6PM user guide

Version 0,1

6PM is a phase modulation(PM) synthesizer made of six oscillators. That's where its name comes from ☺

PM here is equivalent to frequency modulation (FM).

It works under Gnu-Linux system with Jack sound server and Qt5 library.

Real-time mode must be available.

Basics

An oscillator can be **operator** : its output is connected to sound system ; it is heard directly

It can be **modulators** by each five others.

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An oscillator can also be its own **modulators**.

Operators and modulators layout is defined by an **algorithm**.

To learn more : http://en.wikipedia.org/wiki/Frequency_modulation_synthesis

6PM is provided with **32 pre-defined algorithms**, which comes from a famous japanese synthesizer of the seventies...

It gives possibility to define **new user algorithms**.

Installation

See README file.

Jack connections

Audio

6PM automatically connects to the two first system ports.

Midi

Connection must be made by hand with Qjackctl, Catia or other.

Settings

Each oscillator has settings for **volume, base frequency, tremolo and vibrato**. If oscillator is modulated, it has a setting for '**modulation index**. If an oscillator is defined as operator it has moreover a setting for left-right **panoramic**.

For each oscillator

All settings change have an **immediate effect** while a sound is played.

All settings can be saved in a **preset** which is part of a presets **bank**.

All settings can be modified from a midi device : master keyboard, control surface, or from a sequencer, through midi control numbers. That's midi **assignation**.

Assignations set can be saved in a **midi map**.

Provided midi map "OscAmps" simply assigns six oscillators volume potentiometers to controls 74

to 79. Global volume slider is assigned to control 7.

Oscillator settings


From to to bottom :
- Left – right panoramic slider. It appears only if oscillator is an operator.
- Amplitude potentiometer from 0 to 1.
- Frequency setting from -24 to +24.
  It is ratio to base frequency of played note. For instance a value of -12 makes a sound one octave below note. Scale is in semitones.
- Detune
  Fine detune, scaled in hundreds of semitones, from -100 to +100
- trem A trem F, vib A, vib F , : amplitude and frequency of tremolo and vibrato.
- I mod : modulation index.
  This potentiometer only appears if oscillator is modulated.

Tricks
Potentiometers may be actuated with mouse wheel or more finely with keyboard left and right arrow keys.
Double-click on a potentiometer brings it back to its default value.

Amplitude envelope
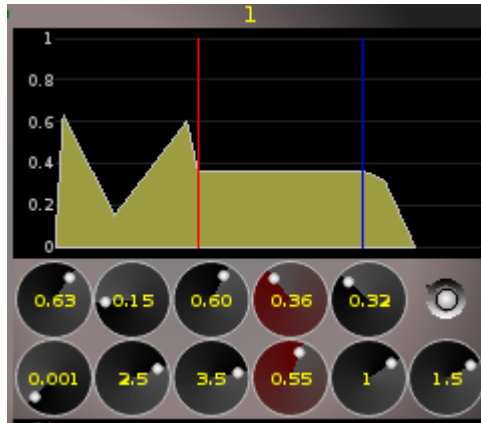
Each envelope point is is defined with two numbers : amplitude from 0 to 1 (top button) and duration in seconds (bottom button).
Red line marks sustain point set by the two slightly red potentiometers.
Blue line marks the farthest sustain point position among six oscillators.
Envelope part on the right of blue line shows sound amplitude after release of keyboard key or when receiving a "note off" midi message.
Each envelope sustain point can be chosen among all envelope points : right-click on window to pop up menu. One may choose to have no sustain point ; then envelope runs straight from beginning to end..

Duration marked for every point is duration of envelope segment before point. On the example total envelope time is 9,051 seconds. Duration before sustain point is 6,551 seconds. Duration after release is 2,5 seconds.

Button on the right of amplitude potentiometers allows to loop envelope .When this option is checked, sustain point is removed and envelope runs straight until last point and endlessly starts again until reception of a "note off" message for example by releasing midi keyboard key.

Frequency envelope
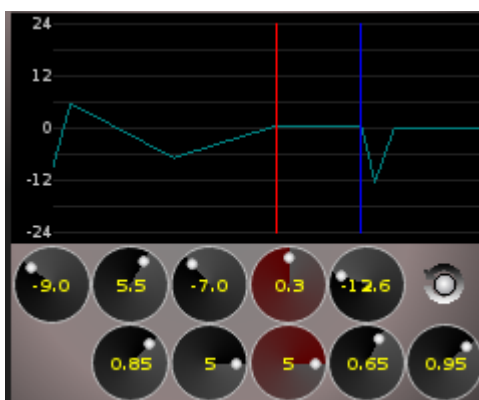
Similar to amplitude envelope. Frequency values go from +24 to -24 that is plus or minus two octaves from base frequency. Potentiometers scale is in semitones.
Amplitude and frequency envelope settings are independent, including sustain points and loops.

Midi controls

To assign
- right-click on potentiometer and choose "midi learn"
  Led flashes in red during 3 seconds.
- Action a control on external midi device during these three seconds and potentiometer is assigned. Led becomes blue.

To remove assignment, right-click and "Remove assignment".
Several potentiometers may be assigned to the same midi control number.
Direction of assignment can be inverted so that potentiometer is at minimum value while control is at its maximum and vice-versa. For that, right-click and check "Invert midi cc".

Midi maps
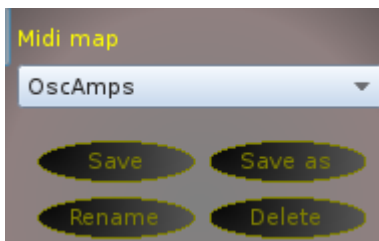
To save a "midi map" : click on button "Save"in "Midi map" box, type a name text edit box hit Return key.
"Save" replaces current midi map "Save as" create another one with given name. "Rename" changes its name without creating a new one "Delete" deletes it.
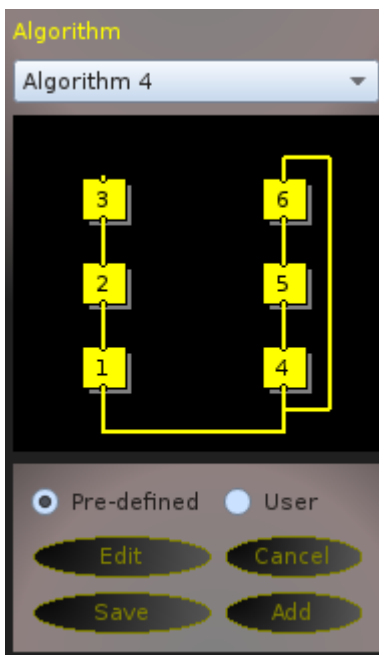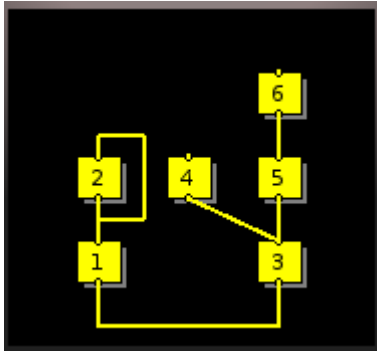
Algorithms

Diagram shows connections between modulators(top) and modulated(bottom)if needed with a loop.

Bottom line oscillators are operator.
Here oscillators 1 and 4 are operators. Oscillator 1 is modulated by 2 itself modulated by 3.
Oscillator 4 is modulated by 5 modulated by 6 itself modulated by 4.

Here oscillators 1 and 3 are operators. 1 is modulated by 2 which is self-modulated. 3 is modulated by two oscillators : 4 and 5. 6 modulates 5 and is not modulated.
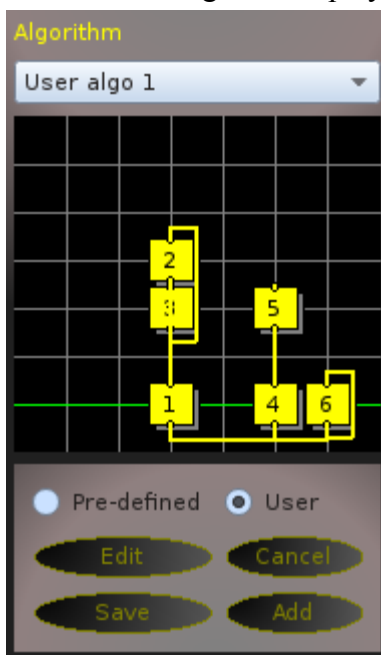
If "Pre-defined" is checked there are 32 predefined algorithms.
If "User" is checked one can choose one of previously user-defined and saved algorithms.

Crate or modify a user algorithm

User button must be checked.
Click on Edit. A grid is displayed

Move oscillators to .wanted places.
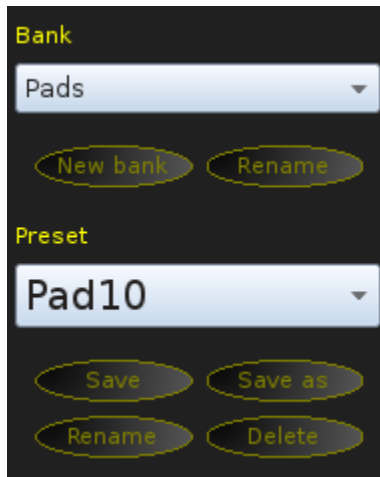**Green line** marks **operators** places.
To create a connection modulators – modulated, just draw it with mouse between bottom connector of modulator towards top connector of modulated oscillator.
"Save" replaces current algorithm.
"Add" adds it to user algorithms list.
"Rename" and **"Delete"** just do what expected..

Banks and presets

"**New bank**" to create an empty new bank.
"**Rename**" to rename current bank
To delete bank, "Folders and files" paragraph.

Same commands for presets.
To save a preset in a different bank than current one :
- select wished bank. Presets list becomes blank.
- click on "Save as" button in "Preset" box
- type a name in text field and hit Return.

Miscellaneous

Diapason potentiometer allow to globally adjust reference frequency which is by default 440 Hertz. Setting is automatically saved.
Test button allows to hear sound of synthesizer with current settings playing A4 note.
Panic interrupts immediately all sound production.
Slider on the right adjust synthesizer global volume..

Folders and files

Global software settings (window geometry, diapason, midi channel etc.) are saved in filer
~/.config/MVSoft/6PM.conf
User algorithms are also stored in this file.
Banks and presets are saved in folder *~/.6pm/Presets*
A bank is just a directory. Each preset is stored in a file with extension *.mvpms*
These files use Qt Qsettings format.
To delete a bank, delete its directory.