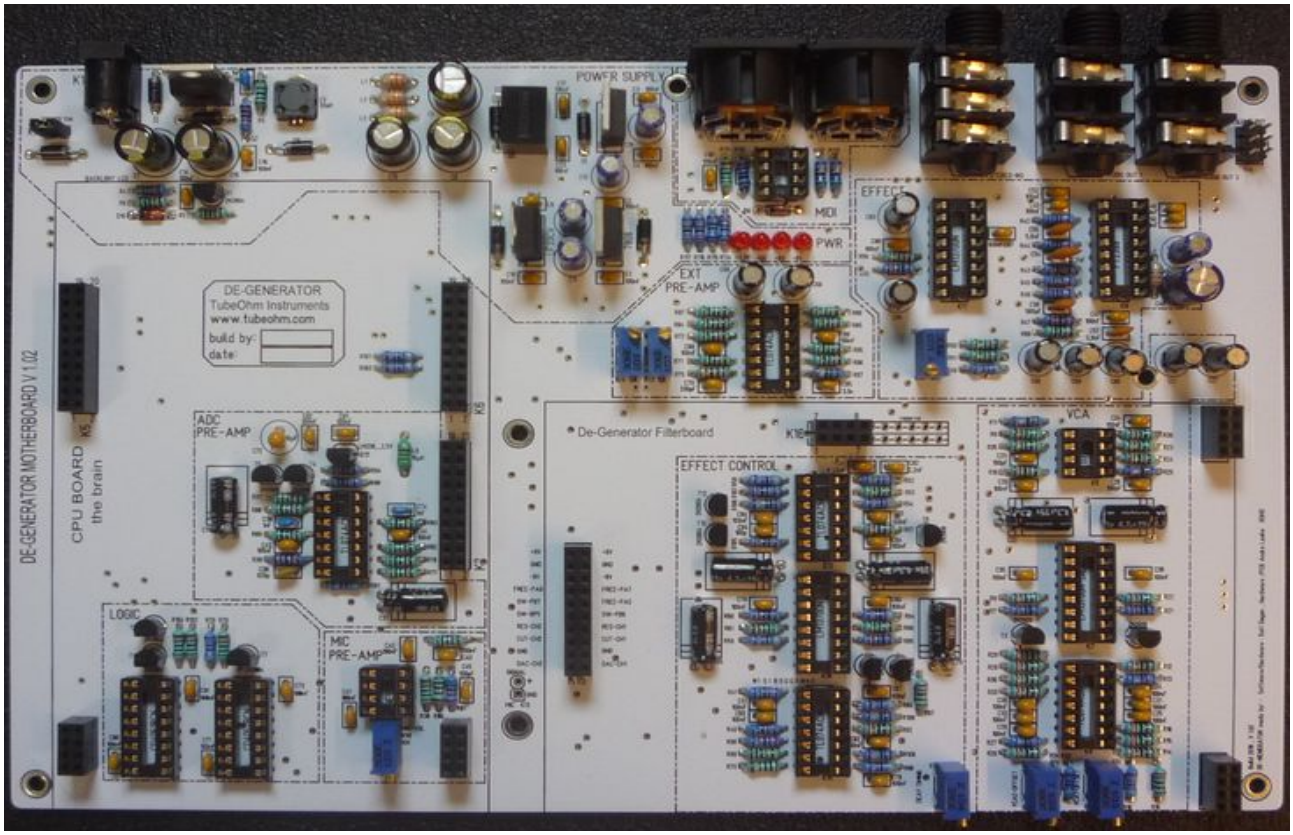
De-Generator

DIY sample Synthesizer

Building instruction 2, the motherboard

V1.02 english
as of 08.04.2019



www.tubeohm.com

About this manual.

To build the DIY Sample-Synthesizer De-Generator successfully, it is necessary to read the DIY manuals.
Please also pay attention to the tips and the texts marked in red.

I hope you have already soldered yourselves warm with the Pannel-Board. Only we start with the more complex motherboard.

Before we start - as always - first HOOOOMMMMMM - and then take a close look at the board.

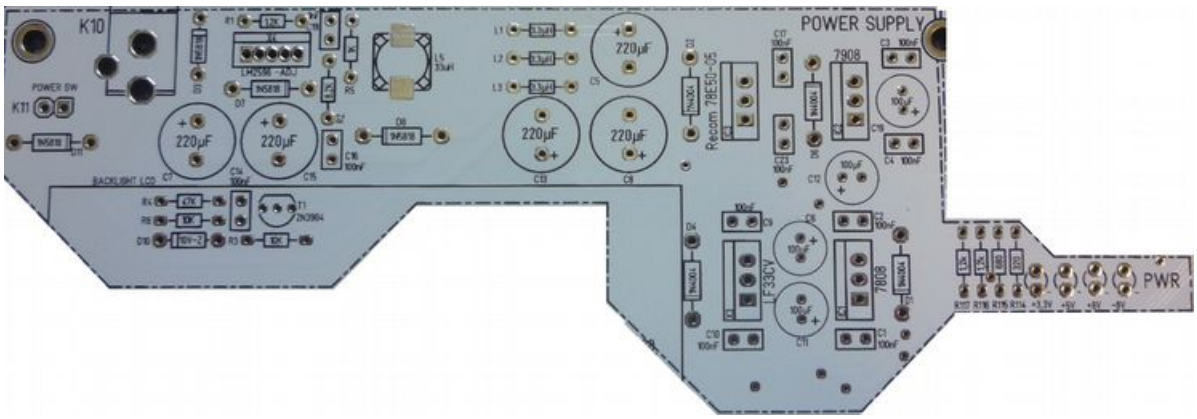
*** Author's note:
Parallel to this DIY manual I solder the motherboard together and take photos. When you start it really looks like a lot of soldering work and complicated. But you will soon notice that the single components are very easy to solder. Very clearly and actually fast made.

In order to make it a little easier for DIY users to build it themselves, the circuit board is divided into individual modules. These are briefly described in the function and then assembled in the second part of this manual.

The motherboard contains the power supply, MIDI in/out, the amplifier for external signals, an effect processor with control, the preamplifier/logic of the ADC, the microphone preamplifier and the VCA.

The assemblies in detail

The power supply unit



The power supply unit generates the supply voltages +8Volt,-8Volt,5 Volt and 3.3 Volt for the de-generator.

Minus (-) 8 volts is generated by the (X4) switching regulator and a (IC2) 7908 for stabilization.

+8 volts are generated from the 12 volt operating voltage via a (IC1) 7808.

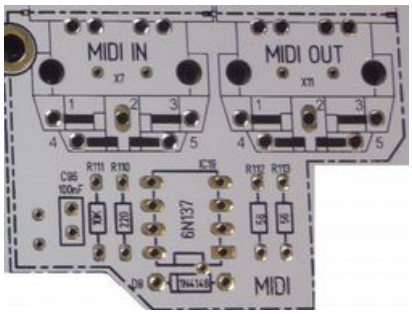
For +5V a Recom switching regulator 78E50-05 is installed, from the generated 5V voltage (X3) LF33CV generates the 3.3 Volt supply for the CPU and the display.
The switching regulator 78E50-05 was taken because it does not get hot!

So that no high-frequency peaks and disturbances on the supply lines
all supply lines are protected by coils L1,2,3 - 3,3 uH .

Furthermore, the four LEDs 3,3 +5 +8 -8 indicate whether the voltages are present. These LEDs are only used for optical control, but do not indicate undervoltage or fluctuating voltages.

When the power supply unit is ready, all voltages should be measured. A multimeter is OK, but an oscilloscope is better because it also determines if there are fluctuations and peaks on the supply voltages.

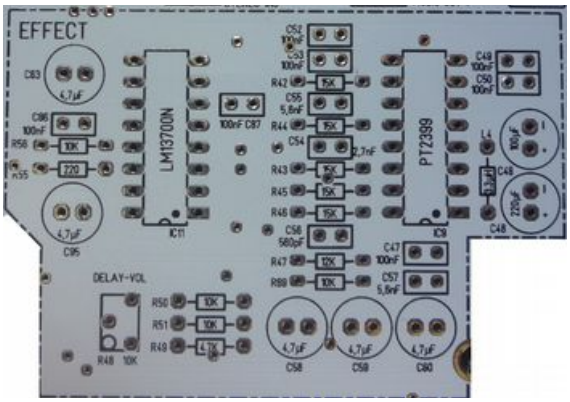
MIDI



MIDI In:
Via R110, 220 Ohm the MIDI signal reaches the optocoupler IC 19 , 6N137.
D9,1N4148 is a reverse polarity protection. C96 is connected as buffer capacitor and R111,10k is used to generate bias voltage for the internal gate of the 6N137.

MIDI Out:
Via R112,56 Ohm pin 4 gets 3,3V operating voltage. The MIDI output signal is sent via R 113 ,56 Ohm .

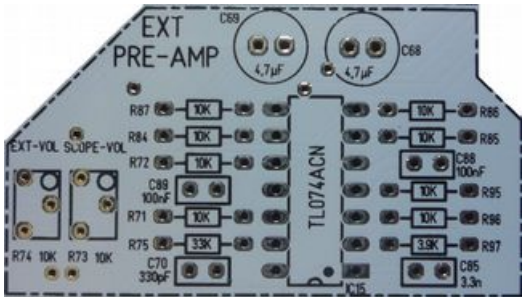
EFFECT



A PT 2399 is used for the echo. The feedback is controlled via IC 11, LM13700 . R48, a 10

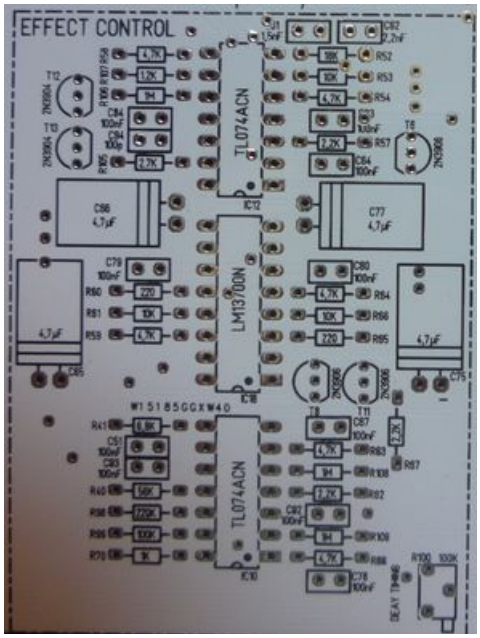
K trimmer is used to adjust the volume of the effect signal.

EXT PRE AMP



The external preamplifier has two functions.
1:) Amplification of an external audio signal - for the filters
2:) Adjusts the amplitude for the scope signal. *** More details in Adjustment of the De-Generator

EFFECT-CONTROL



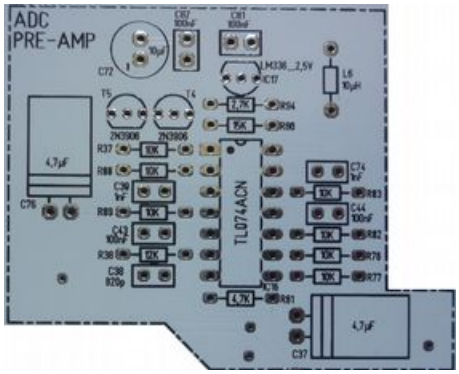
The EFFECT-CONTROL Board contains the controls for the
EFFECT IC IC IC9.

1:) Effect Volume and Panorama . The volume and the panorama will be via IC18, LM13700. IC 10a,b supply the control current for IC18a,b

2:) delay time, IC 10c,d as well as IC12d and T12,13 control the current for the delay time of the PT 2399.

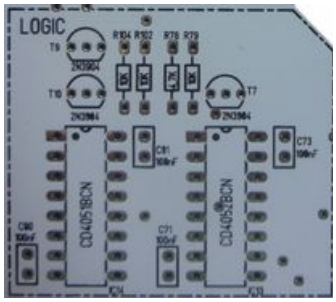
3:) IC 12a /T6 controls the current for the feedback.

ADC-PRE-AMP



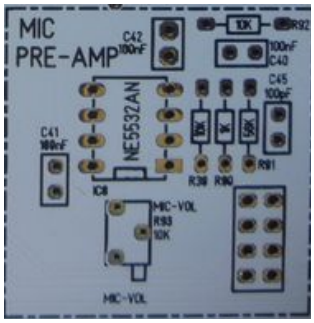
The analog/digital preamplifier IC 16 a,b,c,d limits the amplitude of the audio signal via the transistors T4,T5. The signal filtered via IC 16b is fed via IC 16C into the AD converter of the CPU.
IC 16 D processes the signal so that it can be triggered in the oscilloscope.
The LM336-2.5 serves as a reference voltage source for both freely programmable potentiometers.

LOGIC



IC 14a , CD4051 is a recording selector switch for the Mic, the external input and the the oscilloscope. Via IC13a ,CD 4052 the audio signal can be routed into the stereo filter. T7,9,10 generate the switching voltage for IC 13 and IC 14.

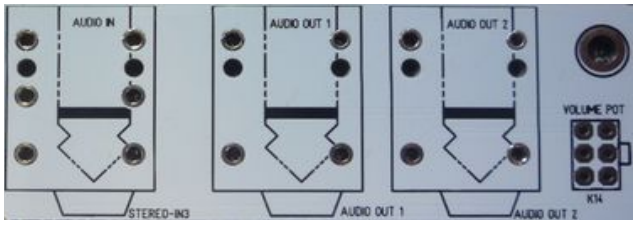
MIC-PRE-AMP



The MIC Preamp NE5532AN is a low noise preamplifier. Via R91/R90 the gain is set to approx. 50. Via R92 the MIC gets its operating voltage. This is decoupled via C40 as alternating voltage. R39 and C 40 serve as high-pass filters with Fg =150 Hz. C45 cuts the

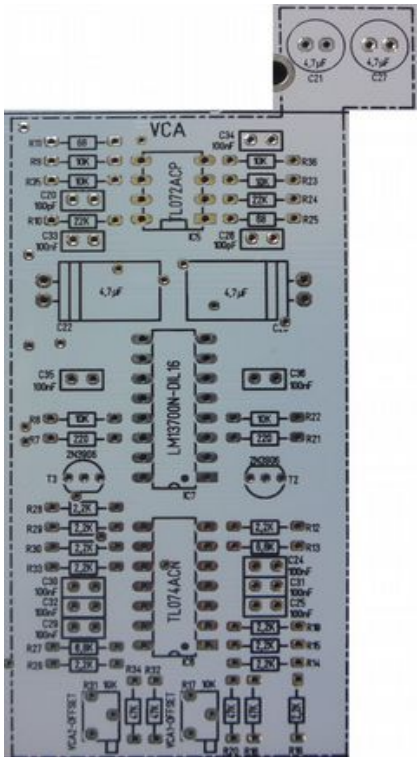
high frequencies.

Audio in/out/Volumen



Audio in / out is not a big deal. Since you can also use the de-generator as -stereo filterbox, the audio input is a stereo IN jack.
Audio out 1 and 2 (left and right) are two mono sockets each.
The audio output is routed to the stereo volume potentiometer via the K14 plug, a 2x three-pin cable, and can be adjusted in volume.

VCA



The VCA and also the separate filterboard are in -stereo.
Channel 1 , IC6a,6b converts the PWM signal coming from the CPU into a DC control voltage. With the trimmer R 17 the VCA is set to complete when no key is pressed. IC6b serves as current source for the actual VCA, an LM 13700. IC 5b now mixes the FX signal with the original signal and works as power amplifier.
Channel 2 is identical to channel 1.
IC6c/d is the filtering and generation of the control current. R31 is again used to adjust channel 2. IC7a is the actual VCA and IC5a works as mixer and power amplifier.

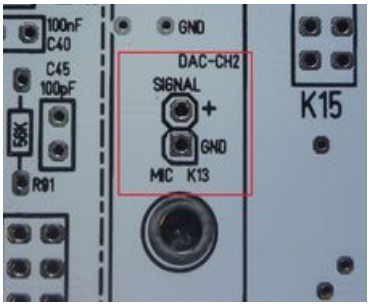
** Why now the trimmers R31 and R17 ?

Well, we work with a 3,3 Volt CPU. One should assume, that with digital gates logically 0 also 0 Volt corresponds. But this is not so. It can be quite 0.05 ...0.1Volt with logical 0 present. Then we have the -offset errors in the opamps. And already we have a voltage of 0.05...0.1 Volt at the output. From this voltage a control current is generated via IC6b and this opens the VCA a bit.
The control current of the VCA goes from a few hundred pA up to about 1 mA. So pretty little .
Since the oscillators in the de-generator are always on, we hear the sound shimmering through, even if no key is pressed on the keyboard.

I don't want it !

So with the potentiometers R17 and R 31 the output of the IC's 6a and 6c is set so that it is actually 0 Volt. The VCA's have to be adjusted in a way that the sound is not audible anymore.

MIC-Connetor

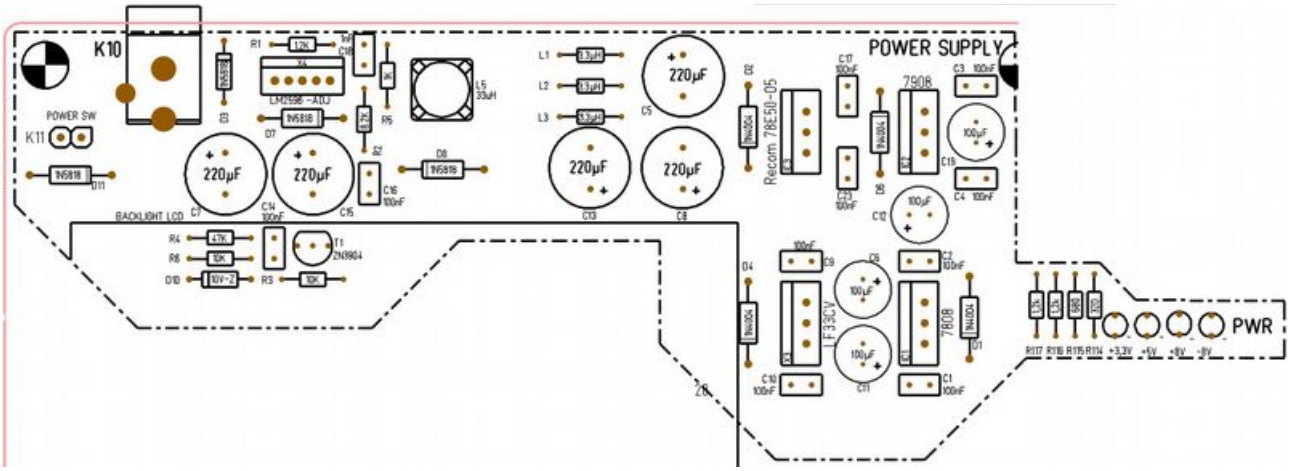


There's not much to say about the microphone connector. It has a plus pole for the signal and ground.
A two-pole cable connects the connector from the motherboard to the MIC connector on the panel board. Make sure that PLUS is connected to PLUS and ground to ground.

So, that was first of all the short version of the individual components on the de-generator motherboard.

Is your soldering iron already warm?
Well then it starts now with the soldering.

We start with the power supply



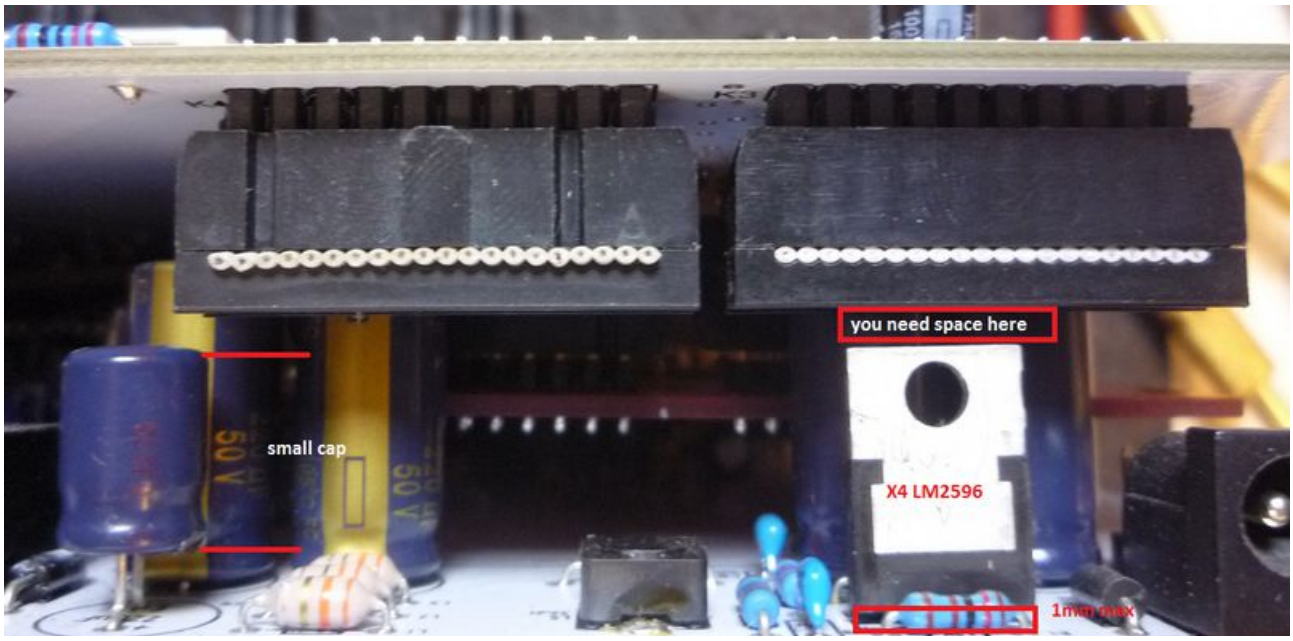
Tip: Make sure that the LM2596 switching regulator is inserted as deeply as possible into the circuit board. The distance between the board and the housing of the switching regulator should be max. 0.5 mm. Attention, if the switching regulator looks too high out of the board, the panel board with the connectors will not fit anymore ! See picture below !

54 Bauteile/54 parts

R1,116,117=1,2k, R2=8,2k, R3,6=10k, R4=47k, R5=1k, R114=330R, R115=680R,	Metall film Resistor mistake , must be 330 R	3x1,2k 1x8,2k 2x10k 1x47k 1x1k 1x330R 1x680R
L1,L2,L3	3,3uH coil	3x3,3uH coil
L5 33uH	33 uH SMD coil	1x33 uH SMD coil
D3,D7,D8,D11	Diode attention polarized	4x1N5818
D1,2,4,6	Diode attention polarized	4x1N4004
D10	Z-Diode attention polarized	1x Z-Diode 10 Volt
C18=1nF, C1,2,3,4,9,10,14,16,17, 23=100nF	Ceramic capacitors	1x 1nF 10x 100 nF
C5,C8,C13,C7,15=220uF	Attention polarized	1x220uF/25V Elko low ESR
C6,C11,C12,C19	100 uF /25V polarized	4x100uF/25V Elko
T1 , Transistor	2N3904	1xTransistor 2N3904
K10 , DC plug	DC plug	1x DC plug
IC3 Recom78E50-05	5 Volt Regulator	1x78E50-05
X3-LF33CV	3,3Volt Regulator	1xLF33CV
IC 2 7908	-8Volt Regulator	1x7908
IC1 7808	(+)8Volt Regulator	1x7808

X4 LM2596-ADJ	Negative switching power supply	1xLM2596-ADJ
LED red, 3.3 , 5, -8, 8 Volt	LED red-polarized	4xLED 3mm red

Attention, the distance between the board and the housing of the LM2596 switching regulator should be approx. 0.5 mm.

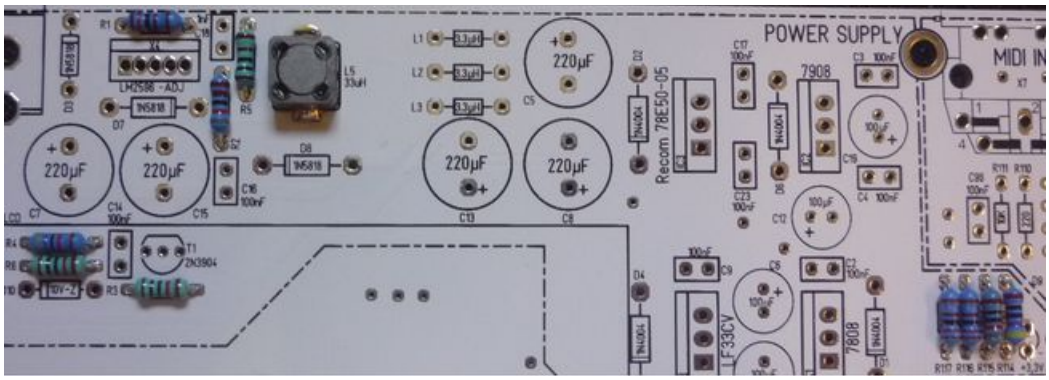


Attention 2 : If you order the parts yourself, pay attention to the size of the LOW ESR electrolytic capacitors.
Otherwise the power switch will not fit into the Plex housing.
220uF/25Volt are used. The pitch can be 3,5 or 5mm.
Low ESR means - 'low impedance'.

Now we solder:

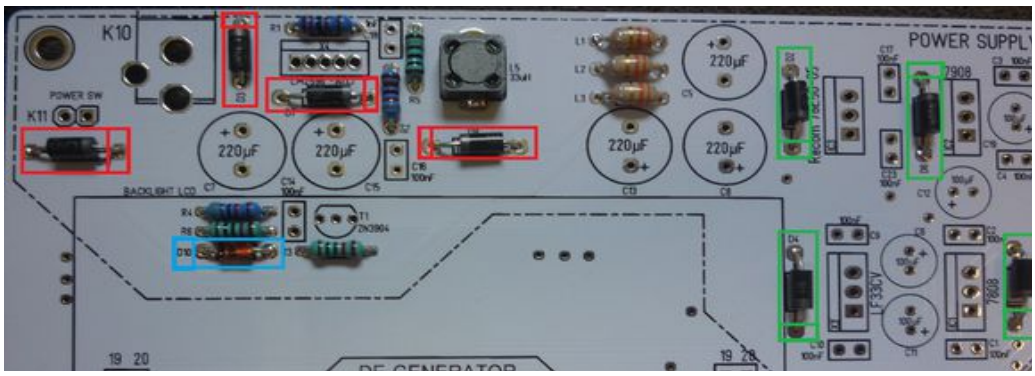
1:) First the SMD coil L5 is soldered in.
2:) 3x1,2 kOhm
3:) R5 = 1kohm
4:) R2 = 8,2kohm
5:) R3,6 =10kohm
6:) R4 = 47kohm
7:) R115 = 680 R(820 R)R 114 = 320 R (470 R)
**R114 and 115 serve as resistors for the LEDs and can be adapted to the LEDs.

Here all resistors and the coil L5



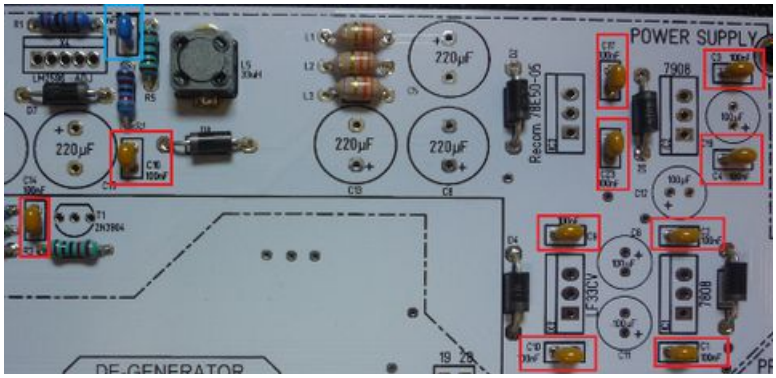
Now follow the diodes and coils

1:) L1,L2,L3 = 3,3 uH *** up to 0,4 A current
2:) D3,D7,D8,D11 = 1N5818
3:) D1,2,4,6 = 1N4004
4:) D10 = Z-Diode 10 Volt



Now the ceramic capacitors are soldered in.

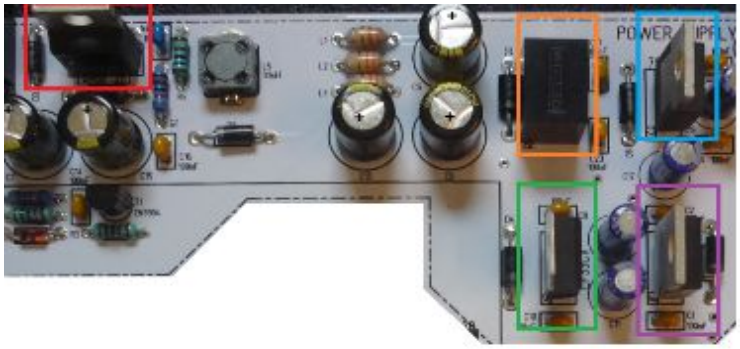
1:) C18=1nF
2:) C1,2,3,4,9,10,14,16,17,23 = 100nF



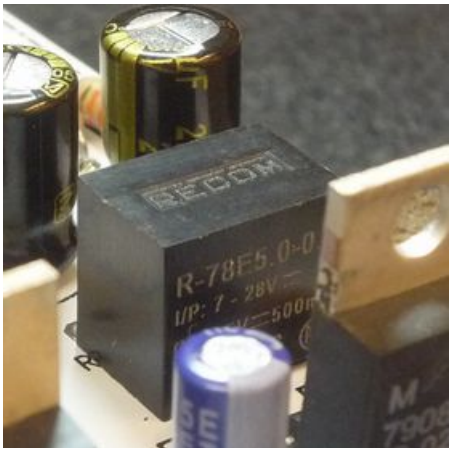
3:) The transistor T1 = 2N3904 is soldered in.

Now all voltage regulators and also the switching regulator can be soldered in.

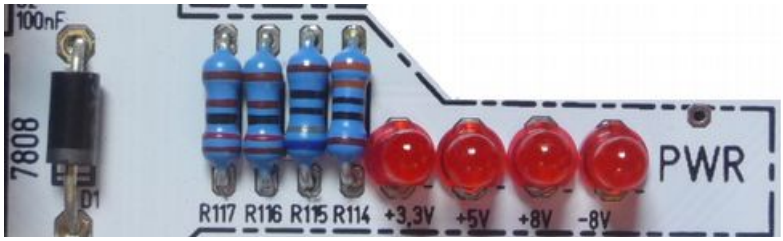
X4 =LM2596-ADJ Attention, solder as low as possible on the PCB!!! Important
IC1 =7808 positive 8 Volt
IC2 =7908 negative 8 Volt
IC3 =Recom78E50-05 switching regulator 5 Volt
X3 =3,3Volt , Power supply of the CPU and the display.



Here again a picture of how the 5V Recom control is installed. The font has to face forward. It fits exactly in front of the diode D2. Maybe you have to press something.



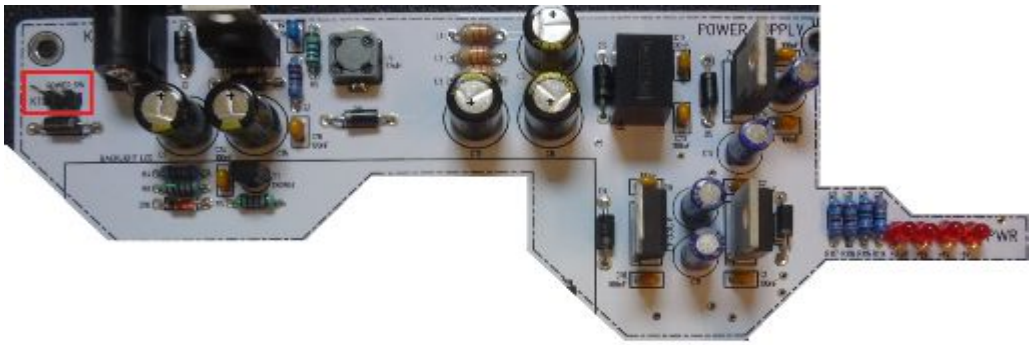
Now come the LEDs
Attention the LEDs are polarized. The minus pole is the short leg.
Minus is marked with (-) on the board.



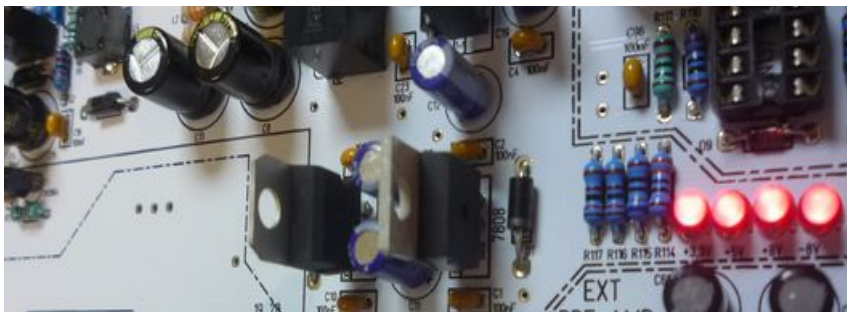
Finally the 100 uF and the 220 uF capacitors -low ESR are soldered in.

C6,C11,C12,C19 = 4x 100uF, Attention , polarized
C5,C8,C13,C7,15 = 5x 220uF low ESR, Attention , polarized

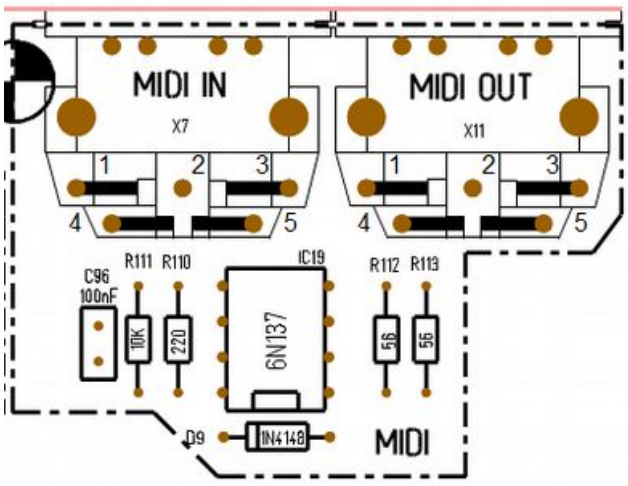
The power supply should now look like the one on the picture. The Power Switch connection can either be provided with a 2-pole pin header or short-circuited with a 15 cm long cable.



And now you can check the power supply immediately. To do this the POWER SWITCH must be short-circuited. Either with the 15 cm long cable - or profan with a jumper - if you have soldered the pin header.
The tension rises - also with me - and - aha the first feeling of success.
Well, if all LED's are on it doesn't mean that everything is okay - the power supply can vibrate high frequency. But it runs already times.



MIDI input/output

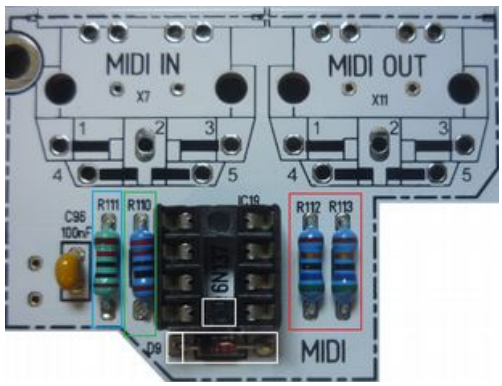


10 Bauteile/10 parts

R111=10k, R110=220R, R112=56R, R113=56R	Metall film Resistor	4xresistor
D9	Diode attention polarized	1x1N4148
C96	Capacitor 100 nF	1x100nF
X7,X11	Din 5 Pol MIDI connector	2x DIN 5 MIDI connectors
IC socket 8 Pol	IC socket	1x IC socket 2x8 Pol
IC 19	6N137 optocoupler	1x IC 6N137

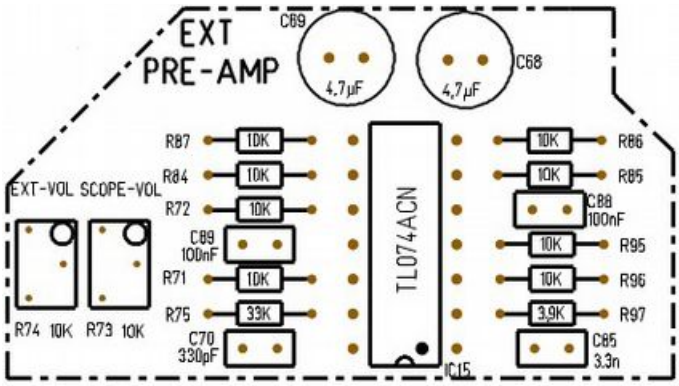
Now we come to the MIDI interface, we solder now :

1:) R112,113 = 56 R
2:) R110 = 220R
3:) R111 = 10K
4:) Diode 1N4148 , Attention, polarized
5:) C96 =100 nF
6:) 8 PIN IC socket



All jacks/MIDI, audio are soldered in at the very end because the board has to be turned several times and because the jacks interfere.

Extern Pre-Amp

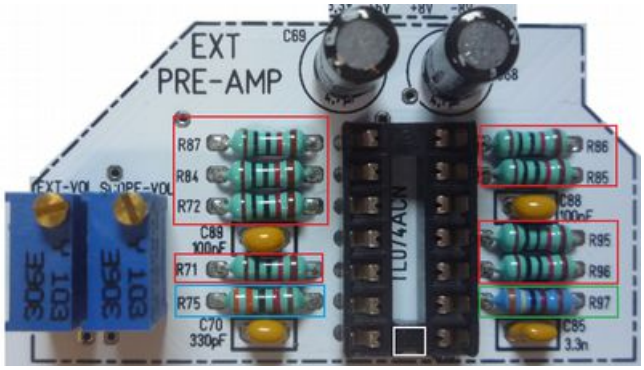


20 Bauteile/20 parts

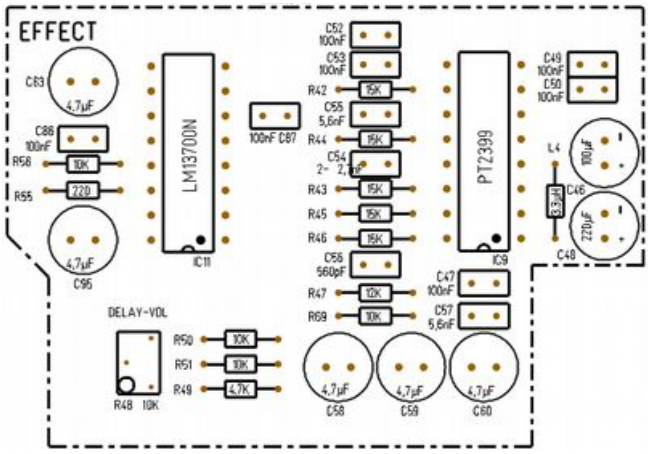
R71,72,84,85,86,87,95,96 =10k R75=33k R97=3,9k	Metal film resistor	8x10k 1x33k 1x3,9k
C70=330pF,C85=3,3nF C88,89=100nF	Ceramic caps RM2,5	1x330pf 1x3,3nF 2x 100nF
C68,69=4,7uF Elko NP	Non polarized Audio elko	2x4,7uF NP
R73,74=10k trimm pot	Trimmer	2x10kohm trimm pot
IC15 -IC socket	IC socket 14 pin	1xIC socket 14 pin
IC 15 TL 074	Quad opamp	1xIC TL074

The external preamplifier, we solder now:

1:) R97 = 3,9k
2:) R71,72,84,85,86,87,95,96 = 8x10k
3:) R75 = 33k
4:) C70 = 330pF[331], C85 = 3,3nF[332] , C88,89 = 100nF[104]
5:) 14 poliger IC Sockel
6:) C68,69=4,7uF non polarized audio electrolytic capacitors
7:) R73,74=10k trimm pot *** Caution the adjusting screw must point upwards.



EFFECT



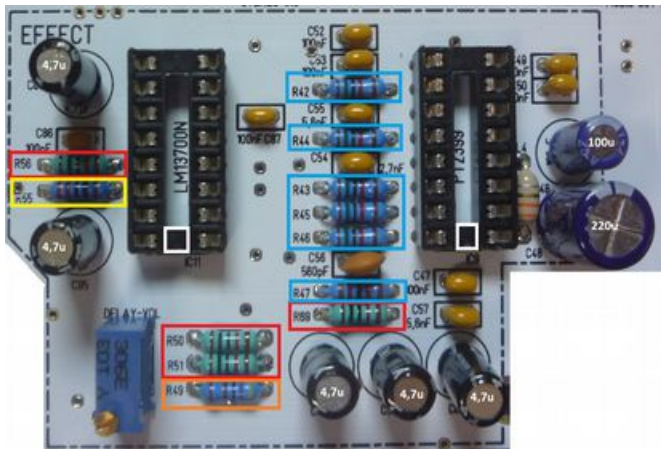
36 Bauteile /36 parts

R50,51,56,69=10k R49=4,7k R55=220R R42,43,44,45,46=15k R47=12k		4x10k 1x4,7k 1x220R 5x15k 1x12k
C47,49,50,52,53,86,87 C54=2,7nF C55,57=5,6nF ***6,8nF C56=560pF	Ceramic cap RM 2,5	7x100nF 1x2,7nF 2x5,6nF ***6,8nF 1x560pF
L4	Coil 3,3 uH	1x3,3uH
C58,59,60,63,95=4,7uF NP	Non polarized Audio elko	5x4,7uF NP
C47=100uF C48=220uF	eklo	1x100 uF 1x220uF
R48 trim pot 10K	Trim pot 10 k	1x10k trim pot
IC9,11 IC socket 16 pin		2xIC socket 16 pin
IC 11=LM13700 IC9 = PT2399	OTA Effekt IC	1xLM13700 1xPT2399

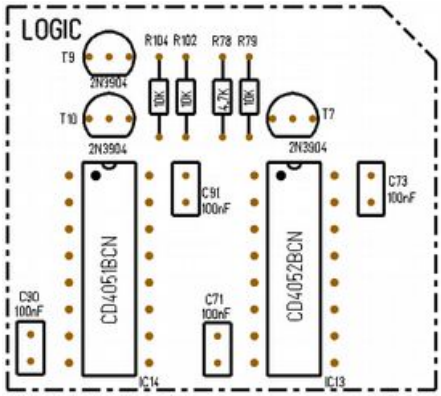
Now we solder the following components first:

1:) R55 = 220R
2:) R49 = 4,7k
3:) R50,51,56,69 = 4x10k
4:) R47=12k
5:) R42,43,44,45,46 = 5x15k
6:) C54 = 2,7nF
7:) C55,57=5,6nF *** alternativ 6,8nF
8:) C56 = 560pF
9:) C47,49,50,52,53,86,87 = 100nF
10:) L4 - Spule/coil 3,3uH
11:) sockets 9,11, 2xIC sockel/sockets 16 pin

12:) C47 = 100uF Elko Achtung polarisiert
13:) C48 = 220uF Elko Achtung polarisiert
14:) C58,59,60,63,95 = 5x 4,7uF NP not polarized - audio electrolytic capacitor
15:) R48 trim pot 10K , screw on top



LOGIC



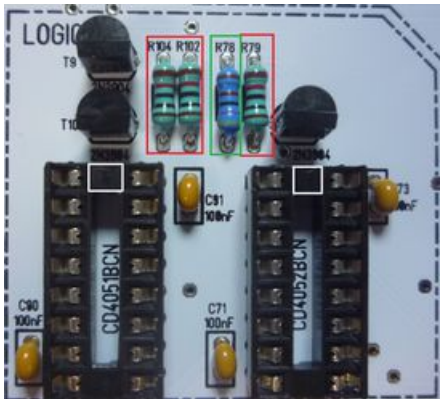
15 Bauteile/15 parts

R79,102,104=10k R78=4,7k	Metall film resistor	3x10k 1x4,7k
C71,73,90,91=100nF	Ceramic caps RM2,5	4x100nF
T7,T9,T10	Transistor 2N3904	3x2N3904
IC13,14 IC sockets 16 pin	IC sockets	2xIC socket 16 pin
IC13=CD4052 IC14=CD4051	Attention, must be C-MOS, can handle +/-8Volt	1xCD4052 C-MOS 1xCD4051 C-MOS

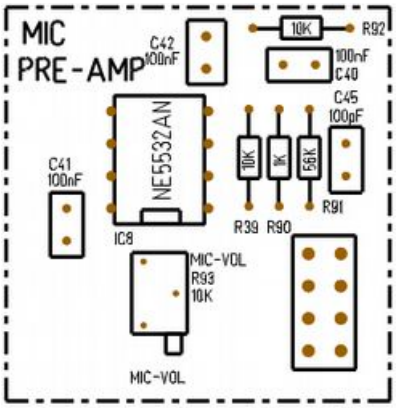
Now it's the turn of the LOGIC circuit
We solder

1:) R78 = 4,7k
2:) R79,102,104 = 3x 10k
3:) C71,73,90,91 = 100nF
4:) IC13,14 IC sockets 16 pin

5:) T7,T9,T10 = 3x 2N3904 Transistor ..... well, that was quick. ...



MIC-PREAMP

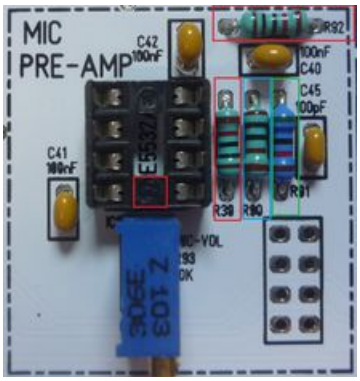


11 Bauteile/11 parts

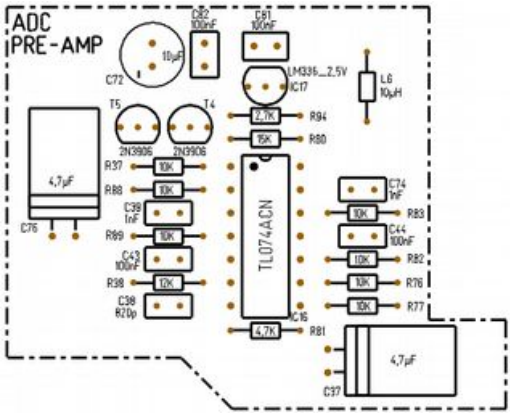
R39,92=10k R90=1K R91=56k	Metall film resistor	2x10k 1x1k 1x56k
C40,41,42=100nF C45=100pF	Ceramic cap	3x100nF 1x100pF
R93 10k trim pot	Trim pot	1x10k trim pot
IC8 IC socket 8 pin	IC socket 8 pin	1x8pin IC socket
IC8 NE5532 less noise	NE5532	1x NE5532

It's soldered fast now, too. We start with :

1:) R90 = 1k
2:) R39,92= 2x 10k
3:) R91 = 56k
4:) C40,41,42 = 100nF [104]
5:) C45 = 100pF [101]
6:) IC8 IC socket 8 pin
7:) R93 10k trim pot [Z103] Attention the screw to the front



ADC PRE-AMP



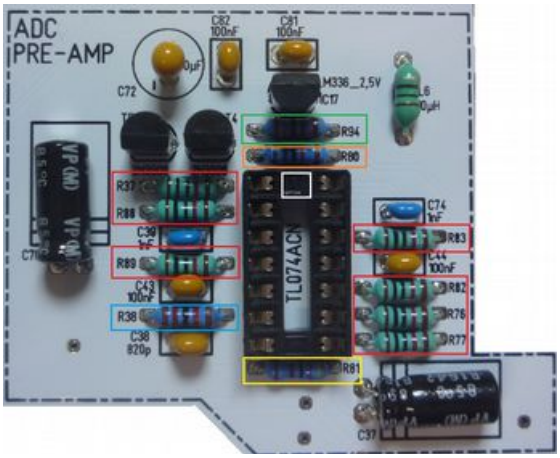
27 Bauteile/27 parts

R37,76,77,82,83,88,89 =10k R38=12k R80=15k R81=4,7k R94=2,7k		7x10k 1x12k 1x15k 1x4,7k 1x2,7k
C39,74=1nF C43,44,81,82=100nF C38=820pF	Ceramic capacitor RM 2,5	2x1nF 4x100nF 1x820pF
C37,76=Elko 4,7uF NP	Elko 4,4 uF not polarized	2x4,7uF Elko NP
C72= tantal Elko 10 uF	Tantal Elko polarized	1x10uF tantal Elko
L6 =10uH coil	Coil 10 uH	1x10uH coil

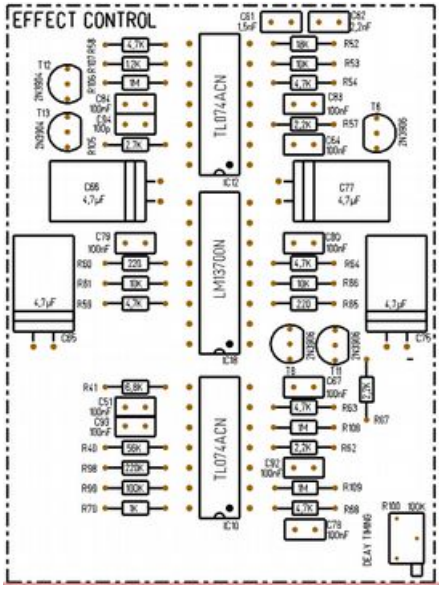
T4,5 =2N3906	Transistor 2N3906	2x2N3906
IC17 = 2,5Volt voltage reference	LM336_2,5	1xLM336_2,5 Voltage reference
IC16 IC socket 14 pin	IC socket 14 pin	1x IC socket 14 pin
IC16 =TL074	TL074	1xTL074

So , now the ADC-Pre-Amp board is soldered

1:) R94 = 2,7k
2:) R81 = 4,7k
3:) R38 = 12k
4:) R80 = 15k
5:) R37,76,77,82,83,88,89 = 7x 10k
6:) C39,74 = 2x 1nF [102]
7:) C38 = 820pF
8:) C43,44,81,82 = 100nF [104]
9:) C37,76=4,7uF audio- Elko NP not polarized , attention you had to bend the legs and mount it flat on the PCB.
10:) C72 = elko 10 uF , attention tantal Elko,- short leg is minus - polarized !!
11:) L6 = 10uH coil
12:) IC16 IC socket 14 pin
13:) T4,5 = 2N3906
14:) IC17 = 2,5Volt voltage reference for the 2 free pots



EFFECT CONTROL



54 Bauteile/54 parts

R60,65=220R R70=1k R107=1,2k R57,62,67=2,2k R105=2,7k R54,58,59,63,64,68=4,7k R41=6,8k R53,61,81=10k R52=18k R40=56k R99=100k R98=220k R106,108,109=1M		2x220R 1x1k 1x1,2k 3x2,2k 1x2,7k 6x4,7k 1x6,8k 3x10k 1x18k 1x56k 1x100k 1x220k 3x1M
C51,64,67,78,79,80,83,84, 92,93 C61=1,5nF C62=2,2nF C94=100pF	Ceramic capacitor RM 2,5	10x100nF 1x1,5nF 1x2,2nF 1x100pF
C65,66,75,77 = 4,7uF NP	Elko 4,7uF non polarized	4x4,7uF NP
R100=100k trim pot	Trimm pot 100k	1x100k trim pot
T12,13=2N3904	Transistor 2N3904	2x2N3904
T6,8,11=2N3906	Transistor 2N3906	3x2N3906
IC10,12=IC socket14pin IC18= IC socket 16pin	IC socket 14 pin IC socket 16 pin	2xIC socket 14pin 1xIC socket 16 pin
IC10,12=TL074	Opamp TL074	2xTL074
IC18=LM13700 OTA	LM13700 OTA	1x13700

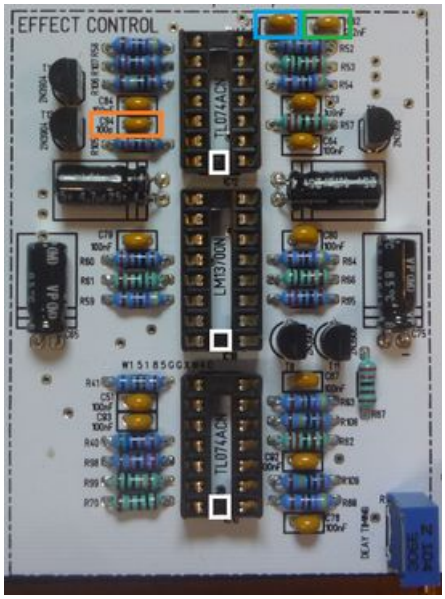
Well, let's solder first.

1:) R60,65 = 220R
2:) R70 = 1k
3:) R107 = 1,2k
4:) R57,62,67 = 3x 2,2k
5:) R105 = 2,7k
6:) R54,58,59,63,64,68 =6x 4,7k
7:) R41=6,8k
8:) R53,61,66 = 3x 10k
9:) R52 = 18k
10:) R40 = 56k
11:) R99 = 100k
12:) R98 = 220k
13:) R106,108,109=3x 1M
----- resistors are ready

14:) C94=100pF [101]
15:) C61=1,5nF [152]
16:) C62 = 2,2nF [222]
17:) C51,64,67,78,79,80,83,84,92,93 = 10x 100nF [104]

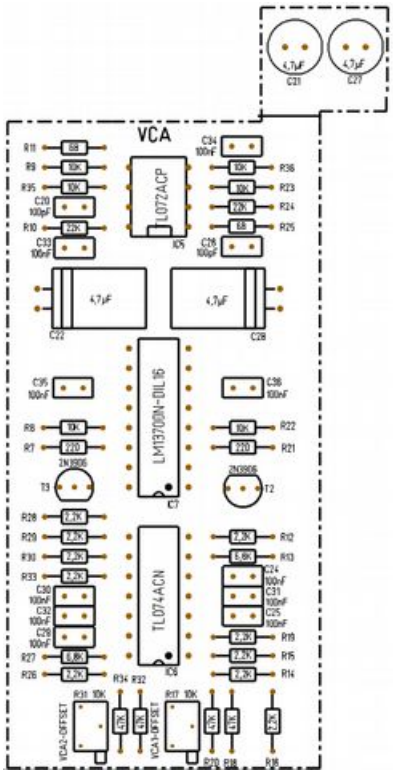
18:) IC10,12=2x IC socket14pin ,
19:) IC18= IC socket 16pin,
attention , solder first 2 pins and look that the socket is flat on the PCB.
Than solder the rest !
20:) T6,8,11 =3 x2N3906
21:) T12,13 = 2x 2N3904

22:) C65,66,75,77 = 4,7uF NP , attention, liegend einlöten/mount it flat on the PCB
23:) R100=100k trim pot [Z 104]



The worst is now done, now only the VCA

VCA

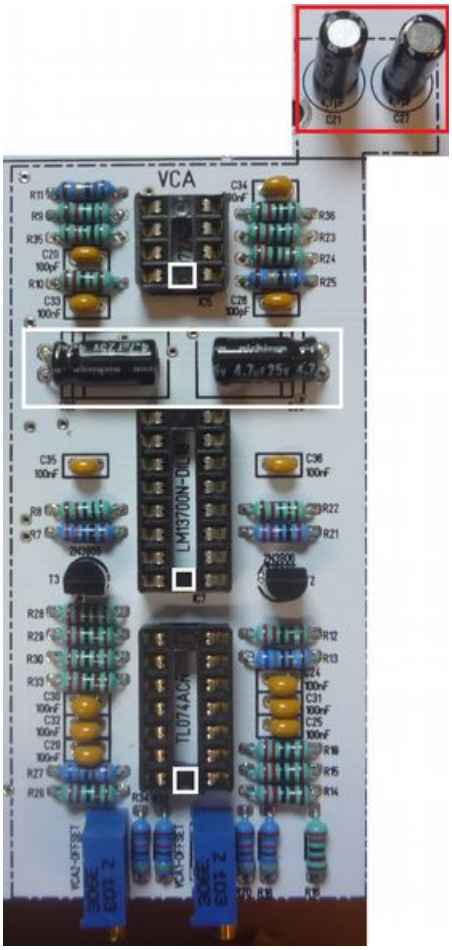


54 Bauteile/54 parts

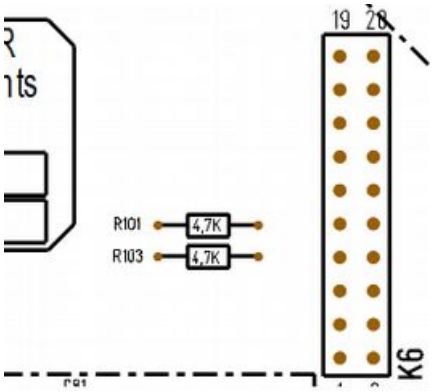
R11,25=68R R7,21=220R R12,14,15,16,19,26,28,29, 30,33=2,2k R13,27=6,8k R8,9,22,23,35,36=10k R10,24=22k R18,20,32,34=47k		2x68R 2x220R 10x2,2k 2x6,8k 6x10k 2x22k 4x47k
R17,31=10k trim pot	10k trim pot	2x10k trim pot
C24,25,29,30,31,32,33,34, 35,36 = 100nF	Ceramic cap RM2,5	10x100nF
C20,26=100pF	Ceramic cap RM2,5	2x100pF
C21,22,27,28=4,7uF NP Elko	4,7uF elko non polarized	4x4,7uF NP Elko
T2,3=2N3906	Transistor 2N3906	2x2N3906
IC5 IC socket 8pin IC8 IC socket 14 pin IC7 IC socket 16 pin		1xIC socket 8pin 1xIC socket 14 pin 1xIC socket 16 pin
IC5=TL072 IC8=TL074 IC7=LM13700	op-amp TL072 op-amp TL074 OTA LM13700	1xTL072 1xTL074 1xLM13700

And already we're soldering.

1:) R11,25 = 68R
2:) R7,21 = 2x 220R
3:) R12,14,15,16,19,26,28,29,30,33 =10x 2,2k
4:) R13,27 = 2x 6,8k
5:) R8,9,22,23,35,36 = 6x 10k
6:) R10,24 = 2x 22k
7:) R18,20,32,34 =4x 47k
8:) C20,26 = 2x 100pF
9:) C24,25,29,30,31,32,33,34,35,36 =10x 100nF
10:) IC5 IC socket 8pin
11:) IC8 IC socket 14 pin
12:) IC7 IC socket 16 pin
13:) T2,3 = 2x 2N3906
14:) C21,27,22,28=4,7uF NP Elko,
Attention , C 22 and C 28 are flat on the PCB .C 21 and 27 mount normal
15:) R17,31 =2x 10k trim pot



Resistors on the board

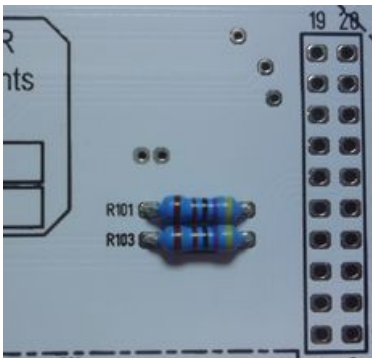


2 Bauteile/2 parts on the PCB

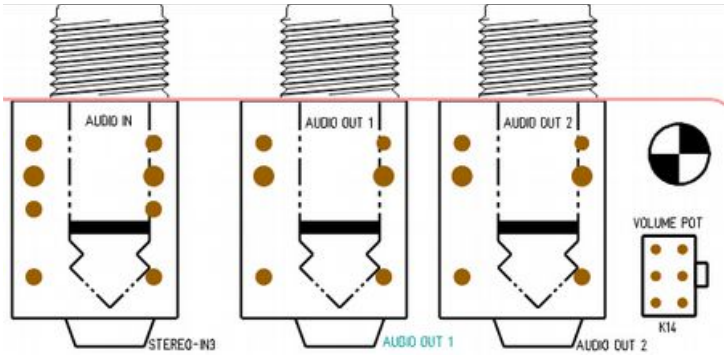
R101,R103=4,7k	Metall film resistor	2x4,7k

And now we solder the last two resistors

1:) R101,R103=4,7k



and the sockets / plugs , MIDI Audio In/Out and Volume



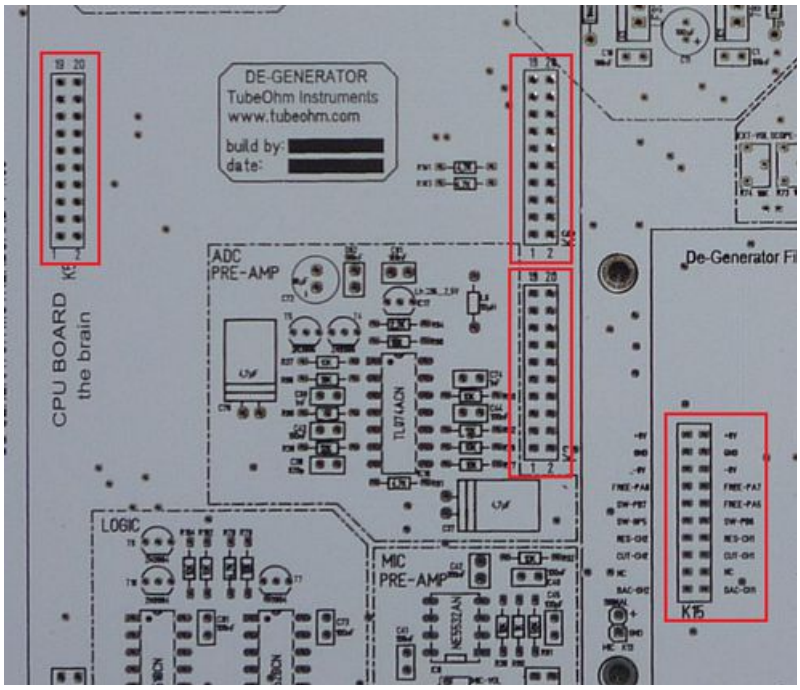
6 Bauteile / 6 parts

Stereo IN3	Stereo Audio plug	1xstereo audio- plug
Audio out1,2	Mono audio- plug	2xmono audio- plug
K14	2x3 pin Volume connector	1x(2x3pin)

X7,X11	DIN 5 pol MIDI	2x DIN 5 Pol MIDI

So now it's time to solder the MIDI and audio sockets as well as the 2x3 pin contact for the volume.

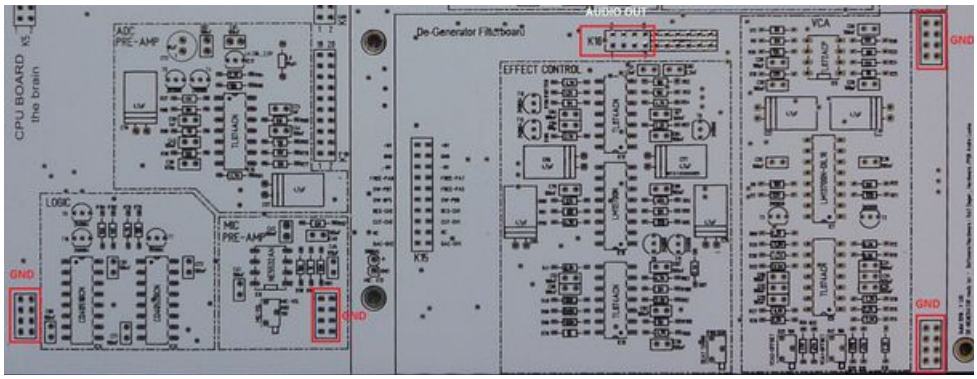
PIN HEADER



4 Bauteile/4 parts

K2,K5,K6,K15	2x10 pin header	4x(2x10 pin header)

GND and AUDIO female connectors



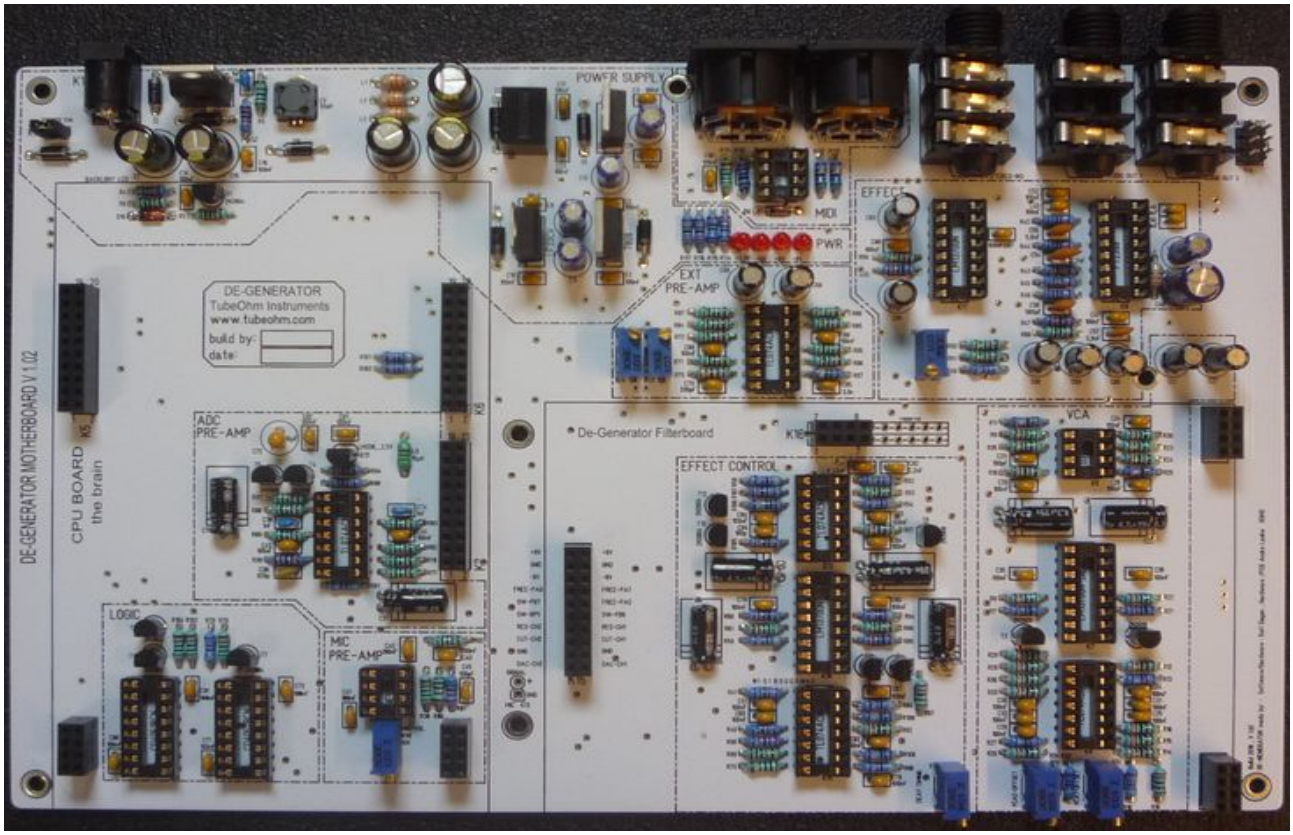
5 Bauteile/5 Parts

X16,GND1...4	2x4 pin header	5x(2x4 pin header)

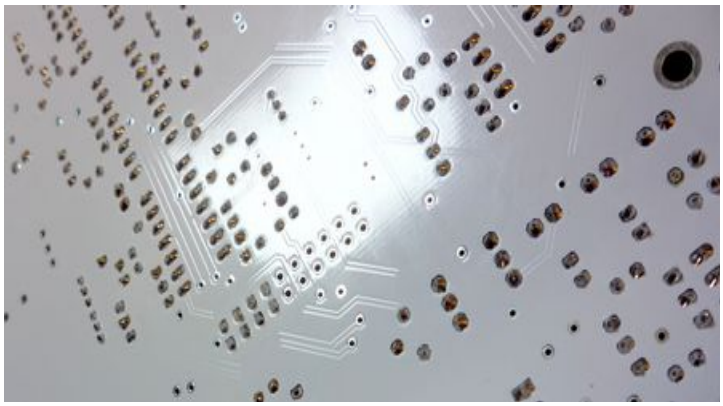
After soldering the female connectors the board is now ready and should be cleaned first. After the cleaning I actually discovered three bad solder joints and soldered them again.

Cleaning people is not only cosmetics, you can see much better if all solder joints are 100% OK.

The motherboard should now look like the picture below.



Here is an example of a neatly cleaned circuit board
and then it works!



A 12 V power supply unit with at least 1000 mA is required for the power supply.
Technical data power supply unit.

- 12V DC
- 1000mA
- Buchse 2,1/5,5 Center positiv

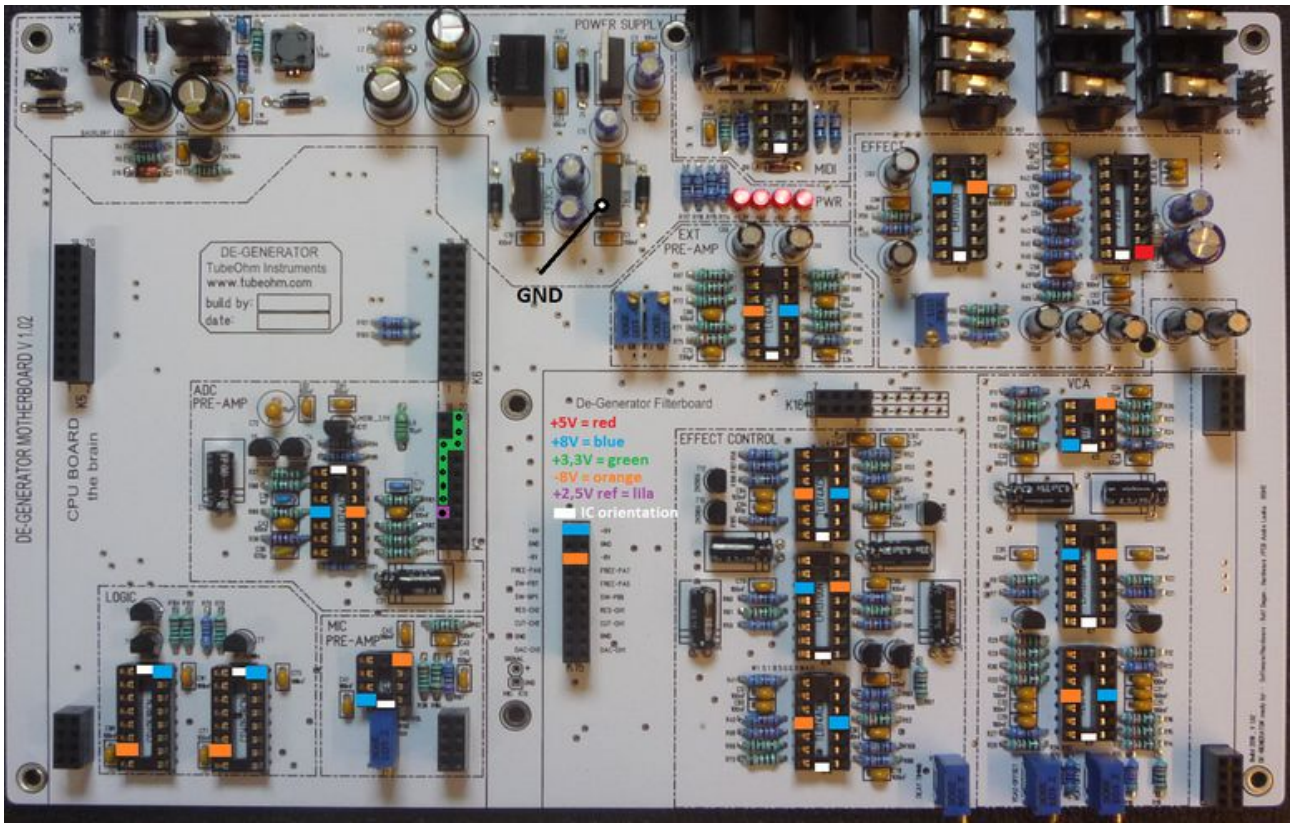
You can find suitable power supplies in almost every specialist shop and at Amazon.

Test the voltages on the motherboard:

1:)	**+5Volt**	**red**
2:)	**+8Volt**	**blue**
3:)	**+3,3 Volt**	**green**
4:)	**-(minus)8Volt**	**orange**
5:)	**+2,5V ref**	**purple**

A multimeter is used to measure against GND.
Ground is at the cooling vane of the IC 1 LM/TL 7808 !

If the motherboard is connected to the 12 Volt power supply - don't forget to bridge the Power Switch K11, the LED's should turn on and the following voltages should be measured.

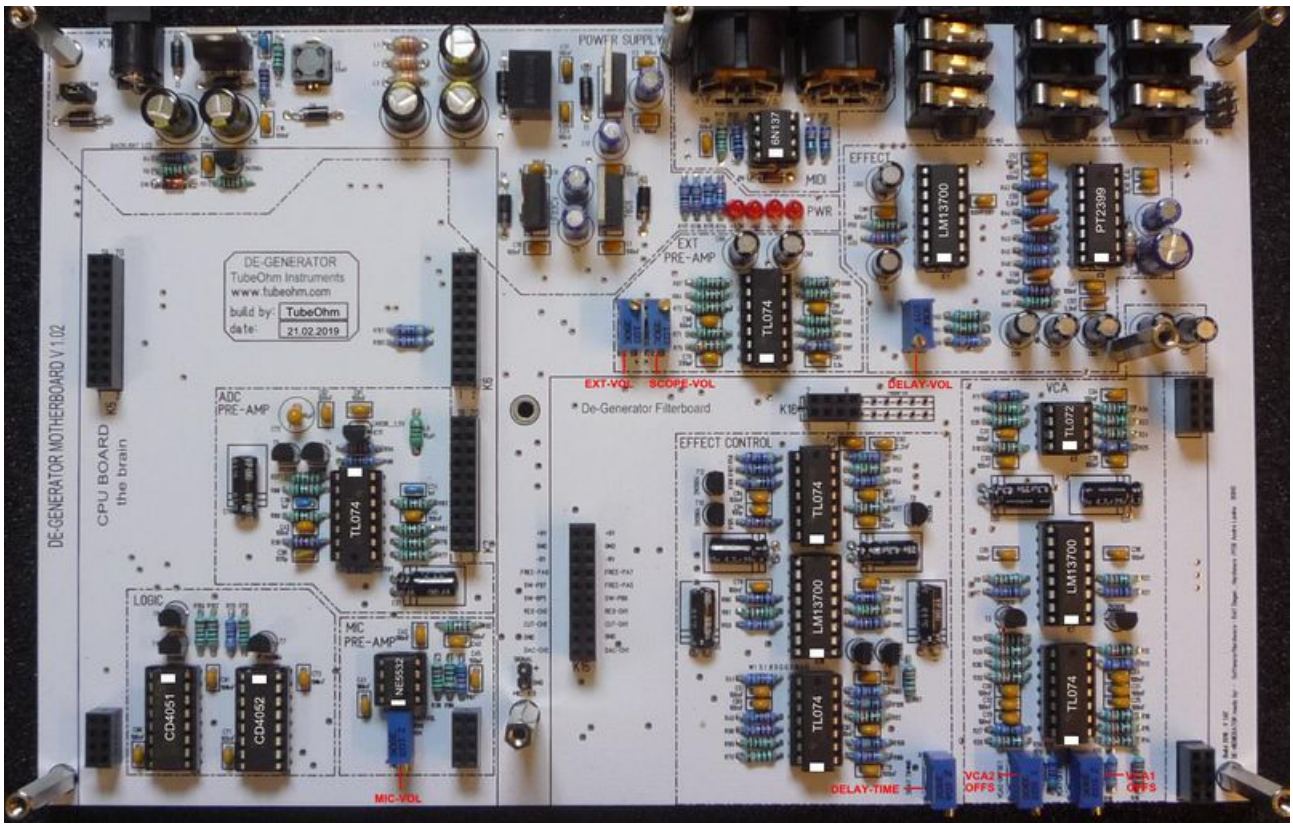


1:)	**+5Volt**	**red**
2:)	**+8Volt**	**blue**
3:)	**+3,3 Volt**	**green**
4:)	**-(minus)8Volt**	**orange**
5:)	**+2,5V ref**	**purple**

If all voltages are correct the IC's can be used. Of course, the board must be disconnected from the power supply before inserting the ICs.

We need:

IC6,10,12,15,16	= 5x TL074	4 fach Opamps
IC7,11,18	= 3x LM 13700	2 fach OTA
IC13	= 1x CD4052	analog switch attention CMOS !!
IC14	= 1x CD4051	analog switch attention CMOS !!
IC8	= 1x NE5532	pre Amp – less noise
IC19	= 1 x6N137	Midi optocoupler
IC9	= 1x PT2399	FX IC - delay



Here again an overview where which IC's have to be used !
The small white rectangle indicates where the IC's must be marked.

To calibrate the hardware there are the following trimmers.

1:) MIC-Volume , where the gain of the microphone is set.

2:) EXT-Volume, sets the input amplitude of an externally applied signal.
This is important if you want to run the degenerator as a filter box.

3:) Delay-Volume, this trimmer adjusts the volume of the delay (PT3299).
This must be set so that the delay is easy to hear, but does not distort when the filter resonates.

4:) Delay-Time sets the maximum delay of the PT 2399. For this purpose, there is a special sound on sound bank 1. The maximum delay time should be set so that the delay signal produces an impulse with the original signal.

5:) VCA OFFSET 1,2 is set so that no sound is heard when the VCA is closed. ***The PWM of the CPU has a small OFFSET voltage. This is the reason why the VCA does not close completely and you can hear a sound shimmering through.

So, congratulations, the second part of the instructions - the motherboard - is completed.

Now we come to the mechanical components and the calibration.

There is also a separate manualfor this.

Andre'
TubeOhm
21.02.2019

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