

Prisma

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Introduction

This synthesizer was developed in the context of the Modular-2 environment. The modular patch served to provide a sort of design draft, or functional prototype, for the new dedicated device presented here. We'd like to thank all of you for your active participation in our design-a-synth contest, and in particular the winner, Dieter Spörri.

Interface

The synthesizer panel is organized into sections in a way that corresponds to the synthesis structure. The synth provides two oscillators, a sub-oscillator, and noise. These signals are sent to the Mix section. After the mix section lies a Filter section with two multimode filters you can use either in series or in parallel. The Amp section and the effects follow the filter section in the signal path. A comprehensive modulation matrix lets you freely configure the modulation sources and targets.



OSC Section

The two multi-oscillators, OSC1 and OSC2, produce sine, triangle, sawtooth up, sawtooth down and pulse (with pulse width modulation) waveforms. The modulation matrix determines the source of the pulse width modulation. You can synchronize OSC2 to OSC1 (hard sync).

The third oscillator is a sub-oscillator that produces waveforms that are continuously variable from sine to square. This oscillator gets its pitch and pitch modulation from OSC1.

To include signals from the white noise generators, add them in the Mix section.

OSC1/2

Coarse/Fine

Controls the pitch of the oscillator. Coarse adjusts the pitch in semitones; Fine adjusts it in cents (1/100 of a semitone).

Waveform

Allows you to choose from the following waveforms: Sine, Triangle, Saw up, Saw down, and Pulse.



PW

When the pulse waveform is selected, use PW to manually adjust the 'duty cycle' of the wave. This adjusts the shape of the pulse rectangle.

Sync

Puts OSC2 (slave) into synchronisation with OSC1(master). The typical sync-sound is achieved through pitchmodulation of OSC2.

Sub

Coarse/Fine

Controls the pitch of the oscillator. Coarse adjusts the pitch in octaves (0 to -4); Fine adjusts it in cents (1/100 of a semitone).

Waveform

Adjusts the waveform from a simple sine to a square wave.

Mix Section

The Mix section lies just ahead of the filters, and lets you control the signal levels of OSC1, OSC2, Sub and Noise individually. The Master Gain control adjusts the overall level. If the signals are too hot you may overload the mix or filter section. If this happens, just reduce the master gain a little.

OSC1

Volume of OSC1.

OSC2

Volume of OSC2.

Sub

Volume of the Sub-Oscillator.

Noise

Volume of the Noise-Generator.

Gain

Master-Gain controls the volume of all signals in the mix-section.



VCF Section

The Filter section provides two multi-mode filters with a slope of 12dB/octave and adjustable resonance. Each filter is configurable as lowpass, highpass, or bandpass. A Thru function switches the filters to bypass. The filters can be configured either in series or in parallel.

You can use the sub-oscillator's sine signal to restore bass to signals in which the bass has been attenuated through highpass or bandpass filtering. To permit this, the sine signal is routed around the mixer and filter sections so that you can mix it in again using the Xtra Sine control at the filter output.

An additional 12dB boost lies downstream from the filter section to reconcile signal losses due to filtering. Or you can use the boost to overdrive the signal for special effects.

The two filters share a common envelope generator.

VCF

Serial/Parallel

Switches the filters to a serial or parallel configuration. If you set the two filters to the same filter type in serial configuration the effect of the filter is summed, and the slope increases to 24dB/octave.

Link Filter 1/2

This option links the Filter1 and Filter2 controls so that they operate in tandem. This is especially useful when the filters are configured in series to create, in effect, a single 24dB/octave filter.

Xtra Sine

With this control you can mix the sine signal from the sub-oscillator back into the main signal after the filter section. This allows you to restore low frequencies to the sound after the highpass or bandpass filters have reduced them.

12dB Boost

Amplifies a signal that has been attenuated by strong filtering. You can also use boost to distort the signal by driving it beyond its normal volume limit.

VCF 1/2

Type

The filters are switchable to operate as highpass, bandpass, or lowpass filter. When set to Thru the filters are bypassed.

Cutoff

Adjusts the cutoff frequency relative to a range of 0..127.



Resonance

Adjusts the resonance relative to a range of 0..127.

Keyf

This parameter allows the filter cutoff to track the keyboard through the MVC. The keyfollow mid-point is fixed at MIDI note #64 (E3). At this note, the cutoff frequency will always stand at its original value, regardless of the key follow setting. When keyfollow is set to 100%, the cutoff frequency will adjust to maintain its frequency relationship to the pitch across the entire keyboard. At a setting of 50%, the cutoff frequency ratio will be lowered by 50% per octave above E3, and raised 50% per octave below E3. A value of 0% means there is no keyfollow modulation, and the cutoff frequency remains fixed.

Env

Adjusts intensity and direction of envelope-modulation.

Filter Env

A

The attack time. When a gate signal is received, the attack segment starts, and continues for the slope time at which point the maximum level is reached.

D

The decay time. The envelope enters the decay segment when the attack phase completes, and the modulation falls back to the sustain level. The time needed for this is the decay time. A decay will not be heard if the sustain level is set to maximum.

S

The sustain level. This is the level at which the modulation signal will be held as long as the gate is open. When the gate closes, the release segment immediately follows.

R

The release time. When the envelope generator receives a gate-off signal, it jumps immediately from its current phase to the release stage. When the change from one segment to another takes place, the release time will be adjusted to account for the volume level at that time.



TKf (Time Keyfollow)

Adjusts the times of all segments of the envelope. Both the intensity and direction of the modulation effect through MIDI-Note-Number is set by this value. Negative values shorten times, and positive values lengthen them.

TVel

Adjusts the times of the three envelope segments. Both the intensity and direction of the modulation effect through velocity is set by this value. Negative values shorten times, and positive values lengthen them.

Lmod

Adjusts the levels of all segments of the envelope. The value here (0..max) controls the intensity of the modulation of the levels by velocity.

AMP-Section

In the Amp-Section pan position and master volume can be set. The amplifier has a envelope of its own.

Amp

Pan

Positions the sound in the panorama.

Volume

The overall volume can be set here. When playing with high polyphony distortion can occur. Turn down the volume to avoid this.

Amp Env

A

The attack time. When a gate signal is received, the attack segment starts, and continues for the slope time at which point the maximum level is reached.

D

The decay time. The envelope enters the decay segment when the attack phase completes, and the modulation falls back to the sustain level. The time needed for this is the decay time. A decay will not be heard if the sustain level is set to maximum.

S

The sustain level. This is the level at which the modulation signal will be held as long as the gate is open. When the gate closes, the release segment immediately follows.

R

The release time. When the envelope generator receives a gate-off signal, it jumps immediately from its current phase to the release stage. When the change from one segment to another takes place, the release time will be adjusted to account for the volume level at that time. ausgehend vom letzten Level.

TKf (Time Keyfollow)

Adjusts the times of all segments of the envelope. Both the intensity and direction of the modulation effect through MIDI-Note-Number is set by this value. Negative values shorten times, and positive values lengthen them.



TVel

Adjusts the times of the three envelope segments. Both the intensity and direction of the modulation effect through velocity is set by this value. Negative values shorten times, and positive values lengthen them.

Lmod

Adjusts the levels of all segments of the envelope. The value here (0..max) controls the intensity of the modulation of the levels by velocity.

LFO Section

Two full-featured LFOs serve as possible modulation sources for several parameters in the synthesizer. The LFOs are monophonic, and can be synchronized to a MIDI clock.



LFO1/2

Rate

The frequency/rate of the modulation. The frequency, in cycles per second, is displayed in an associated text field.

Waveform

Selects the desired waveform.

Retrig

This switch determines whether the signal will run continuously, or be restarted at its initial phase setting each time a new note is played. Retrigger is active when the button is lit.

Init Phase

Determines the position within the waveform (phase) at which the signal will start when a gate signal is received. Retrigger must be enabled for this to take effect.

Delay

Delays the onset of the modulation. The range is from 0 to 20 seconds.

Fade In

When a gate signal is received, the modulation will gradually build to maximum at the time set here. A gate signal must be connected. The range is from 0 to 20 seconds.

Between the fade in and the fade out, the modulation remains at maximum.

Fade Out

When a gate off signal is received, the modulation will gradually fade to 0 at the time set here. A gate signal must be connected. The range is from 0 to 20 seconds.

MIDI

Switches on MIDI clock synchronization. The Rate value disappears from the display and is replaced by a popup menu with a selection of musical note values (that is, 1/4 note, 1/8 note, etc.) that represent one period of the LFO waveform.

Free Env

The Free Env is another envelope generator you can use as a modulation source. The assignment of this envelope generator is not pre-defined. Instead, you assign it using the modulation matrix (see below).



Free Env

A

The attack time. When a gate signal is received, the attack segment starts, and continues for the slope time at which point the maximum level is reached.

D

The decay time. The envelope enters the decay segment when the attack phase completes, and the modulation falls back to the sustain level. The time needed for this is the decay time. A decay will not be heard if the sustain level is set to maximum.

S

The sustain level. This is the level at which the modulation signal will be held as long as the gate is open. When the gate closes, the release segment immediately follows.

R

The release time. When the envelope generator receives a gate-off signal, it jumps immediately from its current phase to the release stage. When the change from one segment to another takes place, the release time will be adjusted to account for the volume level at that time. ausgehend vom letzten Level.

TKf (Time Keyfollow)

Adjusts the times of all segments of the envelope. Both the intensity and direction of the modulation effect through MIDI-Note-Number is set by this value. Negative values shorten times, and positive values lengthen them.

TVel

Adjusts the times of the three envelope segments. Both the intensity and direction of the modulation effect through velocity is set by this value. Negative values shorten times, and positive values lengthen them.

Lmod

Adjusts the levels of all segments of the envelope. The value here (0..max) controls the intensity of the modulation of the levels by velocity.

A Slope

Adjusts the slope curve for the attack phase. The curve is continuously adjustable from linear to logarithmic.

D/R Slope

Adjusts the slope curve for the decay/release phases. The curve is continuously adjustable from a linear to a exponential fade out.

MIDI Section

In this section you can set the receiving MIDI channel, and control the modulation wheel with the mouse. This is also where you set the MIDI clock rate or select external synchronization.



MIDI

Channel

Selects the MIDI Channel.

BPM

Sets the clock tempo BPM (Beats Per Minute). The first field is the whole number value, and the second is the fractional value in 1/100ths of a beat per minute.

internal/external

Switches from internal to external synchronisation.

Effect-Section

The Effect-Section delivers you Chorus and Delay. The Delay-Times are MIDI-clockable.

Chorus

Rate

Controls the frequency of the pitch modulation.

Depth

Adjusts the modulation depth - the strength of the pitch modulation.

Phase

Adjusts the phase difference of the modulation signal between the left and right channels. This influences the 'width' of the stereo field.

Dry/Wet

Determines the relation between the level of the original and the effect signal.

Bypass

Sends the input signal directly to the output, bypassing the effect.

Delay L/R

TimeL/R

Adjusts the delay time, in milliseconds, for the left and/or right channels.

FB

Controls how much of the delayed signal is fed back to the inputs to be delayed once again.

Damp

Adjusts the amount of high frequency filtering applied to each cycle of the signal in the feedback loop.

MIDI

Activates MIDI-Clock synchronisation. The time parameters are replaced by popup menus where you can choose a note length as delay time.



Cross

This switch changes the feedback loop to a Cross Feedback loop: The output of the left channel is fed back to the right channel input, and the right channel output is routed to the left input channel.

Dry

Controls the level of the original signal in the output.

Wet

Controls the level of the delayed signal in the output.

Bypass

Routes the signal directly from the input to the output, bypassing the effect.

Global Section

The Global section contains some basic instrument settings. Here you choose whether or not to use portamento, and adapt the response of the instrument to your playing by selecting different velocity and aftertouch curves.

Tune

Coarse/Fine

Coarse transposes the pitch in semitones, while Fine adjusts it in *cents* (hundredths of a semitone).

PWR

The Pitch Wheel Range setting controls the deflection of the pitch by the incoming pitchwheel values. The range is adjustable from 0 to 24 semitones. The pitchwheel has no effect, of course, of the value here is set to zero.



Porta/Glis

When Portamento or Glissando is switched on, the pitch will either glide (Portamento), or progress in a stepwise sequence (Glissando), from one note to the next over a fixed time period (adjustable - see next section).

You can adjust this parameter to Off, Portamento (P), Glissando (G), fingered Portamento (fP) or fingered Glissando (fG). Note that Portamento/Glissando is only effective when playing in a legato style.

Time

Used in conjunction with the Port/Gliss option, above. This sets the amount of time to glide or gliss from one note to the next.

Velocity/Aftertouch Curve

The illustration shows the 128 possible Velocity/Aftertouch values.

The associated parameters Curve, Sensitivity, and Offset all contribute to the way the MVC adapts the Velocity/Aftertouch values to produce the desired response. The fundamental response is determined by the 7 Curves - linear (curve 1), fixed (curve 3), exponential (curve 4) or logarithmic (curve 6). Sensitivity adjusts the depth of the curve (i.e. the degree of response) and Offset adds or subtracts a fixed amount from the response curve.

Curve

Select one of the curves in the graphic to define the basic behavior.

Sensitivity

Adjusts the upward slope of the curve, and the resulting output values as displayed in the graphic.

Offset

Adds or subtracts the value set here.

Matrix

The Matrix offers an extremely flexible mechanism for connecting modulation sources to various target parameters. Sources and targets can be freely correlated, and the modulation intensity is adjustable individually for each source/target pair.

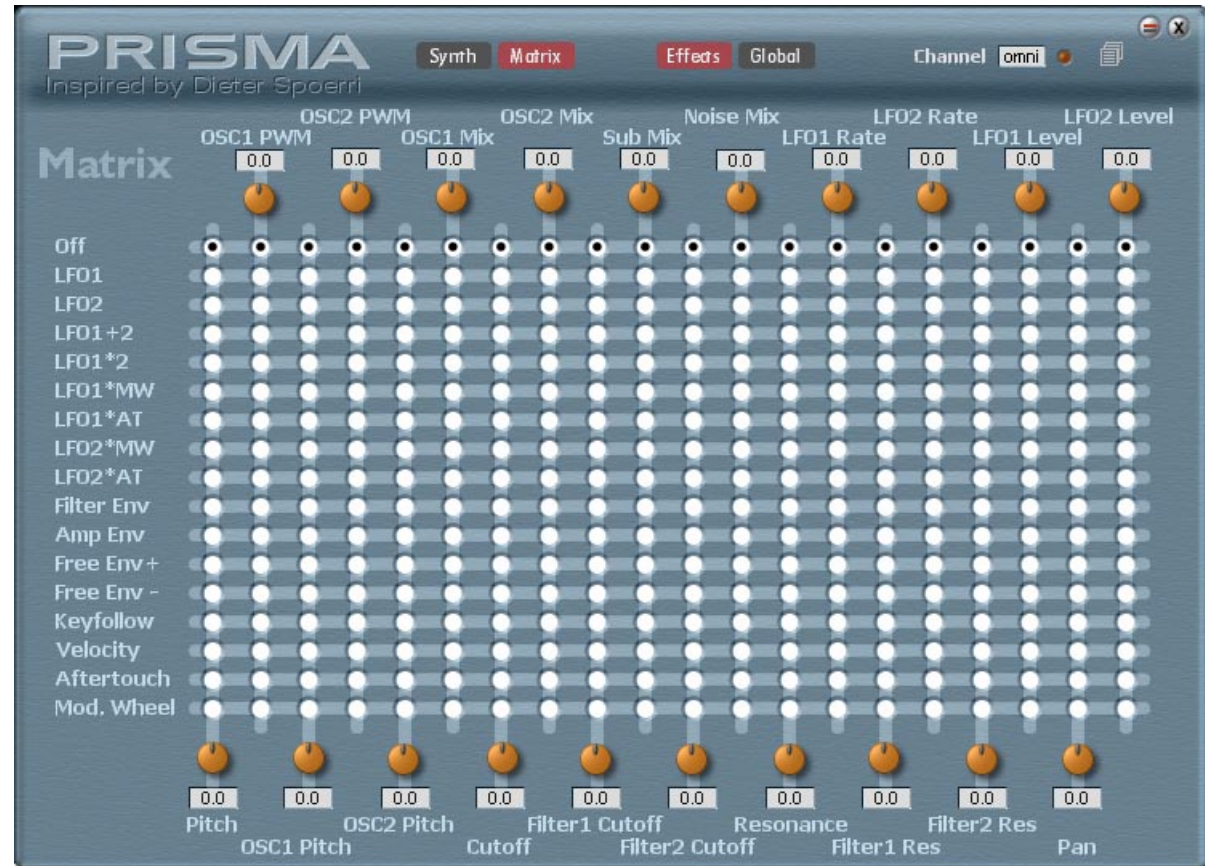
Source

Selects the source for the modulation signal from the following:

LFO1, LFO2, LFO1+2, LFO 1*2, LFO1*MW, LFO1*AT, LFO2*MW, LFO2*AT, filter Env, Amp Env, Free Env+, Free Env -, Keyfollow, Velocity, Aftertouch, Mod.Wheel.

Amount

Adjusts the intensity and direction of the modulation. Positive and negative (inverted) modulation is supported.



Destination

Selects the target of the modulation from the following:

Pitch, OSC1 Pitch, OSC2 Pitch, OSC1 Pulsewidth, OSC2 Pulsewidth, OSC1 Mix, OSC2 Mix, Sub Mix, Noise Mix, LFO1 Rate, LFO2 Rate, LFO1 Level, LFO2 Level, Cutoff, Filter1 Cutoff, Filter2 Cutoff, Resonance, Filter1 Res, Filter2 Res, Pan.

A Note about the Matrix

To conserve system overhead, the Prisma synthesizer's LFOs are monophonic. Modulating polyphonic targets with a monophonic source is not a problem. However, to modulate a monophonic target with a polyphonic source, the source signals (of which there is one for each voice) must first be merged. In Prisma, this merging takes place automatically. Depending on the number of voices in the mixer, only enough headroom remains such that only during full utilization of the voices will the maximum modulation range be achieved. Thus the modulation behaves somewhat differently depending on the number of voices in play in order to maintain an even dynamic.

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