

# JunoX<sup>2</sup> Manual

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# Welcome to JunoX<sup>2</sup>

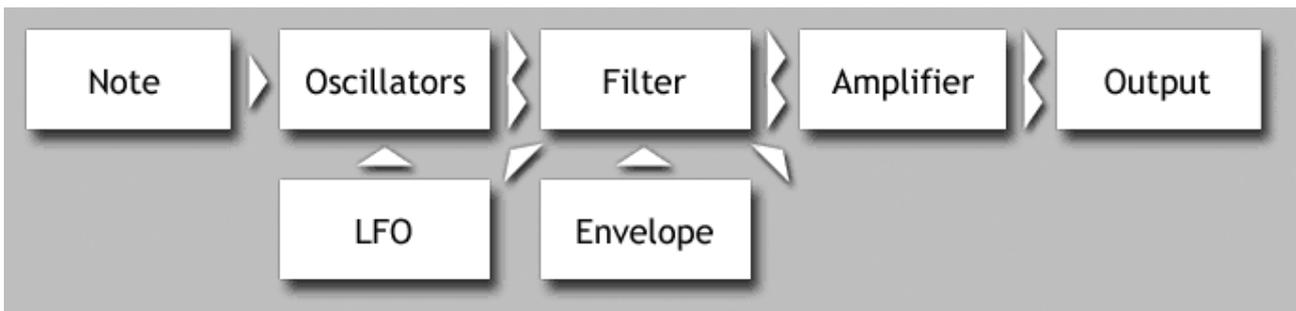
The "Roland Alpha Juno" was a famous synth in the 90's. Now you got that fantastic sound back on your computer as a VST Instrument. We tried to keep the remake as simple as possible. You will notice that building sounds is very easy and you will get impressive results quickly. We're sure you'll love that little bastard.

How does JunoX<sup>2</sup> work?

Please note that the demo-version of JunoX<sup>2</sup> is only two-voice-polyphonic, will only work for 15 minutes and does not receive or send MIDI-CC data.

## The Signal path of JunoX<sup>2</sup>

JunoX<sup>2</sup> is a subtractive synthesizer. Subtractive means that a filter is used to filter specific harmonic contents. The basic structure is very simple:



When a note is played on your midi-keyboard or in your host software, JunoX<sup>2</sup> starts to play up to three oscillators with the frequency depending on the note. There are different types of oscillators. Some offer a feature called Pulse-Width-Modulation that changes their duty-cycle-length. This animates the sound in various ways.

The LFO can be used modulate the Pulse-Width (PWM) of the oscillators.

The envelope controls three different sound-parameters.

- The Volume – this controls the volume of the oscillator
- The Pulse-Width – this controls the duty-cycle-length of the oscillator (if supported)
- The Filter – this controls the cutoff-frequency of the filter

The filter is used to emphasise or dampen the harmonic content of the sound. There are eight different filter types which filter different frequencies and/or distort the sound.

The last step is the amplifier, which can also be controlled by the envelope.

# The Oscillators

JunoX<sup>2</sup> supplies up to three oscillators to generate the basic sound. Oscillator 1 generates square-waves, oscillator 2 generates saw-waves and the sub-oscillator generates a square-signal which is one or two octaves below the main frequency. It is used to give the sound more bass and depth. Some oscillators can be modulated. This is called pulse-width-modulation or short PWM. Pulse-width-modulation depth can be modulated by the envelope or by the LFO.

## Oscillator 1 waveforms

- Pulse
- Pulse 2
- Pulse (PWM)
- Double Pulse (PWM)
- BiPulse (PWM)
- FM Pulse (PWM controls level of FM)
- Formant (PWM controls timbre)

## Oscillator 2 waveforms

- Saw
- Saw2
- Comb Saw
- Comb Saw 2
- Saw (PWM)
- BiSaw (PWM)
- Sync Saw (PWM controls sync level)
- Digital (PWM controls waveform)

## Sub oscillator waveforms

- Pulse one octave lower
- Pulse2 one octave lower
- Comb Pulse one octave lower
- Comb Pulse2 one octave lower
- Pulse two octaves lower
- Pulse2 two octaves lower
- Vocal (PWM controls vocal)

# The Fatness control

The fatness controller has never heard of the weight watchers. Once set to a comfortable level it brightens up the sound considerably. When the display contains a "<>" both oscillators are mixed into one mono stream, creating a narrower sound. Should the display show "><" then the sound is widened to give that extra touch. If you are short on performance, you can set the fatness to "mono" which does only calculate the left channel and mirrors it into the right.

# The Filter Section

JunoX<sup>2</sup> offers eight different filter types. Filters are used to form the harmonic content of the sound. There are three sliders for the filter section.

The first control is the filter cutoff-frequency abbreviated *f*. The second one, *Q*, is the resonance level. It defines how much the frequencies near the cutoff-frequency are emphasised. When set high enough some filters will self-oscillate with the cutoff - frequency. Last, but not least, is the filter-type selector. Here you can choose between several low-pass, high-pass or combination filter types which are listed below.

## JunoX<sup>2</sup> filter types

- LP 12db – Low-pass 12 dB
- Moog – Moog low-pass 24 dB
- HP 12db - High-pass 12 dB
- Notch – Notch filter 12 dB (called band-stop by some)
- LP + Dist – Moog low-pass 24 dB with distortion
- BP + Dist – Band-pass 12 dB with distortion
- Special 1 – Moog low-pass 24 dB parallel to high-pass at 12 kHz
- Special 2 – Notch 12 dB parallel to band-pass 12 db with distortion

Low-pass - Only low frequencies are passed. High frequencies are cut.

High-pass - Only high frequencies are passed. Low frequencies are cut.

Band-pass - Frequencies around the cutoff are passed. All others are cut.

Notch - Opposite to Band-pass. Frequencies around cutoff are cut.

Distortion - Shape of signal gets formed non-linearly which gives a grungy effect.

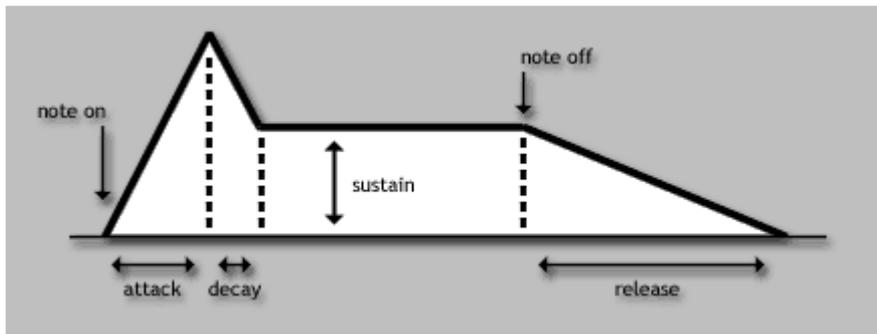
# The LFO

The LFO can be used to modulate the oscillators.

- f – this controls the frequency of the LFO
- PWM – defines how strongly the pulse width is modulated by the LFO
- phase – sets the phase of the LFO when the note is triggered.

## The Envelope Section

JunoX<sup>2</sup> uses an ADSR-envelope. You can change the attack- & decay-time, the sustain level and the release-time.



When a key is hit the envelope starts at zero. It then takes the given attack-time to reach full level. After reaching full level, the decay-phase begins and the envelope will gradually decrease until the sustain-level is reached. The sustain-level will last long as the key is held. Once the key is released the release-phase starts. The envelope level will decrease further until zero is reached again.

There are several controls to change the various parameters of the envelope.

These are

- A – Attack rate.
- D – Decay rate.
- S – Sustain level.
- R – Release rate.
- Vol – Changes the modulation level of the volume.
- PWM - Sets the modulation level for the pulse-width.
- Filter – Controls the modulation level of the filter.

The envelope of JunoX<sup>2</sup> has three send parameters, one for volume, one for PWM and one for the filter. These send values can be set to positive and negative levels.

Negative levels invert the envelope. For example, if you do a cutoff-modulation with the envelope filter-send and the level is set to a negative amount, the value of the envelope will be subtracted from the cutoff-frequency, as opposed to added when the envelope filter-send level would have to be set to a positive value.

## The MIDI-Controllers

Nearly every parameter is connected to a MIDI-Controller. By sending MIDI-Controller messages you can change this parameter at any time from your host.

MIDI-Controller	Parameter
94	Fatness
74	Filter cutoff
75	Filter resonance (Q)
73	Envelope attack rate
72	Envelope release rate
71	ENV->Filter modulation depth
16	ENV->PWM modulation depth
17	ENV->Volume modulation depth
19	LFO frequency
18	LFO->PWM modulation depth
7	Main volume
11	Expression

These MIDI-Controller messages are also send back to the host when the sliders are used. When you record a MIDI-track and you change one of the parameters from the previous list, the sequencer will record this parameter change (only in hosts supporting this feature).

## Contact and Support

We tried to keep JunoX<sup>2</sup> as bug-free as possible. If you should encounter any problems or if you have suggestions for future revisions, don't hesitate to contact us at

<http://www.reFX.net/>

Thank you.