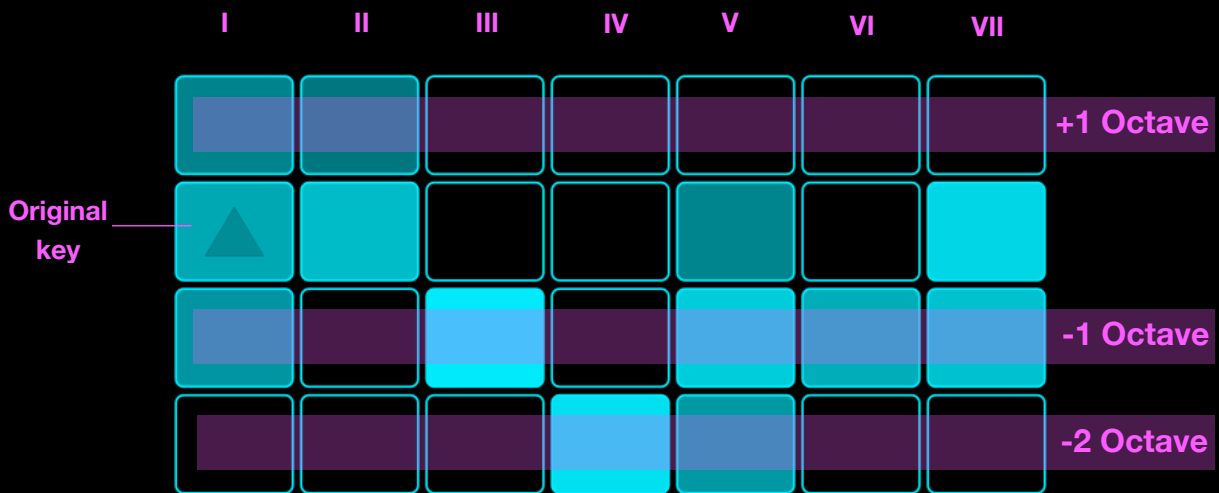
3.5.1 Pitch contours

The visualisation of the panel shows contour lines of equal pitch. The contour which passes through the centre of the crosshairs represents the current pitch being played. The thick contour represents the nominal pitch (i.e. unaltered pitch, or pitch multiplier = 1). As the contour approaches the red contour the pitch reduces until the grains are stopped (i.e. zero pitch, or pitch multiplier = 0). Moving below the red contour causes the pitch to become negative (i.e. the grains begin to move in reverse). Reaching the contour below the red contour represents the nominal pitch in reverse (i.e. pitch multiplier = -1). The extreme left-hand side upper and lower corners represent pitch multipliers of +2 and -2 respectively.

4 NOTES GRID

Think of the notes grid as a piano with each square representing a piano key. The rows represent octaves and the columns represent the notes within the octave. The notes available on each row are dependent on the scale selected, the example in the image below shows a major scale with four available octaves.

As the grains fire, they cycle through the pitches of the notes active in the notes grid. Each grain firing will be assigned to one of the notes; the order of which follows the order in which the notes were entered in the grid. Notes can be entered into the grid either by via the on-screen GUI or by simply playing notes via a MIDI or MPE device.



The note containing the triangle symbol represent the original key of the sample. If this note alone is active, then all grains fired will play the original key of the sample, whichever that may be.

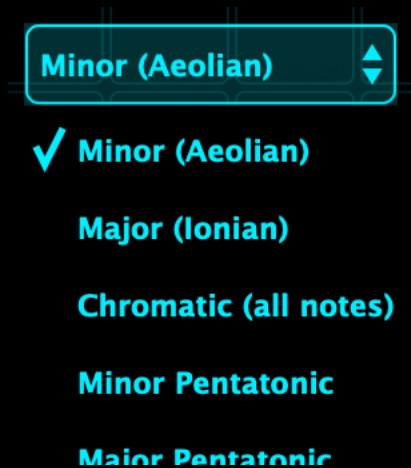
When playing single notes at a time, melodies can be played. When playing multiple notes together either arpeggios are played (in the 'Arp region' of grain panel) or chords are played (in the 'granular region' or 'layer region' of grain panel).

4.1 Notes Grid Settings

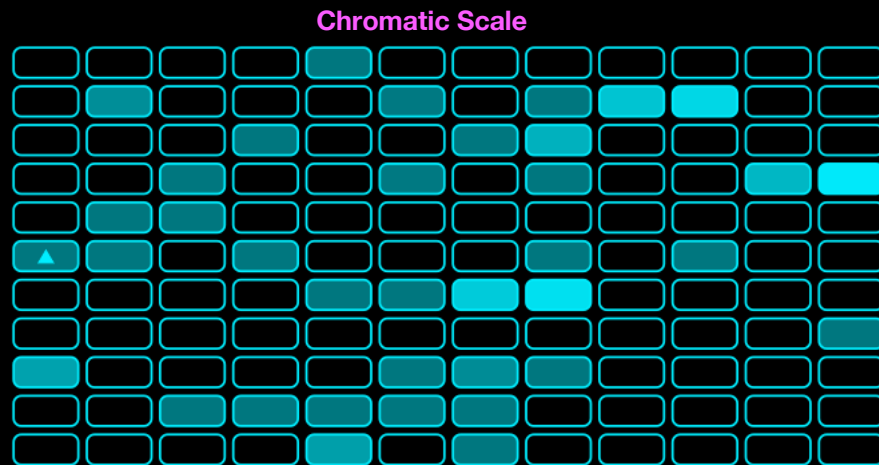
The notes grid settings allow control over both the volume (envelope) pitch aspect of the notes played.



4.1.1 Scale Option



The scale option (bottom left) determines which intervals are present in the columns of the notes grid. The image below shows the notes grid when the Chromatic scale is selected. Here, the first 11 notes of the chromatic scale constitute the 11 columns. A different number of octaves are present in the grid depending on the scale chosen.



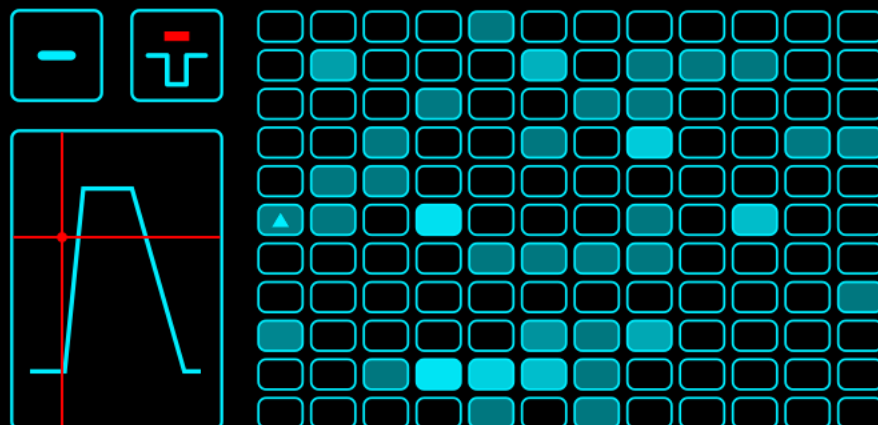
Here, every note available on a full-sized MIDI keyboard (128 in total) is present.

When using scales other than chromatic, a subset of the available notes within an octave are preset. When playing on a midi keyboard these notes are assigned to the white keys only (playing any black key on the MIDI keyboard will play a duplicate note to one of its surrounding white keys).

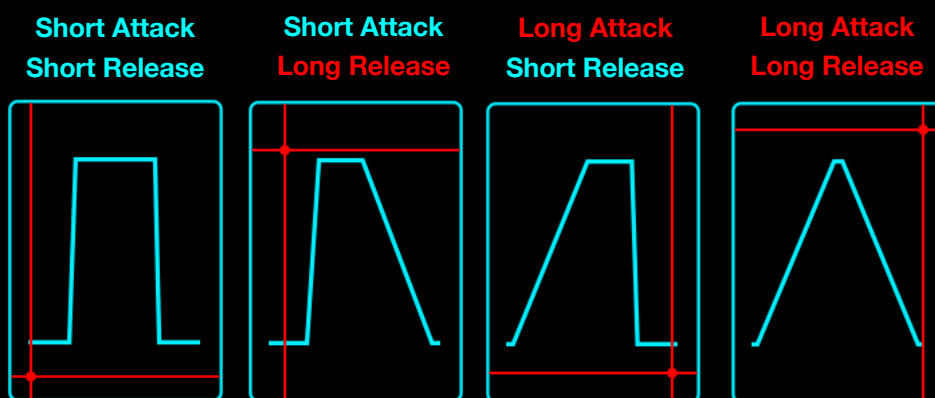
4.1.2 Envelope Option



Setting Envelope On (top-left) will activate a per-note attack/release amplitude envelope. Note that this envelope is triggered by notes being entered into and removed from the grid and is independent from the local amplitude envelope assigned to each individual grain. The XY panel allows control of the note envelope attack (up/down) and release (left/right).



Four typical envelope configurations are shown below:



This button sends the ‘All Notes Off’ and terminates any active notes in the notes grid.

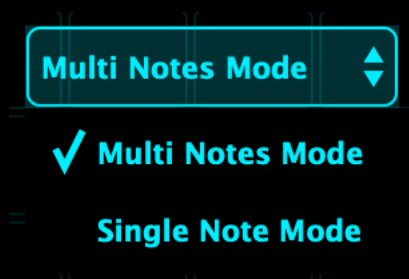


This button toggles MIDI note latch/sustain. This is equivalent to the sustain pedal on a piano and only applies to notes being played via MIDI.



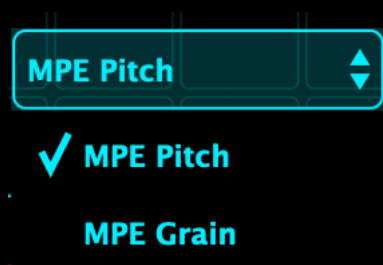
It is important to note that the latch/sustain button has **no impact** on notes being entered in the grid via the on-screen GUI. Note also that this button will also be activated via the sustain pedal (CC64) of any MIDI keyboard.

4.1.3 Single/Multi Notes Option



In Multi Notes Mode, any number of notes can be added to the grid. In Single Notes Mode, only one note can be active on the grid at a time; this is useful when performing monophonic melodies via the on-screen GUI as it eliminates the need to deactivate the previous note manually.

4.1.4 MPE Mode Option



The MPE Mode determines the function of the X-axis (a.k.a. glide) dimension. By default, in 'MPE Pitch' mode, the X-axis controls pitch-bend (this is the standard usage for X-axis in MPE). As an alternative, in 'MPE Grain' mode, instead of pitch/bend, the X-axis is mapped to grain position modulation similarly to the Y-axis but covering a much larger position modulation distance from the play-head. This allows, for example, a large portion of the sample to be explored by moving left-right on a seaboard controller (either at the top or bottom strips) which provides interesting performance opportunities.

5 RANGE PANEL

The region selected in the range panel (i.e. the red rectangle in the image below) determines ‘selection range’; that is, the portion of the sample that is shown in the main performance window.



The single vertical line indicates the location of the play-head in the overall sample (this may or may not be within the selection range).

To change the selection range, drag on the left/right edges of the selection range rectangle. You can also shift the entire selection range without changing its size but dragging left/right on a region that is sufficiently far from the edges of the rectangle.

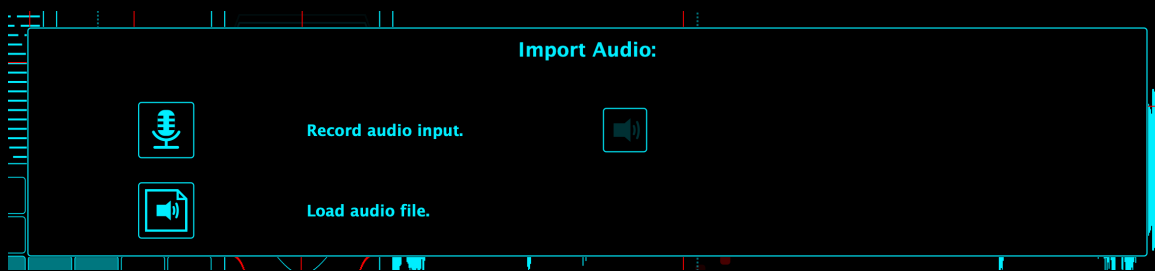
Double tapping once causes the selection range to expand to fill the entire sample. Double tapping a second time causes the selection range to shrink to a small region surrounding the current play-head location.

6 IMPORT AUDIO PANEL

Unless live-sampling is active (Section9), the audio input button (below) will be visible on the GUI.



This button opens the Import Audio panel (Below) will open. This allows the user to either record live audio directly into SpaceCraft via the ‘Record Audio Input’ button or load a sample from a file on the device via the ‘Load Audio File’ button.



6.1 Record Audio Input button

This button records audio data being sent to SpaceCraft. If using SpaceCraft in a DAW/host as VST2, VST3, Audio Unit, AUv3 or IAA, the audio input available will be dependent on how the DAW/host routes audio to SpaceCraft. If using SpaceCraft as standalone iOS app, the audio input will either be via the device microphone or via any line-in input (e.g. via the headphone jack).



Record audio input.

After starting recording, the input audio data will record until it fills up the available maximum sample duration.

The button to the right of the record button is the monitor button. This allows passthrough of the input audio. Note that the gain of the monitored audio is slightly reduced with respect to the actual audio signal sent to SpaceCraft, this is in order to balance the audio levels with the output of SpaceCraft in general. When monitor is enabled, the button will be highlighted as shown in the image below (left).



After recording, the audio data is present in memory and will not be saved to the file system. If SpaceCraft is closed the data will be lost unless one of the following actions are taken:

Page 28

1. The project is saved in the DAW/HOST in which case the audio data will automatically be saved in the User Audio files folder
2. A preset is saved and the 'save audio data' checkbox is ticked
3. The 'Save Sample' button is (located in the settings panel of the Main performance panel, refer to Section3.1.1) it tapped/clicked

An autogenerated name is created for recorded audio which contains the time and date of the recorded audio.

6.2 Load file button

This button opens the file explorer/finder/files app depending on the platform being used. The user can select a single audio file which will be loaded into memory.



Load audio file.

Once the audio is loaded, it will be only stored in memory un

The file format extensions available are as follows:

***.wav *.aif *.aiff *.flac *.mp3 *.wma *.ogg *.aac *.m4a**

After loading an audio file, the audio data is present in memory and will not be saved to the file system. If SpaceCraft is closed the data will be lost unless one of the following actions are taken:

4. The project is saved in the DAW/HOST in which case the audio data will automatically be saved in the User Audio files folder
5. A preset is saved and the 'save audio data' checkbox is ticked
6. The 'Save Sample' button is (located in the settings panel of the Main performance panel, refer to Section3.1.1) it tapped/clicked

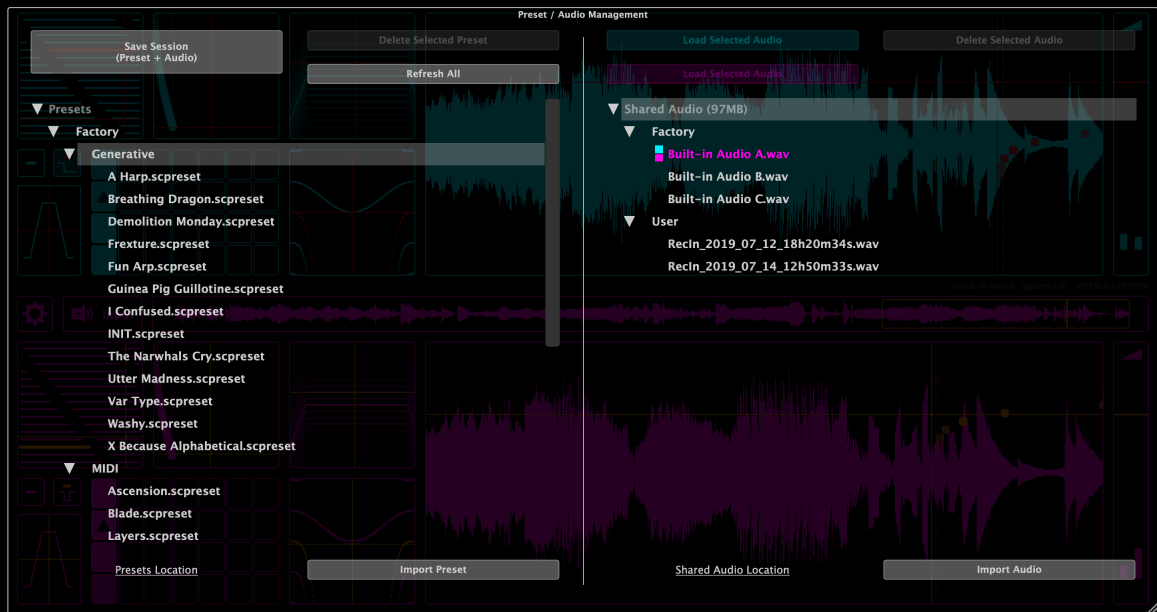
7 PRESETS/AUDIO PANEL

The following button is used to open the factory and user presets/audio via the Preset/Audio Management Panel.



The panel shows the presets on the left and audio files on the right.

To load a preset, simply tap on the preset name in the present pane to the left. In order to load audio from the available files, select the audio file and then tap one of the ‘Load Selected Audio’ buttons (top-right) which send the audio to either the top or bottom engine respectively.



SpaceCraft keeps audio data separate from the presets and shares audio data files between the presets based on audio file name. This approach avoids very large presets files with duplicates of audio data. This ‘shared audio data’ approach is particularly crucial for SpaceCraft due to the typically large audio data files that can be used (up to 16 minutes).

When loading any preset on the left-hand side panel, the corresponding audio file(s) in the right-hand side panel will be loaded automatically into the top and bottom engines if the audio file name(s) defined in the preset file are available.

To save a new preset, click the 'Save Session' button which will open the following panel. All presets will be saved in the User/presets folder.

Create New Preset

LaForgeProximaTranslation

CancelOk

☒ Save With Sample?

Audio samples will be saved internally to 'Shared Audio' if they don't already exist.
The samples will automatically be loaded next time you load the preset.

If the 'save with sample' is checked, the audio data will be saved in User/Audio folder.

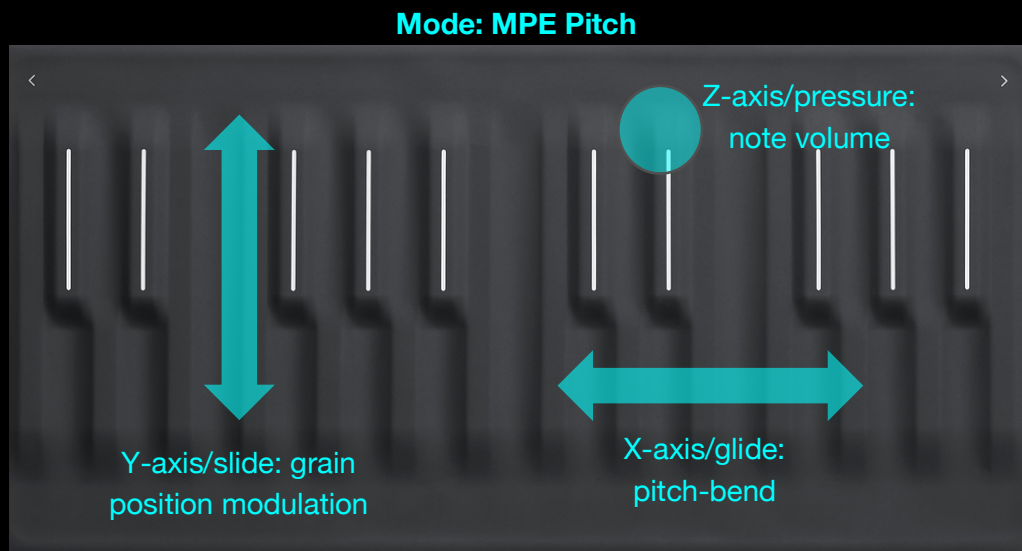
8 MIDI/MPE

As an alternative to adding notes to the notes grid via the on-screen GUI, notes can be played via a MIDI or MPE controller. By default, SpaceCraft always listens for incoming MIDI or MPE notes data.

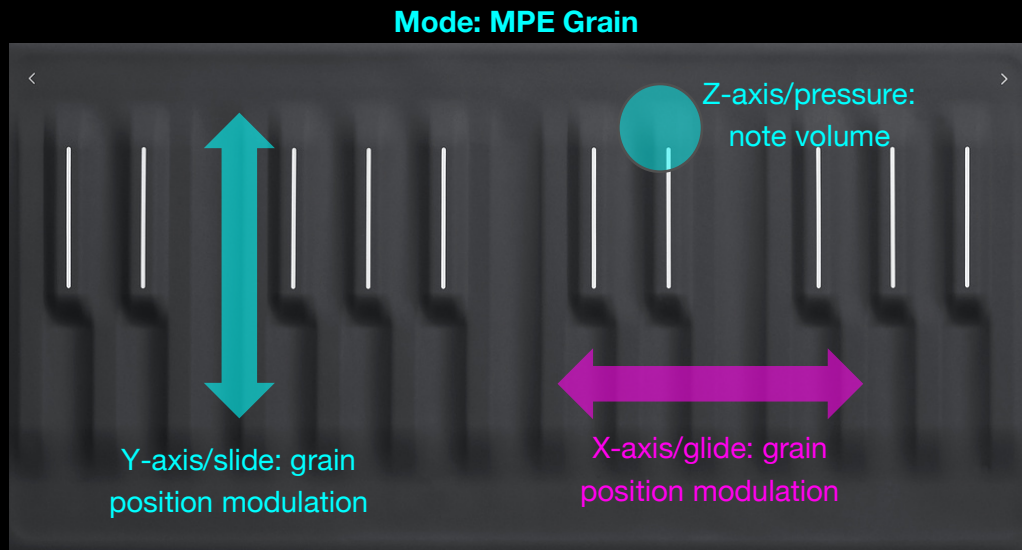
With a standard MIDI controller, the note velocity played determines the volume of any grains assigned to the note.

NB: some MIDI controllers send channel pressure information. Seaboard will process this information and override note velocity with the channel pressure information. Although this can be desirable in some cases, there may be some scenarios where this is not wanted; in which case, there is an option in Global Settings to disable channel pressure input. Note however, that with channel pressure disabled, MPE will not function correctly.

With an MPE controller, the X, Y and Z axes control pitch bend, grain position modulation and note volume respectively when using the default MPE Pitch mode (see Notes Grid settings panel).



Switching to MPE Grain mode assigns the X-axis input to grain position modulation (similar to the Y-axis but over a larger range). This can be useful where greater control of grain position is desired and pitch bend is not desired.



- ▲ *MPE controlled SpaceCraft is especially expressive when playing in the top right corner of the grain panel; in this region pitch and volume respond more immediately to the touch.*

8.1 CC Mappings

The pre-mapped CC are defined in the following table. Pre-mapped CCs are an alternative to DAW parameter automation. On the VST/AU version of SpaceCraft, these pre-mapped CC are disabled by default but can be enabled via Global Settings.

Parameter	Sequencer	CC Number (Default Mapping)	CC Number (Legacy Mapping)
Grain_X	Upper	14	6
Grain_Y	Upper	15	7
LFO_X	Upper	16	8
LFO_Y	Upper	17	9
RevFilt_X	Upper	18	10
RevFilt_Y	Upper	19	11
PitchMod_X	Upper	20	12
PitchMod_Y	Upper	21	13
MainPanel_X	Upper	22	14
MainPanel_Y	Upper	23	15
Range_L	Upper	24	16
Range_R	Upper	25	17
NoteAttack	Upper	26	18
NoteDecay	Upper	27	19
ActionRecordIn	Upper	28	20
ActionMonitorIn	Upper	29	21
ActionNotesOff	Upper	30	22
ActionNotesLatch	Upper	31	23
Grain_X	Lower	75	24
Grain_Y	Lower	76	25
LFO_X	Lower	77	26
LFO_Y	Lower	78	27
RevFilt_X	Lower	79	28
RevFilt_Y	Lower	80	29
PitchMod_X	Lower	81	30
PitchMod_Y	Lower	82	31
MainPanel_X	Lower	85	32
MainPanel_Y	Lower	86	33
Range_L	Lower	87	34
Range_R	Lower	88	35
NoteAttack	Lower	89	36
NoteDecay	Lower	90	37
ActionRecordIn	Lower	102	38
ActionMonitorIn	Lower	103	39
ActionNotesOff	Lower	104	40
ActionNotesLatch (sustain)	Lower	105	41
ActionNotesLatch (sustain)	Both	64	64
Reserved (MPE)	Reserved	74	74
Reserved (Seaboard)	Reserved	107	107
Reserved (Seaboard)	Reserved	109	109
Reserved (Seaboard)	Reserved	111	111
Reserved (Seaboard)	Reserved	113	113
Reserved (Seaboard)	Reserved	114	114
ActionNotesOff	Both	123	123

9 LIVE SAMPLING

The Standard/Live-Sampling option dictates how the live audio input to SpaceCraft is managed during input recording.

In standard mode, the audio input button is used as described in section Section6.



When Live-Sampling is enabled, the audio input button is replaced by the following buttons. The record button (picture of a microphone) on the left allows live audio to be recorded directly into memory without leaving the front-page GUI. This is useful for live performance scenarios where live audio input (for example from other instruments or microphones) can be recorded and granularized quickly.

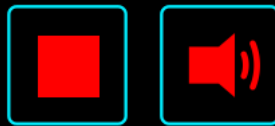


The button on the right is the monitor button. This is equivalent to the monitor button on the audio input panel and simply passes the audio through to the output. Be careful to have headphones plugged in when using this feature to avoid feedback.

When activated (shown below) the record button (left) changes to a stop button. The live audio will continue to record until the maximum duration of

the sample (by default, 2 minutes but can be increased in Global Settings, see Section10) has been completely replaced by the new audio.

When the monitor button is active, it will be red as shows in the image below. Note that the monitor volume passthrough is lower than the input in order to mix better with SpaceCraft's granulated output audio. This can be corrected by increasing gain, as desired, at the output of SpaceCraft at DAW-level.



During live recording the original audio will still be available from the previous live recording action and the new audio will overwrite the previous audio.

After enabling record each time, the range selector will enter a different mode whereby the right-hand side of the range will follow the incoming audio until the user moves the range selector manually. Once the user manually moves the range selector it will switch back to the normal mode and will stop automatically following the latest incoming live recorded audio.

Be careful about granularizing audio too close to the right-hand side (i.e. most recent audio data) as in some cases feedback can occur.

NB: The first time that live sampling is used, you may hear the pitch of the audio already loaded increase or decrease. This occurs when the sampling rate of the previous audio loaded in memory is different from the sampling rate of the device/DAW. Note that this will only occur the first time the record button is pressed.

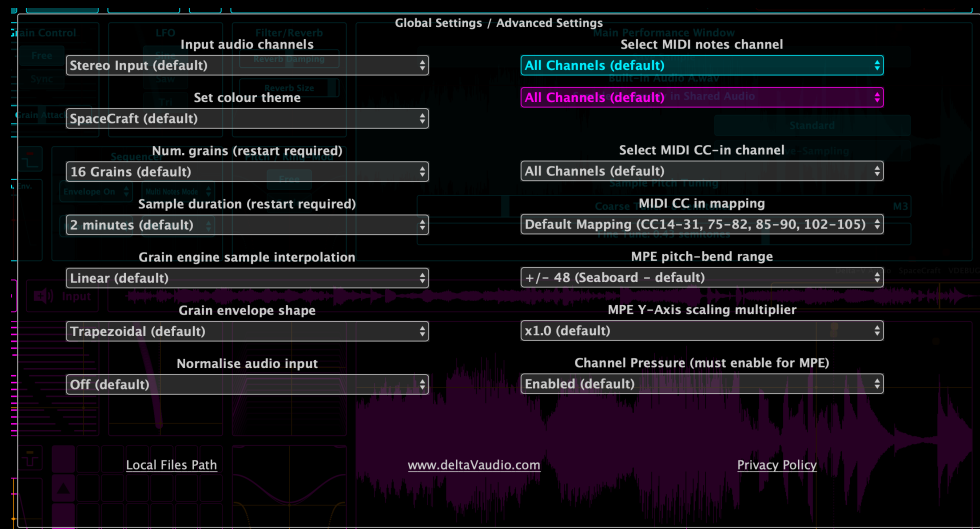
10 GLOBAL SETTINGS PANEL

Global settings control any setting that is independent of the presets/state. In other words, these settings will not be affected when changing presets or loading/saving projects in the DAW. The global settings will be common across all instances of SpaceCraft (between VST2, VST3 and AU for desktop and between standalone, AUv3 and IAA in iOS).

To enter the global settings panel, first click/tap on the settings button (the cog button to the far top-left corner of the interface). Once you enter settings, you will see an additional Global settings button appear just to the right of the settings button. Tapping any button with an 'X' will revert back to the main interface screen.

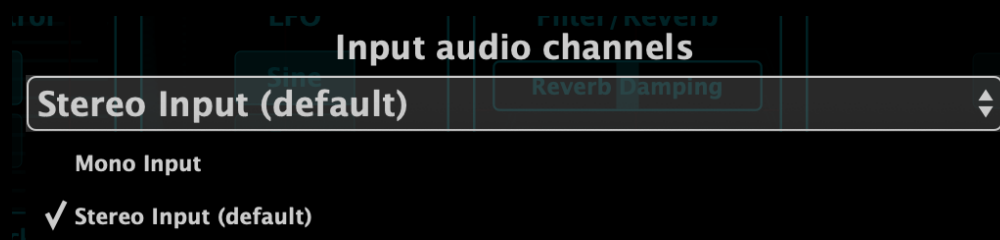


At the bottom left of the Global settings panel is a link (not available in iOS) to open (via explorer/finder for Windows and Mac respectively) the location of the SpaceCraft folder which contains all user Preset and Audio data.



10.1 Global Settings dropdown menu options

SpaceCraft can record any audio that is input via the DAW. In most cases, SpaceCraft will determine the number of input channels and assign appropriately (i.e. if input is MONO, the same audio will be sent to left and right channels). However, in some cases (in particular, iOS), SpaceCraft will apply a Mono input to the left channel only. If this occurs, please select Mono Input option.



Select colour theme from the available options. A light theme (DX2 Turbo) is provided to assist in bright conditions (outdoors on an iPad for example).



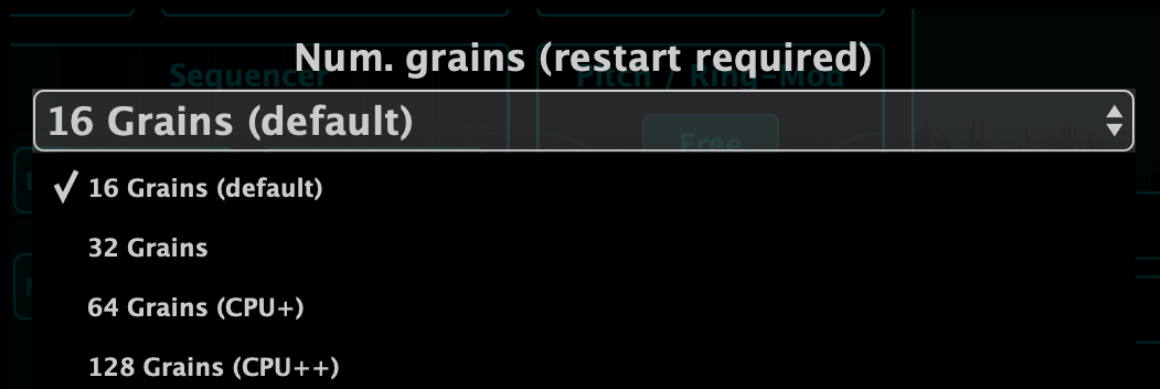
By default, SpaceCraft has 16 grain streams playing simultaneously on each engine (top and bottom, making 32 in total). Adding more grains per engine

can have some significant impact on the sound. As well as allowing more simultaneous sampling of the audio data, using more grains also allows a higher maximum grain firing frequency to be possible as well as greater overlap between the grains. These aspects combined results in a more homogenous and thicker sound, especially in the top-right of the grain panel.

With more grains, it is also possible to have more notes playing simultaneously (e.g. holding down a chord) without losing smoothness in the top-right ‘granular region’ of the grain panel.

Adding more grains has an impact on CPU and a very small increase in RAM usage.

After changing the number of grains please restart SpaceCraft immediately for changes to be applied. This is most easily done by saving your project and restarting the DAW.



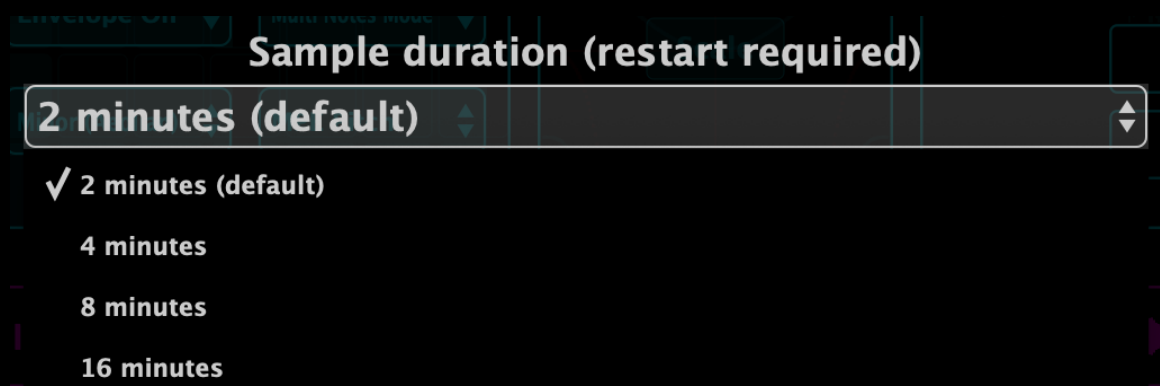
By default, there is a 2-minute limit on the size of the audio sample that can be loaded into memory for both engines. This also applies to the limit of audio recorded into spacecraft using either standard recording or the live sampling feature. If you attempt to load a sample which is larger than the selected duration, SpaceCraft will truncate to the first 2 (or whichever is selected) minutes.

Optionally, the user can increase the number of minutes of audio data. This can be useful for exploring large field recordings or soundtracks, for example.

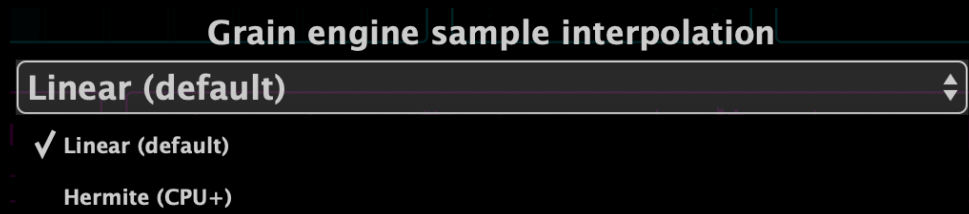
A restart of SpaceCraft is required in order for the new sample duration to be activated.

NB: increasing the sample duration requires extra RAM, if your device is close to the limit of RAM available, then SpaceCraft will not start-up and in some rare cases may crash the DAW. If this occurs, SpaceCraft will automatically revert to the minimum sample duration and give the user an alert dialog upon the next start-up. When increasing sample duration, it is strongly recommended that the user not have unsaved work on the DAW project.

If a preset has been saved when using a longer sample duration, it may not be able to load correctly in an instance of SpaceCraft where the sample duration is shorted (i.e. when the play-head or range are were beyond the current sample duration limit). If this occurs, the user will receive a warning dialog and the play-head/range limits will be truncated as necessary.



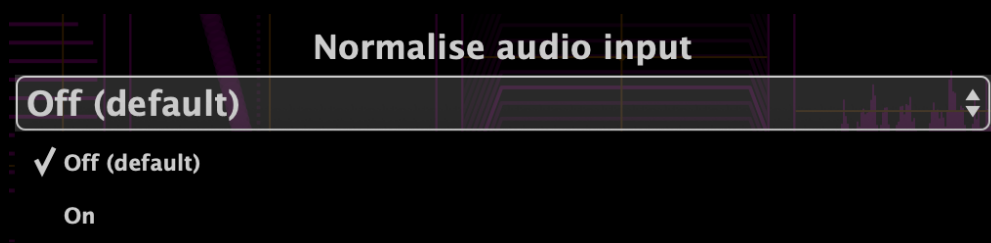
Setting grain engine sample interpolation to Hermite uses a more advanced sample interpolation algorithm with a subtle improvement in audio quality. In most cases this will not be noticeable but is particularly apparent when sampling audio at very low pitch relative to the original pitch.



Setting the grain envelope shape to Hann also results in a subtle improvement in audio quality. This uses a smoother grain envelope shape which can result in significantly reduced audio artefacts when grain duration is very short.



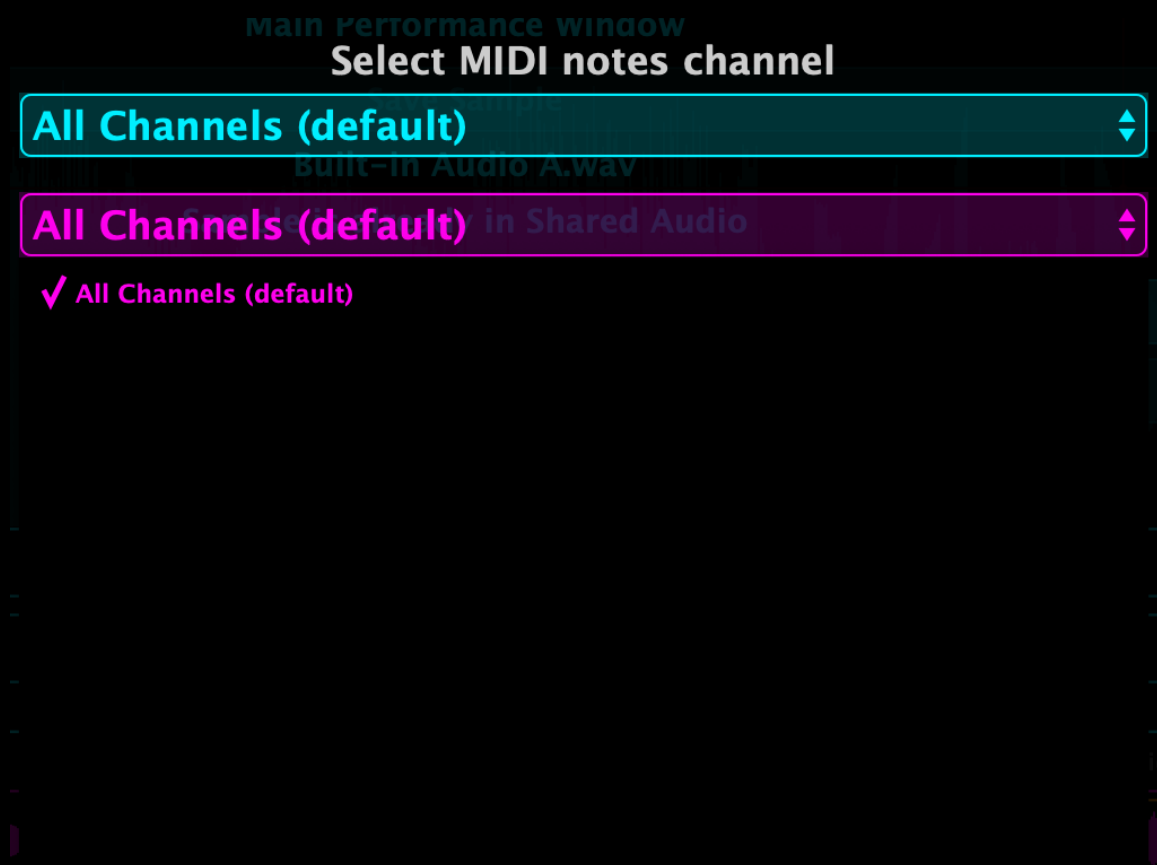
By default, audio input to SpaceCraft either via audio file import, standard input recording, live sampling or loading of presets will NOT be normalised (i.e. original volume of sample will be preserved). Setting normalise to on will normalise all audio except for live sampling audio. Note that to avoid internal clipping, SpaceCraft output levels are slightly lower than the input audio (either files or live recorded audio). Boosting gain of the output audio of SpaceCraft in the DAW can be used to achieve desired levels.



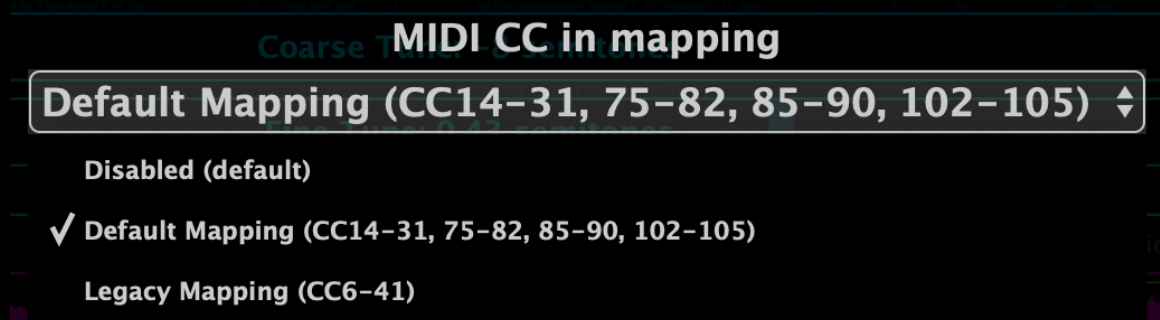
As well as entering via the screen, notes on the grid can be played via a MIDI or MPE device. The user can select which MIDI channel is sent to either top or bottom engines. This can be set to All Channels (default), a single channel, or no channels (i.e. all incoming MIDI notes are disabled for that engine). This can be useful in several scenarios, including:

1. It is desired that one (or both) of the engines is not affected by incoming midi notes (i.e. disable MIDI notes to that channel)
2. When two MIDI controllers are used, each sent to a different engine; here, the top engine can be assigned to channel 1 (first MIDI controller), and bottom engine can be assigned to channel 2 (secondary MIDI controller)

NB: if using MPE it is necessary to have 'All Channels' selected, otherwise erratic note behaviour will occur.

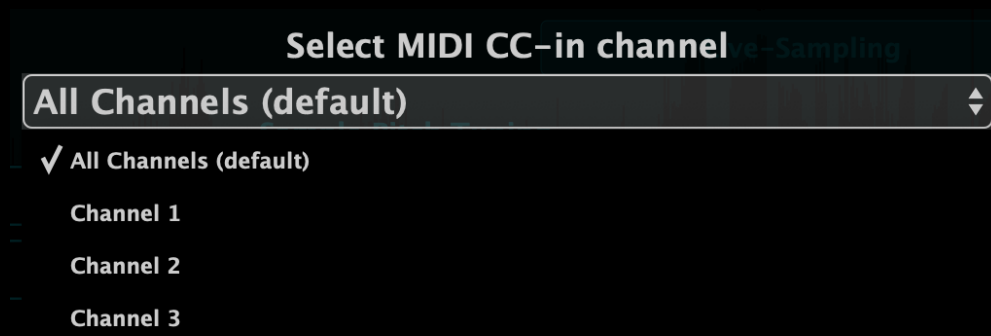


SpaceCraft has optional pre-mapped CCs (see Section 8.1 for CC mappings) which are assigned to the main controls. When using SpaceCraft in a DAW, parameters can be manipulated via DAW automation in general; therefore, it is typically not necessary to utilise this pre-mapped CC functionality. For this reason, pre-mapped CC have been disabled by default in the desktop VST/AU version of SpaceCraft. Pre-mapped CC can be useful in some scenarios: iOS standalone or when using being controlled by another instrument which has pre-mapped CC outputs, such as GEOSHRED.

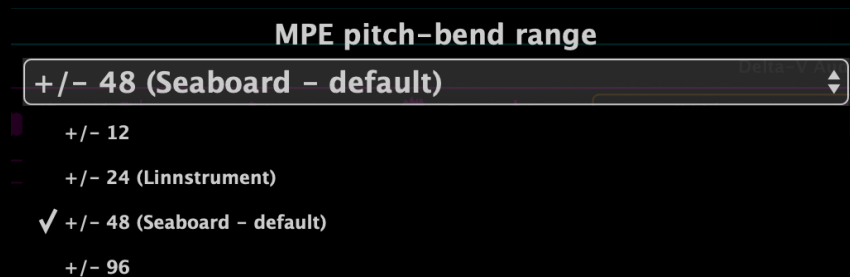


In a similar fashion to the notes-in channel option (above), the MIDI CCs in channel can be selected. Note that a single channel of MIDI CC can be used to control both engines.

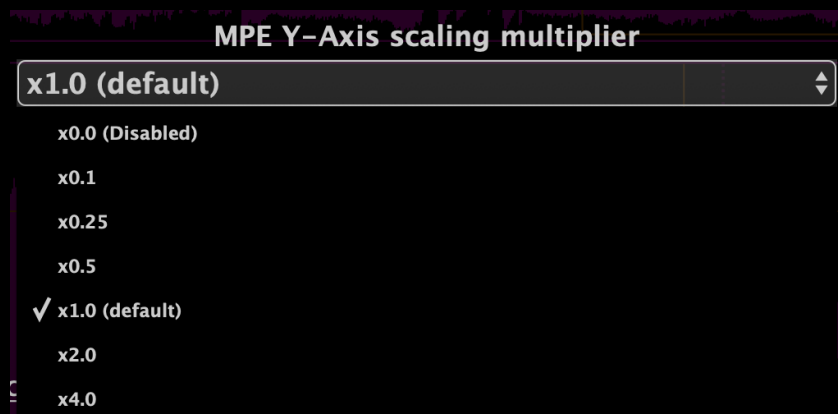
MIDI CC in is used to control global functions such as note sustain, or all notes off applied to both engines as well as per-engine functions such as the XY-pad position of a specific engine.



When using MPE, the left/right (known as ‘glide’ or referred to as x-axis) controls pitch-bend. Depending on the MPE instrument, the pitch-bend scaling factor can vary. For example, the Roli MPE instruments have a default of ± 48 pitch-bend scaling whilst the Linnstrument requires a pitch bend scaling of ± 24 . Setting this parameter correctly will ensure that when you bend from one note location to another on the MPE device, the note pitches will be consistent.

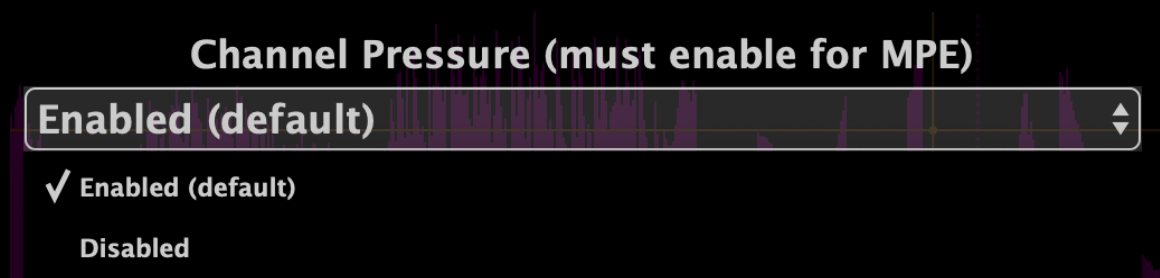


When controlling SpaceCraft with an MPE device, Y-axis (or ‘Slide’, or backwards/forwards on a Roli Seaboard) controls the grain position. This acts similarly to the LFO where the grain position in the sample is modulated with respect to the play-head current location. Using this approach, the user can play different regions of the sample by moving a note in Y-axis dimension (refer to Section8). This option allows scaling of the distance of the position modulation from the play-head. Setting this to zero essentially disables Y-axis position modulation completely.



In order for MPE to function correctly, SpaceCraft is constantly listening (by default) to channel pressure (Z-axis MPE control). The channel pressure controls the loudness of each note being played.

However, some non-MPE devices are also capable of broadcasting channel pressure; for example, the Komplete Kontrol range of keyboards. In this example, when using a Komplete Kontrol MK1 keyboard with SC, pressing harder on the keys will send channel pressure signal to SpaceCraft which will affect the volume of the notes. This can sometimes be desirable but not always, depending on the playing style. To account for this, the options has been included to completely ignore channel pressure input. Note that when using MPE device this must be set to Enabled for correct behaviour.



11 MAC / WINDOWS DAW SPECIFICS

11.1 Desktop Windows/Mac VST/AU

This section captures specific details pertaining to usage in various DAWs. If you feel that something is missing from this section, please contact the developer at deltavaudio@gmail.com.

11.1.1 Ableton Live

11.1.2 Waveform 9/10

Some versions of Waveform 9 convert incoming MPE channel pressure data to aftertouch. In which case, MPE will not function correctly.

11.1.3 Cockos Reaper

It is recommended to load SpaceCraft as an FX in Reaper. Loading SpaceCraft as an instrument

11.1.4 Cubase / Cubase Elements

SpaceCraft can be found in Cubase/Cubase Elements in the category ‘other’

When using SpaceCraft in Cubase as an Effect, no grains will play until audio input is fed into SpaceCraft. This is a feature of Cubase which disables effects until they are being used. However, this is not always appropriate for SpaceCraft as the user may desire to use it without live audio input when loaded in an effects slot (i.e. insert). In this case, it is possible to disable this feature of Cubase and force all effects to play regardless of audio input. To disable this, go to preferences->VST->plug-ins->Suspend VST3 plug-in processing when no audio signals are received.

11.1.5 Logic Pro X

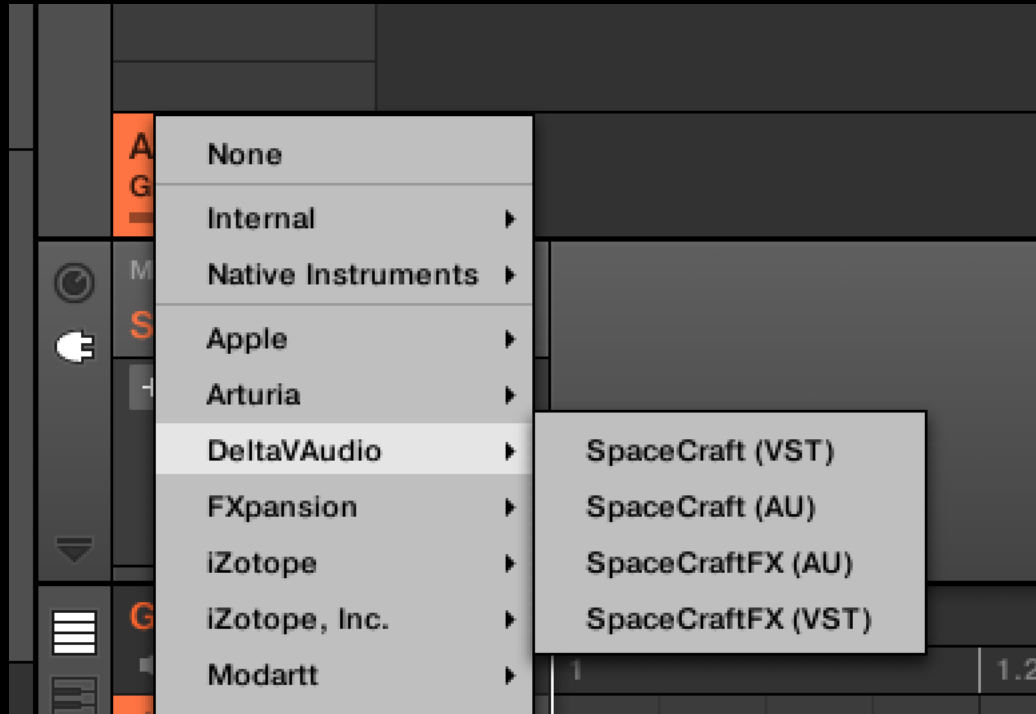
11.1.6 Garageband

11.1.7 FL Studio

11.1.8 Bitwig Studio

11.1.9 NI Maschine

SpaceCraft is not currently an NKS instrument. However, you can run SpaceCraft inside Maschine by loading it as an insert in a group or sound.



11.1.10 Studio One 4

11.2 iOS Daw/Host specifics

In general, if live audio input (either standard recording or live sampling recording) then it is required to load SpaceCraft as an AUv3 Effect and not an instrument. AUv3 Instruments do not have the capability to receive audio input.

11.2.1 AudioBus

11.2.2 AUM

11.2.3 ApeMatrix

11.2.4 Blip Interactive Nanostudio

11.2.5 Intua Beatmaker 3

11.2.6 FL Studio Mobile

11.2.7 Stagelight

11.2.8 Audio Evolution Mobile

11.2.9 Auria Pro

11.2.10 Cubasis 2

It is not possible to record the output of SpaceCraft into a Cubasis track. To this you need to route SpaceCraft through AudioBus and back into Cubasis.

11.2.11 Garageband

SpaceCraft can only be loaded as IAA Effect in the iOS version of Garageband. Please, switch to the Effect tab when searching for SpaceCraft IAA.

Note that when using in Garageband, the output will be muted by default unless headphones are plugged in. This appears to be a precaution of Garageband for Effects to avoid feedback (however, such feedback would not occur by default with SpaceCraft input the monitor feature was enabled in SpaceCraft). Use headphones or any other speaker etc. when using with Garageband to unmute the output.

12 USING SPACECRAFT WITH OTHER APPS/VST

12.1 GEOSHRED

GEOSHRED is an AUv3 compatible iOS app which can be used to control SpaceCraft via MPE. This can be used to control iOS SpaceCraft inside an AUv3 host. Also, you can use GEOSHRED on iOS to control the desktop VST/AU version of SpaceCraft.

For the iOS version of SpaceCraft, simply load the GEOSHRED preset.

For the Desktop version of SpaceCraft, any of the SpaceCraft MPE presets are compatible with GEOSHRED.

When controlling SpaceCraft with GEOSHRED it is recommended to use the dedicated ‘MIDI OUT SpaceCraft’ preset within GEOSHRED to ensure maximum compatibility.

In order for the additional controls at the top of the GEOSHRED interface to work with SpaceCraft you must enable the default CC mapping in SpaceCraft Global Settings (on by default on iOS SpaceCraft, off by default on desktop SpaceCraft).