

SonicProjects

# OP-X

V-Machine Edition



[www.sonicprojects.ch](http://www.sonicprojects.ch)

## Introduction

Congratulations on the purchase of the SonicProjects OP-X VM!

This is a specially adapted version for exclusive use within the SM Pro Audio V-Machine. Have a look at page 3 for details on the adaptations.

The technical structure of this synth is quite unique. The engine is based on six totally independent voices which correspond to the voice boards of the original godfather. There's no voice cloning used to achieve polyphony as it is usually the case in vst instruments. Like in the real analog hardware, each voice is built separately, each voice has its own signal path and each voice differs slightly in its parameter settings and sound - as it is present too in the original. This imperfectness was one of the main reasons for the organic and lively character of the old faithful original.

Although this is a great thing for some sounds (especially pads), it's not so great for others (brass, fm, ...). While you had to tune the voice cards of the original by trimpot adjustments, the voices of the op-x can be tuned by the touch of four global buttons - separately for oscillators, filters, envelopes and portamento times. The original did just provide an autotune button, which tuned the oscillators. The rest was influenced by temperature and aging processes.

With the the op-x, you get total control over the tuning - as you might have wished it from any analog synth of the past - without missing the organic feeling. You can mix tuned oscillators, detuned filters etc. There are no limits. Even the spread knob, which effects a continuous and proportional detuning, can be used for polyphonic sounds, also in combination with the knob detune.

We call this concept Separate Voice Design (SVD).

You can learn more about it on this site which includes a lot of audio clips:  
<http://www.sonicprojects.ch/obx/separatevoicedesign.html>

A welcome consequence of the separate voice design is the presence of stereo pan controls for each voice. This popular feature of old analog synths allows mind blowing real stereo without deluting chorus or delay effects. As every other parameter, the pans can be automated as well.

With cross modulation, oscillator synchronisation, sine based frequency modulation, ring modulation, filterenvelope modulation and noise, the op-x' potential for experimental and disharmonic sounds is enormous. Especially the combination of fm and ring modulation is a sonic bomb.

A further thought had to go to the filter. The old SEM filter was highly appreciated because it didn't loose gain or thickness in high resonance settings and had an extraordinary precious balanced sound and great depth. The filter of the op-x is specially designed and tries to copy this character as good as possible.

## V-Machine adaptations

Although the standard OP-X is listed as supported on the SM Pro Audio site and also a wizard is offered, it boosts the CPU to the limit in some sounds and can cause glitches. After preset changes the free running oscillators are always zeroed which can result in a short phasing, which can be annoying when switching presets in a set.

That's why we've set up an optimized version for exclusive use within the V-Machine, which will work much better and without glitches.

That's what we've done:

- CPU usage reduced by an average of 40-50% (!) by optimizing the engine
- the keyboard animation was globally disabled to save CPU
- added oscillators offset phase state for phasing free start after preset change
- an internally changed registration engine for easy licensing within VFX
- 128 built in presets instead of 64, a selection of all the best OP-X sounds
- no popping up reg window for undisturbed preset change
- the licensee can be showed by clicking on A (formerly used for animation)
- no internal CC functionality since this job is more efficiently done with VFX
- there's a separate „No-GUI“ version (.vfxdll) for V-Machine internal use only

OP-X runs well with the help of these adaptations, even with the included simple effects of the package. Nevertheless it's good to know that it can well max out the CPU of the V-Machine, so you can't think of combining it with cpu intensive effects, and not to think at all of using more than one instance. But it's an excellent collection of sounds for itself, and the included simple reverb and delay offer all for incredible vintage synth sounds ready to play.

Because unwanted activities of the not any more used graphical user interface (GUI) can cause playback errors within the V-Machine (which sound like short machine gun like sample repetitions that can occur then and when) we have developed a separate and fully compatible „No-GUI“ version for V-Machine internal use only while the GUI version is used only within VFX. The switching between the two is done automatically by VFX and the V-Machine.

## Installation

Please read the Installation Guide of the bundle where every step is described in detail. It's important not to move around single dlls since all files within the plugin folders are needed. E.g. the V-Machine needs the Non-GUI vfxdll. If then only move around the whole plugin folder. But the best only move around the whole library which too includes dedicated banks and effect plugins.

## License and copyright

The plugin is bound to the registered user. It's not allowed to pass it on to third persons. Each plugin contains a hidden serial that allows to identify and trace the original user in case of irregular distribution.

## The voice LEDs



These LEDs indicate voice activity. Each voice has its appropriate LED. That means, when a voice is receiving trigger data to play, its appropriate LED shines. In unisono mode, all six LEDs are glowing at the same time. The original has these LEDs too, but mounted on the individual voice boards in the inside of the device. With their help, you could see that a voice was working correctly.

## The MANUAL section:



### **VOLUME**

Master volume. Its setting is stored with the preset.

### **TUNER**

The individually and slightly detuned voices can be tuned here. Read the intro for comprehensive info on the voice tuning.

### **OSC**

Tunes the oscillators. In released state, each voice is slightly and individually detuned as it would be on startup in the original.

### **FILT**

Tunes the filters. In released state, the filter cutoff of every voice is slightly different, as it is the case in every original device that is not freshly serviced.

## ENV

Tunes the attack and decay times of the filter envelopes. In released mode, the attack and release time of every voices' filter envelope is slightly different. This gives organic life to pad and sweep sounds.

The fourth element of the op-x' tuning capabilities is located in the additional functions section below the filters section: the portamento detuner "**Port DET**". See "PORTAMENTO" or "ADDITIONAL FUNCTIONS SECTION".



## SPREAD

Spreads the oscillator tuning of the voices - good for fattening up unisono sounds, but also usable for more controlled detune of polyphonic sounds.

## The CONTROL section



## PORTAMENTO

Also called "glide" sometimes. Makes the pitch change continuously between the notes. Short settings in unisono sounds makes the sound "squeak". The function also works in polyphonic mode. The portamento can be detuned with "Porta DET" in the additional functions section (beyond filters section). In released "Porta DET" mode, the portamento times of each voice are equal. In pushed mode, the times vary from voice to voice which was typical for the original. The sonic result in solo sound is a special sort of "depth" while gliding.

## UNISON

Stacks all six voices for fat solo sounds. L in the levers section activates legato mode if needed (last note priority, pitch returns to hold note, no retrigger). Use the spread knob or release the osc tune knob to fatten up the sound.

## OSC 2 DETUNE

Fine tuning for oscillator 2. This is used to produce beats when both oscillators are on. This results in a fat sound.

## The MODULATION section



This is the section where the main LFO is controlled and routed to the desired modulation aims. For the modulation lever, there's a separate and independent sine LFO (rate control above leavers). If wished, the modulation lever can be switched back to the main LFO as it is in the original device (ADDITIONAL FUNCTIONS SECTION, "Wheel LFO").

### RATE

Regulates the LFO rate. The response is logarithmical. If the LFO is synchronized to song tempo (which can be done in the ADDITIONAL FUNCTIONS section with the LFO button, III for triolic behaviour), the knob will react in three big steps (multiplied by the song tempo).

The waveforms: All three waveforms can be chosen at the same time. For the reason of problem free vst automation, it were done without "radio button" switching behaviour. To jump from one waveform to another, the old one has to be released and the new one pushed. This might be a bit arduous on one hand, but on the other and it allows mixing various waves.

### SINE

Switches on the sine wave of the LFO.

### SQUARE

Switches on the square wave of the LFO.



### **S/H**

Switches on the sample & hold wave of the LFO. Technically explained, white noise is "sampled" with the speed of the LFO rate. This results in a random step wave.

### **FREQUENCY DEPTH**

Regulates the modulation intensity of the LFO to the oscillators and the filter. The response of this knob is specially designed. In the first quarter, you have double logarithmic response which allows to make finest adjustments in very low modulation settings, e.g. for almost imperceptible oscillator vibrato. The rest of the scale does react linear for fast changes.

### **OSC 1**

Switches the above regulated LFO output to oscillator 1 pitch.

### **OSC 2**

Switches the above regulated LFO output to oscillator 2 pitch.

### **FILTER**

Switches the above regulated LFO output to the filter cutoff. The influence amount is dependent on the filter cutoff. Low cutoff settings result in lower LFO influence. This is again a behaviour copied from the original.

### **PULSE WIDTH DEPTH**

Regulates the modulation intensity of the LFO output to the pulse width of the oscillators' pulse waves. Its influence is added to the "WIDTH" setting in the oscillators section.

### **OSC 1**

Switches the above regulated LFO output to oscillator 1 pulse width.

### **OSC 2**

Switches the above regulated LFO output to oscillator 2 pulse width.

## The OSCILLATORS section



### PITCH 1

Sets the pitch of oscillator 1 in four octave steps.

### The waveforms:

Other than in the original both waveforms can be switched on at the same time. This is again for problem free VST automation. Both waves activated results in pulse wave (the same as squ pushed only). However, both buttons **released** results in a SINE wave. This is designed for yamaha type FM.

### SAW

Switches on the saw wave of oscillator 1

### SQU

Switches on the pulse wave of oscillator 1

### SINE

The SINE wave will be activated when both buttons are **released**.

### WIDTH

Manual regulation of the pulse width of both pulse waves. Modulations for each pulse wave are added individually.

### PITCH 2

Sets the pitch of oscillator 2 in semitones. The range is five octaves and three semi tones. If sync is on, the sync spectrum can be controlled with this knob.

### SAW

Switches on the saw wave of oscillator 2

### SQU

Switches on the pulse wave of oscillator 2

### SINE

The SINE wave will be activated when both buttons are **released**.



### **X-MD**

Cross modulation. This is sort of a simple frequency modulation between oscillator 1 and oscillator 2. The result is a disharmonic spectrum. The sound is determinate by the selected waves, the relation of the oscillators frequencies to each other and the modulation amount (regulatable in the ADDITIONAL KNOBS SECTION with "**X-Md**", just above the keyboard . In most cases, the pitch knob of oscillator 2 is used to regulate this. If the frequency of oscillator is modulated (by LFO or filter envelope - described later), the sound will change dynamically over time. If you want to hear only the FM output on its own just switch off oscillator 2.

For yamaha type FM, release the wave buttons (both) for the **SINE** wave to become active. For a little bit more presence, the wave of oscillator 2 can be switched to SQU (Pulse). For even more clearness, the activation of ring modulation (ADDITIONAL FUNCTIONS section, "RING") is recommended.

In the ADDITIONAL FUNCTIONS section, there is a special function to give some additional movement to crossmod sounds: When you switch on the "**ENV**" button, the modulation depth is influenced by the amp envelope. (The same can be done with ring modulation - see later).

### **SYNC**

Hard sync. Oscillator 2 is synchronized by oscillator 1. Everytime the oscillator 1 wave amplitude crosses zero, the oscillator 2 wave amplitude is being set to zero too. The sonic result is the well known and famous sync sound with rich harmonics. As it is with cross modulation, changes of the oscillator 2 pitch results in changes in the spectrum. The whole thing gets interesting too if oscillator 2 is modulated.

## The FILTER section



A specially designed 12db Filter tries to do its best to emulate the famous SEM sound. The SEM filters got famous with the beige SEM-Modules and the SEM based Four- and Eightvoice. The OB-X was the last Ob. synth that was equipped with this discrete design. Later models, beginning with the OB-Xa, got the standard Curtis Chips. One of the special things of the SEM filters is that in high resonance settings, the sound remains as fat as in zero resonance settings. This is a wonderful thing for pads and sweeps. The old SEM filters had no self oscillation, so you won't find it here too.

### **CUTOFF**

Regulates the filter cutoff frequency.

### **RESON.**

Regulates the filter resonance. As already described, there is no self oscillation but still very fat and full tone even at the highest resonance setting.

### **ENV AMT**

Regulates the amount of the filter envelope influence on the cutoff frequency. This is added to the cutoff setting.

### **OSC1**

Switches oscillator 1 to the filter.

### **OSC2 HALF**

Switches half of the volume of oscillator 1 to the filter.

### **OSC2 FULL**

Switches the full volume of oscillator 1 to the filter.

If both knobs are activated, there's a slight volume push. In vst automation, these parameters are continuous, so you can do fine adjustments here and save it with the preset. This by the way also works with other buttons.

### **NOISE HALF**

Switches half of the volume of the white noise generator to the filter.

## NOISE FULL

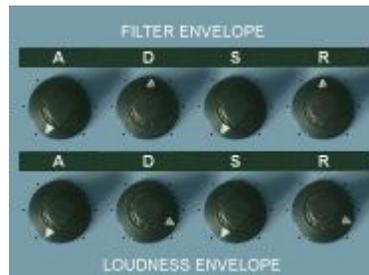
Switches the full volume of the white noise generator to the filter.

If both knobs are activated, there's a slight volume push. Also here, you can do fine adjustments using vst automation where the parameters are continuous.

## KEY

Keyboard tracking. It makes the filter cutoff follow the key position, which means that every note has the same amount of harmonics. When the resonance is in a high setting, you can hear the filters' beginning feedback pitch follow the keyboard. Try the preset named "Noise Whistle" to hear this.

## The ENVELOPES section



Nothing spectacular here, just an ADSR envelope for the filter on top and an ADSR envelope for the amp at the bottom. But nevertheless there is one thing to mention: The filter envelope can be used to modulate the oscillators pitch and the pulse width. The knobs for this are at the bottom left side named OM and PM (described later). This function was not present in the original.

A last thing: If the arpeggiator is on in polyphonic mode (unisono button not on), you have to regulate down the amp sustain to zero to separate the voices from each other.

ADSR of course means :

- A** Attack
- D** Decay
- S** Sustain
- R** Release

## The ADDITIONAL FUNCTIONS section (below filter)



In former days, you could save your settings here in 32 (4 x 8) memory locations. There was a cassette interface to backup the memory. Today, 27 years later, in the virtual world, we don't need this section anymore. This allows us to equip these free buttons with the control for various additional functions.

The abbreviations below the buttons are designed to remember what the specific button is for. We could not write a book below every button, so you have to know what the abbreviations refer to. You simply have to learn this (not a big deal):

### **Lfo Phase:**

#### **OSC**

Inverts the phase of the LFO modulation to the oscillators. This is helpful when the LFO is synchronized to a sequencer. If you want the LFO rise on 2 and 4 instead of 1 and 3, just push this button.

#### **PW-FILT**

The same for pulse width and filter. The LFO phase to these two destination is inverted. Very important function again when synchronized to song tempo.

### **Filterenv Modulation:**

#### **OSC2**

Makes the filter envelope modulate oscillator 2 only (if env modulation is activated). This is important for moving sync- and crossmod sounds.

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Inverts the effect of the filter envelope modulation to the oscillators (if env modulation is activated).

#### **PW1**

Makes the filter envelope modulate pulse width 1 only (if env modulation is activated).

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Inverts the effect of the filter envelope modulation to the pulse width (if env modulation is activated).



## RING

Switches on ring modulation. Ring modulation means that the volume of one oscillator is multiplied by the output of the other (not the pitch as it is with x-mod). This sounds a bit different than cross modulation. Please note that both oscillators have to be switched on to hear a result. The amount is too regulated with the x-md amount knob above the keyboard. Using a moderate amount ring modulation can be used to brighten up a sound a bit.

## ENV

A very special feature that can be interesting in arpeggiator mode: When pushing this button, the output of the modulating oscillator for cross- or ringmodulation is taken after the amp, which means that the amp envelope has an influence on the sonic result. The influence can be heard when the decay and release times are short.

## Wheel LFO

The extra modulation wheel LFO can be switched off here. In this case, the wheel is routed to the main lfo (as it was in the original device).

## VEL

Switches velocity sensitivity on. The velocity does have an effect on the filter envelope. Combined with the filterenv modulation, not only the cutoff can be velocity controlled, but also pitch and pulse width (dependent on the **OM** and **PM** settings).

## Porta DET

Portamento detune. In released "Porta DET" mode, the portamento times of each voice are equal for snappy "squeek". In pushed mode, the times vary from voice to voice which was typical for the original. The sonic result in solo sound is a special sort of "depth" while gliding

## Sync to Songtempo:

### LFO

Synchronizes the LFO to the song tempo of the sequencer. In this mode, the RATE knob will react in three big steps only, dependent on the tempo. Note, that the phases of the individual LFO sections can be inverted (OSC / PF).

### III

Switches on triolic synchronization mode (multiples of three notes per beat).

### ARP

Synchronizes the Arpeggiator to the song tempo of the sequencer. In this mode, the Speed knob will react in three big steps only, dependent on the song tempo.

## ARP ON

This button switches the arpeggiator on. A second click (led shines red) causes the arpeggiator to switch to hold sequence mode.

Normal arpeggio (led orange):

The notes are played back in the same order and place as they were played in. The range is one octave. The speed can be varied with the „Speed“ knob above the keyboard. You can also synchronize the arpeggiator to the song tempo with the „ARP“ button below „Sync to song tempo“. The arpeggio can be hold with the damper pedal. You have to adjust sustain and release for this mode if the hold line should sound exactly the same.

Step sequencer mode (led red):

When you play a new note, it will be saved in one of the memory locations of a six step sequencer. Every new note is saved in the next memory location. When all six locations are full, it will be saved to location 1 again. Right above the keyboard you can find two dedicated knobs: The **Speed** knob regulates the playback speed. The **Steps** button varies the amount of steps repeatedly played. In the minimal setting, this number is 2, in the max 7. In the 7-mode the first step of the 6-step sequencer is being repeated.

The arpeggiator can be used in unison and polyphonic mode. If you are in polyphonic mode, you have to **turn the amp envelope sustain to zero** to separate each voice from the others. Done so, you can play with the filter envelope, the amps attack and decay and also with the voice pans.

## The ADDITIONAL KNOBS row (above Keyboard)



The knobs above the keyboard you won't find in the original. These are all additional functions or functions that were only accessible after opening the device.

From left to right:

### LFO

Regulates the speed of the additional modwheel sine-LFO. This LFO can be switched off in the PROGRAMMER section as already described.

### Aftertouch:

#### A Vib.

Regulates the aftertouch (key pressure) influence on the oscillator vibrato. This is driven by the LFO switched to the modulation wheel.



### **A Filt.**

Regulates the aftertouch (key pressure) influence on the filter cutoff. Great for expression.

### **Envmod:**

#### **OM**

Regulates the amount of the filter envelope modulation to the oscillators. Have a look at the ADDITIONAL FUNCTIONS section description for further options (OSC, \ ). This is a prophet synth speciality.

#### **PM**

Regulates the amount of the filter envelope modulation to the pulse width. Have a look at the ADDITIONAL FUNCTIONS section description for further options (PW, \ ). This is a prophet synth speciality too.

### **TUNE**

Master tune. The default setting is center (mid). The pitch can be adjusted up to one half tone down (turn left) or up (turn right) to match acoustic instruments with deviating tuning.

### **Sequencer controls:**

#### **STEP**

Regulates the number of played back steps in step sequencer mode (ARP ON: red). From min to max: 2,3,4,5,6,7 (7 is actually 6 with step 1 repeated). More details in the ADD FUNCTIONS: ARP ON section

#### **SPEED**

Regulates the speed of the arpeggiator. In sync mode, it will react in three big steps. Have a look at the arpeggiator description (ADD FUNCTIONS: ARP ON) in this manual for more details.

### **X-Md**

This knob regulates the X-Md (cross modulation) amount. In the minimal setting, the amount is not fully zero. The higher the amount, the more harmonics are added (especially well hearable if yamaha type sine wave modulation is used).



### The voice pans:

This was a very popular feature amongst old analog synths. In contrast to many old synths, the controls can be accessed on the surface and also can be stored with the preset. The panpots can also be automated. In the original device, these pots were placed on a board in the inner device.

**1**

Pan setting for voice 1

**2**

Pan setting for voice 2

**3**

Pan setting for voice 3

**4**

Pan setting for voice 4

**5**

Pan setting for voice 5

**6**

Pan setting for voice 6

Some possible ways of using the pans:

1. Wide stereo in polyphonic mode:

Set the pans repeatedly fully left and fully right (1 left, 2 right, 3 left...)

2. Wide stereo in polyphonic mode with analog flavour:

Set the pans repeatedly fully left and fully right (1 left, 2 right, 3 left...) and alter the settings a bit from voice to voice

3. Analog mono:

Set the pans to center, but not exactly - vary the settings a bit from voice to voice - the sound will become more natural like this

4. Broad unisono:

Set the pans repeatedly fully left and fully right (1 left, 2 right, 3 left...) - the unisono patch will become smooth, big and broad

5. Panning arpeggio:

Set the pans increasingly from fully left (voice 1) to fully right (voice 6). The arpeggio will move now from far left to far right in the stereo field.

## The LEVERS section



A speciality of old oberheim synths was that they had two vertically working levers instead of the popular wheels invented by moog. The **modulation lever** is on the left side. In the original it only worked downwise. In the OP-X, it can be used up- or downwise. Upwise, the modulation is inverted (noticeable only in a realtive time context). The **pitch lever** is on the right side. It reacts vice versa than a popular wheel. Downwise movement highers pitch, upwise movement lowers pich, just as it was in the original.

### A

Switches off the keyboards' response to midi data. This is recommended in very slow daws since keyboard animation can cause slighty higher cpu usage.

### L

Remotely switches the „Lega ON“ button for legato mode (no retrigger). More about it in „ADD BUTTONS: Lega ON“ in this manual.

### Os2

Oscillator 2 only. When switched on, the pitchwheel (or whatever it is called) does change the pitch of oscillator 2 only. This is great for controlling sync sounds. Try the preset "SyncSolo Pitchwheel" to explore this.

### +12

This button serves for switching the pitchwheel interval from a third (standard) to an octave (12 semitones).

### Oct.

Switches the keyboard octave (three octave range). Be careful handling it in vst automation mode because of the "radio button" switch mode. If the buttons don't react correctly just click one time on the active led before switching. When keyboard tracking is on, the octave setting will have an influence on the harmonics. So better use your master keyboard's transpose function to extend playing range without altering the harmonics.

## Why six voices?

The original godfather of this project has six voices too. The original could be purchased with 4, 6 or 8 voices. Every device had sockets for eight voice boards. So the voices could be expanded by mounting further voiceboards.

## LOAD AND SAVE SOUNDS

OP-X comes with a huge collection of additional soundbanks in steinberg fxb format. This is the standard format and can be read by almost all existing vst hosts. The banks collection is included in the download package. Put it to a place that suits you best.

The banks folder contains an text info file where the contents of the banks are briefly described. The names of the bank always begin with the prefix "opx\_" followed by the name of the bank.

New additional banks are published for free download in the user area:  
<http://www.sonicprojects.ch/obx/userarea.html>

The banks are not being loaded by the plugin itself. This has to be done with your vst host. Almost all vst hosts support loading of fxb banks. So you have to browse and load the banks from your vst host.

How this is done depends on your vst host. Generally look for "load or import (fxb) bank". This function in most cases can be accessed either by an icon or menu in the plugin window itself or can be found in the vst hosts' "plugin" menu. Some examples:

Cubase/Nuendo:

File -> Load bank (on top of the plugin window)

Herman Seib VSTHost:

Plugin -> Load bank

Orion Platinum:

Click on folder icon on the right of the presets chooser

Ableton Live:

Click on chooser below title bar

Create custom patches:

1. Tweak an existing preset or set up a new sound from scratch
2. Save the preset as fxp to a place you like and give it a name

Load the fxps:

You can load the fxps (presets) into any location of an existing bank by file -> load preset or plugin -> load program. There's an empty bank in the banks collection called "opx\_empty" that can serve as empty root bank.

Create your own banks:

1. Load the opx\_empty bank
2. Load your saved presets (see above) into this bank
2. Load your saved presets (see above) into this bank

## VST automation

Every single parameter of the OP-X can be vst automated as you know it from other vstis. How exactly this is done depends on your vst sequencer. Example Cubase: Push the write button on top of the vst plugin window (R), start the sequencer and tweak the controls you want to automate. To read the written data, go back to the zero position, push the read button on top (R) and start the sequencer. The automated controls will move now according to the written data which itself also can be edited.

While knob automation always works fine, some sequencers have problems with button automation (not only with the op-x). They only react to changes and don't write down the buttons' beginning state. You can tweak the wiritten curves manually to fix the problem.

## MIDI CC Implementation

In this adapted VFX version of OP-X the internal MIDI CC functionality was completely deactivated since this job is more efficiently done with the MIDI learn engine of VFX which connects to the VST automation functionality of the parameters. If there was an internal CC engine working in parallel this could lead to double mappings. The included standard VFX bank however is completely pre-mapped offering the same mapping based on the VFX learn engine as the standard version offers internally. There's also an unmapped version of it available in the „Unmapped“ folder.

With the VFX based mapping you can remotely control every single parameter of OP-X with external controllers. For fast handling and first trials, the MIDI CC Implementation follows the popular standard **Pro53** implementation, which is present as preset in almost every midi keyboard. So if you load the Pro53 preset in you midi keyboard, you can access the most important controls (but not all) immediatly. The V-Machine MIDI engine even offers full support for parameter feedback for endless rotary controllers which allows for parameter jump free remote control.

The full Midi CC mapping of the pre-mapped bank:

<b>sorted by cc number</b>	<b>*different order</b>	<b>control present</b>
001	Modulation Lever	Pro53: compatible
005	Portamento	Pro53: compatible
007	Volume	
016	Oct Low	
017	Oct Mid	
018	Oct High	
020	LFO Freq Depth	Pro53: PolyMod Source Filt Env
021	LFO PW Depth	Pro53: PolyMod Source Osc B
022	OscTune	Pro53: PolyMod Dest Freq A
023	FiltTune	Pro53: PolyMod Destb PWidth A
024	EnvTune	Pro53: PolyMod Dest Filter
025	Port Detune	Pro53: LFO Midi Sync

026	LFO Rate	Pro53: compatible
027	LFO Sine	Pro53: compatible *
028	LFO Square	Pro53: compatible *
029	LFO S/H	Pro53: compatible *
030	LFO Sync	Pro53: LFO Envelope Trigger
031	III Arp LFO	
033	PM	
034	OM	Pro53: WheelMod LFO-Noise Mix
035	LFO to Osc1	Pro53: compatible
036	LFO to Osc2	Pro53: compatible
037	LFO to PW1	Pro53: compatible
038	LFO to PW2	Pro53: compatible
039	LFO to Filter	Pro53: compatible
040	Pitch Osc1	Pro53: compatible
041	Saw Osc1	Pro53: compatible
042	Pulse Osc1	Pro53: compatible
043	Pulse Width	Pro53: compatible (OSC A)
044	Sync	Pro53: compatible
045	Osc1 On	Pro53: compatible (not continuous)
046	Osc2 Full	Pro53: compatible (not continuous)
047	Noise Full	Pro53: compatible (not continuous)
048	Arp Speed	Pro53: Mixer External Input
049	Arp Steps	
050	Pitch Osc2	Pro53: compatible
051	Osc2 Detune	Pro53: compatible
052	Saw Osc2	Pro53: compatible
053	Osc2 only	Pro53: Oscillator B Triangle
054	Pulse Osc2	Pro53: compatible
055	X-Mod Depth	Pro53: Oscillator B Pulse Width
056	X-Mod	Pro53: Oscillator B Low Freq
057	Ring	Pro53: Oscillator B Key Follow
059	Unisono	Pro53: compatible
068	Legato On	
070	Cutoff	Pro53: compatible
071	Resonance	Pro53: compatible
072	Env Amt	Pro53: compatible
073	Key Track	Pro53: compatible (not continuous)
074	Osc2 Half	Pro53: Filter HPF Mode
075	A Filter	Pro53: compatible
076	D Filter	Pro53: compatible
077	S Filter	Pro53: compatible
078	R Filter	Pro53: compatible
079	Noise Half	Pro53: Filter Envelope Invert
080	A Amp	Pro53: compatible
081	D Amp	Pro53: compatible
082	S Amp	Pro53: compatible
083	R Amp	Pro53: compatible
084	+12	Pro53: Amplifier Hold
085	Arp On / Hold	Pro53: Release on/off / dependent on value
086	Velocity	Pro53: compatible
087	Spread	Pro53: Analog
088	Master Tune	Pro53: compatible

089	ENV	
090	O2o	
091	OM neg.	
092	P1o	
093	PM neg.	
094	LFO Osc Phase	
095	PW-FILT Phase	
096	W-LFO 1/2	
104	Arp Sync	
105	W-LFO Rate	Pro53: Delay Effect Time
106	A.Touch Vib.	Pro53: Delay Effect Spread
107	A.Touch Filt.	Pro53: Delay Effect Depth
111	Pan1	Pro53: Delay Effect Low Cut
112	Pan2	Pro53: Delay Effect High Cut
113	Pan3	Pro53: Delay Effect Invert (not continuous)
114	Pan4	
115	Pan5	Pro53: Delay Effect On (not continuous)
116	Pan6	Pro53: Delay Effect Wet

**sorted by function groups:**

**manual**

007	Volume	Receptor version (see intro)
022	OscTune	Pro53: PolyMod Dest Freq A
023	FiltTune	Pro53: PolyMod Destb PWidth A
024	EnvTune	Pro53: PolyMod Dest Filter
087	Spread	Pro53: Analog

**control**

005	Portamento	Pro53: compatible
059	Unisono	Pro53: compatible
051	Osc2 Detune	Pro53: compatible

## modulation

026	LFO Rate	Pro53: compatible
020	LFO Freq Depth	Pro53: PolyMod Source Filt Env
021	LFO PW Depth	Pro53: PolyMod Source Osc B
027	LFO Sine	Pro53: compatible *
028	LFO Square	Pro53: compatible *
029	LFO S/H	Pro53: compatible *
035	LFO to Osc1	Pro53: compatible
036	LFO to Osc2	Pro53: compatible
039	LFO to Filter	Pro53: compatible
037	LFO to PW1	Pro53: compatible
038	LFO to PW2	Pro53: compatible

## oscillators

040	Pitch Osc1	Pro53: compatible
043	Pulse Width	Pro53: compatible (OSC A)
050	Pitch Osc2	Pro53: compatible
041	Saw Osc1	Pro53: compatible
042	Pulse Osc1	Pro53: compatible
056	X-Mod	Pro53: Oscillator B Low Freq
044	Sync	Pro53: compatible
052	Saw Osc2	Pro53: compatible
054	Pulse Osc2	Pro53: compatible

## filter

070	Cutoff	Pro53: compatible
071	Resonance	Pro53: compatible
072	Env Amt	Pro53: compatible
045	Osc1 On	Pro53: compatible (not continuous)
074	Osc2 Half	Pro53: Filter HPF Mode
046	Osc2 Full	Pro53: compatible (not continuous)
079	Noise Half	Pro53: Filter Envelope Invert
047	Noise Full	Pro53: compatible (not continuous)
073	Key Track	Pro53: compatible (not continuous)

## envelopes

075	A Filter	Pro53: compatible
076	D Filter	Pro53: compatible
077	S Filter	Pro53: compatible
078	R Filter	Pro53: compatible
080	A Amp	Pro53: compatible
081	D Amp	Pro53: compatible
082	S Amp	Pro53: compatible
083	R Amp	Pro53: compatible

## additional functions

094	LFO Osc Phase	
095	PW-FILT Phase	
090	O2o	
091	OM neg.	
092	P1o	
093	PM neg.	
057	Ring	Pro53: Oscillator B Key Follow
089	ENV	
096	W-LFO 1/2	
086	Velocity	Pro53: compatible
025	Port Detune	Pro53: LFO Midi Sync
030	LFO Sync	Pro53: LFO Envelope Trigger
031	III Arp LFO	
104	Arp Sync	
085	Arp On	Pro53: Release on/off - Value: 75
085	Arp Hold	Value: 127

## additinal knobs

105	W-LFO Rate	Pro53: Delay Effect Time
106	A.Touch Vib.	Pro53: Delay Effect Spread
107	A.Touch Filt.	Pro53: Delay Effect Depth
034	OM	Pro53: WheelMod LFO-Noise Mix
033	PM	
088	Master Tune	Pro53: compatible
049	Arp Steps	Pro53: Mixer External Input
048	Arp Speed	
055	X-Mod Depth	Pro53: Oscillator B Pulse Width
111	Pan1	Pro53: Delay Effect Low Cut
112	Pan2	Pro53: Delay Effect High Cut
113	Pan3	Pro53: Delay Effect Invert (not continuous)
114	Pan4	Pro53: Delay Effect On (not continuous)
115	Pan5	
116	Pan6	

## levers

068	Legato On	
053	Osc2 only	Pro53: Oscillator B Triangle
084	+12	Pro53: Amplifier Hold
016	Oct Low	
017	Oct Mid	
018	Oct High	

**Impressum:**

Programming and graphic design:  
B. Maechler

Programming, public relations and sound design:  
P. Wiesler

Mail:  
[info@sonicprojects.ch](mailto:info@sonicprojects.ch)  
Web:  
[www.sonicprojects.ch](http://www.sonicprojects.ch)

Chassis design and 3d models:  
Reiben Flounders

Web:  
[www.affinity3d.com](http://www.affinity3d.com)

Sounbase contributors:  
G. Poropat, M. Sauvageau, M. Saulino, B. Whitney

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