

## NAVA BUILDING GUIDE

- **About Nava:**

Nava is Roland TR-909 Rhythm computer clone. This is an exact reproduction of the analog part of the TR - 909 (with the exception of the BA662 VCA Clap has been replaced by a BA6110) coupled with a MIDI sequencer. You can store up to 128 patterns organized into 8 banks of 16 patterns in a Non-volatile EEPROM. Various functions have been added such as the ability to mute every sound, to chain patterns as you want, copy, paste, clear patterns ... (cf [Nava v1.0 user manual](#))



- **Characteristic of Nava v1.0**

- 128 Rhythm patterns from 1 to 16 steps
- 16 tracks of 999 measures
- 1 external instrument track by pattern that can store 99 notes like SH101 sequencer style.
- A Midi keyboard mode allow you to play external Midi device
- Multi out for each instruments
- Individual accent for BD, SD, LT, MT, HT, RS, HC and CH
- A total accent track
- Master out (L/R Mono) 6Vp-p 1Kohm
- tempo 30 - 250 Bpm
- 7 shuffle levels
- 4 scales (1/8t, 1/16, 1/16t and 1/32)
- 4 sequencer directions (forward, backward, ping-pong and random)
- Easy copy and paste pattern function
- Shift left or right the entire pattern or individual instrument

- In/Out/Thru Midi
- DinSync 24ppqn Out
- Trig Out 2ms +5V
- And More...

- **The kit includes:**

- 2 x PCBs: the Mainboard and the IO Board
- The  $\mu$ C, a Atmega1284P pre programmed with Firmware Nava v1.0
- 3x program EPROM 27C256 with the sound of HitHat, Crash and Ride as those present in the original TR-909.
- 36 x M5218L Mitsubishi. Those are the original TR-909 OPA
- 2 x HD14006BP 18 Bit static shift register used to Noise generator
- 1 x AN6912 Quad comparator. HandClap envelop generator identical to that of TR-808.
- 1 x BA6110. This is the only component that we have replaced the original TR-909.
- 19 x 2SA1115-F PNP transistors
- 56 x 2SC2603-F NPN transistors
- 4 x 2SA798 PNP Monolithic Transistor Pair
- 2 x 2SD1469 NPN Small signal transistor
- 2 x 2SC2878 NPN Epitaxial transistor for muting application
- 27 x Potentiometers Potentiometers (all necessary controls for the construction of Nava v1.0)
- 19 x Cherry switches with whites caps
- 17 x illuminated square tact switches

All other components to complete your kit are available in this Mouser

BOM: <http://www.mouser.com/ProjectManager/ProjectDetail.aspx?AccessID=26a285d084>

.The only component that you must get is a 15VAC supply 1000mA, the same used for the Yocto v1.0. A screen printed aluminum case will soon be available on the [forum](#). The wall wart PSU have to be a **15VAC or 16VAC 1000mA**. It is easily found at all distributors of electronic equipment. You can find it here: [Jameco 16VAC 1000mA](#) .

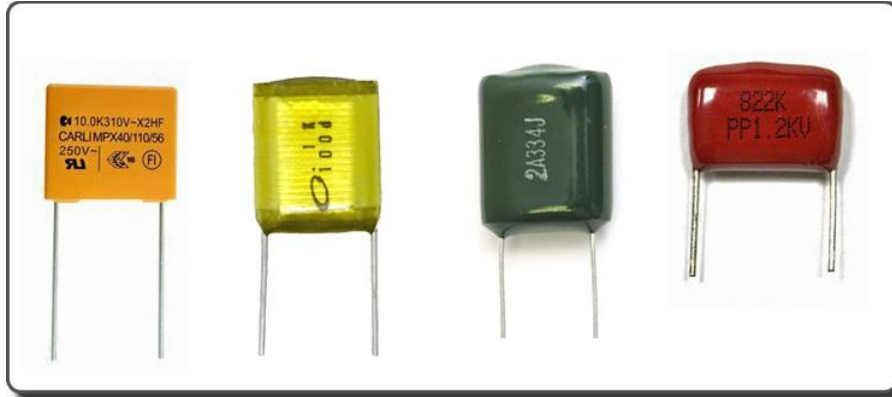
- **Build it:**

For assembly process you need a soldering iron, tin, wire cutters for electronics, multimeter. That is it. Settings for different sounds you'll need either an oscilloscope or [Scope software](#) that allows you to use your computer's sound card as an oscilloscope. Be focused and meticulous during assembly, pay attention to orientation of the polarized electrolytic capacitors, diodes, transistors and integrated circuits components. If you don't find a component position, download the [BRD file Nava PCB](#) and the [trial version of Eagle](#). Open the file in Eagle and click the "Show object" function represented by an eye, then type the name of the component you are looking for the location and press Enter. The component will highlight indicating its location. Patience and organization are the key words that will make your Nava work the first time. If it's your first project or you never soldering components have a look on this Soldering tutorial:

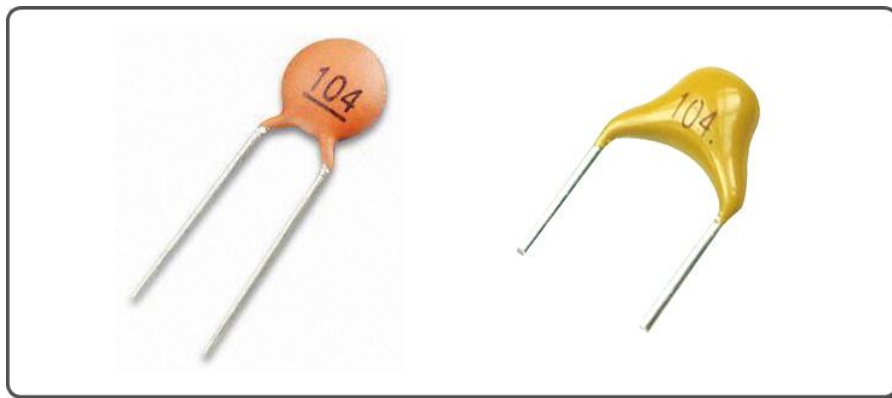
**The components you will receive may differ from the components on pictures mounting tutorial, this is due to regular update of Mouser list. Especially for the non-polarized**

# capacitor:

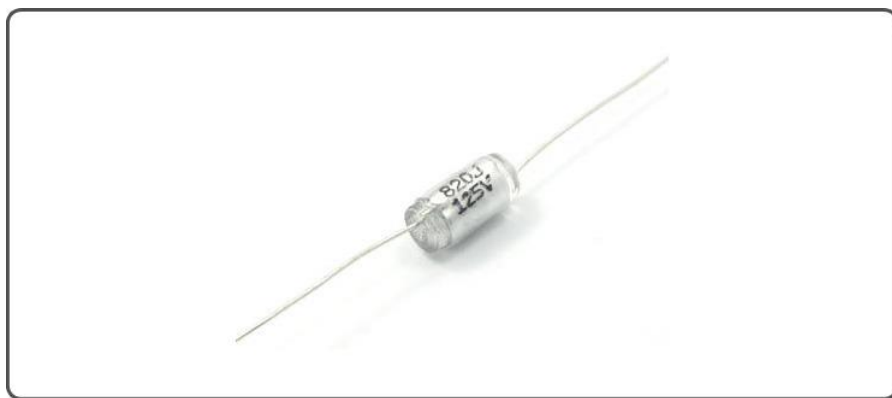
Film capacitor could be one of those:



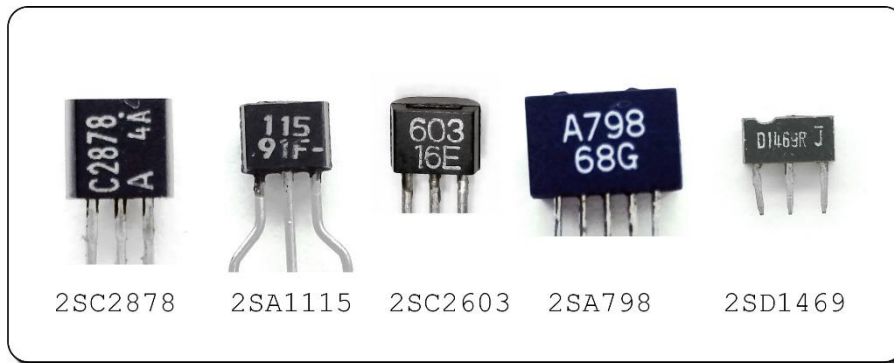
Ceramic capacitor could be one of those:



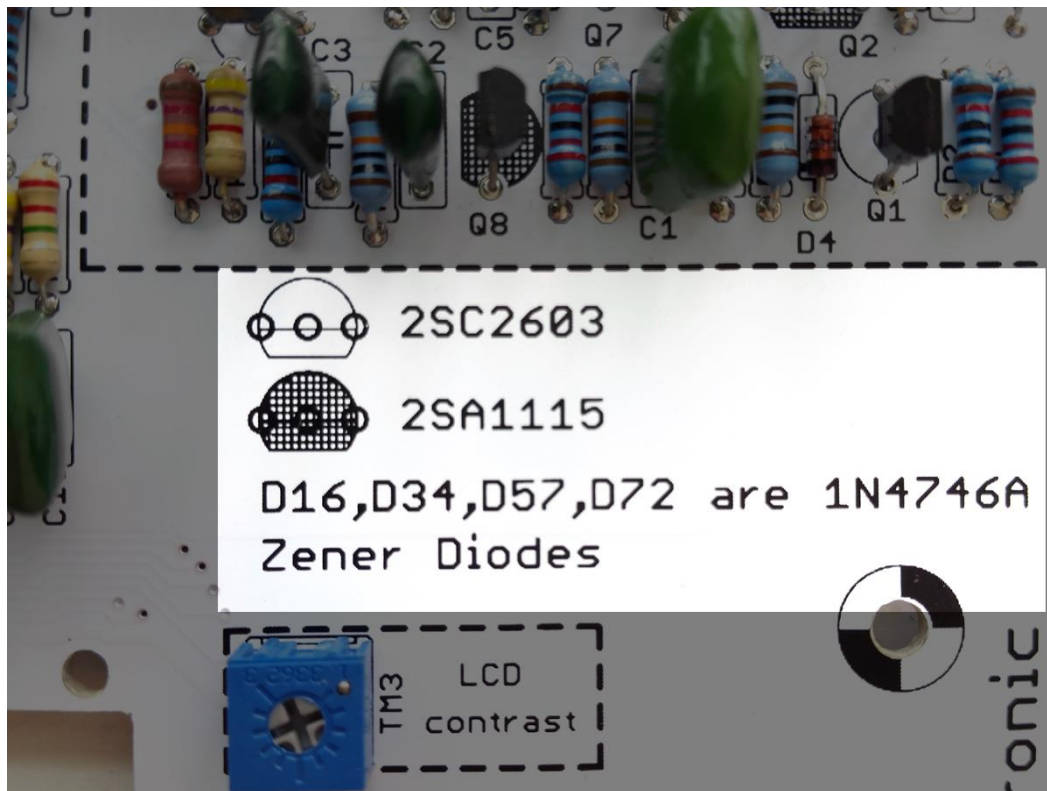
And polystyrene capacitor have to be this one:



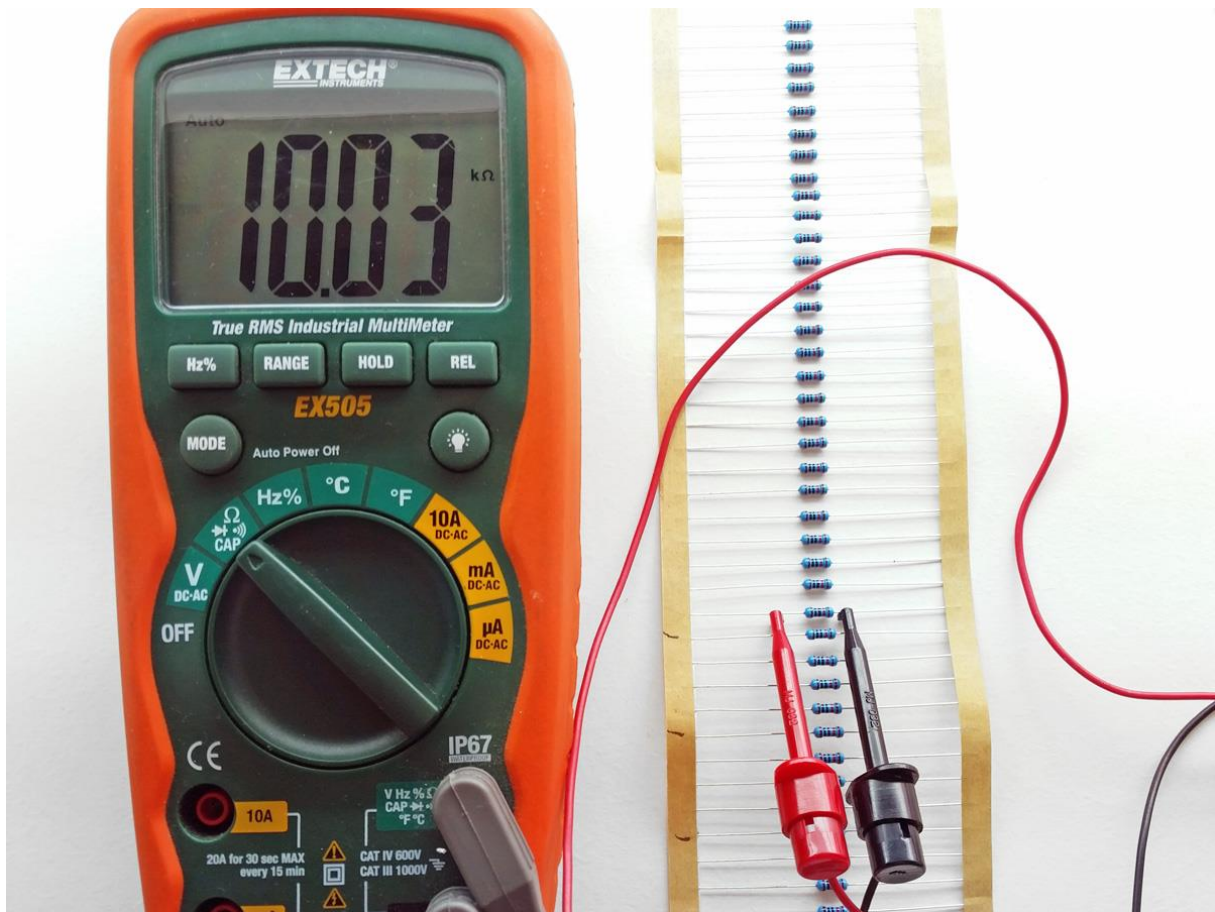
Transistor are marked like follows:



**2SC2603 and 2SA1115 has different silkscreened symbol, so you can't mix it ;)**



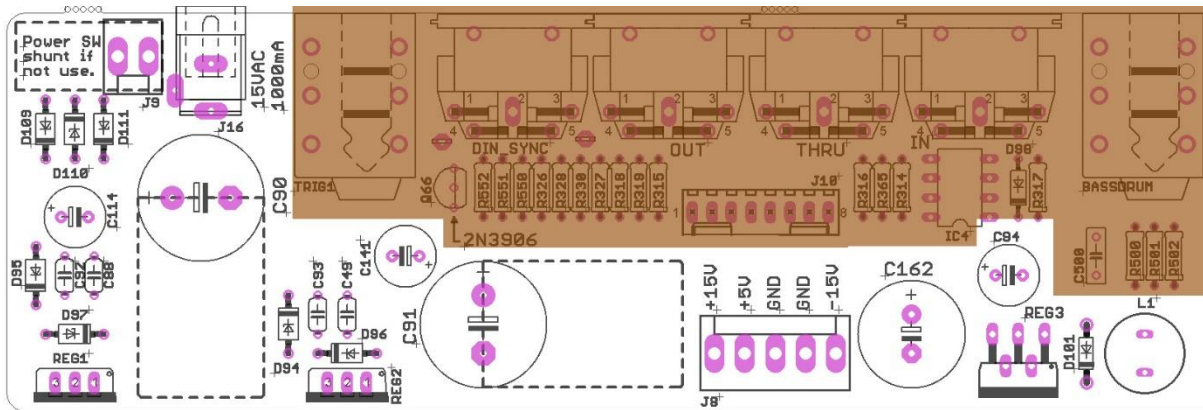
Let's start to sort 10Kohm resistors for crash, ride and hihat digital to analog converters. Measure the value of all 10Kohm resistors and keep the one whose value is closest to 10Kohm (more or less 0,3%). You need five of them.



We recommend that you build your kit in the following order

- [Power Supply](#)
- [Noise](#)
- [BassDrum](#)
- [SnareDrum](#)
- [LowTom](#)
- [MiddleTom](#)
- [HighTom](#)
- [RimShot](#)
- [HandClap](#)
- [HitHat](#)
- [Ride/Crash](#)
- [Sequencer](#)
- [IO Board](#)
- Master:** As the master section GND come from the IO board you have to build it after the IO board
- [Finished](#)

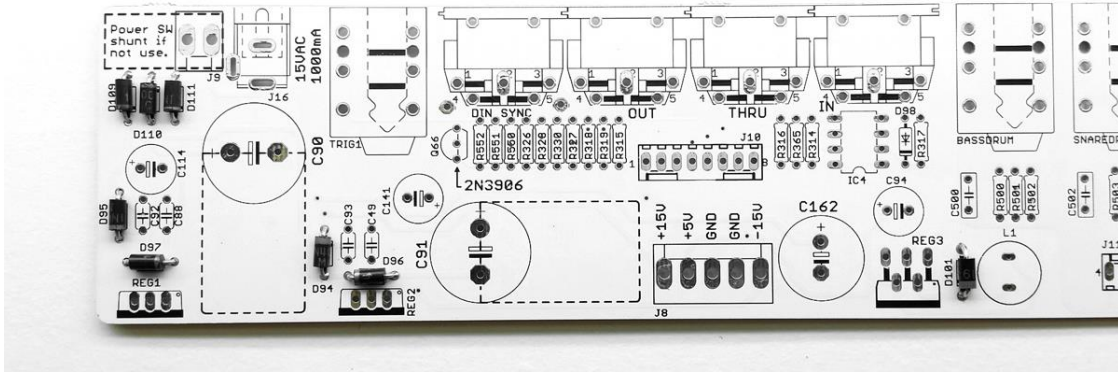
# • Power supply



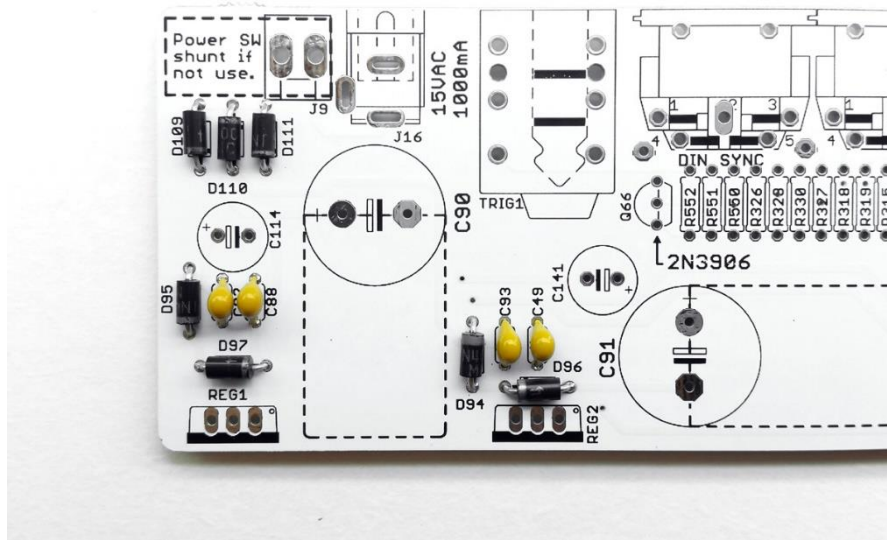
## • Power supply parts list

Nava v1.0 Power Supply parts list: 26 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Capacitors</b>				
C49, C88, C92, C93	0.1	C050-024X044	4	Ceramic capacitor
C114, C141	100/35	E3,5-8	2	Electrolytic capacitor
C94	220/35	E3,5-8	1	Electrolytic capacitor
C162	680/35	E5-13	1	Electrolytic capacitor
C90, C91	2200/35	E7,5-16	2	Electrolytic capacitor
<b>Diodes</b>				
D94, D95, D96, D97, D109, D110, D111	1N4004	DO41-7	7	
D101	1N5819	DO41-7.6	1	
<b>Regulator</b>				
REG3	LM2596-5.0	T05D	1	
REG1	7815	TO220	1	
REG2	7915	TO220	1	
<b>Inductor</b>				
L1	33u	BS11	1	
<b>Connectors</b>				
J16		JACK_PSU_2.1MM	1	2.1mm barrel
J9		KK-156-2	1	Power switch
J8		KK-156-5	1	5 pins male
J5		KK-156-5	1	5 pins male

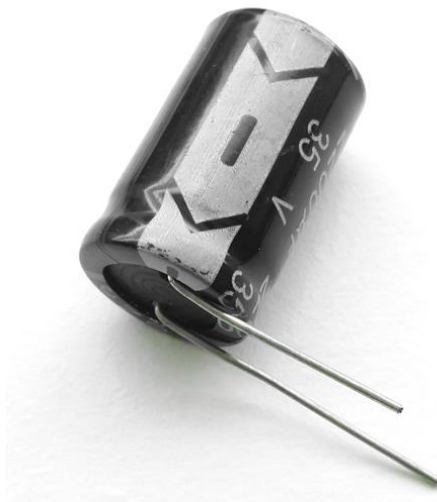
Let's start with the power supply section. First, let's populate the board with diodes. Diodes are polarized, the white ring must match the symbol silkscreened on the PCB. Do not mix D101 (1N5819) with others diodes !

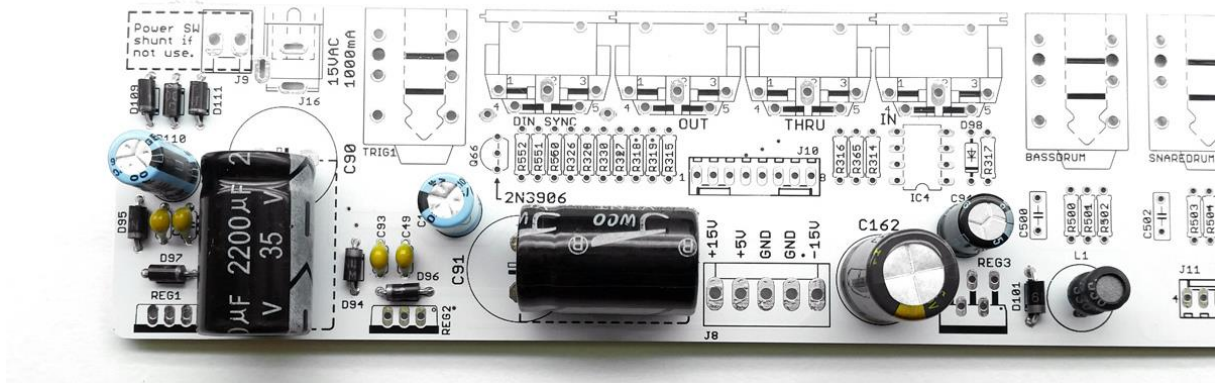


Add the four 100nF ceramic capacitors.

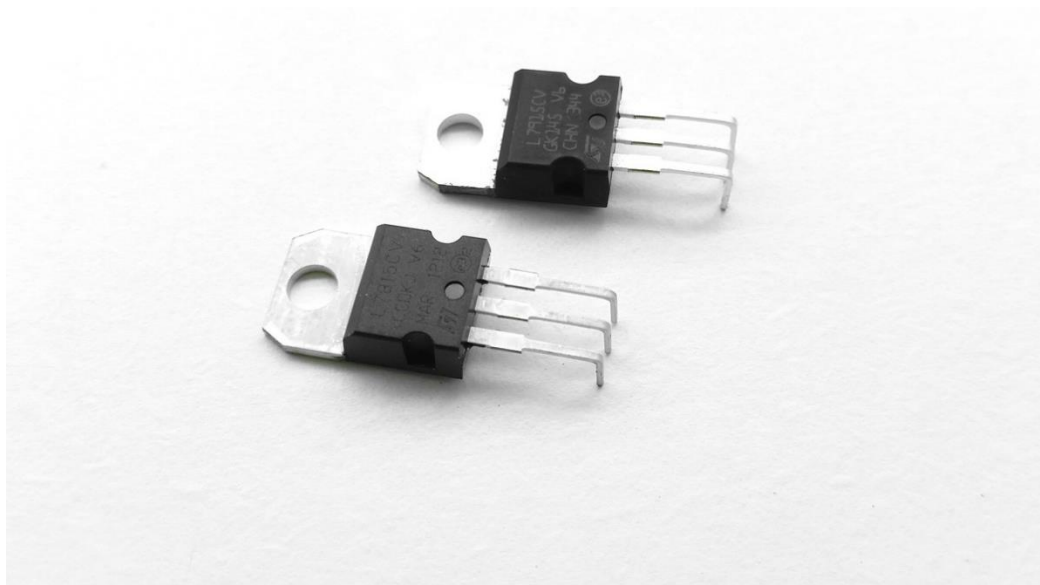
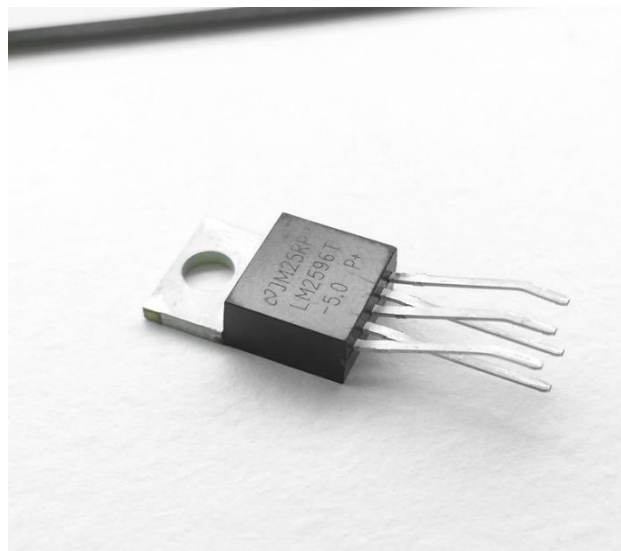


Now add the electrolytic capacitors and the inductor L1. **Electrolytics capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytics capacitors.** First, bend 2200uF capacitors legs.



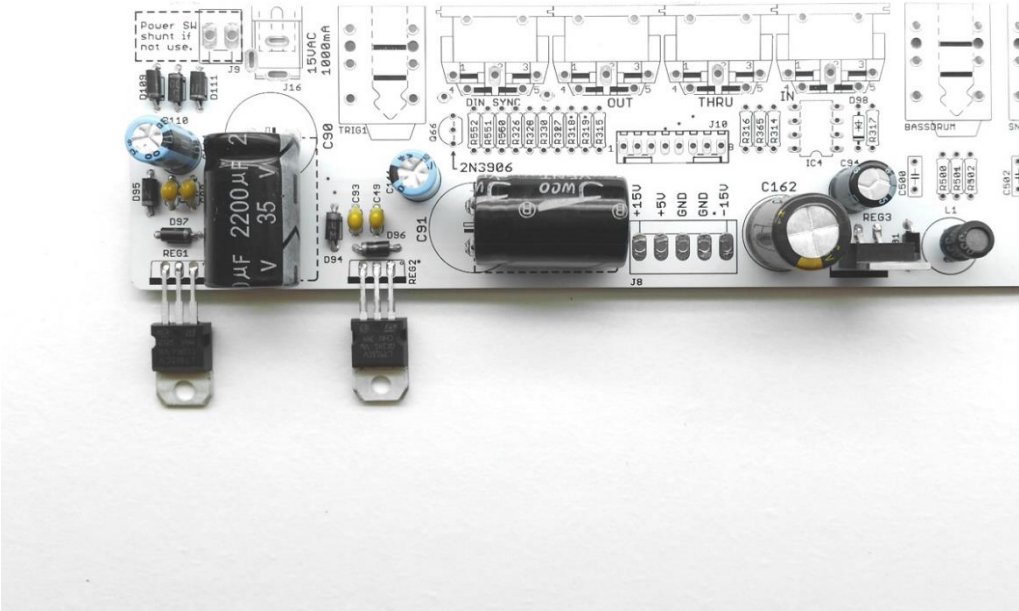


Now bend regulators legs as follow:

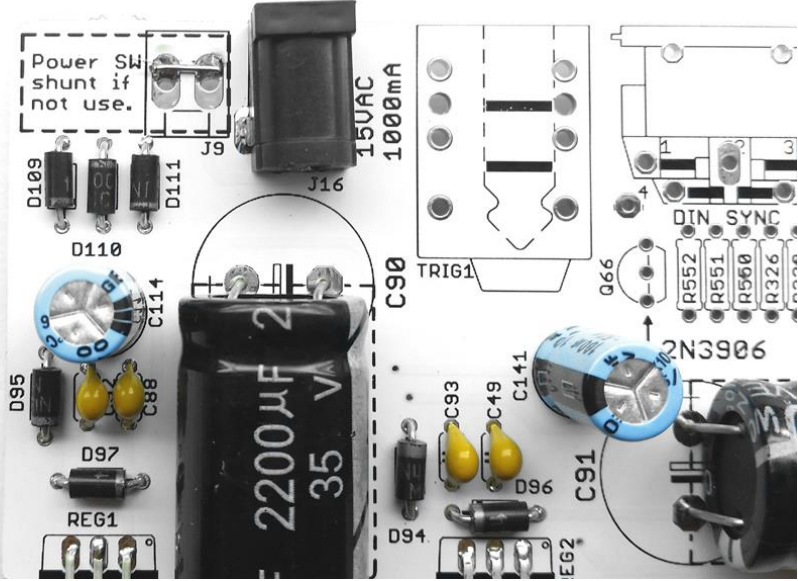




Add the regulators on the IO board. **Pay attention to the orientation!** and do not mix 7815 with 7915 they are different.

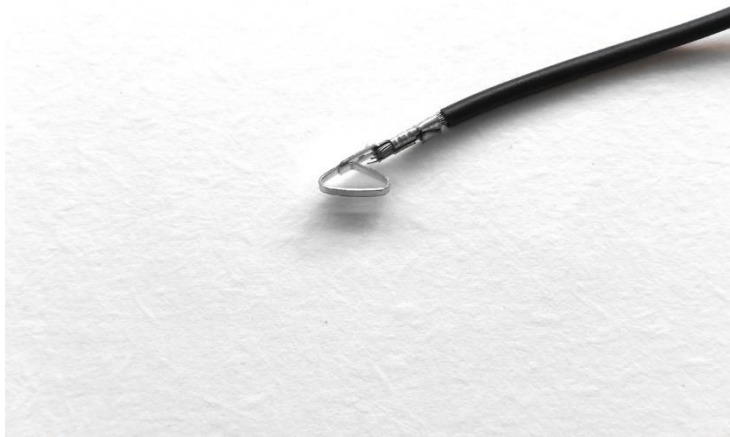


Now add 2.1mm barrel connector and short J9 power switch connector with a component leg.

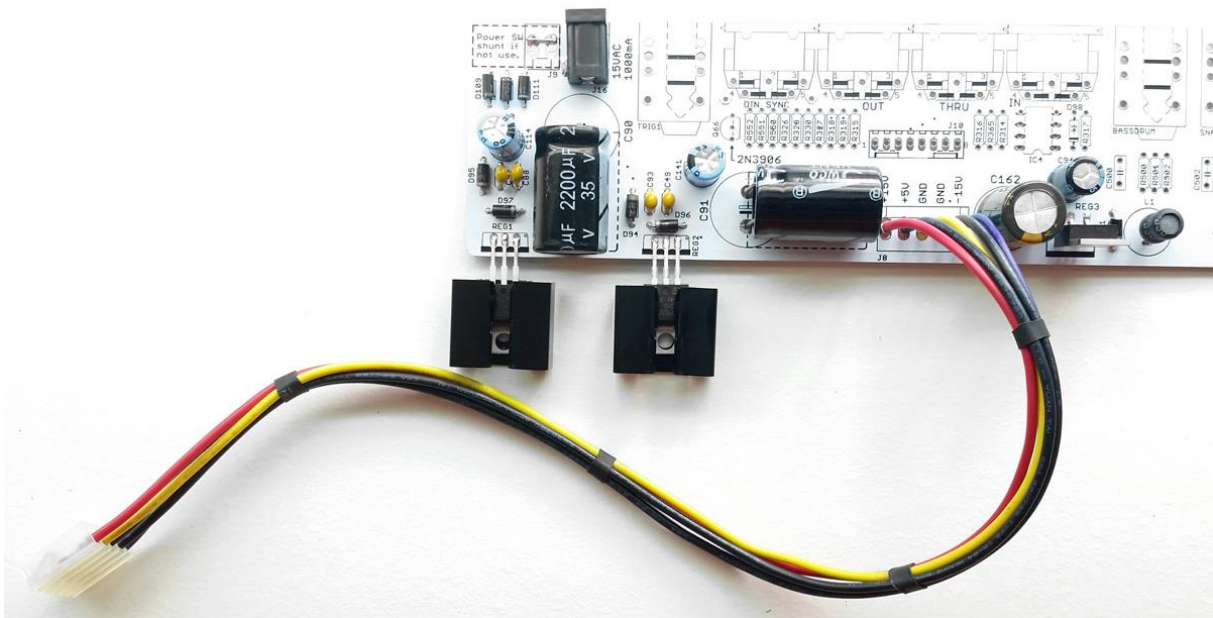


Now you need to prepare a five pins cable. First you need to crimp five wires. If you never do that before have a look on Youtube or Google there are lots of tutorial on "How to crimp a wire".

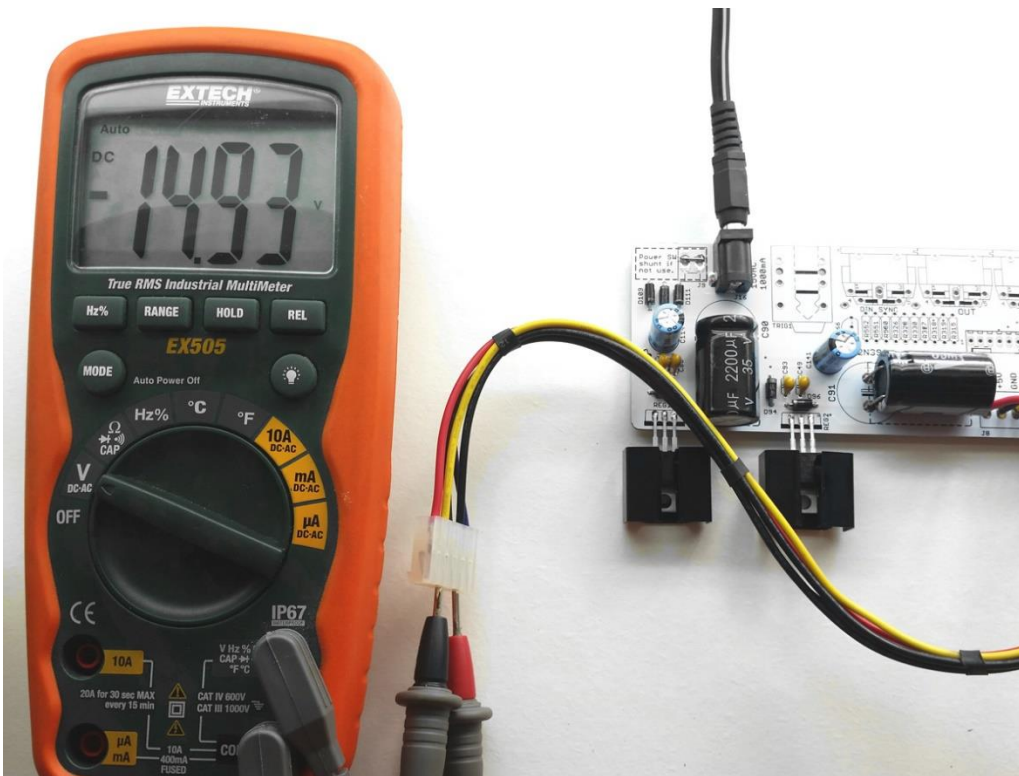
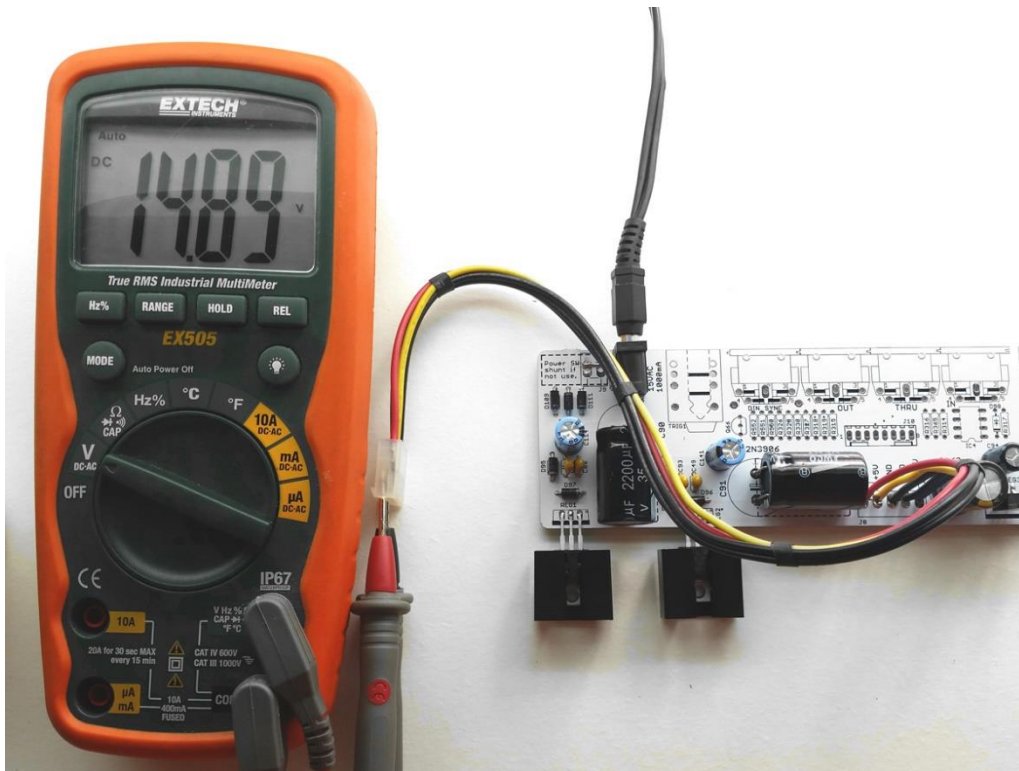
You got two different type of crimp in the Mouser Bom, use the biggest one for the power supply.

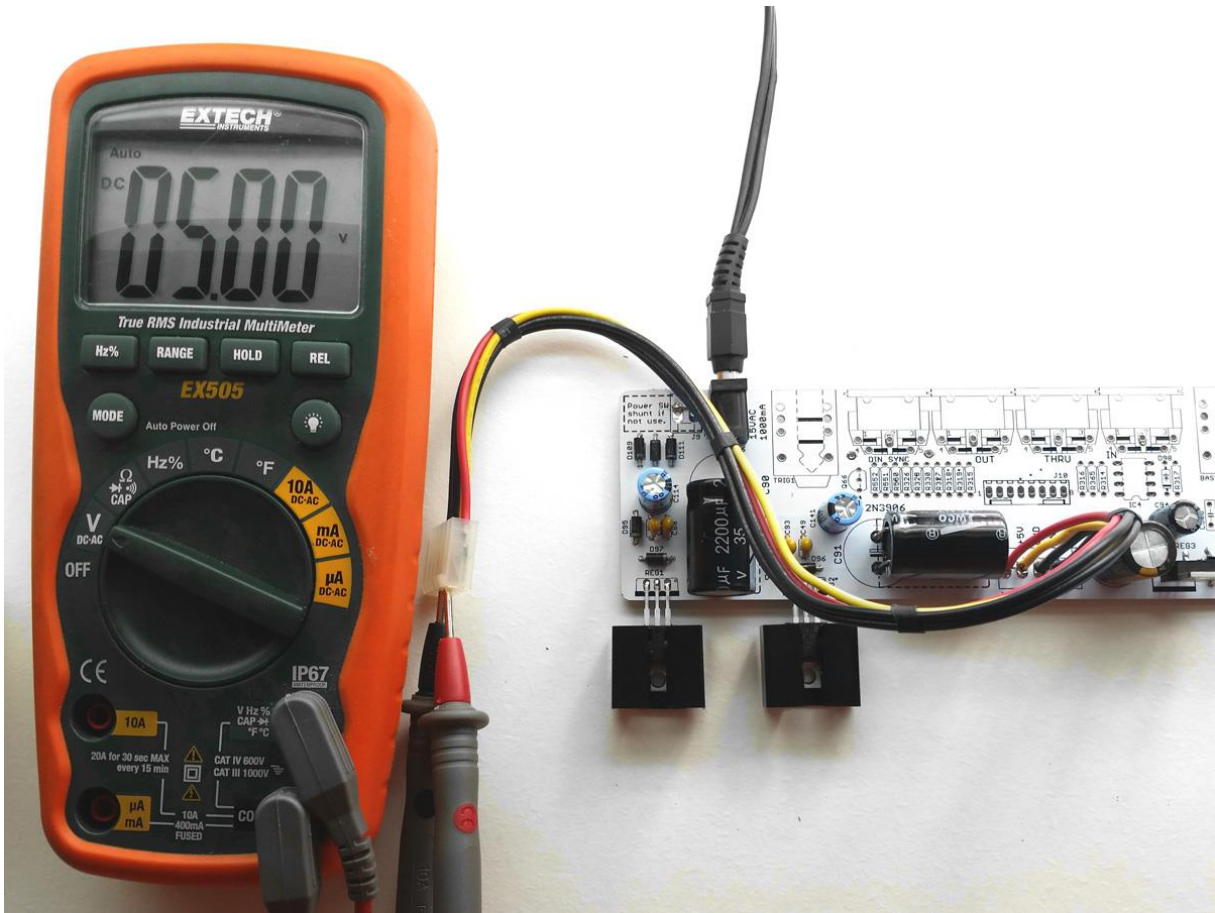


Solder the five wires respecting the order of connecting and add the both heat sink, then you are ready to test your power supply.

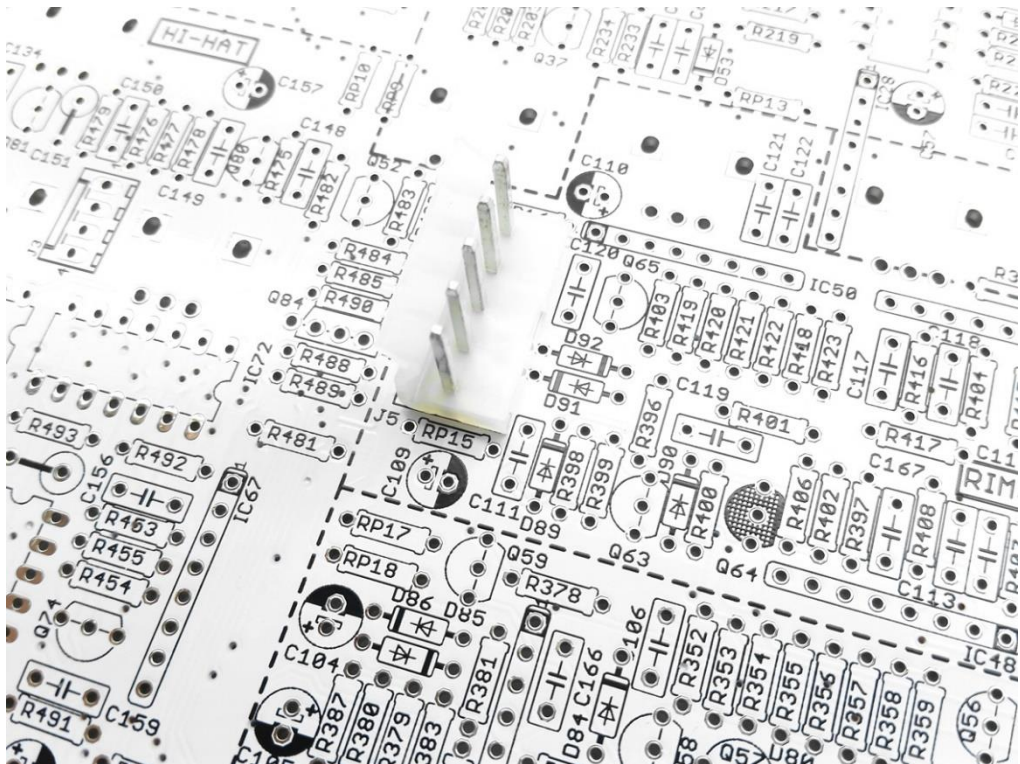


Plug your 15VAC 1000mA wall wart transformer to the IO board. Connect your multimeter in DC mode between ground and each output: you should measure +15v, -15v (more or less 0.5v) and +5V.

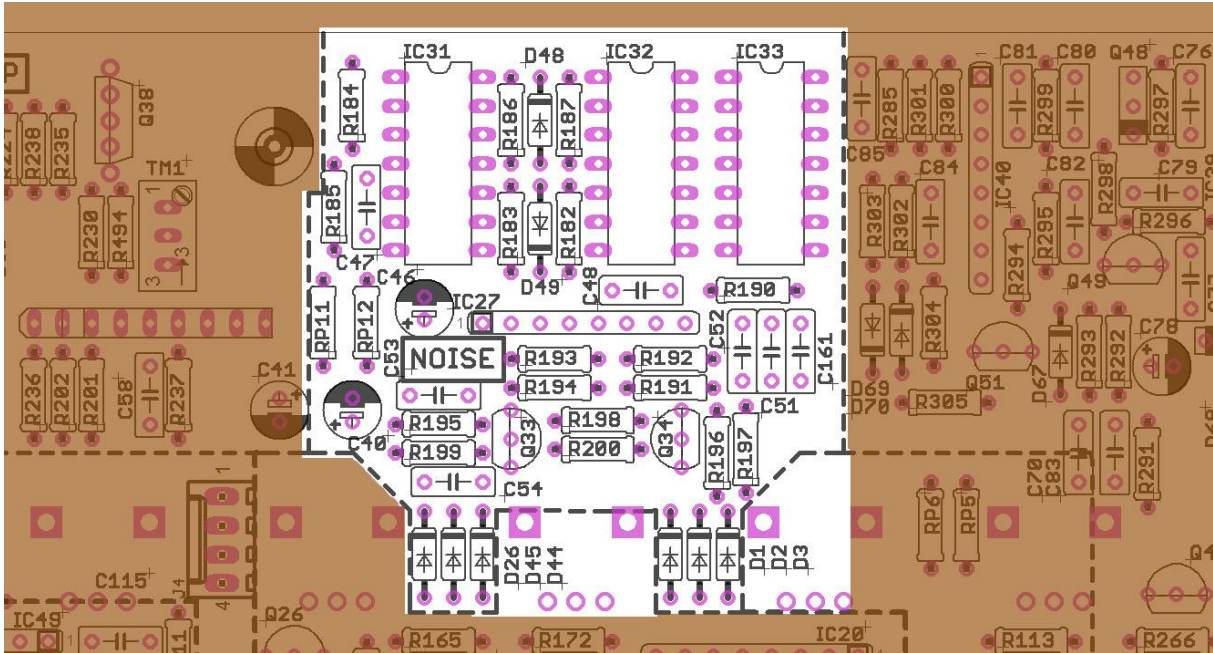




Finally, add J5, the 5 pins 3.96mm pitch connector on the Mainboard. Then you finished the power supply. Let's go to the [Noise section](#)



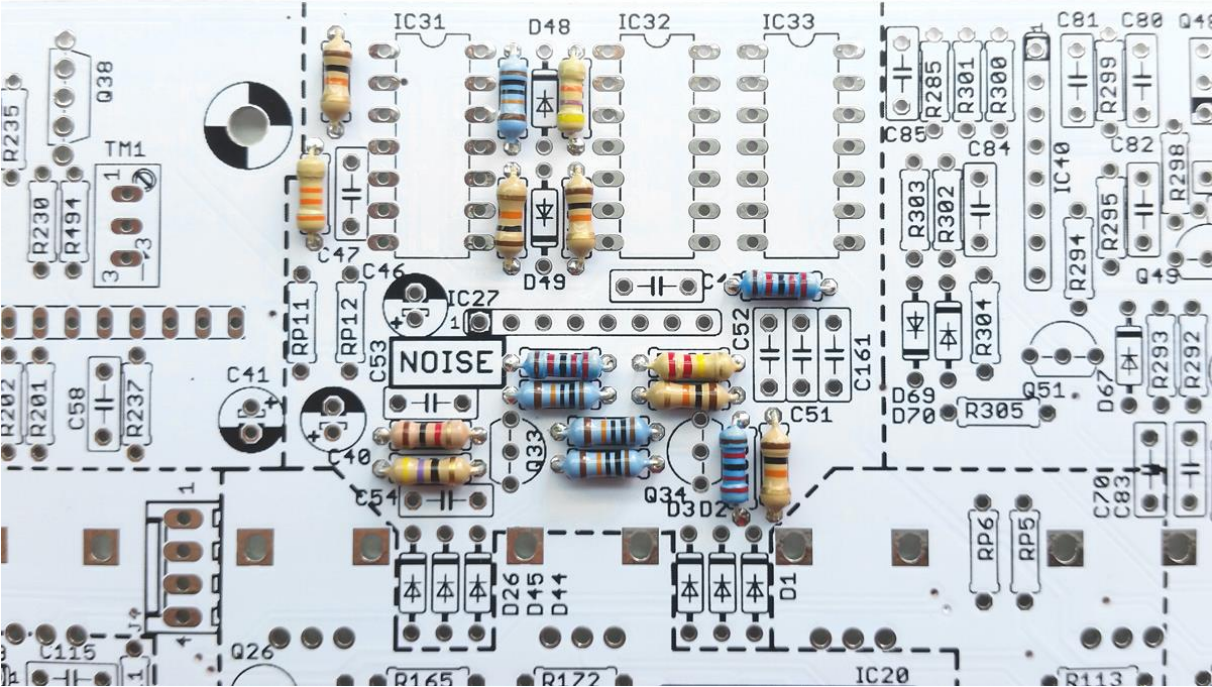
# . Noise



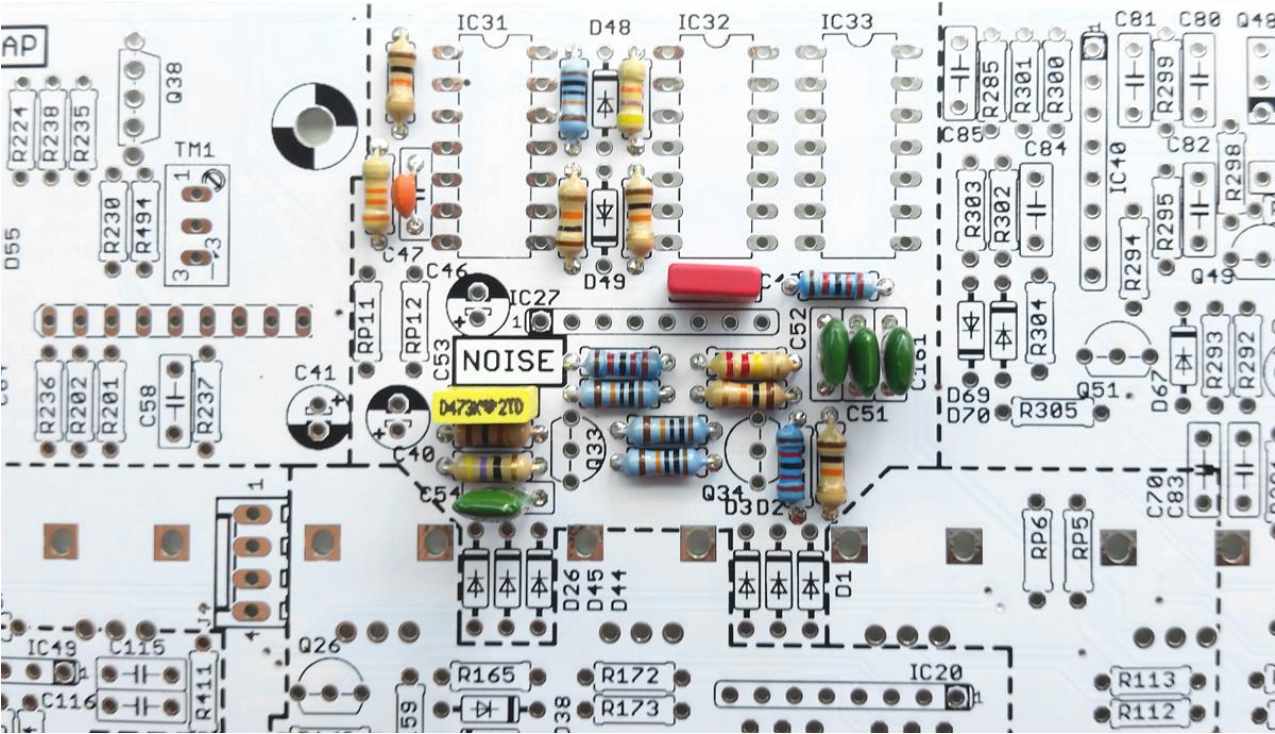
- Noise parts list

Nava v1.0 Noise parts list: 41 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
RP11, RP12	0R	0207/7	2	
R195	1K	0207/7	1	
R182, R183, R184, R191, R197	10K	0207/7	5	
R190, R193, R196	22K	0207/7	3	
R185	33K	0207/7	1	
R187	47K	0207/7	1	
R199	47R	0207/7	1	
R186, R194, R198, R200	100K	0207/7	4	
R192	220K	0207/7	1	
<b>Capacitors</b>				
µF				
C48	0.1	C050-025X075	1	Film capacitor
C51, C52, C54, C161	0.0047	C050-025X075	4	Film capacitor
C53	0.047	C050-025X075	1	Film capacitor
C47	100p	C050-025X075	1	Ceramic capacitor
C46	4.7/50	E2-5	1	Electrolytic capacitor
<b>Diodes</b>				
D1, D2, D3, D26, D44, D45, D48, D49	1N4148	DO35-7C	8	
<b>Transistors</b>				
Q33, Q34	2SC2603	TO92-ECB	2	
<b>Integrated circuits</b>				
IC32, IC33	4006N	DIL14	2	
IC31	4070N	DIL14	1	
IC27	M5218	SIL8	1	

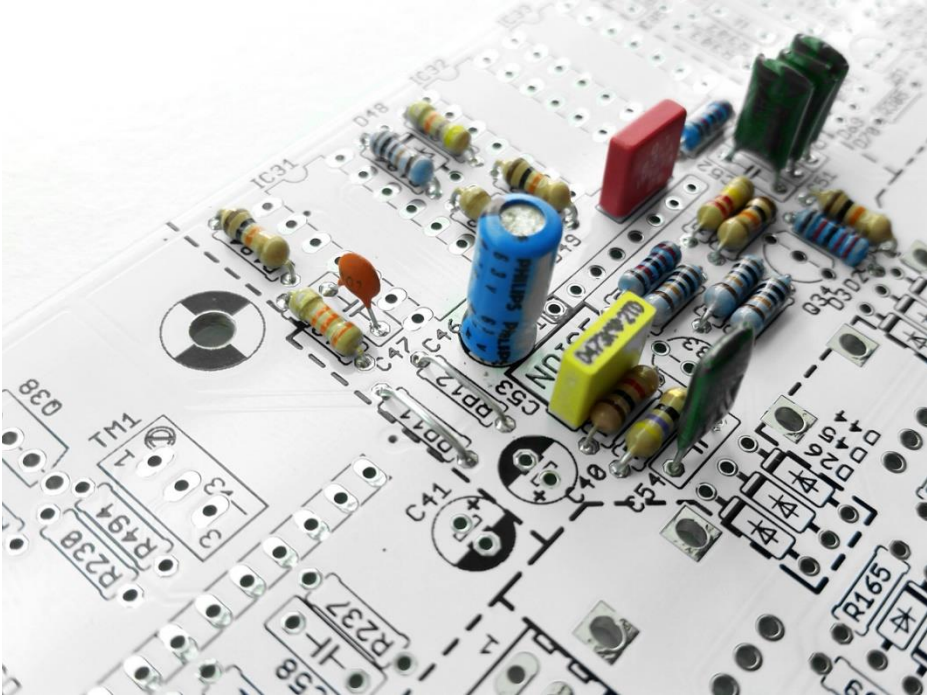
Let's continue with the noise section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.



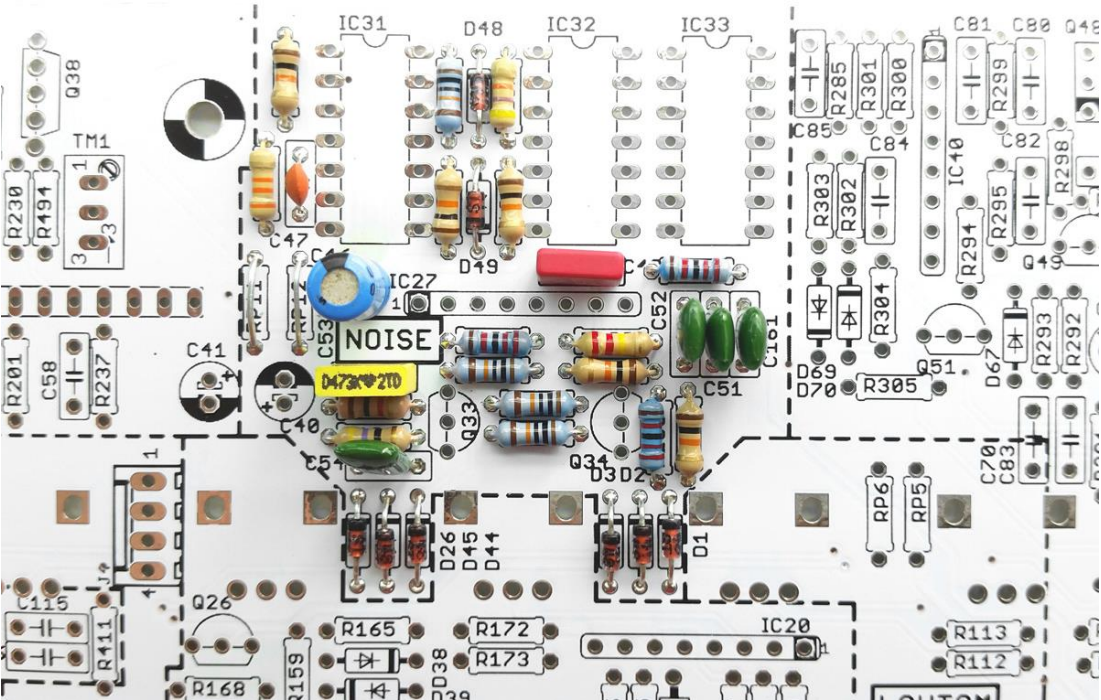
Add film capacitors



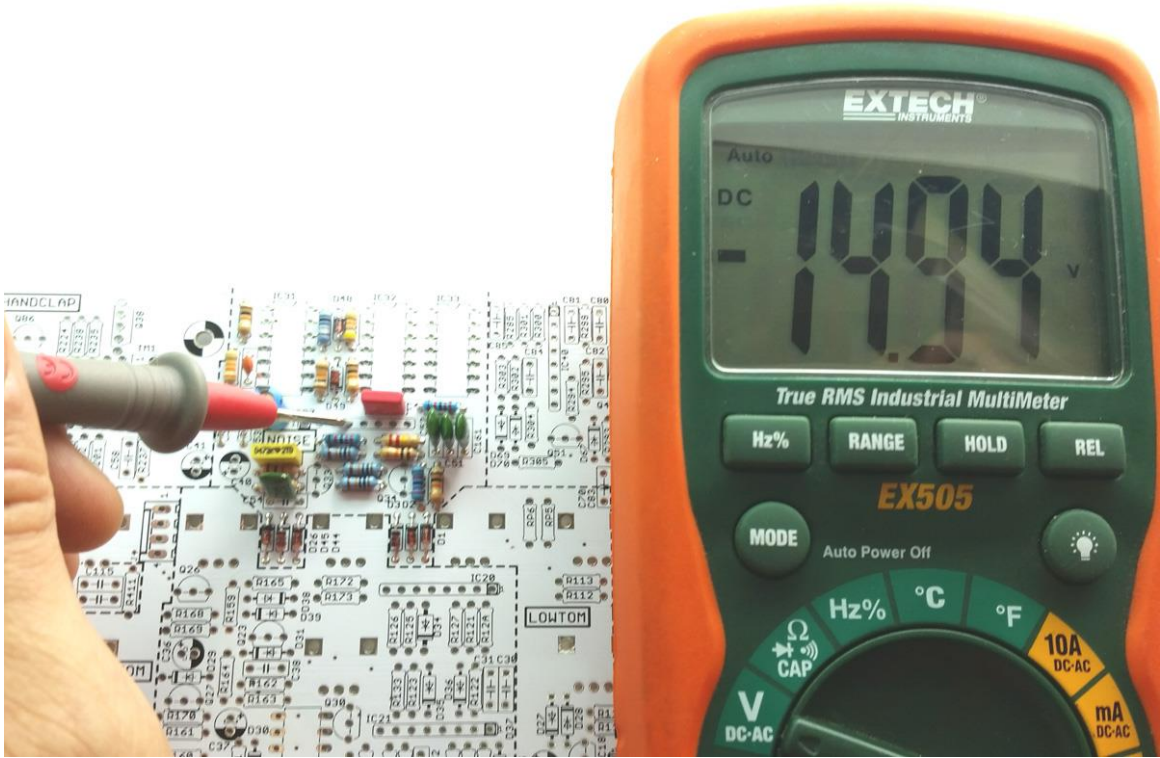
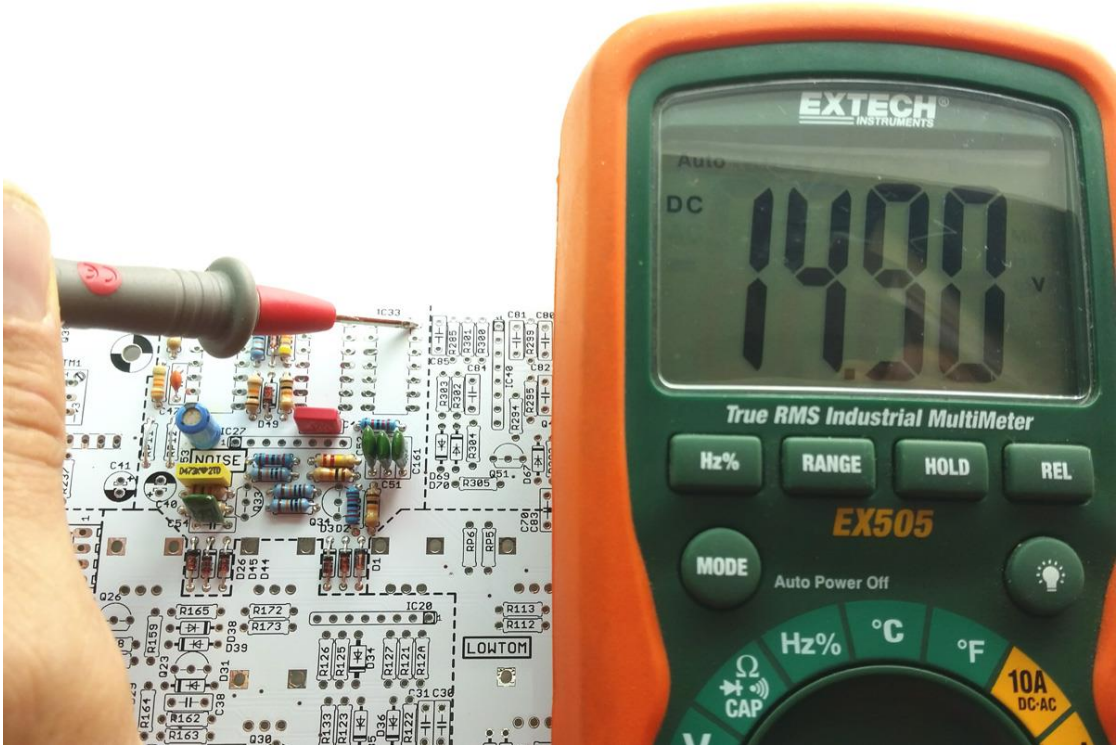
Add electrolytics capacitors. **Electrolytics capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytics capacitors.** The black part on the silkscreened electrolytic capacitor symbol is **negative**. RPxx resistors are power resistors. You can use a components leg or a 0ohm resistor which acts as a fuse.



Add diodes. **Diodes are polarized, the black ring must match the symbol silkscreened on the PCB.**

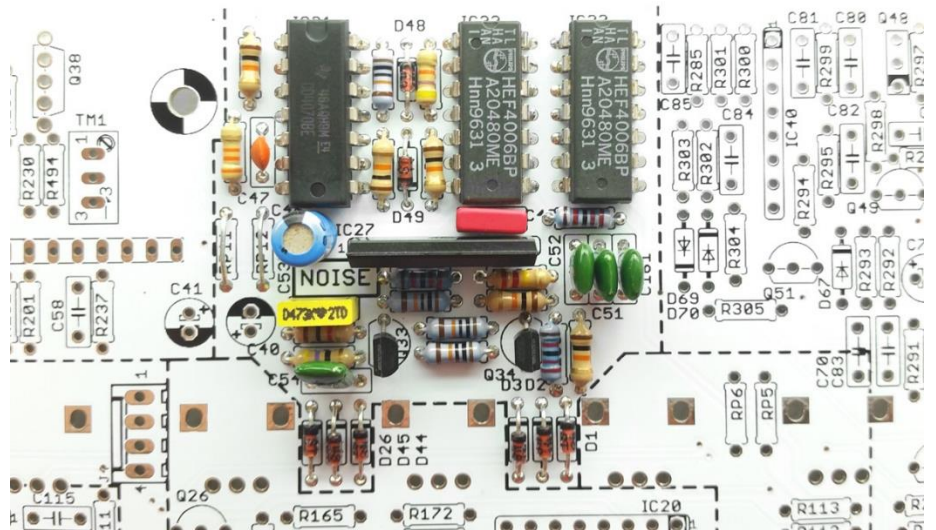


Now, plug power supply and check noise section voltage. Power symbol are silkscreened on the bottom for each ICs. (a square is +15V and a round is -15V).

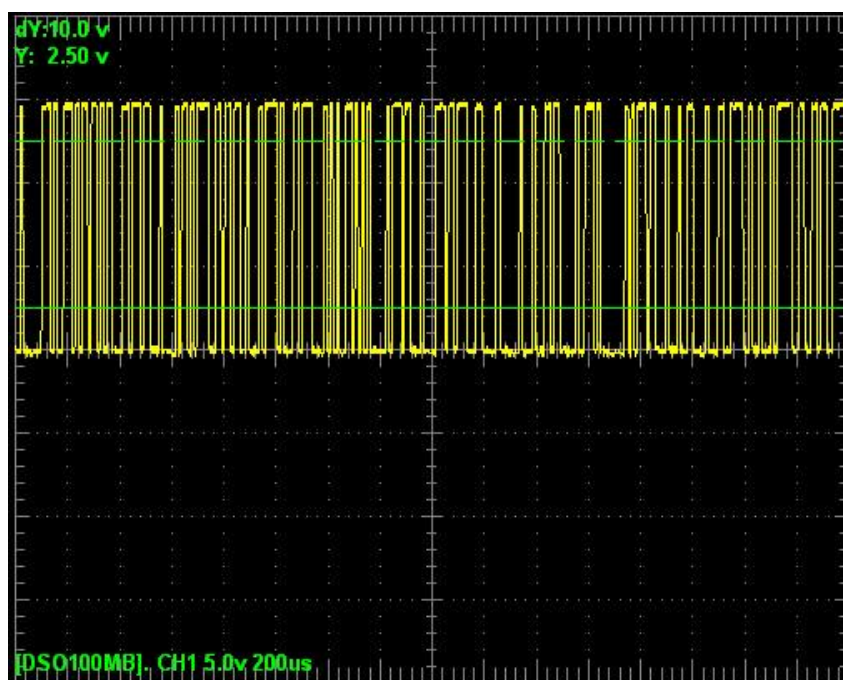
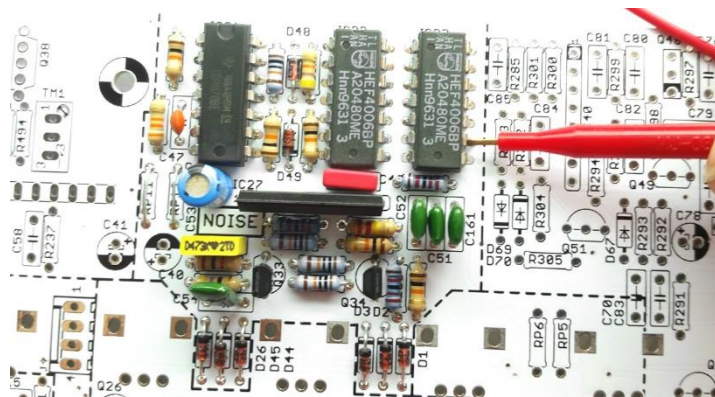




**Unplug your PSU** and add ICs. **Do not overheat ICs pins during solder process!**



Finally, plug your PSU and test Noise out with a Headphone, scope or speakers on IC33 pin 9. Then noise section is finished, let's go to the [bassdrum](#) section Boooooommm :) )



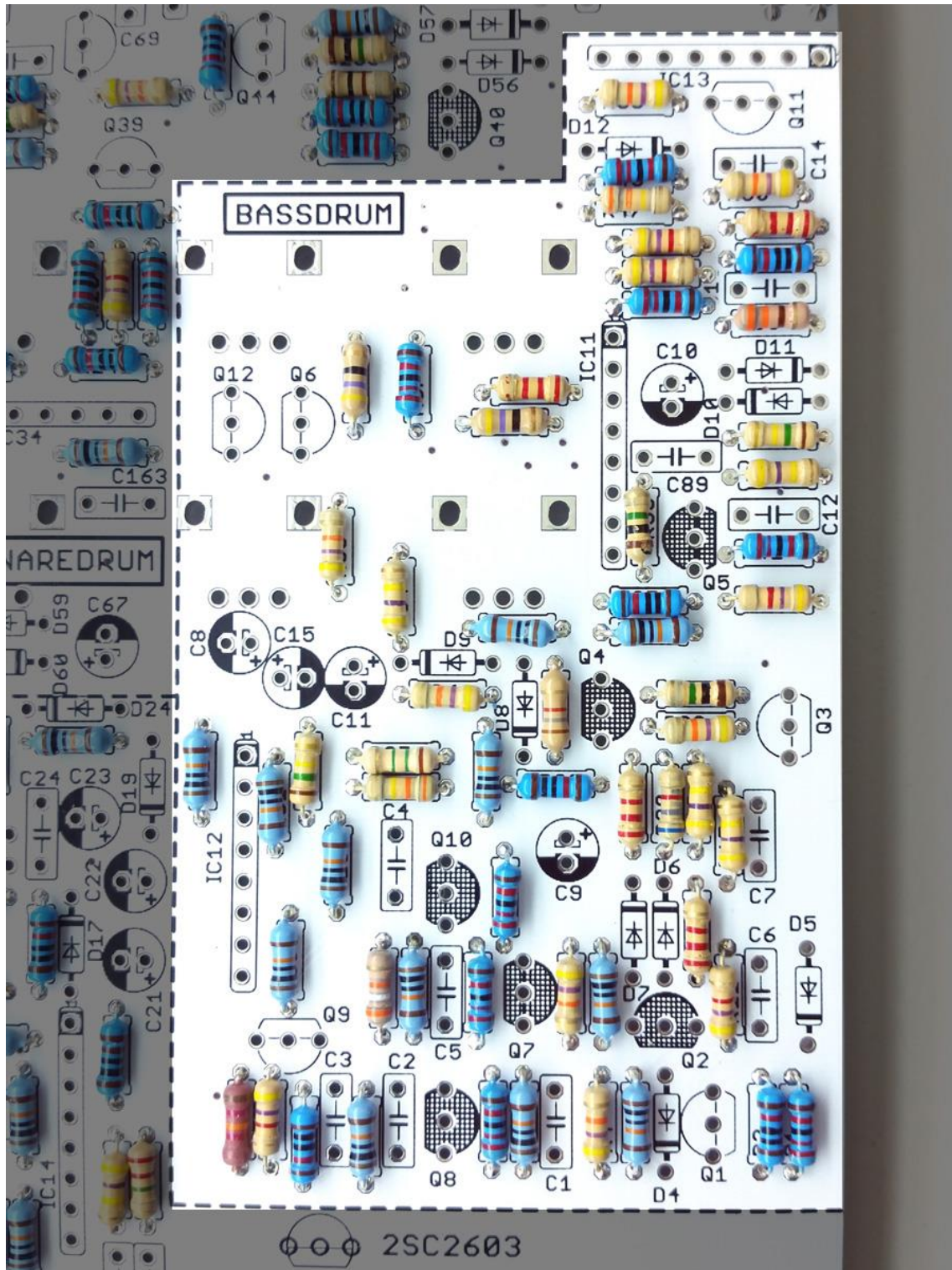
# . Bass Drum

- BD parts list

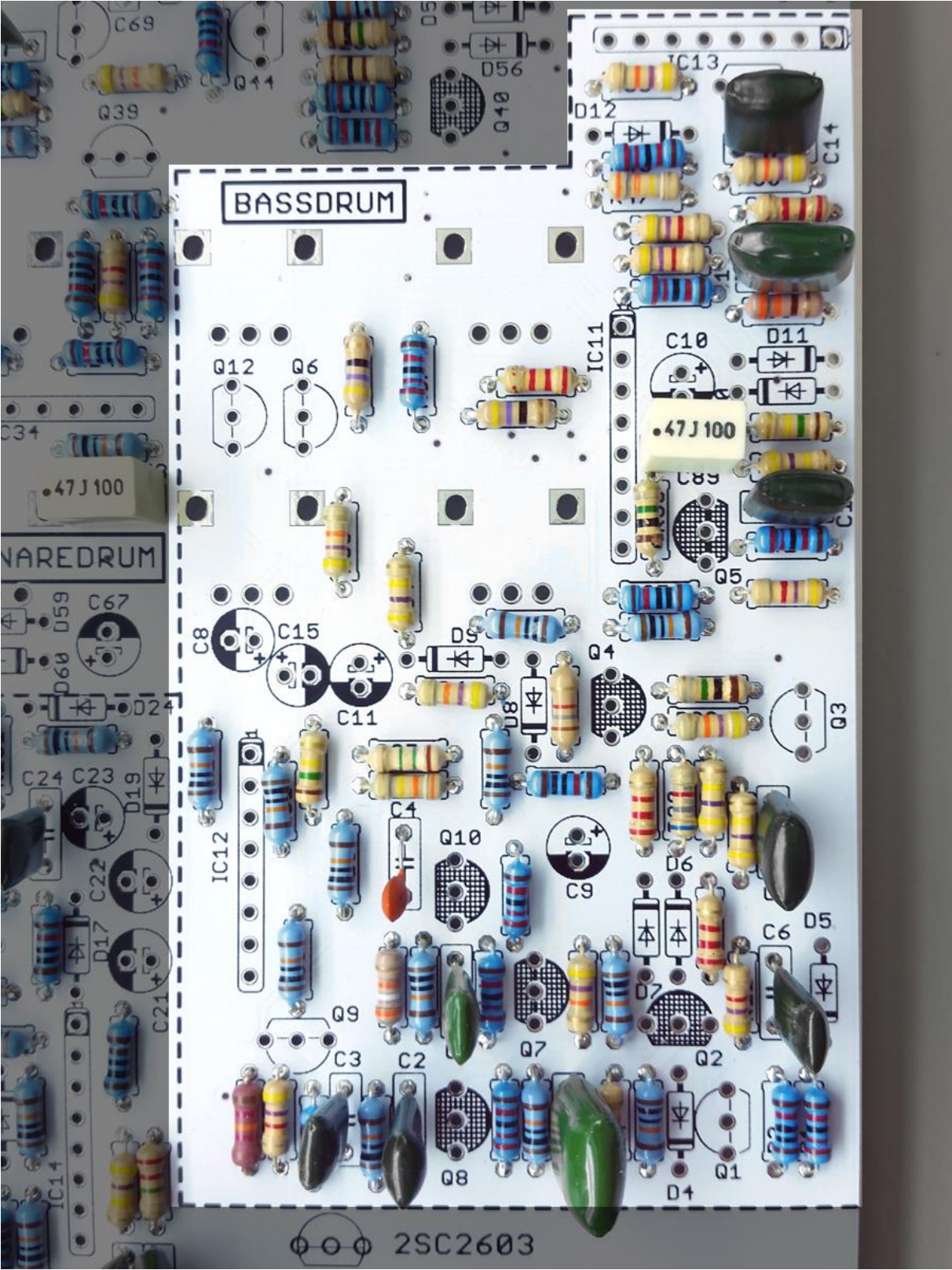
Nava v1.0 BassDrum parts list: 106 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
<b>Ohm</b>				
RP1, RP2	0R	0207/7	2	Could be a wire
R2, R8, R22, R37, R52	10K	0207/7	5	
R3, R5, R7, R12, R15, R23, R25, R29, R30, R31, R34, R49	100K	0207/7	12	
R33, R39	1M	0207/7	2	
R10	12K	0207/7	1	
R28, R495	150K	0207/7	2	
R27	1.5M	0207/7	1	
R35	1.8K	0207/7	1	
R19, R21, R51, R53	2.2K	0207/7	4	
R1, R6, R14, R24, R41, R44, R48, R57	22K	0207/7	8	
R56	330R	0207/7	1	
R26, R47	330K	0207/7	2	
R16	39K	0207/7	1	
R43, R55	47R	0207/7	2	
R9, R11, R38, R45, R46	4.7K	0207/7	5	
R4, R13, R32, R36, R50, R58, R59	47K	0207/7	7	
R17, R18, R42, R54	470K	0207/7	4	
R20	6.8K	0207/7	1	
<b>Capacitors</b>				
<b>µF</b>				
C4	100p	C050-025X075	1	Ceramic capacitor
C89	0.01	C050-025X075	1	Film capacitors
C13	0.1	C050-025X075	1	Film capacitors
C6	0.0022	C050-025X075	1	Film capacitors
C2	0.0033	C050-025X075	1	Film capacitors
C7, C12, C14	0.033	C050-025X075	3	Film capacitors
C3	0.0047	C050-025X075	1	Film capacitors
C5	0.0068	C050-025X075	1	Film capacitors
C1	0.068	C050-025X075	1	Film capacitors
C10	10/16	E2-5	1	Electrolytic capacitors
C8, C9	0.33/50	E2-5	2	Electrolytic capacitors
C11, C15	0.47/50	E2-5	2	Electrolytic capacitors
<b>Diodes</b>				
D4, D5, D6, D7, D8, D9, D10, D11, D12	1N4148	DO35-7C	9	
<b>Transistors</b>				
Q2, Q4, Q5, Q7, Q8, Q10	2SA1115-F	TO92-ECB	6	
Q1, Q3, Q6, Q9, Q11, Q12	2SC2603-F	TO92-ECB	6	
<b>Integrated circuits</b>				
IC11, IC12, IC13	M5218L	SIL8	3	
<b>Connectors</b>				
J1		6410-04	1	4 pins male
<b>Potentiometers</b>				
<b>Ohm</b>				
VR2	100KA	EVUF	1	
VR3	500RB	EVUF	1	
VR4	100KB	EVUF	1	
VR5	1MA	EVUF	1	

Let's continue with the bassdrum section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.

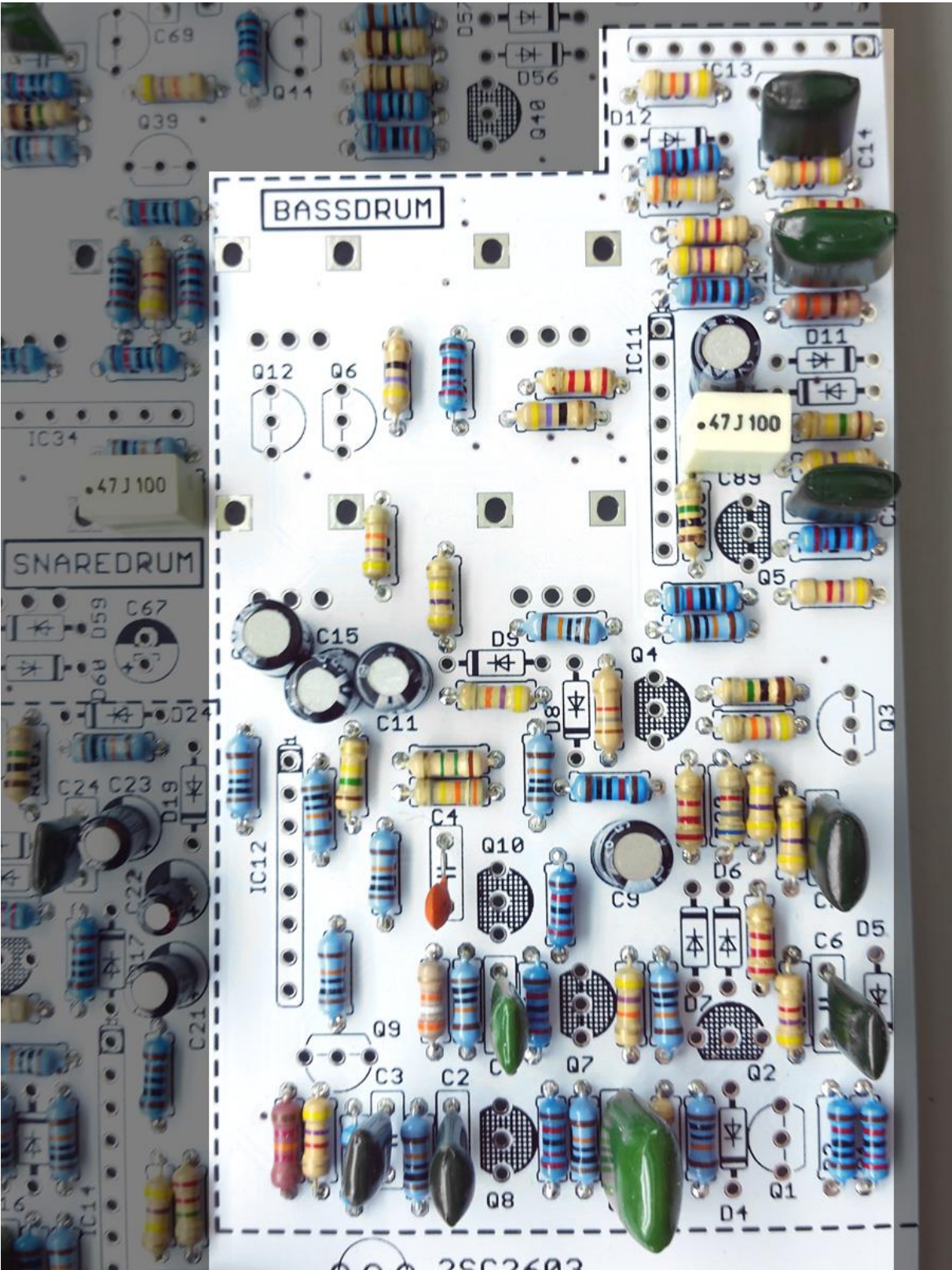
**IMPORTANT for the mainboard v1.01 owner: refer to this [TOPIC](#) before to start this section. For the V1.01 owner connect a wire between P1 and P1'. For v1.02 owner no more mods is needed and C89 has been removed**



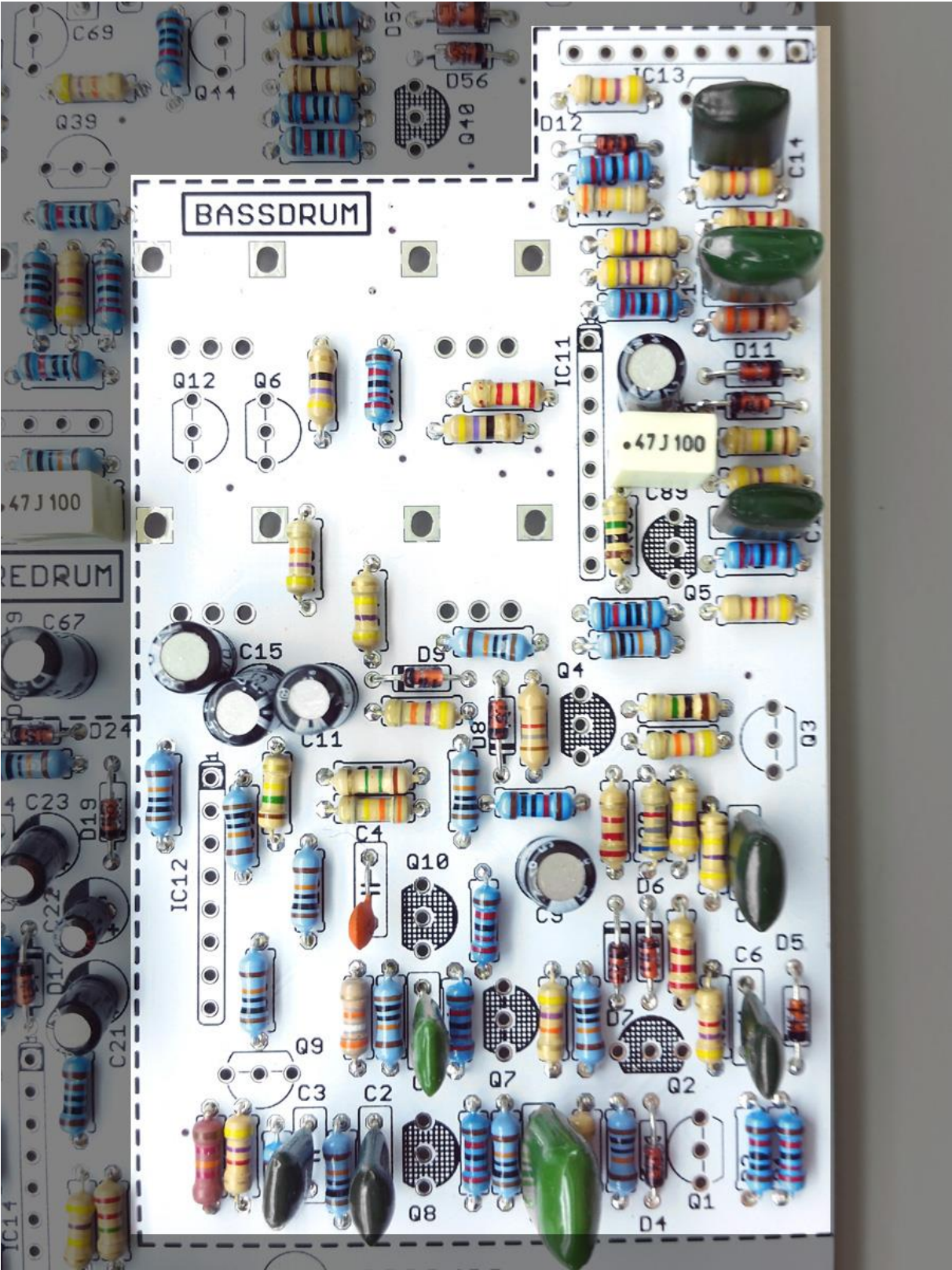
Add film capacitors



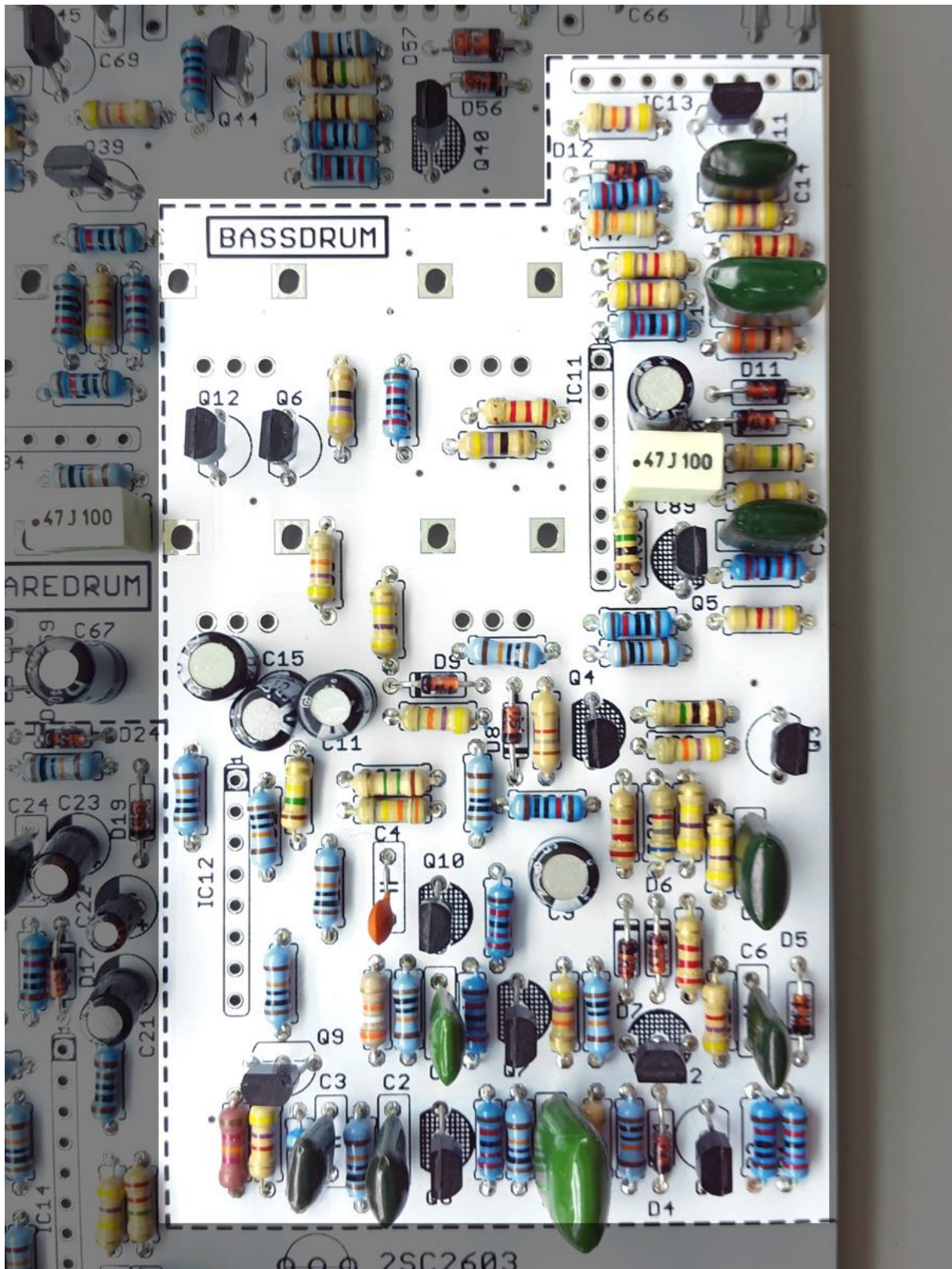
Add electrolytics capacitors. **Electrolytics capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytics capacitors. The black part on the silkscreened electrolytic capacitor symbol is negative.**



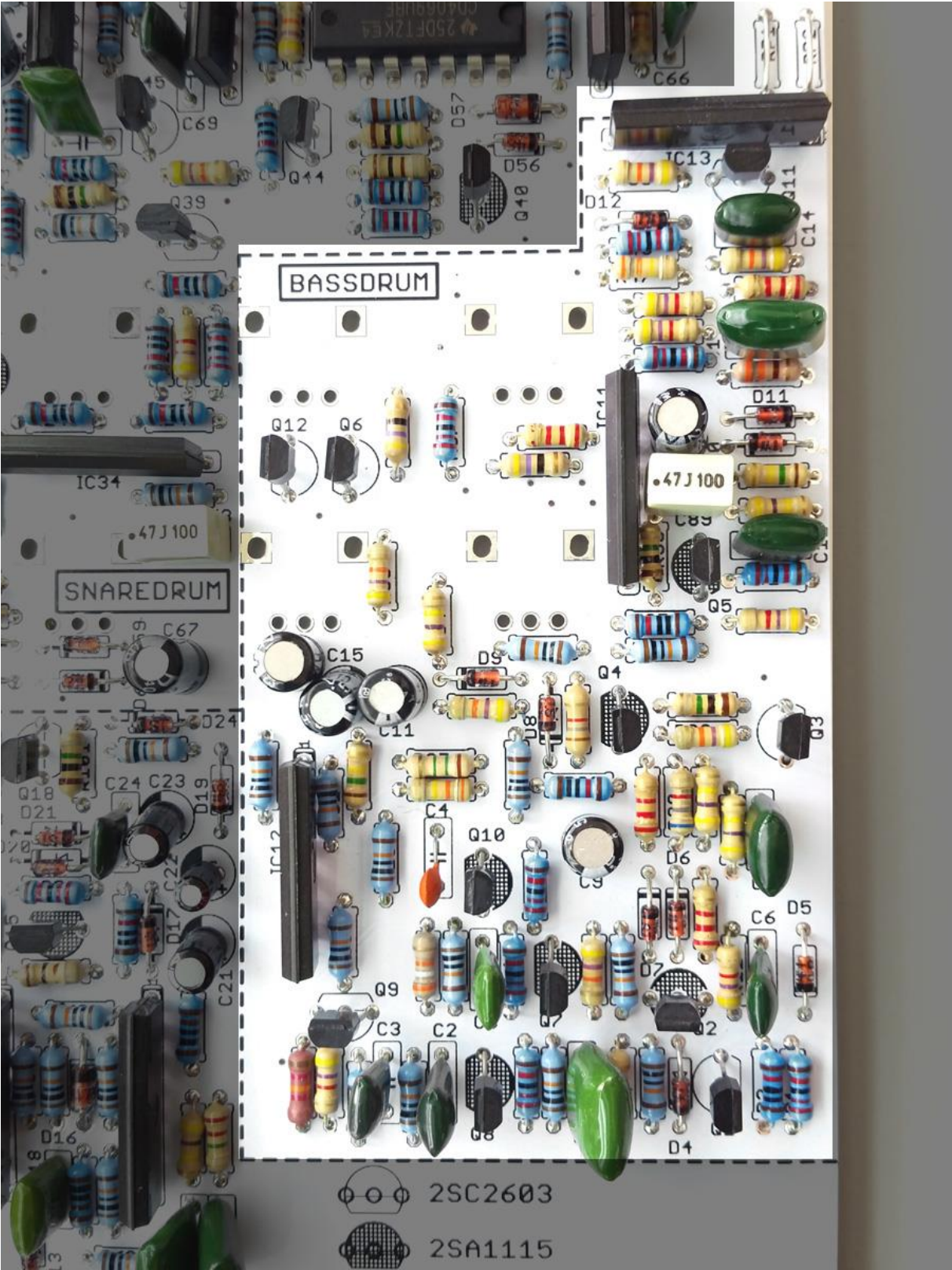
Add diodes. Diodes are polarized, the black ring must match the symbol silkscreened on the PCB.



Now, add transistors. **Pay attention! There are two different types of transistors: 2SA1115 and 2SC2603. Do not mix !**

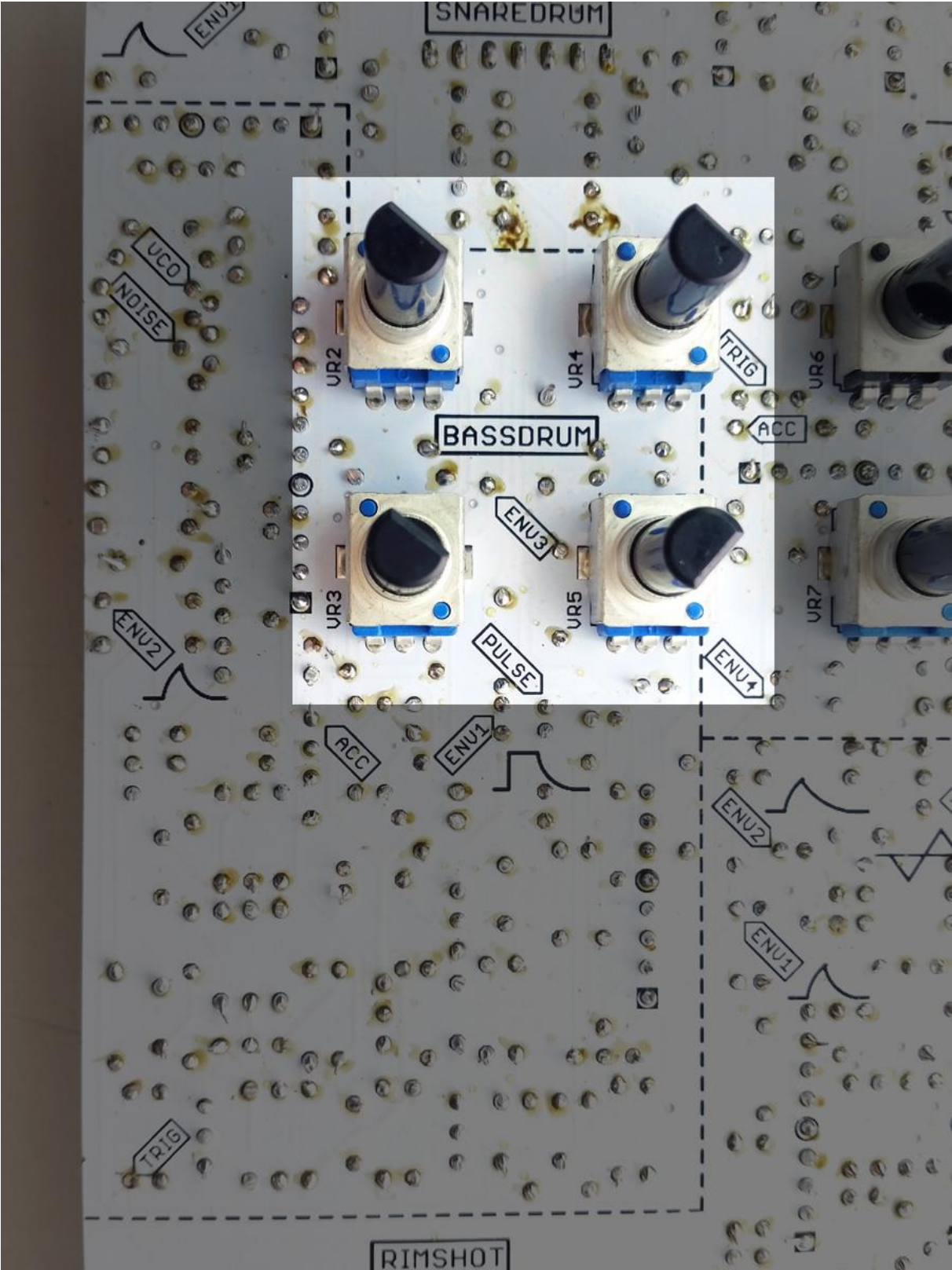


Now, check bassdrum section power voltages and add ICs. **Do not overheat ICs pins during solder process!**

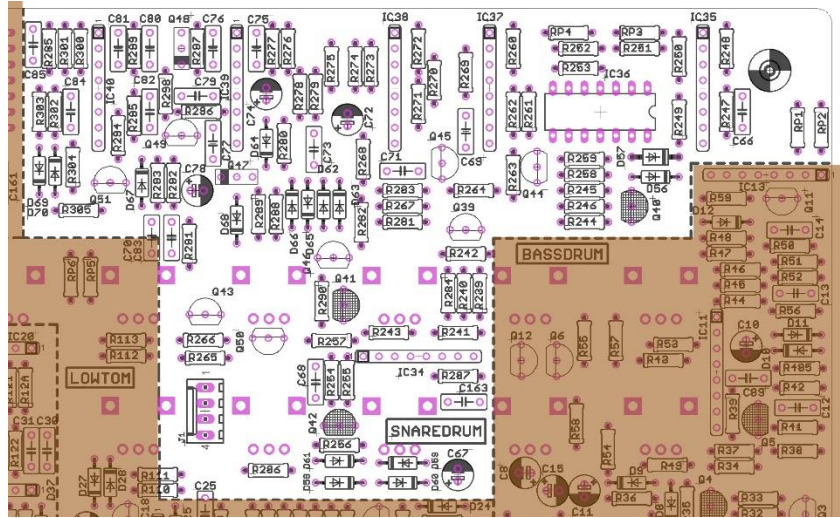




Finally, add potentiometers. **Pay attention to potentiometers value they are all different.** Then bassdrum section is finished, let's go to the [snaredrum](#) section.



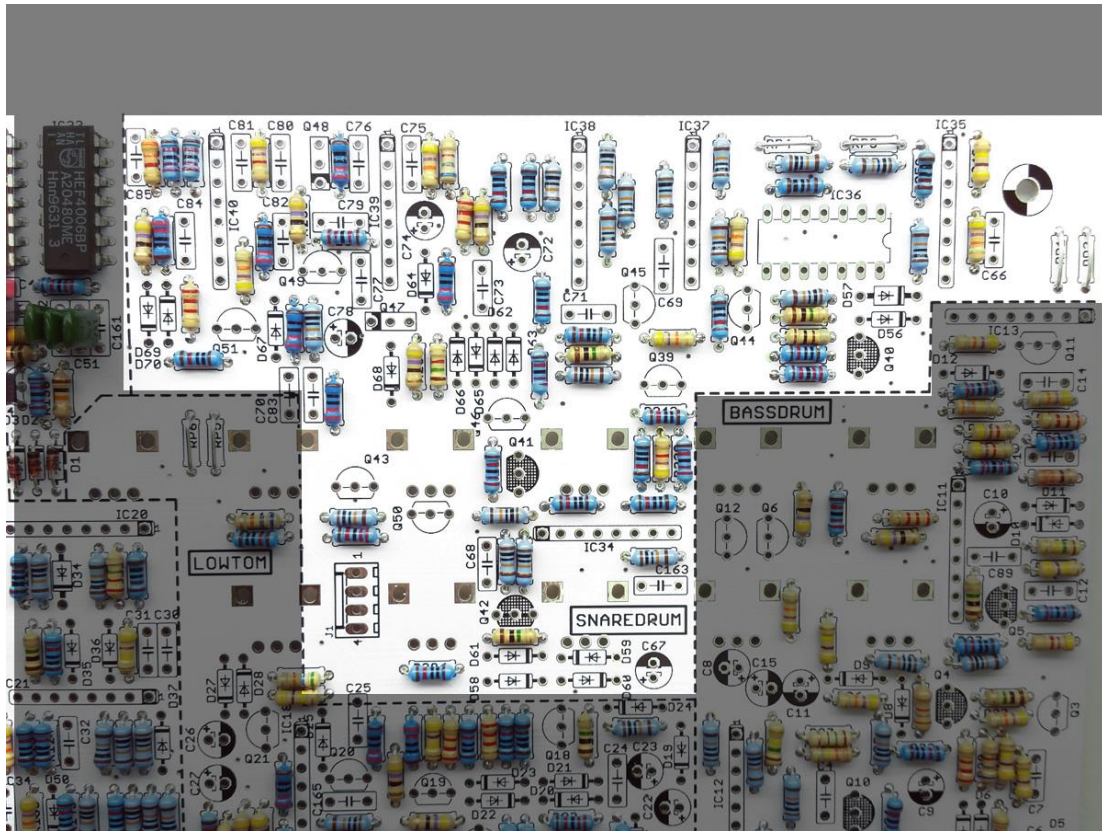
# SnareDrum



- SD parts list

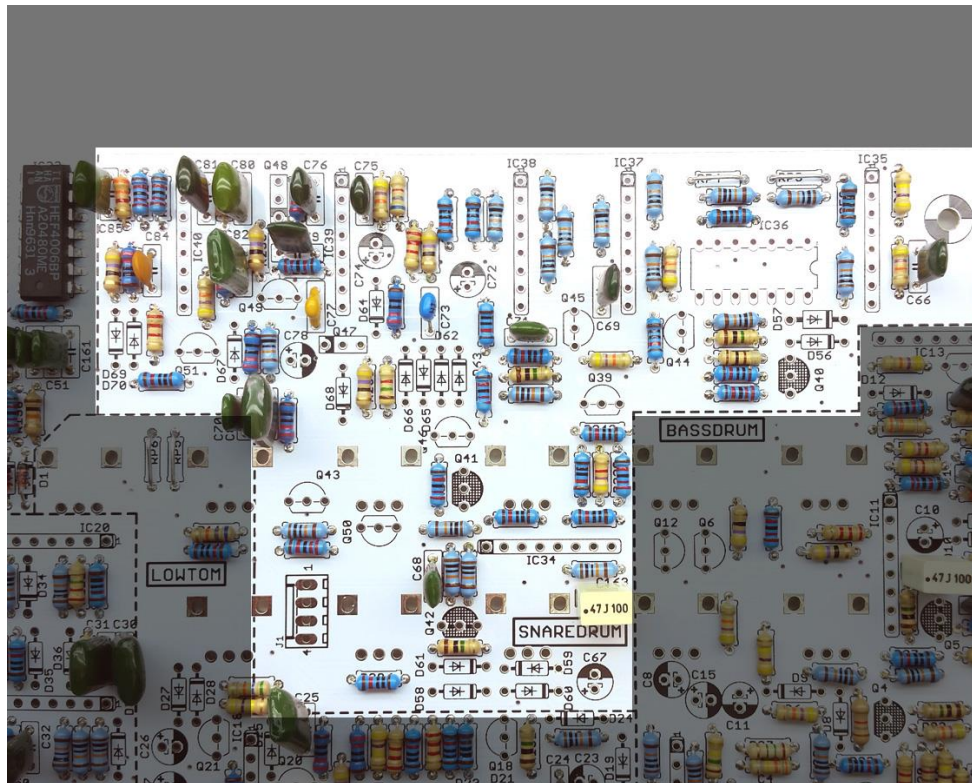
Nava v1.0 SnareDrum parts list: 129 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
RP3, RP4	0R	0207/7	2	
R245	100R	0207/7	1	
R250, R253	1K	0207/7	2	
R241, R242, R243, R244, R263, R268, R274, R275, R283, R284, R286, R305	10K	0207/7	12	
R249, R251, R252, R254, R255, R257, R259, R260, R262, R266, R269, R270, R271, R272, R273, R281, R287, R292	100K	0207/7	18	
R256, R258, R267	1M	0207/7	3	
R288	1.5K	0207/7	1	
R278, R304	2.2K	0207/7	2	
R239, R246, R265, R282, R290, R296, R300, R301	22K	0207/7	8	
R280, R291, R293, R295, R297, R302	220K	0207/7	6	
R285	3.3K	0207/7	1	
R279, R289, R298, R303	47R	0207/7	4	
R240, R299	4.7K	0207/7	2	
R247, R261, R264, R277, R294	47K	0207/7	5	
R248	470K	0207/7	1	
R276	6.8K	0207/7	1	
<b>Capacitors</b>				
C66, C69, C79, C163	0.01	C050-025X075	3	Film capacitors
C83	0.1	C050-025X075	1	Film capacitors
C85	0.015	C050-025X075	1	Film capacitors
C75, C76	0.0022	C050-025X075	2	Film capacitors
C80	0.022	C050-025X075	1	Film capacitors
C81	0.0033	C050-025X075	1	Film capacitors
C70	0.0047	C050-025X075	1	Film capacitors
C82	0.047	C050-025X075	1	Film capacitors
C68, C71	0.0068	C050-025X075	2	Film capacitors
C77	10p	C050-025X075	1	Ceramic disk capacitors
C84	220p	C050-025X075	1	Ceramic disk capacitors
C73	470p	C050-025X075	1	Ceramic disk capacitors
C67, C78	0.47/50	E2-5	2	Electrolytic capacitors
C72, C74	10/16	E2-5	2	Electrolytic capacitors
<b>Diodes</b>				
D56, D58, D59, D60, D61, D62, D63, D64, D65, D66, D67, D68, D69, D70	1N4148	DO35-7C	14	
D57	1N4746A	DO41-7C	1	
<b>Transistors</b>				
Q40, Q41, Q42	2SA1115	TO92-ECB	3	
Q39, Q43, Q44, Q45, Q46, Q49, Q50, Q51	2SC2603	TO92-ECB	8	
Q47, Q48	2SD1469	SIP-3	2	
<b>Integrated circuits</b>				
IC36	4069UB	DIL14	1	
IC34, IC35, IC37, IC38, IC39, IC40	M5218	SIL8	6	
<b>Potentiometers</b>				
VR6, VR9	10KB	EVUF	2	
VR8	50KB	EVUF	1	
VR7	500KB	EVUF	1	

Let's continue with the snaredrum section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.

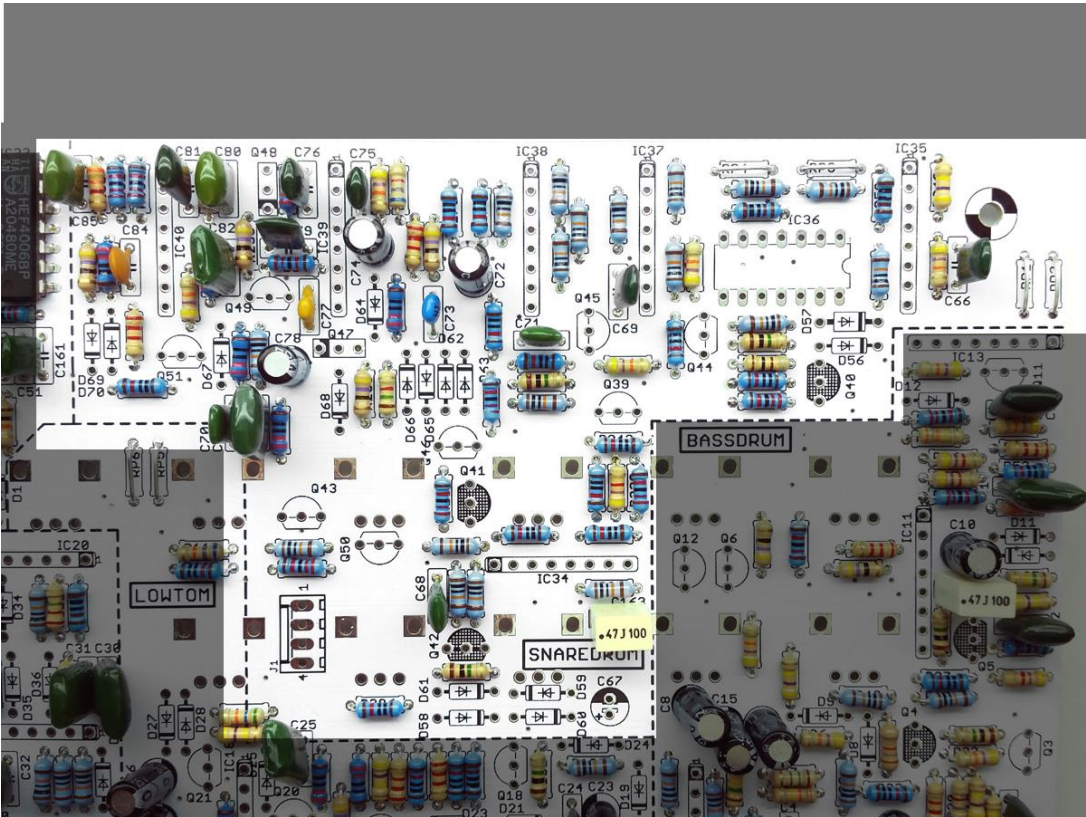


Add film capacitors. On v1.02 mainboard C163 has been removed.

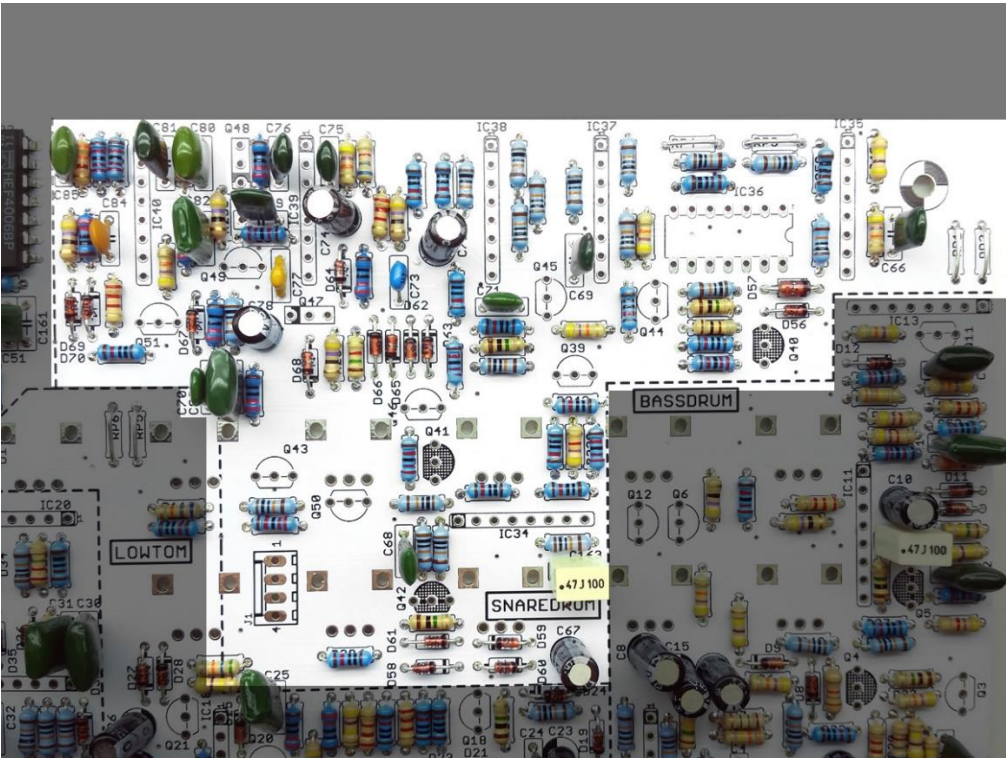
For v1.02 builder, you must add a 1Mohm resistor across C83 on the bottom side of the PCB like describe on this [topic](#). This prevent too long snare tone decay issue.



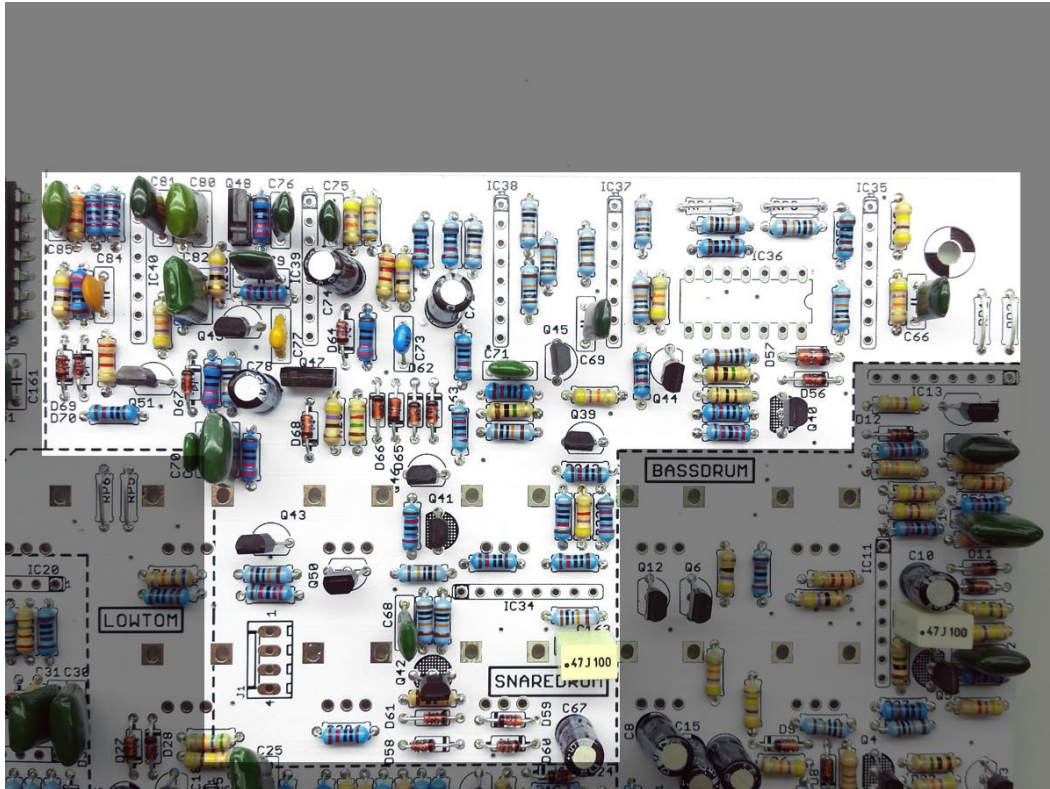
Add electrolytic capacitors. **Electrolytic capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytic capacitors. The black part on the silkscreened electrolytic capacitor symbol is negative.**



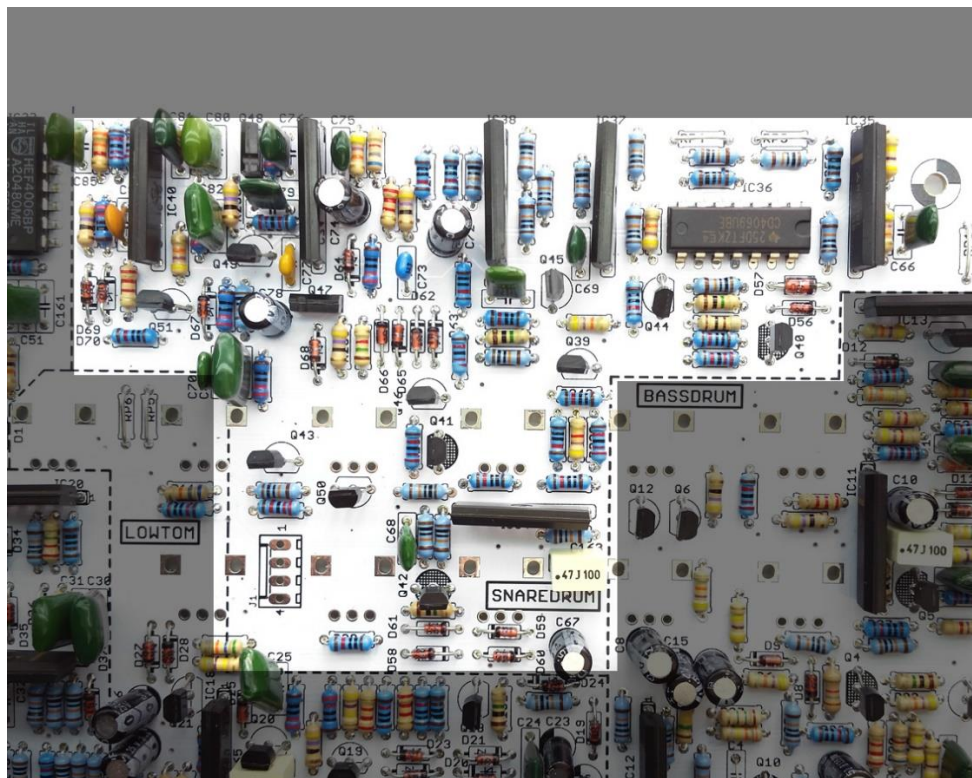
Add diodes. **Diodes are polarized, the black ring must match the symbol silkscreened on the PCB. D57 is a 1N4746 this is the only one, take care!**



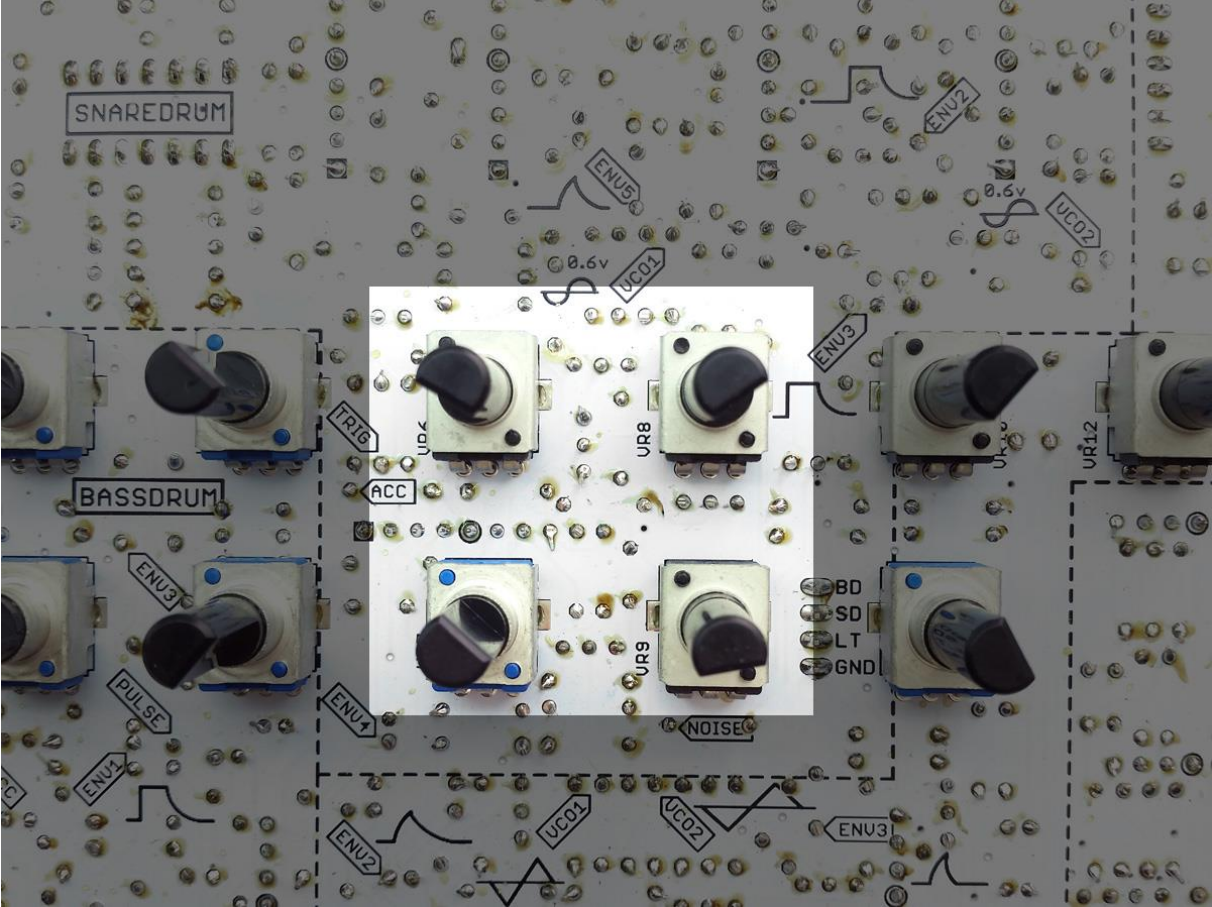
Now, add transistors. **Pay attention! There are two different types of transistors: 2SA1115 and 2SC2603. Do not mix! Pay attention to the orientation in which you solder Q47 and Q48. 2SD1469 marker have to match with the symbol black part silkscreened.**  
**IMPORTANT for the mainboard v1.0l owner : Q43 Q46 and Q49 have to be solder with pin 1 and 2 reversed like describe in this [topic](#)**



Now, check snaredrum section power voltages and add ICs. **Do not overheat ICs pins during solder process!**



Finally, add potentiometers. **Pay attention to potentiometers values they are all different.** Then snaredrum section is finished, let's go to the [lowtom](#) section

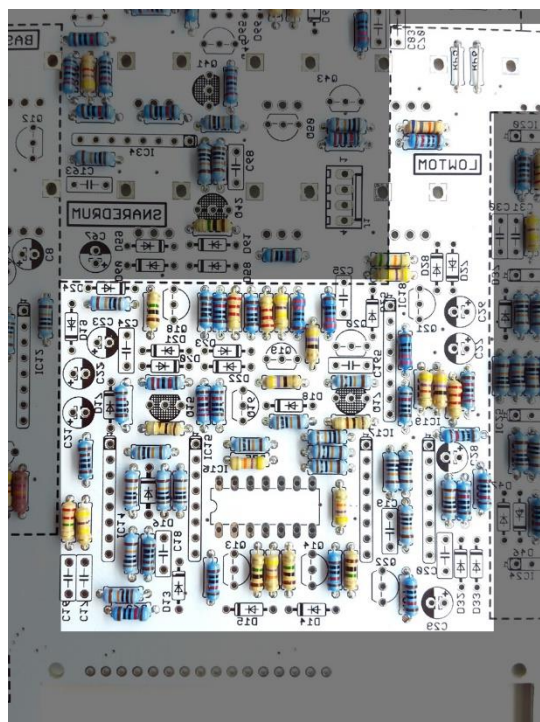


# LowTom

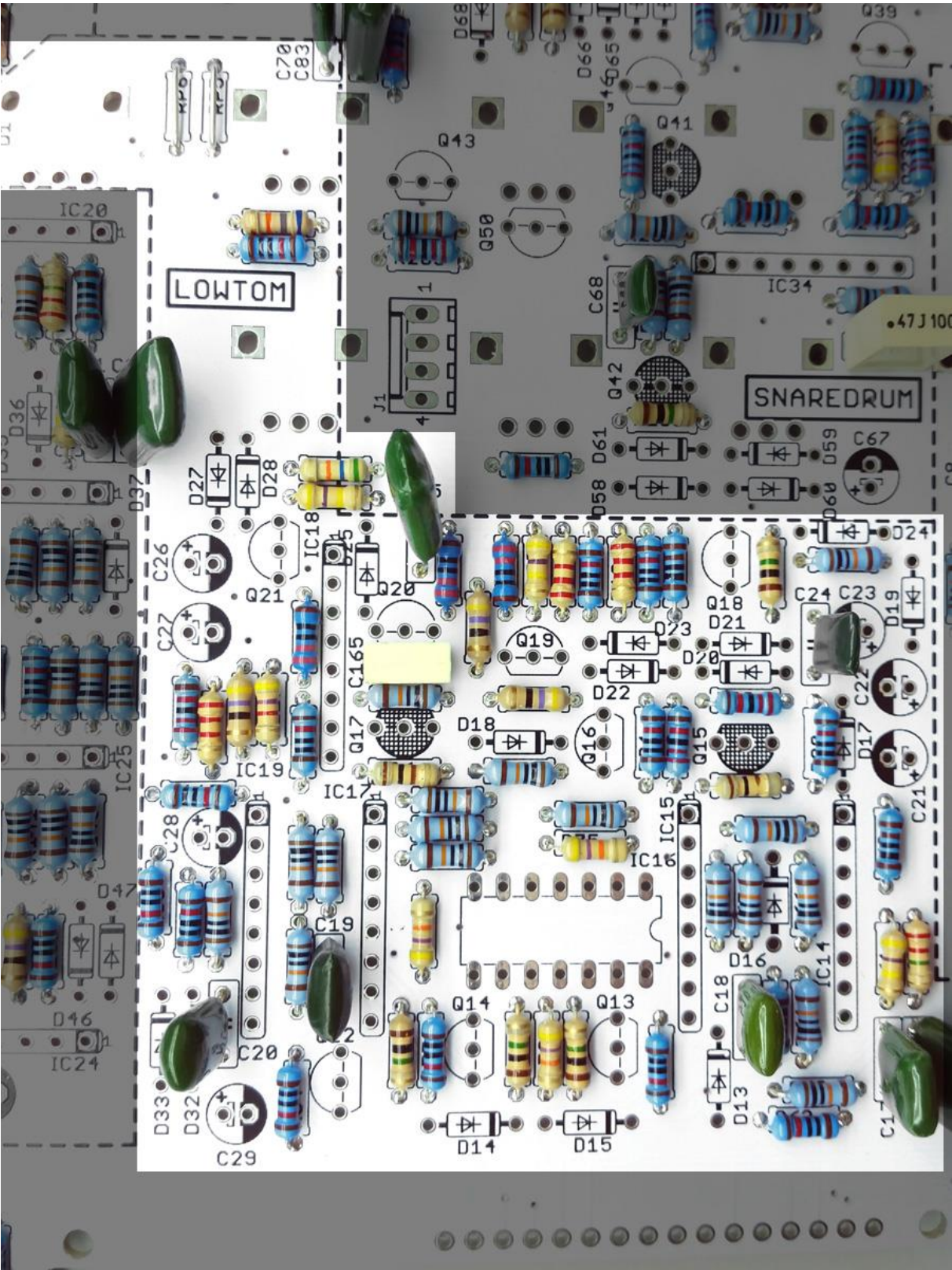
- LowTom parts list

Nava v1.0 LowTom parts list: 114 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
RP5, RP6	0R	0207/7	2	
R91, R96	100R	0207/7	2	
R65, R68, R102	1K	0207/7	3	
R62, R71, R77, R84, R88, R89, R90, R94, R103, R105, R112, R117, R119	10K	0207/7	13	
R63, R64, R66, R67, R69, R70, R79, R80, R81, R82, R83, R85, R86, R87, R95, R97, R100	100K	0207/7	17	
R72, R74, R76, R101	1M	0207/7	4	
R104, R106, R116	2.2K	0207/7	3	
R92, R93, R114	22K	0207/7	3	
R108, R109, R118	220K	0207/7	3	
R60	2.2M	0207/7	1	
R98, R99, R115	47R	0207/7	3	
R120	4.7K	0207/7	1	
R73, R75, R78	47K	0207/7	3	
R61, R107, R110	470K	0207/7	3	
R111	56K	0207/7	1	
R113	68K	0207/7	1	
<b>Capacitors</b>				
µF				
C24	0.01	C050-025X075	1	Film capacitor
C16	0.1	C050-025X075	1	Film capacitor
C20	0.012	C050-025X075	1	Film capacitor
C18	0.022	C050-025X075	1	Film capacitor
C19	0.033	C050-025X075	1	Film capacitor
C17, C25, C165	0.047	C050-025X075	3	Film capacitor
C26, C27, C28, C29	10/16	E2-5	4	Electrolytic capacitor
C22	0.22/10	E2-5	1	Electrolytic capacitor
C21, C23	0.68/10	E2-5	2	Electrolytic capacitor
<b>Diodes</b>				
D13, D14, D15, D17, D18, D19, D20, D21, D22, D23, D24, D25, D27, D28, D32, D33	1N4148	DO35-7C	16	
D16	1N4746A	DO41-7	1	
<b>Transistors</b>				
Q13, Q14, Q16, Q18, Q19, Q20, Q21, Q22	2SC2603	TO92-ECB	8	
Q15, Q17	2SA1115	TO92-ECB-PNP	2	
<b>Integrated circuits</b>				
IC14, IC15, IC17, IC18, IC19	M5218	SIL8	5	
IC16	4069UB	DIL14	1	
<b>Potentiometers</b>				
Ohm				
VR10	10KB	EVUF	1	
VR11	500KB	EVUF	1	
VR12	50KB	EVUF	1	

Let's continue with the lowtom section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.

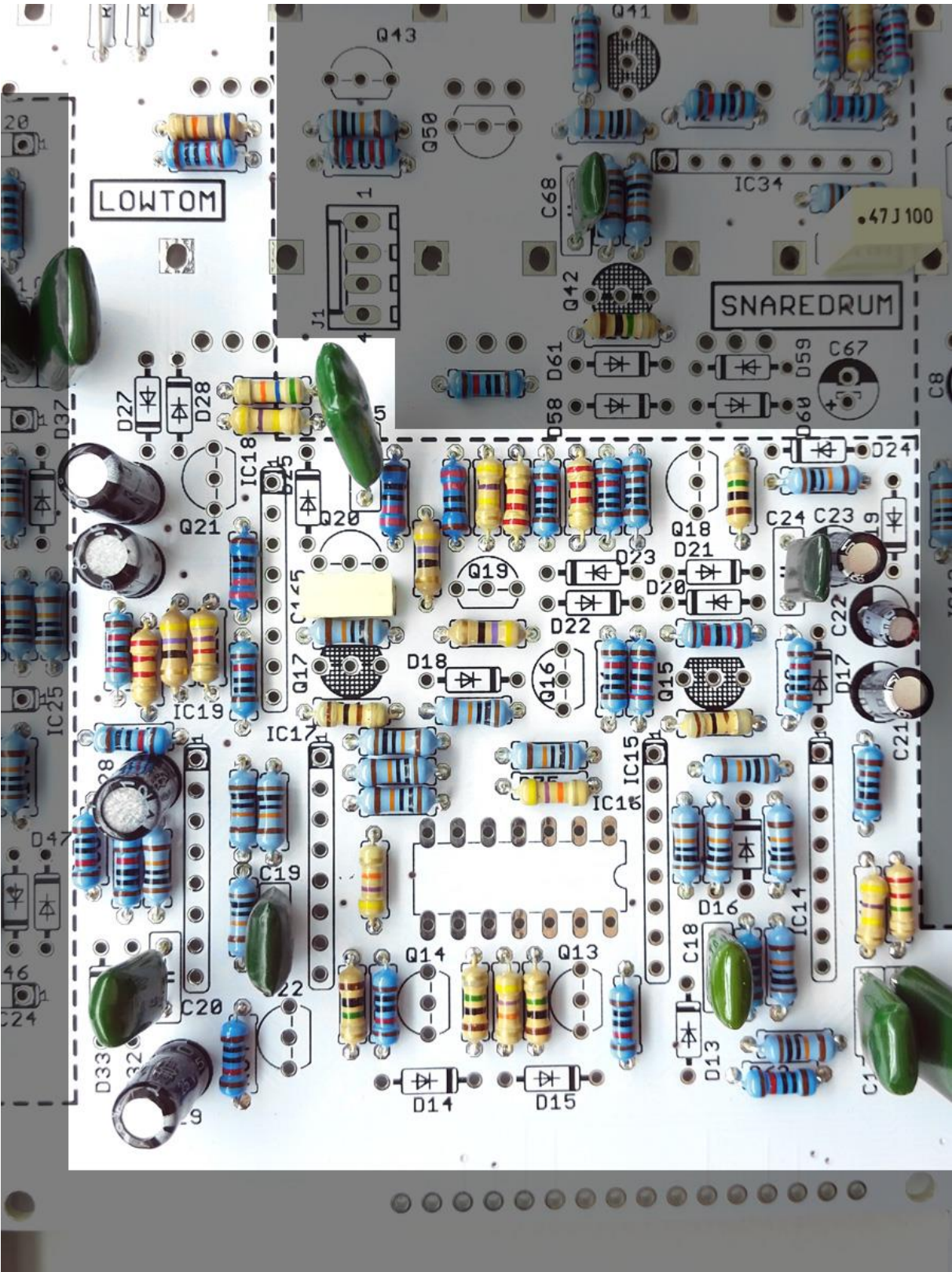


Add film capacitors

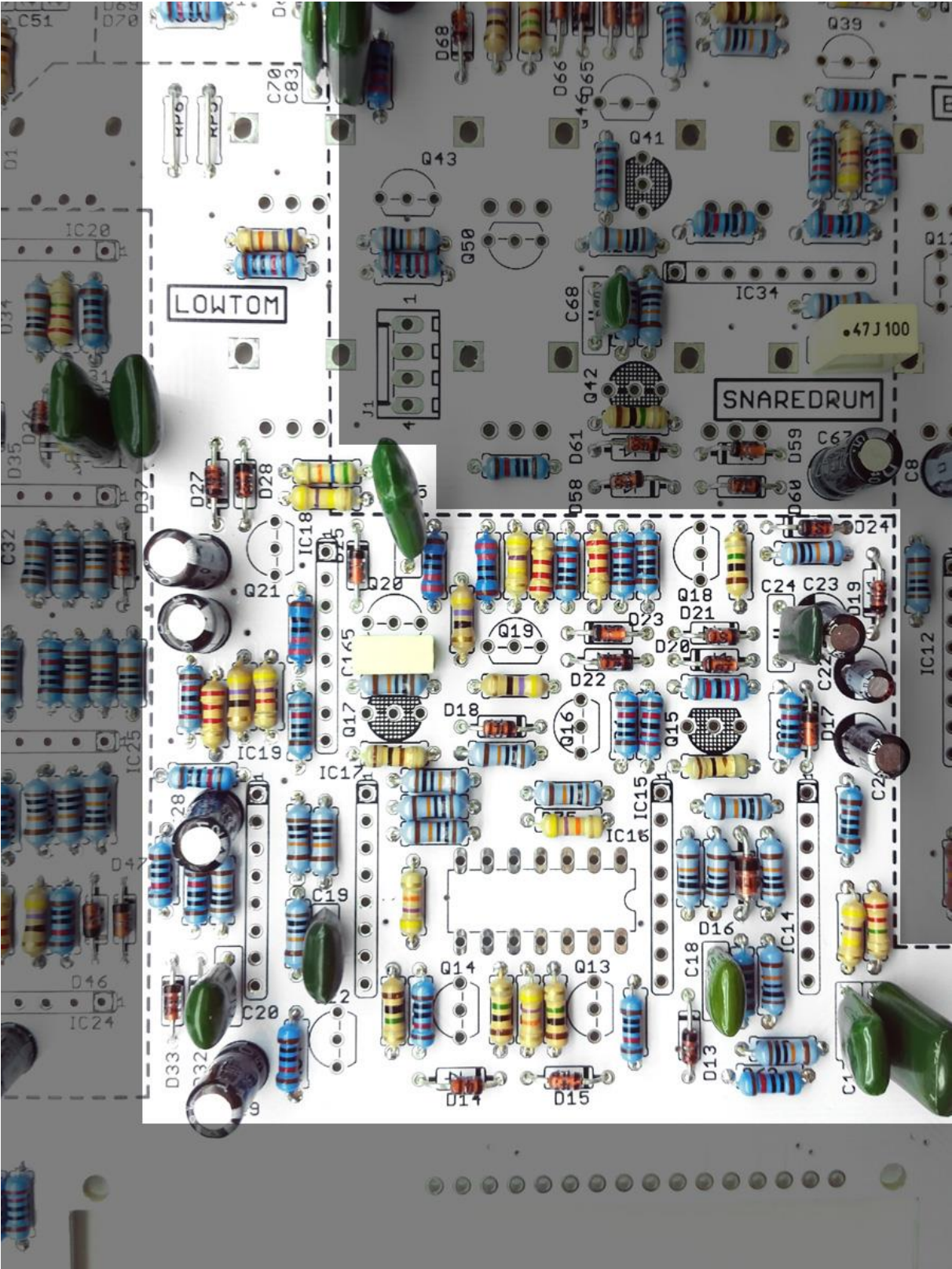




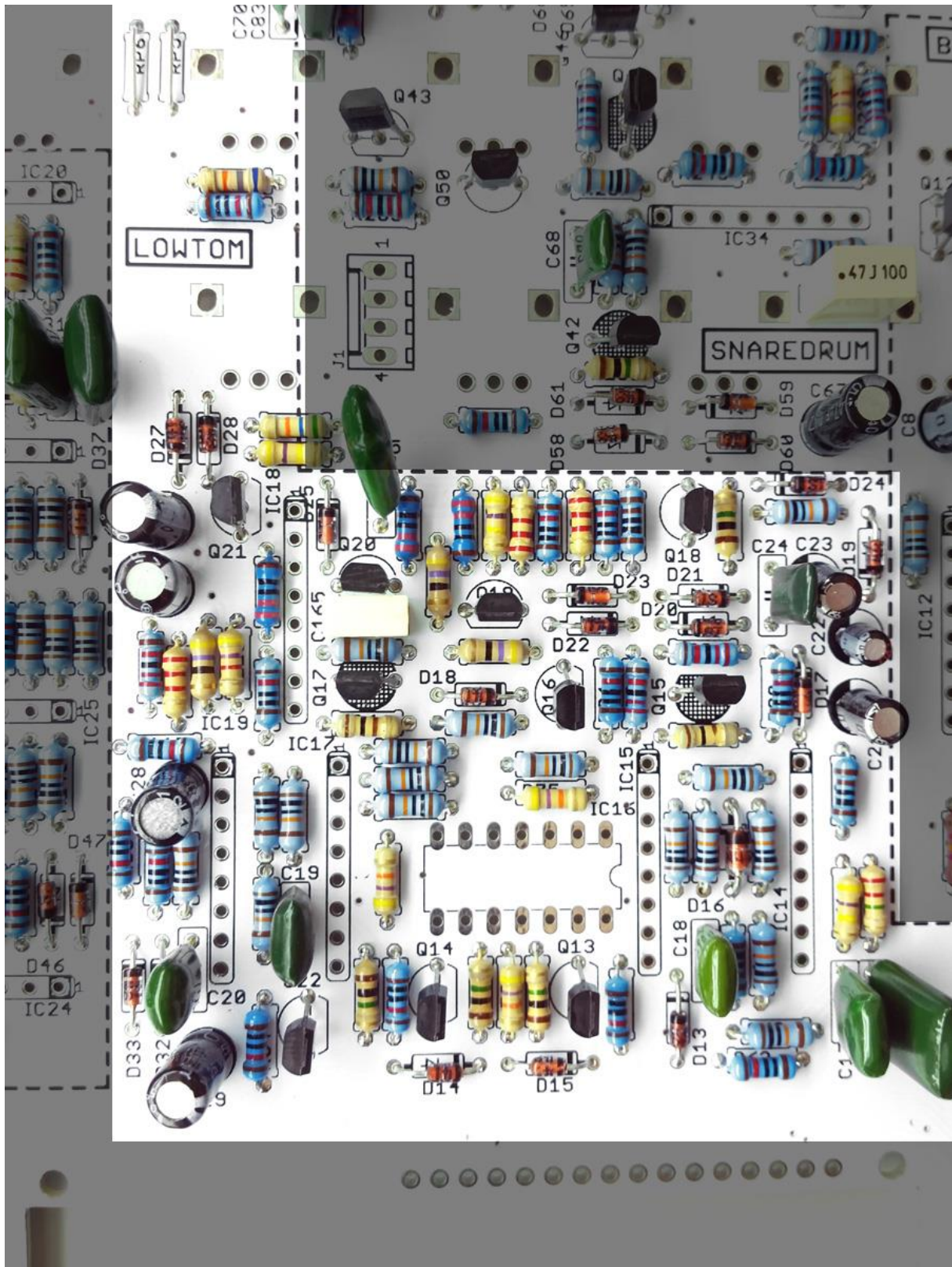
Add electrolytic capacitors. **Electrolytic capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytic capacitors. The black part on the silkscreened electrolytic capacitor symbol is negative.**



Add diodes. Diodes are polarized, the black ring must match the symbol silkscreened on the PCB. D16 is a 1N4746 this is the only one, take care !



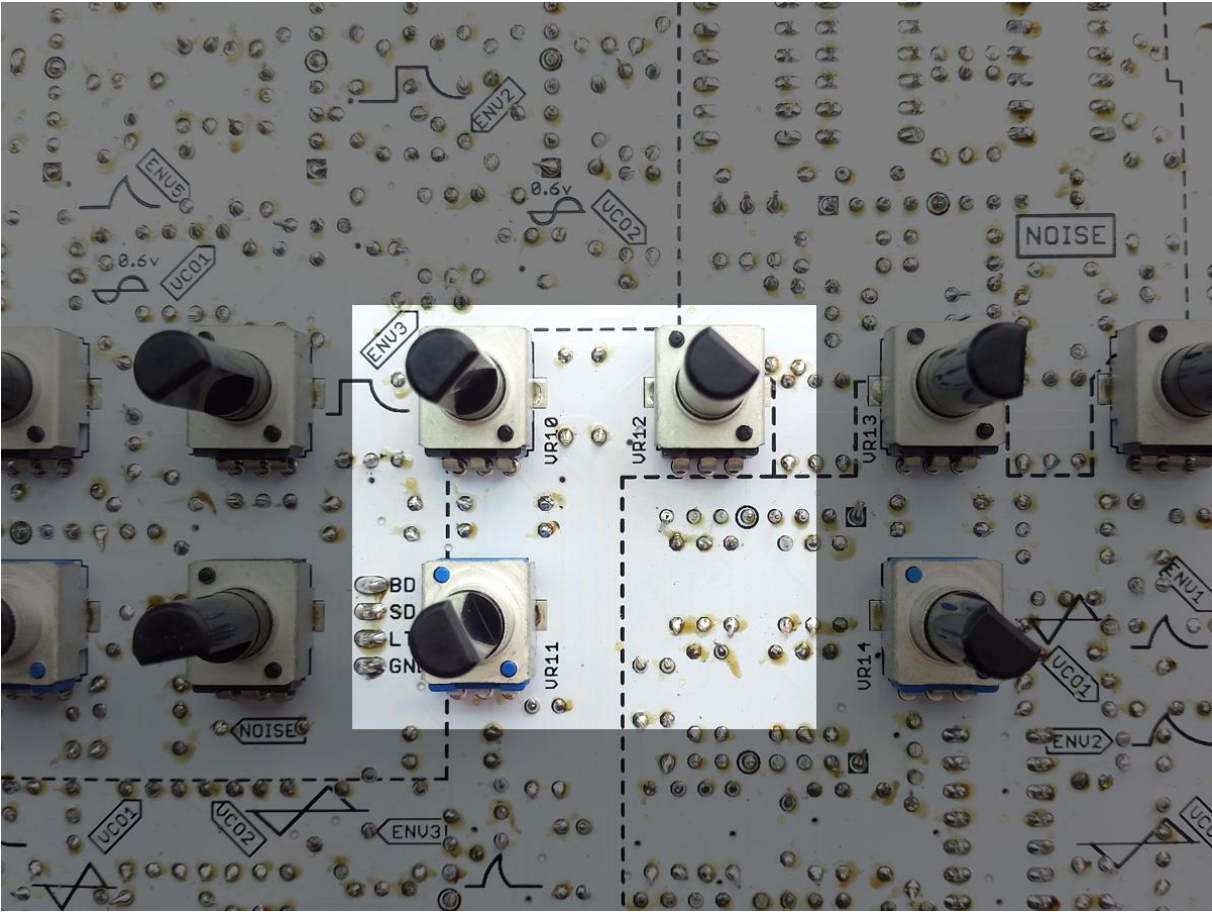
Now, add transistors. **Pay attention! There are two different type of transistor: 2SA1115 and 2SC2603. Do not mix !**



Now, check lowtom section power voltages and add ICs. **Do not overheat ICs pins during solder process!**



Finally, add potentiometers. **Pay attention to potentiometers value they are all different.** Then lowtom section is finished, let's go to the [midtom](#) section.

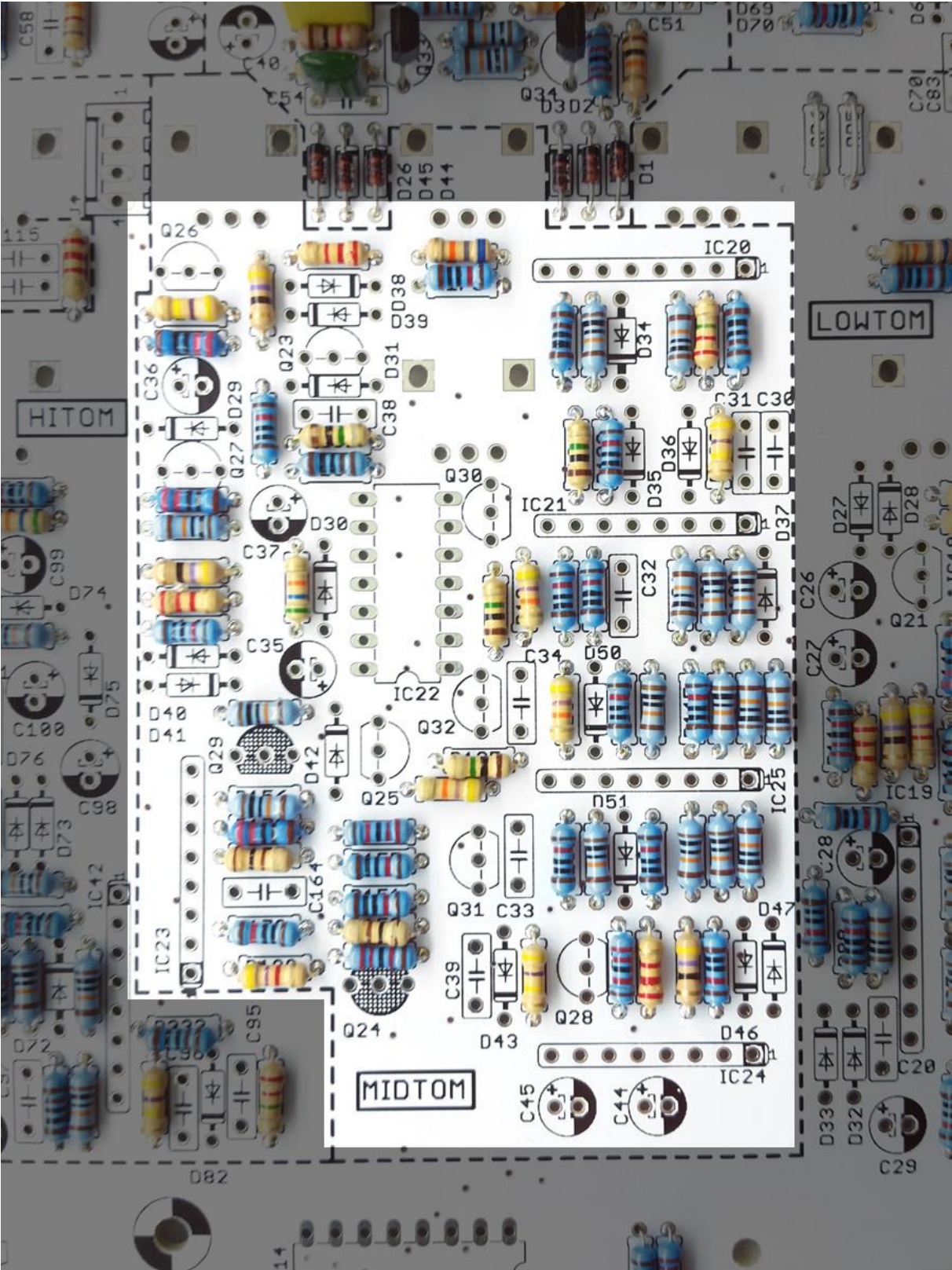


# • MiddleTom

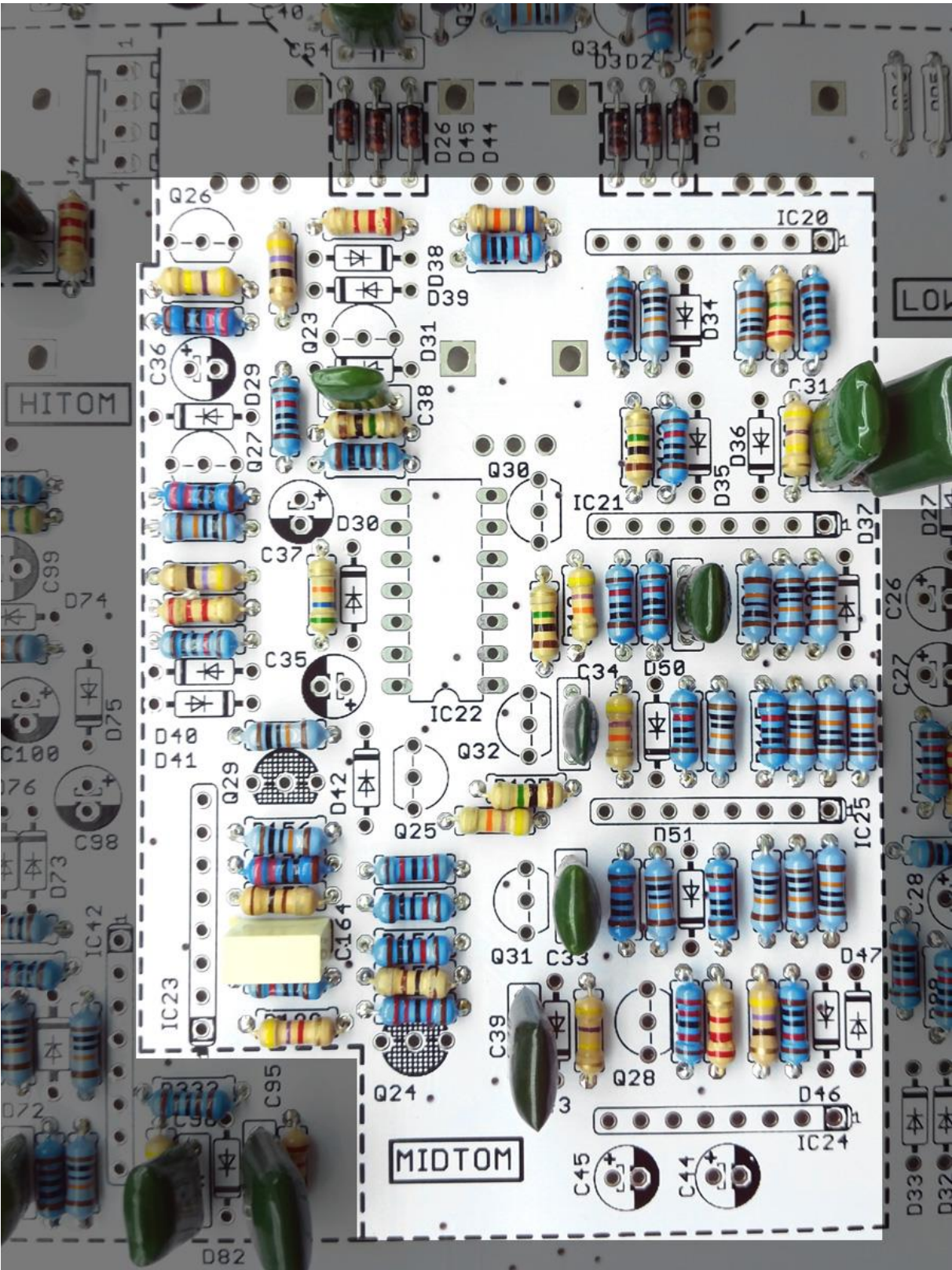
- MT parts list

Nava v1.0 MiddleTom parts list: 113 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
R12A, R126, R163	1K	0207/7	3	
R133, R135, R137, R162	1M	0207/7	4	
R165, R167, R176	2.2K	0207/7	3	
R121	2.2M	0207/7	1	
R180	4.7K	0207/7	1	
R123, R132, R138, R145, R149, R150, R151, R155, R164, R166, R173, R179, R181	10K	0207/7	13	
R153, R154, R177	22K	0207/7	3	
R134, R136, R139	47K	0207/7	3	
R159, R160, R175	47R	0207/7	3	
R171	56K	0207/7	1	
R172	68K	0207/7	1	
R124, R125, R127, R128, R130, R131, R140, R141, R142, R143, R144, R146, R147, R148, R156, R158, R161	100K	0207/7	17	
R152, R157	100R	0207/7	2	
R169, R170, R178	220K	0207/7	3	
R122, R129, R168	470K	0207/7	3	
<b>Capacitors</b>				
µF				
C34	0.01	C050-025X075	1	Film capacitor
C30	0.1	C050-025X075	1	Film capacitor
C32	0.018	C050-025X075	1	Film capacitor
C33	0.027	C050-025X075	1	Film capacitor
C31, C164	0.047	C050-025X075	2	Film capacitor
C39	0.056	C050-025X075	1	Film capacitor
C38	0.0068	C050-025X075	1	Film capacitor
C36	0.15/10	E2-5	1	Electrolytic capacitor
C35, C37	0.47/50	E2-5	2	Electrolytic capacitor
C40, C41, C44, C45	10/16	E2-5	4	Electrolytic capacitor
<b>Diodes</b>				
D29, D30, D31, D35, D36, D37, D38, D39, D40, D41, D42, D43, D46, D47, D50, D51	1N4148	DO35-7C	16	
D34	1N4746A	DO41-7	1	
<b>Transistors</b>				
Q23, Q25, Q26, Q27, Q28, Q30, Q31, Q32	2SC2603	TO92-ECB	8	
Q24, Q29	2SA1115	TO92-ECB-PNP	2	
<b>Integrated circuits</b>				
IC20, IC21, IC23, IC24, IC25	M5218	SIL8	5	
IC22	4069UB	DIL14	1	
<b>Connectors</b>				
J4		6410-04	1	4 pins Male connector
<b>Potentiometers</b>				
Ohm				
VR13	10KB	EVUF	1	
VR15	50KB	EVUF	1	
VR14	500KB	EVUF	1	

Let's continue with the midtom section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.



Add film capacitors. On v1.02 mainboard C164 has been removed

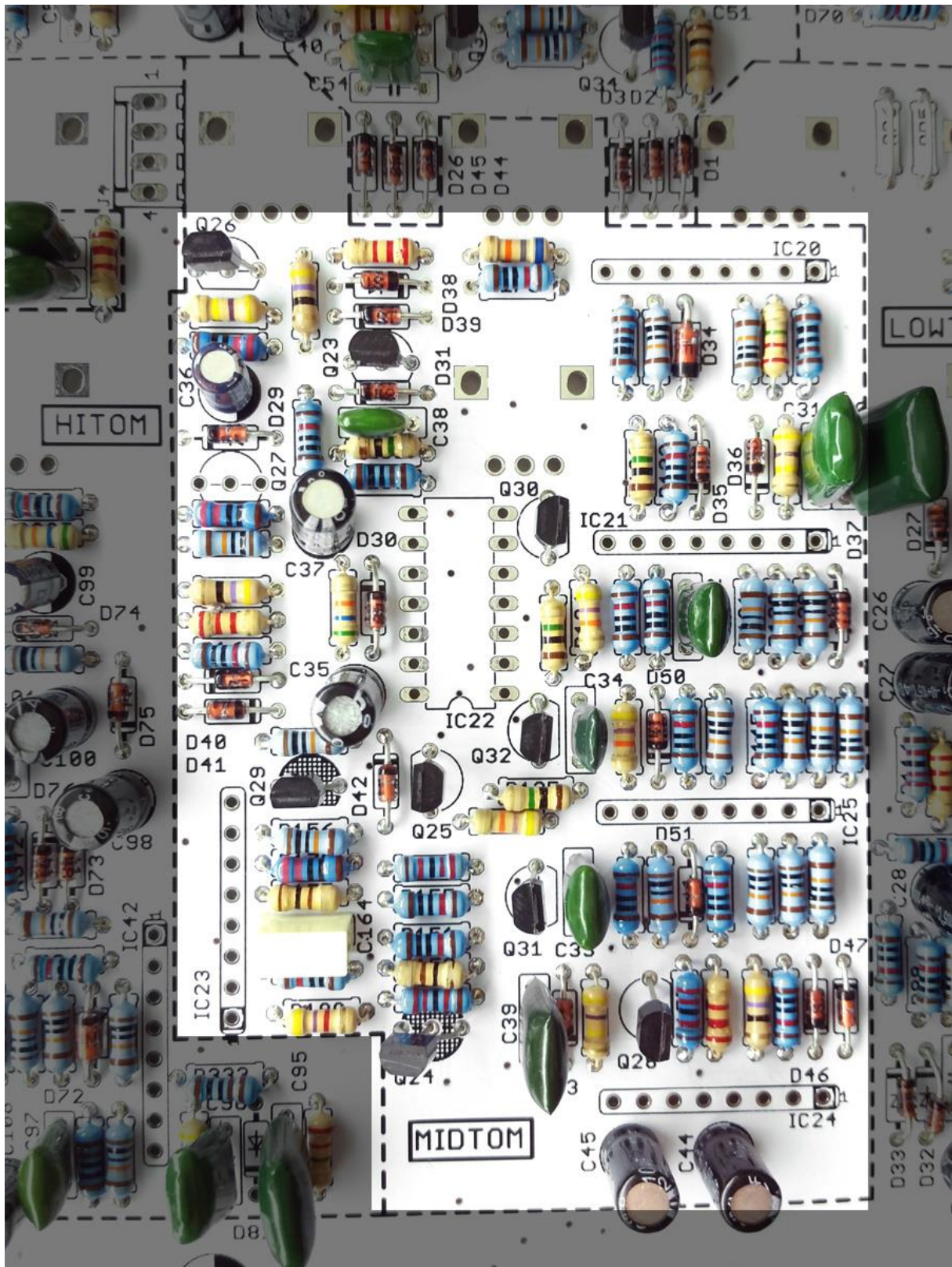




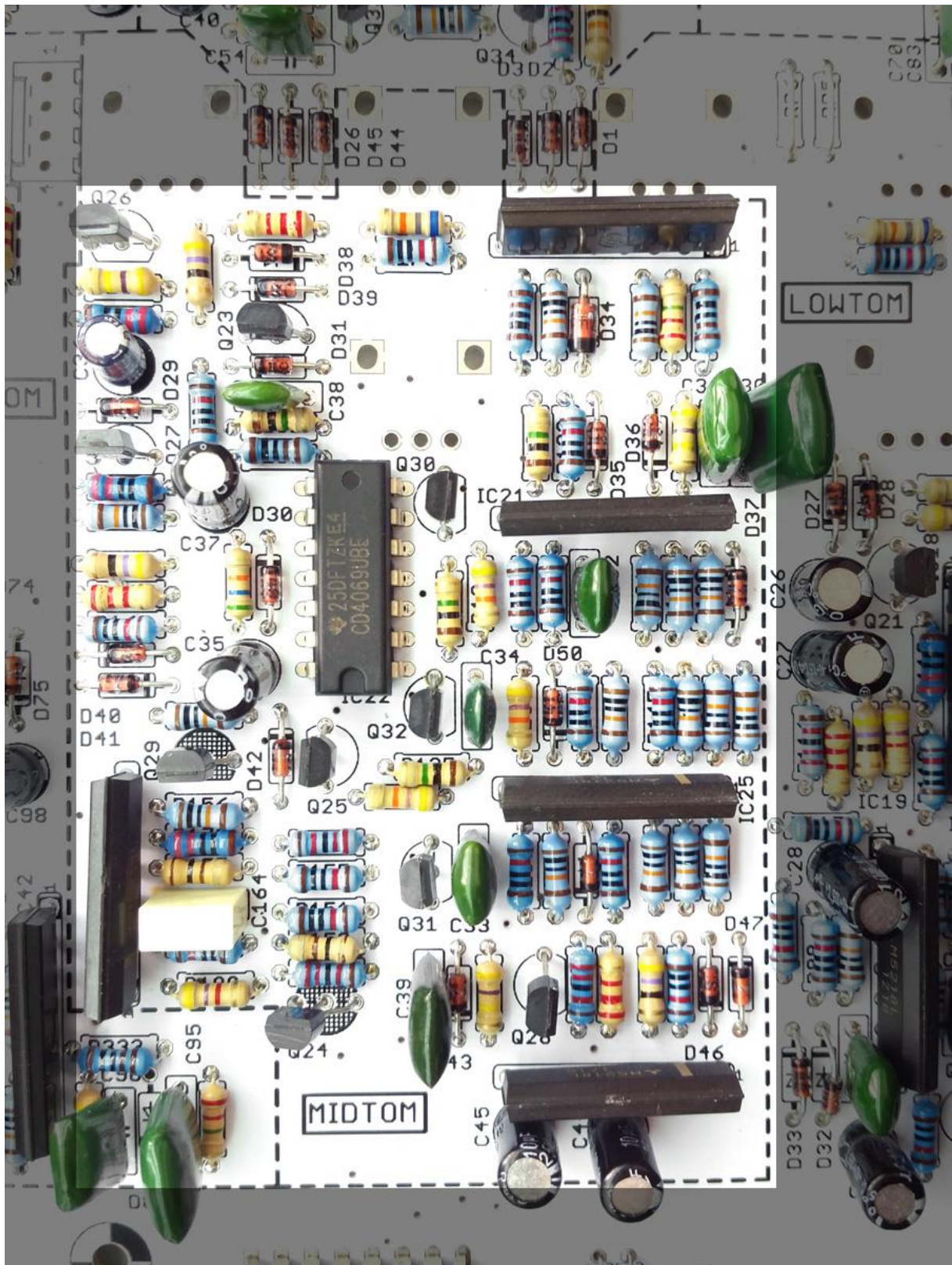




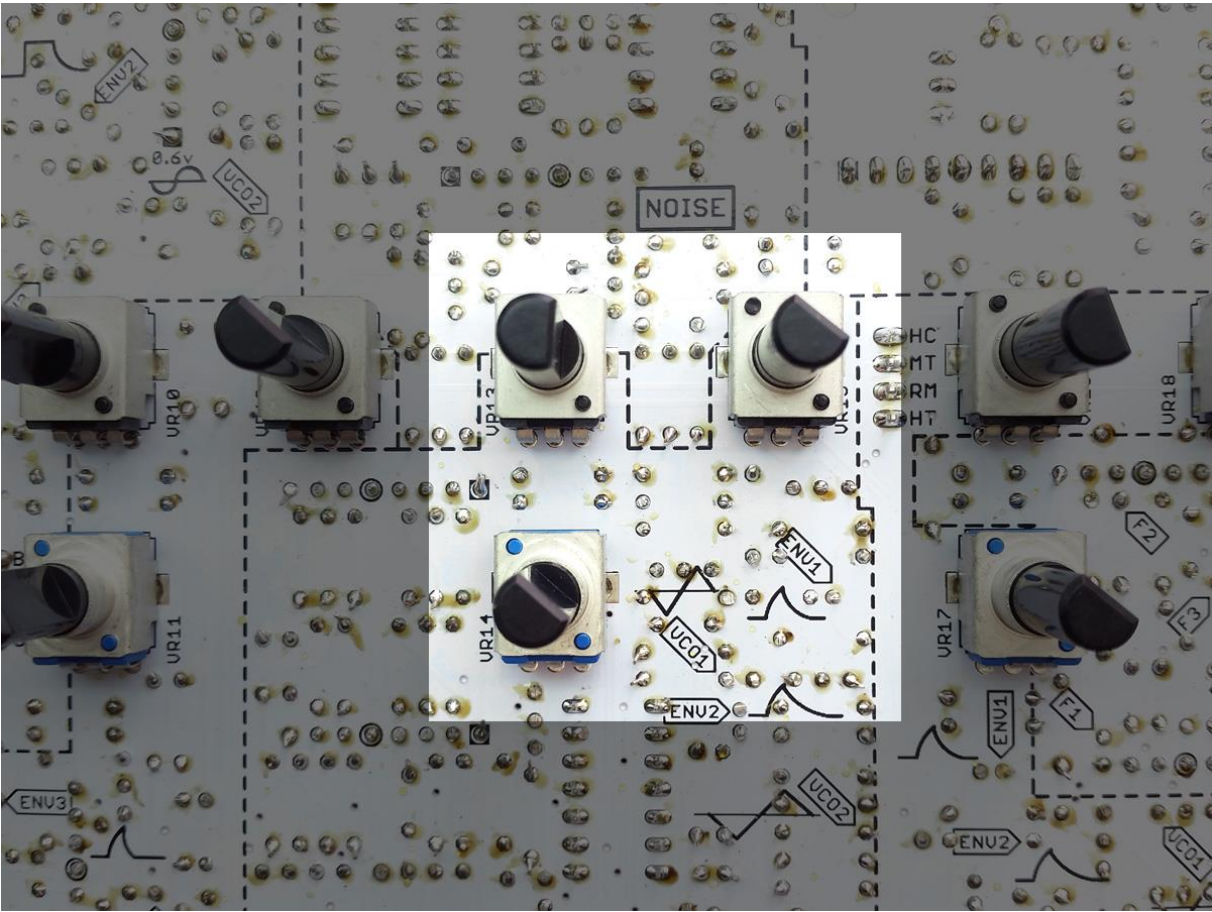
Now, add transistors. **Pay attention! There are two different type of transistor: 2SA1115 and 2SC2603. Do not mix !**



Now, check midtom section power voltages and add ICs. **Do not overheat ICs pins during solder process!**



Finally, add potentiometers. **Pay attention to potentiometers value they are all different.** Then midtom section is finished, let's go to the [hitom](#) section.

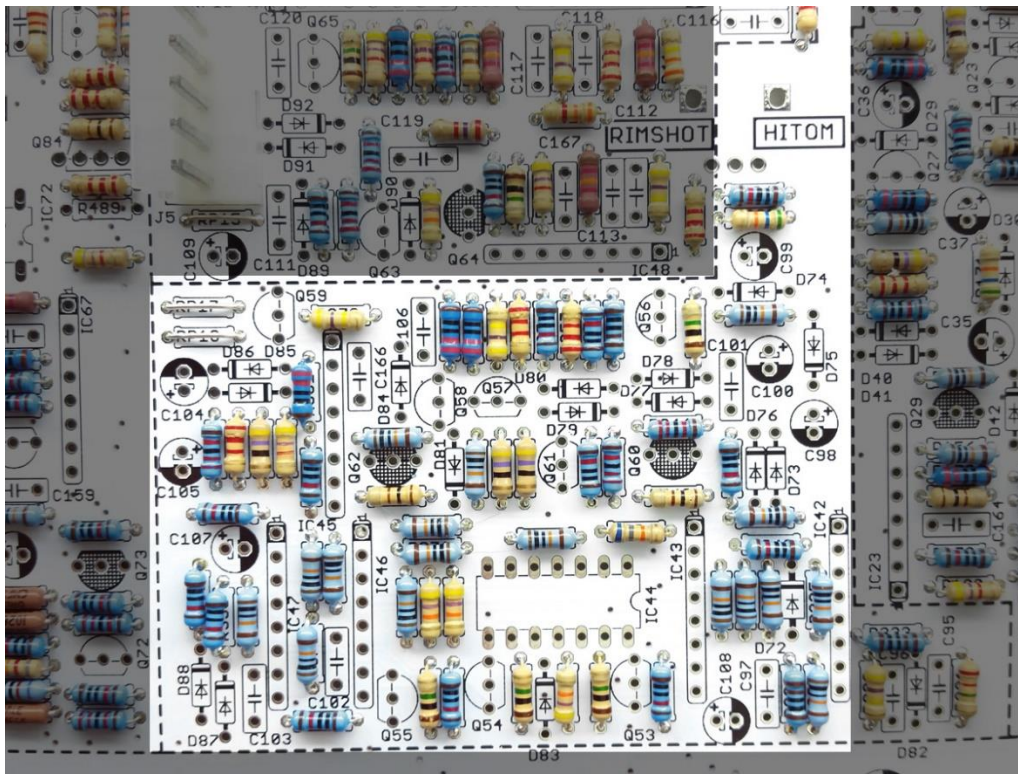


# • HighTom

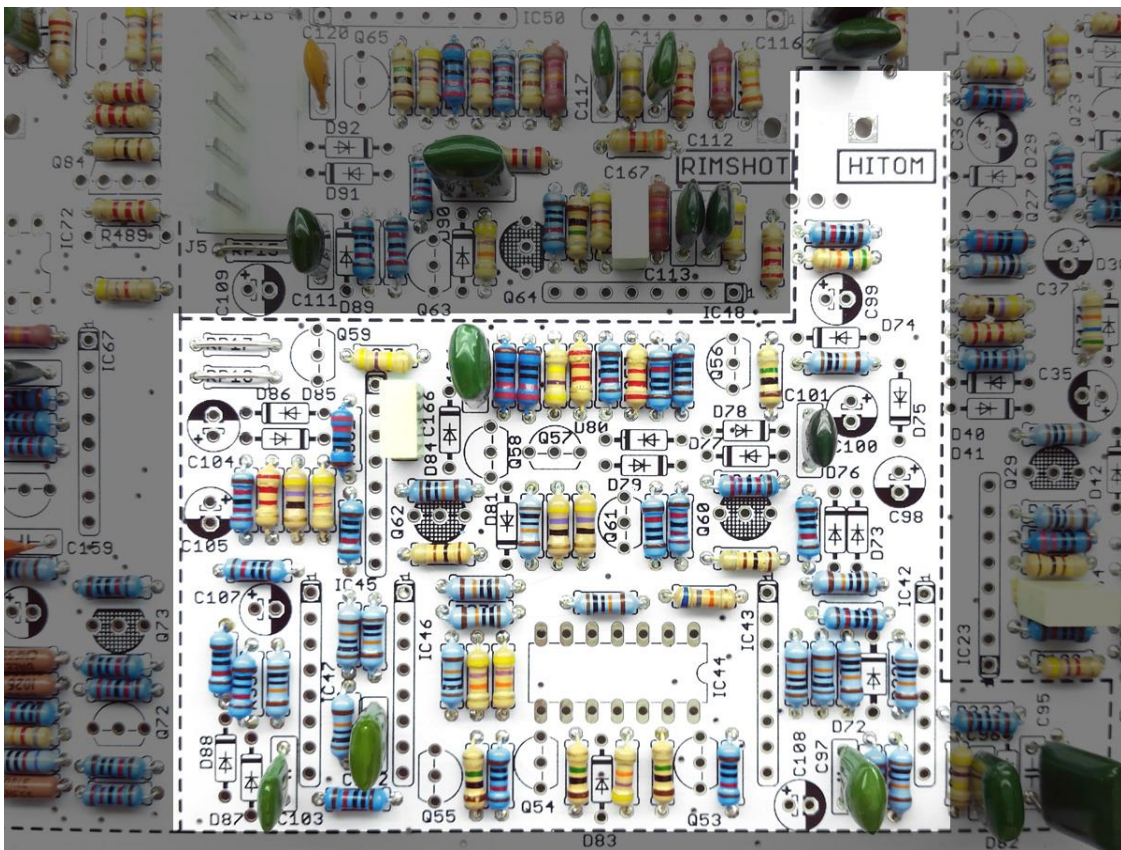
- HT parts list

Nava v1.0 HiTom parts list: 114 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
RP17, RP18	0R	0207/7	2	
R333, R338, R359	1K	0207/7	3	
R329, R360, R363, R377	1M	0207/7	4	
R355, R357, R380	2.2K	0207/7	3	
R331	2.2M	0207/7	1	
R383	4.7K	0207/7	1	
R340, R342, R346, R356, R358, R361, R367, R376, R382, R384, R388, R390, R391	10K	0207/7	13	
R344, R345, R387	22K	0207/7	3	
R364, R366, R368	47K	0207/7	3	
R350, R351, R379	47R	0207/7	3	
R385	56K	0207/7	1	
R386	68K	0207/7	1	
R334, R335, R336, R337, R339, R341, R347, R349, R362, R369, R370, R371, R372, R373, R374, R375, R389	100K	0207/7	17	
R343, R348	100R	0207/7	2	
R352, R353, R381	220K	0207/7	3	
R332, R354, R378	470K	0207/7	3	
<b>Capacitors</b>				
µF				
C95	0.1	C050-025X075	1	Film capacitor
C97	0.015	C050-025X075	1	Film capacitor
C102	0.022	C050-025X075	1	Film capacitor
C96, C106, C166	0.047	C050-025X075	3	Film capacitor
C101	0.0056	C050-025X075	2	Film capacitor
C103	0.0082	C050-025X075	1	Film capacitor
C99	0.15/10	E2-5	1	Electrolytic capacitor
C98, C100	0.47/50	E2-5	2	Electrolytic capacitor
C104, C105, C107, C108	10/16	E2-5	4	Electrolytic capacitor
<b>Diodes</b>				
D73, D74, D75, D76, D77, D78, D79, D80, D81, D82, D83, D84, D85, D86, D87, D88	1N4148	DO35-7C	16	
D72	1N4746A	DO41-7	1	
<b>Transistors</b>				
Q53, Q54, Q55, Q56, Q57, Q58, Q59, Q61	2SC2603	TO92-ECB	8	
Q60, Q62	2SA1115	TO92-ECB-PNP	2	
<b>Integrated circuits</b>				
IC42, IC43, IC45, IC46, IC47	M5218	SIL8	5	
IC44	4069UB	DIL14	1	
<b>Potentiometers</b>				
Ohm				
VR16	10KB	EVUF	1	
VR18	50KB	EVUF	1	
VR17	500KB	EVUF	1	

Let's continue with the Hitom section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.



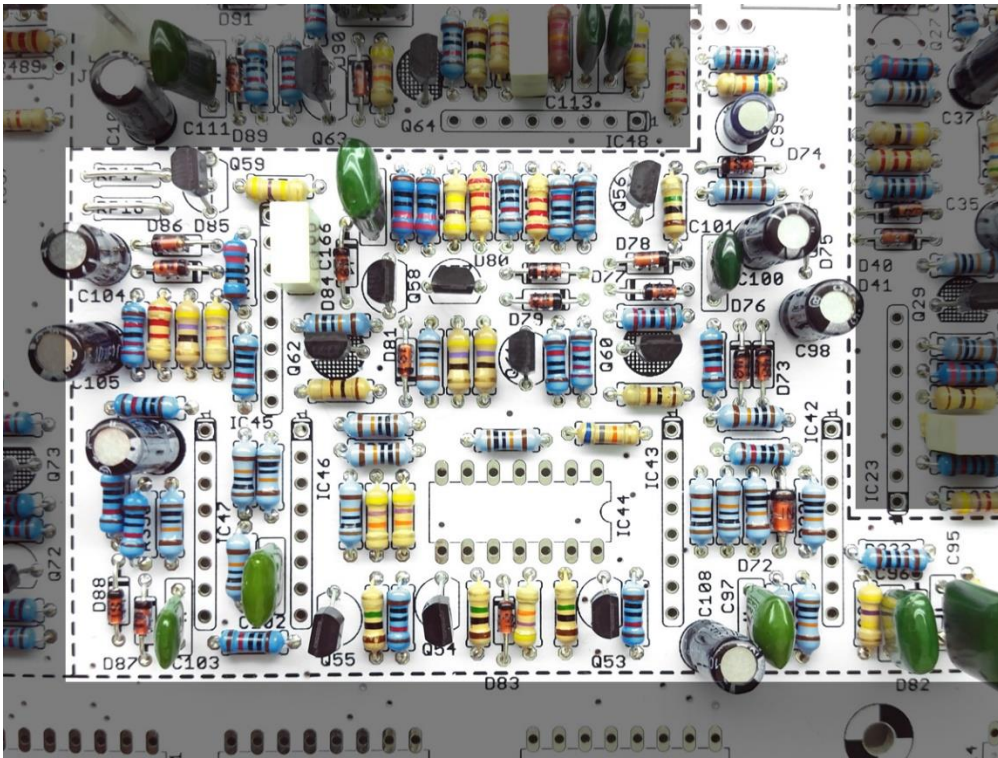
Add film capacitors. On v1.02 mainboard C166 has been removed







Now, add transistors. **Pay attention! There are two different type of transistor: 2SA1115 and 2SC2603. Do not mix !**

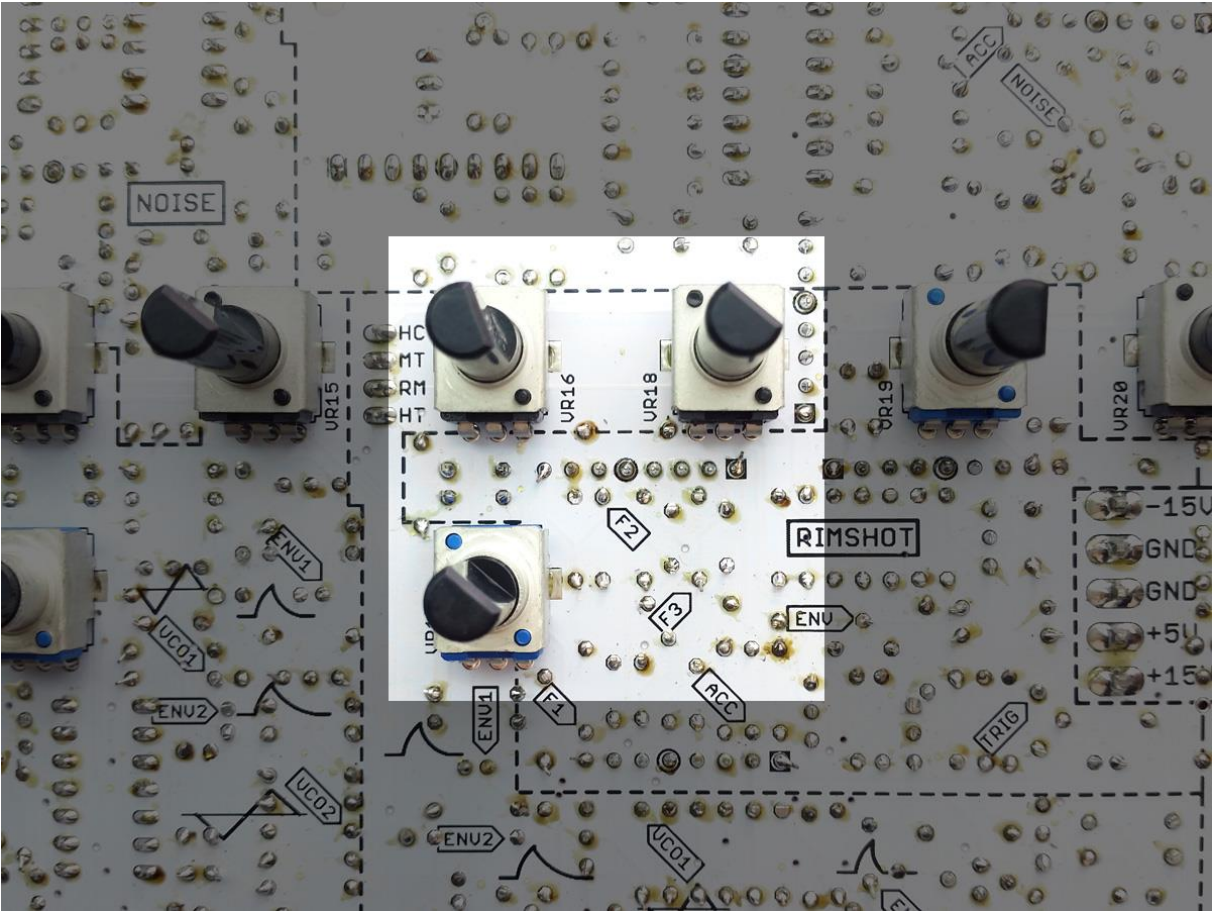


Now, check hitom section power voltages and add ICs. **Do not overheat ICs pins during solder process!**



Finally, add potentiometers. **Pay attention to potentiometers value they are all different.**

Then hitom section is finished, let's go to the [rimshot](#) section.

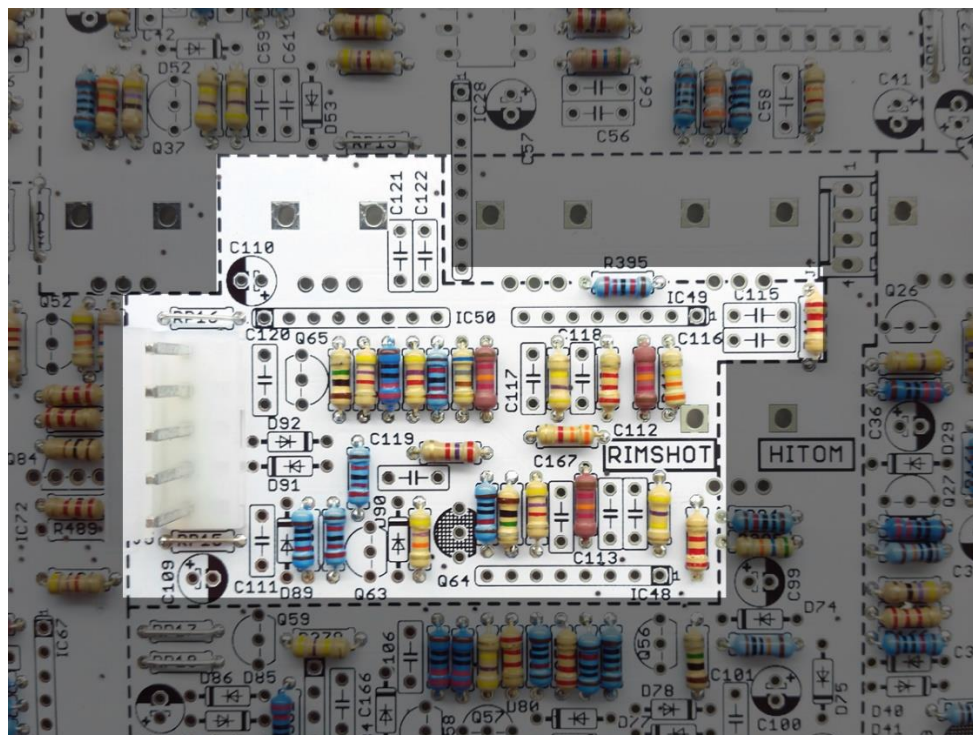


# RimShot

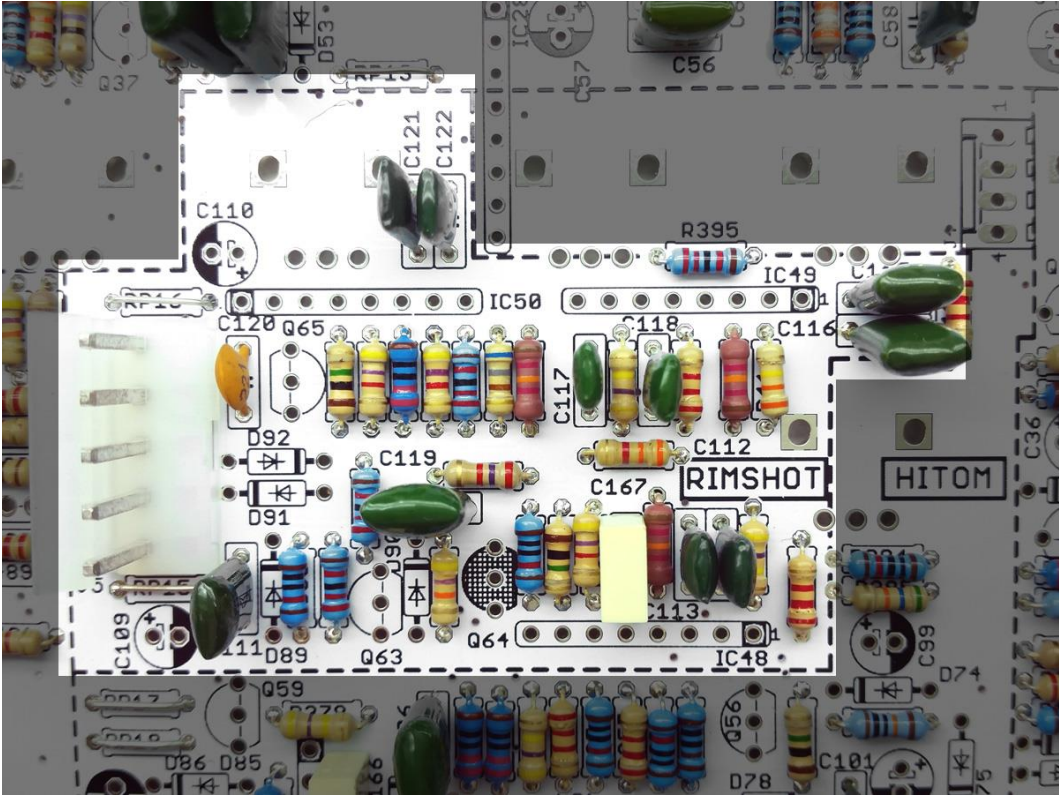
- RS parts list

Nava v1.0 RimShot parts list: 52 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
RP15, RP16	0R	0207/7	2	
R402, R403	1M	0207/7	2	
R394, R404, R411	2.2K	0207/7	3	
R401	2.7K	0207/7	1	
R417	3.3K	0207/7	1	
R397, R419, R421	4.7K	0207/7	3	
R398, R406	10K	0207/7	2	
R408, R415, R423	12K	0207/7	3	
R395, R396, R399, R422	22K	0207/7	4	
R400	47K	0207/7	1	
R420	220K	0207/7	1	
R414	330K	0207/7	1	
R407, R416	470K	0207/7	2	
R418	680R	0207/7	1	
<b>Capacitors</b>				
µF				
C112, C113, C121, C122	0.01	C050-025X075	4	Film capacitor
C111	0.018	C050-025X075	1	Film capacitor
C115, C116	0.027	C050-025X075	2	Film capacitor
C117, C118	0.0047	C050-025X075	2	Film capacitor
C119, C167	0.047	C050-025X075	2	Film capacitor
C120	220p	C050-025X075	1	Ceramic disk capacitors
C109, C110	10/16	E2-5	2	Electrolytic capacitor
<b>Diodes</b>				
D89, D90, D91, D92	1N4148	DO35-7C	4	
<b>Transistors</b>				
Q63, Q65	2SC2603	TO92-ECB	2	
Q64	2SA1115	TO92-ECB-PNP	1	
<b>Integrated circuits</b>				
IC48, IC49, IC50	M5218	SIL8	3	
<b>Potentiometers</b>				
VR19	100KB	EVUF	1	

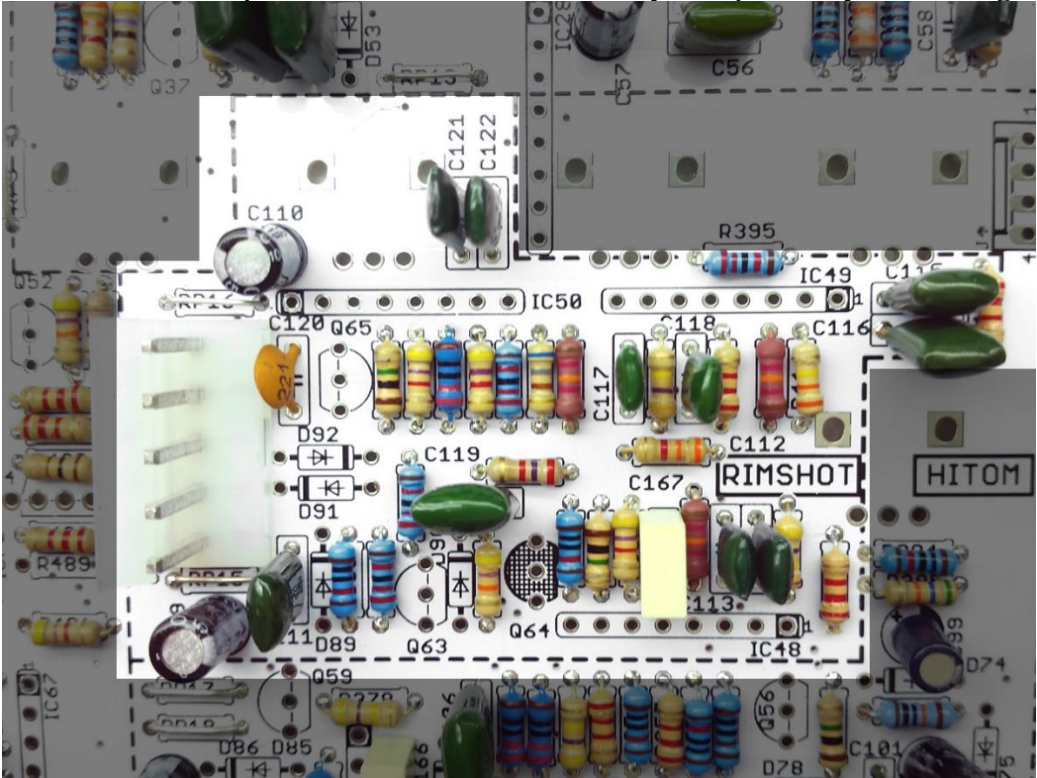
Let's continue with the rimshot section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.



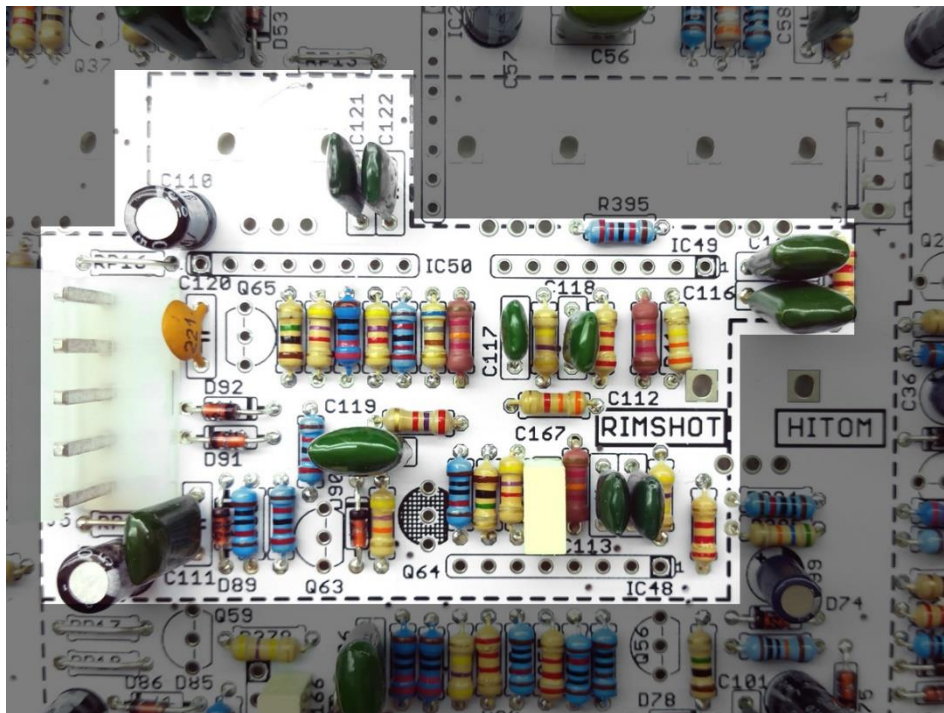
Add film capacitors. On v1.02 mainboard C167 has been removed



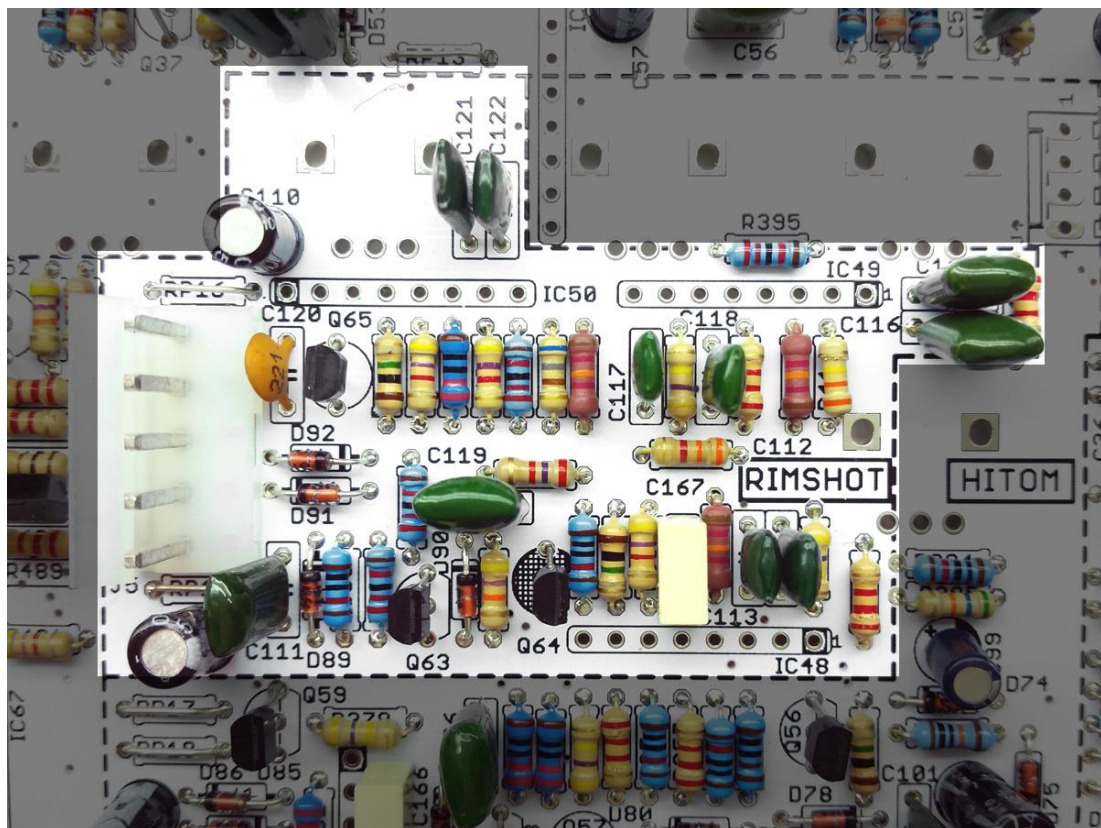
Add electrolytic capacitors. **Electrolytic capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytic capacitors. The black part on the silkscreened electrolytic capacitor symbol is negative.**



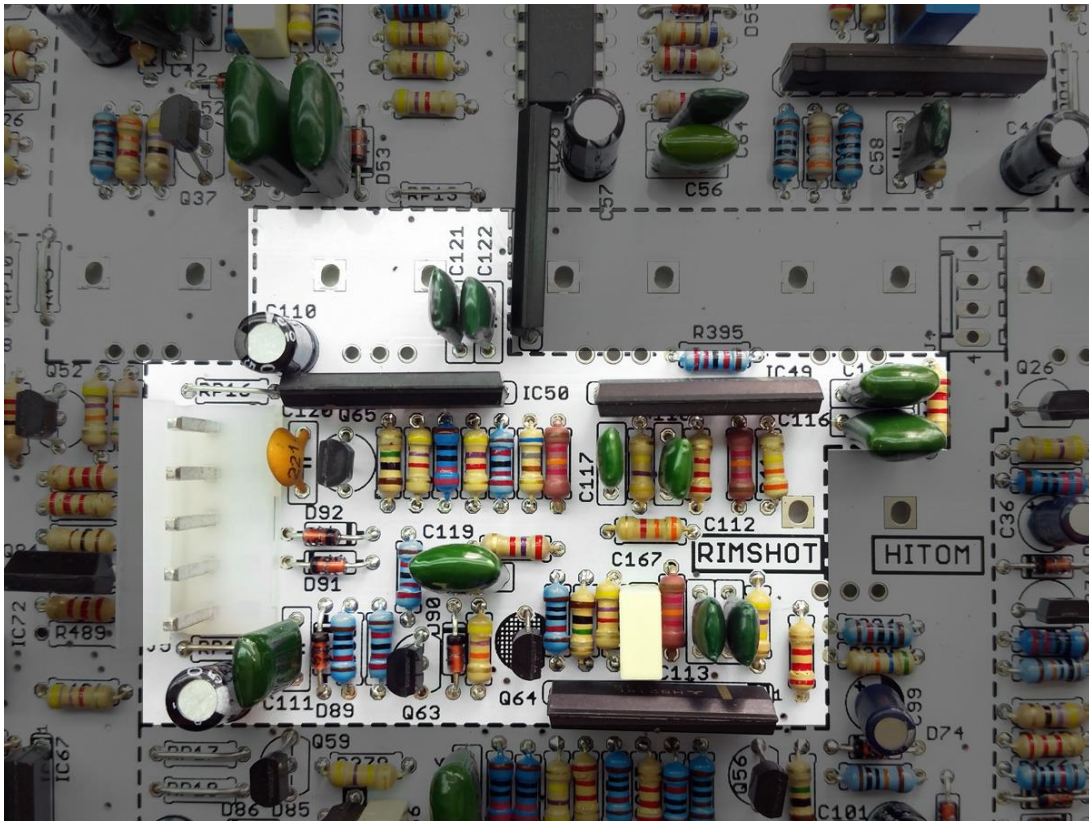
Add diodes. **Diodes are polarized, the black ring must match the symbol silkscreened on the PCB.**



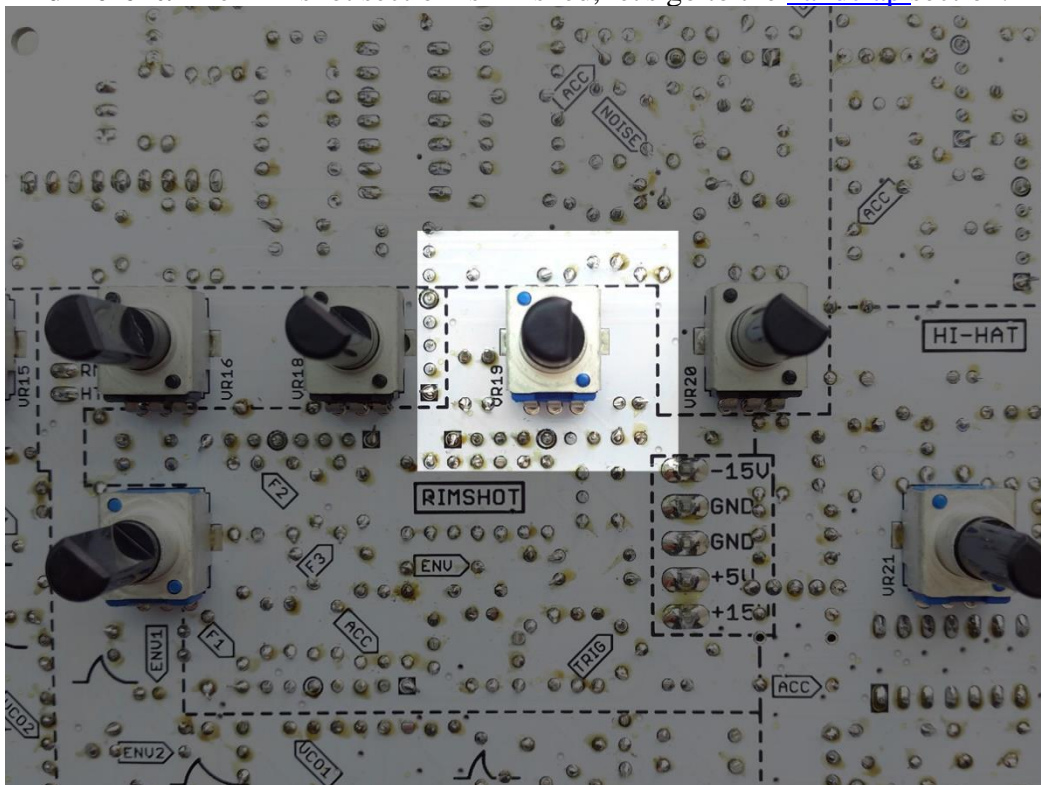
Now, add transistors. **Pay attention! There are two different type of transistor: 2SA1115 and 2SC2603. Do not mix !**



Now, check rimshot section power voltages and add ICs. **Do not overheat ICs pins during solder process!**



Finally, add the volume potentiometer. **Pay attention to potentiometers value they are all different.** Then rimshot section is finished, let's go to the [handclap](#) section.

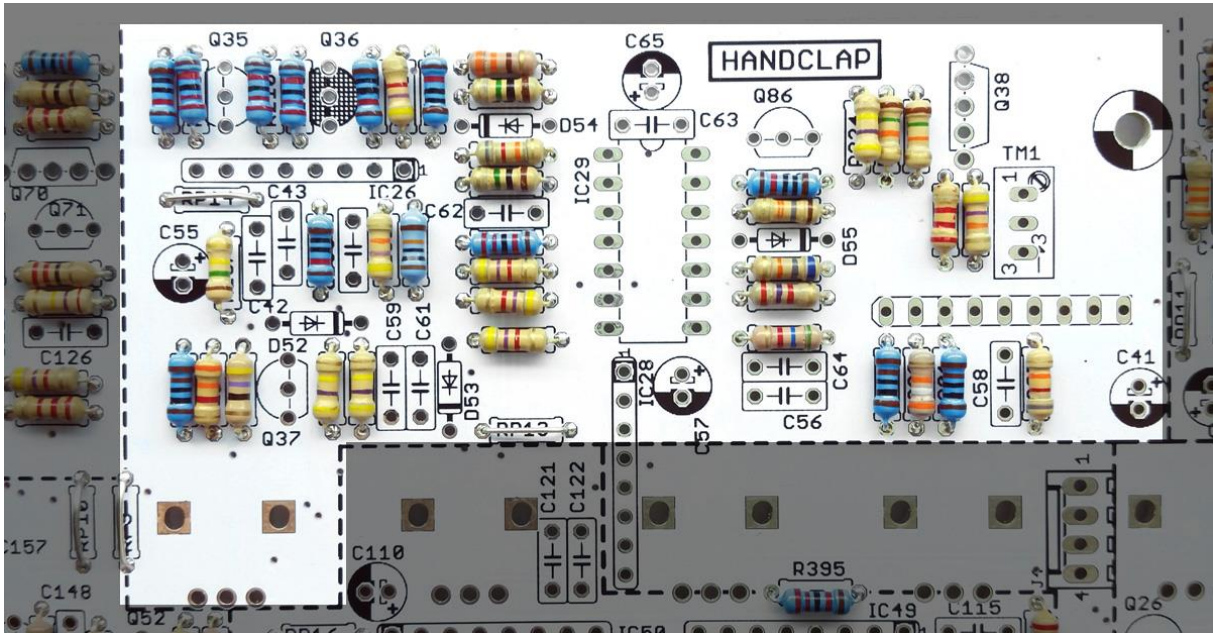


# HandClap

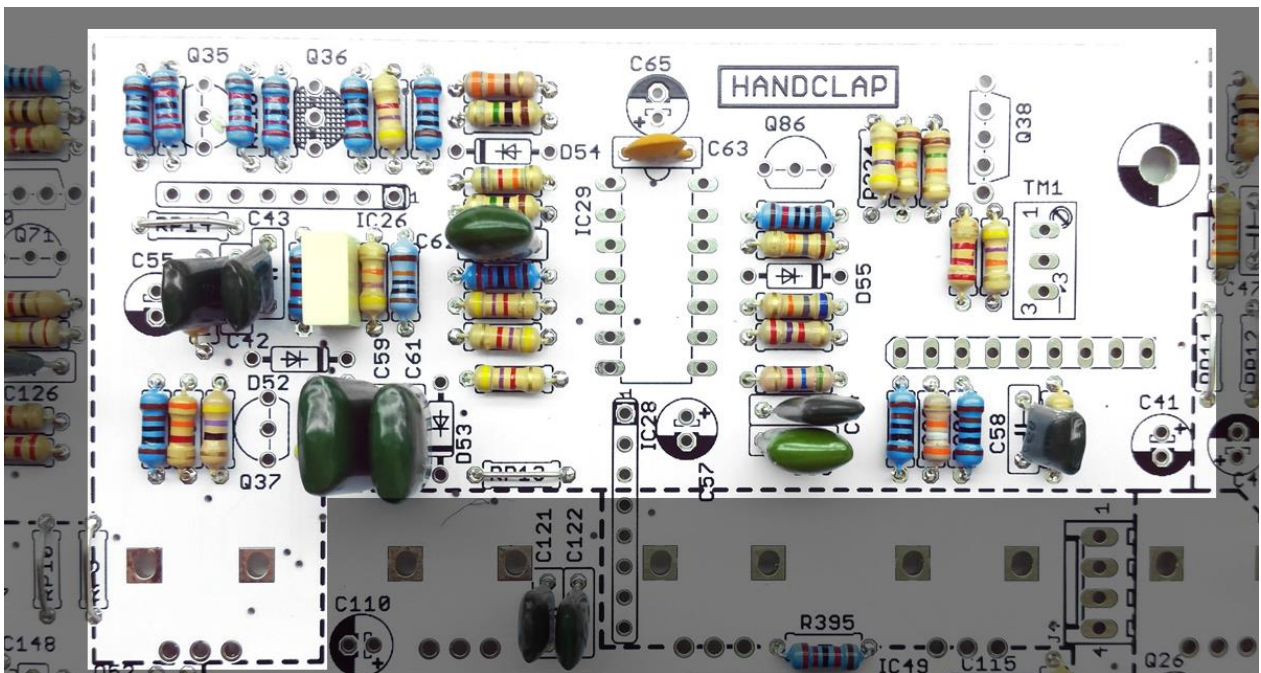
- HC parts list

Nava v1.0 HandClap parts list: 68 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
RP13, RP14	0R	0207/7	2	
R201, R204, R236	1K	0207/7	3	
R225, R229	1M	0207/7	2	
R230	2.2K	0207/7	1	
R227	2.7K	0207/7	1	
R205	3.3K	0207/7	1	
R206, R214, R217, R219	4.7K	0207/7	4	
R228	5.6K	0207/7	1	
R209, R211, R212, R216, R222	10K	0207/7	5	
R235, R238	15K	0207/7	2	
R221	18K	0207/7	1	
R210, R213, R215, R218	22K	0207/7	4	
R202	39K	0207/7	1	
R208, R494	47K	0207/7	2	
R203	47R	0207/7	1	
R226	68K	0207/7	1	
R220, R237	82K	0207/7	2	
R496	100K	0207/7	1	
R207	150K	0207/7	1	
R223	330R	0207/7	1	
R224, R233, R234	470K	0207/7	3	
<b>Capacitors</b>				
µF				
C58, C64	0.001	C050-025X075	2	Film capacitor
C59, C61	0.1	C050-025X075	2	Film capacitor
C56	0.022	C050-025X075	1	Film capacitor
C62	0.027	C050-025X075	1	Film capacitor
C42, C43	0.0047	C050-025X075	2	Film capacitor
C168	0,047	C050-025X075	1	Film capacitor
C63	220p	C050-025X075	1	Ceramic disk capacitors
C55, C57, C65	0.47/50	E2-5	3	Electrolytic capacitor
<b>Diodes</b>				
D52, D53, D54, D55	1N4148	DO35-7C	4	
<b>Transistors</b>				
Q38	2SA798	SIP-5	1	Double transistor
Q35, Q37, Q86	2SC2603	TO92-ECB	3	
Q36	2SA1115	TO92-ECB-PNP	1	
<b>Integrated circuits</b>				
IC26, IC28	M5218	SIL8	2	
IC30	BA6110	SIL9	1	
IC29	AN6912	DIL14	1	
<b>Potentiometers</b>				
Ohm				
VR20	50KB	EVUF	1	
TM1	10K	S64W	1	Trimmer

Let's continue with the Handclap section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.

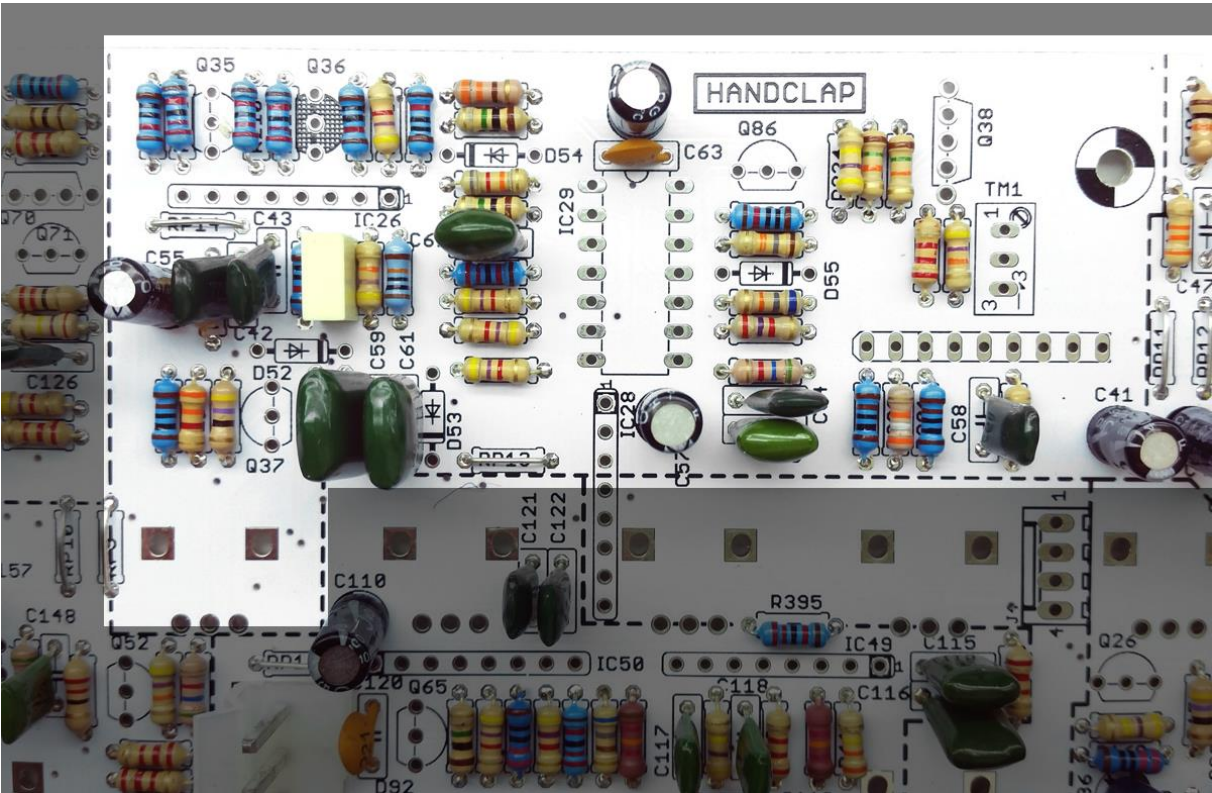


Add film capacitors. On v1.02 mainboard C168 has been removed

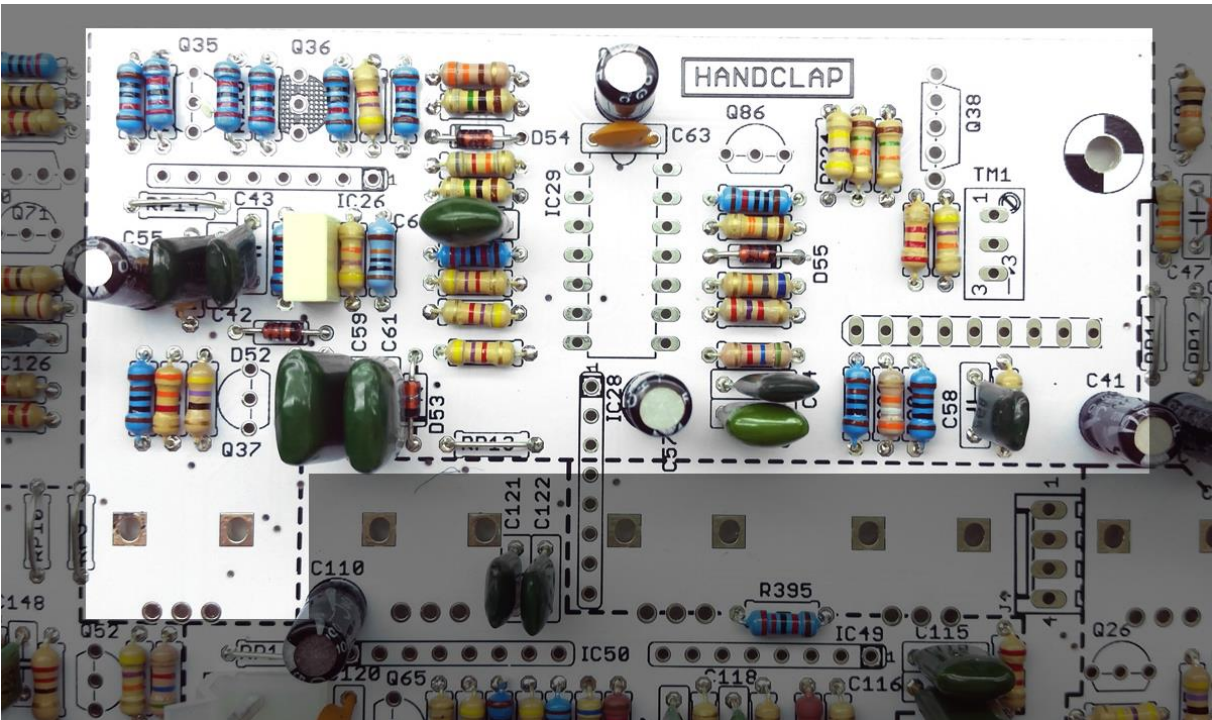




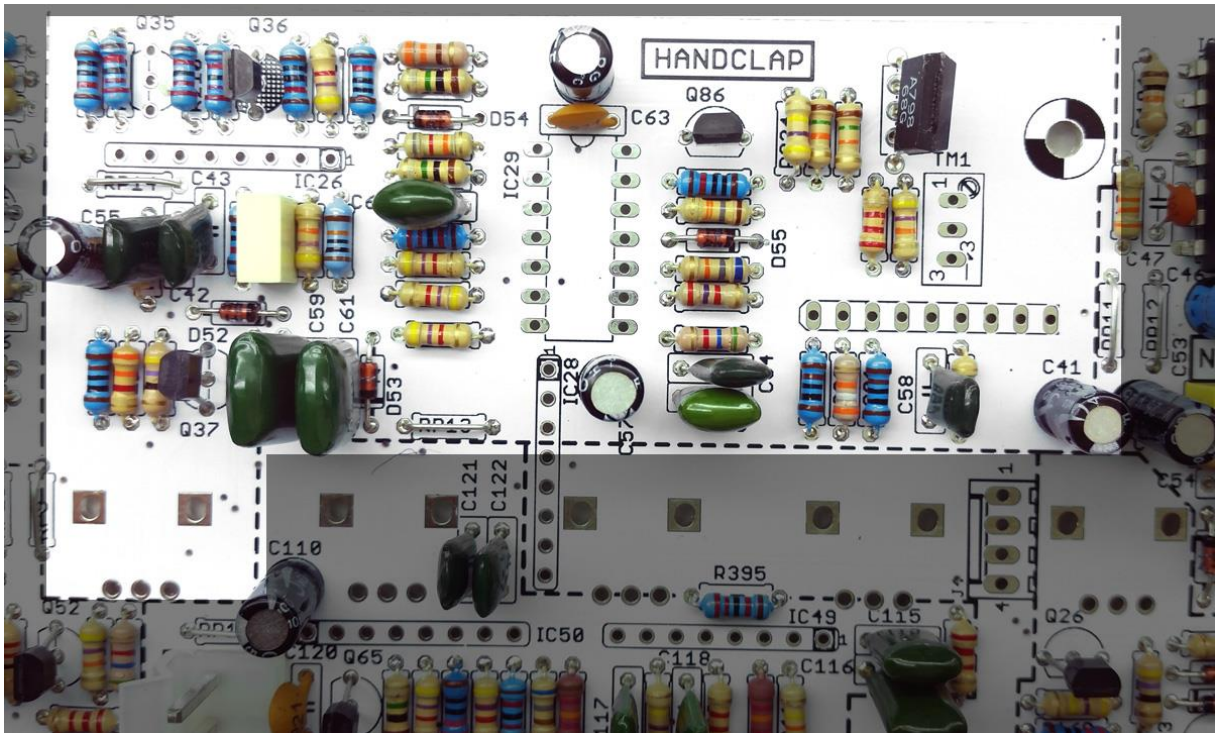
Add electrolytic capacitors. **Electrolytic capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytic capacitors. The black part on the silkscreened electrolytic capacitor symbol is negative.**



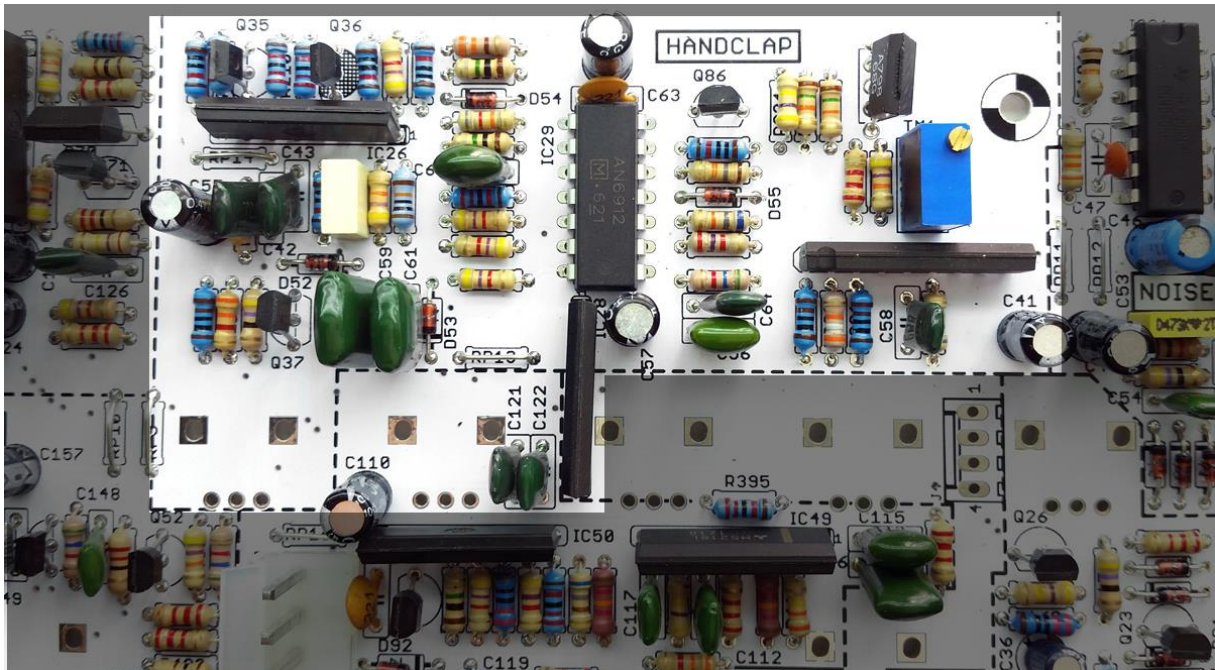
Add diodes. **Diodes are polarized, the black ring must match the symbol silkscreened on the PCB.**



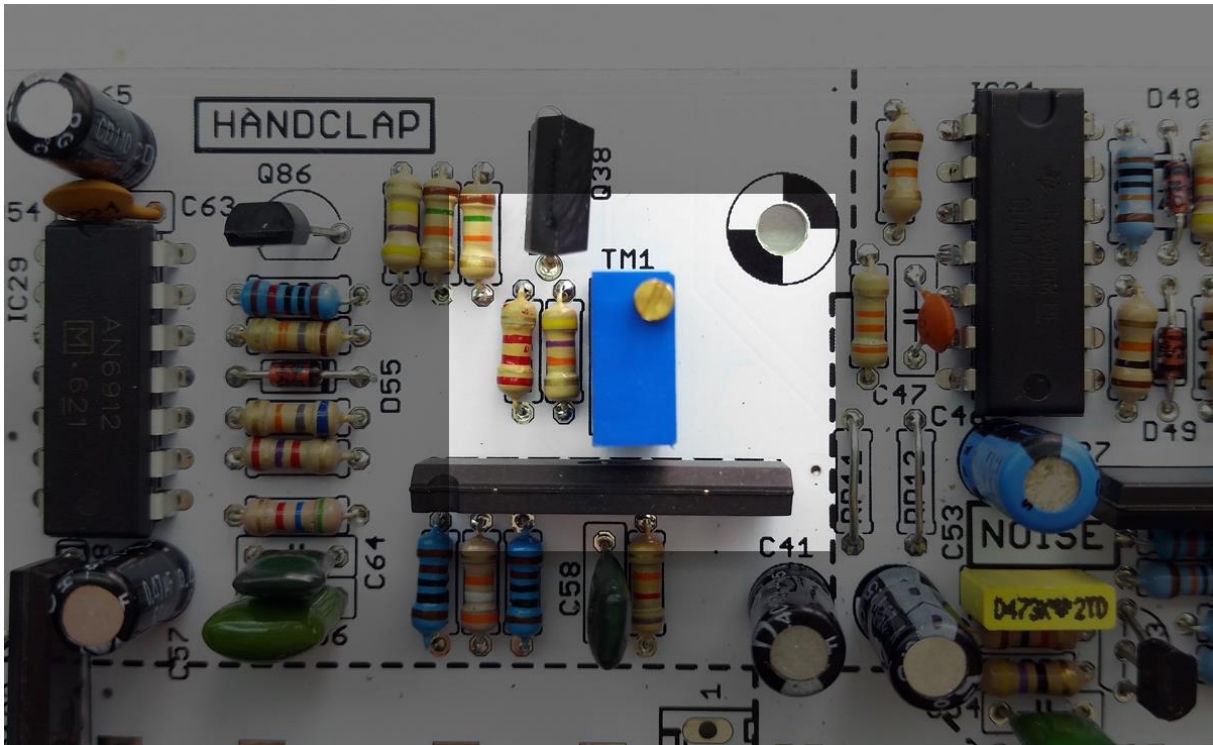
Now, add transistors. **Pay attention! There are three different type of transistor: 2SA1115, 2SC2603 and 2SA798. Do not mix !**



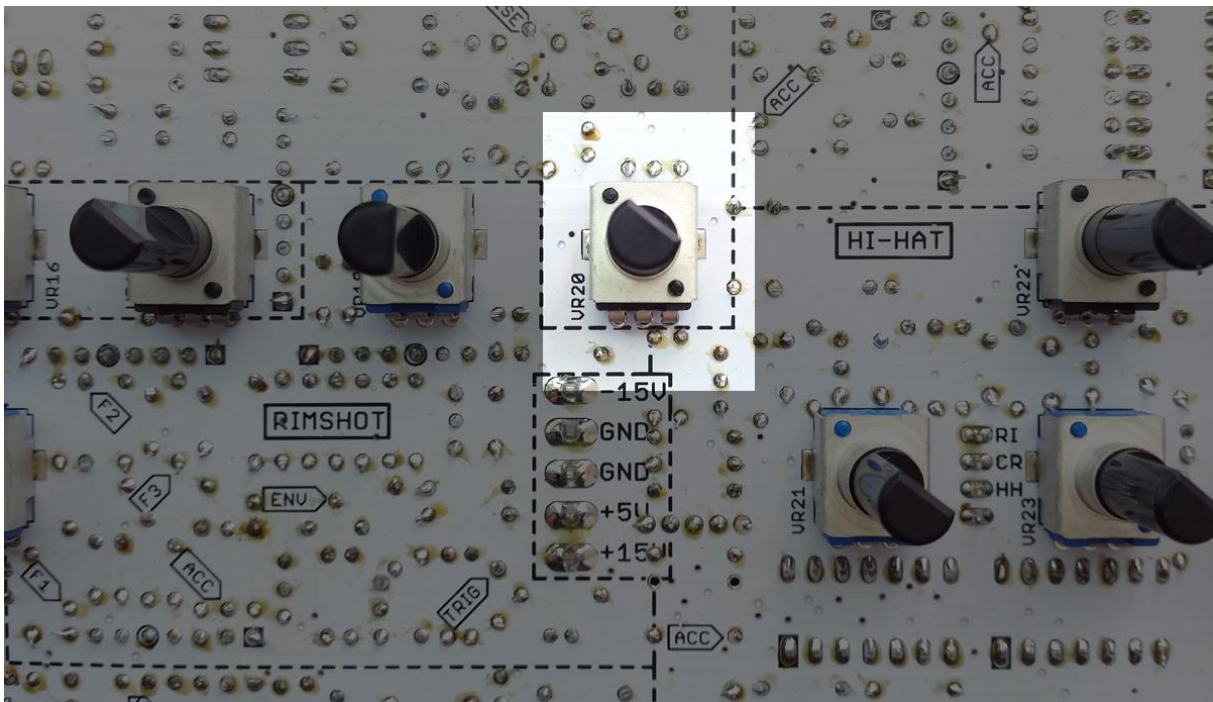
Now, check handclap section power voltages and add ICs. **Do not overheat ICs pins during solder process! Pay attention to BA6110 orientation. (look at the picture)**



Add TM1 10kohm trimmer. TM1 adjustment is deccribed on PCBs top silkscreen. A complete explanation is available in "[finished](#)" section.



Finally, add the potentiometer. **Pay attention to potentiometers value they are all different.** Then handclap section is finished, let's go to the [Hihat](#) section.

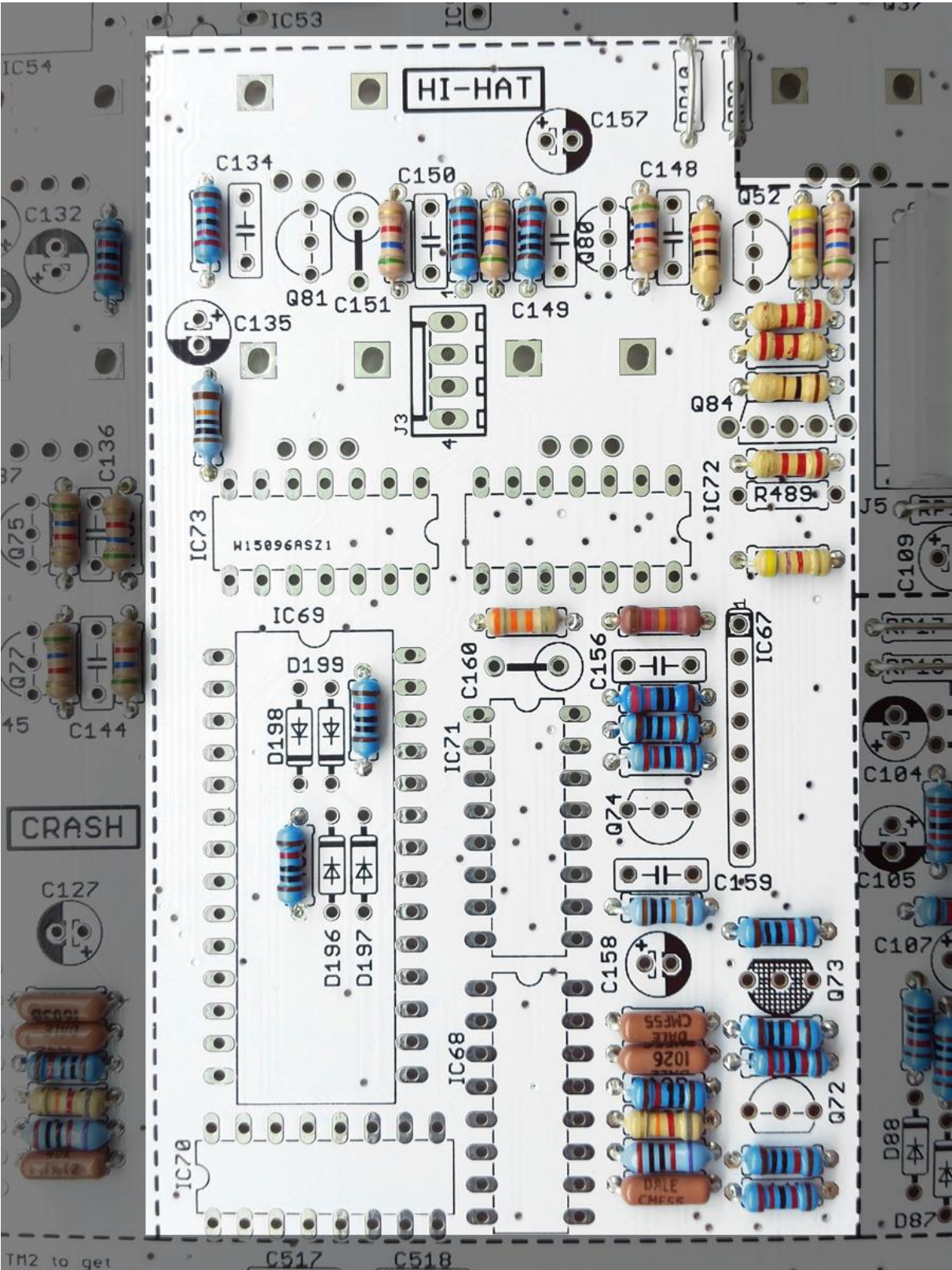


# HitHat

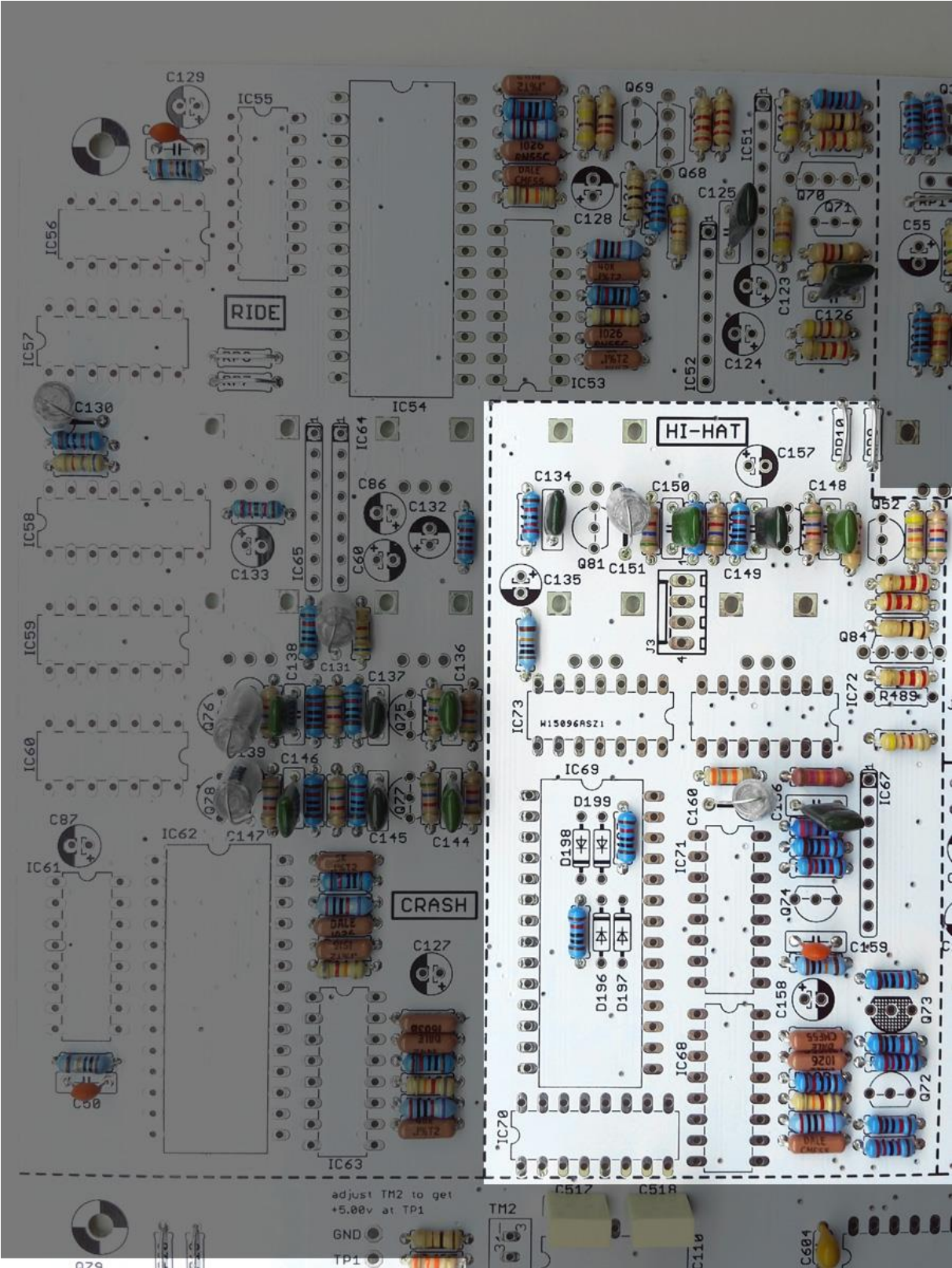
- HH parts list

Nava v1.0 HiHat parts list: 71 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
RP9, RP10	0R	0207/7	2	
R484, R488	2.2K	0207/7	2	
R481	4.7K	0207/7	1	
R475, R477, R479, R480	5.6K	0207/7	4	
RA9A	5K	0207/7	1	
R448, R450, R451, R455, R476, R478, R485, R486, R487, RA9B	10K	0207/7	10	
R492	12K	0207/7	1	
RA9C	20K	0207/7	1	
R444, R447, R449, R454	22K	0207/7	4	
R482	22R	0207/7	1	
R493	33K	0207/7	1	
RA9D	40K	0207/7	1	
R483	47K	0207/7	1	
RA9E	80K	0207/7	1	
R452, R491	100K	0207/7	2	
R490	100R	0207/7	1	
R489	150R	0207/7	1	
RA9F	160K	0207/7	1	
R453	220K	0207/7	1	
<b>Capacitors</b>				
µF				
C151	390p	C025_RE	1	Polystyren capacitor
C160	470p	C025_RE	1	Polystyren capacitor
C149, C156	0.001	C050-025X075	2	Film capacitor
C134	0.01	C050-025X075	1	Film capacitor
C148	0.0012	C050-025X075	1	Film capacitor
C150	0.0027	C050-025X075	1	Film capacitor
C159	100p	C050-025X075	1	Film capacitor
C135	1/50	E2-5	1	Electrolytic capacitor
C157, C158	10/16	E2-5	2	Electrolytic capacitor
<b>Diodes</b>				
D196, D197, D198, D199	1N4148	DO35-7C	4	
<b>Transistors</b>				
Q84	2SA798	SIP-5	1	
Q52, Q72, Q74, Q80, Q81	2SC2603	TO92-ECB	5	
Q73	2SA1115	TO92-ECB-PNP	1	
<b>Integrated circuits</b>				
IC72	4011UB	DIL14	1	
IC73	4013N	DIL14	1	
IC68	74HC174	DIL16	1	
IC71	4040N	DIL16	1	
IC70	4520N	DIL16	1	
IC69	27C256P	DIL28-6	1	
IC65, IC67	M5218	SIL8	2	
<b>Connectors</b>				
J3		6410-04	1	4 pins male connector
<b>Potentiometers</b>				
Ohm				
VR23	1MA	EVUF	1	
VR22	50KB	EVUF	1	
VR21	100KB	EVUF	1	

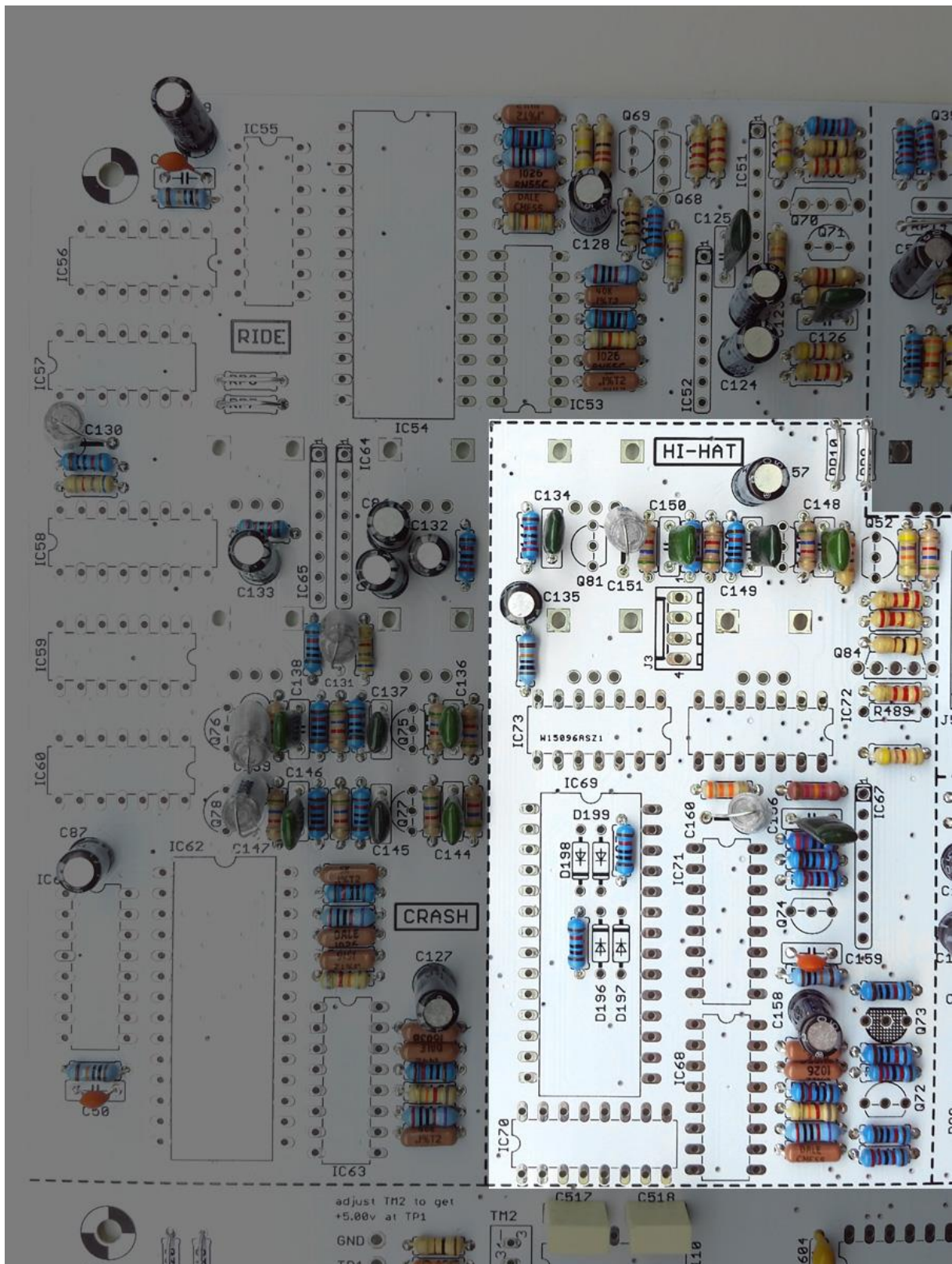
Let's continue with the hihat section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors. RA9B 10kohmmust be a resistor you measure at the beginning of assembly.



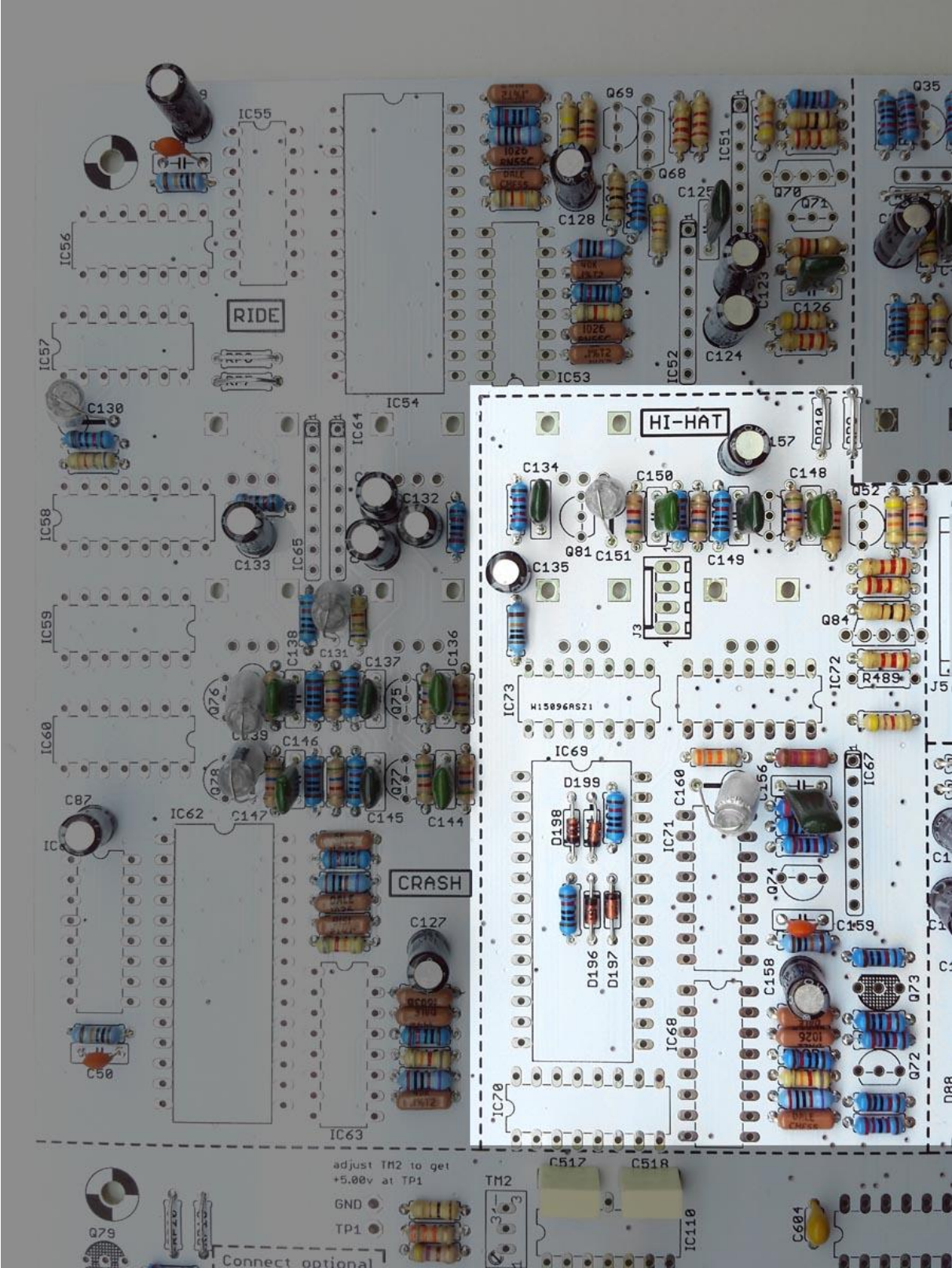
Add film capacitors. C151 and C160 have to be polystyrene capacitors.



Add electrolytic capacitors. **Electrolytic capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytic capacitors. The black part on the silkscreened electrolytic capacitor symbol is negative.**

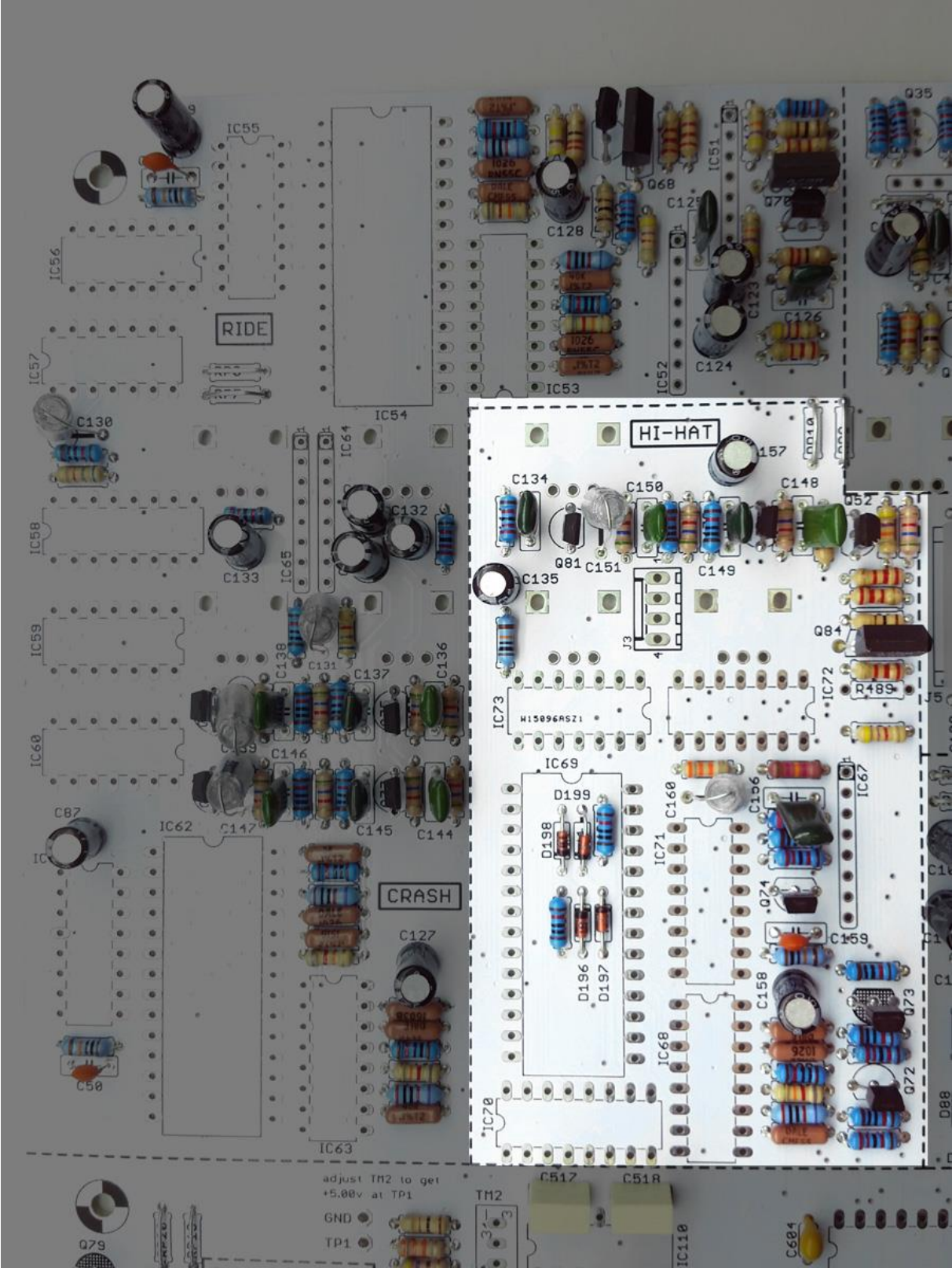


Add diodes. Diodes are polarized, the black ring must match the symbol silkscreened on the PCB.

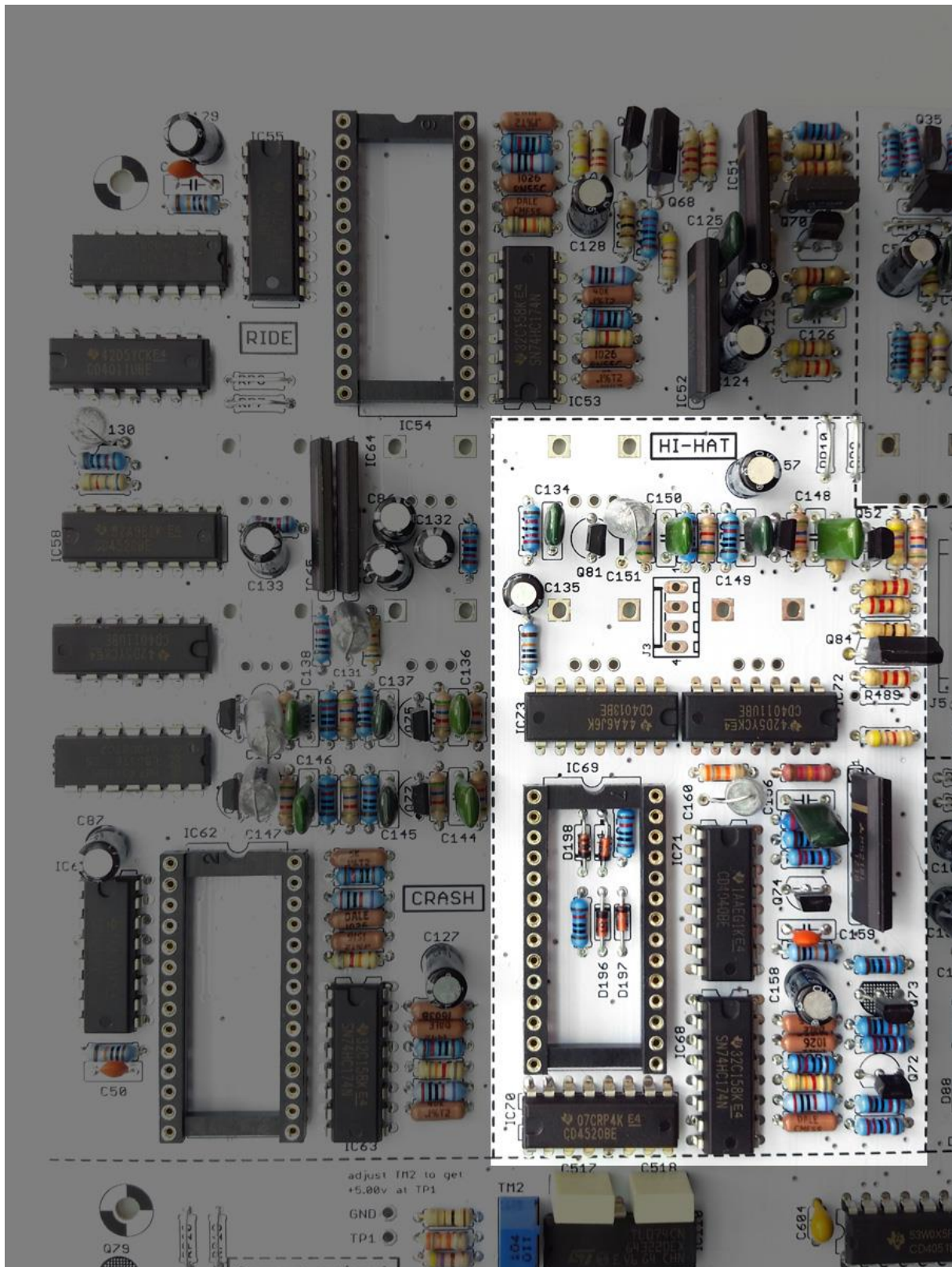




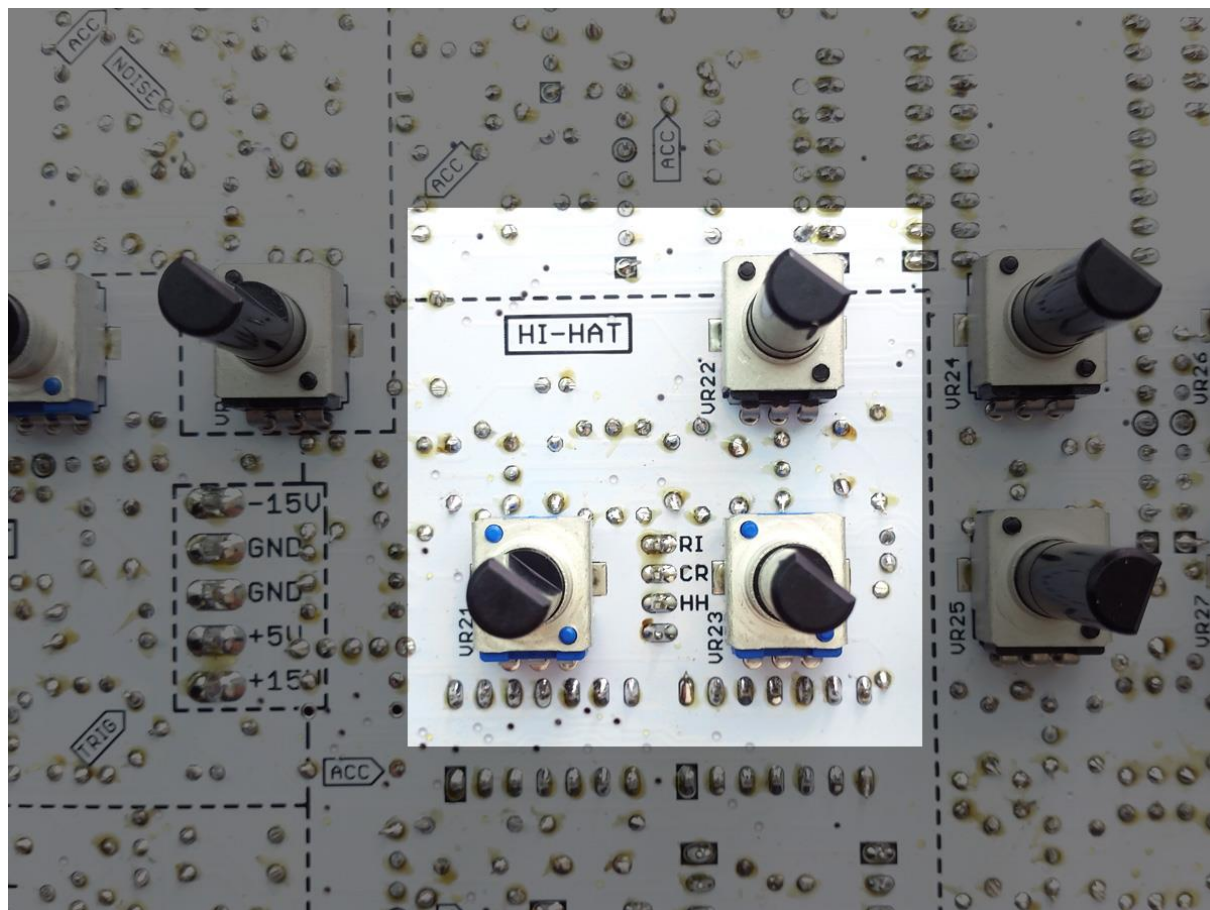
Now, add transistors. **Pay attention! There are three different type of transistor:2SA798, 2SA1115 and 2SC2603. Do not mix !**



Now, check hihat section power voltages and add ICs and 28 pins IC socket. **Do not overheat ICs pins during solder process!**



Finally, add potentiometers. **Pay attention to potentiometers value they are all different.** Then hihat section is finished, let's go to the [Ride/Crash](#) section.

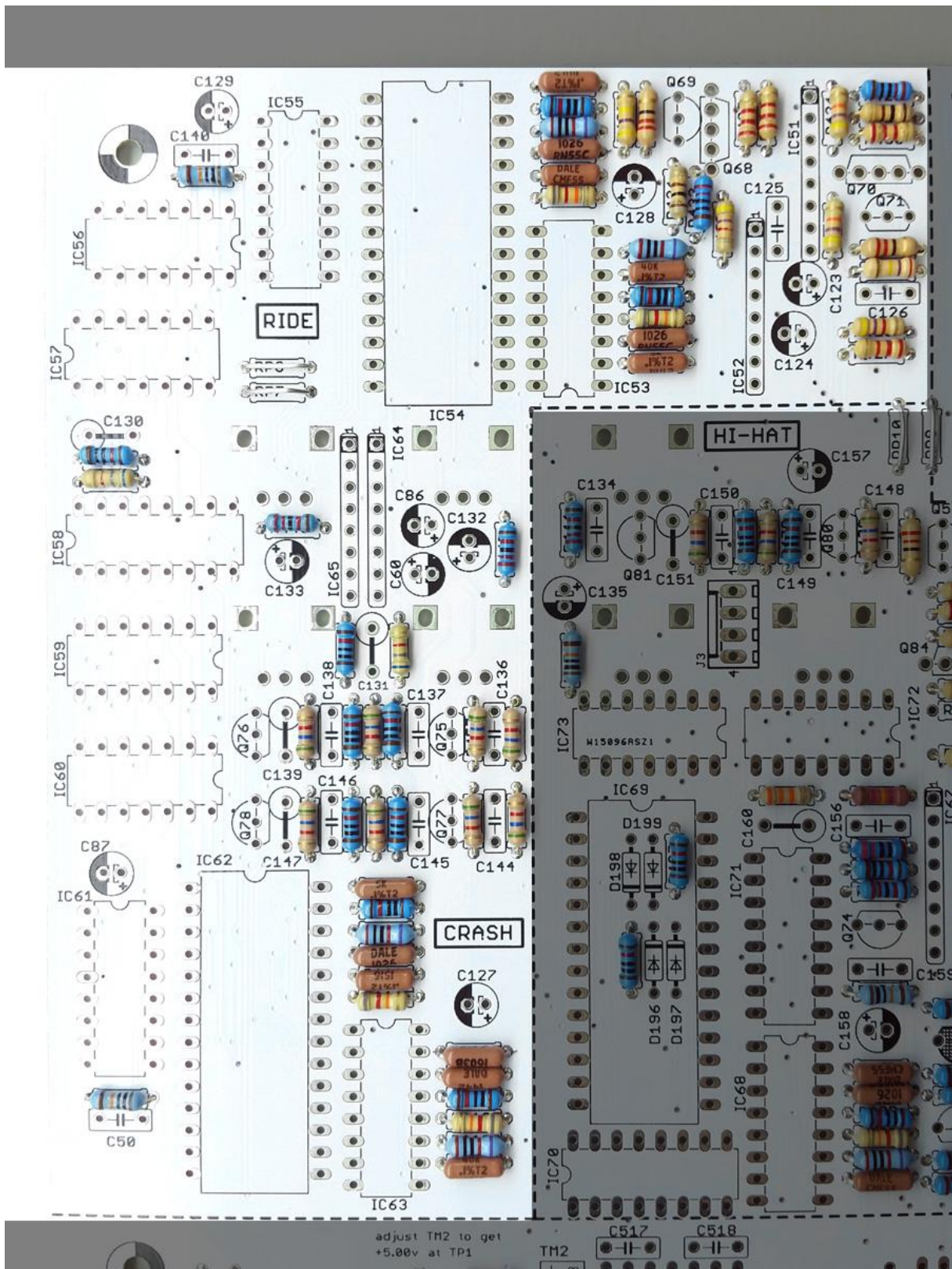


# Ride Crash

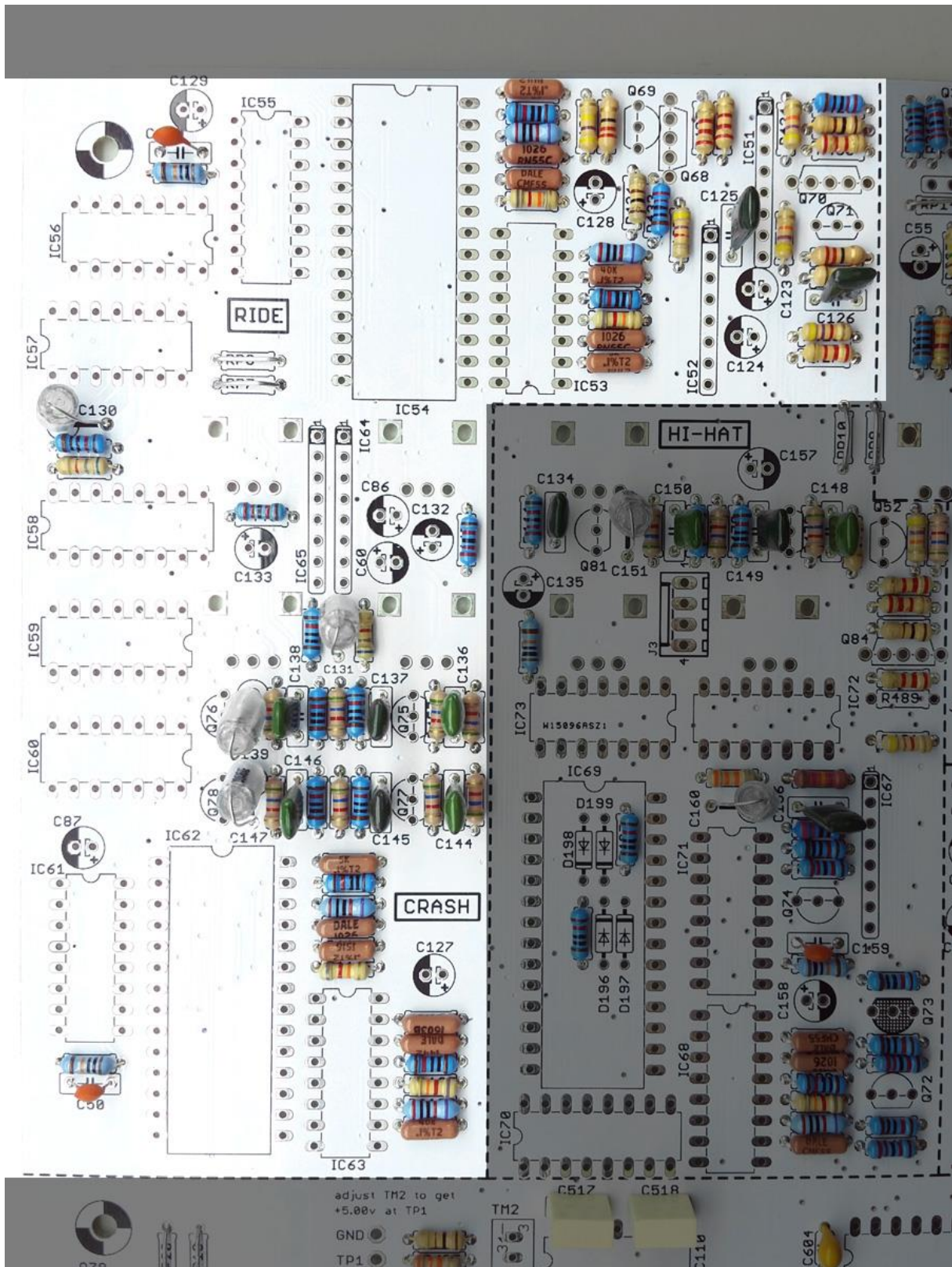
- Ride/Crash parts list

Nava v1.0 Ride parts list: 59 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
	<b>Ohm</b>			
RP7, RP8	0R	0207/7	2	
R436, R437	2.2K	0207/7	2	
R435	4.7K	0207/7	1	
R462, R463, R465, R467	5.6K	0207/7	4	
RA12A, RA13A	5K	0207/7	2	
R441	6.8K	0207/7	1	
R440, R464, R466, RA12B, RA13B	10K	0207/7	5	
RA12C, RA13C	20K	0207/7	2	
R446	22K	0207/7	1	
R438	22R	0207/7	1	
RA12D, RA13D	40K	0207/7	2	
R424	47K	0207/7	1	
RA12E, RA13E	80K	0207/7	2	
R188	100K	0207/7	1	
R434	100R	0207/7	1	
RA12F, RA13F	160K	0207/7	2	
R433	220R	0207/7	1	
R439	470K	0207/7	1	
<b>Capacitors</b>				
	<b>µF</b>			
C147	390p	C025_RE	1	Polystyren capacitor
C130	470p	C025_RE	1	Polystyren capacitor
C125, C145	0.001	C050-025X075	2	Film capacitor
C144	0.0012	C050-025X075	1	Film capacitor
C146	0.0027	C050-025X075	1	Film capacitor
C140	100p	C050-025X075	1	Ceramic disk capacitors
C123, C124, C128, C129, C133	10/16	E2-5	5	Electrolytic capacitor
<b>Transistors</b>				
Q68	2SA798	SIP-5	1	
Q69, Q77, Q78	2SC2603	TO92-ECB	3	
<b>Integrated circuits</b>				
IC57	4011UB	DIL14	1	
IC56	4013N	DIL14	1	
IC53	74HC174	DIL16	1	
IC55	4040N	DIL16	1	
IC58	4520N	DIL16	1	
IC54	27C256P	DIL28-6	1	
IC51, IC52, IC64	M5218	SIL8	3	
<b>Potentiometers</b>				
	<b>Ohm</b>			
VR27	10KB	EVUF	1	
VR26	50KB	EVUF	1	

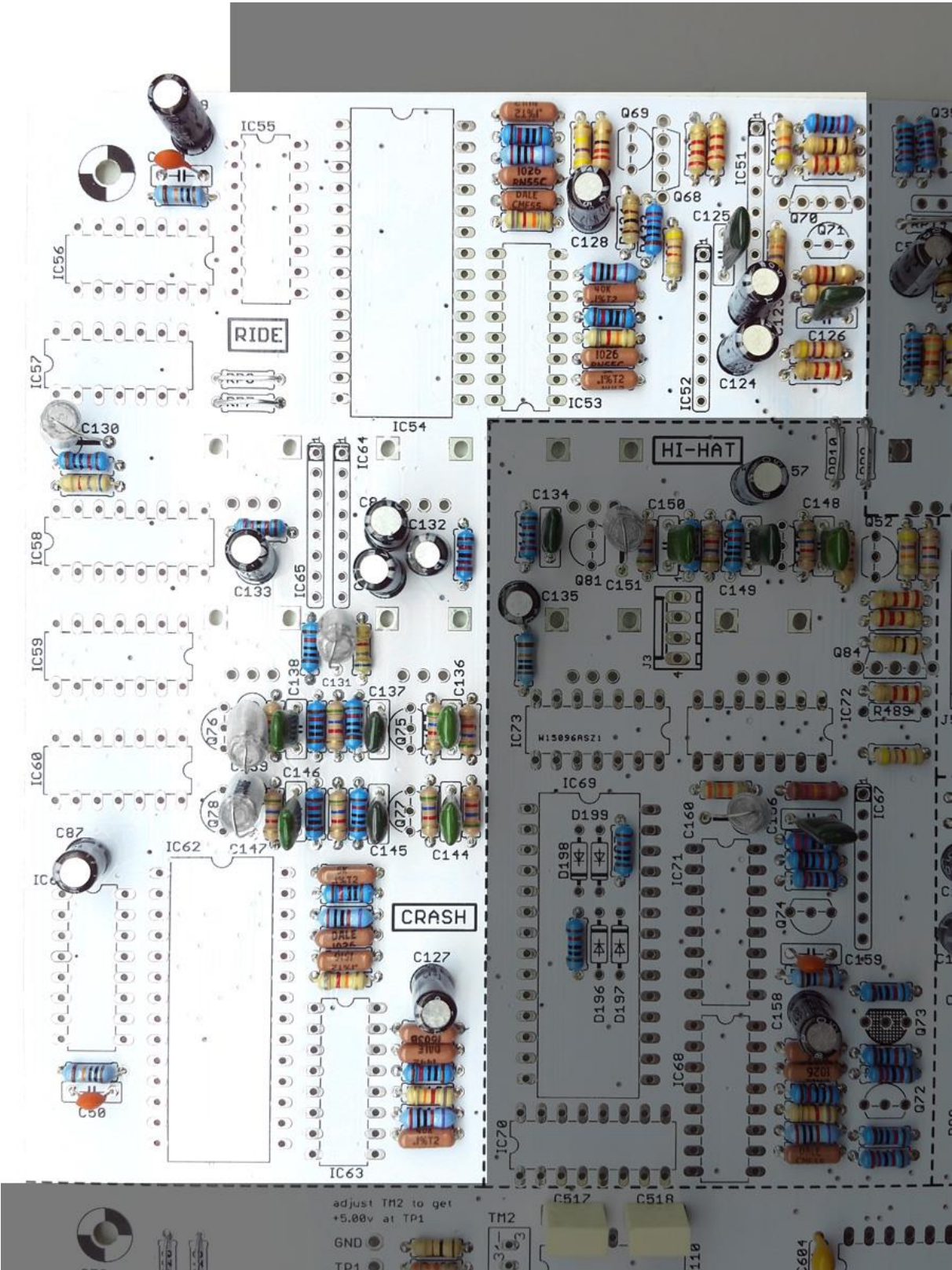
Let's continue with the ride crash section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors. RA10B, RA11B, RA12B, RA13B 10Kohm must be a resistor you measure at the beginning of assembly.



Add film capacitors. C130, C131, C139 and C147 must be polystyren capacitors.



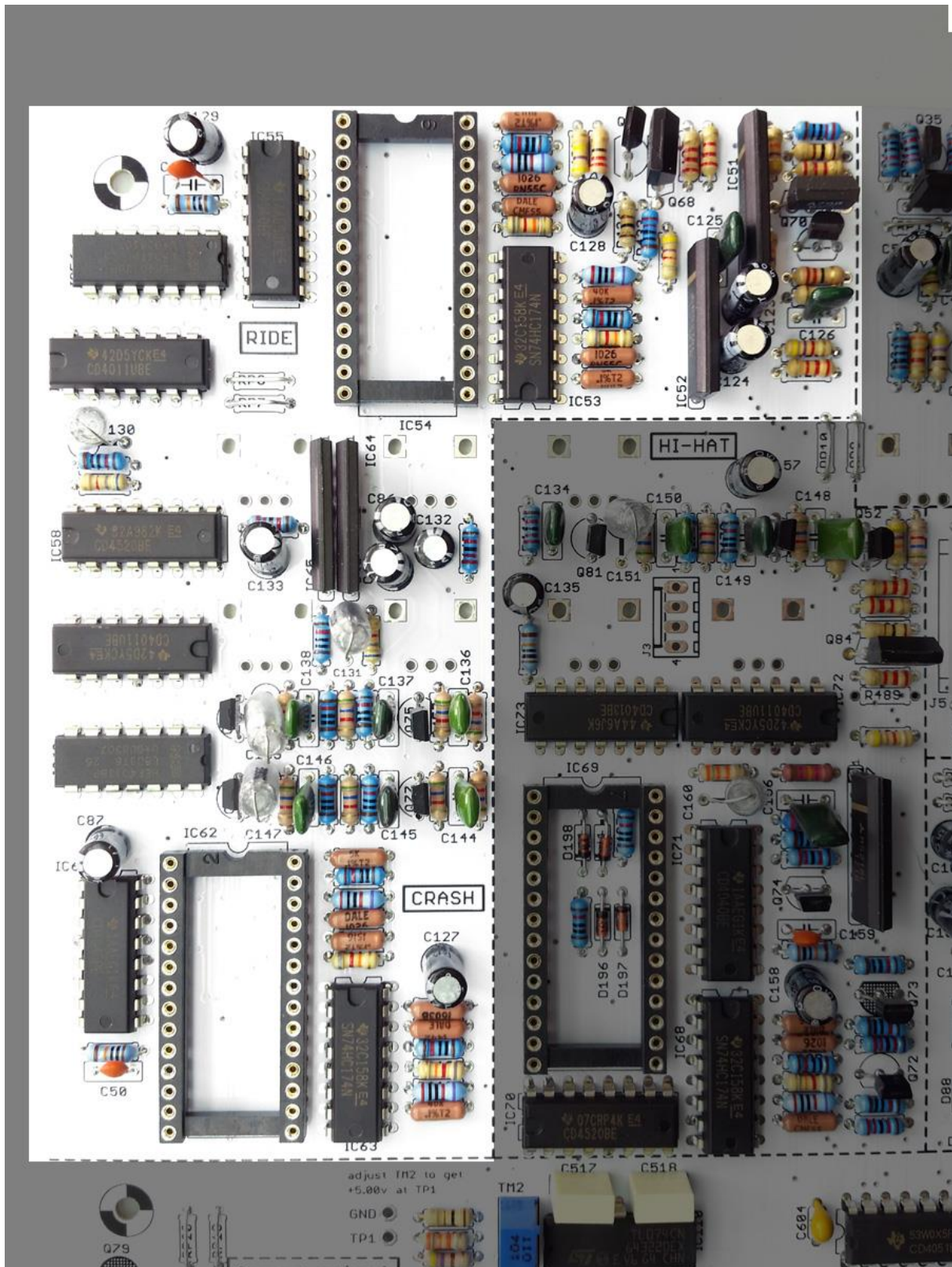
Add electrolytic capacitors. **Electrolytic capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytic capacitors. The black part on the silkscreened electrolytic capacitor symbol is negative.**



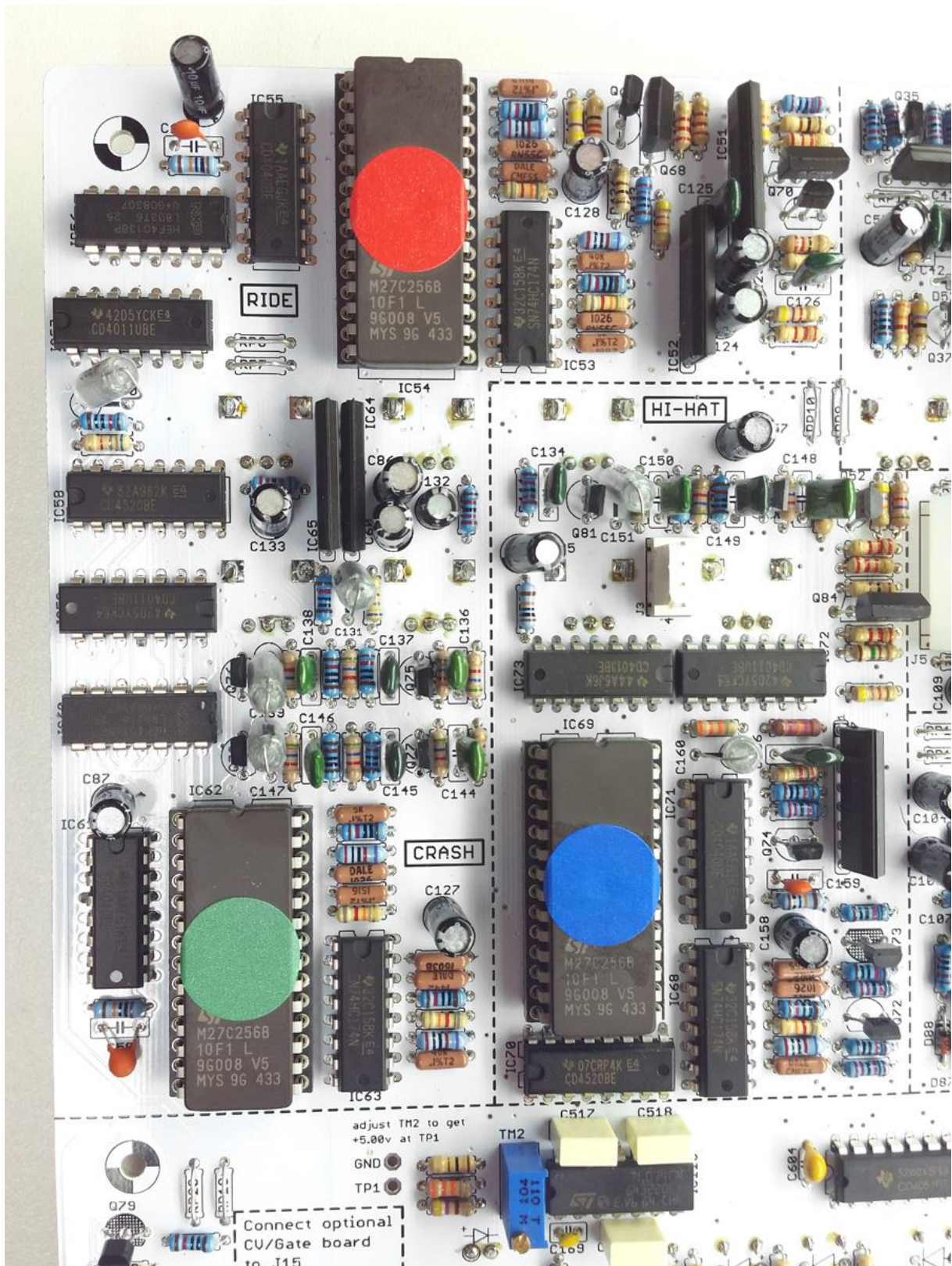




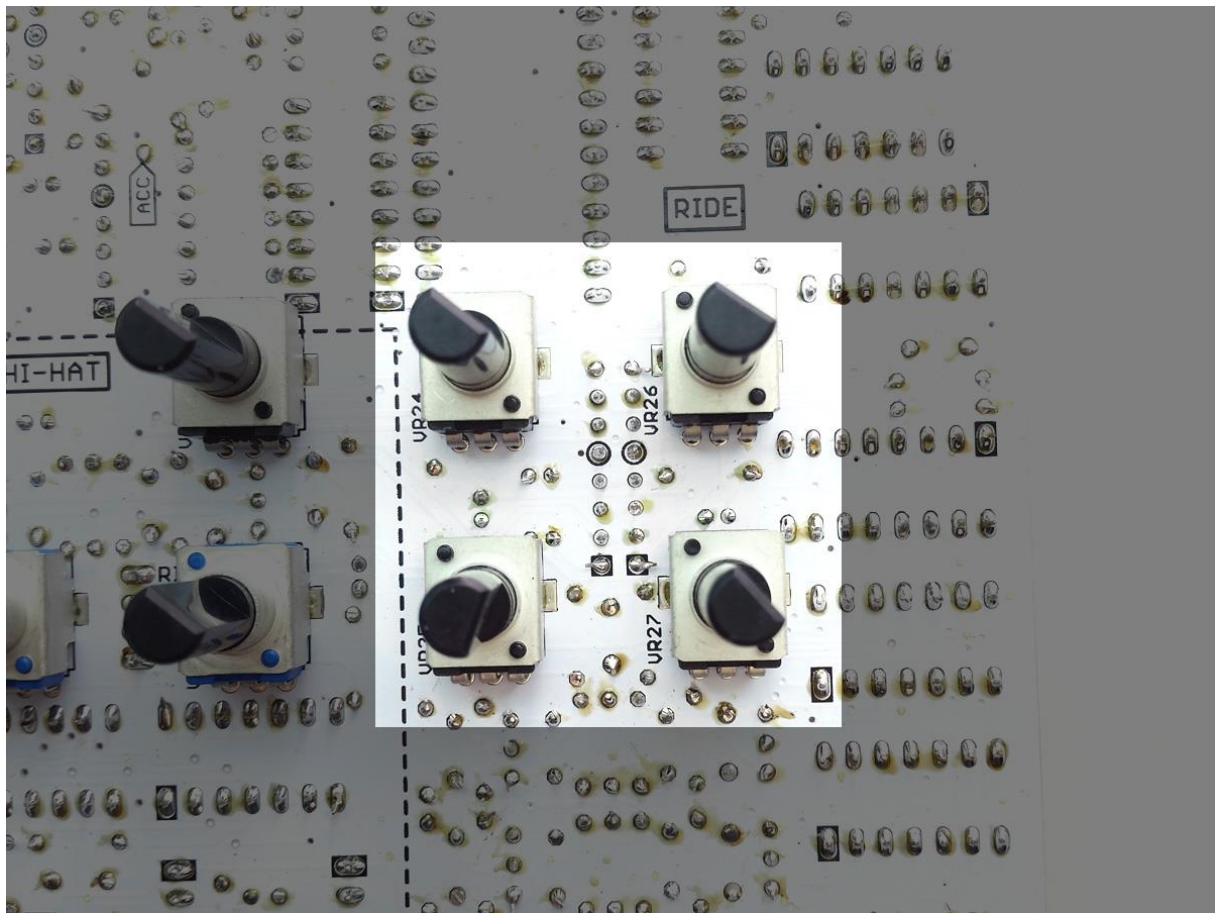
Now, check ride/crash section power voltages and add ICs and 28 pins IC sockets. **Do not overheat ICs pins during solder process!**



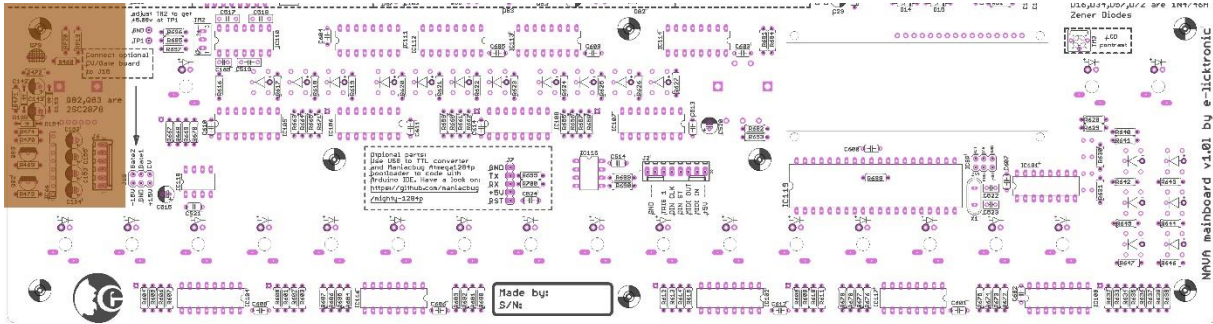
Add sound Eprom. Respect colour position. Each Eprom has different sound. You must bend 27C256 pins a little bit to fit in the socket.



Finally, add potentiometers. **Pay attention to potentiometers value they are all different.** Then ride /crash section is finished, let's go to the [sequencer](#) section.



# • Sequencer

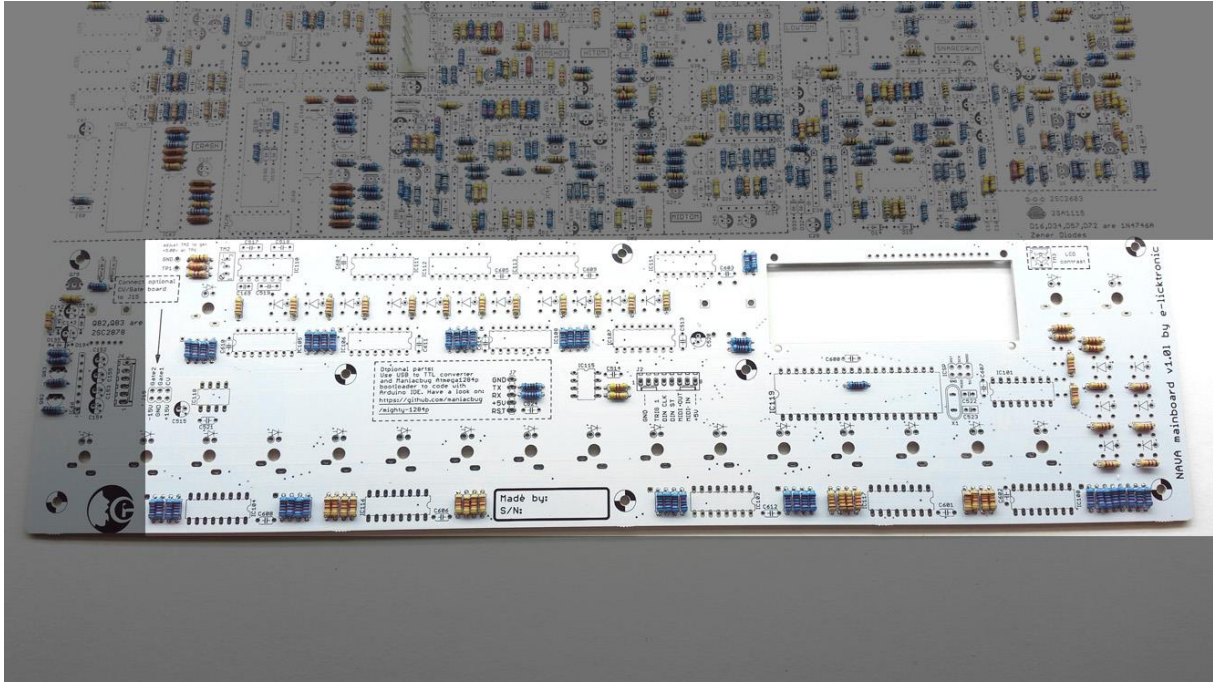


## • Sequencer parts list

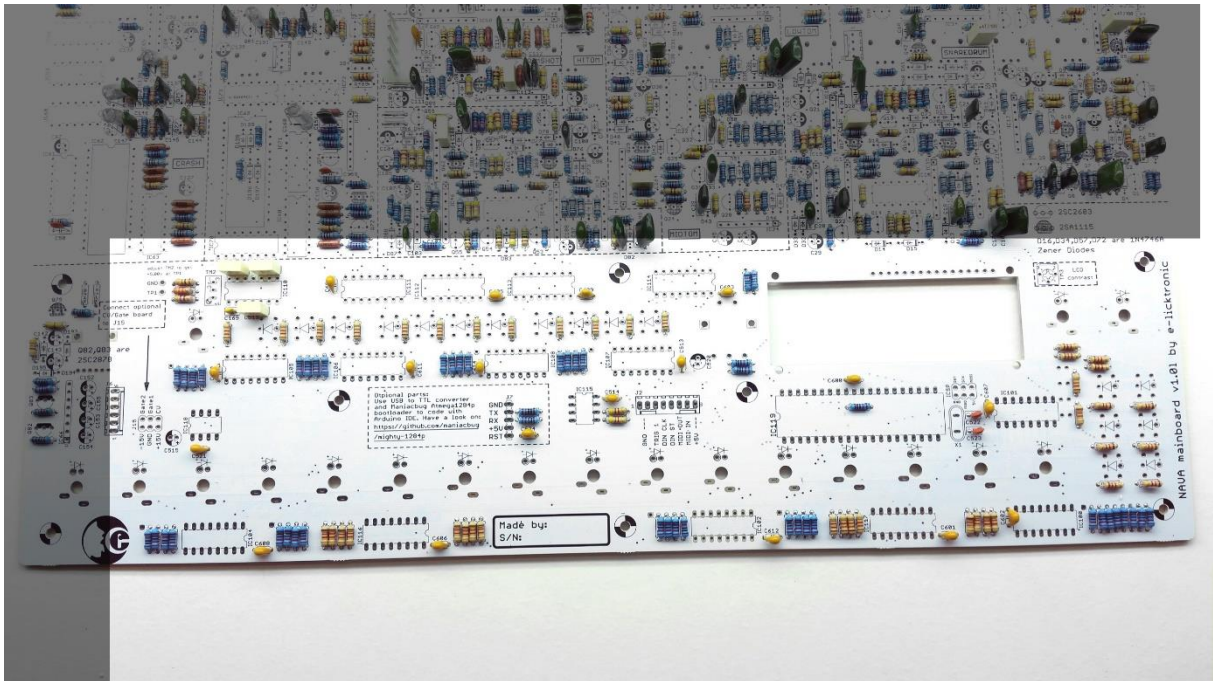
Nava v1.0 Sequencer parts list: 204 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
R616, R617, R618, R619, R620, R621, R622, R623, R624, R625, R626, R627, R628, R629, R630, R631, R640, R641, R642, R643, R644, R645, R646, R647, R672, R673, R674, R675, R676, R677, R678, R679, R680, R681, R682, R683, R684, R685, R686, R687, R694	Ohm			
R689, R690	1.2K	0207/7	41	Leds Resistors
R600, R601, R602, R603, R604, R605, R606, R607, R608, R609, R610, R611, R612, R613, R614, R615, R632, R633, R634, R635, R636, R637, R638, R639, R655, R656, R657, R658, R659, R660, R661, R662, R663, R664, R665, R667, R668, R669, R670, R671, R688, R691, R692, R693, R699, R700	4.7K	0207/7	2	
R695	10K	0207/7	46	
R696	33K	0207/7	1	
R697	100R	0207/7	1	
R697	470R	0207/7	1	
<b>Capacitors</b>				
C522, C523	µF			
C522, C523	22p	C025-025X050	2	Ceramic capacitor
C169	47p	C025-025X050	1	Ceramic capacitor
C513, C514, C521, C524, C600, C601, C602, C603, C604, C605, C606, C607, C608, C609, C610, C611, C612, C614	0.1	C050-024X044	18	Ceramic capacitor
C517, C518, C519	0.047	C050-025X075	3	Film capacitor
C515, C520	100/10	E2-5	2	Electrolytic capacitor
<b>Diodes</b>				
LED1, LED2, LED3, LED4		LED3MM	4	
S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19		LED3MM	19	cherry switches leds
<b>Switches</b>				
S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S17, S18, S19		MX1A-SW	19	
S20, S21, S22, S23, S24, S25, S26, S27, S28, S29, S30, S31, S32, S33, S34, S35, S36		SPH_SW	17	
<b>Integrated circuits</b>				
IC115	CAT24M01	DIL08	1	
IC118	MCP4822	DIL8	1	
IC110	TL074P	DIL14	1	
IC100, IC102, IC104, IC105, IC108	74HC165N	DIL16	5	
IC101, IC106, IC107, IC112, IC113, IC116, IC117	74HC595N	DIL16	7	
IC111, IC114	CD4051	DIL16	2	
IC119	ATMEGA12			
IC119	84P-20PU	DIL40	1	
<b>Connectors</b>				
ICSP, J15		MA03-2	2	
J7		MA05-1A	1	
J2		6410-08	1	
<b>Encoder</b>				
VR29	CODER	PEC16_ENCODER	1	
<b>Trimmers</b>				
TM2	100K	S64W	1	
TM3	10K	B25P	1	
<b>Crystal</b>				
X1	16MHz	QS	1	
<b>Connectors</b>				
DIS1		TUXGR_16X2_R2	1	LCD 16x2

If you get the v1.02 MainBoard, you don't need to solder IC111 and IC114 but both MUX\_SH board, refer to this [tutorial](#), IC110 (TL074) has been replaced by IC1 (TL072) and C517, C518 and C519 has been removed.

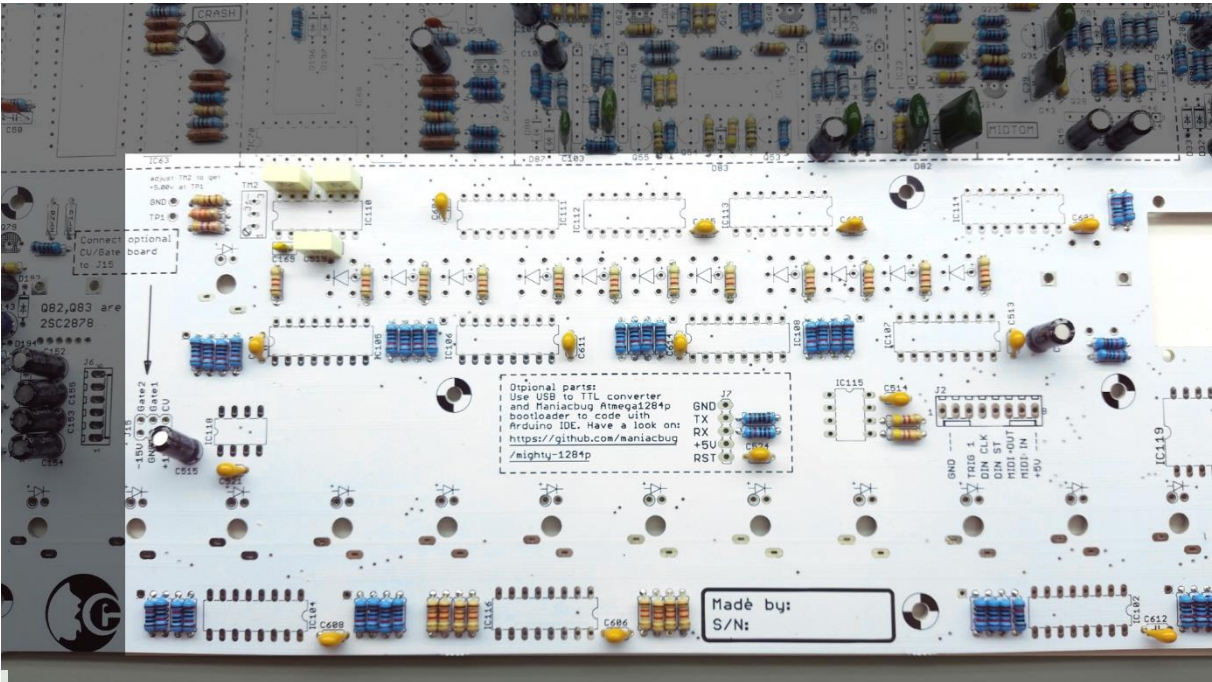
Let's continue with the big part sequencer section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.



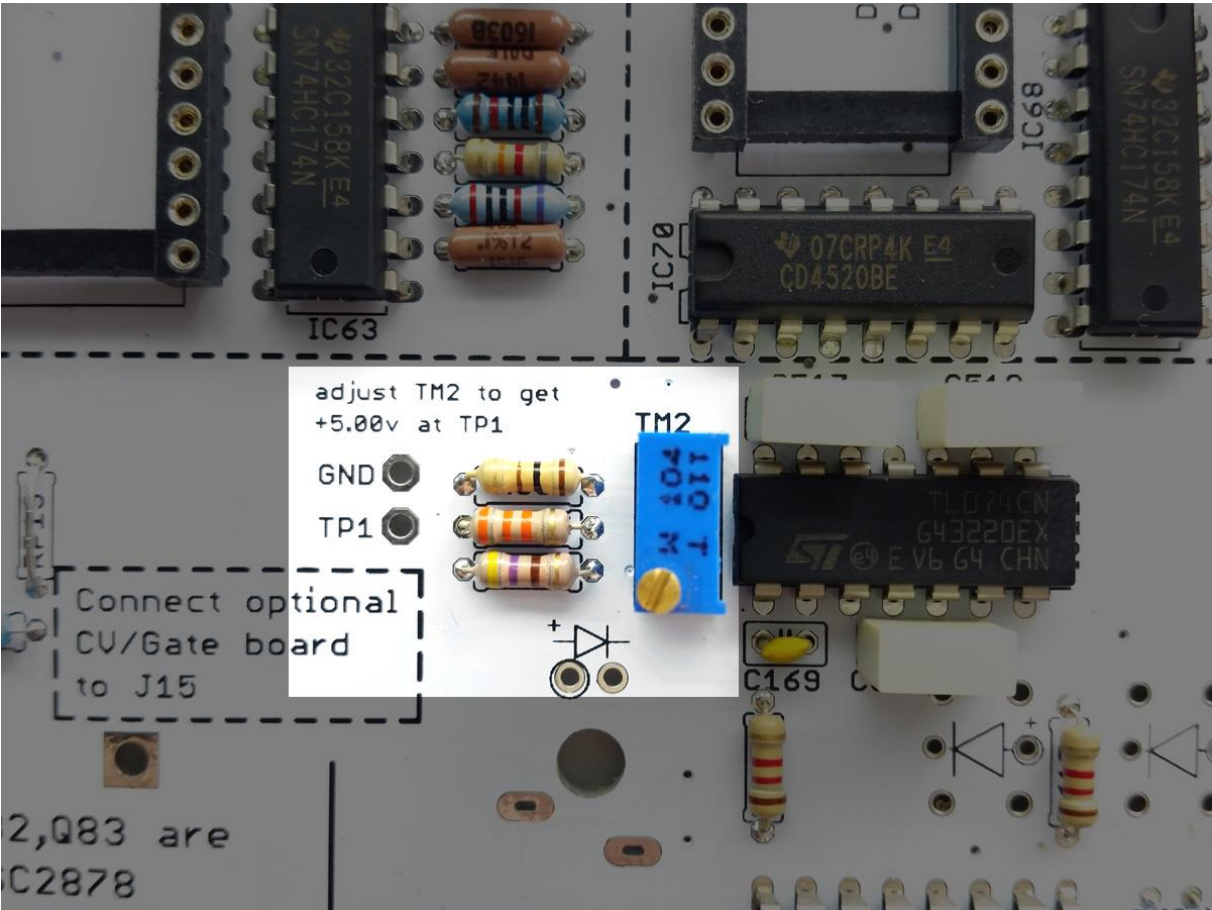
Add film and ceramic capacitors.

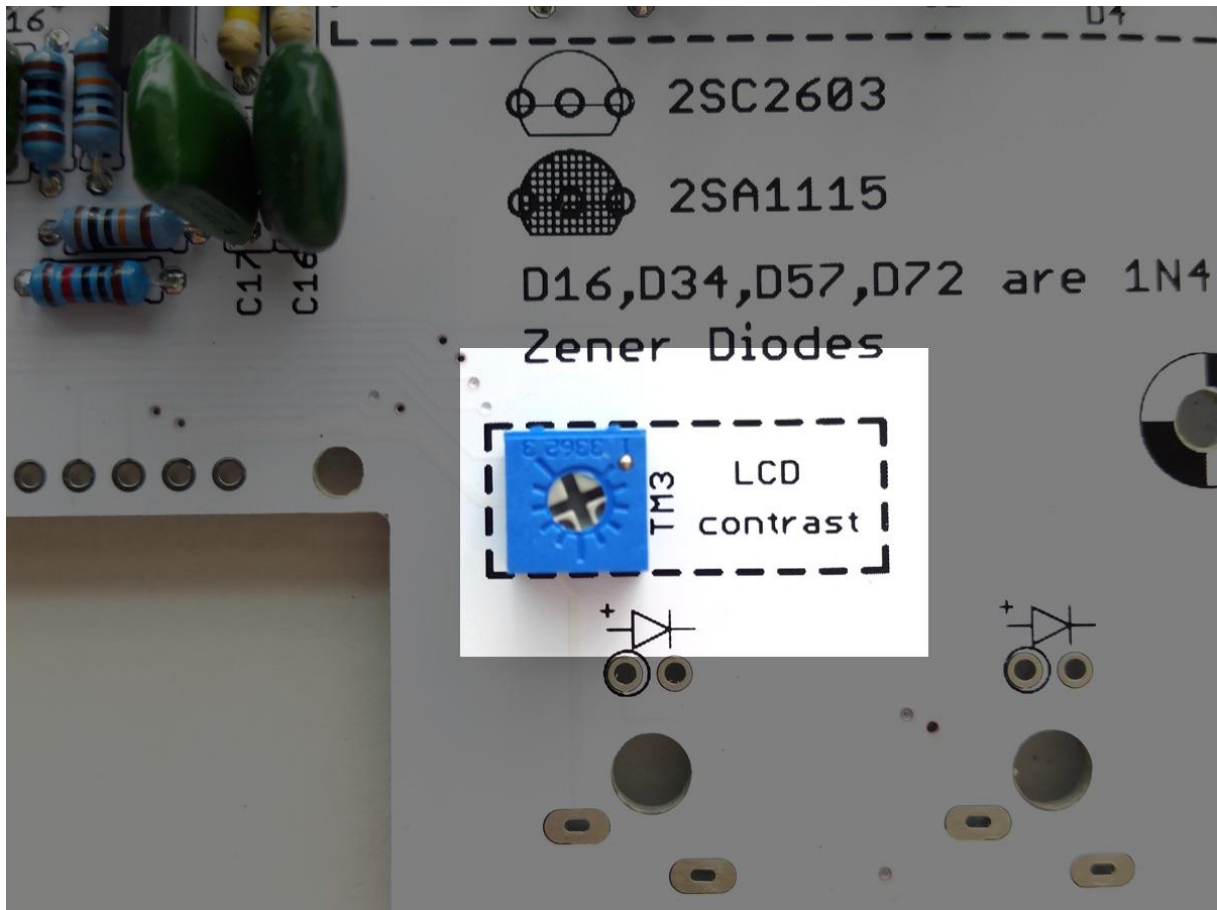


Add electrolytic capacitors. **Electrolytic capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytic capacitors. The black part on the silkscreened electrolytic capacitor symbol is negative.**

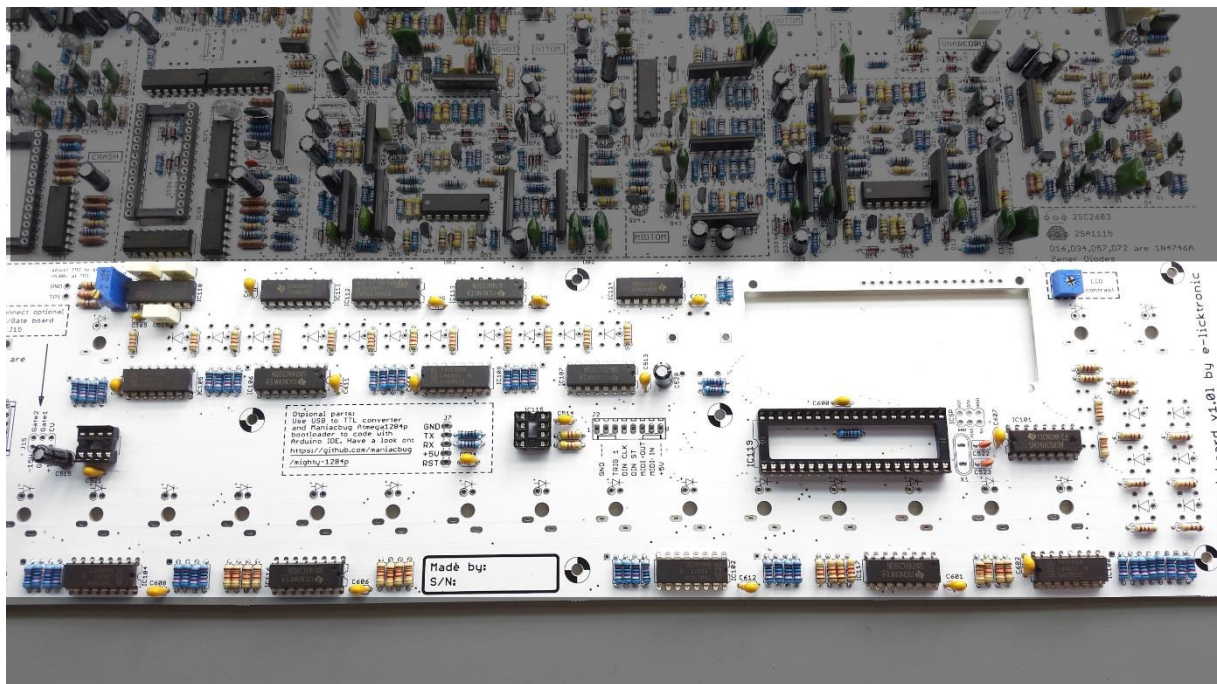


Add TM2 and TM3 trimmers. TM2 adjustment is explained in "[finished](#)" section

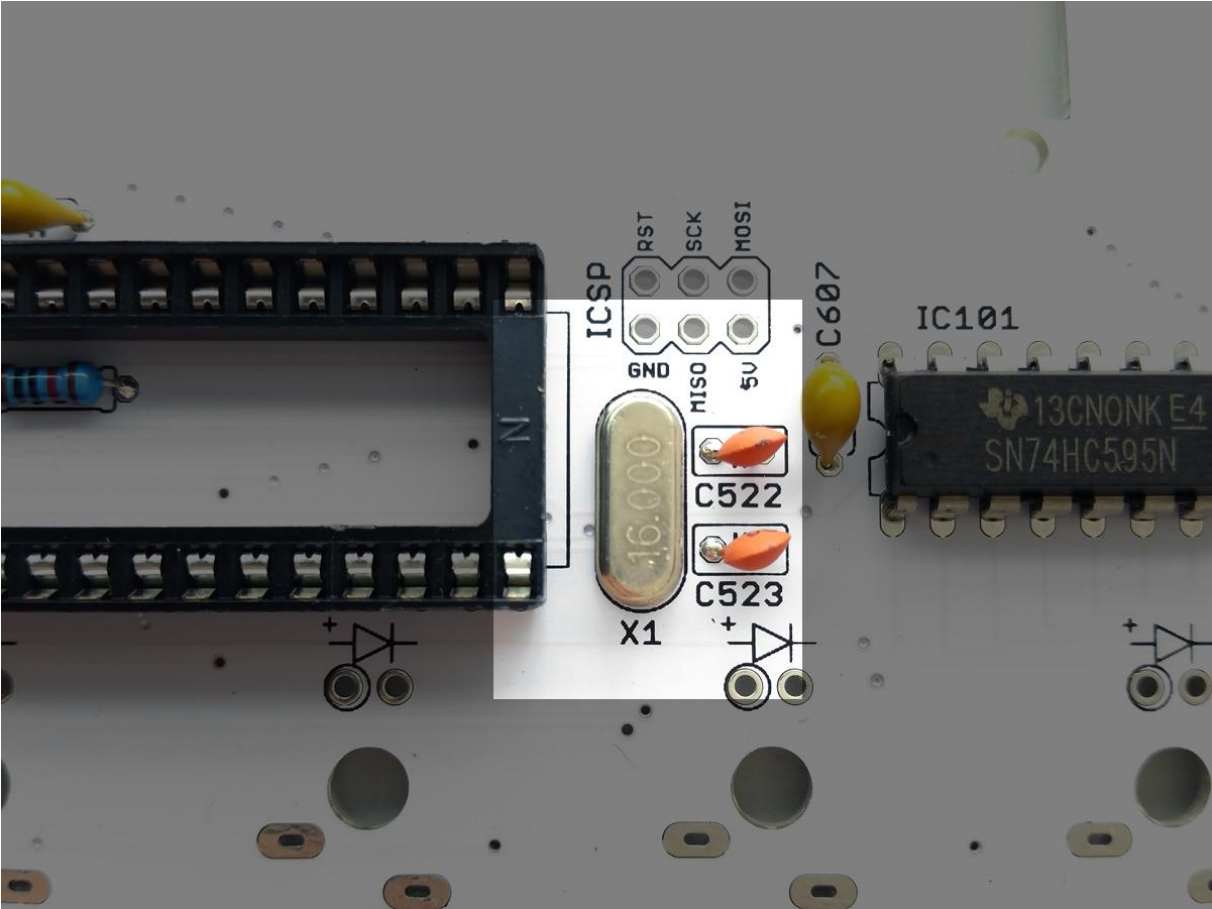




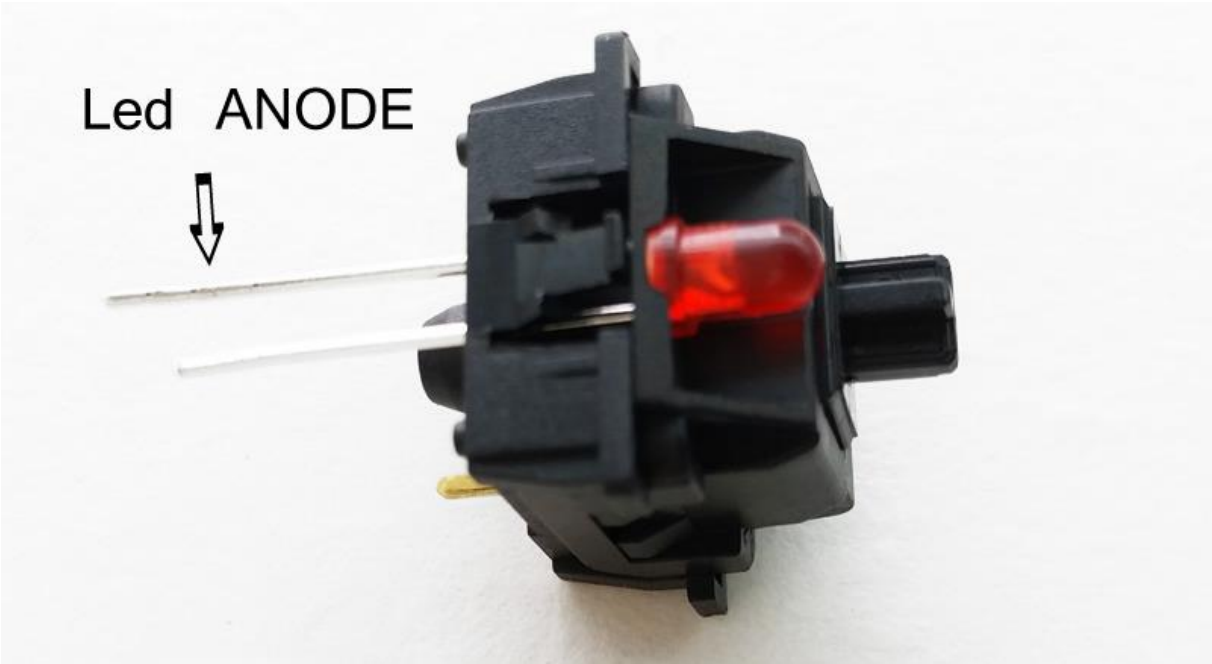
Now connect J2 to J10 (IO Board) to power sequencer section and check sequencer section power voltages (a square indicate +5v on each IC) and add ICs and sockets. **Do not overheat ICs pins during solder process!**



Add the 16Mhz crystal

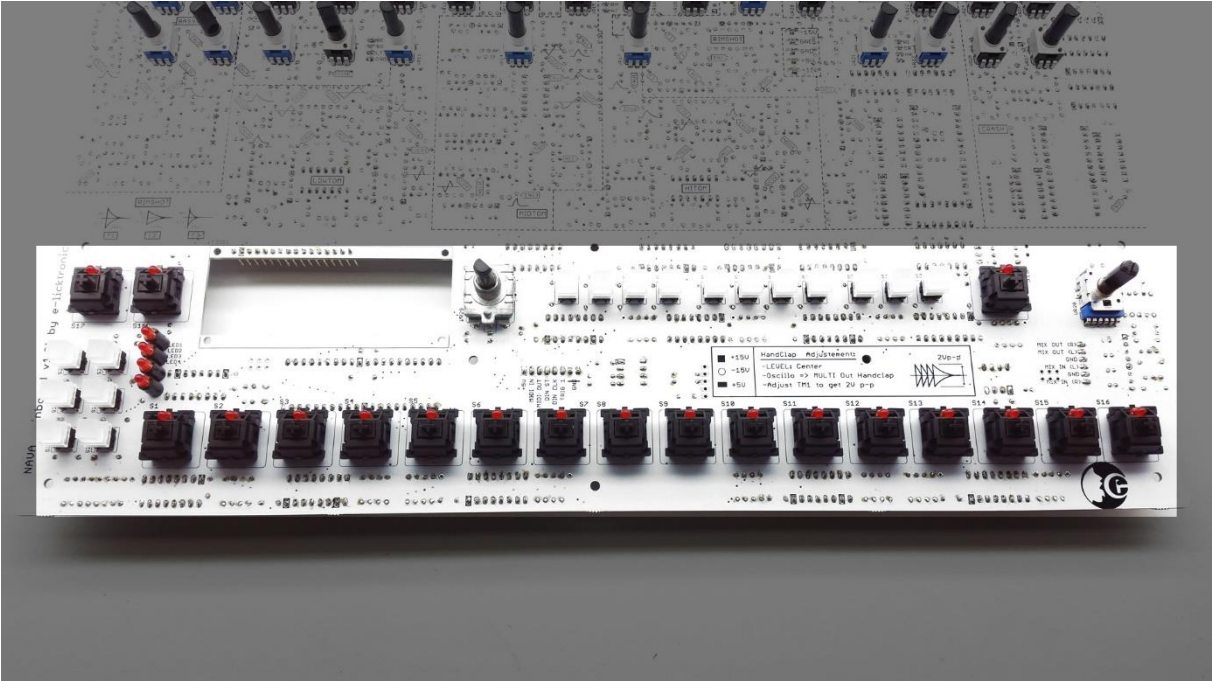
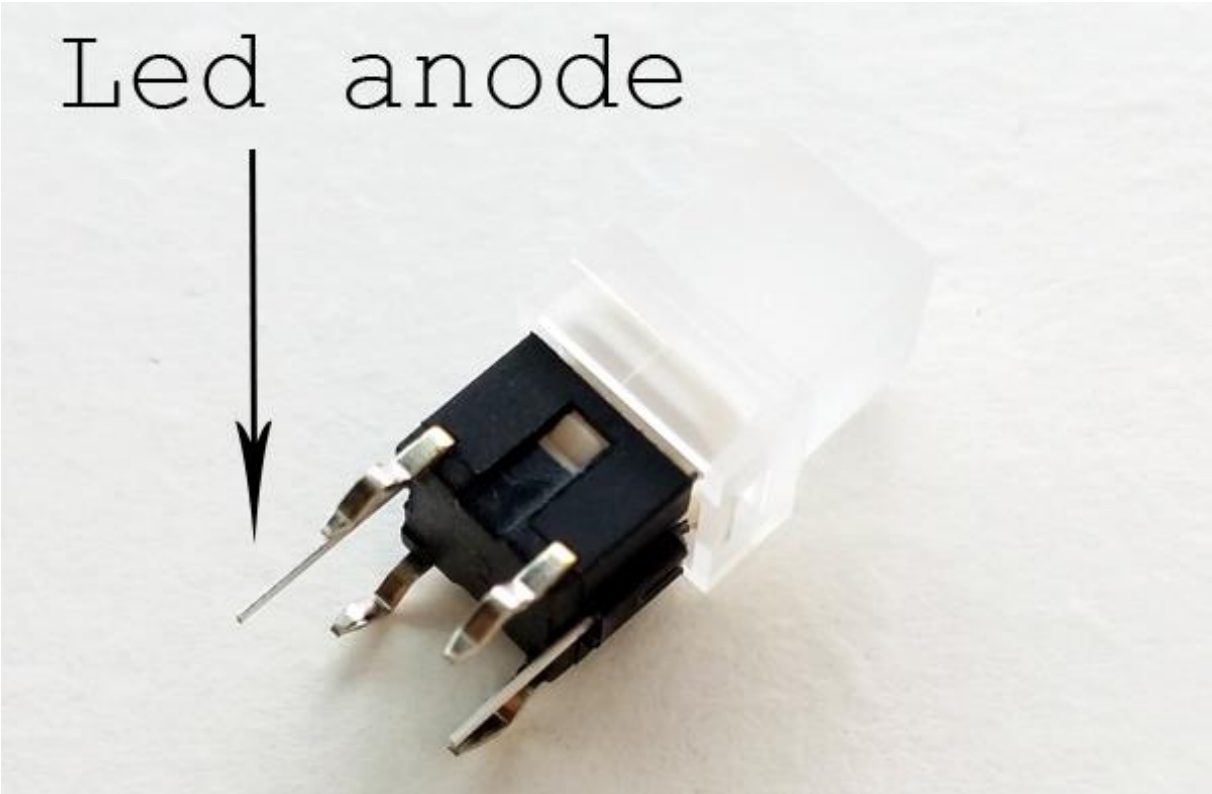


Thread red leds in the cherry switches like follow. **Respect the orientation of the leds.**



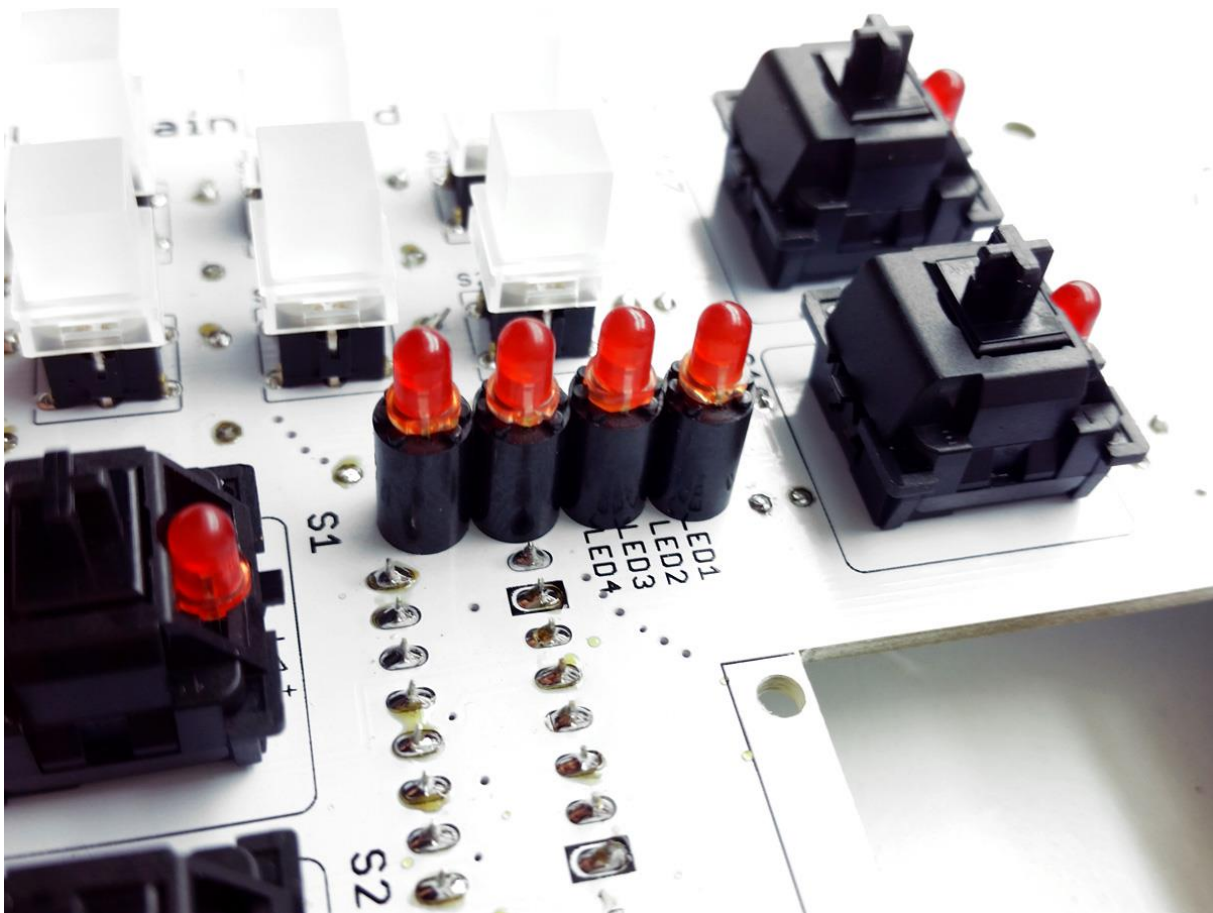


Add switches. **Pay attention to orientation of which you solder switches. Long legs must match with positive symbol on the silkscreen.**

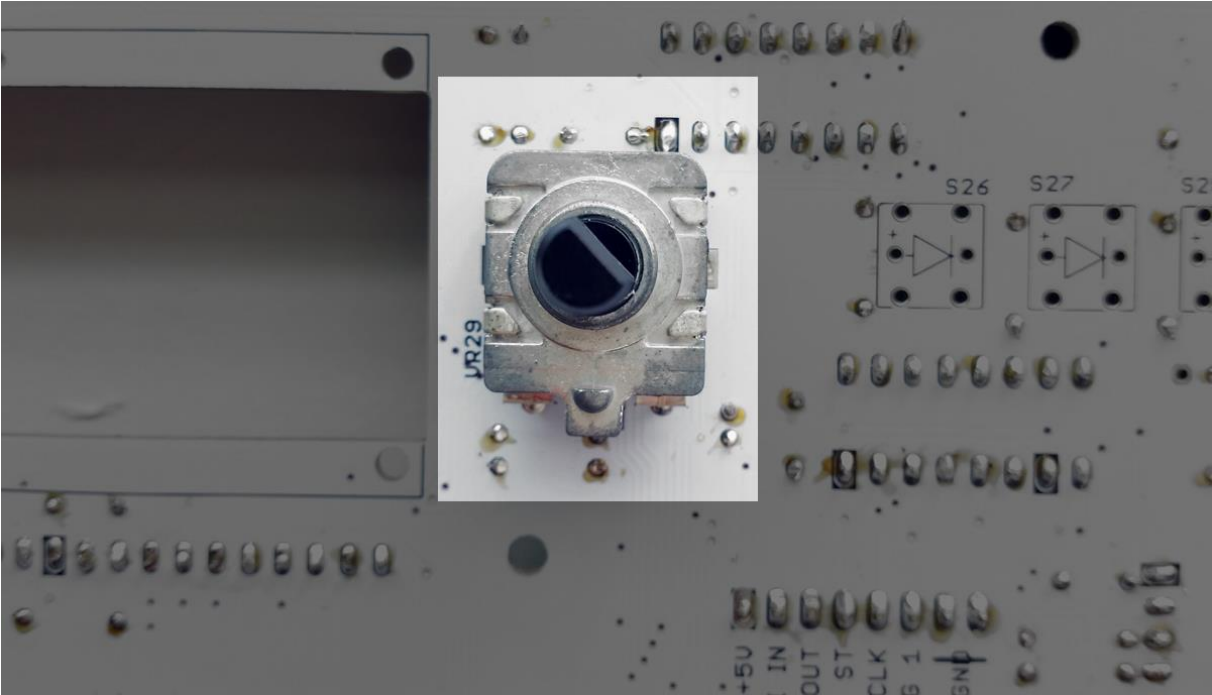


Add Leds. **Leds are polarized, the long legs must match the positive symbol silkscreened on the**

**PCB. First prepare led in the holder. Pay attention to plate the led holder on PCB.**

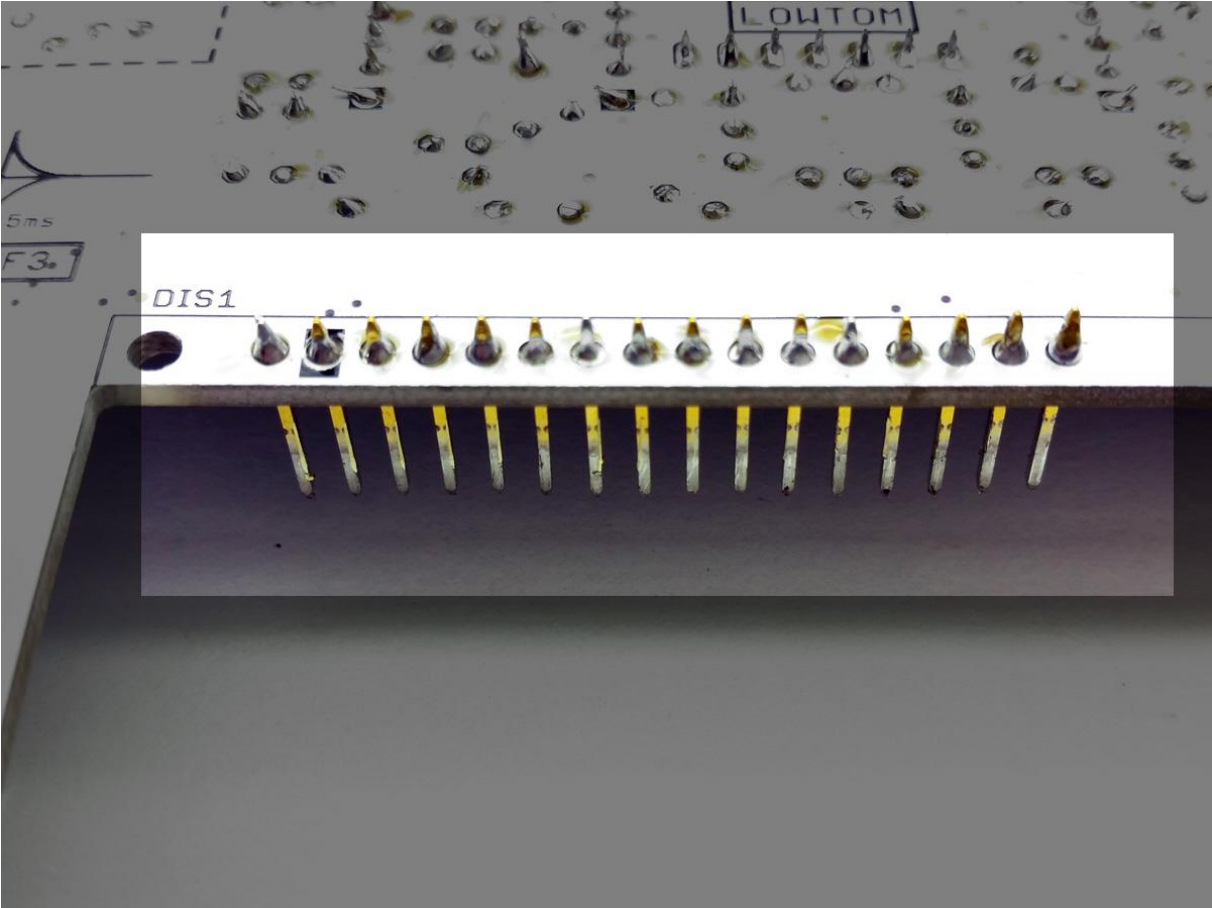


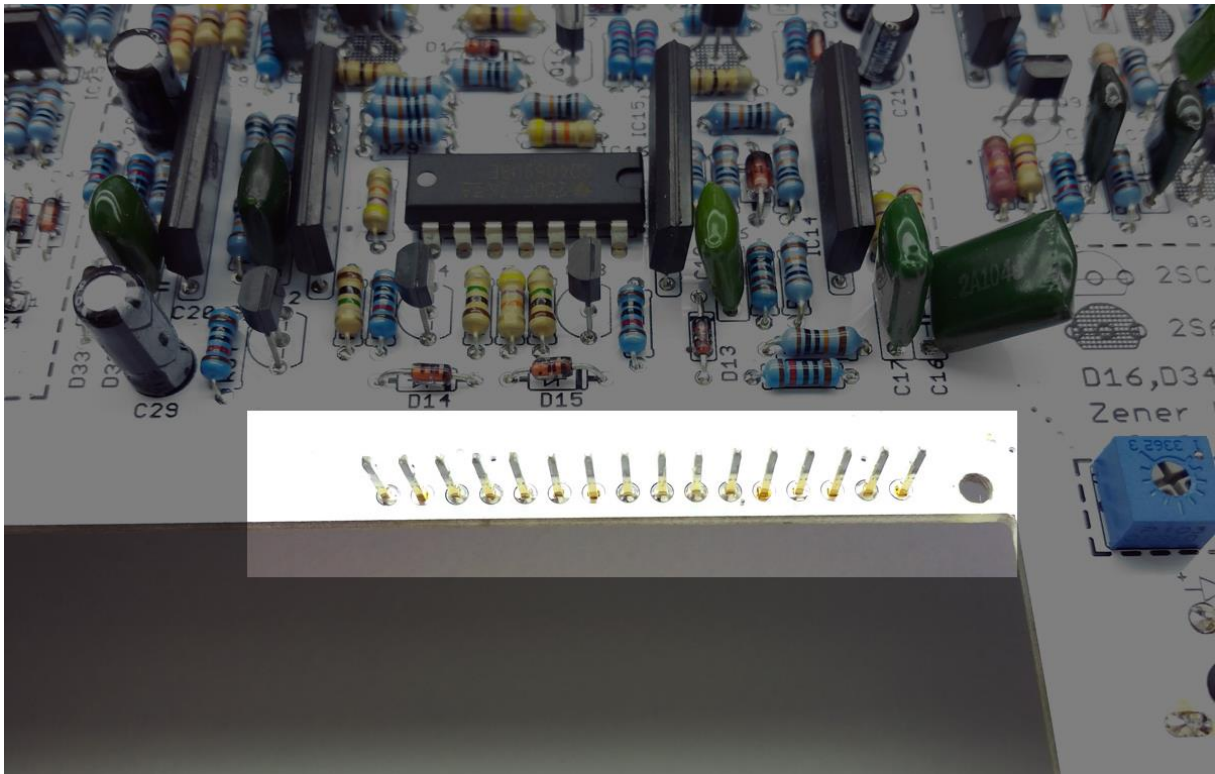
Add the encoder.



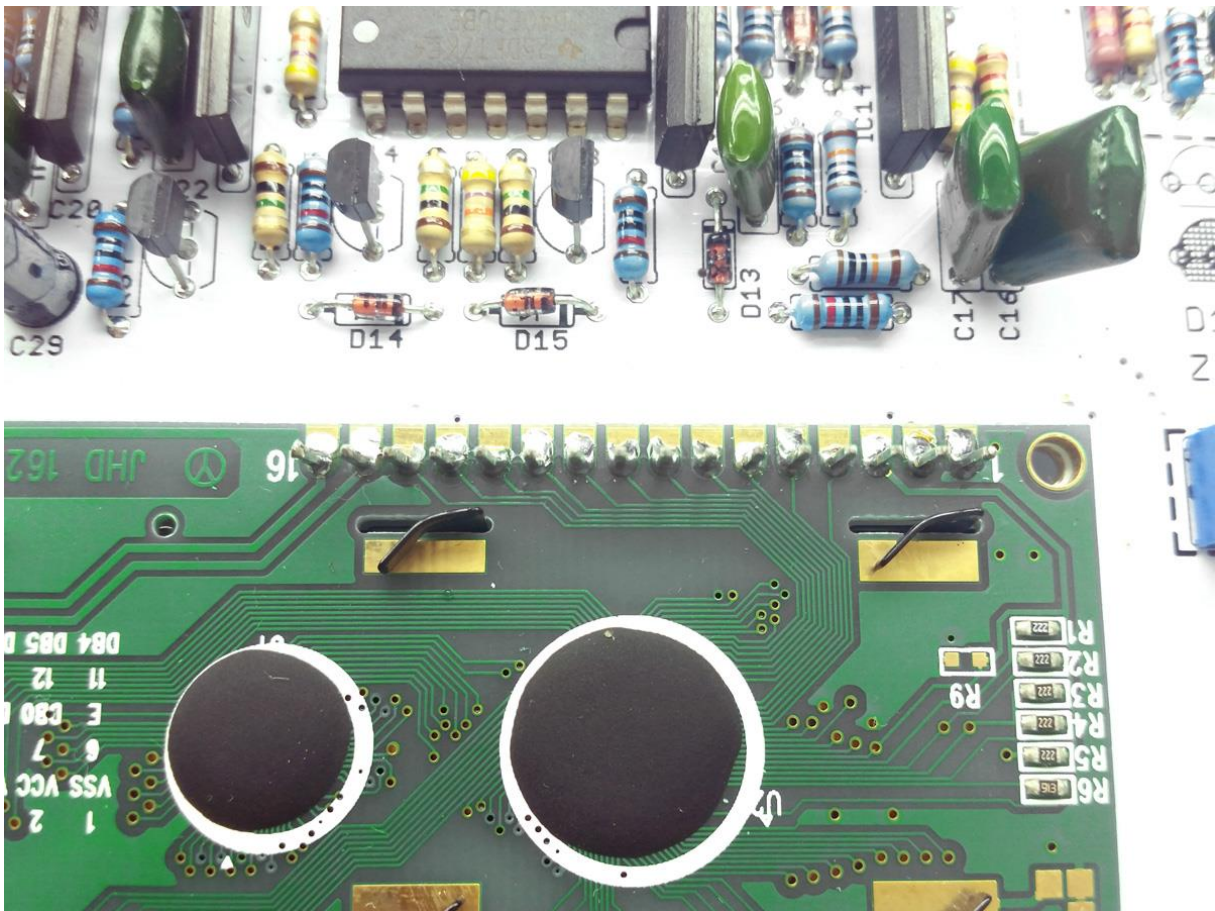
Add the LCD. If your LCD is more than 10mm thick you have to solder it on the top side like follow.

First solder pins. We use pins from a pin header.

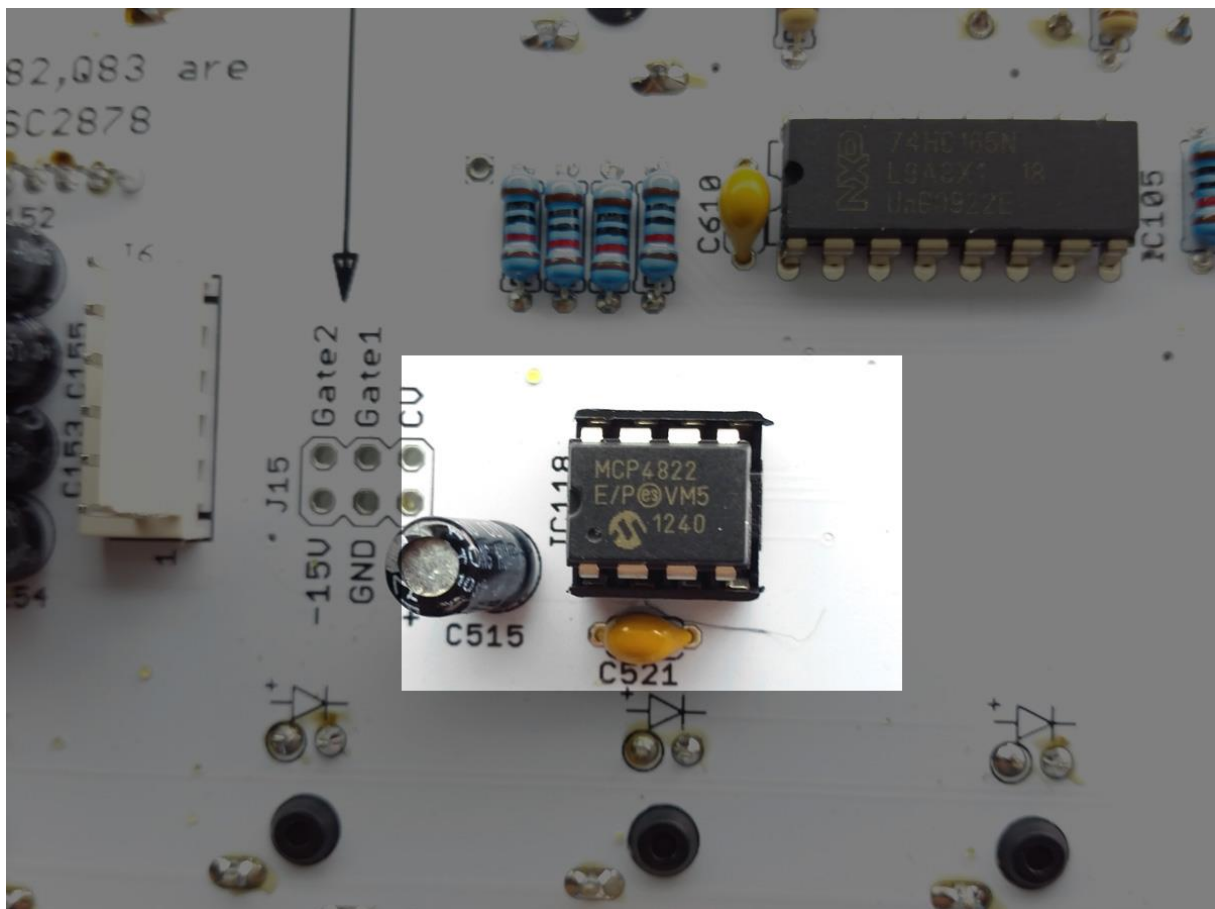
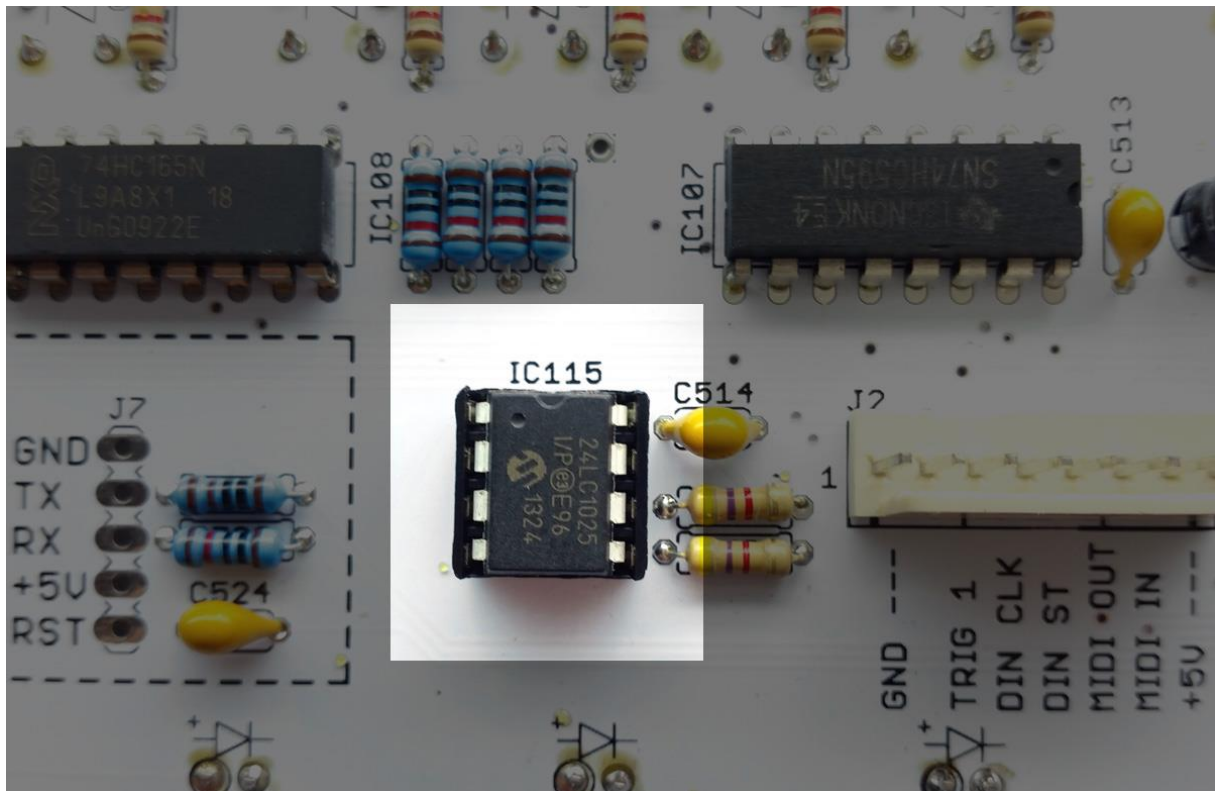


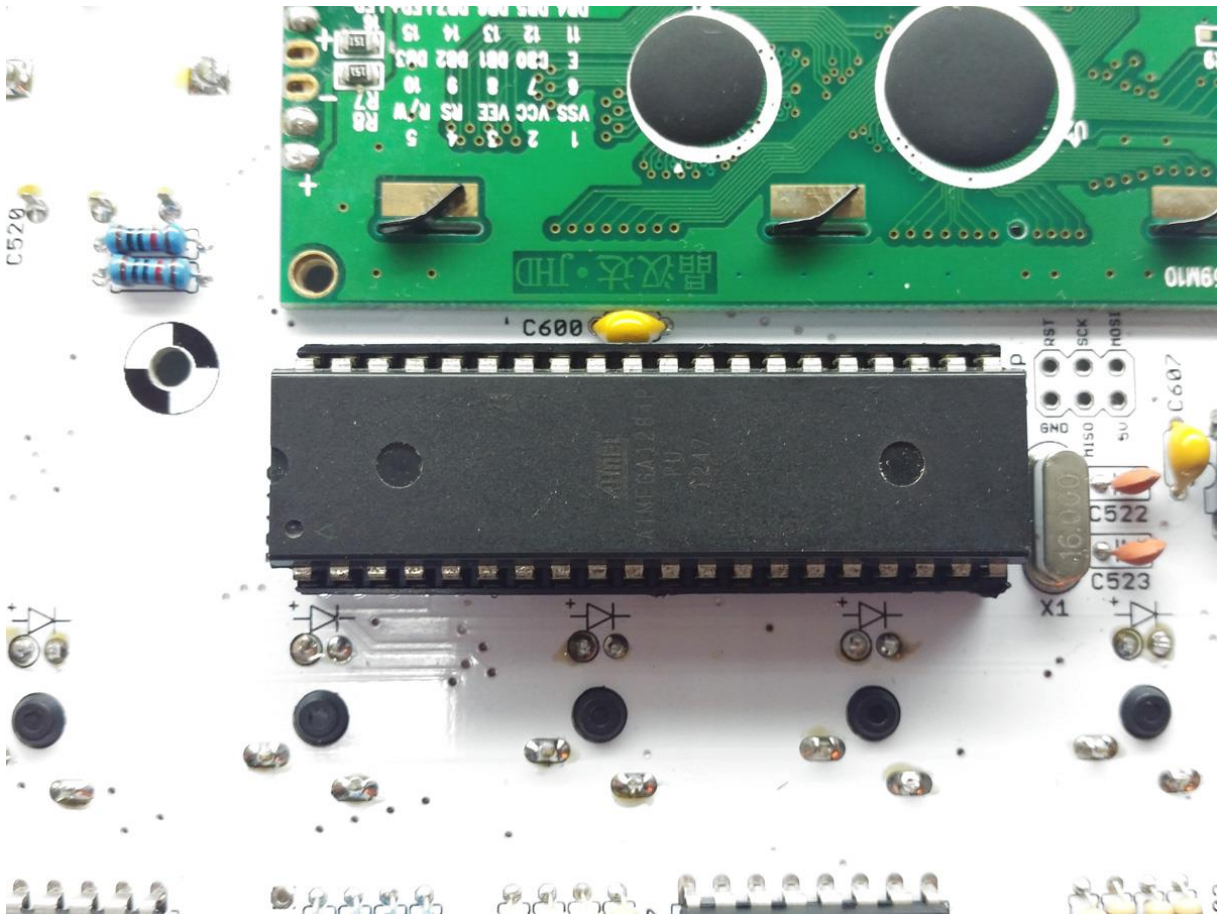


Then solder the LCD.



Finally, add ICs in our socket (EEPROM, DAC and CPU). Sequencer section is finished, let's go to the [IO board](#) section.



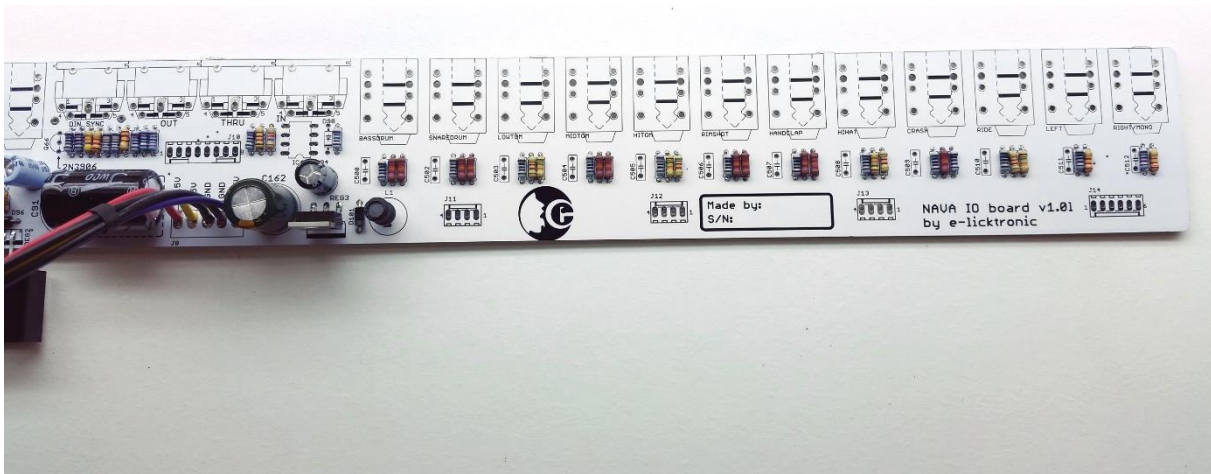


# . IO Board

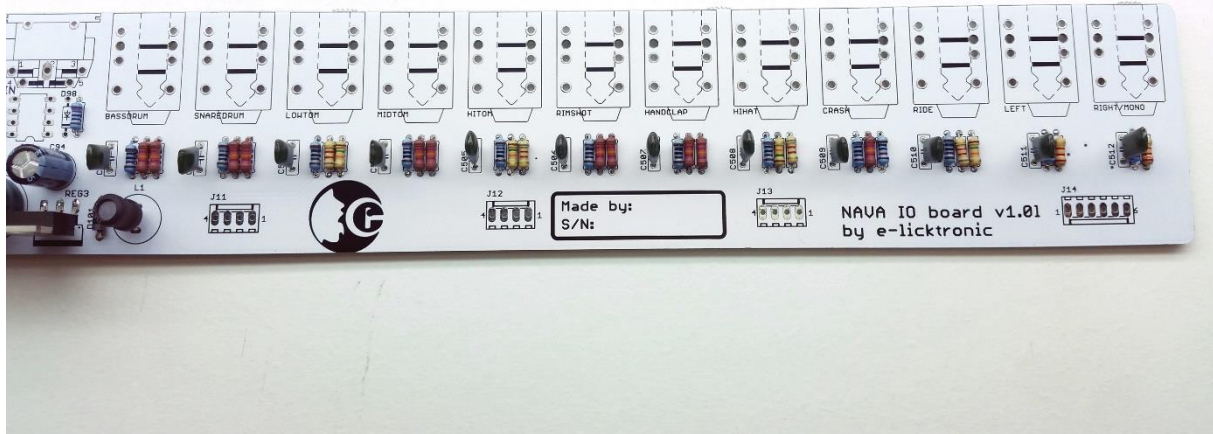
- IO Board parts list

Nava v1.0 IO board parts list: 85 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
R500, R503, R506, R509, R512, R515, R518, R521, R524, R527, R552	1K	0207/7	11	
R365	1.2K	0207/7	1	
R326, R327, R530, R532	2.2K	0207/7	4	
R314	5.6K	0207/7	1	
R507, R514, R523, R528	8.2K	0207/7	4	
R526, R531, R533	10K	0207/7	3	
R501, R502, R504, R505, R510, R511, R516, R517, R519, R520, R525	12K	0207/7	11	
R508, R513, R522, R529	15K	0207/7	4	
R551	22K	0207/7	1	
R550	47K	0207/7	1	
R328, R330	100K	0207/7	2	
R315, R316, R317, R318, R319	220R	0207/7	5	
<b>Capacitors</b>				
µF				
C500, C502, C503, C504, C505, C506, C507, C508, C509, C510, C511, C512	0.01	C050-025X075	12	Film capacitor
<b>Diodes</b>				
D98	1N4148	DO35-7C	1	
<b>Transistors</b>				
Q66	2N3906	TO92-EBC-SMALL	1	
<b>Integrated circuits</b>				
IC4	6N138	DIL08	1	
<b>Connectors</b>				
J11, J12, J13		6410-04	3	
J14		6410-06	1	
J10		6410-08	1	
DIN_SYNC, IN, OUT, THRU		MAB5SH	4	
BASSDRUM, CRASH, HANDCLAP, HIHAT, HITOM, LEFT, LOWTOM, MIDTOM, RIDE, RIGHT/MONO, RIMSHOT, SNAREDRUM, TRIG1		JACK_TRS	13	

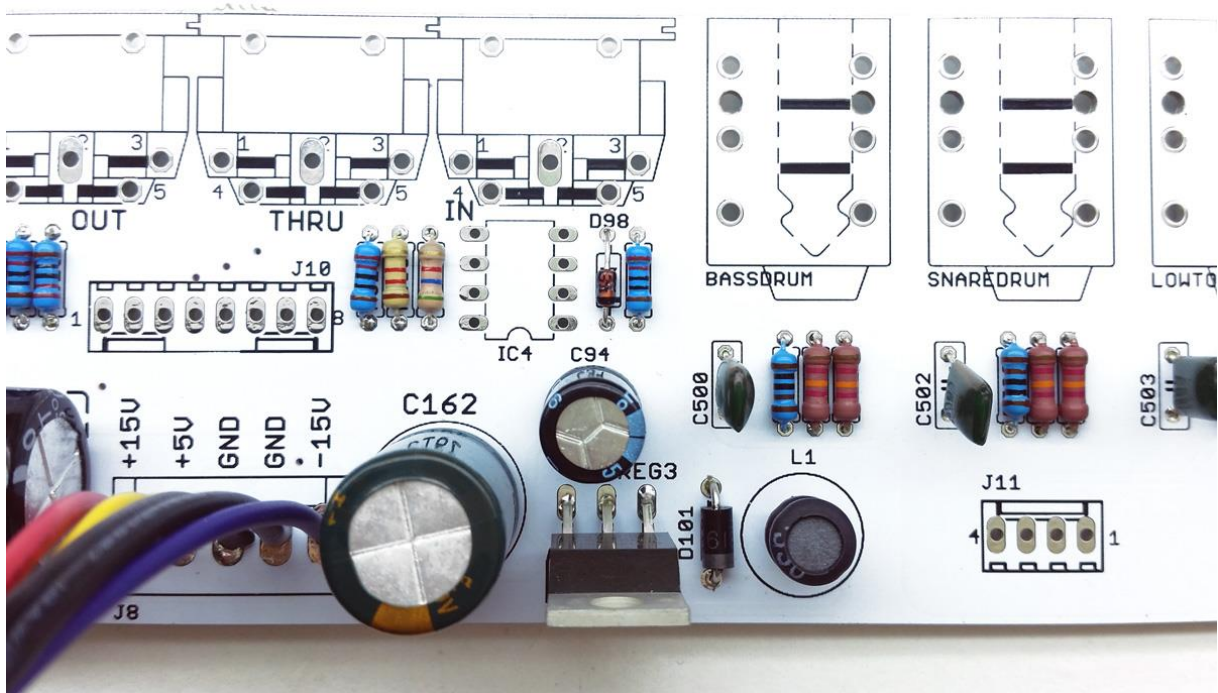
Let's continue with the IO board section. First add resistors. Do not pay attention of resistors type on the picture you certainly have different resistors.



Add film capacitors

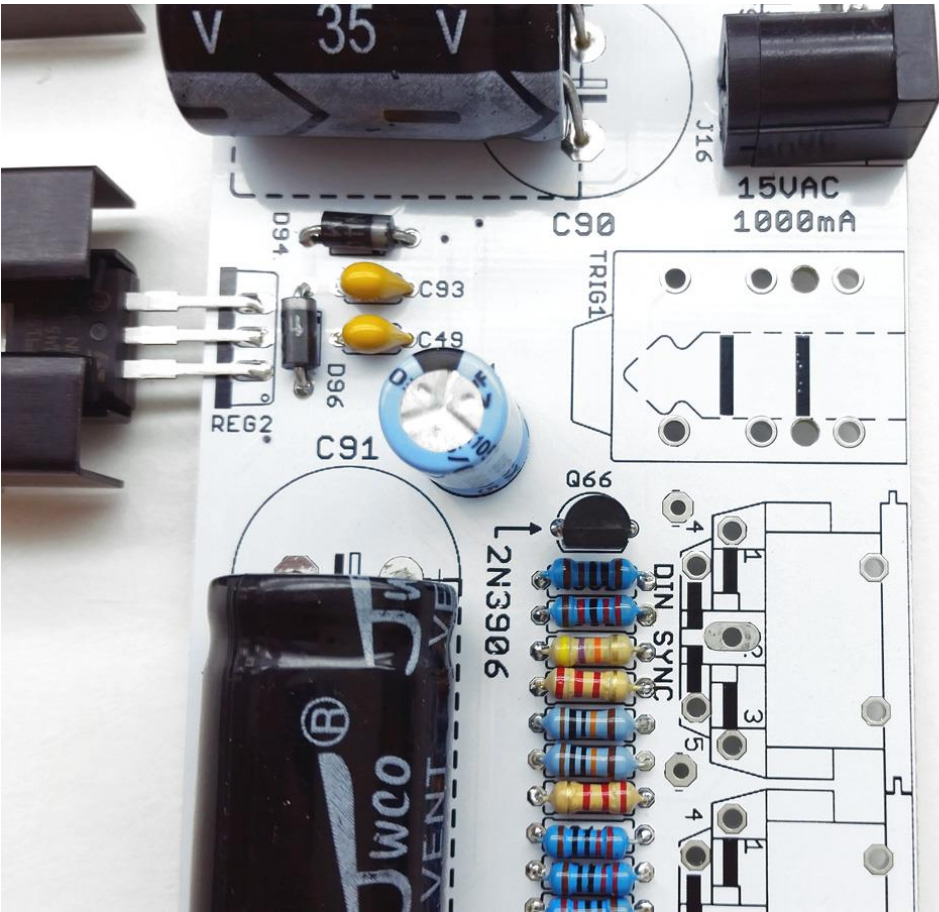


Add the diode. Diodes are polarized, the black ring must match the symbol silkscreened on the PCB.





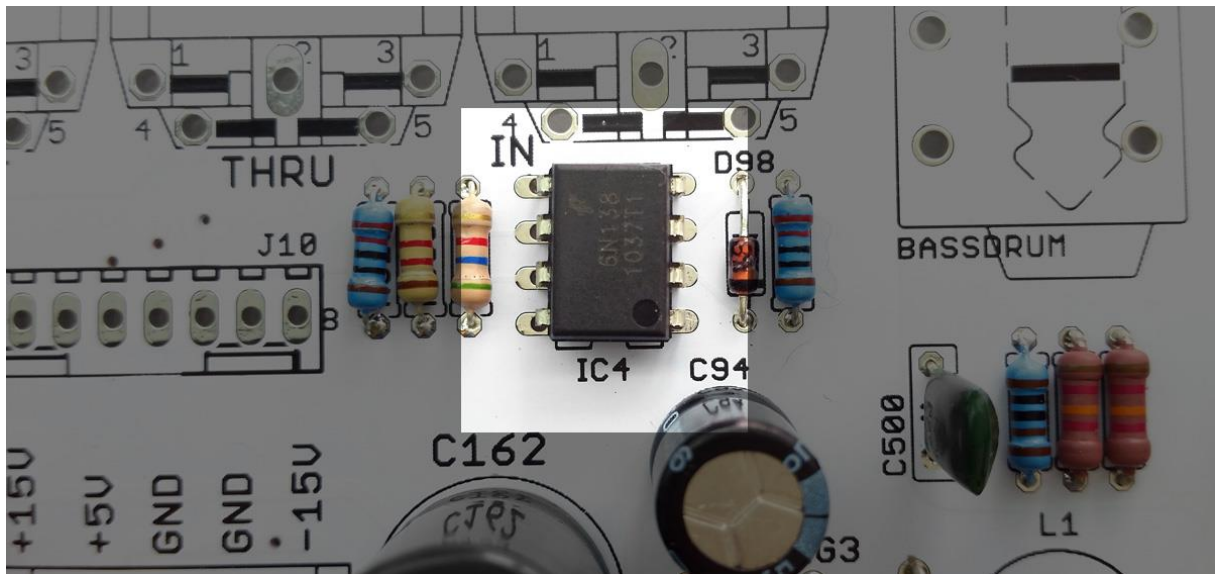
Now, add the trig out transistor. **Pay attention! This is a 2N3906.**



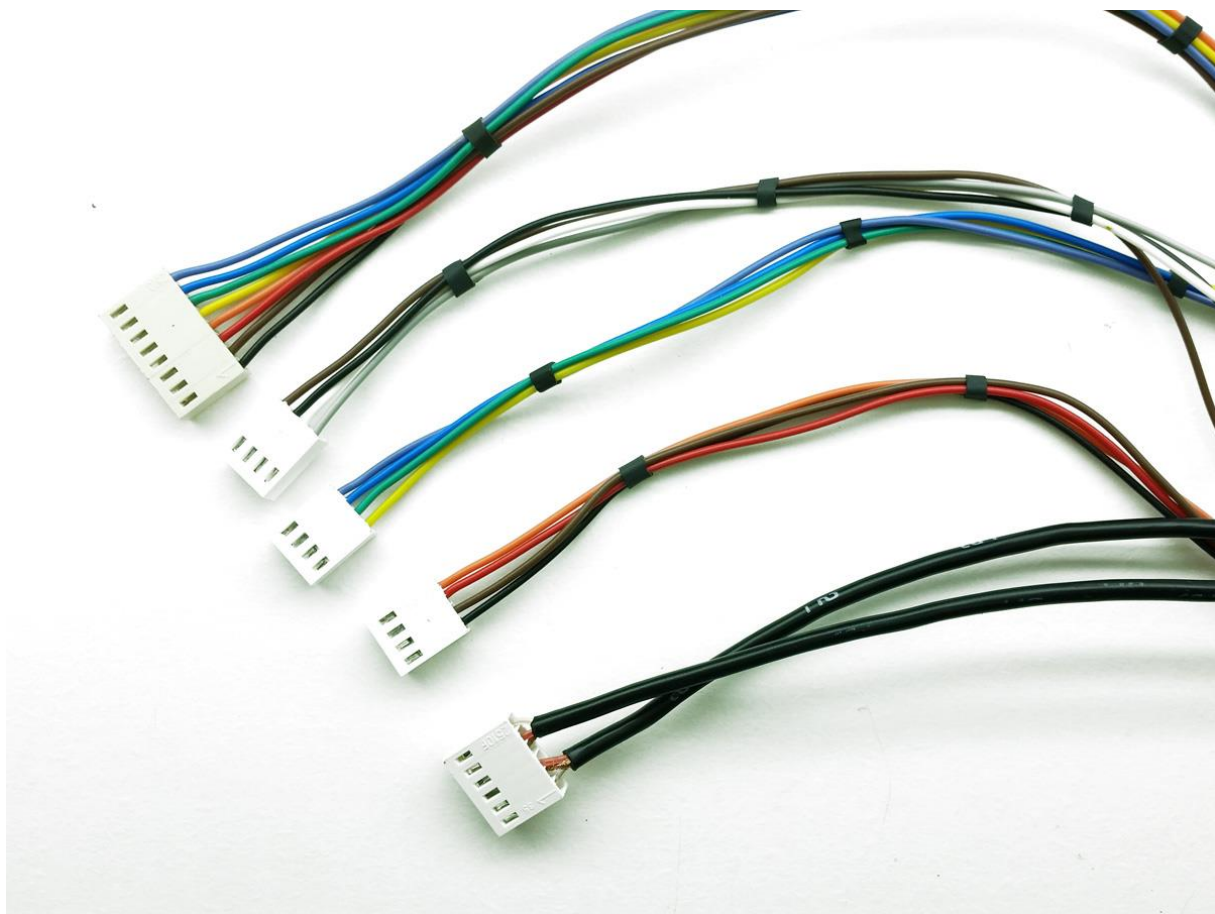
Add Din connectors and 6.35mm jacks.



Now, check io board section power voltages and add the 6N138. **Do not overheat ICs pins during solder process!**

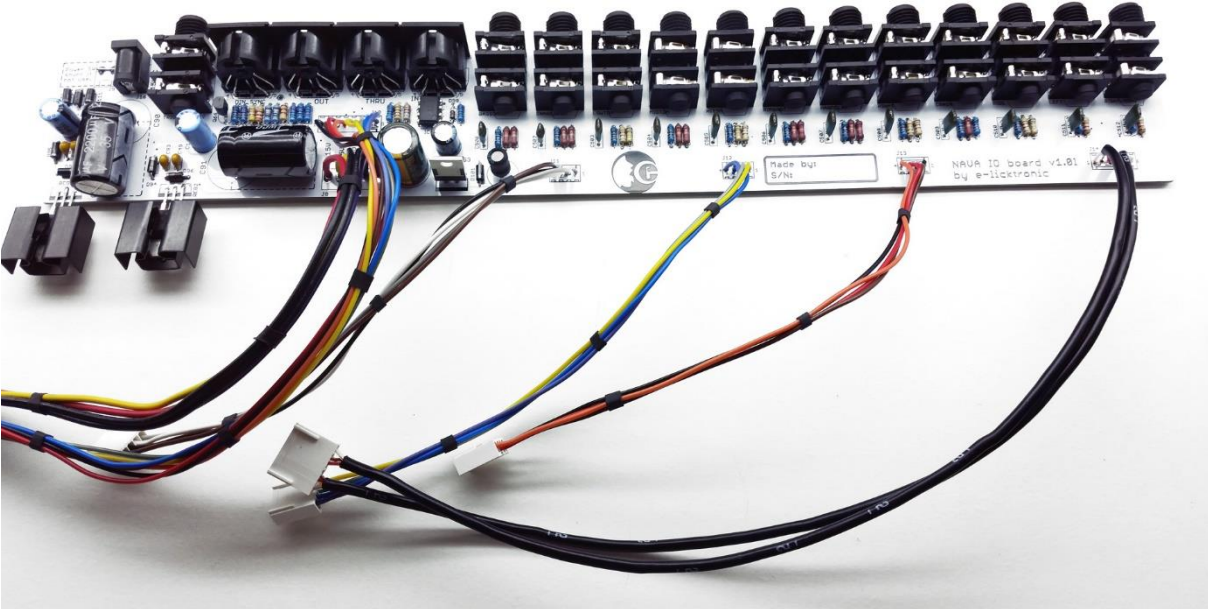


Now this is the part of the assembly that i definitely hate: MAKE WIRES. You must crimp 26 pcs of wire :(



Solder wires respecting the way. Cable housing connectors Pin1 must match Pin1 silkscreened on IO board.

Then io board section is finished, let's go to the [Master](#) section.

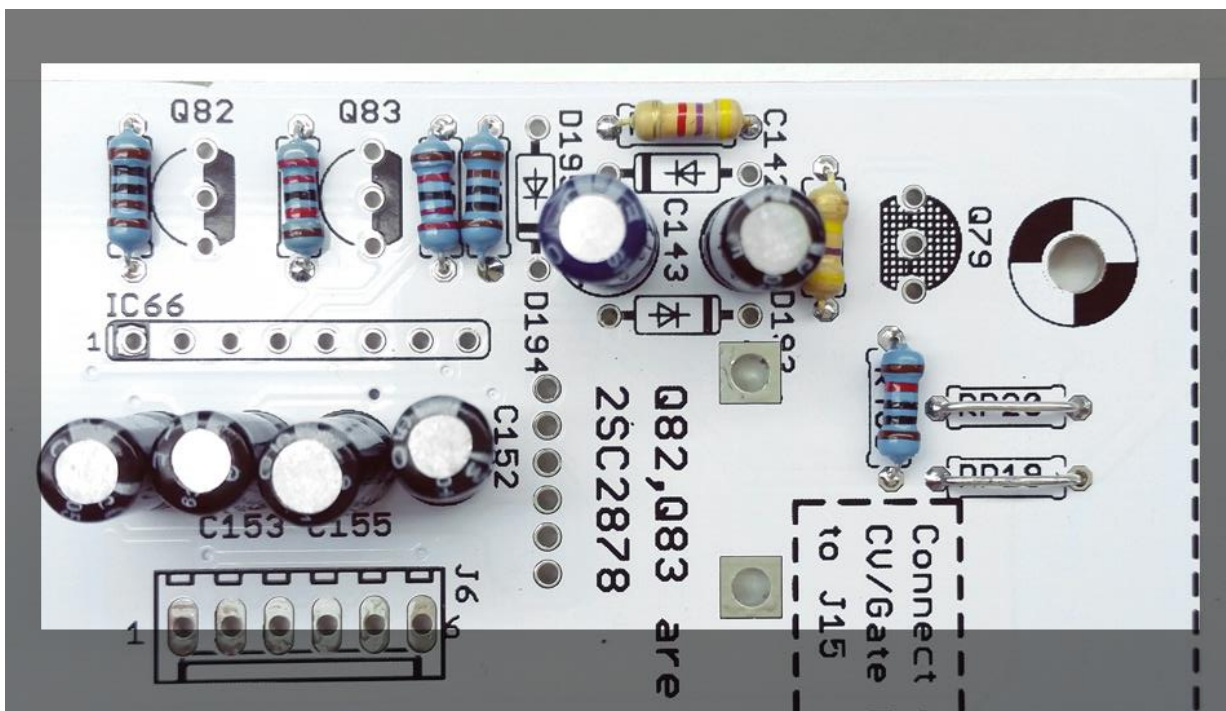


# MASTER

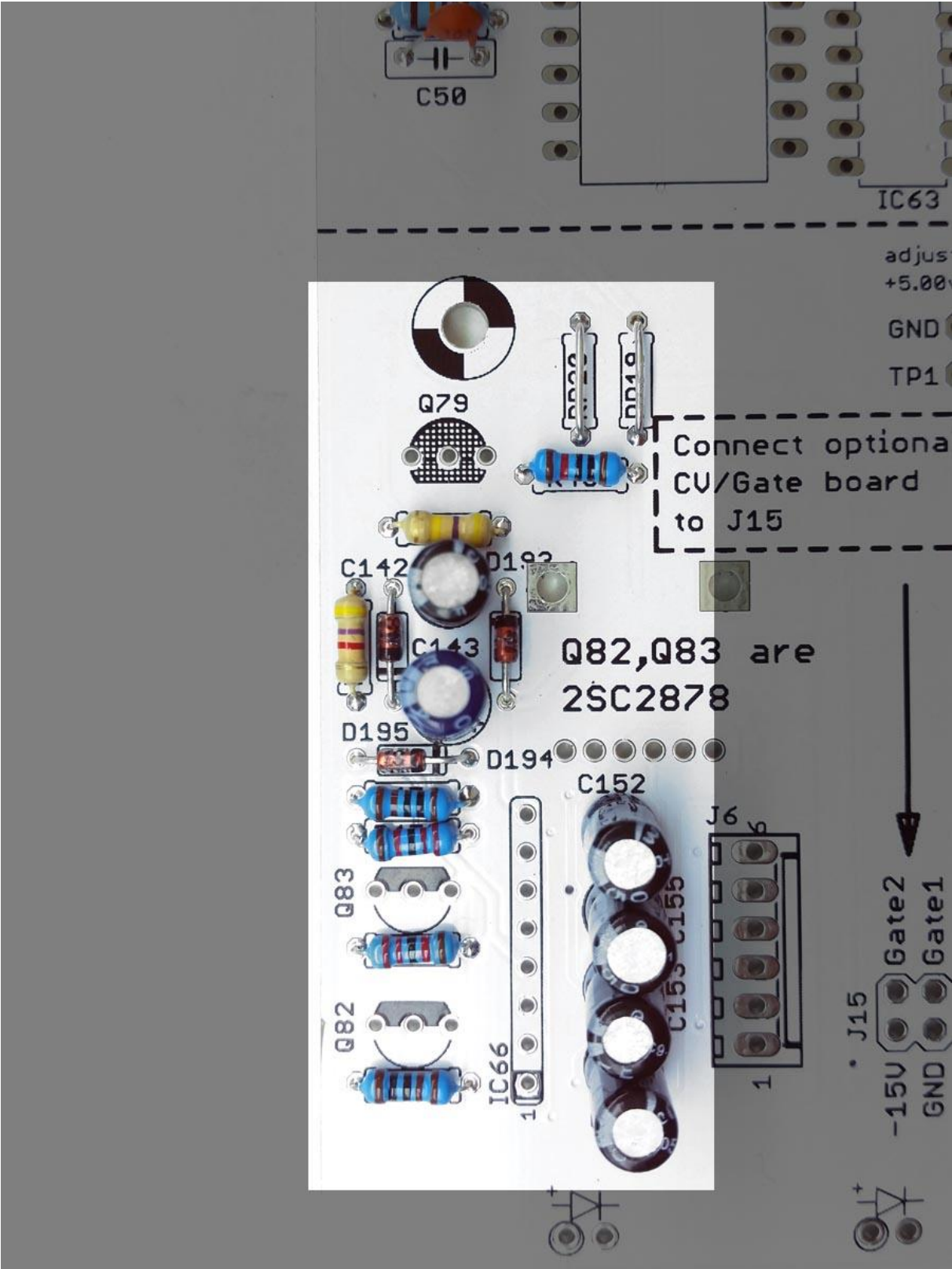
- Master parts list

Nava v1.0 Master parts list: 24 parts, grouped by values				
Part	Value	Package/Pitch	Qty	Note
<b>Resistors</b>				
Ohm				
RP19, RP20	0R	0207/7	2	
R473, R474	1K	0207/7	2	
R471	4.7K	0207/7	1	
R468	10K	0207/7	1	
R469, R470	22K	0207/7	2	
R472	470K	0207/7	1	
<b>Capacitors</b>				
µF				
C143	47/35	E2,5-6	1	Electrolytic capacitor
C153, C154	1/50	E2-5	2	Electrolytic capacitor
C142, C152, C155	10/16	E2-5	3	Electrolytic capacitor
<b>Diodes</b>				
D193, D194, D195	1N4148	DO35-7C	3	
<b>Transistors</b>				
Q82, Q83	2SC2878	TO92-ECB	2	
Q79	2SA1115	TO92-ECB-PNP	1	
<b>Integrated circuits</b>				
IC66	M5218	SIL8	1	
<b>Connectors</b>				
J6		6410-06	1	6 pins male connector
<b>Potentiometers</b>				
Ohm				
VR28	50KB	PTV112-4	1	

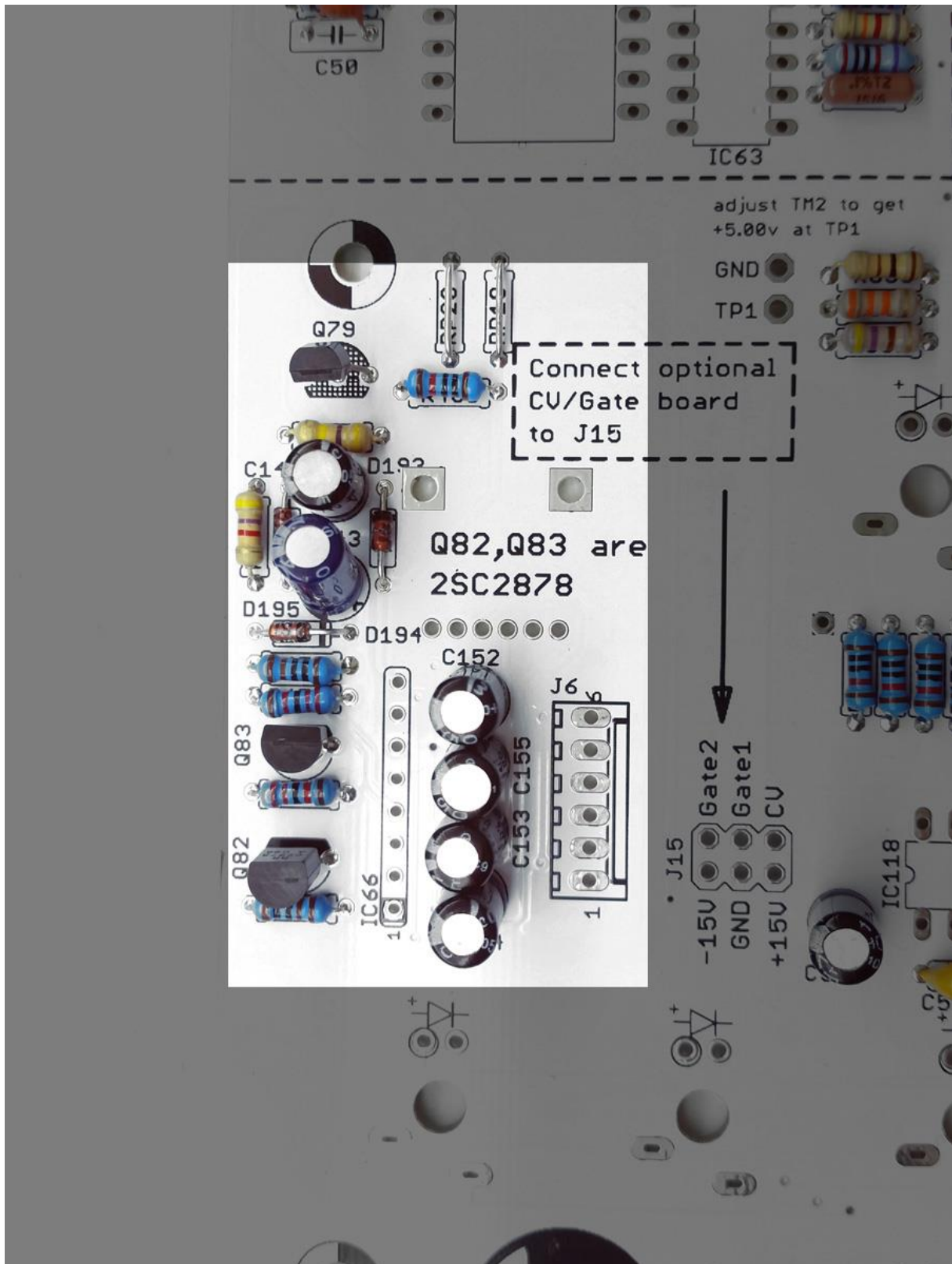
Let's continue with the Master section. First add resistors. Still the same, do not pay attention of resistors type on the picture you certainly have different resistors and electrolytic capacitors. **Electrolytic capacitors are polarized, the long leg of the capacitors is the positive. Pay attention to orientation in which you solder electrolytic capacitors.** The black part on the silkscreened electrolytic capacitor symbol is **negative**. **IMPORTANT for the mainboard v1.0! owner: Do not sold D195 and R471. Refer to this [topic](#)**



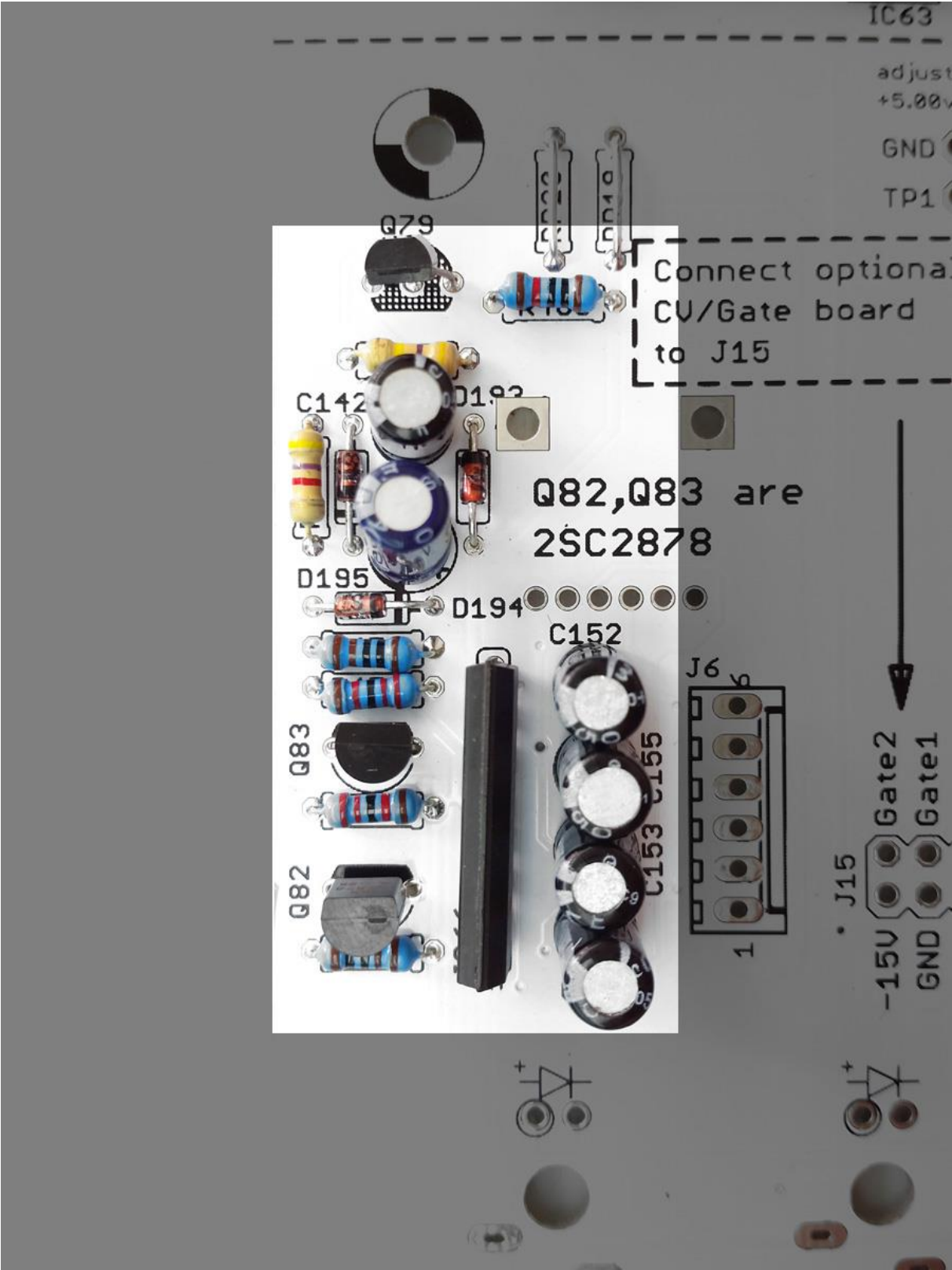
Add diodes. Diodes are polarized, the black ring must match the symbol silkscreened on the PCB.



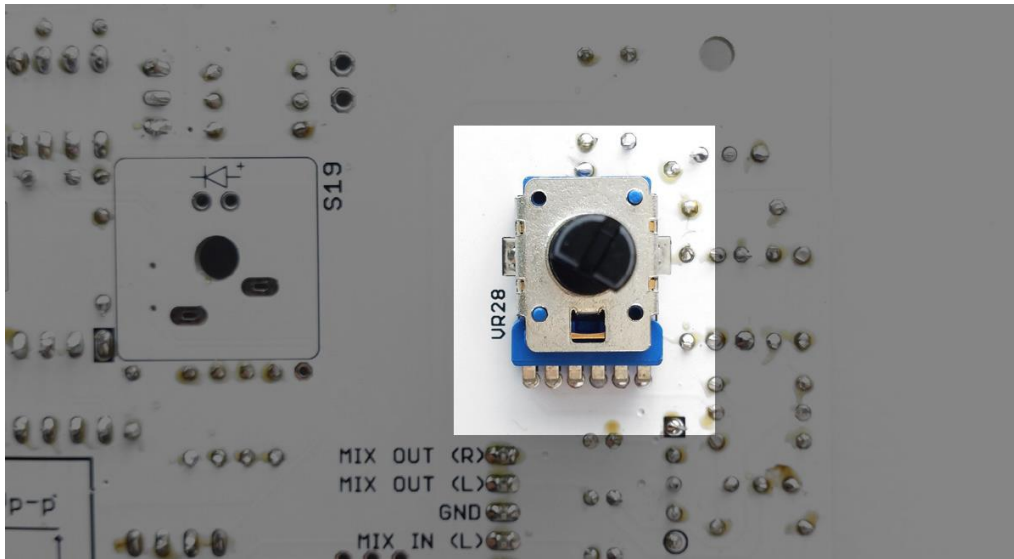
Now, add transistors. **Transistors are 2SC2878 Do not mix !**



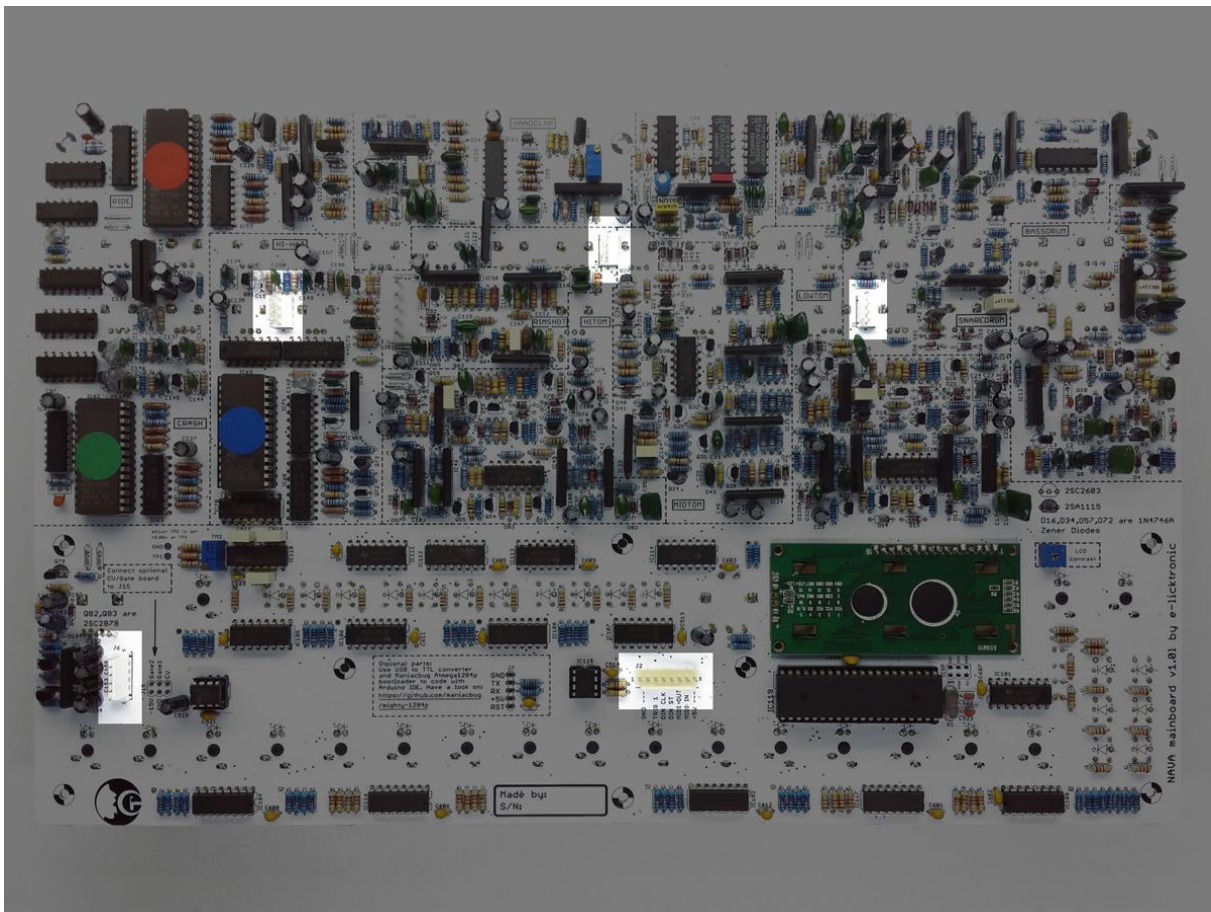
Now, check master section power voltages. You must connect J6 to test voltage on master section. GND come from there. Add IC. **Do not overheat ICs pins during solder process!**



Finally, add the stereo potentiometer. Then master section is finished, let's go to the [finished](#) section.

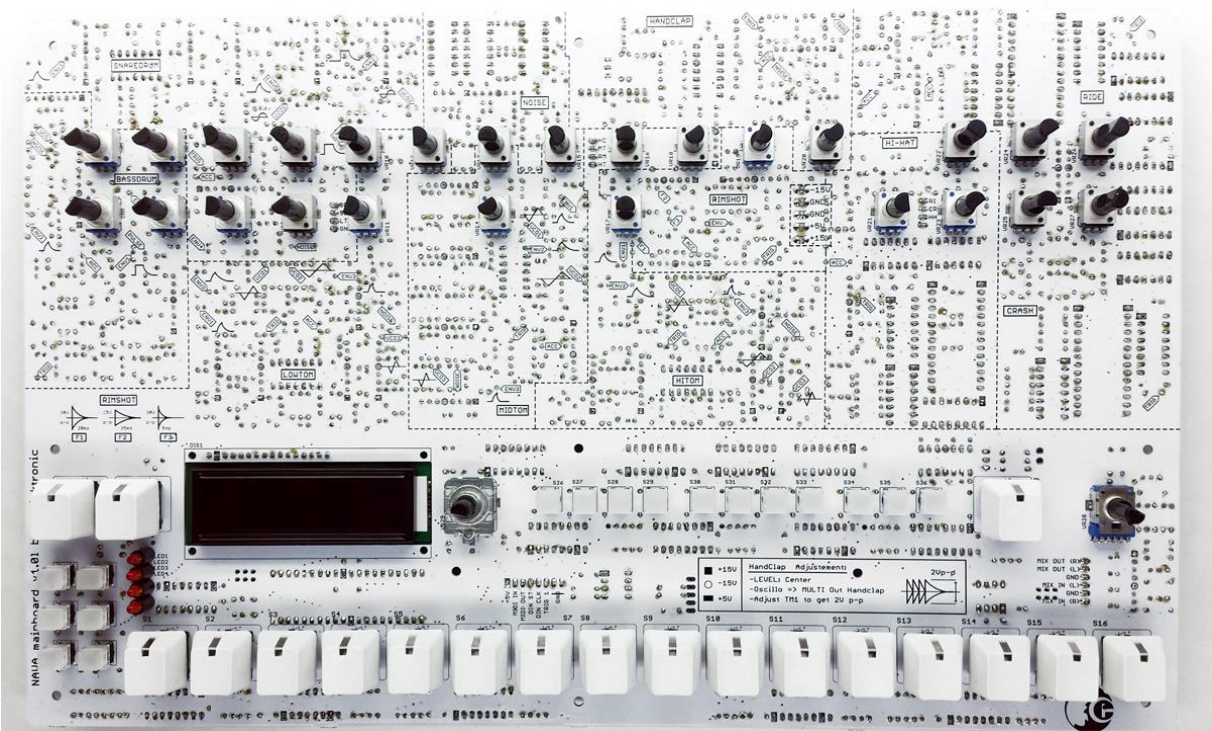


Add connectors to the mainboard.

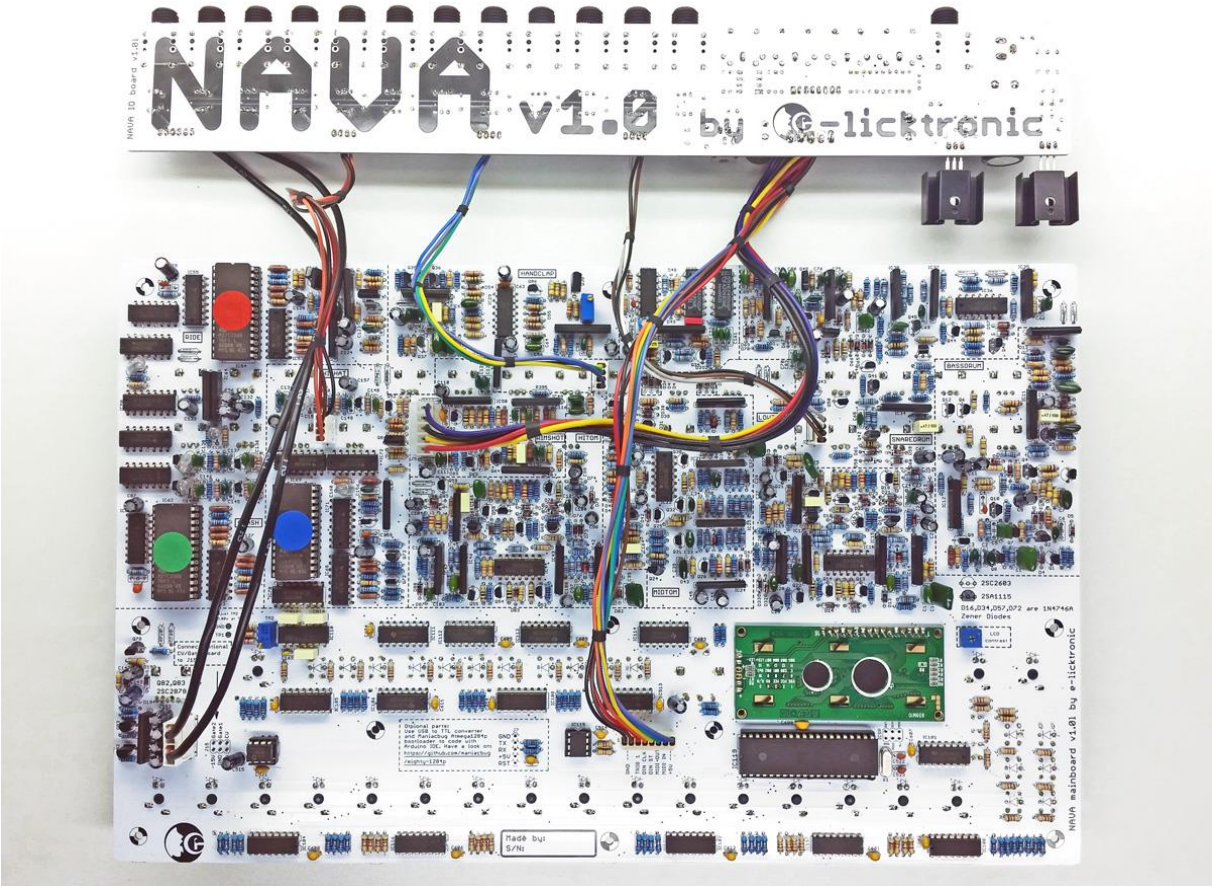




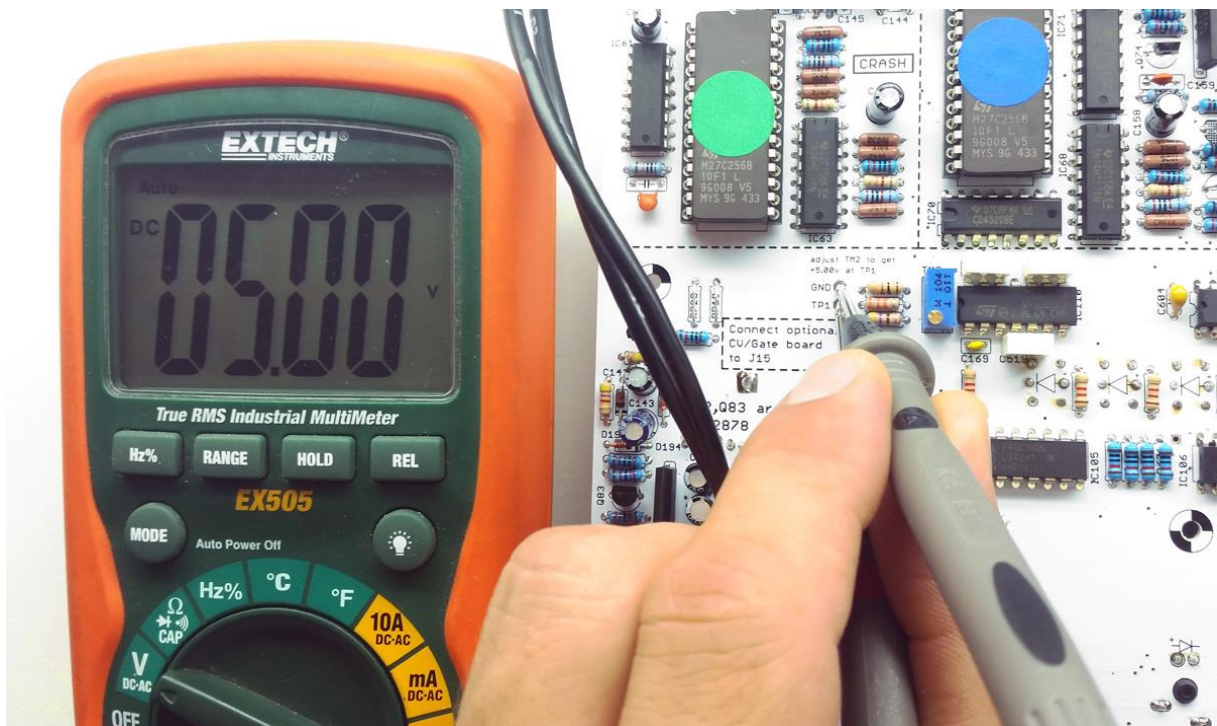
Add cherry switches knobs.



Connect the mainboard and the io board together.



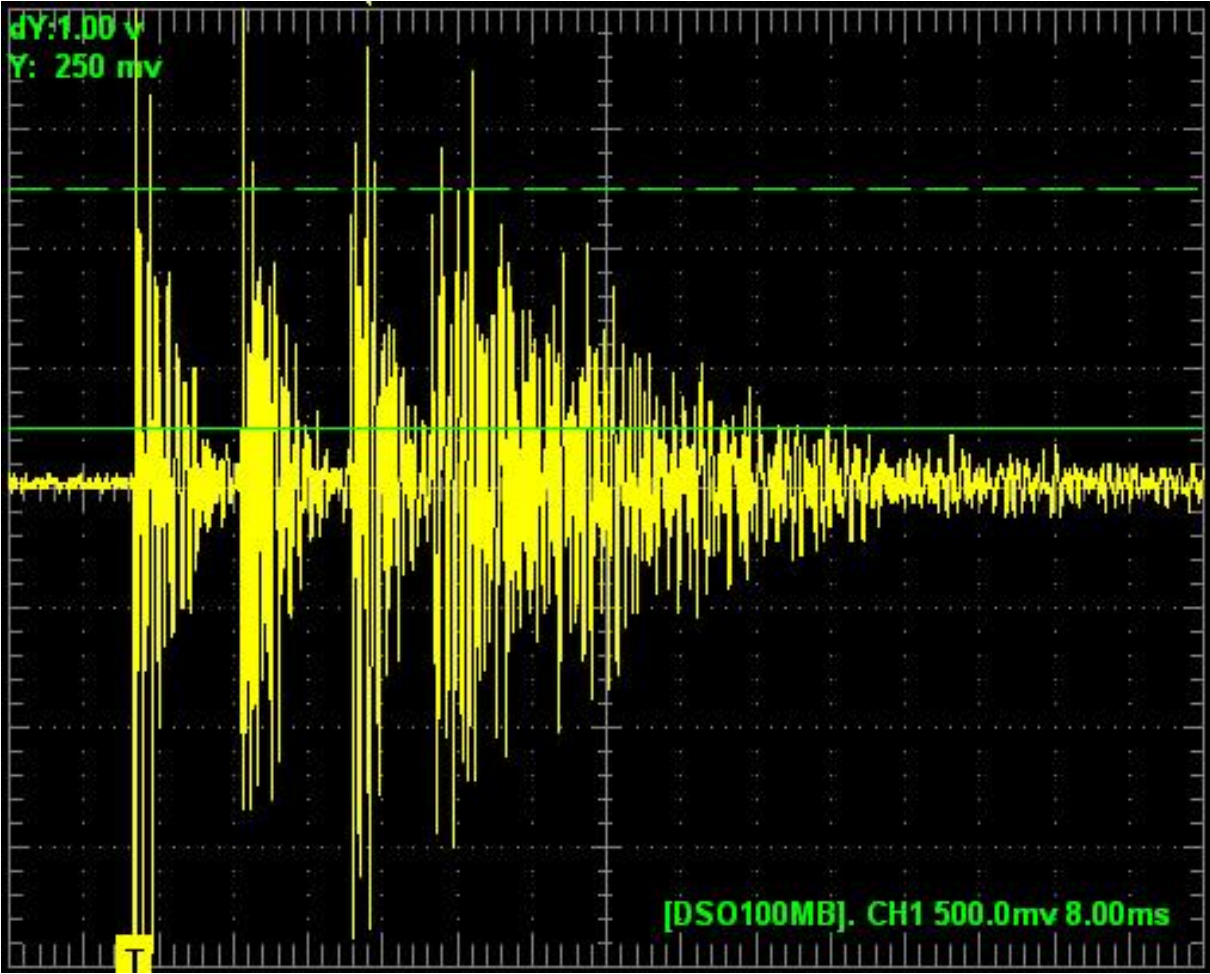
Now, power up your Nava holding the "ENTER" button. LCD should print "TM2 adjustment process". You need to adjust your LCD contrast maybe ;). Adjust TM2 to measure +5.00V at TP1.



Now turn off your Nava then turn on it again holding "START" and "STOP" button. You enter in "Init EEPROM mode". You got 5s to press "START" and "ENTER" to init your EEPROM. Steps leds show you the progress of the initialization. Make a Handclap pattern to adjust TM1 handclap offset. Connect your oscilloscope or scope (soundcard oscilloscope to multi out hand clap).



Then adjust TM1 to get 2v P-P waveform.



After all this works you finished your Nava v1.0 TR 909 clone. Congratulation ! Have fun ;)