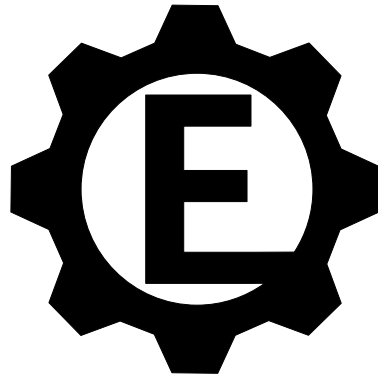


Eternal Engine EMI



APPARATUS
TUBE SYNTHESIZER

User Manual
v0.9b

GENERAL RECOMMENDATIONS

Thank you for the buying “Apparatus”, a musical tube synthesizer.
Before opening please check::

- the integrity of the packaging;
- completeness;
- correct operation of the device.

Read this manual carefully before using the synthesizer. Make sure you know the definition of controls and jacks for external connections.

DELIVERY SET:

- tube synthesizer “APPARATUS”;
- connector cable for connection to the power grid;
- fuse;
- kit of tubes (2x TF1-0.1/0.3, 2x 6H8C, 2x6H9C, 6LJ5C);
- kit of spare parts of tubes (TF1-0.1/0.3, 6H8C, 6H9C, 6LJ5C);

SAFETY REQUIREMENTS AND OPERATING PROCEDURES FOR THE SYNTHESIZER



Do NOT use the synthesizer with damaged tubes! This synthesizer uses a high voltage, which, if used improperly, can cause electric shock, and even kill you. If you are unsure about following all the steps in this manual, do NOT use the device. High voltage is not a joke. It is deadly to use the synthesizer under the influence of alcohol. The lamps reach high temperatures during use, do NOT touch them with your hands to avoid burns. Liquid spill on / into the device is inadmissible. It can cause electric shock, damage to the device, and fire. Do NOT leave the synthesizer unattended on. The Synthesizer is intended for use in an enclosed, dry environment only (at home or in a studio). If synthesizer was at temperature below +5 °C, then keep it at room temperature for 2-3 hours before usage. Otherwise this can cause condensation on the internal parts of the synthesizer. It can cause electric shock, damage to the device, and fire. Do not leave the Synthesizer plugged in when it is not in use. Do not subject the Synthesizer to sudden shocks or falls. The Synthesizer is not intended for use by children. The manufacturer assumes no responsibility for damage to third-party equipment resulting from use of the Synthesizer. The manufacturer is not responsible for damage caused by failure to observe safety precautions and operating instructions.

The tube musical synthesizer “APPARATUS” is designed to operate from the AC of 120V or 230V (depending on the region of delivery).

Put the plug out before changing a fuse.

Do Not use a self-made fuses.

Do NOT leave the synthesizer unattended on.

The synthesizer is not intended for using with humid environments and at ambient temperatures below +10° C and above +35° C.

All controls have easy movement or strictly fixed position. Do NOT make efforts to adjust and switch them.

Protect the instrument from sharp shocks, drops, and moisture

SYNTHESIZER CONFIGURATION

The configuration and routing scheme of the synthesizer units is shown in the diagram (Fig. 5.).

The control of the tube synthesizer “Apparatus” consists of the following groups (Fig. 2.):

1. POWER

Power management. Turns on the synthesizer and indicate synthesizer power status .

2. KEYBOARD

Interface unit with external control. Receiving MIDI commands from external MIDI devices.

3. OSC MIX

Tone Generators (OSC) are the main sources of the audio signal. Mixer (MIX) mixes the signals from the tone oscillators. You can change the pitch of the oscillators over a range of ± 2 or ± 12 semitones using your MIDI controller’s pitch bend wheel.

4. FILTER

Low pass filter, controlled by voltage. Serving for tone formation. The filter can operate as a sine wave oscillator, in self-oscillation mode.

5. ENVELOPE GENERATOR

An envelope generator is used to modulate the cutoff frequency of filter and generate an amplitude envelope.

6. LFO

The low frequency oscillator is used for frequency modulation of the tone oscillators and filter with a triangular or rectangular voltage. You can smoothly change the shape of the generated signal and synchronize the frequency from the MIDI clock. You can change the depth of modulation of the oscillators frequency using your MIDI controller’s modulation wheel. Modulation depth range is ± 2 semitones for triangular waveform and +12 semitones for rectangular / sample & hold waveform.

7. AMPLIFIER

A controlled amplifier is used to express and amplitude modulate the signal from the filter output from the envelope generator. An amplifier overload mode is possible to enrich the spectral composition of the audio signal.

Controls and indicators (Fig. 2.):

01. POWER

Power indicator. Synthesizer power-on control.

02. POWER

Switches on/off the synthesizer.

03. BENDER RANGE

MIDI Pitch Bend controller range switch. Range selectable ± 2 semitones / ± 12 semitones.

04. POLY

Mono / Duophonic mode switch.

To use the duophonic mode, move the POLY switch to the up position. Then when you press more than one key on the MIDI keyboard, oscillator 1 will always play the highest note and oscillator 2 the lowest.

05. ACTION

Indicator for receiving MIDI commands Note On / Note Off.

06. LEARN

MIDI receive channel setup button.

To switch to another MIDI channel, you need to set the desired channel on the MIDI keyboard, then press and hold the LEARN button, then press any key on the MIDI keyboard. Then you can release the LEARN button. The MIDI channel will be set to the desired channel.

07. VELOCITY

Adjusts the depth of the modulation of the EG amplitude versus key velocity.

08. MIX

Source selection switch. OSC1, OSC1 + OSC2, OSC2.

09. OSC1

Waveform selection for the oscillator 1.

10. OSC2

Waveform selection for the oscillator 2.

11. PORTA / LEGA

Adjusts the time and mode (legato / continuous) of the oscillator frequency from one note to another. Pull the handle towards you to turn on the "continuous" mode.

12. TUNE

Adjusts oscillator 1 within ± 2 semitones.

13. DETUNE

Adjusts oscillator 2 within the range of 0 ..- 12 semitones.

14. OCTAVE

Oscillator 1 range select switch: 32° / 16° / 8° .

15. OCTAVE

Oscillator 1 range select switch: 32° / 16° / 8° .

16. AMOUNT OF ENVELOPE

Adjusts the depth of modulation of the filter cutoff frequency by the envelope generator.

17. CUTOFF

Sets the cutoff frequency of the filter.

18. EMPHASIS

Adjusts the filter Q-factor from minimum to self-oscillation at the filter cutoff frequency.

19. ATTACK

Sets the attack time, during which the cutoff frequency of the filter increases from the value set by the CUTOFF control to the value determined by the AMOUNT OF ENVELOPE control. Also sets the rise time of the output signal amplitude from the zero level to the maximum value.

20. DECAY

Sets the decay time, during which the cutoff frequency of the filter decreases from the value established at the end of the attack to the frequency set by the SUSTAIN control. Also sets the decay time of the output signal amplitude from the maximum level to the level set by the SUSTAIN control

21. SUSTAIN

Sets the hold level of the filter cutoff frequency and the level of the output signal that is held while the key is pressed.

22. RELEASE

Sets the time during which the filter cutoff frequency decreases from the value set by the SUSTAIN control to the value selected by the CUTOFF control after releasing the keys. Also sets the time during which the amplitude of the output signal decreases from the value set by the SUSTAIN control to zero after releasing the keys.

23. SINGLE / MULTI

Sets the mode to restart the EG when more than one key is pressed at the same time.

24. FREQ

Adjusts the LFO frequency and enables the LFO frequency synchronization from the MIDI clock. Pull the control toward you to enable synchronization from the MIDI clock.

25. SHAPE

Smooth changes the shape of the triangular and rectangular signals of the LFO.

26. FORM

LFO waveform selection (square / triangle / sample & hold).

27. RETRIG / FREE

Restarting the LFO by pressing one key.

28. MOD FILTER

The depth of modulation of the cutoff frequency of the filter by the signal from the LFO.

29. MASTER

Output signal level indicator.

30. MASTER

Adjusts the output level.

31. DRIVE

Turns on and adjusts the amplifier overload level.

32. PHONES

Headphone jack.

External commutation panel (Fig. 4.):

1. EXTERNAL INPUT

External audio signal line input.

2. OUTPUT

Audio signal line output.

3. EXPRESSION PEDAL / VCF CV

Connector for a resistive expression pedal or external control voltage input for filter cutoff. The resistance of a pedal must be at least 10 k Ω .

4. VCA CV

External control voltage input for amplifier.

5. KEYBOARD

Connector for a MIDI keyboard, or any other source of MIDI signals (MIDI controller, sequencer).

6. PC

Connector for connection to a computer.

7. Fuse holder.

Also contains a spare fuse included in the package.

8. Power connector.

Used to connect the power cord.

TECHNICAL SPECIFICATIONS

Power supply voltage is 120 / 230 volts (depending on the region of delivery).

Power consumption is not more than 40 watts.

Output voltage is not less than 1 Vp-p.

External input voltage swing is 1,6 Vp-p.

Control voltage swing is 0-10 V.

Keyboard range is 6 octaves.

Full sound range of the instrument is 10 octaves.

BEFORE YOU START

To prepare your synthesizer for work you have to:

- Place the synthesizer on a stable surface;
- Install the radio tubes in the synthesizer on corresponding sockets. The position of the lamp keys is indicated by arrows (Fig. 3.);
- Connect the KEYBOARD IN (Fig. 4. 3) with the output of a MIDI keyboard or sequencer;
- Connect the mains power cord (Fig. 4. 6);
- Connect the output (Fig. 4. 1) to the input of the amplifier device using an instrumental connecting cable
- Turn on (Fig. 2. 01). and warm up the synthesizer for at least 5 minutes.
- To master the synthesizer you should study all the capabilities of the instrument at first.

WARNING:

If synthesizer was at temperature below +5 ° C, then keep it at room temperature for 2-3 hours before usage.

Tubes have a limited lifetime and are consumable items. All our tubes are new old stock and we cannot provide guarantees for them. Some can operate for at least 800 hours (minimum operating time according to a passport), some - 20000, some can go out immediately. That's why we complete the device with a set of spare lamps. All lamps have been tested before shipping.

Do not leave the synthesizer on when you are not using it to extend the lamps' lifetime.

To avoid damaging the tubes, install and remove them only by the tube base (Fig. 1). Before removing the lamps, turn the Synthesizer off and wait for it to cool down (5 to 10 minutes). Do not insert or remove tubes while the Synthesizer is powered on.

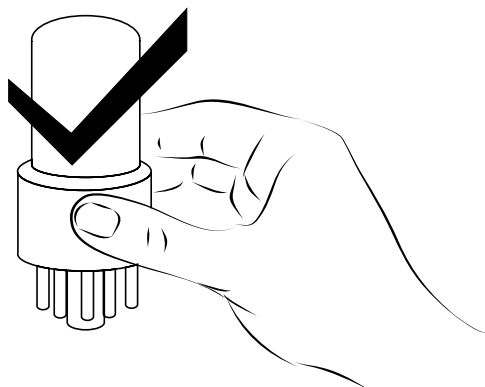


Fig. 1a. Correct tube installation

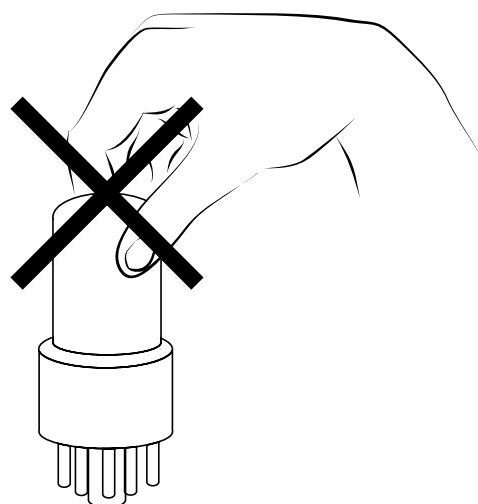


Fig. 1a. Incorrect tube installation

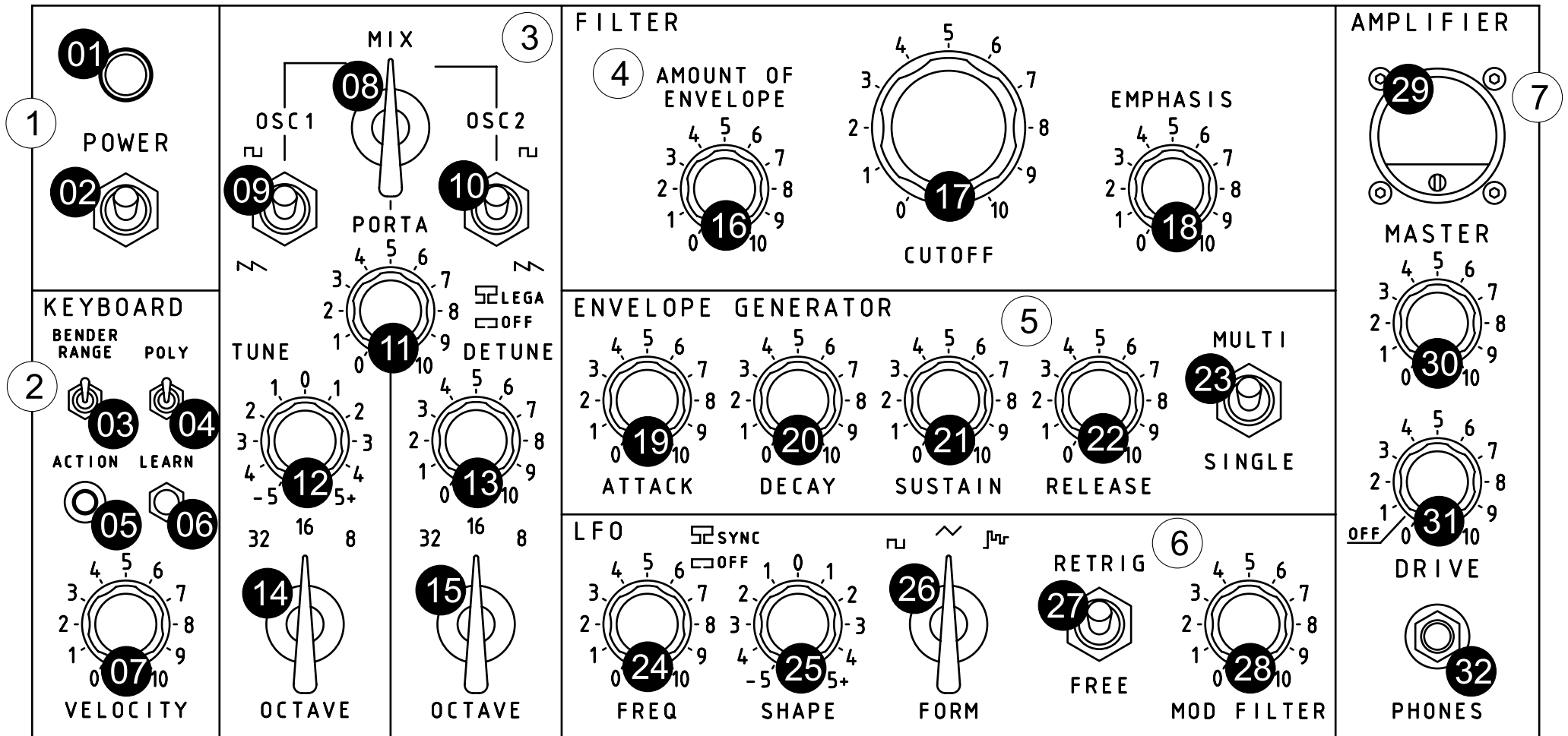


Fig. 2. Location of controls.

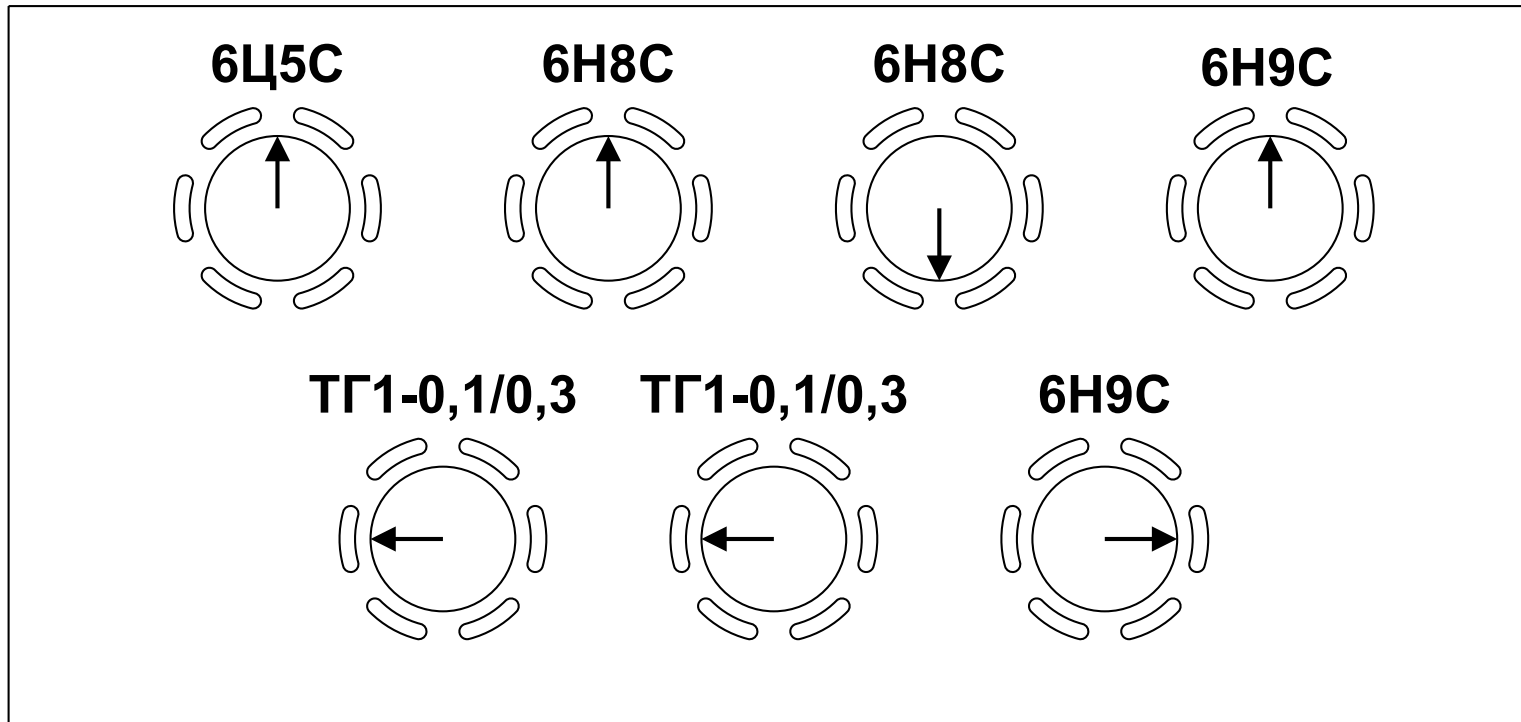


Fig. 3. Installation of the tubes.

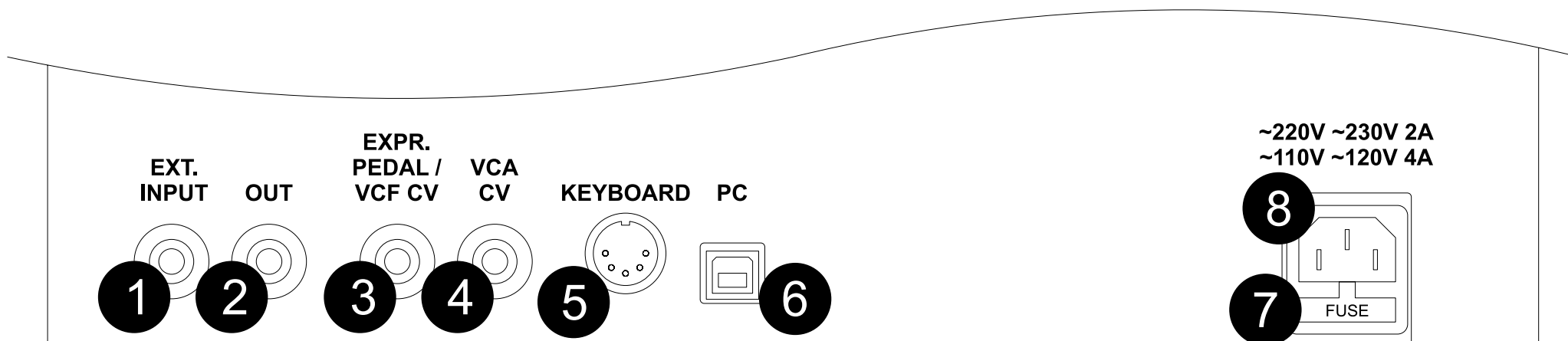


Fig. 4. External commutation panel.

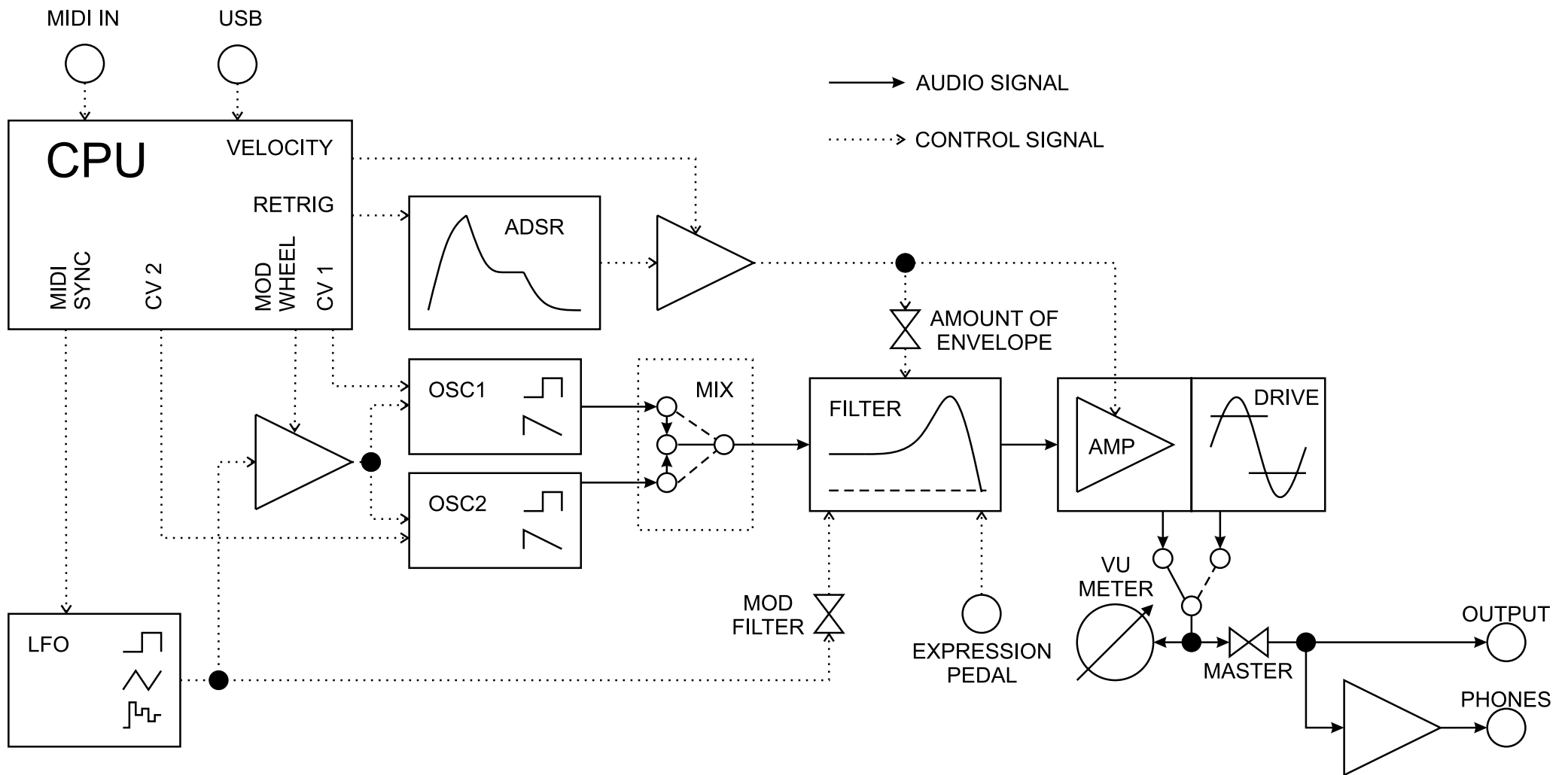


Fig. 5. Configuration and routing scheme of the synthesizer units.

LIMITED WARRANTY

Manufacturer warrants that its products will be free from defects in materials and workmanship, and shall conform to specifications current at the time of shipment, for a period of one year from date of purchase. During the one-year period, any defective products will be repaired or replaced, at manufacturer option, on a return-to-factory basis. This Warranty covers defects that manufacturer determines are no fault of the user.

RETURNING YOUR SYNTHESIZER FOR REPLACEMENT/REPAIR

You must obtain prior approval before returning any product to us. Wrap your synthesizer carefully. The warranty will not be honored if the product is not properly packed. Send it to manufacturer with transportation and insurance charges paid. A reasonable cost for service, materials and return freight will be charged to replace materials defective through the fault of the user, or for which the one year warranty period has expired. Shipping products repaired or replaced under warranty from the company to your address in the Russian Federation will be paid by the manufacturer.

<p>POWER</p>	<p>MIX</p> <p>OSC1 OSC2 </p> <p>PORTA </p> <p>TUNE LEGA <input type="checkbox"/> OFF <input type="checkbox"/></p> <p>DETUNE </p> <p>OCTAVE OCTAVE </p>	<p>FILTER</p> <p>AMOUNT OF ENVELOPE </p> <p>CUTOFF </p> <p>EMPHASIS </p>	<p>AMPLIFIER</p> <p>MASTER </p> <p>DRIVE </p> <p>PHONES </p>
<p>KEYBOARD</p> <p>BENDER RANGE POLY </p> <p>ACTION LEARN </p> <p>VELOCITY </p>	<p>TUNE </p> <p>OCTAVE OCTAVE </p>	<p>ENVELOPE GENERATOR</p> <p>ATTACK DECAY SUSTAIN RELEASE </p> <p>LFO <input type="checkbox"/> SYNC <input type="checkbox"/> OFF <input type="checkbox"/></p> <p>FREQ SHAPE </p> <p>FORM </p> <p>RETRIG </p> <p>FREE </p> <p>MOD FILTER </p> <p>MULTI </p> <p>SINGLE </p>	<p>MASTER </p> <p>DRIVE </p> <p>PHONES </p>

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