GUIDE TO ASSEMBLY OF ERICA SYNTHS POLIVOKS-INSPIRED VCO

If you are reading this, most probably, you are about to build Erica Synths DIY Polivoks-inspired Oscillator. This VCO is 35mm deep, skiff friendly, has solid mechanical construction and doesn't require wiring. The core of the VCO is borrowed from famous Russian synth Polivoks VCO and in exponential converter we use the original matched transistor IC that was used in Polivoks. But we significantly updated schematics:
1) we introduced +-10V regulators for greater stability of operation,
2) we adjusted signal amplitudes to match requirements of contemporary modular synths and made all output signals available simultaneously,
3) we redesigned CV inputs to accept positive CV signals,
4) we introduced PWM circuit with manual and voltage controlled pulse width,
5) we introduced synchronization input, so you can sync the VCO to other VCOs.

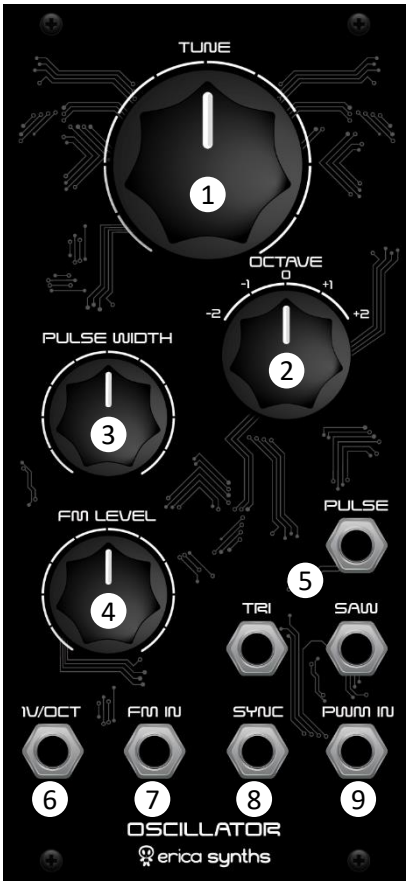
The Oscillator kit comes in three versions:
1) Set of 2 PCBs + matched transistor IC + mechanical parts (PCB connectors and spacer) + 5 position rotary switch,
2) Set of 2 PCBs + matched transistor IC + mechanical parts (PCB connectors and spacer) + 5 position rotary switch + panel,
3) Full kit.

FEATURES:

- Triangle, saw and pulse wave outputs
- Manually adjustable and CV controlled pulse width
- Great tracking across 8 octaves
- Exponential FM input with attenuator
- Synchronization input
- Octave switch – 5 octaves
- Skiff-friendly design

SPECIFICATIONS:

• Audio output amplitude	10Vptp
• Octave range	C0 – C8
• Panel width	12HP
• Module depth	35mm
• Power consumption	34mA@+12V, 36mA@-12V



1. The TUNE knob allows you to set the tune of the VCO across two octaves
2. Use Octave switch to set octave the VCO tune octaves up or down instantly
3. Adjust pulse width manually!
4. This is FM CV attenuator
5. These are VCO outputs. All three waves are available simultaneously
6. Patch 1V/oct CV source here. The VCO tracks well across 8 octaves
7. Patch FM CV source here for vibrato effects!
8. This is VCO Sync input. Patch another VCO output here to reset VCO circle. This gives you new, interesting waveforms
9. Patch PWM CV source here! 10Vptp CV signal affects pulse width form 1% to 99%

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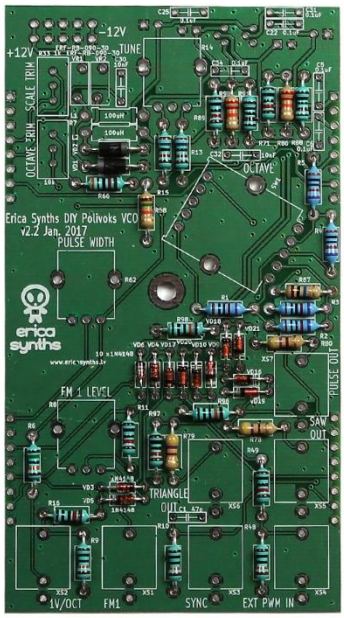
ASSEMBLY

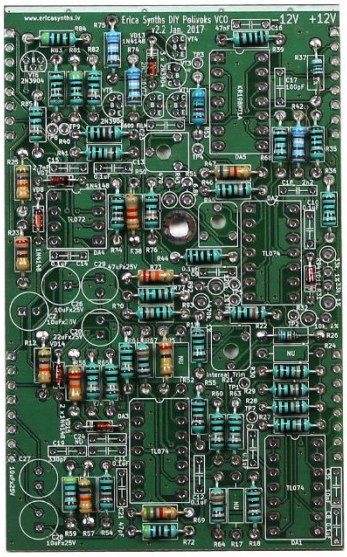
Take precautions with regard to electrostatic discharge (ESD) safety. Handling components should be done in electrostatically safe environment. Use personal and workplace grounding. Any discharge (even a minor one) from body to a component may permanently damage it.
Our PCBs have silkscreened both component values and designators nevertheless we highly recommend you to print out files with component placement before you start assembly of the module. And, please, at least take a look on this manual!
Some components are marked as NU (not used) – leave those unpopulated! Some components are market as OPTION (those are for optional modifications) – leave those unpopulated for now.

1 Solder horizontally placed resistors and diodes on both PCBs (Controls board and Main board)! Pay attention on orientation of diodes!

Controls board



Main board



2 Solder IC sockets and vertically placed resitors on the Main board, ferrite beads on the Control board and capacitors of both boards!

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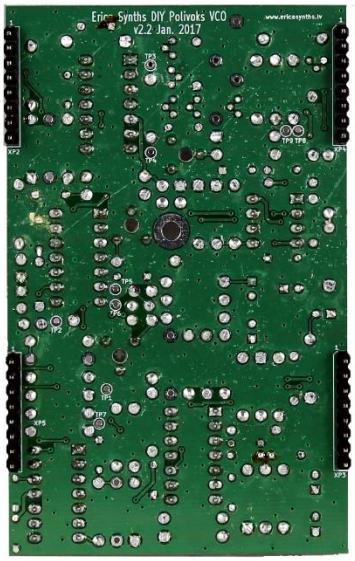
Solder electrolytic capacitors, transistors and trimpots on the Main board! Mind polarity of electrolytic capacitors and orientation of transistors! Don't mix up NPN and PNP transistors!

Negative lug of electrolytic capacitor is marked with a stripe!

4

Turn the Main board around and solder 1x8 male connectors!



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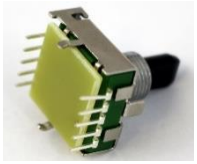
Place 16x16mm textolite piece under the switch (it will ensure that the switch is the same height as potentiometers) and solder the switch, potentiometers, two multiturn trimpots and jacks! Cut off orientation stopper on the switch.



6

Turn the connectors PCB around and solder voltage regulators, resettable fuses and electrolytic capacitors! Also solder 1x8 female connectors and PSU connector! Bend resettable fuses down.

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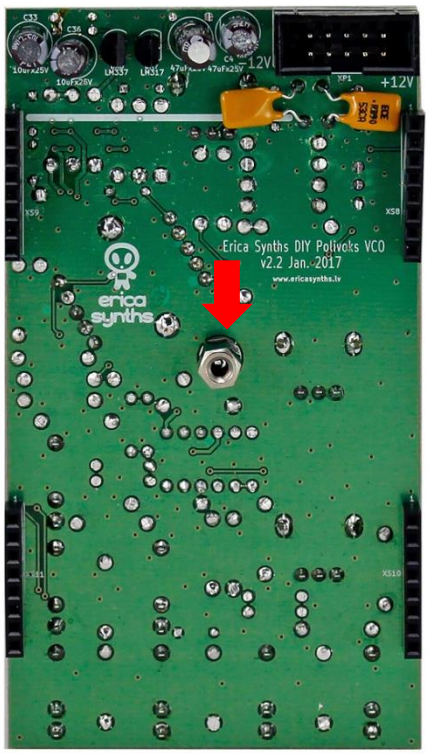
Now it's time to make some measurements! Connect a PSU to controls PCB and measure, if you get +-12V and +-10V on the connector to the main PCB (refer to schematics)! If you are not getting these voltages, check, if you have soldered 10V regulators correctly!

8

Use M3x6 screw to install 11mm header on the controls PCB!



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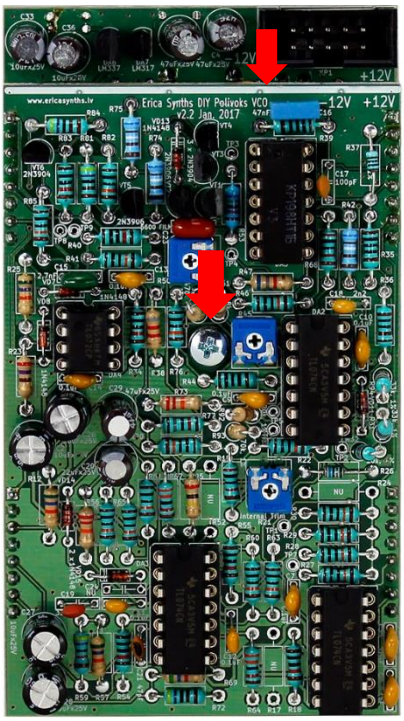
Connect both PCBs together! And fix the bottom one with the M3x6 screw! For all our modules with 2 PCBs white stripes on both PCBs have to match.



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Install the front panel and potentiometer knobs!

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CALIBRATION

1) Connect the VCO to the PSU. Let it "heat up" for ~15mins.
2) Set octave switch to 0 and Tune pot somewhere around 12:00
3) Set Octave switch to +2! Connect multimeter to the TP1 and adjust OCTAVE trimpot (bottom one on the front panel) until you get +5V on TP1! Switch across all octaves and adjust OCTAVE trimpot, until you have exactly 1V intervals between octaves. Don't worry, if you can't adjust it exactly. We'll come back to octave interval adjustment later.
4) Connect a tuner to the saw output of the VCO
5) Connect ka keyboard/midi-CV interface that generates 1V/oct CV to the input
6) Play C4 on the keyboard and use TUNE potentiometer on the front panel to adjust tuning so that tuner shows C4
7) Play C5 on the keyboard and see the tuner reading
8) If the tuner shows something higher that C5 use SCALE tripmot to INCREASE the frequency of the VCO slightly. If the tuner shows something lower than C5, use SCALE trimpot to DECREASE frequency slightly
9) Play C4 again and use TUNE potentiometer to adjust tuning so tuner shows C4 again.
10) Play C5 and see, what you get. The tuning should be more precize. If it's not exactly C5, go back to step 6
11) Once you are happy with C5, check what you get on C6, C7 and C3. You may need to adjust it little bit more as described on step 6.
12) Now set the frequency to C4 and rotate the OCTAVE switch around several octaves, and check tuner readings! If switching octaves up, frequency gradually increases octave by octave, turn OCTAVE trimpot (top right one) slightly clockwise, set frequency to C4, and check readings again. If the frequency decreases, turn the trimpot counter clockwise. With slight adjustments you should be able to get precise readings C4, C5, C6, C7 and C3, C2 when rotating the octave switch.

If you succeeded with calibration – congratulations – you have completed the most difficult module of Erica Synths DIY line! Enjoy!