USER

MANUAL

ABOUT

Welcome to the world of SOLAR 50

SOLAR 50 is the unique analogue performance oriented electronic music instrument that is designed for creating movie soundtrack, atmospheric sound, microtonal music, background music and super polyphonic electro symphonies. Variations of sound you can create with «SOLAR 50» are really great. Solar 50 is inspired by early electronic musical developments of the last century, particularly Leo Theremin's instrument called "Harmonium" and other weird Soviet synths like ANS.

No midi, no presets, no volt-octave. Only experimental, sensitive approach and spontaneous sounding.

SOLAR 50 consists of 10 voices, each voice has its own volume. All voices are divided into groups of 5 units for the right side and for the left side and mixed by the MAIN MIXER where the Knob 01-05 sets the volume of 5 left voices and the knob 06-10 sets the volume of 5 right voices. Also, there are external audio input and volume PIEZZO knobs on the MAIN MIXER. All audio signals go to a 12 dB analog filter from POLYVOX synthesizer, which is controlled by voltage. From the filter, audio signals enter the effector (with cartridges) which is controlled by CV as well - the same circuit is used in ELTA music CONSOLE pedal. Here, the BLEND knob sets the effect level. The VOLUME knob sets the overall volume WET OUT. To process a pure voice signal by external effects, there are DRY OUT L and DRY OUT R which are clean outputs for both groups of voices. When being used, these outputs are dropped out from the general mixer and no longer go to the filter and to the effector. Then you can return one of the processed channels to EXT AUDIO input so you can create stereo sounds. In this case the contact microphone inside the keyboard always goes to the filter and to the effector by default. It also controls the ENVELOPE follower / Gate detector, or you can choose to connect an external microphone, electro-musical instrument or guitar.

BLOCK DIAGRAM

VOICE DIAGRAM

to voice mixer

VCA CV in

attack
release

hold switch

contact sensor

VCA

envelope
generator

gate in

mute
mute
mute
mute
mute

30–100 Hz (+/– 5%)
80–245 Hz (+/– 5%)
140–435 Hz (+/– 5%)
315–990 Hz (+/– 5%)
975–3075 Hz (+/– 5%)

OSC 1   tune
OSC 2   tune
OSC 3   tune
OSC 4   tune
OSC 5   tune

PITCH
(voltage reduction
to all oscillators)

mod
mod
mod
mod
mod

CV mod in

led

photo
sensors

photo–sensitive detector
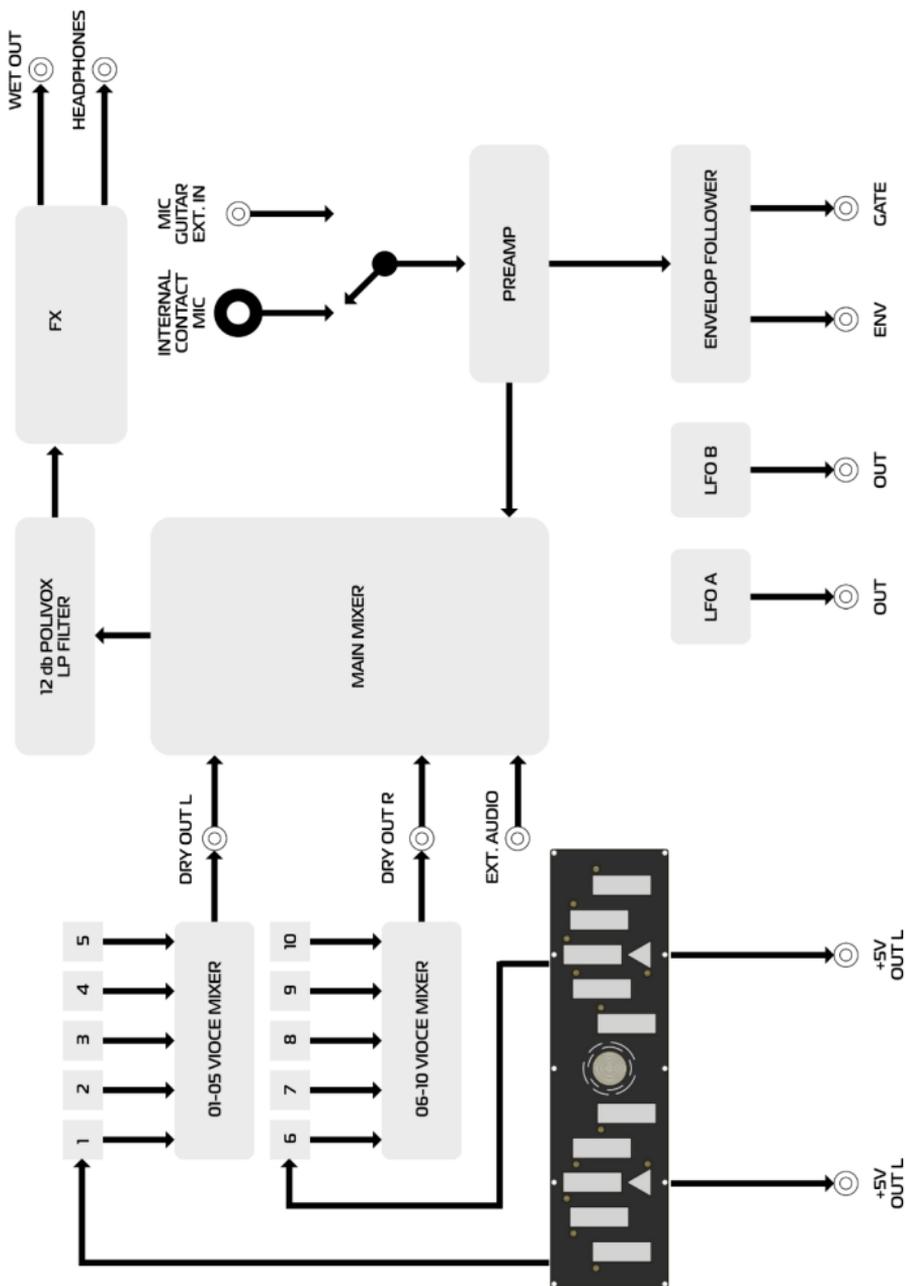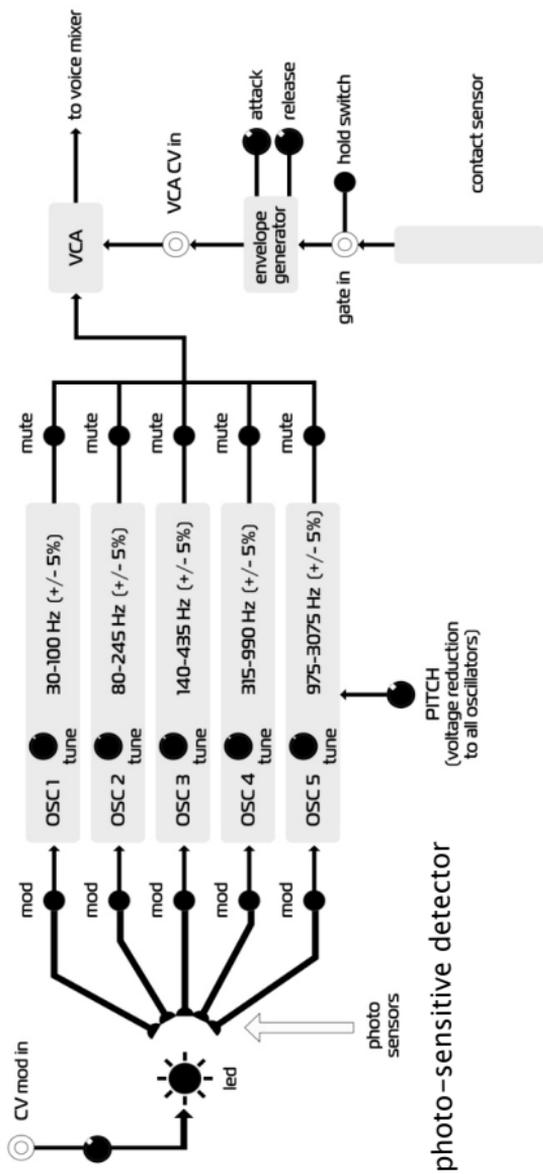
VOICE

Each voice consists of 5 simple sawtooth generators that do not have a logarithmic or linear voltage control like standard VCOs. There is only a pitch knob – TUNE. 1st generator has a tuning knob from 30 to 100 Hz; 2nd generator – from 80 to 245 Hz; 3rd – from 140 to 435 Hz; 4th – from 315 to 990 Hz; 5th – from 975 Hz to 3075 Hz; It covers the approximate range of 8 octaves from B 0 to G 7. Each of the 5 generators in the voice can be turned off or on by MUTE buttons allowing you to create different variations of chords, triads, two-sounds or to use one generator. You can modulate the pitch of the oscillators using the MOD buttons by sending any CV source to the input of CV MOD or by using a light-sensitive eye that changes the frequency of the oscillators. Surrounding lightning also influences on a photo-sensitive detector of the instrument, when activating a MOD BUTTON on any generator, the frequency (pitch) of a generator changes depending on the level of surrounding lighting The PITCH knob transposes down all 5 voice generators at the same time. After half the stroke of the knob, generators start to modulate each other creating FM synthesis effect. Voices are triggered by a touch control keyboard, each sensor corresponds to its own voice, giving out a 5 volt gate that starts the Attack/Release envelope, opening VCA in a voice. You can use external CV sources to trigger voice, envelope control, or VCA. You can use the envelope output to trigger next voice or modulate a voltage of the filter or the effector.

VOICE

photo-sensitive detector
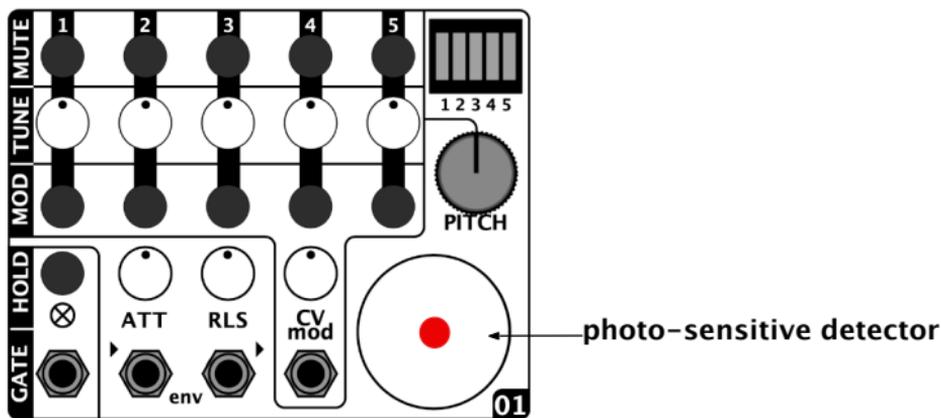
GATE external +5v

HOLD gate on

ATT attack control

RLS release control

MUTE on/off osc

TUNE frequency osc

PITCH transpose all osc

MOD on/off modulation osc

CV mod external CV with amount control 0...+10V

ENV in (**VCA in**) external CV sources 0...+10V

ENV out envelope out 0...+6V

12345 indication osc status

CONTACT MIC/ENVELOPE FOLLOWER

Built-in (internal) contact microphone (PIEZZO) soldered right under the sensor keyboard, turning the case of SOLAR 50 into a microphone. A large palette of organic, physical sounds can be produced by scratching, tapping, and more generally by collecting any acoustic waves using the built-in effector with the cartridges. Amplification stage suitable for external contact microphones, electro-acoustic instruments like guitars, or plain line-level signals. With its built-in envelope follower and gate detector, it can also be the gateway between external audio sources and CV.

Contact mic piezzo

External mic/guitar or mic internal

CONTACT MIC

EXT/⬤   GAIN
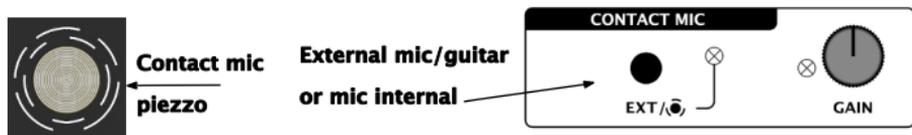
•Audio amplifier with 1M input impedance, up to 40dB of gain. This large gain ranges covers everything – from the amplification of line-level instruments, to the magnification of tiny sonic details captured by external contact microphones. MIC/GUITAR 6,3 Jack connector

•External input bypassing the built-in contact microphone.

•Envelope follower with attack and release and Envelope CV output

•Gate detector with 3 sensitivity levels (THS switch) and +8V gate output.

•Three indicator LEDs: amplifier clipping (white), envelope follower level (red), gate detector activity (green).
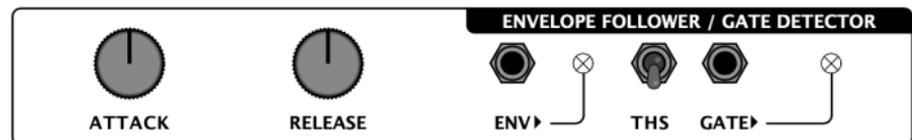
ENVELOPE FOLLOWER / GATE DETECTOR

ATTACK   RELEASE   ENV▶   THS   GATE▶

MIXING / FILTER

VOICE MIXER
01 02 03 04 05 06 07 08 09 10

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01–05 L – groups volume of 5 left voices

**06–10 R** – groups volume of 5 right voices

EXT. – external audio

PIEZZO – contact mic volume external mic/guitar or internal mic

MAIN MIXER
01–05 L   06–10 R   EXT.   PIEZZO

All audio signals are fed to a 12 dB analog low-pass filter from the POLYVOX synthesizer, which is voltage controlled. The Polyvox filter uses two classic Soviet chips – UD1208 to create a unique and iconic filter tone.


12dB FILTER
FREQ   Q   CVfreq
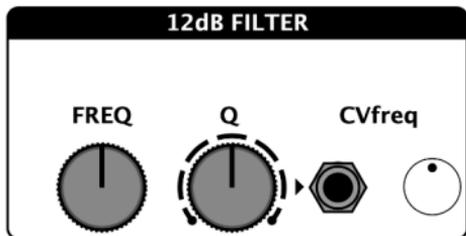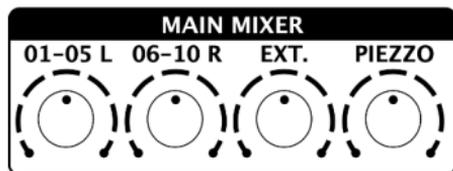
FREQ – cutoff control filter

Q – resonance amount

CVfreq – CV cutoff, input minijack and amount CV
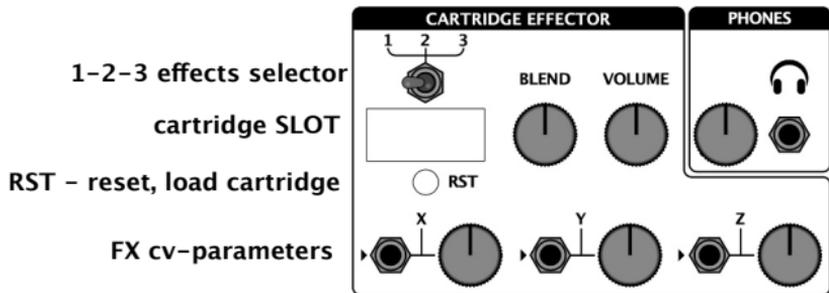
LOW-pass filter
dB
20   Hz   20 000

EFFECTOR/CONNECTORS

1-2-3 effects selector

cartridge SLOT

RST - reset, load cartridge

FX cv-parameters

Audio signals enter the effector (**with cartridges)** which is controlled by CV as well - the same circuit is used in ELTA music CONSOLE pedal. Here, the BLEND knob sets the effect level. The VOLUME knob sets the overall volume WET OUT. X, Y, Z parameters controlled by CV 0...+10V. Each effect has its own parameters on the X, Y, Z knobs. (**Look into cartridge manual**). Each cartridge has three effects. To use it just insert cartridge any side into the slot and press reset/load button. 1-2-3 program selector - switches active effect from the cartridge.

POWER **OFF**   **EXT**   **L OUT R**   **WET**   **MIC**
⎧⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯
POWER **ON**   **AUDIO**   ⎿⎯**DRY**⎯⎦   **OUT**   **GUITAR**

POWER ON/OFF - power supply socket and power on / off button

EXT AUDIO -external audio signal (synthesizer, drum machine, others) On the mixer, the **EXT.** control.

L R out dry - Sound of voices, no filter and no effector. It's much cleaner and louder. Stereo panning of voices.

WET OUT - Filtered and effected voices. Mono output.

MIC/GUITAR - Connecting external microphones, piezo, guitar and other weak signal devices. On the mixer, the PIEZZO control.

KEYBOARD/LFO
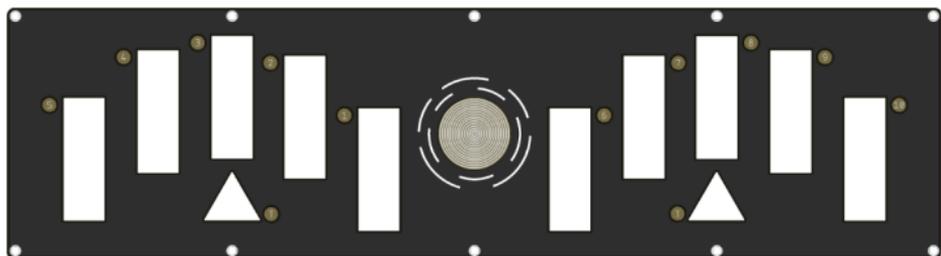
Touch-sensitive keyboard generates +5V when you put your finger on a sensing element, turning on the amp envelope in the voice. The numeration of sensing elements corresponds to the numeration of voices on the instrument panel. You can also trigger a sensitive element with a cartridge set to it. Try to experiment with it! In addition, SOLAR 50 has two extra sensing elements with individual outputs +5V. You can connect them to modulate voices or to control the effector parameters, creating interesting sounds.
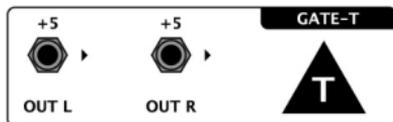
On the board of SOLAR 50 there are 2 independent LFO's with a waveform adjustment from square to triangle and the knob set in the middle position adjusts the mix of both triangle and square waves.
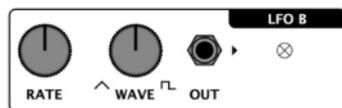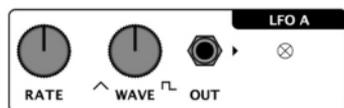
SPECIFICATION

10 voices, 50 sawtooth oscillators, 120 control pots, 50 cv miniJacks 5 in/out Jacks, 113 switches, 10 photo-sensors, cartridge effector, Polyvox filter, sensor keyboard.

External input   2V
External guitar/mic input   1M input impedance, gain 40dB
DRY outputs   4V
WET output   2V

The range of input and output CV   0.....+10 V
Power Supply   24 VDC 1A (+ center)
Size   500 mm length / 300 mm width / 26 mm height
Weight   5 kg
The kit includes   SOLAR 50, power supply 24vdc, 5 minijack patch cord, 3 cartridges, user manual.

Solar 50 team

Idea, development, engineering and production: Arseny Tokarev

Design: Arseny Tokarev, Timur Bekov, Viktoriya Anufrieva

Enclosure construction and PCB: Ilya Sidorenko, Grigoriy Ryazanov

Translation and editing: Nikolay Poletaev

User manual: Evlash Sergey, Arseny Tokarev

Special thanks to Ivan Dorn

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CE   ⊖–⦿–⊕   ELTA

ELTA MUSIC

Designed by Tokarev Arseny

Made in Moscow, 2020

BIG AMBIENT MACHINE