KNOBULA

Pianophonic

Instruction Manual

Version 0.7.18

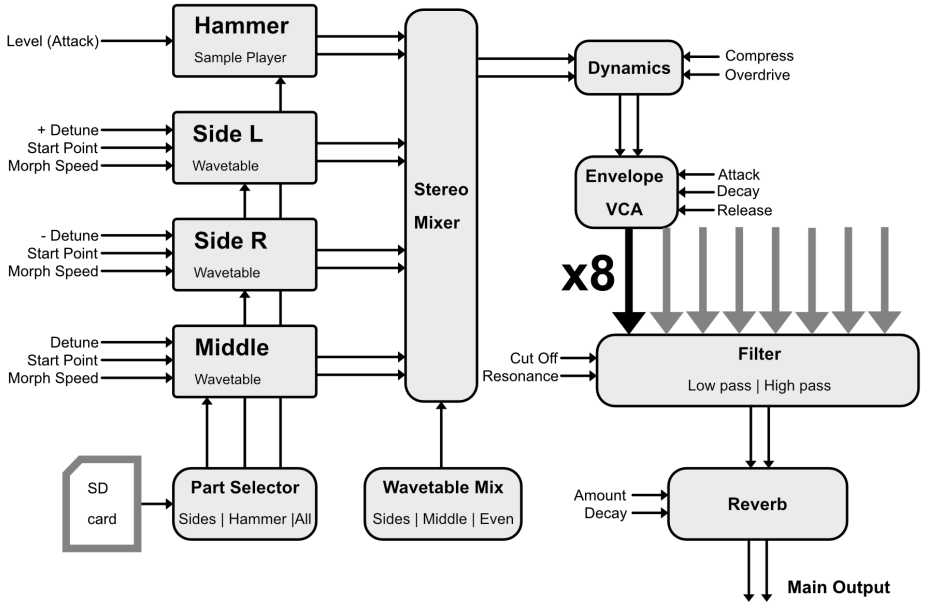
Contents

Introduction

Pianophonic is a wavetable synthesiser like no other, it takes its inspiration from the three stringed hammer action of the traditional piano by featuring 3 wavetable oscillators and a sample based playback engine, per voice. This hybrid oscillator combo allows you to create harmonically rich and evolving sounds together with an added percussive hit at the start. Not limited to piano sounds, the SD card included with the module features many key mapped wavetables derived from a variety instruments including four types of acoustic piano, electric piano, guitars, tuned percussion, and several classic synthesisers as well as useful sets of harmonic waveforms. You can also upload your own sounds to Knobula's Waveslicer tool, enabling you to create your own custom sounds for Pianophonic.
With the power of multi-oscillator wavetable synthesis in combination with the percussive detail of sampled hammer sounds Pianophonic gives you a hands on circuit bending experience of 90s piano sounds, as well as direct one knob per function access to 1000s of unique wavetable based synth sounds that can be modified and combined amongst the different sound sources and playback engines.
As with all Knobula products, Pianophonic is performance orientated and all of its essential functionality has dedicated controls, allowing you immediate fingertip access to everything that matters.

Schematic Diagram

The diagram below is a visual representation of the internal architecture of Pianophonic showing the sound sources and signal flow through the module.



SD Card

Each Pianophonic module comes with an SD Card preloaded with the standard Pianophonic sound library containing the following sounds.

Selector	Wavetable	Hammer
1	Grand Piano	Grand Piano
2	Upright Piano	Upright Piano
3	Bright Piano	Bright Piano
4	Felt Piano	Felt Piano
5	Toy Piano	Toy Piano
6	Wurlitzer Piano	Wurlitzer Piano
7	DX Piano	DX Piano
8	Tom's Acoustic	Picked Guitar
9	Ingleby Strat	Picked Guitar
10	Glockenspiel	Glockenspiel
11	Vox Humana	Breath
12	Pulse Width Synth	Kickain Bass
13	SynthWave	PluckWave
14	Wavetables A	SH-3 Bass
15	Wavetables B	Xylophone
16	Wavetables C	Organ Percussion

Any SD card can be used to store sounds so you can create your own custom cards featuring different selections of wavetables and presets. All settings and preferences, including midi channel and presets are stored on the card in a settings file.
SD cards are not hot-swappable, a restart is required.

Getting Started

Power

Connect the unit to a standard Eurorack +- 12v power supply using the ribbon cable provided.

Midi

Connect the Midi In to the Midi Out of a keyboard or a midi controller such as Chord Pilot. A stereo trs A to midi 5 pin din cable is provided for connecting a standard midi instrument to the unit.

CV Gate Connections

If not using Midi to control pianophonic, connecting a gate signal to gate input allows you to trigger notes stored in the chord memory and a CV voltage can be connected to the V/Oct in to change the chord’s pitch and the overall pitch of the unit.

Initialising the Controls

In order to enjoy Pianophonic at its best, try to set up the controls as shown below in order to get a good initial sound that is faithful to the samples and wavetables from which it was derived. Only then should you begin your sonic explorations.

Controls

Attack Knob

Sets both the level of the hammer sample and the wavetable attack time. When the knob is rotated fully anti-clockwise to zero position only the hammer is audible, as you turn the knob to the right it crossfades into the wavetable oscillators. At the centre the attack is zero, the wavetable is 100% and the hammer is silent, turning still further to the right increases the attack time of the voice without the hammer.

Decay Knob

Sets the overall decay of the sound whilst a note is held down. Turning the control fully clockwise will sustain the envelope forever. Some sounds such as the pianos are set to automatically decay faster for higher notes and longer for lower notes.

Release Knob

Sets the release time of the envelope. Turning the control fully clockwise will cause the envelope to drone indefinitely after a key is released.

Part Selector Control

The Part Selector Control lets you choose the source sounds for your hammer and wavetable combinations. Choose from 16 different sample and waveform collections stored on the SD card.

Loading All Oscillators With Wavetables and Samples

First make sure the toggle switch is set to All.
Now turn the selector knob to the desired number and wait a split second before the sound starts to load. The trigger LED will flash while the sound is loading, this can take between 0.1 to 2 seconds depending on the size of the sound file being loaded and the number of key mapped wavetables it contains.

Loading Just Side Oscillators

Set the Part selector toggle switch to Sides, this will load 2 out of 3 of the oscillators, leaving the middle oscillator and the hammer intact. The side oscillators are normally panned left and right.

Saving Presets

Favourite combinations of hammers, wavetables and knob settings can be saved to any of 16 different memory slots. To save a preset first hold down Shift and rotate the Part Selector Knob to a destination number (if you want to save it to the currently selected slot just wiggle the knob once back and forth) and, while still holding down Shift, long press the Trigger button until it flashes.

Recalling Presets

Hold down Shift and select a number, release Shift and the saved preset will load. Note; The control positions will no longer reflect the actual settings of the sound.

Part Selector Switch

Use the Part Selector Switch to control which element of the sound you wish to load in when you turn the part selector knob.

All

Loads sounds for all oscillator types: hammer samples, middle and side wavetable oscillators and if recalling a preset (by holding Shift) loads all the knob and switch positions.

Hammer

Loads only the hammer samples.

Sides

Loads in wavetables for the side oscillators only, leaving the middle oscillator and hammer intact.

Trigger Button

Chord Trigger

The trigger button manually triggers the most recent note or chord played. This button also blinks when a note is triggered from elsewhere or when a midi channel is changed or a chord memory slot is changed.

Save Settings (Shift)

To Save the current settings of Pianophonic, hold Shift and briefly press Trigger. This will save current fine tune, midi channel and reverb decay values to the SD card.

Start Point Knob

Start Point - Forward | Reverse

Sets the position in the wavetable from where Pianophonic will begin playback. In the centre position it will play the wavetables from the very start and continue to the end before looping. As you turn the knob clockwise it will start playing the wavetable at a later point in the table. Turning the knob to the left of centre will perform a similar function only it will play in reverse back to the start and continue forwards to the loop point..

Morph Speed Knob

Morph Speed

Controls the rate at which the individual waveforms are played through the wavetable. This can seemingly stretch or shrink the sampled sounds and can ultimately freeze a waveform in place, at this point the Start Point control allows you to select a static oscillator waveform.

Midi Channel (Shift)

Hold Shift and turn Morph Speed Knob to change midi channel, each time a channel changes the Trigger Button will blink. Options are Omni (all channels) then 1 through 16.

Wavetable Mix

There are 3 wavetable oscillators that are divided into two types; the side oscillators, which are usually panned left and right, and the middle oscillator in the centre. This switch lets you set which of these types is the loudest. Depending on stereo panning, detune and overdrive settings this can have a major effect on the sound.

Sides

The side oscillators dominate the mix which also increases the stereo field.

Middle

The middle oscillator is more dominant and extreme detuning is more audible.

Even

All three oscillators have the same loudness.

Dynamics Knob

Compress | Overdrive

Many of the wavetables are sampled from real world sounds such as pianos and thus contain a natural envelope that is preserved in the wavetable. Turning the control clockwise negates this natural envelope and in the centre position Pianophonic will playback each waveform at the same level, similar to the operation of an extreme audio compressor. Turning the control still further to the right will cause the waveform to be overdriven by a tube distortion algorithm. This effect happens on each voice individually, so even the most extreme overdriven voices will still decay according to the envelope generator and sounded chords will not intermodulate with distortion.

Output Gain (Shift)

Holding Shift allows you to trim the output gain of the sound. Whilst this should generally be left untouched to prevent internal distortion, there are times when a sound needs a boost, perhaps if it is only ever played monophonically or it is composed of a quieter section from a wavetable. This value is also stored with a preset.

Filter Knob

Cut Off frequency - Lowpass | Highpass

This is a ‘DJ’ filter routed to the stereo output.Turning the Filter Knob to the right of centre sets the cut off frequency for the high pass filter and turning the knob to the left of centre sets the cut off for the low pass filter. In the centre position the filter is bypassed.

Resonance (Shift)

Hold down Shift to set the resonance of the filter.

Detune Knob

Detune

Knobula’s classic detune control as featured in Poly Cinematic is used here to easily tune between Unison, Fifth and Sub-Octave. Turned fully anti-clockwise the three oscillators are perfectly in unison and in phase with each other and operate as if they were a single oscillator. Turning the control clockwise will begin detuning the two side oscillators until eventually the middle oscillator drops to a fifth and finally to a sub octave.

Temperament (Shift)

Also featured on Poly Cinematic. Holding Shift and turning the Detune Knob allows you to increase or decrease the temperament, or microtuning, of the notes in the scale. At the default setting (Knob pointing at about 9 o’clock) Pianophonic will subtly alter the tuning of the notes according to their relationship with other notes, so for example two notes played

an octave apart will be tuned or ‘stretched’ slightly apart so you would hear a slow phasing ‘beat’ instead of hearing that static digital oscillator sound. More extreme settings will sound completely out of tune.

Pitch Knob

Pitch

Sets the base pitch of all 8 voices up to +/- one octave in semitone intervals. Care should be taken when using external CV together with this control since the upper limit for tuning the wavetables is +1 octave, there is no lower limit.

Fine Tune (Shift)

To fine tune the unit, hold down Shift to tune in smaller increments of +- 50 cents.

Reverb Knob

Reverb Amount

Adds a 24bit stereo reverb to the output. The knob sets the reverb send amount. Hold down shift to alter the decay time.

Decay Time (Shift)

Adjust the decay time from zero up to 10 seconds.

Voice Mode

Poly | Mono

Pressing Voice Mode makes Pianophonic into a mono synth, or a chord playback device depending on what notes were last pressed in poly mode. A red led indicates that Mono Mode is active.

Chord Memory

Storing Chords

Pianophonic is constantly recording the last chord you played into the current chord memory, every time you play another chord it overwrites the previous chord. In order to stop overwriting a chord you need to change the active chord memory. The current active chord memory can be changed either by altering the Modulation value (midi) or by applying a voltage to the Chord Select (cv). To keep a chord permanently even after a power cycle, hold down Shift and press Trigger briefly to store the chord set.

Chord Playback

Once you are happy with the chords stored in the 8 chord memories, they can be played back using a combination of Chord Select and V/Oct to control chord type and chord pitch respectively. It should be noted with Pianophonic that even though most presets are multisampled across the keyboard span, when altering the pitch over CV the samples and wavetables assigned to each note will retain their original source sounds and will not retrigger different sounds as the pitch changes, this only happens when playing discrete notes over midi. So V/Oct behaves much like a pitch bend control.

Control Inputs and Outputs

Midi Input

Connect the Midi In to the Midi Out of a keyboard or a midi controller such as Chord Pilot. A stereo trs A to midi 5 pin din cable is provided for connecting a standard midi instrument to the unit.

Gate Output

A gate signal is sent to the Gate Output whenever a midi gate is received. This allows for ‘paraphonic’ expansion of the module, so external envelopes and filters can be patched into the sound.

Gate Input

Connecting a gate signal to Gate Input allows you to trigger notes stored in the chord memory. Together with the Chord Select CV and the CV Input Pianophonic can be used in a CV Gate workflow to play a wide variety of polyphonic parts.

CV Input

If not using Midi to control Pianophonic, a CV voltage can be connected to the V/Oct in to change the chord’s pitch and the overall pitch of the unit.

Start Point (CV A)

Alter the starting position of the wavetable.

Chord Select (CV B)

Any of the 8 chord memory slots can be activated by applying a 0-5v signal to this input. Chord select can always be operated over midi using the modulation depth control, even if the CV is assigned elsewhere.

Custom Assignable CV Inputs

You can customise which parameters the CV inputs control on your Pianophonic device. By default, they control specific functions (Start Point and Chord Select), but you can change these assignments to suit your needs by following the steps below. The red LED flashing behaviour serves as an indicator of the mode you are in and the assignments you are making.
Once you have assigned a CV control to a knob, the knob is still active and works as an offset to the incoming CV, so it may be necessary to turn the knob to zero to get the full effect of the incoming CV.

Entering CV Assignment Mode

Press and hold the Shift and Voice Mode buttons simultaneously for 2 seconds.
This action enters the mode where you can assign CV inputs to different controls.

Assigning CV A

After entering CV Assignment Mode, the LED begins flashing, the device is now ready to register a new assignment for CV A. To assign CV A, simply turn or 'wiggle' any knob on the Pianophonic you want CV A to control. Once you do this, the device acknowledges the new assignment for CV A. You'll notice a change in the LED behaviour (it starts flashing faster) to indicate this.

Assigning CV B

After assigning CV A, you have two options:
If you want to assign CV B as well, wiggle another knob while the LED is flashing. This action assigns that knob's function to CV B.
If you do not want to assign CV B, simply wait. The LED will stop flashing after a short period, indicating that CV Assignment Mode has exited. In this case, only CV A will have a new assignment.
Assigning CV B Only:
If you want to skip assigning CV A and directly assign CV B, enter CV Assignment Mode by holding Shift and Voice Mode for 2 seconds. When the LED starts flashing, press Shift again. This skips the CV A assignment and the LED starts flashing faster to indicate this. Now, wiggle the knob you want to assign to CV B.

Midi CC

Pianophonic's parameters can be accessed over midi using midi CC messages.
This table lists the message numbers to access each parameter along with other useful information to help you set up remote control of the device.

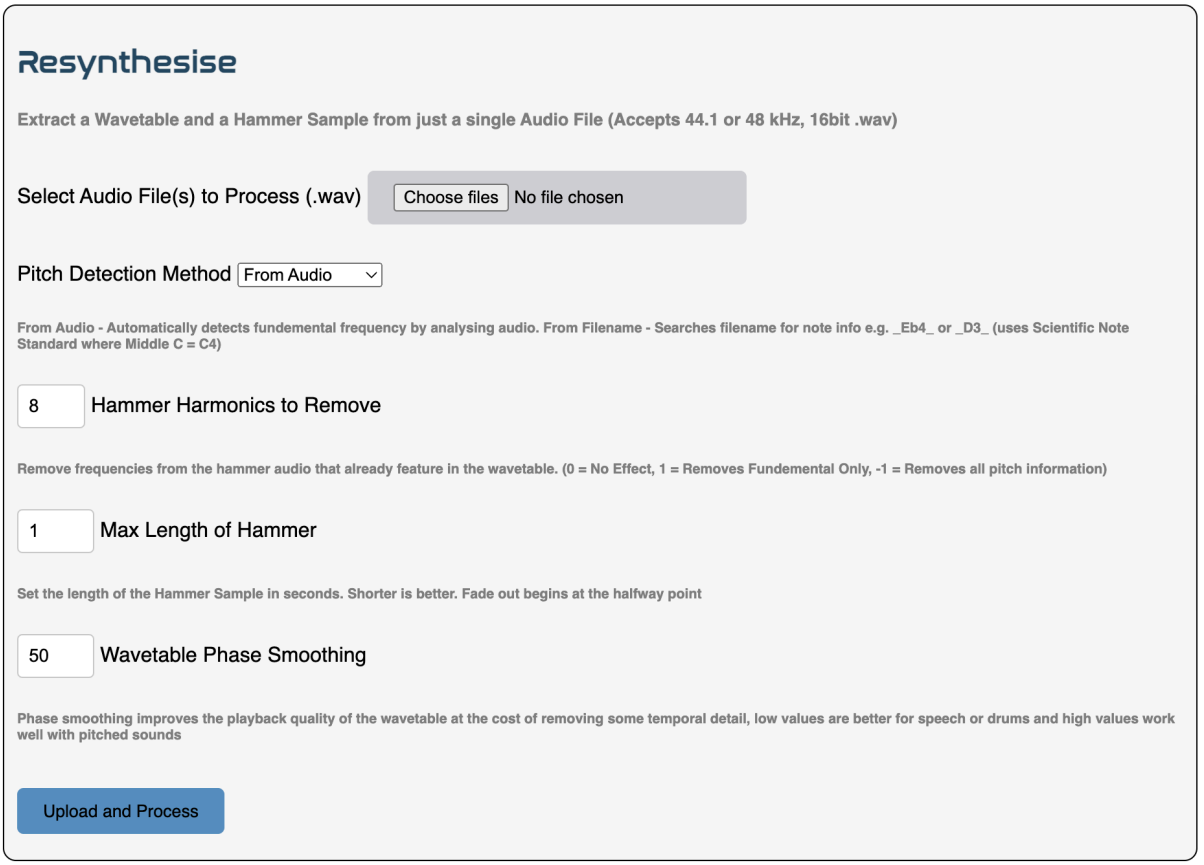
Parameter Table

Parameter	Midi CC	Hardware Control	default	stored	CC value 0	CC value 127	Notes/Math
All sounds off (Panic)	120	Press Trigger button fast 4 times	-	-	Trigger	-	Forces all voices off ignoring release time
Chord Select	1 (Mod wheel)	CV input	-	no	Select chord slot 0	Select chord slot 8	
Attack Offset	73	Dedicated Pot	-	no	Biploar offset to knob value		
Decay Offset	75	Dedicated Pot	-	no	Biploar offset to knob value		
Release Offset	72	Dedicated Pot	-	no	Biploar offset to knob value		
Filter Offset	74	Dedicated Pot	-	no	Biploar offset to knob value		
Detune Offset	94	Dedicated Pot	-	no	Biploar offset to knob value		
Start Position Offset	78	Dedicated Pot + CV	-	no	Biploar offset to knob value		
Morph Speed Offset	77	Dedicated Pot	-	no	Biploar offset to knob value		
Reverb Send Scaling	92	Dedicated Pot	-	no	mute	+9dB	Additional scaling factor on reverb send path. 64 is unity gain
Main Volume	7	n/a	100	yes	mute	+9dB	Additional scaling of output signal (100 is unity gain)
V/Oct Slope	23	n/a	64	yes	1.10V/Oct	0.91V/Oct	Adjust the sensitivity of the V/Oct input. 64 is 'exactly' 1V/Oct
V/Oct Offset	24	n/a	64	yes	-100 cents	+100 cents	Adjust the static offset to be applied to the V/Oct input. 64 is no offset.

Waveslicer

Introduction

Waveslicer is an online set of tools for creating custom user generated sounds for Pianophonic. The suite currently comprises two parts, Resynthesise and Create Preset. Together these form part of a simple 2-step workflow for generating wavetables from audio files and then compiling them into presets that can be stored on Pianophonic's micro SD card.



Resynthesise

Step 1. Resynthesise takes an audiofile or series of audiofiles and converts them into pairs of wavetables and hammers, the hammer being a sample. Waveslicer automatically calculates the fundamental frequency of the audio file before slicing it into a wavetable and it also extracts the non-harmonic elements of the sound into a hammer sample. These two elements - wavetable and hammer sample - form the basis of each Painophonic sound. There are no restrictions on how these elements are created, wavetables can be created by any number of specialised programs such as Tone2's Icarus synthesiser so long as they are saved as a .wav in the popular Nx2048 wavetable format. Hammers are simply audio

samples and can be created in any number of audio editors but the hammers created by Waveslicer are designed to complement the wavetable sound.

Select Audio File(s) to Process

Choose the file or list of files you wish to process.

Pitch Detection Method

From Audio. Automatically detects the fundamental frequency. Works on most sounds, but less reliable on metallic sounds or low pitched sounds.
From Filename
Looks for note names inside the filename like xxxx_C3.wav or xxxx_Ab2.wav. Uses the Scientific note name standard where Middle C = C4. Some sample libraries (including Spitfire) do not adhere to this standard which may require samples to be renamed first.

Hammer Harmonics to Remove

Select how many of the harmonics you want to remove from the audio file to make the hammer sound, the more harmonics that are filtered out the less ‘tuneful’ the hammer sounds. The hammer should ideally just contain the non-pitched percussion element of the sound and any random noise. 0 = No Effect, 1-32 = Removes Fundamental and N x Harmonics, -1 = Removes all pitch information.

Max Length of Hammer

Adjust the length in seconds for the hammer sample before it fades out.

Wavetable Phase Smoothing

The wavetable algorithm can smooth out the changes in the sound to make it better for slicing into individual waveforms, however some of the temporal detail of the sound can be lost with higher settings.

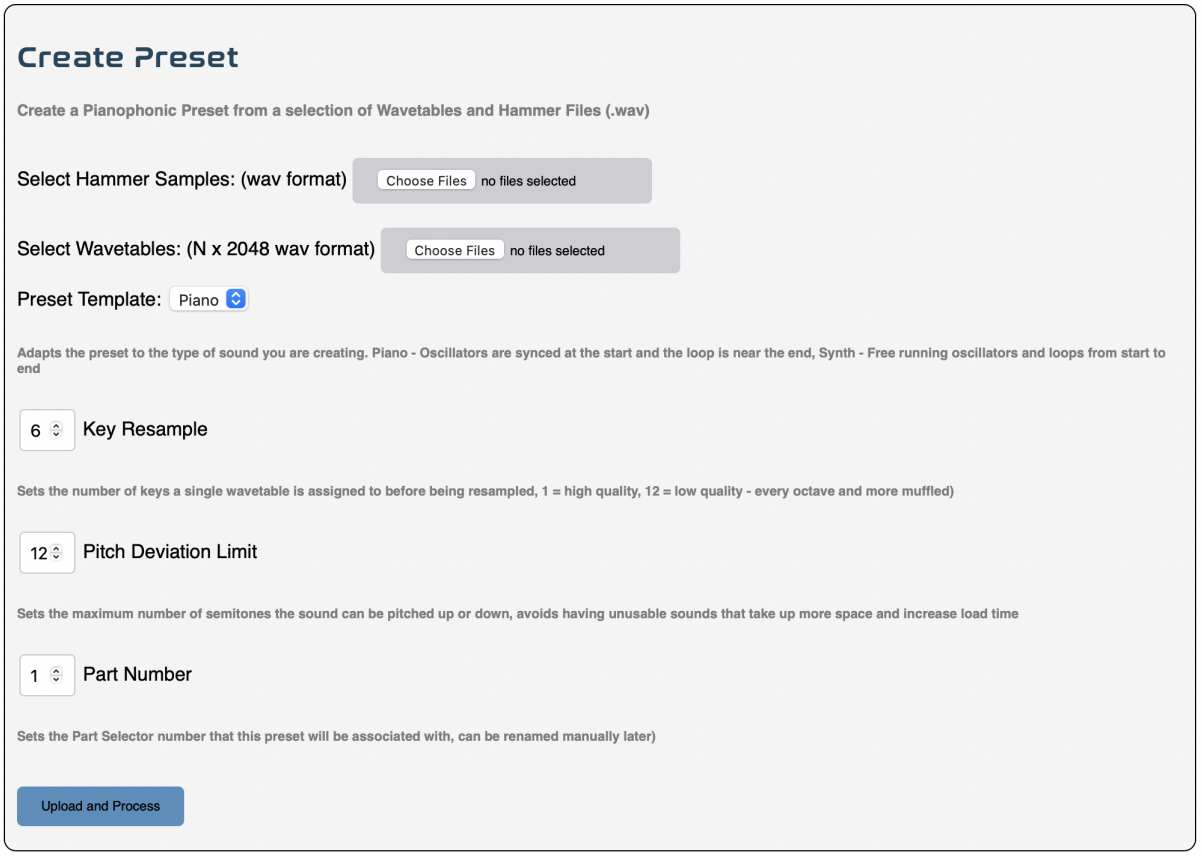
Upload and Process

Depending on your connection speed and the number of files uploaded at a time this can take a few seconds or a few minutes. After the files are processed you will be taken to the downloads section. There you can download the processed files, make any edits or changes before moving on to stage 2.

Create Preset

Step 2. Create Preset will take hammer sounds together with wavetable files and create a “.pfon” preset for playing back on the Pianophonic module from an SD card. You can add just a single wavetable or you can load a large set of hammers and wavetables, Waveslicer

will automatically zone the samples across the keyboard based on the Pitch Detection Method used in Resynthesise by reading the Hz value burnt into the filename. If you didn't use Waveslicer for the first stage or you have altered the filenames then your sounds may not be correctly mapped across the keyboard.



Select Hammer Samples

Select one or any number of hammer audio samples in mono 16 bit .wav format.

Select Wavetables

Select one or any number of wavetables in N x 2048 wav format. The wavetable file is usually provided by the Resynthesise function above but it can be from any compatible software such as Tone2's Icarus. However it is important that the wavetable filename includes a reference to its root frequency e.g. SoftPiano_440Hz.wav otherwise it will default to C4 (middle C).

Preset Template

The preset template sets up a template for the type of sound you are converting. There are currently two types. Piano which will thin out the number of wavetables used and will set the oscillators to all sync at the start of the note, Synth will instead leave the wavetable as is and will also leave the oscillators free running. You can experiment with both presets as they dont strictly need to be used for Piano or Synth but it helps.

Key Resample

Sets the minimum number of keys a wavetable/hammer sample is played before being resampled. This is a trade off between load time and quality, if you want a single wavetable to sound bright across the whole keyboard choose a low number such as 3, if you don't intend to pitch the sound far beyond its root note then pick a higher number such as 12 which will only resample on each octave. In some cases this will produce a duller sound at lower pitches. Higher quality settings will increase preset load times.

Pitch Deviation Limit

Sets the maximum number of semitones the sample/wavetable can be mapped across the keyboard beyond its root note. This avoids having unusable high pitched bass sounds that can take up more memory and increase load time

Part Number

This names the file according to a convention which will ensure the sound is loaded with a given preset number. This can easily be edited afterwards. Note - Each preset number on the SD card must be unique from 1-16, duplicated numbers will not load.

WARRANTY

This product comes with a one-year guarantee starting from the product's original purchase date and covers any manufacturing defects or other functional deficiencies that may arise during the warranty period.

The warranty does not apply in case of:

- Damage caused by misuse
- Mechanical damage arising from careless treatment (dropping, vigorous shaking, mishandling, etc.)
- Damage caused by liquids or powders penetrating the device
- Heat damage caused by overexposure to sunlight or heating
- Electric damage caused by improper connection

This warranty covers replacement or repair only where we deem it is reasonable. Please contact us or your dealer via email to obtain an RMA number. Shipping costs of sending a module back for servicing is paid by the customer. Warranty parts and replacements can only be sent to addresses in the country where the item was purchased.

Device complies with all EU regulations concerning RoHS lead-free manufacturing and WEEE disposal.