De-Generator
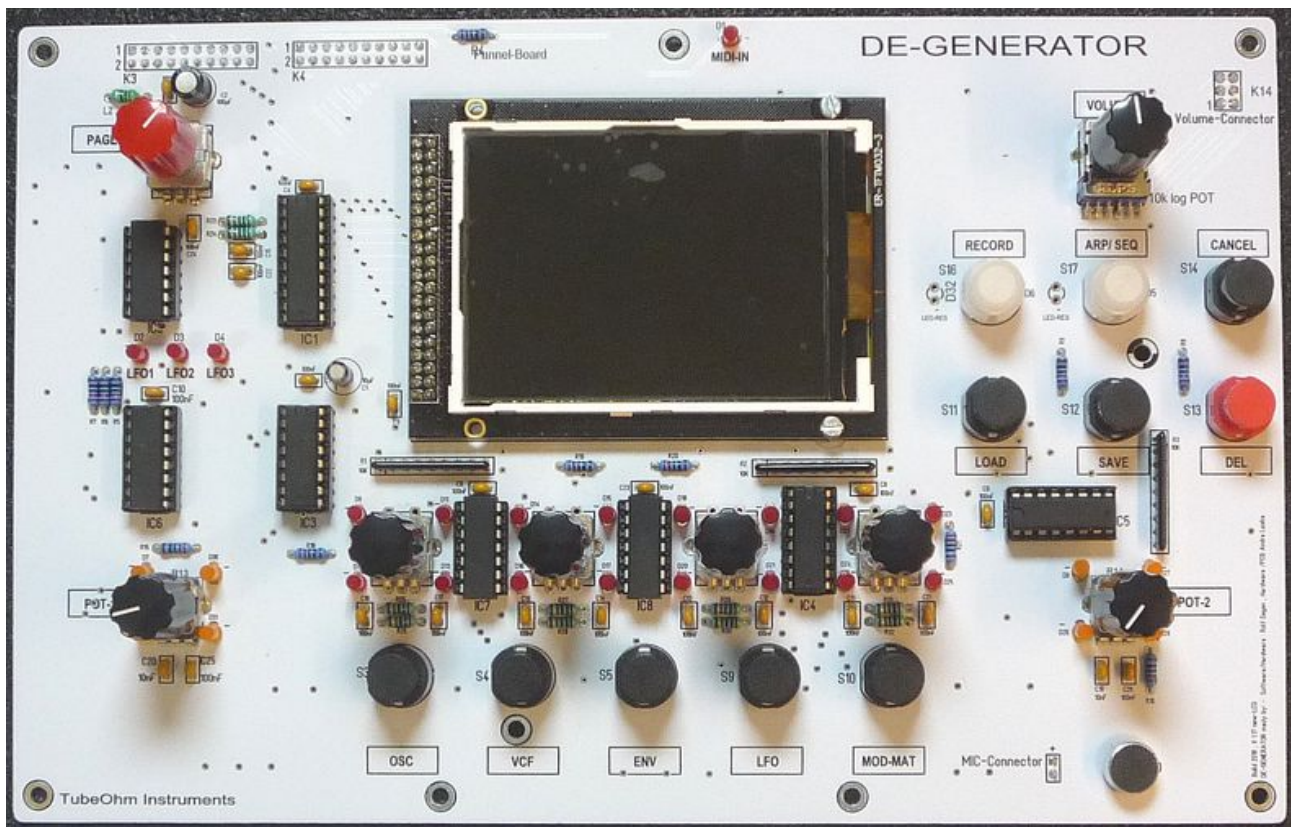
DIY sample synthesizer
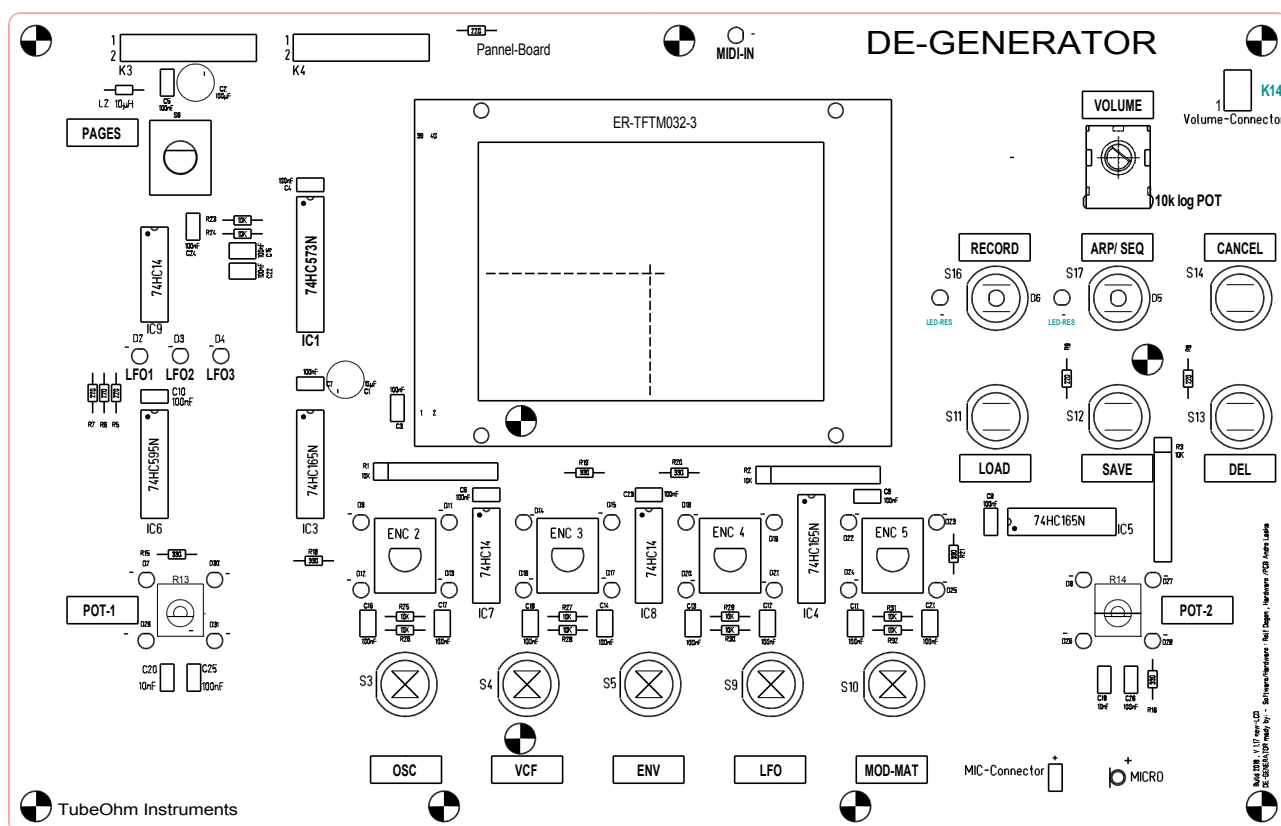

Building instruction 1, the panelboard

V1.02 english
stand 08.04.2019

www.tubeohm.com

De-Generator part Layout

DE-GENERATOR

MIDI-IN

Pannel-Board

K3
K4

PAGES

LZ 10µH

ER-TFTM032-3

VOLUME

K14
1
Volume-Connector

10k log POT

74HC14
IC9

74HC573N
IC1

RECORD
S16
LED-RES

ARP/ SEQ
S17
LED-RES

CANCEL
S14

D7 D3 D4
LFO1 LFO2 LFO3

C10
100nF

74HC595N
IC6

74HC165N
IC3

S11

LOAD

S12

SAVE

S13

DEL

POT-1

R13

ENC 2

74HC14
IC7

ENC 3

74HC14
IC8

ENC 4

74HC165N
IC4

ENC 5

74HC165N
IC5

R14

POT-2

C20
10nF

C25
100nF

S3

S4

S5

S9

S10

OSC

VCF

ENV

LFO

MOD-MAT

MIC-Connector

MICRO

TubeOhm Instruments

Preface

We try to write the DIY manual as detailed as possible.
If you have any questions, please contact us at Kontakt@TubeOhm.com

If you can't get on with a component, let it go first, clarify the situation with us, and then you can move on. It is essential - check beforehand - not after !!

The power lies in peace, please choose the parts you need and check twice if they are the right parts. LED's, electrolytic capacitors, resistor arrays, MIC etc. have a polarity. Before you solder components in, you better check twice. The resistors should also be measured through before soldering. Nothing is more annoying than searching for hours because a wrong resistance has been soldered in.

For LEDs, potentiometers, buttons and encoders... one or two legs can be soldered on first. Then it is much easier to straighten the component. If everything is straight and consistent, the component is completely soldered.

The IC sockets can also be soldered crosswise to two pins. The socket should lay flat on the PCB. If not, heat both pins again and press it onto the PCB.

So now we start with the first of three DIY manuals for the de-generator.

We'll start with the panel board. It is relatively easy to build.

Required tools :

1:)   Soldering iron, best adjustable, solder and a suction pump
2:)   a cutter
3:)   multimeter

Here are some tips :

Guys, pick up the circuit board and take a look at it first.
The solder pads are so big that there should be no problems. Check that you have the right tip on the soldering iron and also look at the regions on the board where the wires come a little closer together. In these regions you should then solder more carefully.

Please remember - one part is quickly soldered in but it is very tricky to get it out !

If you don't know 100% exactly which part should be soldered in - leave it off and call or mail us and ask. It's better to ask once than to search for errors for hours afterwards.

I can understand that you want the de-generator to be finished quickly, but if you work too fast you make mistakes very quickly.

Please also check the connectors K3,K4,K14 and the MIC connector.
These are soldered in almost last, and at the bottom.

The enclosed microphone should also be soldered quickly so that it does not get too hot.

Of course you have to make sure that all potentiometers, encoders and switches are soldered straight onto the board. If you have the Plexiglas case you can use the top side as a template.

If the components are soldered on crooked, the housing will not fit afterwards and "it looks sh***t (bad).

For people who want to install LEDs with other colors :

Different coloured LEDs can be used. The total current for 4 LEDs should not exceed 5..8 mA. This applies to the LEDs, the encoders 2,3,4,5 and the freely programmable potentiometers 1 and 2.

4 LEDs each are connected in parallel and have one series resistor. Thus the series resistor is decisive for the total current, since the LED voltage is always the same, no matter how many LED's are connected in parallel. The total current is divided into 4 partial currents of the individual LEDs.
Here some information .

LED red V1,6 V...2,1 Volt
LED yellow/green   1,9V..2,2 Volt
LED blue/white   2,9V..4V

The Formular.

UB = operating voltage 3,3 Volt
U_led= voltage of the LED
I_led= current of the LED
R_vor= value of the resistor in Ohm

R_vor=(UB-U_led)/I_led.

Sample calculation for   4 LED's red .

U_LED=1,6 Volt
I_LED =5 mA
R_vor =?
UB=3,3 V

R_vor=(3,3V-1,6V)/0,005A = 340 Ohm

All right, let's get started. Is your soldering iron hot?

The following procedure.
First come the resistors / coil, then the capacitors, then the IC sockets, then the LEDs, then the potentiometers and encoders, switches, connectors and the mic and finally the LCD display.

First, the coil is soldered in
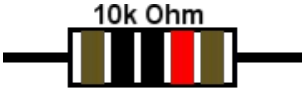
Coil/Spule	Farbcode/colorcode	Value/Position
	brown, black, black, silver " can be the bigger or smaller one in the kit	L2 , 10 uH 1xL
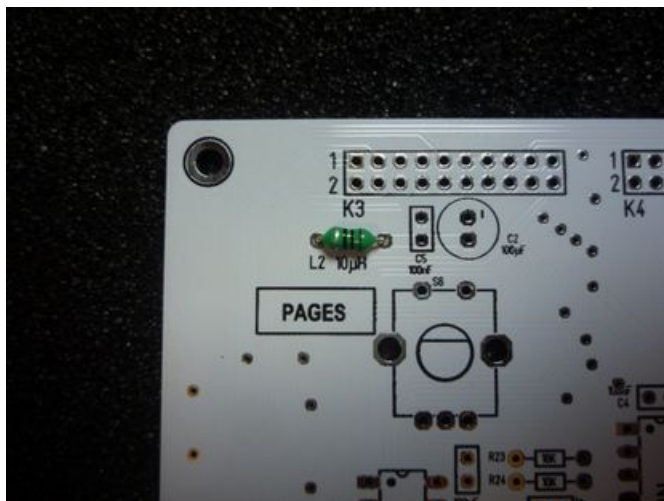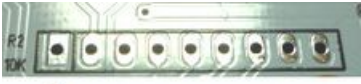
The Resistors

Resistor/Widerstand	Farbcode/colorcode	Value/Position
220 Ohm	Red,red,black,black brown	R4,5,6,7,8,9 =220 Ohm 6 x 220 Ohm
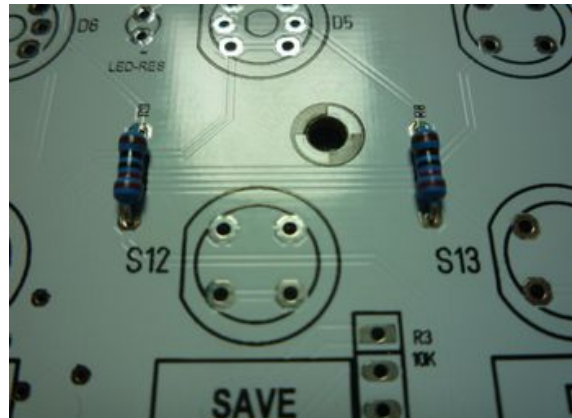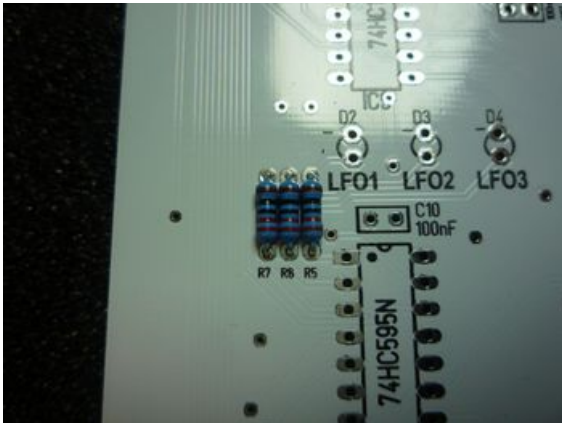
Resistor/Widerstand	Farbcode/colorcode	Value/Position
10k Ohm	Brown,black,black,red,brown	R23,24,25,26,27,28,29,30,31,32 10x10K
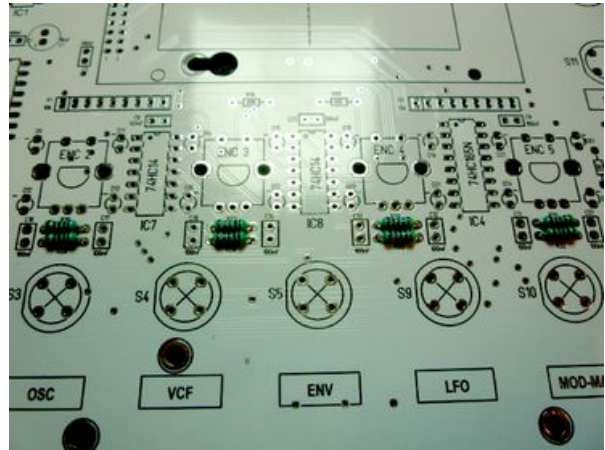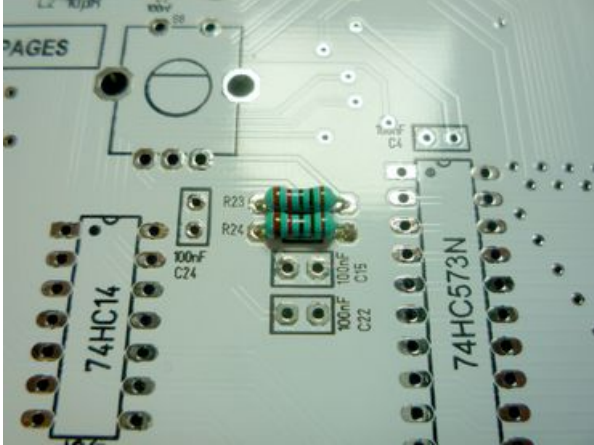
| Resistorarray/Widerstands-array	Farbcode/colorcode/code	Value/Position
	A103 Attention, the resistor-array is polarized, the white point is pin 1 and marked on the part . On the PCB it is marked with a rectangle.	R1,2,3=10K 3x10K resistor array
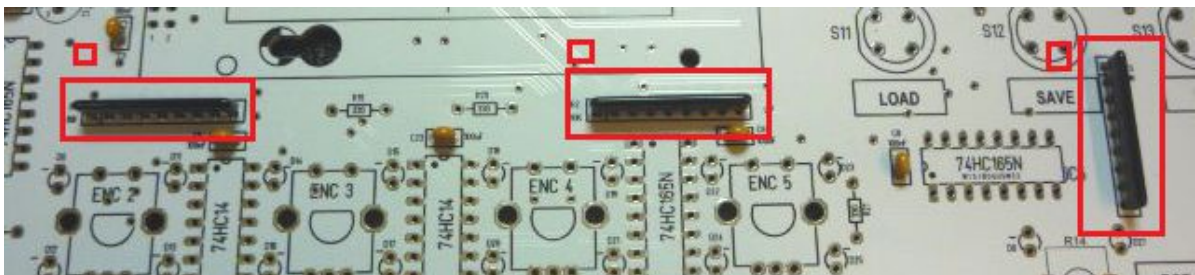
The Capacitors

Capacitor	Farbcode/colorcode	Value/Position
	marked/markiert (104)	C3,4,5,6,7,8,9,10,11,12,13, 14,15,16,17,18,21,22,23,24, 25,26 22x100nF
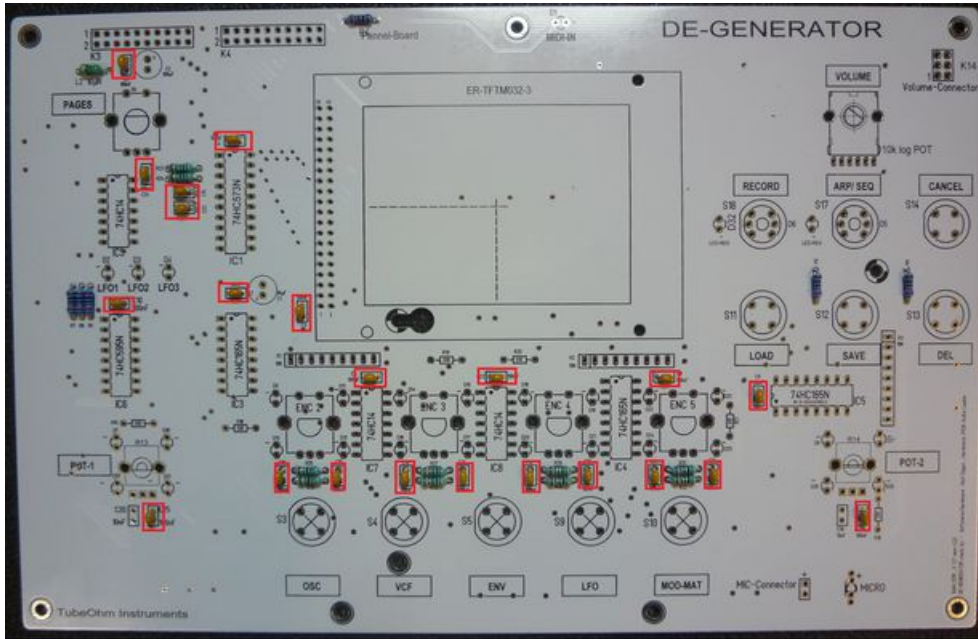
Capacitor	Farbcode/colorcode	Value/Position
	marked/markiert (103)	C19,20 2x10nF

Capacitor /Elko	Farbcode/colorcode/code	Value/Position
short=minus	100 uF Attention , this part is polarized, short pin is minus	C2 = 100uF 1x100uF Elko
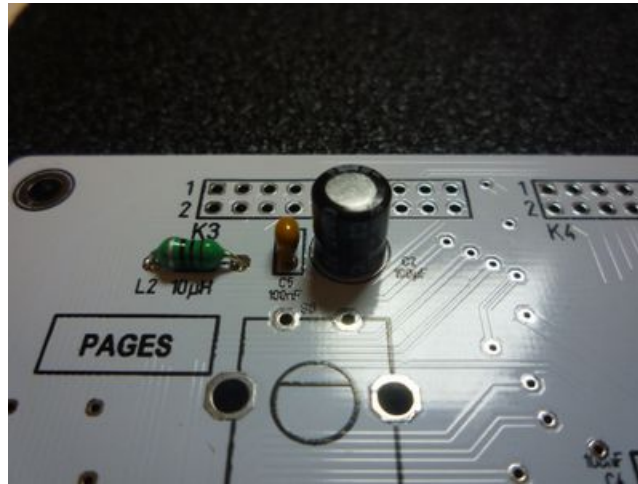
Capacitor/Elko	Farbcode/colorcode/code	Value/Position
short=minus	10 uF Attention , this part is polarized, short pin is minus	C1 = 10uF 1x10uF
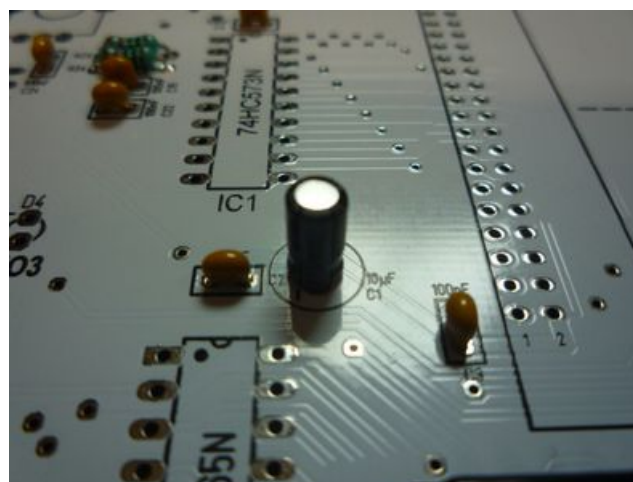
Now we come to the IC sockets

We need :

3x14 pin = for IC 7,8,9 =74HC14
4x16 pin = for IC 3=74HC165, IC4=74HC165, IC5=74HC165, IC6=74HC595
1x20 pin = for IC 1=73HC573

Attention, the IC sockets are marked. Please solder the sockets right around into the board. Later it is easier to put the IC's correctly into the sockets.
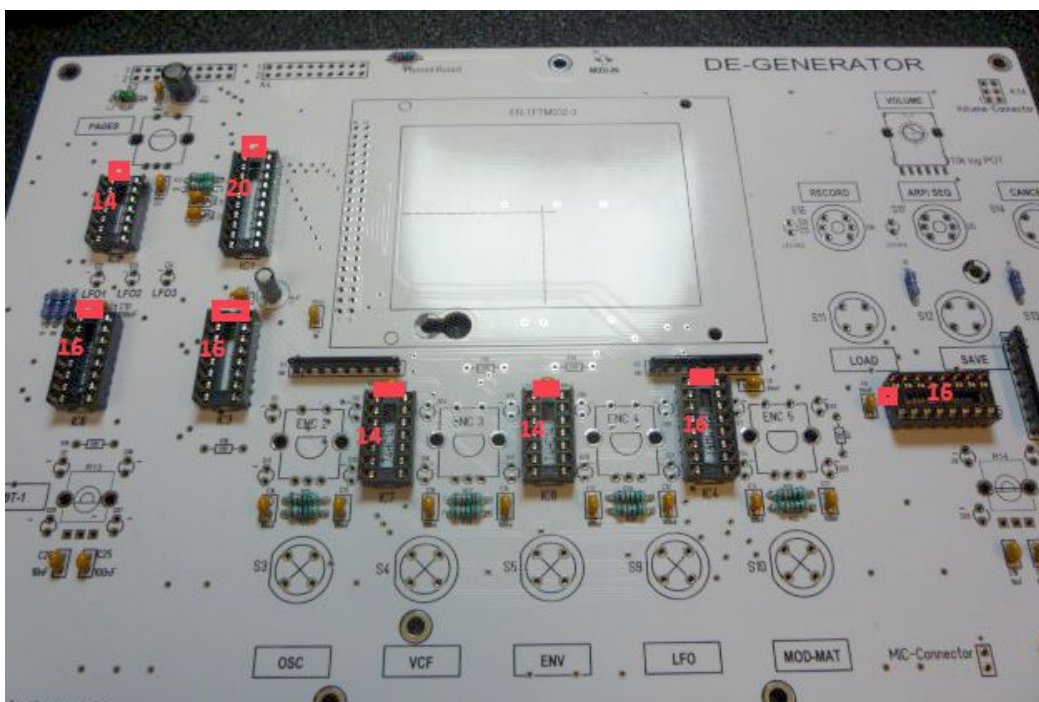

TIP:
solder the IC sockets first on two legs.
Be sure that the socket is flat on the PCB. If not , press the socket with the finger against the PCB and solder both pins again.
Attention also to the mark. Solder it into the right direction.

The buttons in the De-Generator

The buttons have a flattened side. This is also marked on the board.
They must be installed in such a way that the markings point to the left !

1:) 2x white with red LED
2:) 1x red without LED
3:) 8x black without LED
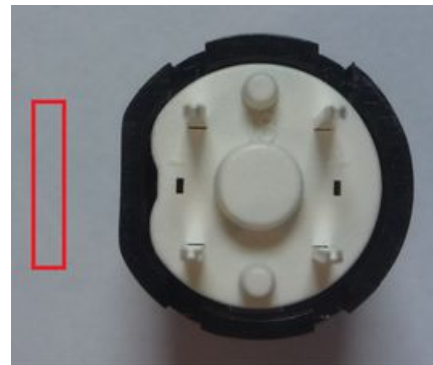
Make sure that the buttons are soldered as straight as possible into the board.
It's a little tricky. Take your time .

First solder the buttons for the control panel.

Tip: always solder a pin first, then align the button, solder and align the next button to a pin, etc.
If all buttons are soldered to one pin each, the entire buttons can now be aligned in their positions.

RECORD and ARP/SEQ are the buttons with the LEDs. Pay attention to polarity !
You can also see two additional LEDs. LED_RES next to keys S16 and S 17.

Since the buttons with the LED's are sometimes difficult to get, you can solder in buttons without LEDs and use two separate LEDs. The series resistors R8 and R9
have 220 Ohm and can be used for the LEDs in the buttons as well as for the separate LEDs.

Now the five buttons of the pages are soldered in
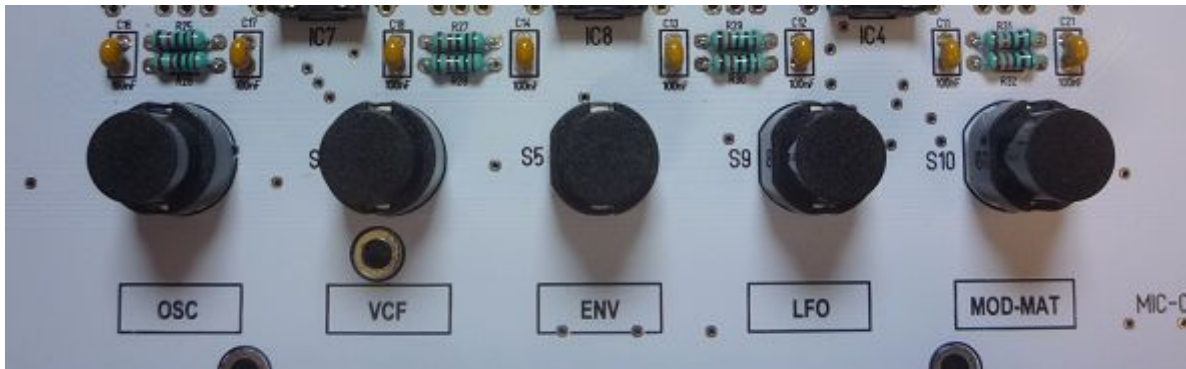
The encoders

The De-Generator uses longlive encoders with 100,000 switching cycles.
1x **PEC11L4120F-S0020**
This is the Page Encoder and has an additional button. This encoder has five connections

4x **PEC11L-4120F-N0020**
these encoders are without pushbutton and are installed in the positions ENC 2,3,4,5. This encoder has 3 connections

***depending on the availability of the encoders, 5 xPEC11L4120FS0020 encoders with switch can also be supplied with the kit. Both encoders are identical in construction, but differ by a button. The buttons then have no function for ENC 2.3.4.5.
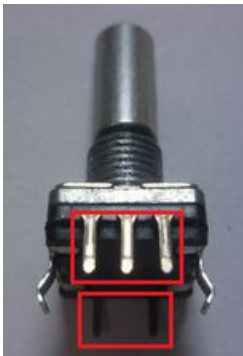
PEC11L4120FS0020 five pin with switch   **PEC11L-4120F-N0020 without switch**

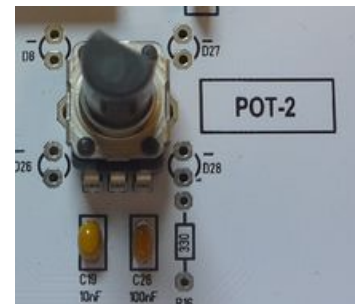The S6 encoder with switch is the PAGE encoder and is soldered into position 'Pages'.
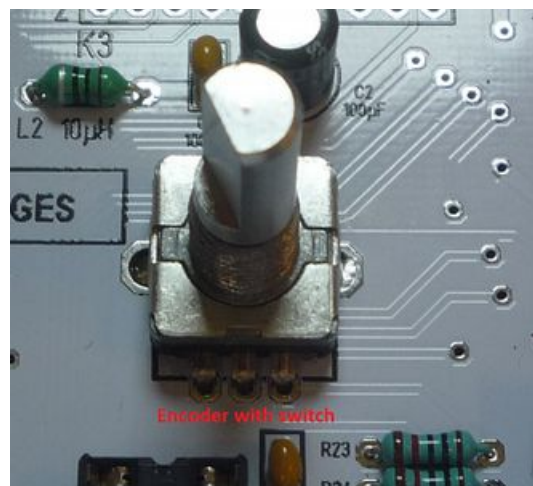
The encoders without pushbuttons are soldered in positions 2...4

The freely programmable potentiometers

Pot 1,2	Farbcode/colorcode/code	Value/Position
	DC103B	Pot1,Pot 2 2x10Kohm lin

The volume pot

volume pot	Farbcode/colorcode/code	Value/Position
	103A	Volume 1x10Kohm log /stereo

The LEDs

LED red LFO D1,2,3,4 and for the encoder D9,11,12,13,14,15,16,17,18, D19,20,21,22,23,24,25	Farbcode/colorcode/code	Value/Position

		D1,D2,D3,D4 D9,11,12,13,14,15,16,17,18, 19,20,21,22,23,24,25 20 x LED red
	Attention , this part is polarized. Short leg is (-) minus	

Four red LEDs are soldered to positions D1,D2,D3,D4
Attention - pay attention to the polarity (minus) is at the top !

Attention, we use red LEDs for the De-Generator with a Plexiglas case, because these are not so bright. R18,19,20,21 are then changed from 330 Ohm to 220 Ohm.
The LEDs on the encoders can also be omitted if desired. It is a ' CAN BE'

For the metal case ultrabright blue LEDs are used, the series resistors are changed to 390 Ohm.

Now we solder the 16 red LEDs into the positions
D9,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25
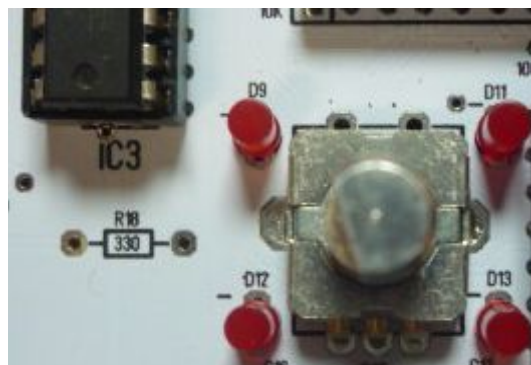
Attention - pay attention to the polarity (minus) is at the top !
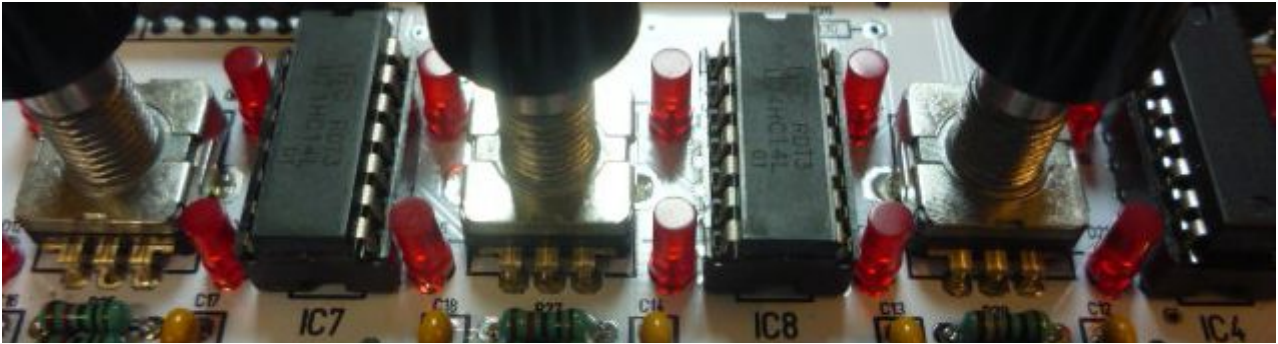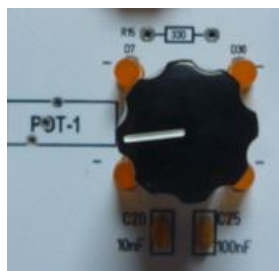
| LED-Resistor/Widerstand	Farbcode/colorcode	Value/Position
Pre-resistors LED red. R18,19,20,21 for red LEDs we use 220 Ohm (plex case) for blue LEDs we use 390 ohm	depends of the LED type . 330 Ohm works in most cases.	4x 220...390 Ohm R18,19,20,21
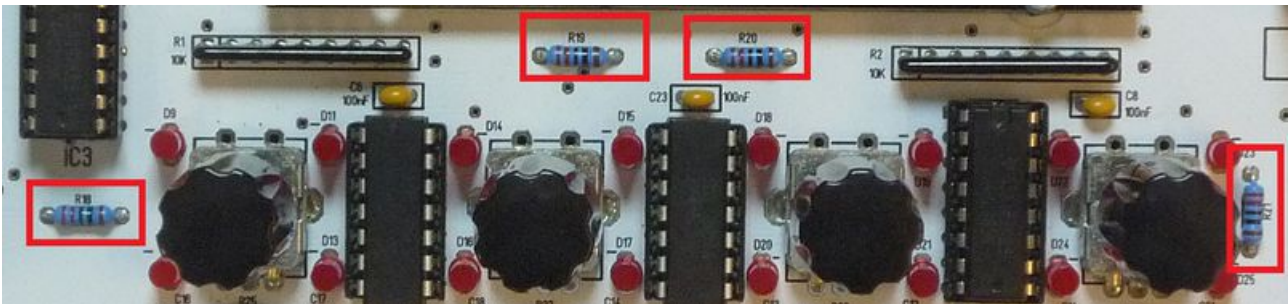
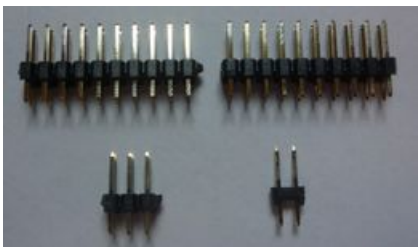| LED orange for the free pots	Farbcode/colorcode/code	Value/Position
	Attention , this part is polarized. Short leg is (-) minus	D7,29,30,31,8,26,27,28 8x LED orange for the two pots Pot 1,Pot 2

Now solder the orange LEDs to the positions D7,29,30,31,8,26,27,28
Attention - pay attention to the polarity (minus) is at the top !

| LED-Resistor/Widerstand	Farbcode/colorcode	Value/Position
Pre-resistors LED orange. R 15,16 for orange LEDs we use 220 Ohm	Depends of the LED type . 330 Ohm works in the most cases.	2 x 220...390 Ohm R 15,16
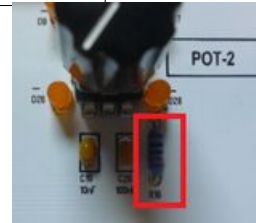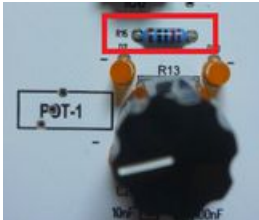
The connectors

connector male	Farbcode/colorcode/code	Value/Position
	Connector male	K3,K4= 2x10 pin K14= 2x3pin Mic-Con= 1x2 pin

Attention the plugs K3,4,14 and MIC-con go down

The mic connector is pushed through the holes from the back and soldered from above. Then bend the two pins in such a way that they lie horizontally to the board.

K14, the volume connector connects the volume control to the audio signal
It is also pushed through the holes from the back and soldered from above.
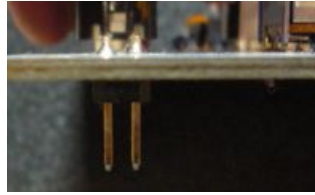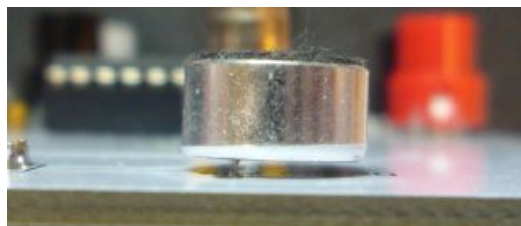

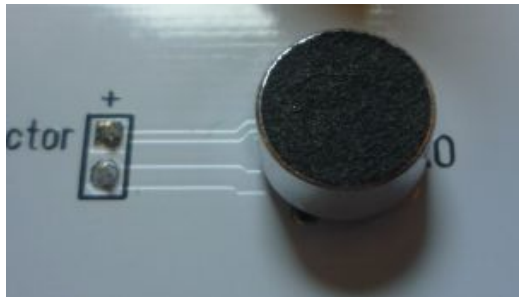K3,K4 is the connection to the CPU board and should look like this
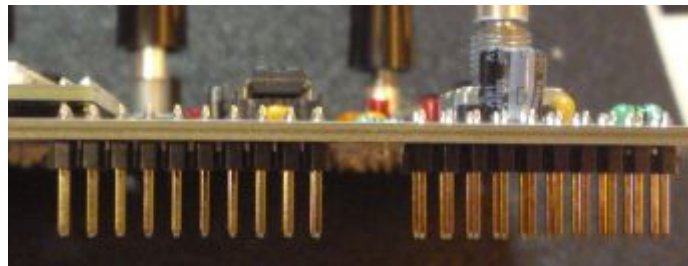
The Micro

Mic	Farbcode/colorcode/code	Value/Position
	Attention , this part is polarized.	1xMicro

The MIC should be soldered on in such a way that it is approx. 1mm above the board.

So, all soldered together? Soon it will be done. Before we solder in the display we do a quality control.

The board should now look like this from below

Tip: So, for example, I don't feel like troubleshooting for hours, so I clean up
I'll take a look at all the solder joints with a magnifying glass. There are still one or two bad solder joints. Nothing is harder to find than a bug you build yourself !!!
So better take a look twice.
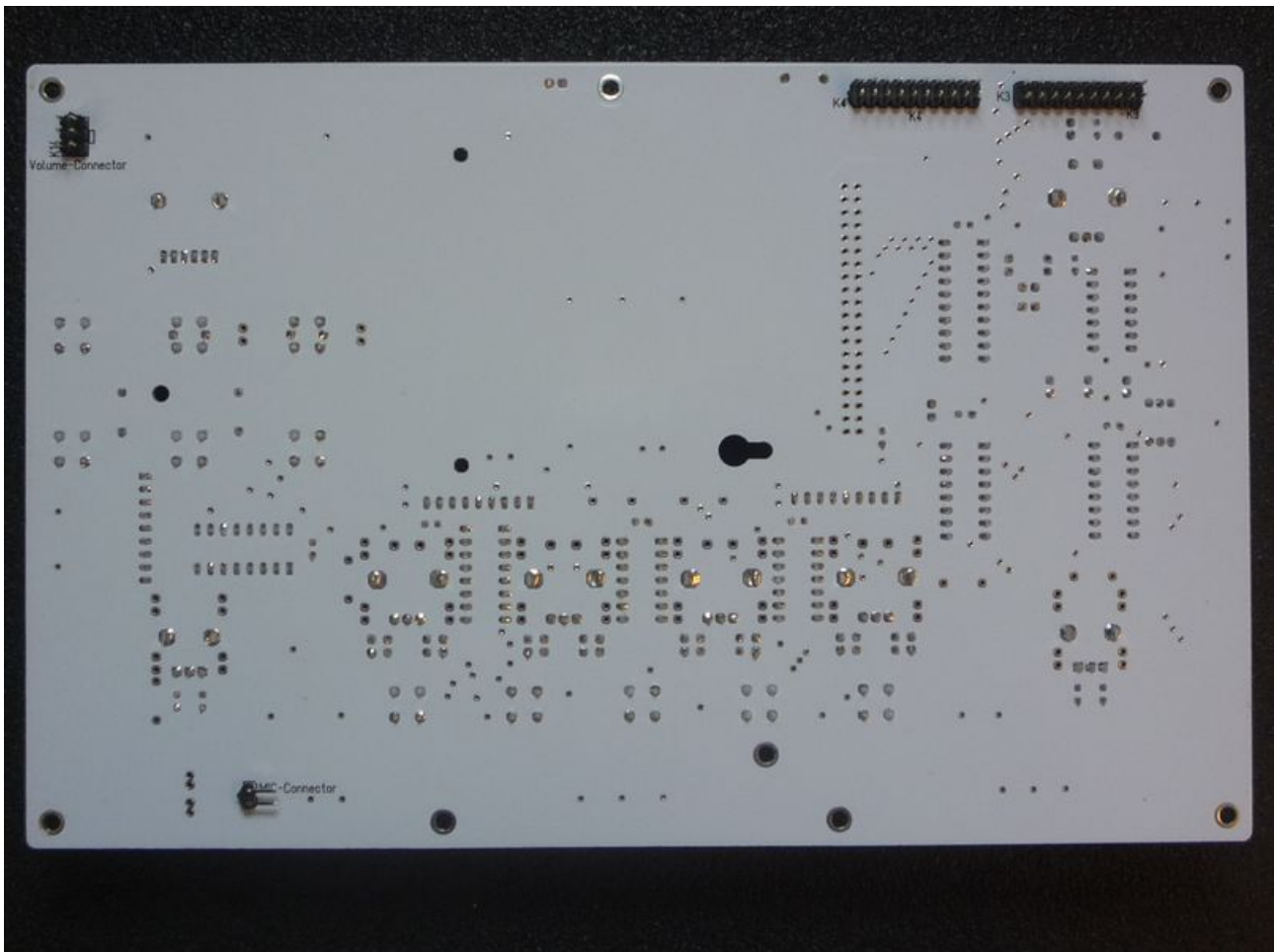
The LCD Display
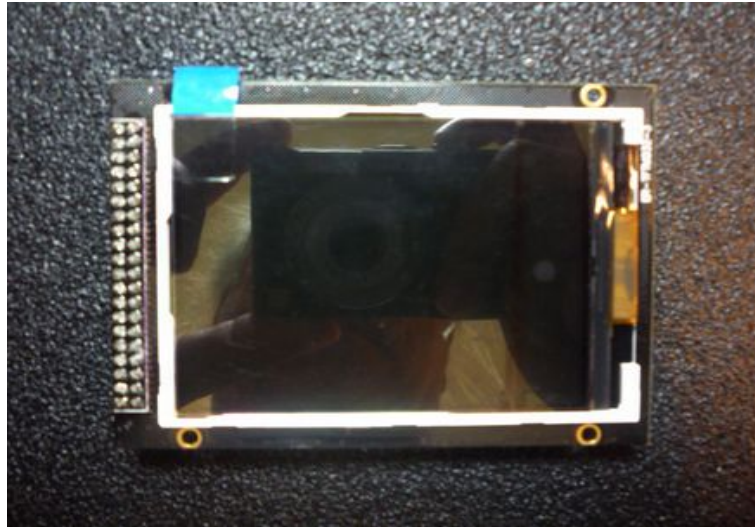
Screws and nuts	Farbcode/colorcode/code	Value/Position
		2x M2,5 screw 4x M2,5 nuts 2x plastik washer

Both screws are inserted into the rear holes and secured with the nuts. A plastic washer is placed on each nut.
The plastic washer prevents the metal nut from being damaged.
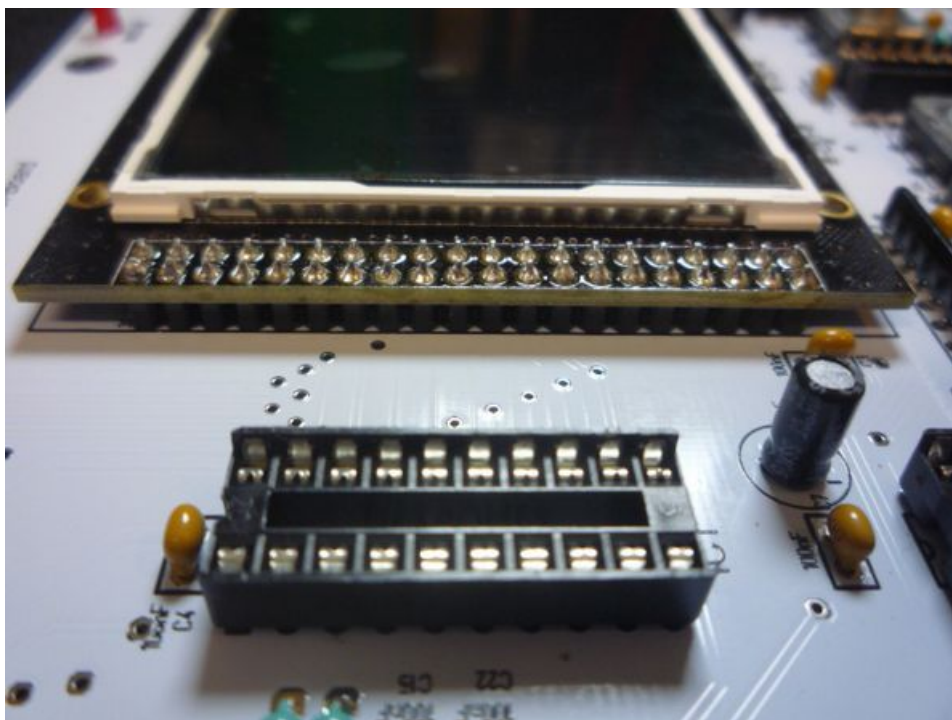short-circuits on the board.

The distance between the LCD and the board is 2.5 mm and is given by the plastic connector of the connector on the LCD.
The nut is 2 mm thick, the washer 0.5 mm - so the display should now rest horizontally on the PCB.
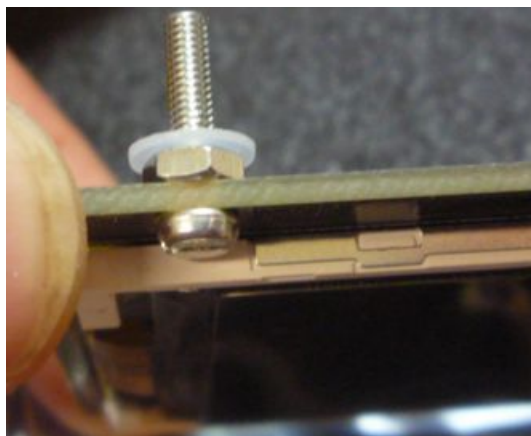
Now insert the display into the board and fix it with the remaining two nuts.
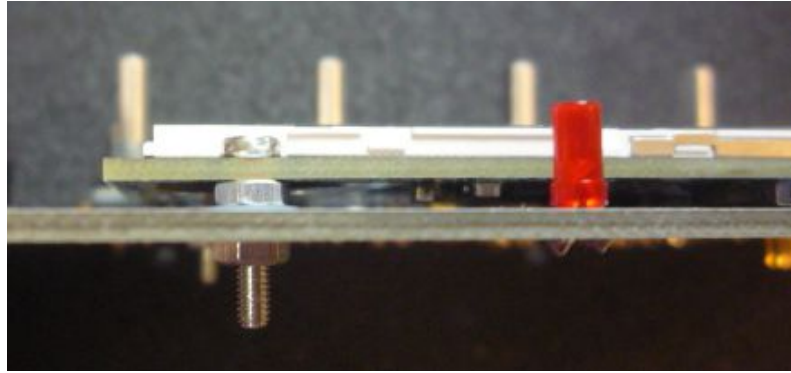
Now the board should look like this:

When everything is straight and screwed on, the display can now be soldered to the board.
It is best to solder first one row of the connector and then the second row.

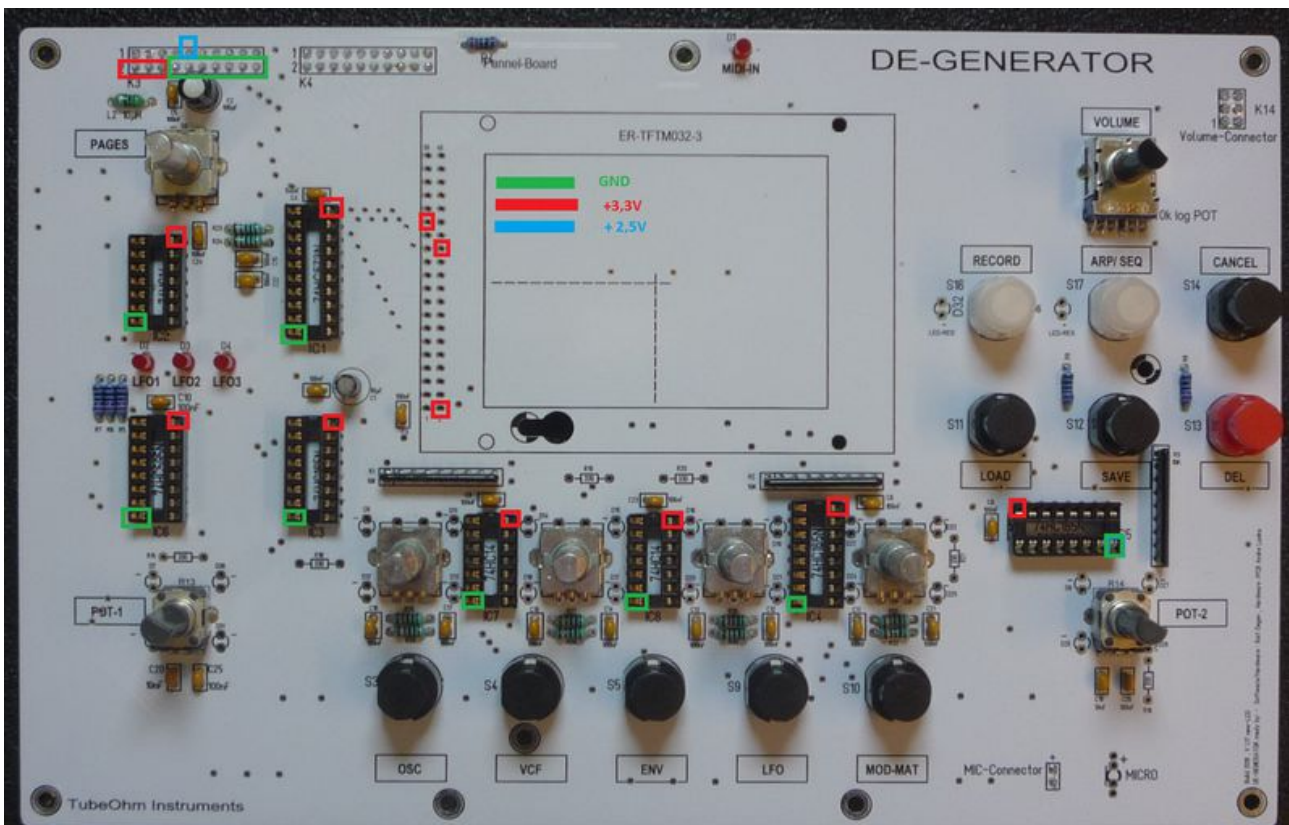The projecting pins of the plug are cut with a side cutter.

Power supply and test points

green = GND
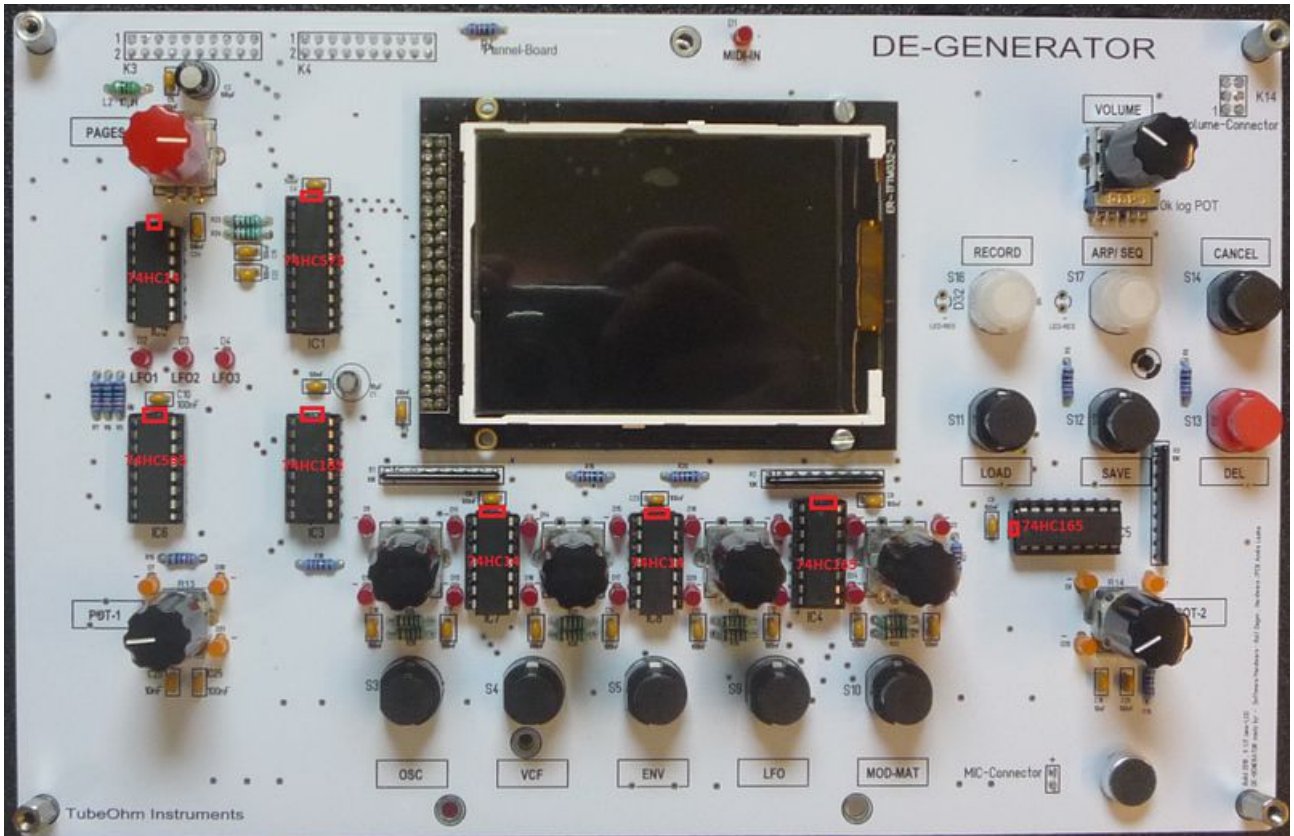red= 3,3 Volt = UB
blue=2,5 Volt = U_ref for Pot 1 and Pot 2

Now the IC's are plugged into the sockets. Make sure the polarity is correct.

We use:

3 x 74HC14
1 x 74HC573
3 x 74HC165
1 x 74HX595

The finished panel board should now look like this.

Congratulations, the pannel board is now ready.

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