

When developing Erica Black Series and Pico Series modules, we accumulated quite a know-how on compact and great sounding designs, and we decided to share some of those with DIY community. And therefore Erica Synths proudly presents – DIY Synth Voice module! It consists of all essential blocks for versatile monosynth, and is 100% patchable for even more control options. In order to make the module more compact and reliable in tuning, it has digital/analogue design. VCO and envelope generators/LFOs are digital, other parts are analogue. Digital parts are designed around pre-programmed STM controller, which comes with a kit presoldered on a small controller board. Chain up several Erica Synths DIY Synth Voice modules and you have a versatile polysynth!

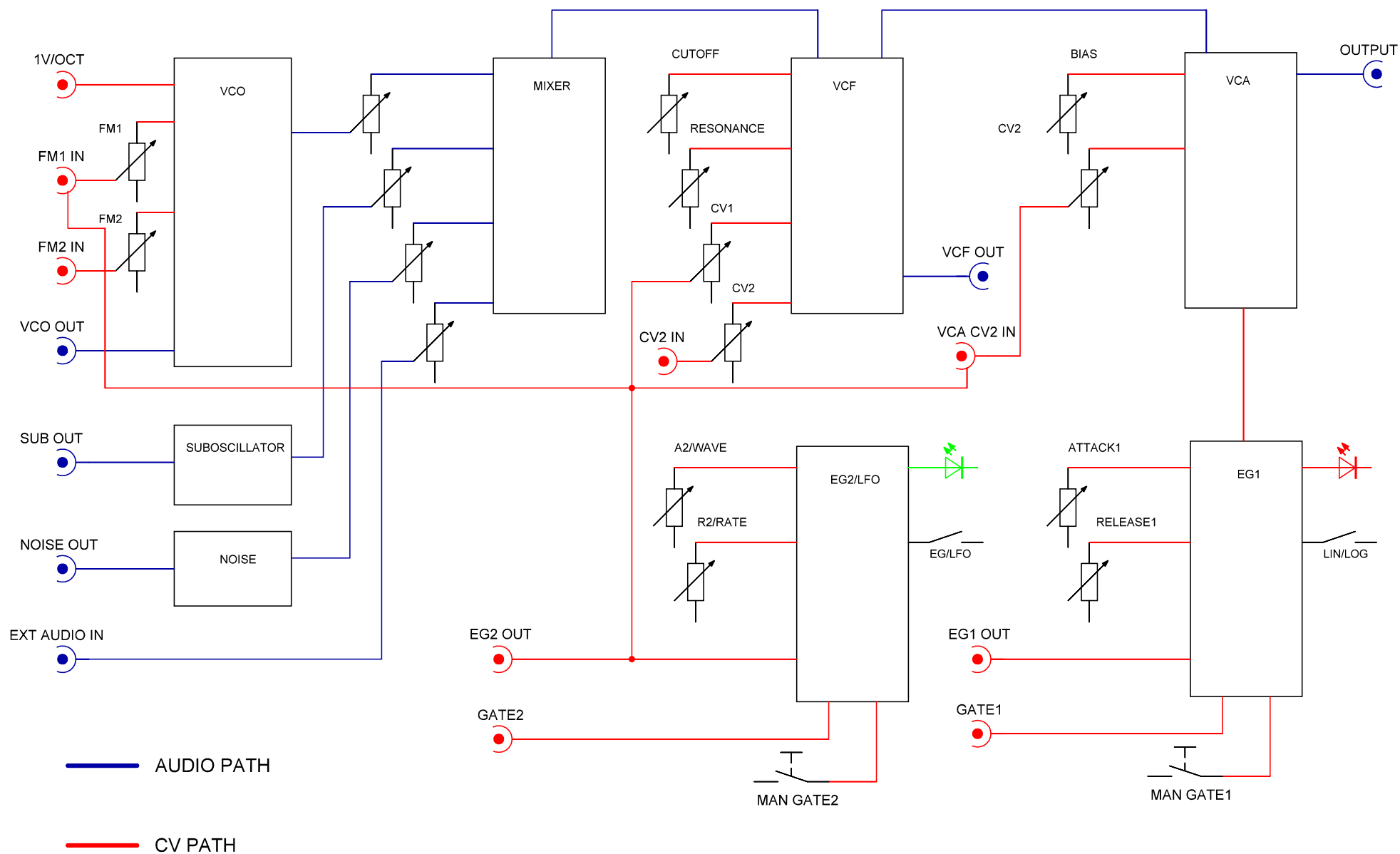
FEATURES

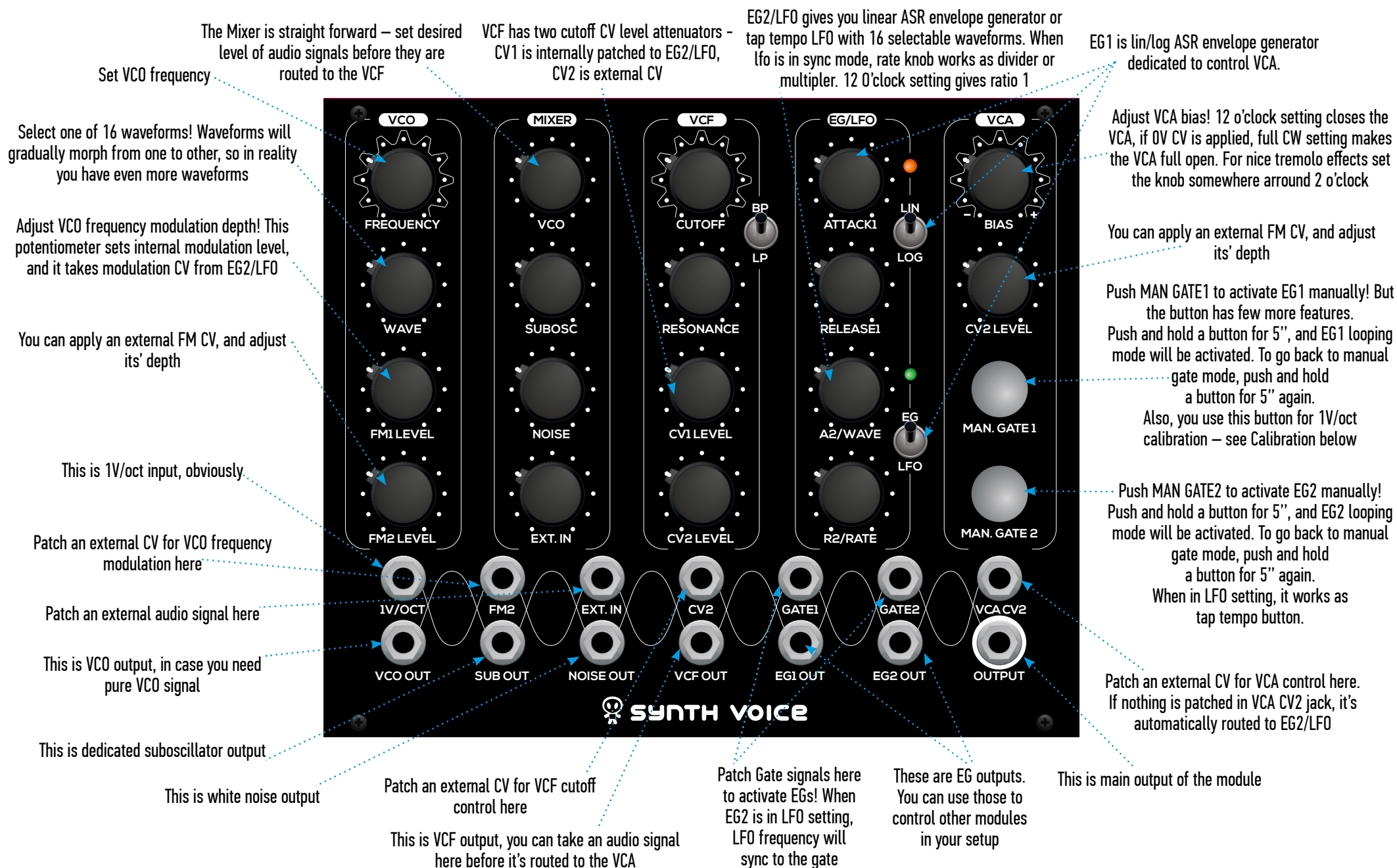
- VCO with 16 waves and manual wave morphing
- 1 oct suboscillator
- White noise generator
- External audio input
- Audio Mixer
- LP/BP VCF inspired by Black Polivoks VCF
- Lin/log ASR envelope generator with looping function
- Lin ASR EG/LFO with looping function
- 9 LFO waves with wave morphing
- Tap tempo and LFO sync
- LFO frequency multiplication (x2, x4) and division (/2, /4) in sync mode
- VCA with bias control
- Auto calibration for better 1V/oct tuning

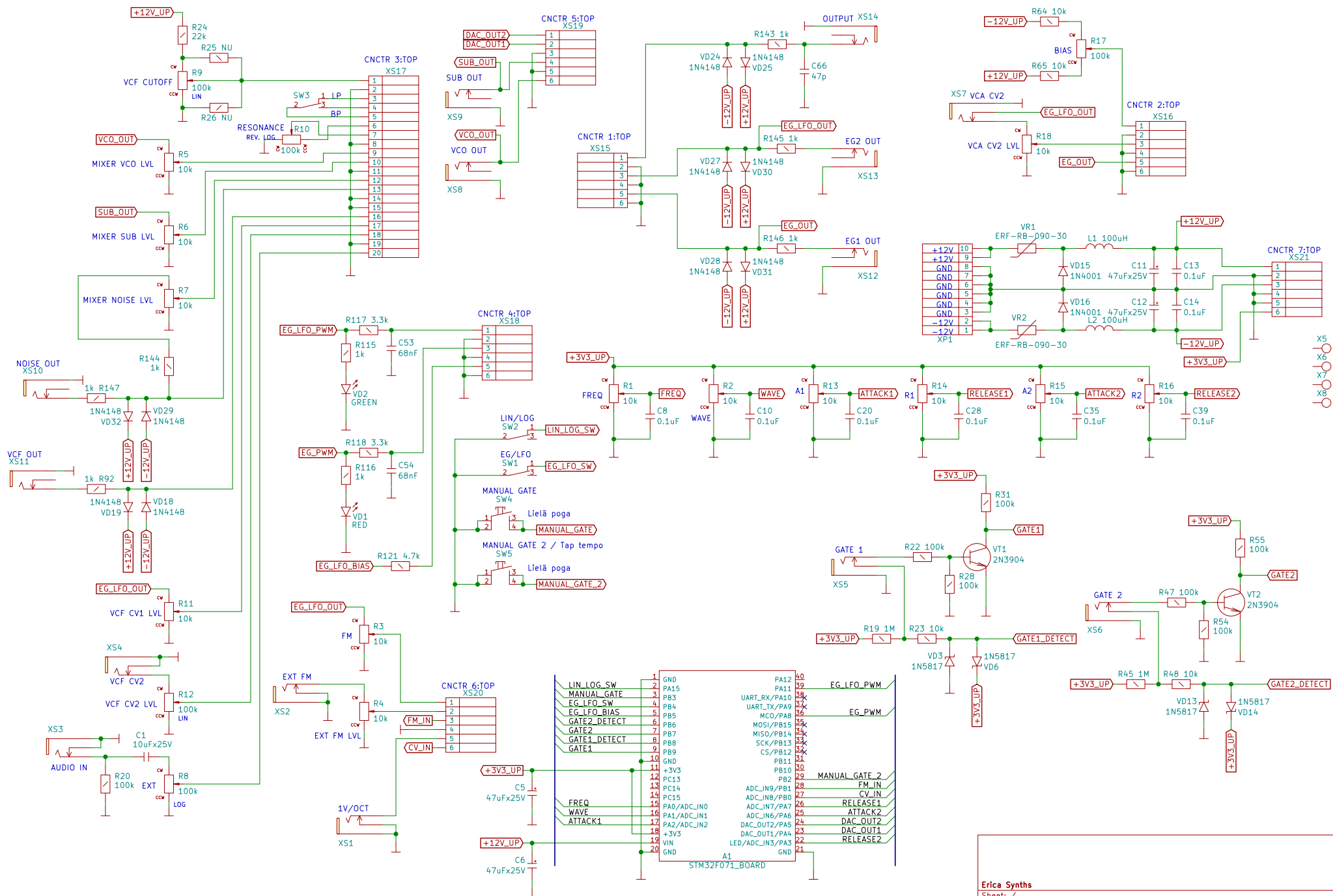
TECHNICAL SPECS

- VCO range: C1 – C8
- Audio output level: 10V ptp
- LFO output level: -5V - +5V
- EG output level: 0-+10V
- EG1 attack time 0-500ms
- EG1 release time 0-2"
- EG2 attack time 0-500ms
- EG2 release time 0-1"
- LFO frequency: 0,1Hz - 70Hz
- VCA attenuation level: 80dB
- Panel width: 30HP
- Module depth: 35mm
- Power consumption: 82mA@+12V, 50mA@-12V

Here are basic blocks and their connections of Erica Synths Synth Voice!

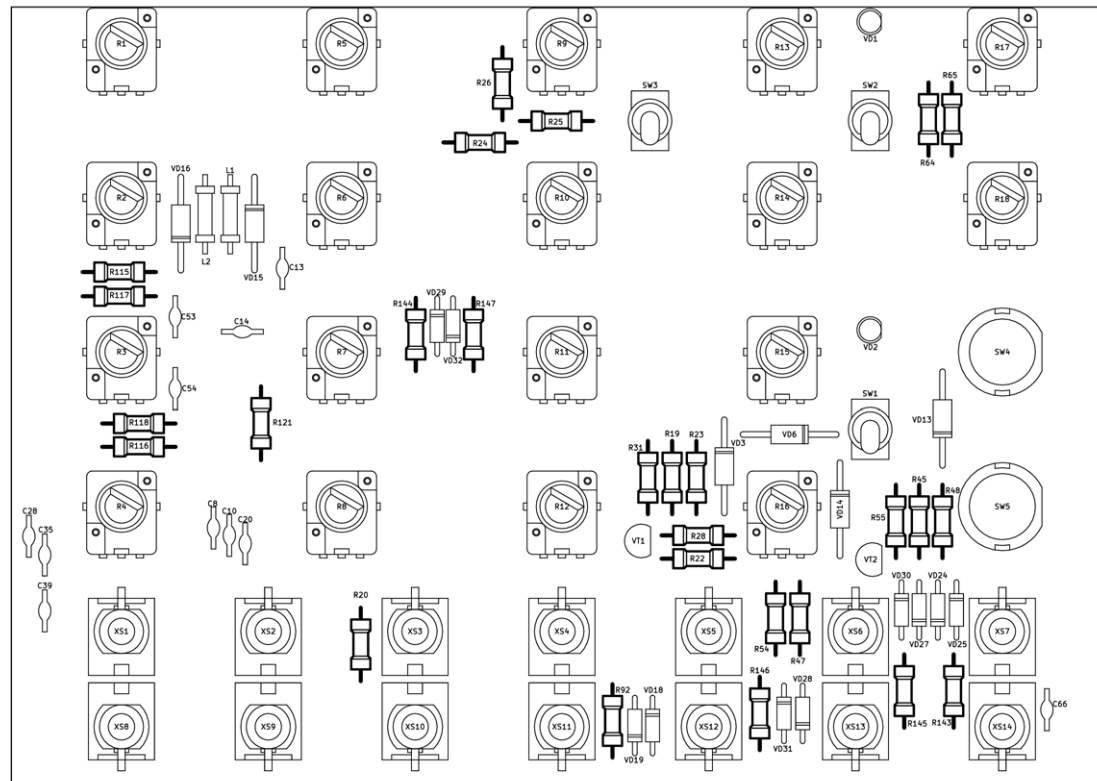








Component designators – Control board



BOM

	Erica Synths DIY Synths Voice				
	Controll board				
	Bill of Materials				
	V 1_1				
Id	Designator	Package	Qty	Designation	Supplier and ref
CERAMIC CAPACITORS					
10	C8,C10,C13,C14,C20,C28,C35,C39	C-5mm	8	0.1uF	
11	C53,C54	C-5mm	2	68nF	
12	C66	C-5mm	1	47p	
ELECOTROLYTIC CAPACITORS					
8	C1 non polarized	CE63x25_NP	1	10uFx25V	http://lv.farnell.com/nichicon/uvp1e100mdd1td/aluminum-electrolytic-capacitor/dp/1823717
9	C5,C6,C11,C12	CE63x25	4	47uFx25V	
SEMICONDUCTORS					
22	VD3,VD6,VD13,VD14	DO-41	4	1N5817	1N4148 will work fine here, as well
23	VD15,VD16	DO-41	2	1N4001	use any from 1N4001 - 1N4007
24	VD18,VD19,VD24,VD25,VD27,VD28,VD29,VD30,VD31,VD32	DO-35	10	1N4148	
25	VT1,VT2	TO-92-M	2	2N3904	
5	VD1	LED-3MM	1	RED	
6	VD2	LED-3MM	1	GREEN	
RESISTORS					
14	R19,R45		2	1M	
15	R20,R22,R28,R31,R47,R54,R55		7	100k	
16	R23,R48,R64,R65		4	10k	
17	R24		1	22k	
18	R25,R26		2	NU	
19	R92,R115,R116,R143,R144,R145,R146,R147		8	1k	
20	R117,R118		2	3.3k	
21	R121		1	4.7k	
POTENTIOMETERS					
1	R1,R2,R3,R4,R5,R6,R7,R11,R13,R14,R15,R16R18	RD901F	13	10k	https://www.thonk.co.uk/shop/alpha-9mm-pots/
2	R8,R9,R10,R12,R17	RD901F	5	100k	https://www.thonk.co.uk/shop/alpha-9mm-pots/
MISCLANEOUS					
13	L1,L2	R0125W	2	100uH	Ferrite bead or 10ohm resistor
28	VR1,VR2	polifuse	2	ERF-RB-090-30	http://lv.farnell.com/littelfuse/30r090uu/polyfuse-ptc-radial-0-9a/dp/1822232
26	XP1	IDC-10MS	1	IDC-10MS	comes with a kit
29	XS15,XS16,XS18,XS19,XS20,XS21	PBS-6	6	PBS-6	comes with a kit
30	XS17	PBS-20	1	PBS-20	comes with a kit
7	XS1,XS2,XS3,XS4,XS5,XS6,XS7,XS8,XS9,XS10,XS11,XS12,XS13,XS14	WQP-PJ301M-12	14	WQP-PJ301M-12	comes with a kit
3	SW1,SW2,SW3	2MSxT1B5M2RE	3	ON-ON switch	http://lv.farnell.com/multicomp/2ms1t1b5m2re/switch-spdt-0-1a-20v-on-on/dp/9473041
4	SW4,SW5	KS01-xxx	2	Pushbutton	http://lv.farnell.com/c-k-components/d6r10lfs/switch-spno-0-1a-32vdc-tht/dp/1201381

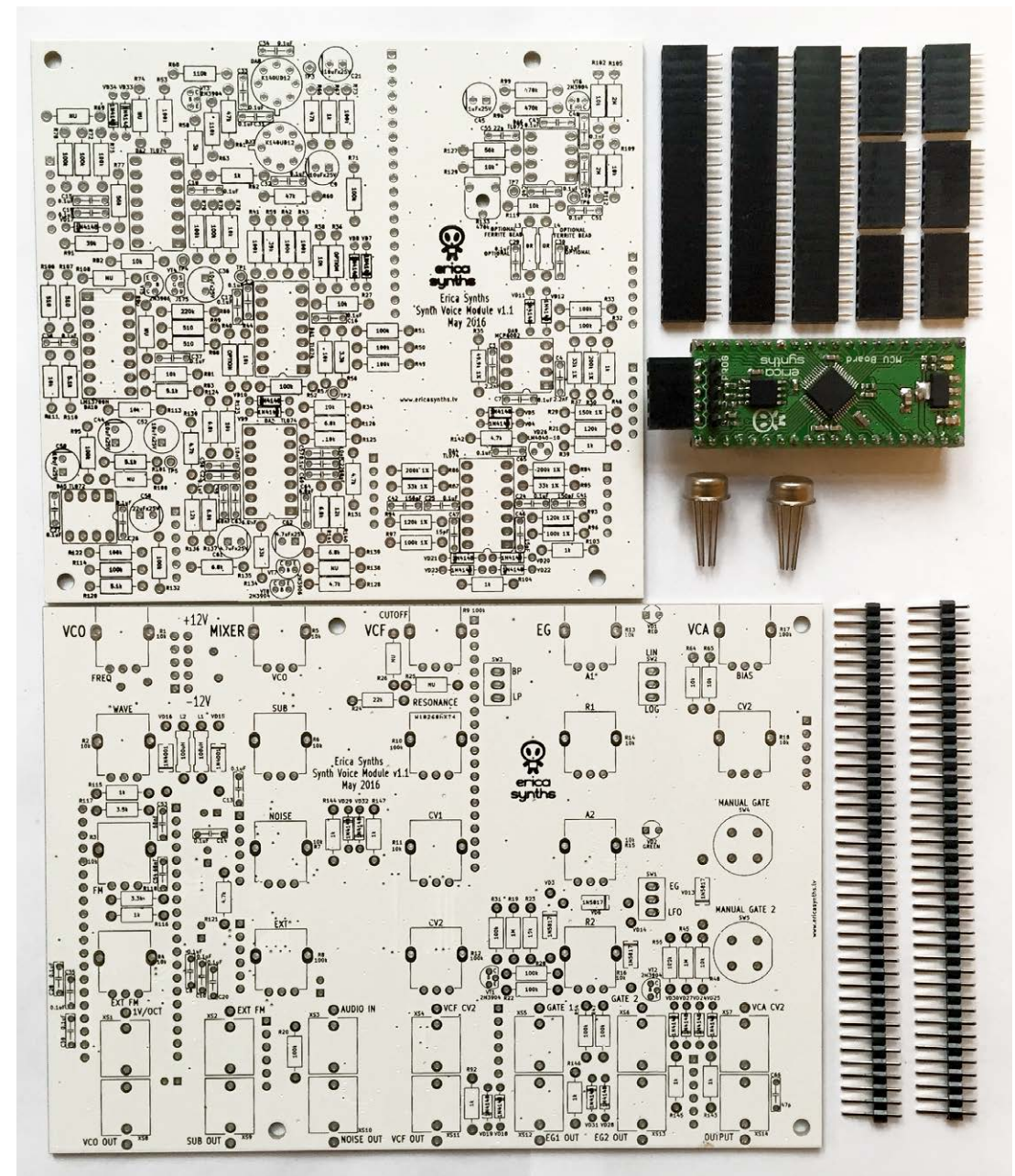
BOM

Erica Synth DIY Synth Voice					
Main board					
Bill of Materials					
V 1.1					
Id	Designator	Package	Qty	Designation	Supplier and ref
CERAMIC CAPACITORS					
1	C2,C7,C15,C16,C17,C18,C19,C22,C23,C24,C25,C26,C27,C29,C30,C31,C32,C33,C34,C37,C38,C40,C43,C48,C51,C65	C-5mm	26	0.1uF	
2	C3,C4	C-5mm	2	2.2nF	
3	C41,C42	C-5mm	2	150pF	
4	C46,C47	C-5mm	2	15pF	
5	C49	C-5mm	1	10p	
6	C55	C-5mm	1	22n	
7	C56,C57	C-5mm	2	10nF	
8	C59,C60	C-5mm	2	68nF	
9	C63,C64	C-5mm	2	6.8nF	
ELECTROLYTIC CAPACITORS					
10	C45	CE63x25	1	1uFx25V	
11	C9,C21,C44,C50	CE63x25	4	10uFx25V	
12	C36,C52 (non polarized)	CE63x25_NP	2	10uFx25V	http://lv.farnell.com/nichicon/uvp1e100mdd1td/aluminum-electrolytic-capacitor/dp/1823717
13	C58	CE63x25	1	22uFx25V	
14	C61,C62	CE63x25	2	4.7uFx25V	
SEMICONDUCTORS					
15	DA3,DA4,DA1,DA2	DIP-14	4	TL074	
16	DA5,DA6	DIP-8	2	TL072	
17	DA7,DA8		2	K140UD12	comes with a kit
18	DA9	DIP-8	1	MCP6002	http://lv.farnell.com/microchip/mcp6002-e-p/ic-op-amp-dual-1mhz-dip8-6002/dp/1332117
19	DA10	DIP-16	1	LM13700N	
20	VD4,VD5,VD7,VD8,VD9,VD10,VD11,VD12,VD17,VD20,VD21,VD22,VD23,VD33,VD34	DO-35	15	1N4148	
21	VD26	TO-92	1	LM4040-10 0,1%	http://lv.farnell.com/texas-instruments/lm4040aiz-10-0-nopb/voltage-ref-shunt-10v-to-226aa/dp/1673984
22	VT3,VT6,VT8	TO-92-M	3	2N3904	
23	VT5,VT7	TO-92-M	2	2N3906	
24	VT4	TO-92	1	J175	http://lv.farnell.com/fairchild-semiconductor/j175-d26z/transistor-jfet-30v-60ma-to-92/dp/2322634
RESISTORS					
25	R21		1	120k	
26	R27,R34,R38,R44,R57,R78,R81,R82,R102,R109,R111,R113,R119,R123,R125,R129		16	10k	
27	R29		1	150k 1%	
28	R30,R84,R86		3	200k 1%	
29	R32,R33,R41,R42,R43,R49,R50,R51,R52,R53,R70,R71,R72,R73,R75,R76,R79,R95,R114,R122,R132		21	100k	
30	R35		1	49.9k 1%	
31	R36,R40		2	OPTION	
32	R37,R85,R87		3	33k 1%	
33	R39,R46,R62,R67,R103,R104		6	1k	
34	R56		1	3.3k	
35	R58		1	3k	
36	R59,R91		2	39k	
37	R60,R61,R66		3	47k	
38	R63,R68		2	110k	
39	R69,R74,R90,R100,R108,R138		6	NU	
40	R77,R127		2	56k	
41	R80		1	220k	
42	R83,R101,R110,R120		4	5.1k	
43	R88,R89,R106,R107		4	510ohm	
44	R93,R94		2	120k 1%	
45	R96,R97		2	100k 1%	
46	R98,R99		2	470k	
47	R105,R112		2	2M	
48	R124,R126,R135,R137,R139,R141		6	6.8k	
49	R128,R130,R131,R142		4	4.7k	
50	R134		1	33k	
51	R136,R140		2	12k	
TRIMPOTS					
52	R133		1	470k	
MISCLANEOUS					
53	L3,L4	Ferrite bead	2	0R	option
54	XP2,XP3,XP5,XP6,XP7,XP8	PLS-6	6	PLS-6	comes with a kit
55	XP4	PLS-20	1	PLS-20	comes with a kit
56	IC SOCKET	DIP-8	3		
57	IC SOCKET	DIP-14	4		
58	IC SOCKET	DIP-16	1		

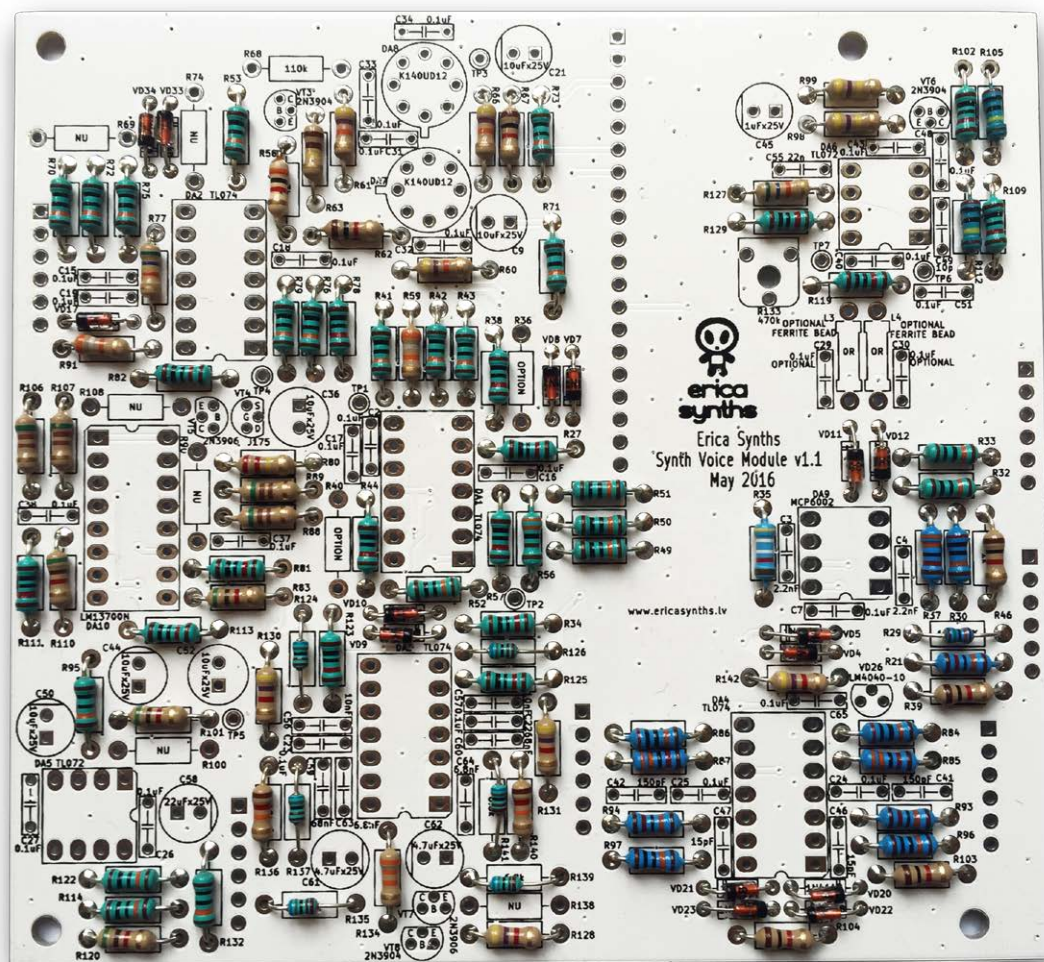
What you get?

The Synth Voice kit comes in three versions:

- 1) Set of 2 PCBs + MCU board + 2xK140UD12 opamps + mechanical parts (PCB connectors and spacers)
- 2) Set of 2 PCBs + MCU board + 2xK140UD12 opamps + mechanical parts (PCB connectors, spacers) + panel
- 3) Full kit, so you do not need to worry about ordering parts.

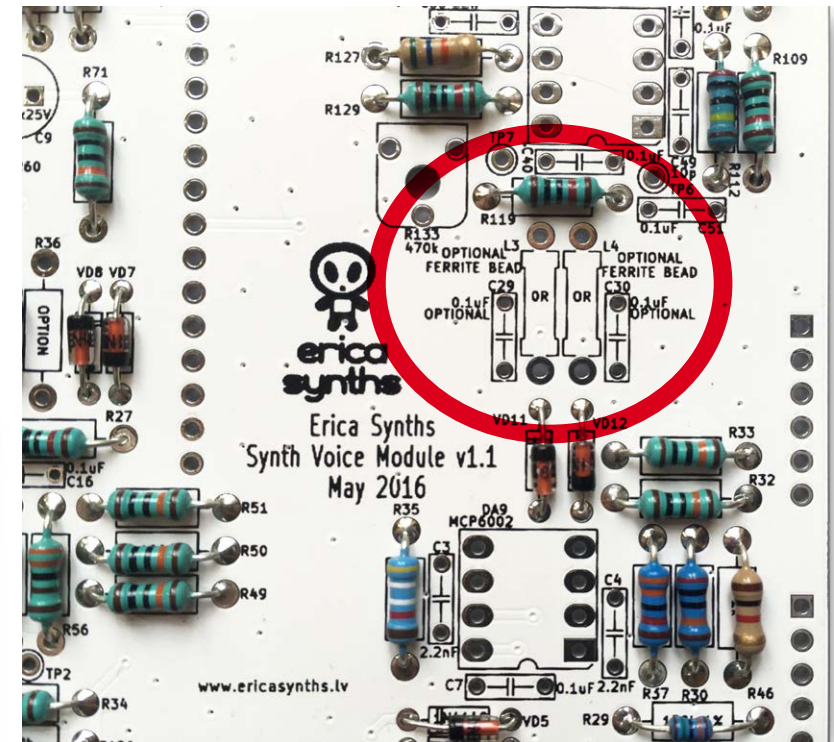
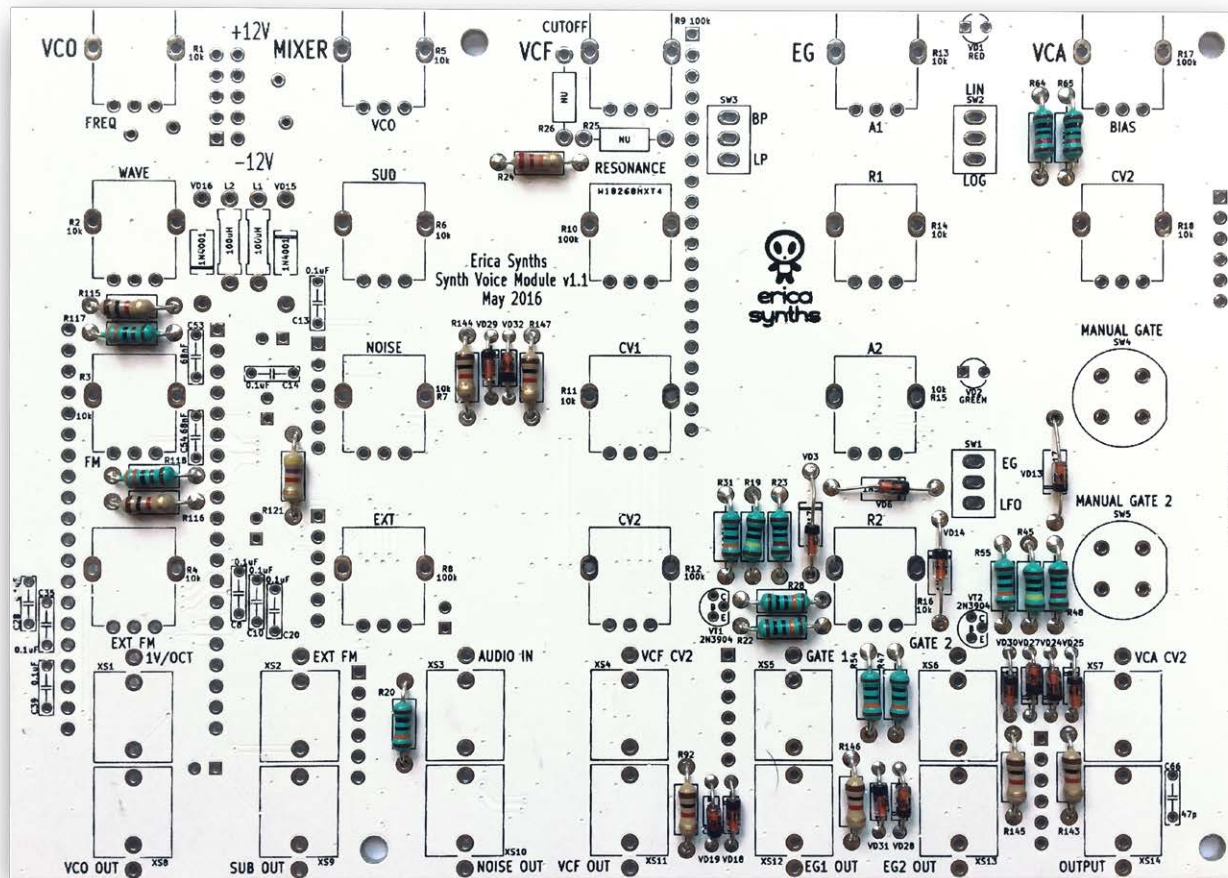


1. Take precautions with regard to electrostatic discharge (ESD) safety. Handling components should be done in electrostatically safe environment. Use personal and workplace grounding. Any discharge (even a minor one) from body to a component may permanently damage it.
2. Solder all resistors and diodes on main PCB! The silkscreen has both resistor values and designators, so, theoretically, you do will not go wrong with assembly and troubleshooting later. Please, pay attention on silkscreen – some resistors in the VCO circuit have to be 1%. Also – mind polarity of diodes!

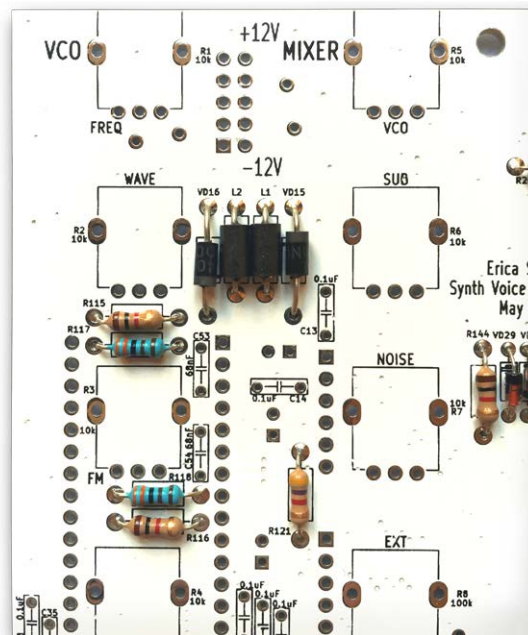


3. There are optional ferrite beads and capacitors for noise generator power supply filtering in order to prevent possible noise getting into PSU circuit. You may omit those and replace ferrite beads with wire jumpers (leave capacitors unpopulated). As our experiments show, the module works fine with wire jumpers.

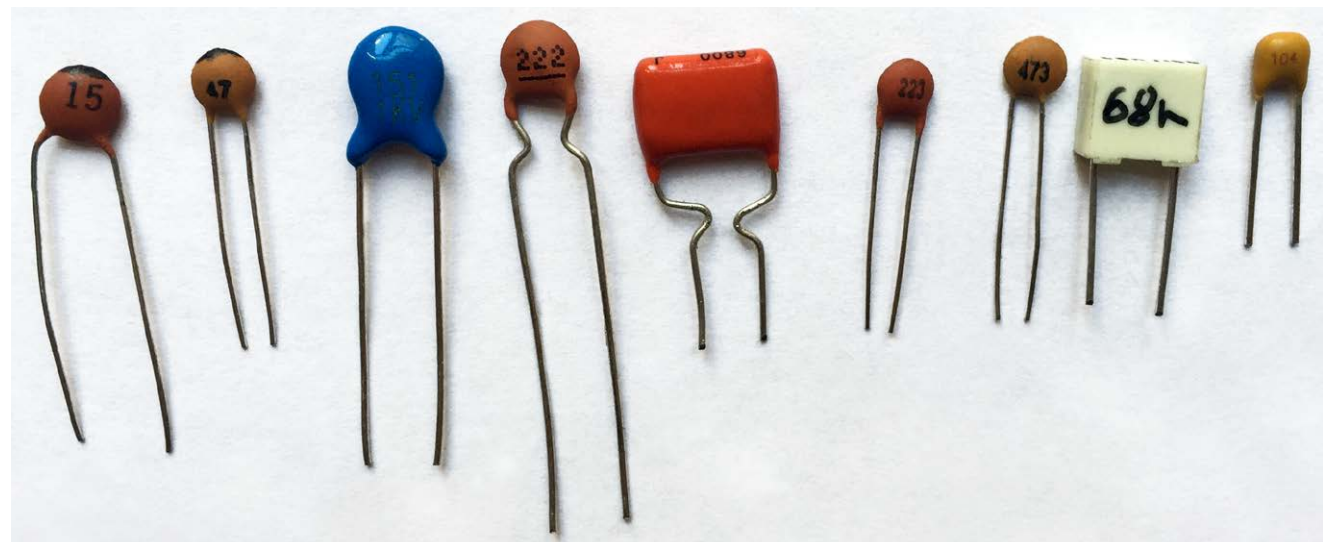
4. Populate all resistors and diodes on the Control board! Mind the polarity of diodes!



5. Install also ferrite beads and reverse polarity protection diodes.



6. Now, let's sort ceramic and film capacitors!
Capacitors provided with kit look like this:



15 pF

47 pF

150 pF

2n2

6n8

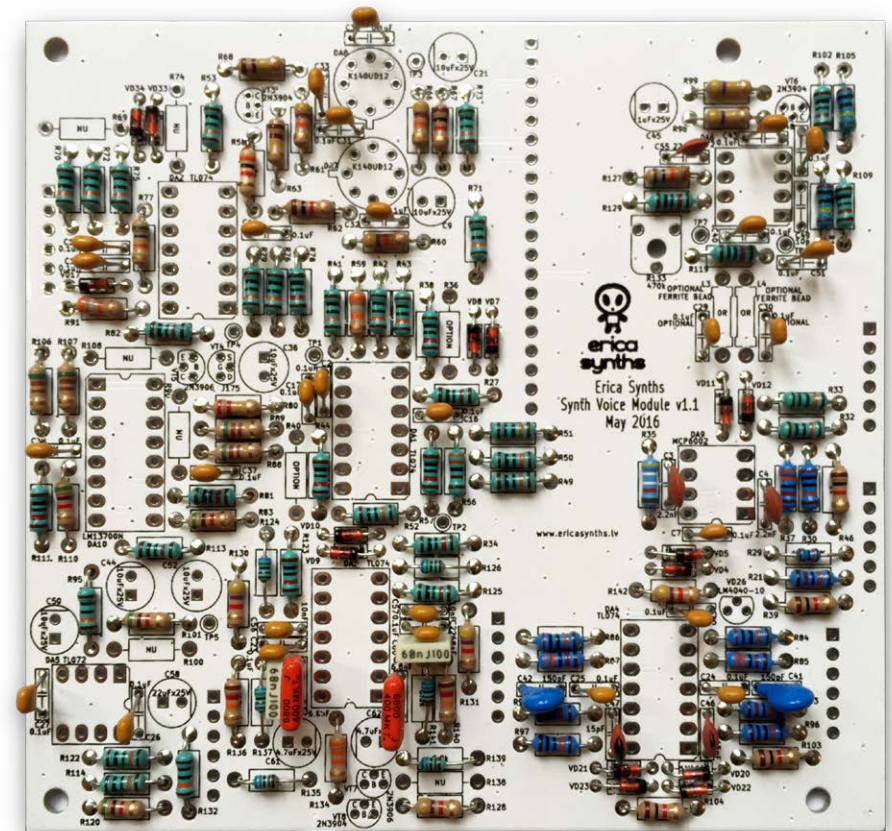
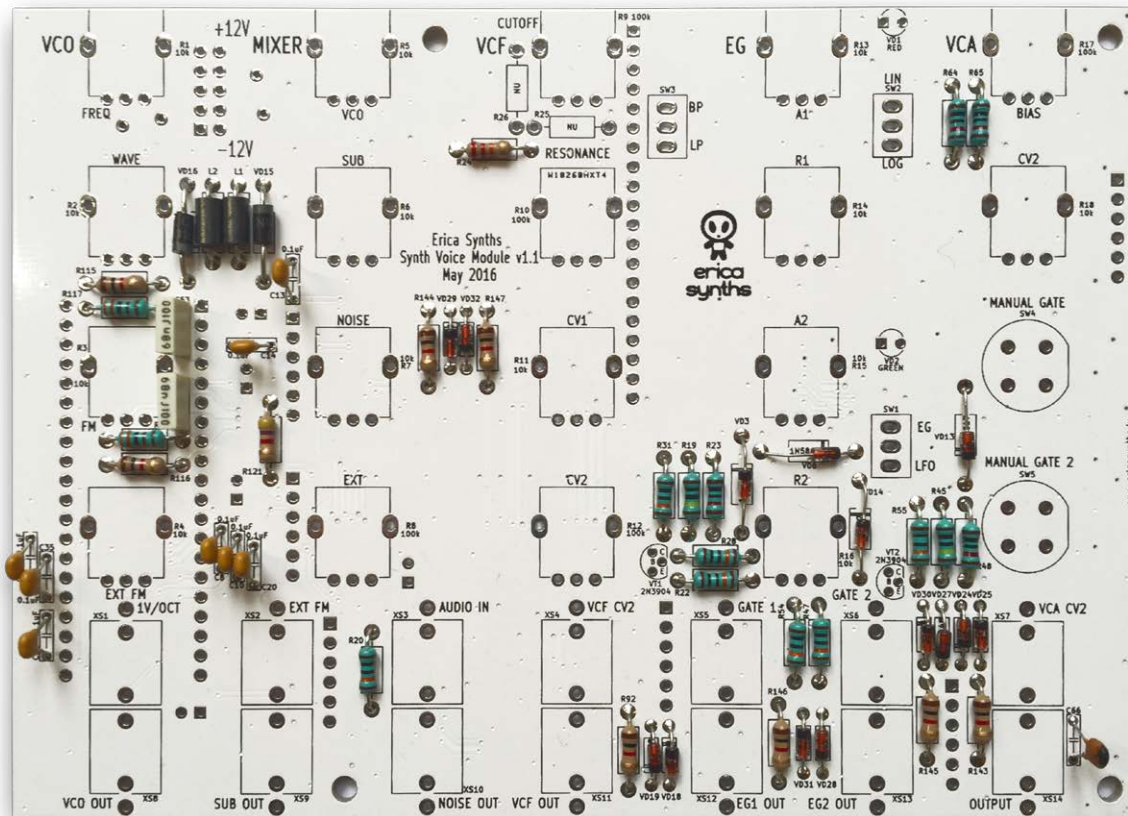
22 nF

47 nF

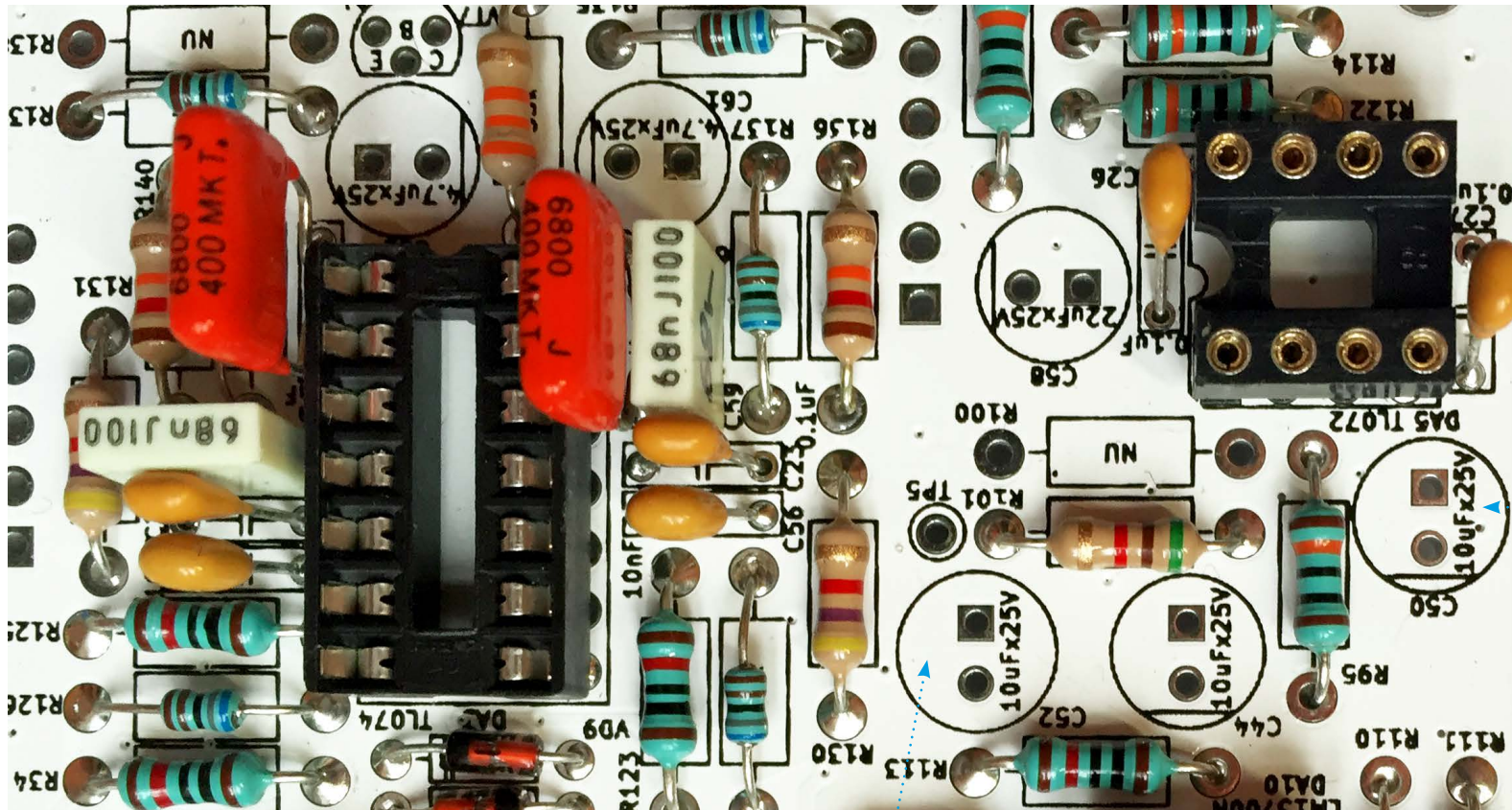
68 nF

100 nF

7. Populate all ceramic and film capacitors on both PCBs!



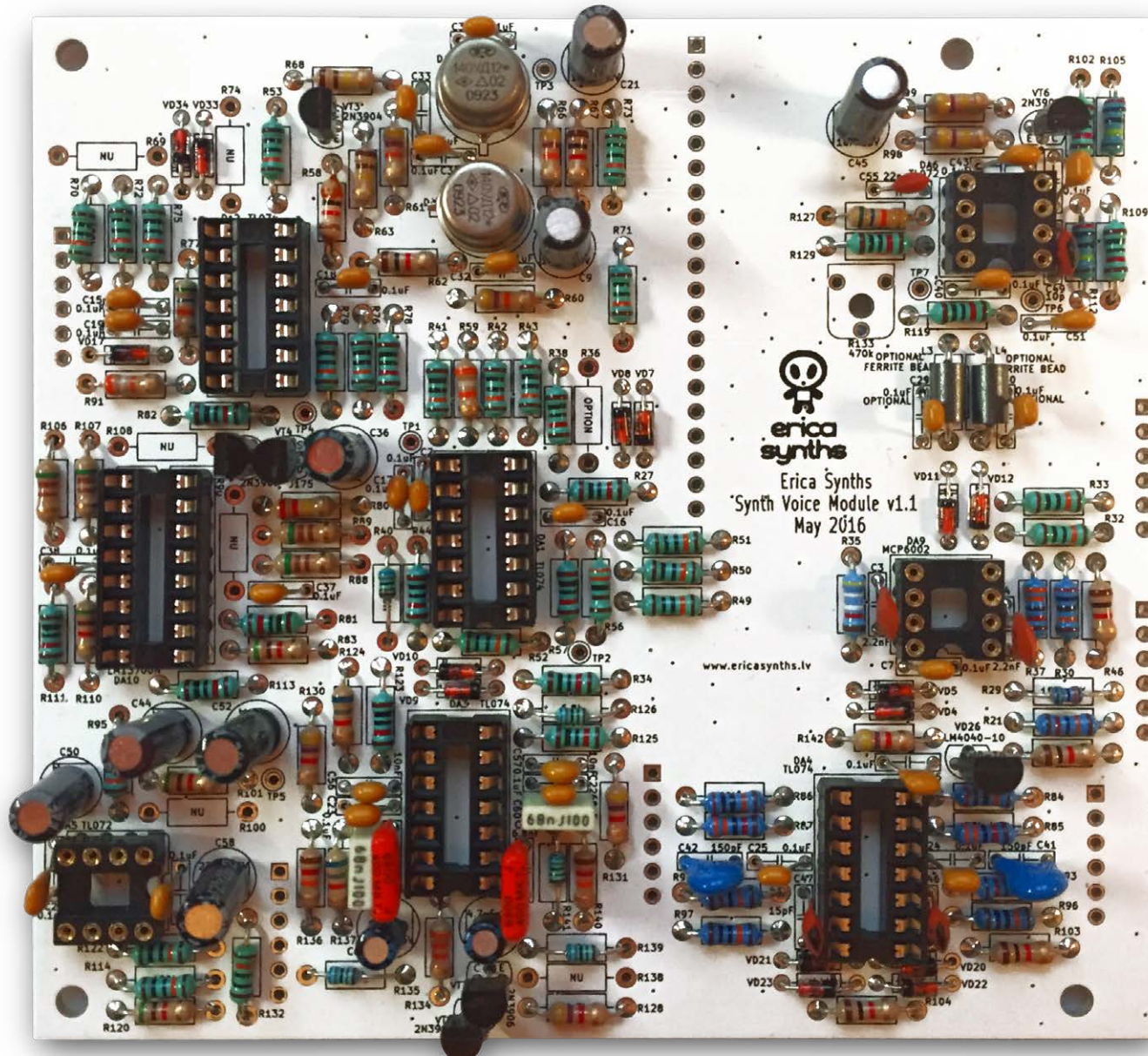
10. Now let's figure out, how to install electrolytic capacitors!



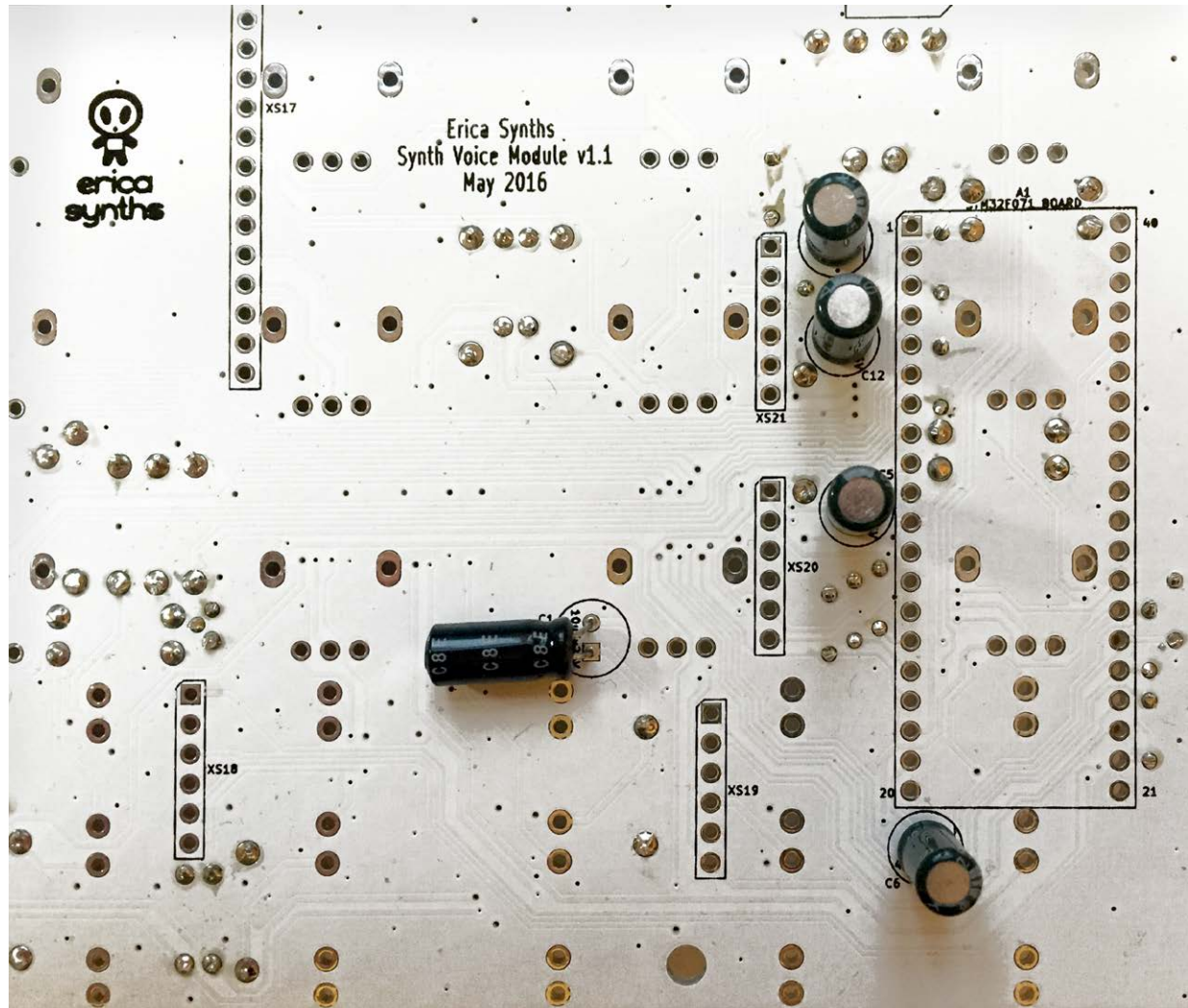
This is polarized electrolytic capacitor. Minus lug of the capacitor goes to the hole next to the stripe

This is non polarized electrolytic capacitor

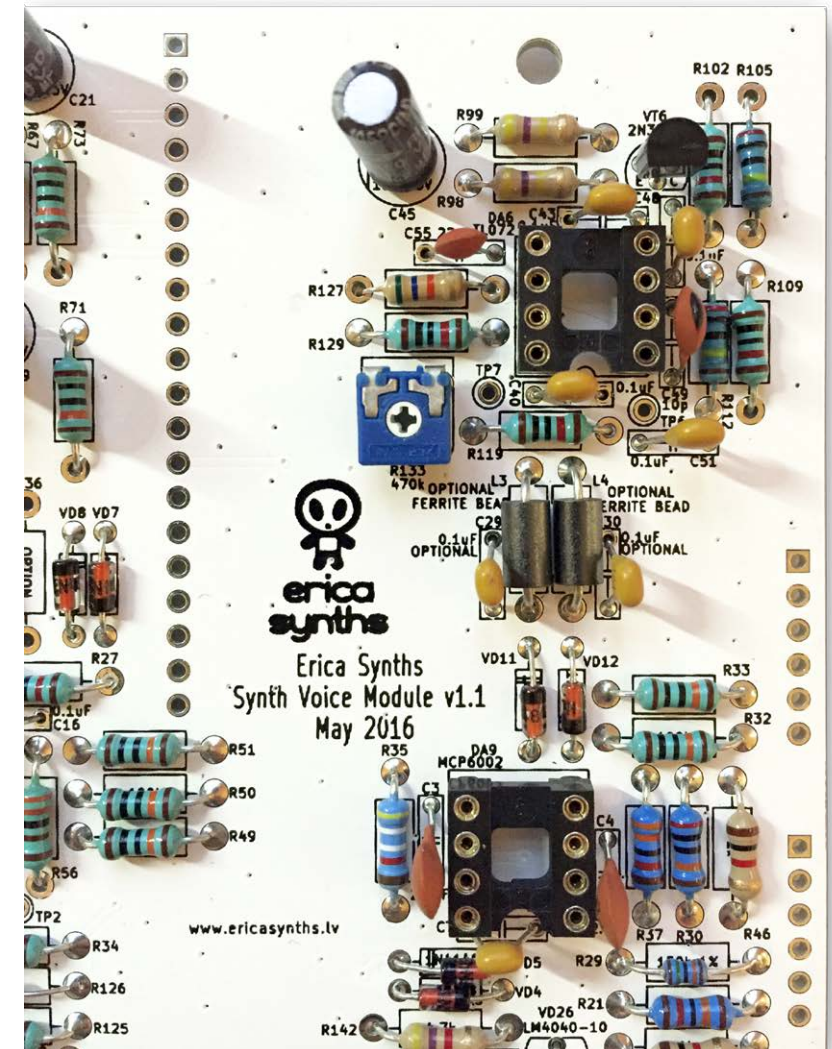
11. Solder electrolytic capacitors on the Main board. Pay attention on polarity for polarized capacitors.



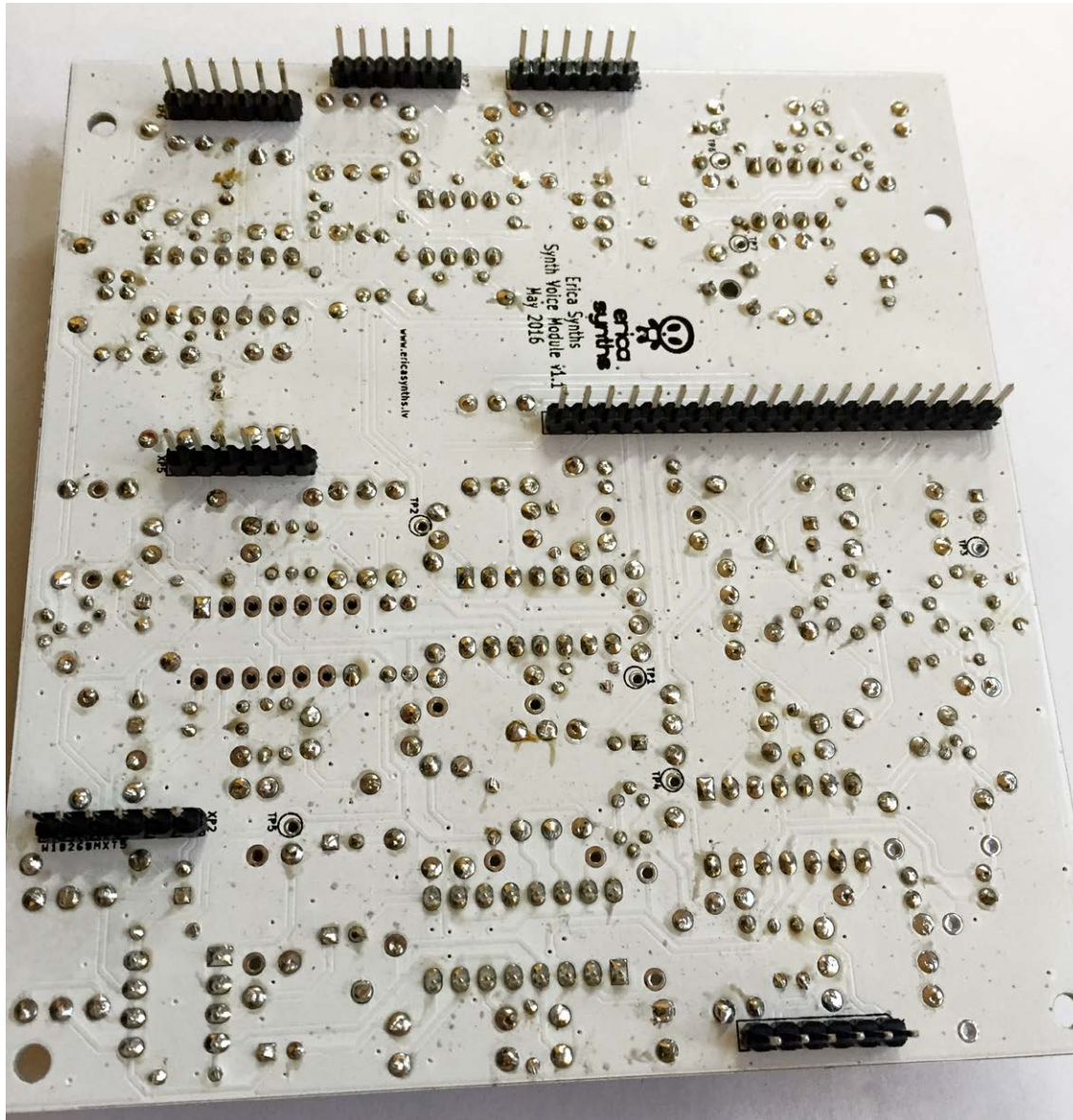
12. Solder electrolytic capacitors on the back side of the Controll PCB! Note that non polarized capacitor C1 has to be installed horizontally



13. Solder noise level adjustment trimpot!



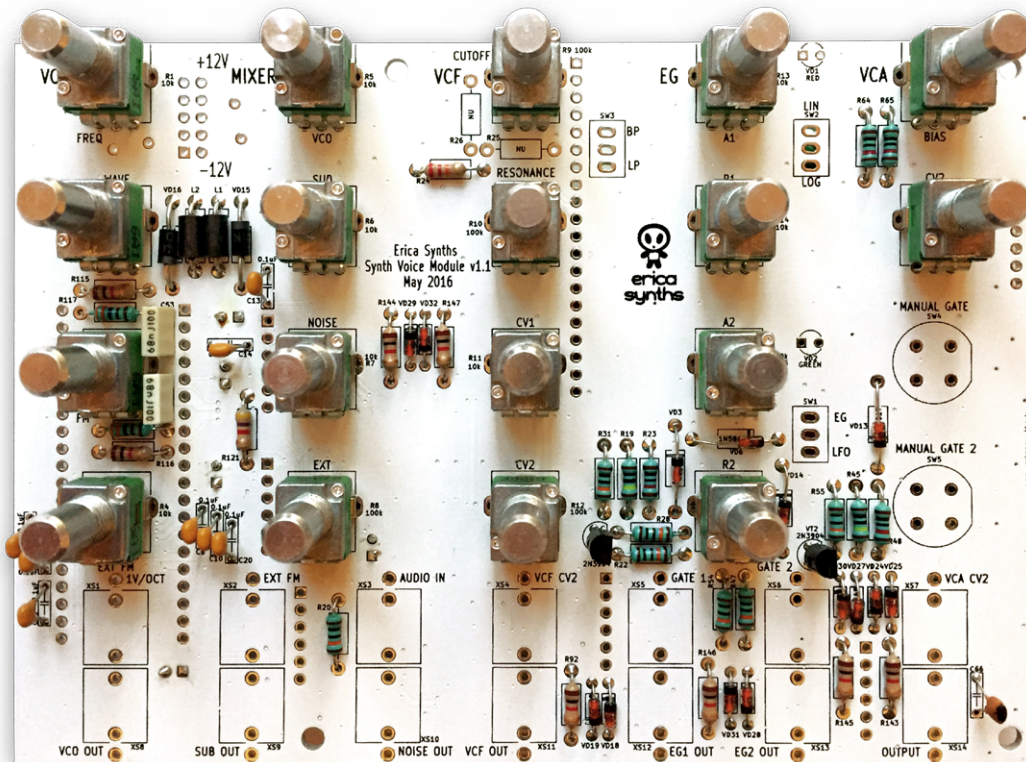
14. Solder PCB connector male pins on the Main PCB!



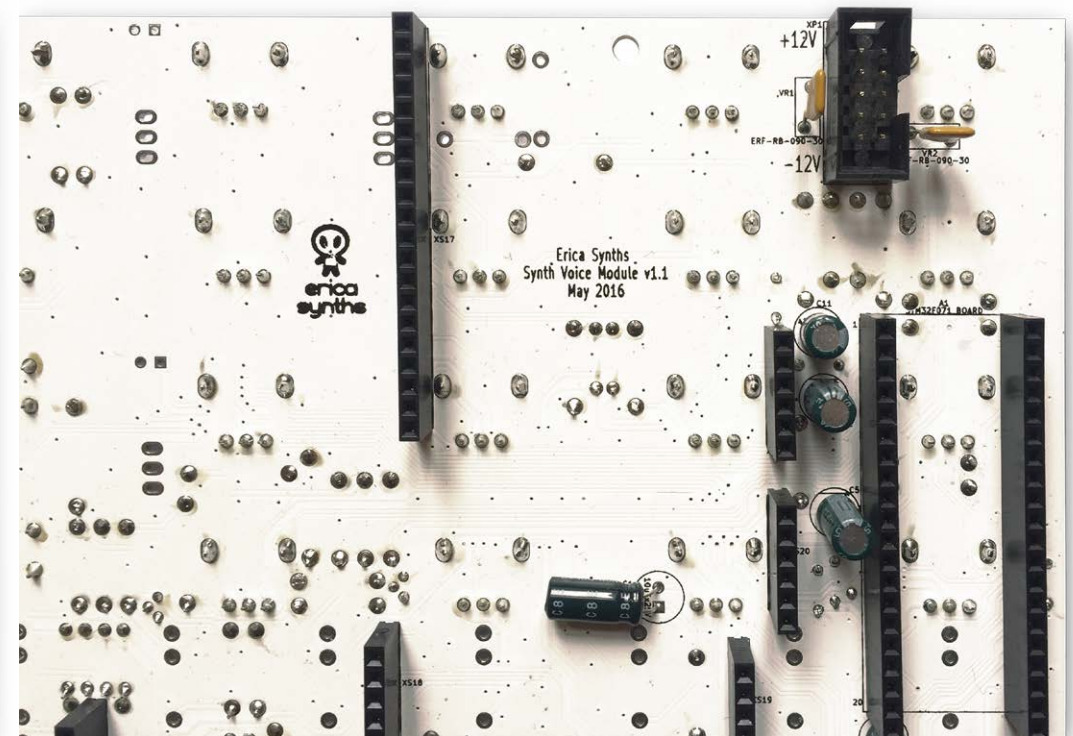
15. Cut off orientation pins of potentiometers!



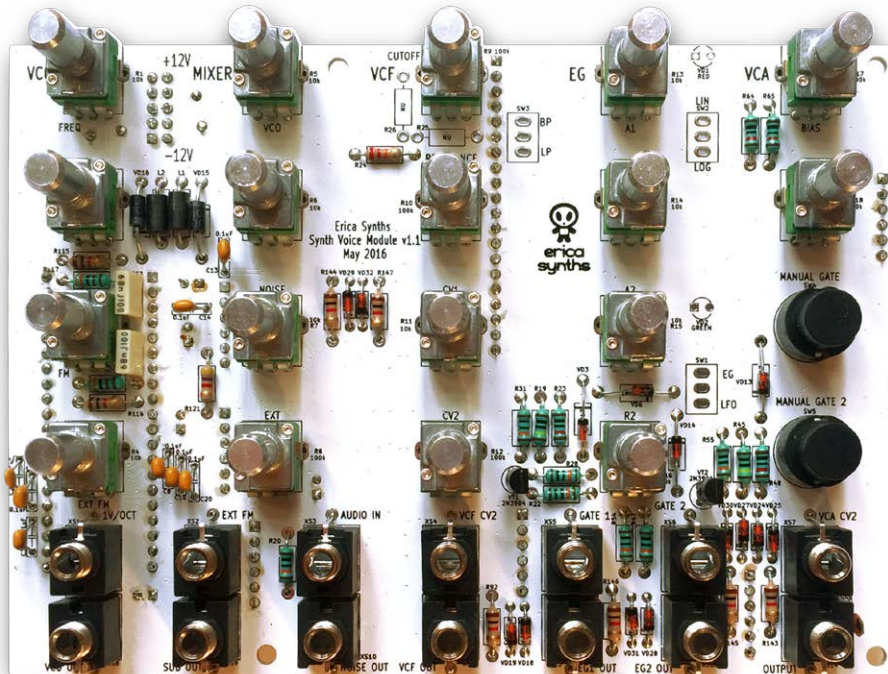
16. Solder potentiometers on the Controll PCB!



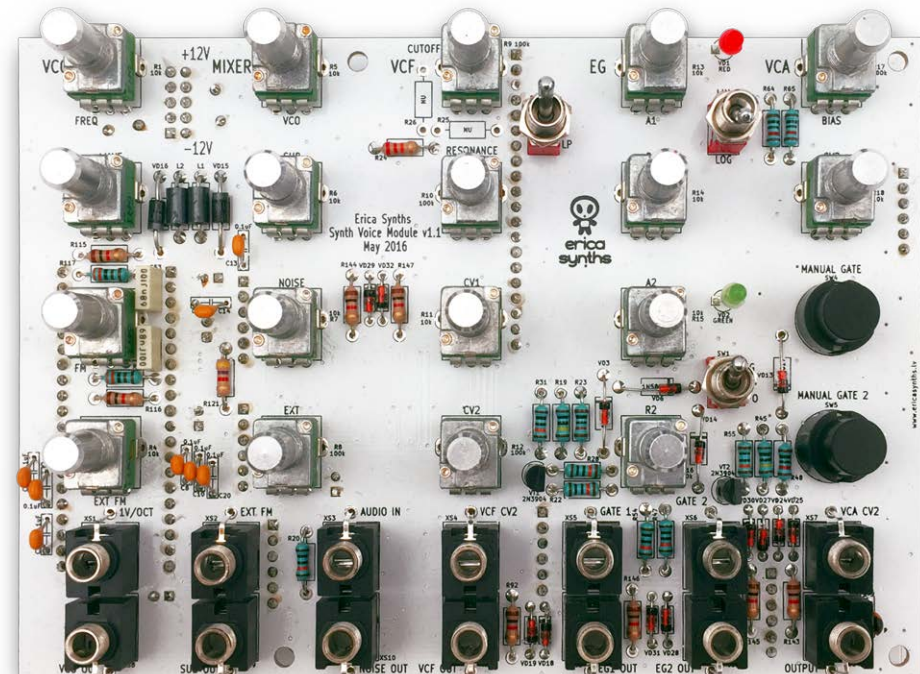
17. Turn Controll PCB around and solder female connector sockets! Also solder PSU ribbon cable socket! Mind orientation! Solder fuses (yellow ones). You can replace those by wire jumpers on your own risk.



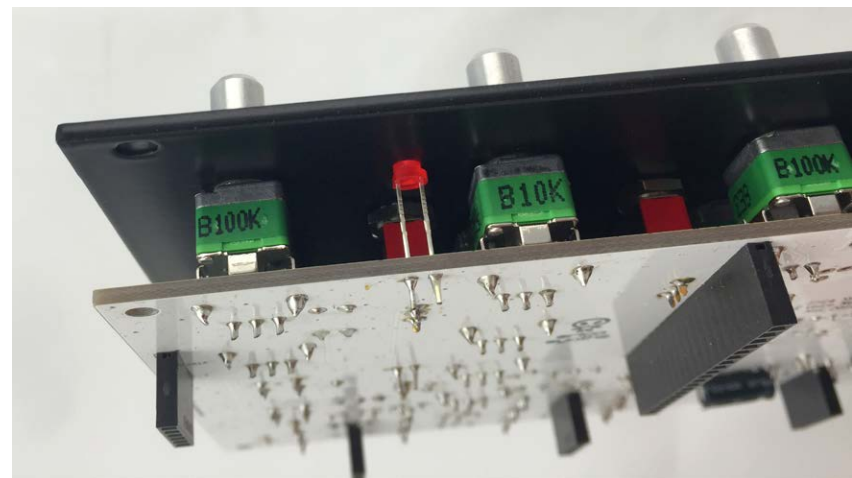
18. Insert jacks and pushbuttons on the Control PCB, but do not solder them yet!!



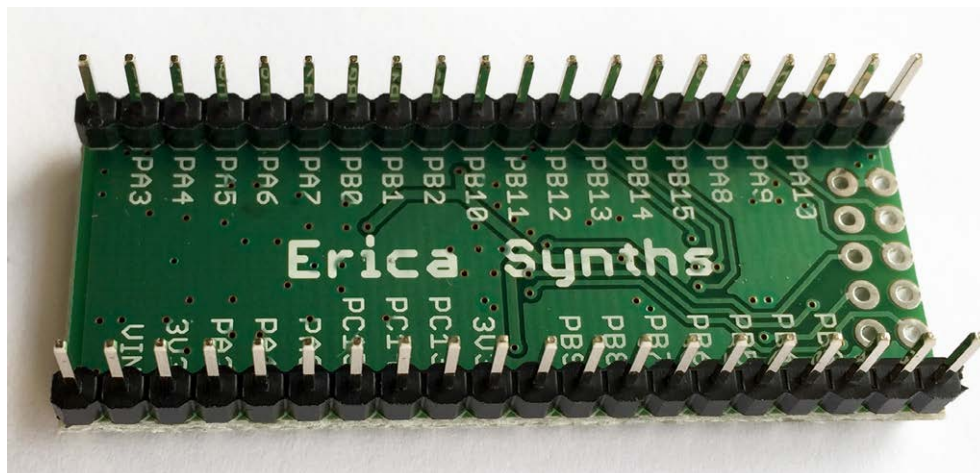
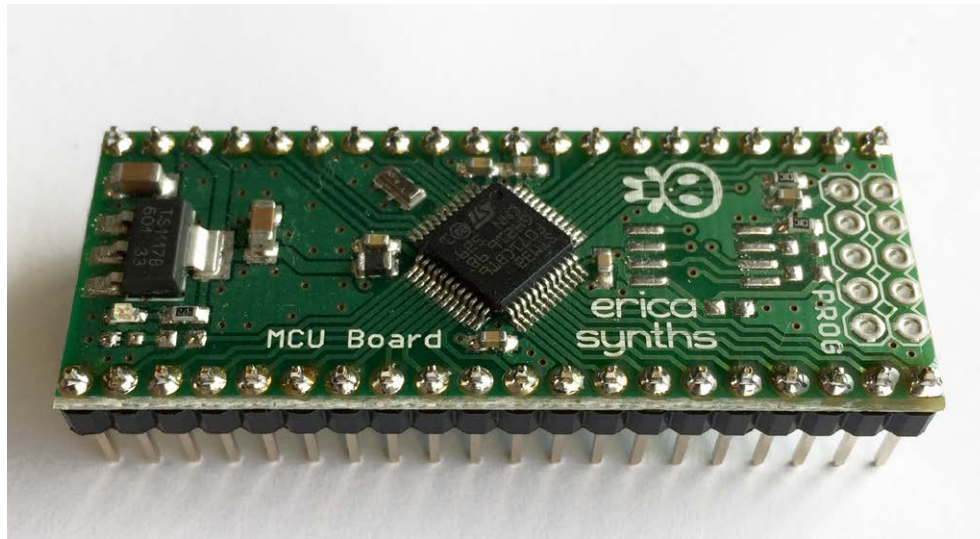
19. Insert 3 toggle switches and LEDs (pay attention on the orientation – follow the silkscreen) in relevant places, but do not solder them yet!



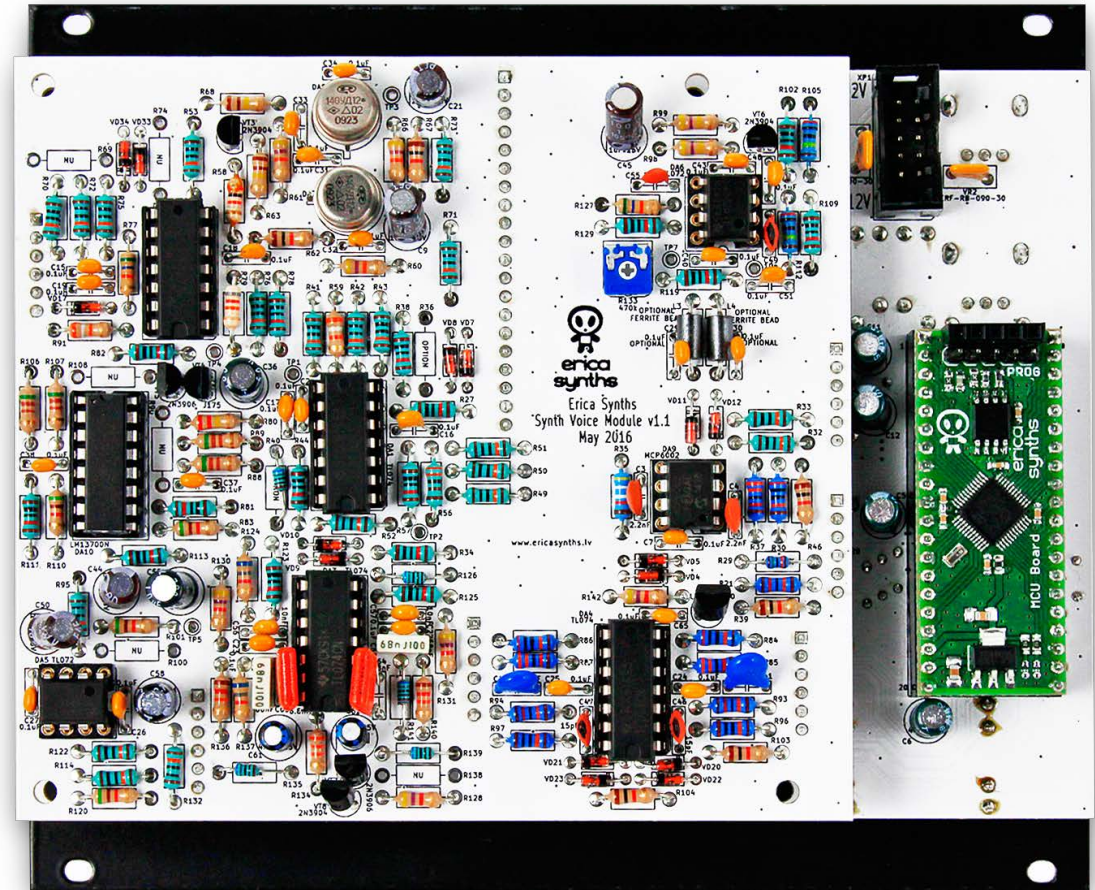
20. Install the front panel! Now jacks, pushbuttons, switches will be in correct position, switches will be in correct position, and you can solder those. Same goes with LEDs – push them through holes on the front panel and solder! Cut off excess of pins.



21. Solder male connectors on the small MCU board!



22. Connect all three PCBs! Pay attention on MCU board orientation!



23. install potentiometer knobs!



CONGRATULATIONS! YOU HAVE COMPLETED ERICA SYNTHS DIY SYNTH VOICE!

Now you can connect the module to PSU, and see, what happens. If you haven't make mistakes in assembly process, the module should work straight away.

Calibration is easy. Only thing, you have to do, is adjust desired noise level using trimpot.

The VCO comes 1V/oct calibrated, but PSUs on modular synths are so different, therefore, if needed, you can perform the calibration procedure specifically for your modular setup. You will need precise 5,000V CV source:

1. Disconnect your Synth Voice from the PSU.
2. Connect a patch cable to the CV source and make sure, you get 5,000V (exactly five volts) on the output.
3. Push and hold MAN GATE1 button on the Synth Voice and connect it to the PSU on your modular! Both LEDs will start to blink. Now you can release MAN GATE1 button.
4. Connect 5,000V patch cable to 1V/oct input of the module!
5. Push MAN GATE1 button promptly to initiate the calibration! Both LEDs will go off, and this means that you have successfully calibrated the VCO!

ENJOY!

If your module doesn't work, please check the Erica Synths Synth Voice build thread on Muffwiggler or contact us on the email info@ericasynths.lv!