

SYNTRX



Thank you for purchasing the Erica Synths SYNTRX Synthesizer!

Since its beginnings, Erica Synths has promoted experimental electronic music and has developed instruments that enable musicians to unleash their creativity. When it comes to standalone instruments, we considered the Synthi AKS to be

one of the most encouraging instruments in experimental music. We, therefore, teamed up with engineers from the Riga Technical University to develop a synthesizer (no part of the schematics was cloned from Synthi) with a user interface that challenges conventional wisdom in sound design. We believe that it will inspire users to explore the sonic universe and travel to previously undiscovered audible realms.



Features:

- 3 highly accurate VCOs that track admirably over 8 octaves
- +/-1 octave switch for the VCO1
- Sync switch for the VCO2
- Noise generator with "colour" filter
- Resonant VCF
- Ring modulator
- Spring reverb
- ASR/AD looping envelope generator
- Joystick controller
- Two external signal inputs
- Input amplifier with adjustable gain
- 3 VCAs
- Sample & Hold circuit with an individual clock
- Output signal filter
- Mechanical CV/audio signal level indicator
- 2xCV inputs and Gate input
- MIDI In and MIDI Thru
- Built-in speakers

What's included:

- SYNTRX synthesizer
- Universal 12VDC wall wart adapter
- User manual
- 10 patch note stencils

SYNTRX

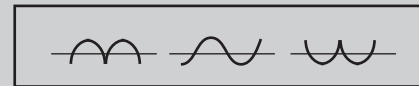
THE "MODULES"

The SYNTRX is somewhat similar to the modular synthesizer – here you can modulate any available “module” with another, and possible connections are almost limitless. The mixer/splitter matrix allows the mixing of up to 16 signals to one output and likewise – because all inputs and outputs are buffered – split one signal to up to 16 destinations. Let’s take a closer look at individual “modules” in order to fully understand all the functionality of the synthesizer.

OSCILLATOR 1

OSCILLATOR 1 is primarily an audio rate oscillator and without an external CV applied, it generates sine and sawtooth waves at frequencies from 1Hz to 10kHz and has a +-1 oct switch. Both waves are mixed before being routed to the patch matrix with an adjustable level for each wave. Furthermore, the sine wave has a manually adjustable waveshape. If an external CV is used, Oscillator 1 is controlled via CV1 input.

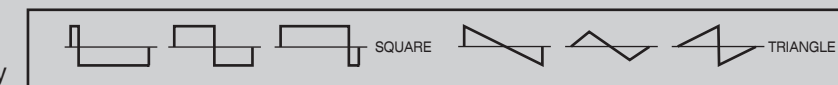
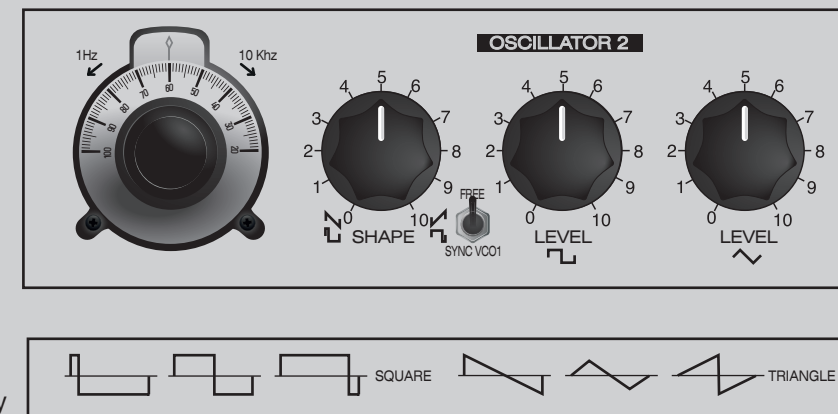
Set the master frequency of Oscillator 1
 Flip a switch to change the pitch of Oscillator 1 for +-1 one octave instantly
 Set the sine wave signal level
 Set the sawtooth wave signal level



OSCILLATOR 2

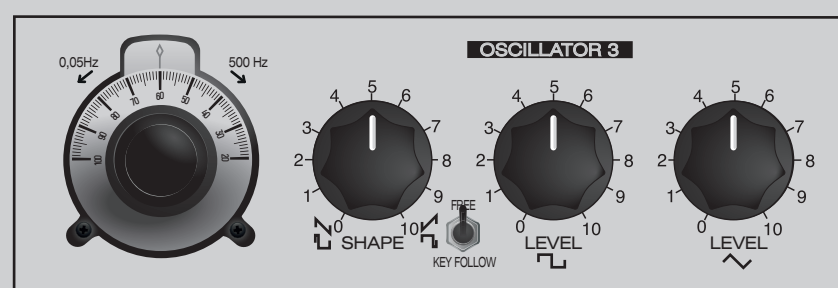
OSCILLATOR 2 is primarily an audio rate oscillator and without an external CV applied, it generates pulse and triangle waves at frequencies from 1Hz to 10kHz. Both waves are mixed before being routed to the patch matrix with an adjustable level for each wave. Both waves have a manually adjustable waveshape. Oscillator 2 can be free running or synchronized to Oscillator 1. If the external CV is used only on CV1 input, Oscillator 2 is controlled via CV1 input, but if CV2 is used, it takes over control of Oscillator 2.

Set the master frequency of Oscillator 2
 Adjust the waveshape manually; it simultaneously affects both waveshapes
 Use the switch to synchronize Oscillator 2 to Oscillator 1
 Set the pulse wave signal level
 Set the triangle wave signal level



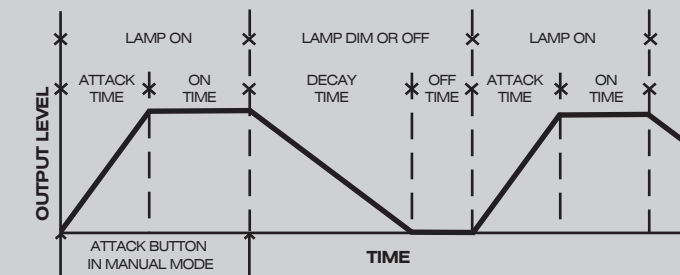
OSCILLATOR 3

OSCILLATOR 3 is functionally similar to Oscillator 2, but it's primarily a low frequency oscillator that goes into audio range, and without an external CV applied, it generates pulse and triangle waves at frequencies from 0.05 Hz to 500 Hz. Both waves are independently available on a patch matrix with an adjustable level for each wave and both waves have a manually adjustable waveshape. Oscillator 3 can be free running or controlled via an external CV (key follow). On the patch matrix, the triangle output shares the input with the Sample&Hold output. Use the switch on the Sample&Hold module to select the output, which is routed to the matrix! Set the master frequency for Oscillator 3
 Adjust the waveshape for both waves simultaneously
 Use the switch to choose between a free running or CV controlled mode
 Set the pulse wave signal level
 Set the triangle wave signal level



TRAPEZOID

SYNTRX has a distinct looping envelope generator, functionally similar to the one found on the EMS Synthi, and called a TRAPEZOID, because the envelope shape reminds one of a trapezoid. The Trapezoid generates control voltages to control events on the SYNTRX – the amplitude of the signal, the pitch of the oscillators, the cutoff frequency of the filter, the reverb mix, etc. By default it's a looping envelope generator with 4 stages – attack, on, release (decay), and off.



All stages are manually adjustable and the decay stage is also voltage controlled, so the decay time of the envelope can be varied automatically. If the OFF control is set to more than 9, looping is terminated, and a new envelope circle can be initiated by pressing the ATTACK button next to the joystick controller. If SYNTRX is used with an external CV/Gate signals (connected to the CV and Gate inputs correspondingly) or a MIDI keyboard or sequencer, in most cases looping must be switched off (OFF control all the way clockwise), otherwise, when the gate is off, the envelope will start looping. Also, with the external gate signal applied, the ON knob will have no effect – the ON time is defined by the gate length. The AD/ASR switch allows one to select between the full attack-on-release-off envelope (ASR) and the attack-decay envelope, where ON and OFF controls have no effect, but a decay stage begins as soon as the attack voltage reaches the maximum level. This is particularly handy to produce sharp, punchy sounds, and also - when in manual attack mode (pressing the ATTACK button) – to cancel the effect of holding the button for a longer time. The output level of the envelope generator is adjusted by the TRAPEZOID knob. In other words, it's a modulation depth for other “modules” on the SYNTRX.

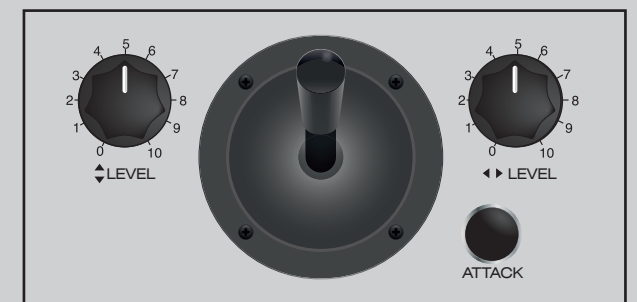
Besides the envelope generator, the trapezoid unit has a built-in voltage-controlled amplifier (VCA); its control voltage input is linked to the output of the envelope generator. The audio signal input for the VCA is the ENVELOPE input on the patch matrix, and the SIGNAL control in the trapezoid unit sets the audio signal level after the VCA output.

- Set the ATTACK time for the envelope generator (6ms – 850ms)
- Set the ON time for the envelope generator (0-1.5s)
- Set the RELEASE/DECAY time for the envelope generator (16ms – 2s)
- Set the OFF time for the envelope generator (14ms – 1.3s) and turn the looping off, when the control is set full clockwise
- Select between the ASR and AD envelope modes
- Set the envelope generator (TRAPEZOID) output level
- Set the VCA signal output level
- The LED gives visual feedback on the envelope generator status

JOYSTICK

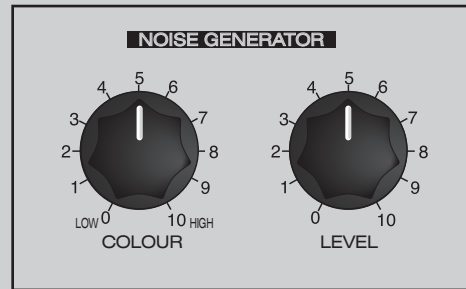
The JOYSTICK enables one to alter two bipolar control voltages simultaneously. These control voltages can be applied to control parameters on other “modules” e.g. the Oscillator pitch, the Filter cut-off frequency, the VCA gain and others. The X and Y level controls define the range of control voltages, where the maximum range is -5V to +5V. The joystick is connected to pins 15 and 16 on the patch matrix, and there's a hidden feature – the control voltage from user defined MIDI CC messages is added to the one from the joystick, so you can have more versatility in controlling the SYNTRX.

The Joystick module also features a manual ATTACK button that controls the envelope generator described above.



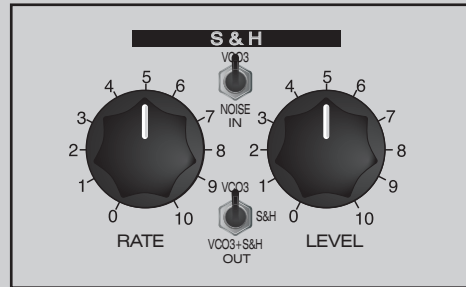
NOISE GENERATOR

SYNTRX has a Zener diode based NOISE GENERATOR that provides full spectrum white noise. The Noise Generator is not voltage controlled, but the COLOUR knob allows the emphasizing of the low (LOW setting) or high (HIGH setting) frequencies of the noise spectrum. Adjust the COLOUR – frequency spectrum of the noise - manually Set the noise signal level



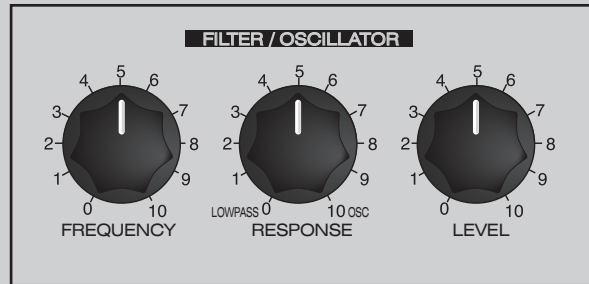
SAMPLE&HOLD

SAMPLE&HOLD generates stepped control voltages for voltage control of other modules. It has independent sample RATE control as well as LEVEL control, and two switches – one selects the input signal, the other – the type of signal that is sent to the patch matrix. The matrix has only 16 inputs, therefore, the Sample&Hold shares the matrix input with the Oscillator 3 triangle output. Adjust the sample rate manually – from one sample in a few seconds to a low audio rate. Adjust the output signal level – the control voltage span. Max span is -5V - +5V Select the input signal for the S&H circuit. The available options are a triangle-sawtooth wave from Oscillator 3 and Noise. The triangle-sawtooth wave (depending on the waveform knob setting) will generate staircase-like control voltages on the output. Noise will generate random voltage steps. Select which signal is routed to the patch matrix! The three position switch selects between a triangle-sawtooth wave from Oscillator 3 (unaffected by the S&H circuit), S&H output and a mix of Oscillator 3 and S&H outputs for super random modulations.



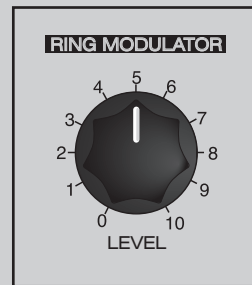
FILTER/OSCILLATOR

The FILTER/OSCILLATOR is a resonant lowpass filter of unique design. It can be modulated at audio rate and when the resonance is set to 10, it becomes an oscillator that produces a pure sine wave. The frequency of the oscillator will depend on the Frequency knob setting, as well as on the CV applied to the Filter Frequency input on the patch matrix. The Filter/Oscillator will not track 1V/oct. Set the cut-off frequency for the lowpass filter. The Filter Frequency control voltage is added (or subtracted, if it's negative) to the knob setting Set the desired resonance level. In settings above 9, the filter will start to self-oscillate Set the filter signal level



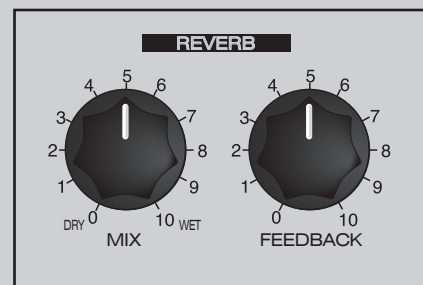
RING MODULATOR

The RING MODULATOR, also known as a Four-Quadrant Multiplier, is a special case of amplitude modulation - one signal changes the level of (or "multiplies") the level of the second signal. Two signals (A and B on the patch matrix) are required in order for the ring modulator to operate (if you multiply by zero, you get zero). For example, two oscillators running at audio rates or an oscillator and microphone patched into one of the Inputs on SYNTRX. Depending on the input signal frequency relationship, the output is a complex set of component tones, being typically metallic, bell-like sounding. When voice from the microphone is modulated by an oscillator, a robotic speech effect is achieved. Set the level of the ring modulator output



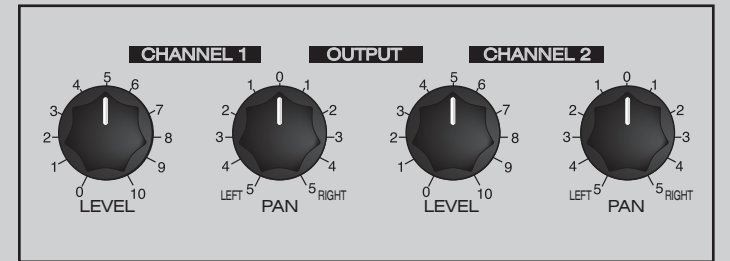
REVERBERATION

A REVERBERATION effect is achieved by feeding the audio signal through the spring reverb tank and then picking it up and mixing it with the original signal. As this is actual spring reverb, not digital emulation, the reverberation unit may make a slight noise, which can be heard at higher output signal levels. It can also pick up mechanical vibrations from other sources, and feedback from internal loudspeakers may occur. Therefore, when using the internal loudspeakers, control their loudness, unless you want to use the reverberation unit as another sound source. Fade between DRY (unaffected audio) and WET (processed through the reverb tank) signals manually! This is also a voltage controlled setting, and control voltage is added to the knob setting The reverberation unit on SYNTRX features a manually adjustable amount of spring feedback. At far CW settings, the module goes into self-oscillation and you can basically use it as an instrument on its own, even with no audio input.



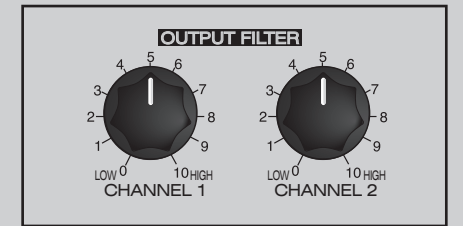
OUTPUT AMPLIFIERS

The OUTPUT AMPLIFIERS are the final treatment for the audio signal before it's sent to the internal loudspeakers, headphones and to the outputs. As there are two output channels (Ch1 output and Ch2 output on the patch matrix), and each channel has stereo panning controls PAN (the manual only control), a user can design advanced sound scapes in stereo. The LEVEL controls allow one to set the output level manually, but there's a voltage controlled amplifier on each channel, so the control voltage from the patch matrix is added to the manual level settings, providing even more versatility in sound design.



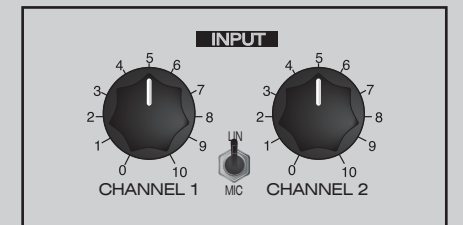
OUTPUT FILTER

Both output channels feature an OUTPUT FILTER, which is essentially a tone control. If the control is at 5 on the dial, the frequency response is flat. Turning the control counter-clockwise (towards the LOW setting) it boosts lower frequencies, while turning it clockwise (towards the HIGH setting), boosts higher frequencies. These are manual only controls. Use the output filter to do the final treatment for the sound for each channel.



INPUT AMPLIFIERS

The SYNTRX has two external audio signal inputs. You can use the instrument as an FX unit for external signal treatment or to inject the external signal into advanced patches and generate completely new sounds. Two identical INPUT AMPLIFIERS are implemented to adjust the level of the external audio signal and/or to boost it to the necessary level. The gain switch selects between line level signals on the input and microphone level signals (this setting is also recommended for guitar pickups). Select the input amplifier gain and adjust the signal level. You can also overdrive the signal in the far clockwise settings of the level controls.



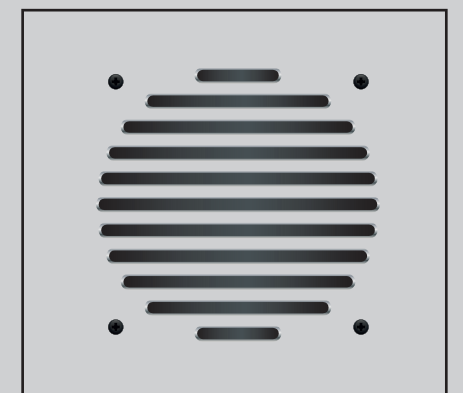
METER

The METER is used to monitor both CV and audio signal levels in the SYNTRX patches. The internal signal levels in the SYNTRX are modular level, meaning, the normal unattenuated audio signal is 10Vptp. CV signals may be up to -10V - +10V. Use the switch to select between CV and audio signal measurement. In the Audio setting, the measurement starts from the left side of the scale, and the full scale is 12V. In the CV setting, the centre of the scale is 0 and it indicates both positive and negative voltages. The maximum range is from -10V to +10V.



SPEAKERS

The SYNTRX has two built in speakers for monitoring purposes and experiments with feedback loops. Use the MUTE/ON switches to turn them on or off. At louder settings, the speakers may distort the sound and with spring reverb in action, they will go into feedback loop with the spring. You can use it as a sound source for future treatments. You may also want to try playing feedback loops with a microphone connected to the input and bringing it to the speaker. Obviously, the best monitoring is achieved with studio monitors or headphones, so built-in speakers are a nice extra on the SYNTRX.



The SYNTRX has a digitally controlled analogue PATCH MATRIX. It's a mixer/buffered multiple matrix, so when designing patches, you can mix up to 16 inputs to a single output without losing signal strength, or alternatively, you can send one signal to up to 16 outputs simultaneously. Moreover, each patch-point has three levels of attenuation – gain 1, gain 0.7 and gain 0.3 for more advanced patches. The matrix has 16 inputs (or receives, where signals are applied) and 16 outputs (or sends, where signals are sent).

Inputs (or receives) are:

Outputs (or sends) are:

Inputs (or receives) are:		Outputs (or sends) are:			
SOURCES	Output Ch1	▶ Output of the output amplifier 1 – if you have made a patch on the Output 1, use this signal for future processing or experiment with feedback by feeding it to one of Inputs.	▶ The input of the output amplifier for the Channel 1	▶ Ch1 Output	SIGNAL INPUTS
	Output Ch2	▶ Output for output amplifier 2	▶ Input for level meter	▶ Meter	
	Oscillator 1	▶ Output for Oscillator 1 – both waveforms mixed at levels defined by manual level controls	▶ Input for output amplifier for Channel 2	▶ Ch2 Output	
	Oscillator 2	▶ Output for Oscillator 2 – both waveforms mixed at levels defined by manual level controls	▶ Audio input for VCA linked to the envelope generator	▶ Envelope	
	Oscillator 3 +S&H	▶ Pulse output for Oscillator 3	▶ Signal input for ring modulator	▶ A Ring mod	
		▶ Selectable between the triangle/sawtooth output of Oscillator 3 and the Sample&Hold CV output	▶ Carrier input for ring modulator	▶ B	
	Noise	▶ Output for the noise generator	▶ Audio input for spring reverberation unit	▶ Reverb	
Input	Ch1 ▶ Amplified/attenuated signal from external audio input 1	▶ Audio input for filter	▶ Filter	CONTROL INPUTS	
	Ch2 ▶ Amplified/attenuated signal from external audio input 2	▶ Control voltage input for Oscillator 1 pitch	▶ 1		
Filter	▶ Output for Filter/Oscillator	▶ Control voltage input for Oscillator 2 pitch	▶ 2 Oscillator frequency		
Trapezoid	▶ Control Voltage output for envelope generator	▶ Control voltage input for Oscillator 3 pitch	▶ 3		
Env. signal	▶ Audio signal output for VCA linked to the envelope generator	▶ Control voltage input for envelope decay time	▶ Decay		
Ring mod	▶ Output for Ring modulator	▶ Control voltage input for reverberation unit Dry/Wet mix	▶ Reverb Mix		
Reverb.	▶ Output for Reverberation unit	▶ Control voltage for filter cutoff frequency	▶ Filter Frequency		
Joystick	▶ Control Voltage from the Joystick corresponding to vertical movement, also control voltage associated with configurable MIDI controller	▶ Control voltage for VCA of Output amplifier 1	▶ 1 Output ch. level		
	▶ Control Voltage from the Joystick, corresponding to horizontal movement, also control voltage associated with configurable MIDI controller	▶ Control voltage for VCA of Output amplifier 2	▶ 2		

BUILDING PATCHES

Building patches on the patch matrix requires non linear approach that is bit different form patching a regular synthesizer. Without patch designed the SYNTRX will not make any sound. When connecting the modules, you basically go in circles in and out of the patch matrix. Here are some examples.

1

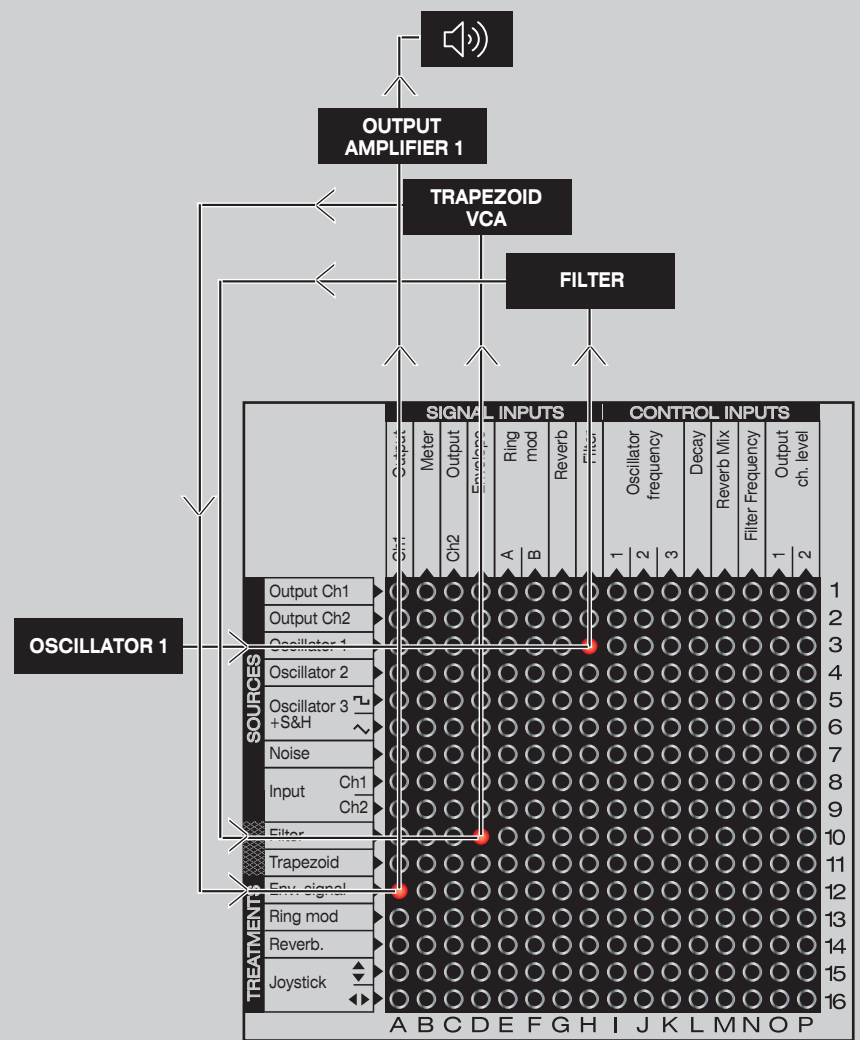
In this basic patch, the output signal from Oscillator 1 goes directly into the input of the Output amplifier for Channel 1. Nothing interesting here, but we have a sound on the output. By adjusting the Frequency dial on Oscillator 1, you can alter the pitch of the sound, and by adjusting the waveshape and level controls, you can alter the timbre of the sound.

2

In this patch the output signal from the Oscillator 1 goes into the input of the Filter and the output of the Filter is patched into the Output amplifier of the Channel 1. Now you can alter the cutoff frequency and response of the filter and alter the timbre of the sound. Take note that same as for the oscillator outputs you need to set the filter level output too with the level pot on the filter section.

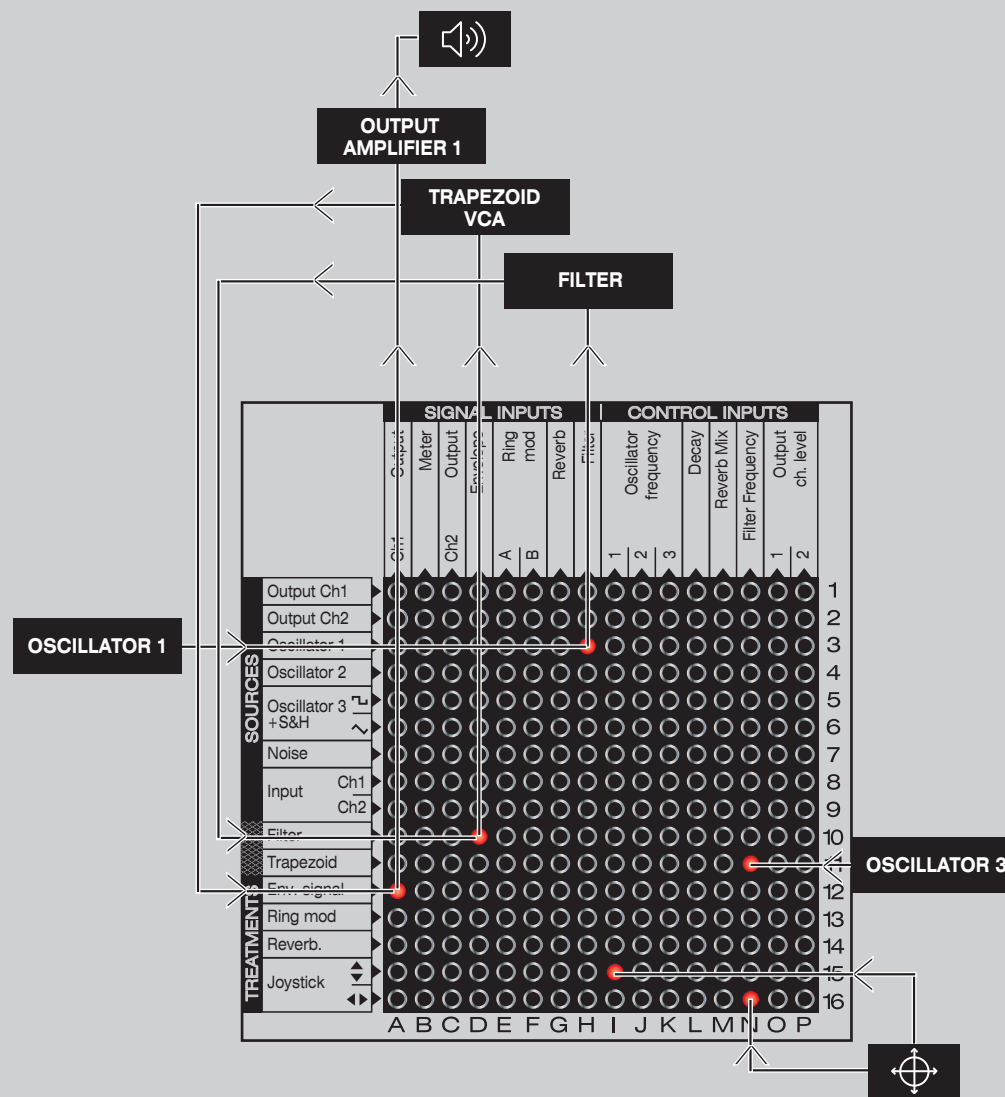


BUILDING PATCHES



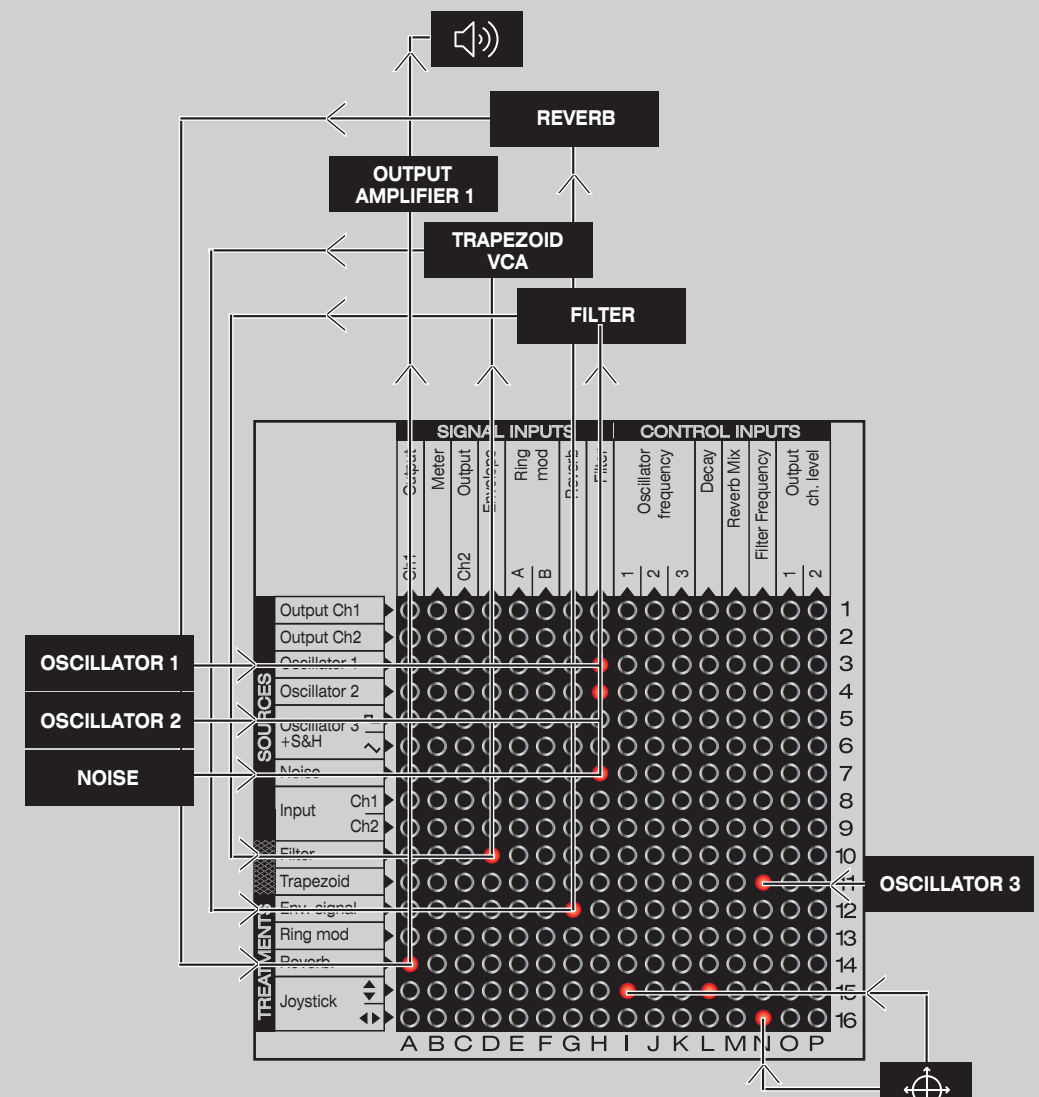
3

In this patch the output signal from the Oscillator 1 goes into the input of the Filter and the output of the Filter is patched into the VCA linked to the envelope generator (Trapezoid). The signal from the VCA output goes into the Output amplifier of the Channel 1. The looping envelope generator will alter the gain of the VCA, therefore you will hear the change of loudness of the sound on the output, and also here you need to set the VCA output manually with the signal pot on the trapezoid section of the unit.



4

In this patch the output signal from the Oscillator 1 goes into the input of the Filter and the output of the Filter is patched into the VCA linked to the envelope generator (Trapezoid). The signal from the VCA output goes into the Output amplifier of the Channel 1. Now, let's add some modulation sources! The cutoff frequency of the filter will be simultaneously modulated by the Oscillator 3 sawtooth wave and the horizontal movement of the Joystick and the pitch of the Oscillator 1 will be modulated by the vertical movement of the Joystick.



5

This patch builds on the previous one by sending also the Oscillator 2 and the Noise to the Filter, and the Envelope Signal goes to the Reverberation unit. The output of the Reverberation unit is sent to the Output Amplifier 1. The Y movement of the Joystick now controls also the Decay time of the Trapezoid generator.

CONNECTIONS



1 Flip the switch to turn the SYNTRX on. The SYNTRX is fully analogue synthesizer, therefore, when switched on, it takes some 5-10 minutes to “warm up” before VCOs are in tune.

2 Connect the external power supply here! Use only the power supplied with the unit, otherwise you risk permanently damaging the SYNTRX.

3 Connect monitoring headphones here.

4 This is the line level Output 2. Connect it to the mixer.

5 This is the line level Output 1. Connect it to the mixer. Depending on the patch, nice stereo panning is achievable.

6 This is the external audio Input 2.

7 This is the external audio Input 1.

8 This is the MIDI thru output.

9 This is the MIDI input. The SYNTHI receives MIDI note, note on, mod wheel and pitch wheel messages, as well as two configurable CC messages – refer to the MIDI configuration page.

10 The LED signals MIDI activity. The small pushbutton is used for MIDI configuration. Refer to the MIDI configuration page.

11 This is the Gate input. It initiates the envelope generator

(Trapezoid). Ensure that the Trapezoid is in the manual, non-looping, mode.

12 This is the second control voltage input. If the CV is connected here, it takes over control of the Oscillator 2 from the CV1 IN, so you can design paraphonic patches.

13 This is the first main control voltage input. Connect any 1V/octave CV source (a keyboard, sequencer, ribbon controller, etc.) and the CV is routed to all three Oscillators, unless the CV2 for Oscillator 2 is connected. The CV from MIDI note messages is added to CV1.

MIDI IMPLEMENTATION AND CONFIGURATION

The SYNTRX has basic MIDI implementation – you can select a MIDI channel on which SYNTRX receives MIDI note, note on (gate), pitch wheel, modulation wheel (assigned to the VCF cutoff) messages, as well as two configurable CC messages and note velocity message that is assigned to the VCF cutoff. The SYNTRX receives only one MIDI note at time, and it's higher note priority. If no external CV is patched in the relevant inputs, MIDI note messages control pitch of the VCOs, if the external CV is used, MIDI notes are added to the external analogue CV, so you can use the MIDI keyboard or sequencer to transpose the pitch of the VCOs.

MIDI CC messages are added to the joystick X and Y control voltage correspondingly, so you can address them via same patch matrix connection points as the joystick.

MIDI CONFIGURATION.

Connect the MIDI keyboard to the MIDI IN. MIDI configuration is performed via small button next to the MIDI connectors on the

rear panel of the SYNTRX.

Pushing the button promptly sends the MIDI panic message.

In order to configure MIDI settings push and hold the button for 2”. This will initiate configuration sequence:

The MIDI LED will flash once and you can select MIDI channel 1-12 simply pushing any key on the MIDI keyboard. C on any octave corresponds to MIDI channel 1, C# - channel 2, D – channel 3, etc. Once happy, push the button to advance to the next step. The default CC1 message is 20, and CC2 is 21.

The MIDI LED will flash twice and you can assign the MIDI CC message 1. Simply move/rotate the relevant MIDI controller you wish to assign, and it is automatically assigned to generate control voltages that are added to the joystick X movement. Once happy, push the button to advance to the next step.

The MIDI LED will flash three times and you can assign the MIDI CC message 2. Simply move/rotate the relevant MIDI controller you wish to assign, and it is automatically assigned to generate control

voltages that are added to the joystick Y movement. Once happy, push the button to advance to the next step.

The MIDI LED will flash four times and now you can toggle on or off the VCF cutoff control via keyboard velocity. Push the C key on the keyboard to activate the velocity control, and C# to deactivate it. The keyboard velocity is added to the cutoff knob setting. Once happy, push the button to exit MIDI configuration.

You can skip one of configuration steps by simply pushing the button repeatedly.

The MIDI CV converter is highly accurate and comes calibrated from the factory, but if you feel, you need to recalibrate it, please, contact the Erica Synths Support. If needed, it's possible to update the firmware of the patch matrix and the MIDI converter, please, follow the Erica Synths announcements or contact the Erica Synths Support.

SAFETY INSTRUCTIONS

Please follow the instructions for the use of the Erica Synths SYNTRX below, because only this will guarantee the proper operation of the instrument and ensure the warranty from Erica Synths.



Use the SYNTRX exclusively with the power supply unit (PSU) supplied with the unit. Powering it with other PSU units may cause permanent damage to the device.



Water is lethal for most electric devices unless they have been rendered waterproof. The SYNTRX is NOT intended for use in a humid or wet environment. No liquids or other conducting substances should be allowed into the module. Should this happen, the module should be disconnected from mains power immediately, dried, examined and cleaned by a qualified technician.



Do not expose the instrument to temperatures above +50° C or below -20° C. If you have transported the instrument in extremely low temperatures, leave it at room temperature for an hour before plugging it in.



Transport the instrument carefully. Never let it drop or fall over. The Warranty does not apply to instruments with visual damage.



SYNTRX must be shipped in the original packaging only. Any system shipped to us for return, exchange and/or warranty repair must be in its original packaging. All other deliveries will be rejected and returned to you. Ensure that you keep the original packaging and technical documentation.

You will find the Erica Synths terms of warranty at www.ericasynthslv
Items for return, exchange and/or warranty repair should be sent us according to the guidelines on SUPPORT section on www.ericasynthslv

Erica Synths
Andrejostas St. 43
Riga
Latvia
LV-1045

DISPOSAL

This device complies with EU guidelines and is manufactured and confront RoHS without the use of lead, mercury, cadmium or chrome. Nevertheless, this device is special waste and disposal in household waste is not recommended.

User manual by [Girts Ozolins@Erica Synths](mailto:Girts.Ozolins@EricaSynths).
Design by [Ineta Briede@Black8](mailto:Ineta.Briede@Black8).

Copying, distribution or any commercial use in any way is prohibited and needs the written permission of Erica Synths.

The specifications are subject to change without notice.

If you have any questions, feel free to contact us on SUPPORT section on www.ericasynthslv