Assembly instructions for XOno:

Rectifier board:

On the board, the use of the inductors is strongly recommended. Alternatively, you can use resistors. These should be dimensioned so that the voltage regulators on the main board receive a voltage surplus of at least 3V, i.e. 32.5V. More than this is not a problem. However, this more is converted into heat, so the voltage should not be too high (above 40V).

The calculation of the resistances or DC resistance of the inductors is done for the total current consumption of both channels.

Unbalanced variant(RCA):

The positive current consumption is about 130mA. I use transformers with 2x30V AC. This gives me an input voltage of about 42V. I want to have 34V and have to reduce the difference of 8V. This gives me (8V/0.13 (130mA)) = 61.5 ohms.
Please measure the actual voltage obtained. For this you should use a load resistor (approx. 330 Ohm/5 to 10W).
Now I use the above calculated resistor value only as an approximation, because I probably won't find an inductor with this value. Since here two inductors are connected in series, I must add the resistances of these together. Conversely, this means that I may halve the calculated value. This also gives me the possibility to work with different inductances.
To complicate it a bit more, I connected another inductance in parallel to each inductance. This halves the resistance and doubles the load capacity (current). This allows me to incorporate inductors with lower load capabilities.
Example:

2 x 10mH (100mA/26,4 Ohm) = 13,2 Ohm = 13,2 * 0,13 (130mA) = 1,7V Voltage drop

(https://www.reichelt.de/festinduktivitaet-axial-hm50-ferrit-10-mh-bi-hm50-103klf-p245509.html?&trstct=pol_2&nbc=1)

2 x 47mH (80mA/100 Ohm) = 50 Ohm = 50 * 0,13 (130mA) = 6,5V Voltage drop

(https://www.reichelt.de/festinduktivitaet-axial-xhbcc-ferrit-47-mh-l-xhbcc-47m-p138564.html?&trstct=pol_0&nbc=1)

Negative current consumption = 57mA, (8V/0.06 (approx. 57mA)) = 133 ohms. Here I have a little more leeway.
For example, I can now insert 1 of each of the above values.
This gives me 127 ohms = 127 * 0.057 (57mA) = 7.24V voltage drop

The same calculation is required when using resistors. It makes sense to first determine the values of the inductors available for one personally and thus calculate the voltage drop.

Aufbau:

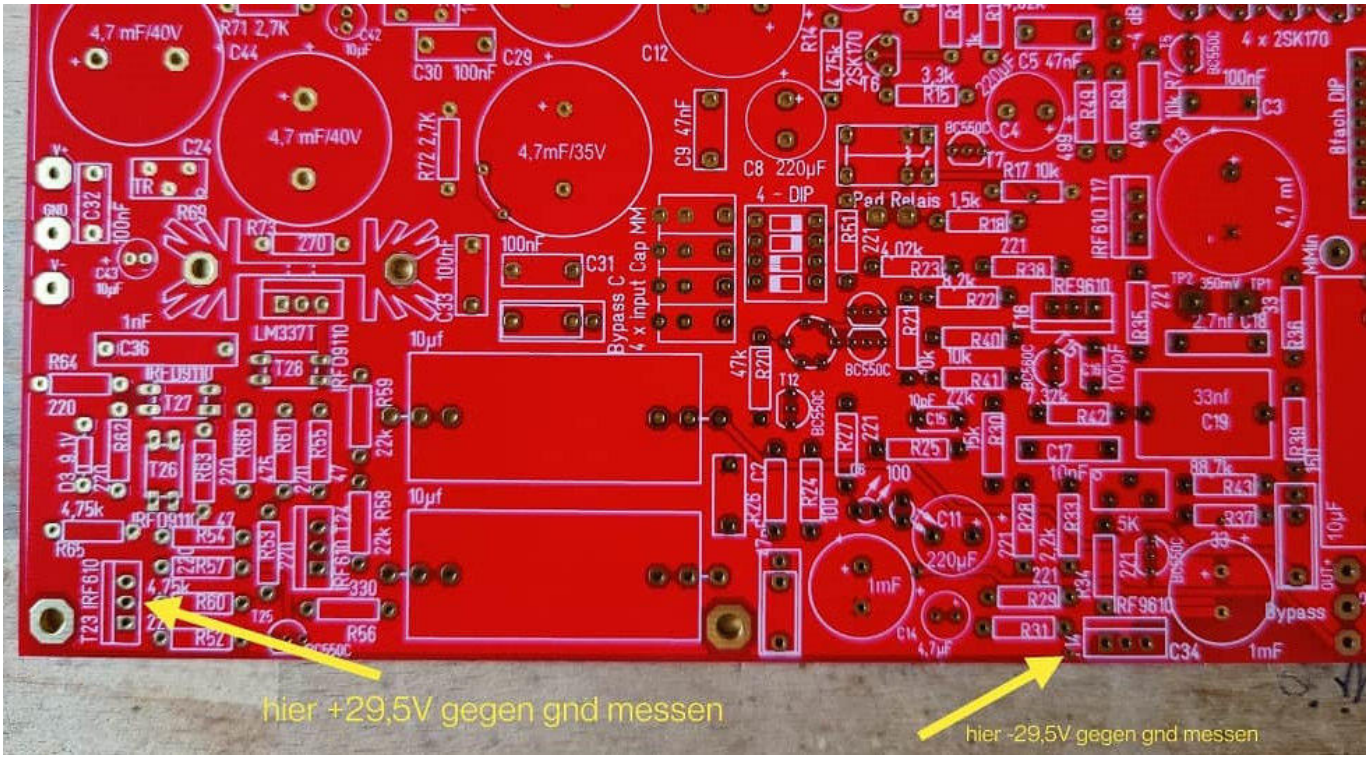
Solder the parts in this order (from small to large): diodes, film capacitors, inductors or resistors and then the electrolytic capacitors (pay attention to the polarity).

Check the function with a transformer, using one load resistor (see above) per branch.

Regulated power supply (located on the main board):

Solder the parts in this order (from small to large): resistors, film capacitors, voltage regulators, electrolytic capacitors.
The voltage regulators must be cooled as follows:
If a variant is unbalanced, i.e. RCA only, the negative voltage regulator does not need a heat sink. If one variant is operated in XLR, both voltage regulators need a heat sink.

I recommend setting up the voltage regulation completely first and testing it.
A load is needed for testing. I use a 1k resistor here.
You need at least 32.5V as input voltage. After switching on, the voltage slowly increases. When the voltage stops, it can easily be adjusted to +29.5V/-29.5V.



Amplifier range :

If you bought the transistors from me:

An explanation : the 4 pieces 2SK170BL were very carefully matched. 2SC1844 and 2SA953 have been replaced by BC550C and BC560C. These are high-end audio transistors, although they are available very cheaply. Low noise and small capacitances speak for them.

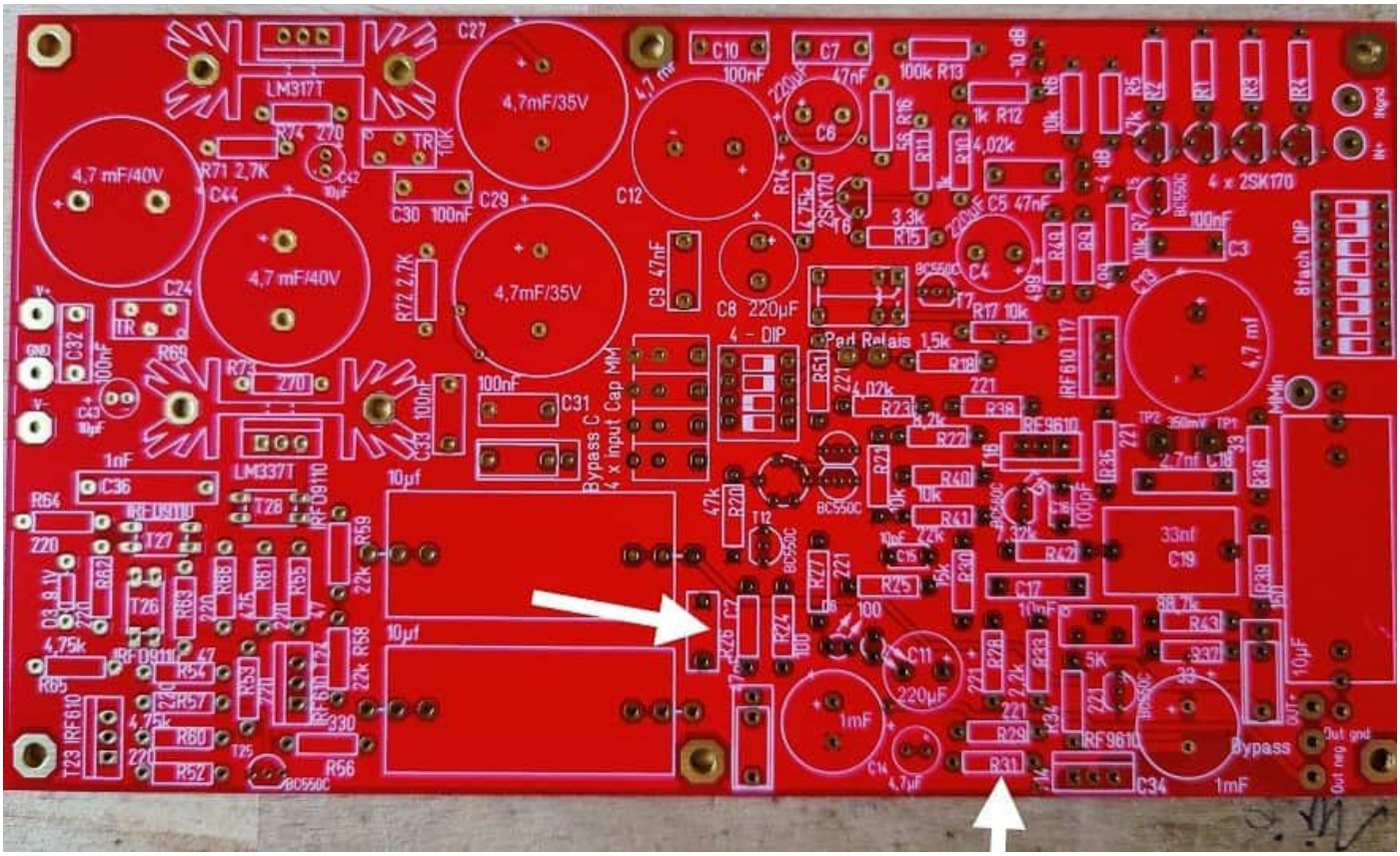
Use an LSK389A. This transistor is intended as a replacement for the 2SK389. Do not buy a new 2SK389 from China. I have never heard that these are not fakes. The same goes for new 2SK170GR or BL from China. They are all fakes.

Set the trimmer to centre position before assembling. Now assemble all parts as above in order from small to large. Attention, mount BC560C in the right place. The print on the circuit board is not so easy to see. Also make sure that the IRF610 and IRF9610 are mounted correctly, mount in the right direction. Also pay attention to the polarity of the electrolytic capacitors.
One pin of the relay coil is directly connected to gnd. The other side ends at a pad near the relay. A resistor is already installed to lower the voltage to 24V. Connect the PAD to a switch that is connected to the supply voltage. This way you can use the switch to switch between MC and MM. The diode between the coil connections has already been installed by me. (SMD).
After you have mounted all parts, please check again the correct position of all parts (if it could be relevant).

A few words about setting:
For all measuring and adjustment work, short-circuit the input (alternatively set 10 ohms via the DIP switch). Do not install the jumpers for the gain adjustment.
The bias current is adjusted with the trimmer. The voltage around R36 could be very high (if set incorrectly before installation) when the amplifier is switched on. If you have set the trimmer to the centre position beforehand, this should not be a problem.

The current sources on boards supplied by me assembled (fully or partially assembled) are already calculated exactly and adjust automatically. Please insert the intended values.

Explanation of the CSS:
There are 2 current sources (CSS) in the amplifier. The correct setting is really important for the sound. The red LED is part of the CSS. But since the required LED is no longer available, we have to adjust the CSS ourselves. We have to calculate the resistance of the CSS exactly.
Source one is T12 and R26. I have used 619 ohms. A current of 2.1mA is needed here. Measure the voltage across your resistor. I got 1.308V. This gives ~2.1mA. Divide your voltage by the current: (mine: 1.308/0.0021 = 622). This gives you the value of the resistor. I have 619 Ohm. A small difference is no problem.
Do the same with T13 (between trimmer and T14) and R31. This is source two. R31 is marked on the board without a value. I used 200 ohms. This gives me a voltage of 1.338V across R31 and a perfect match at 6.7mA.



Enough words, now let's get started:

Connect your voltmeter (voltage up to 20V) to TP1 and TP2. This will measure the voltage around R36 (33 Ohm). Switch on the amplifier (one channel) and set the voltage to 350mV. If the voltage is higher than 1V, please hurry with the adjustment, otherwise the resistors can get very hot.

The voltage will change for a while (more than an hour). After the amplifier is installed in a closed housing, this adjustment must be done again. The amplifier is very sensitive to temperature. It likes a high ambient temperature, so to speak. Therefore, it is better if the amplifier is not ventilated. I always tape off the ventilation slots on my amplifier.
Nelson Pass recommends always leaving the amplifier on. I don't do that, I'm too safety conscious (ugs for scared). I'm always afraid that something might happen in my absence.

Don't forget to remove the input short before installing it in the case. I think mounting the boards and transformer is no problem. Nelson Pass used 5 ohm resistors to connect the power supply to the motherboards. This is not absolutely necessary.

XLR part:

Assemble this part of the board in the same order as the SE part. So assemble the parts according to size. Please note that the IRFD9110 must be cooled. The heat sinks are glued on.
No adjustment is necessary there.

The cinch connections:
Make the solder connections before mounting the back panel!
All cinch sockets must be insulated from the cabinet! I connect all GND connections of the cinch sockets of one channel to each other (silver Teflon cable, approx. 1mm). Then this connection gets a connection to a GND pad (or GND area) of the corresponding PCB each.
I mount the cinch socket for MC near the PCB where the input PAD is. I wire with a silver Teflon cable (shielding is not necessary as it is too short) from the RCA to the PCB. The MM input does not need a shielded cable either.

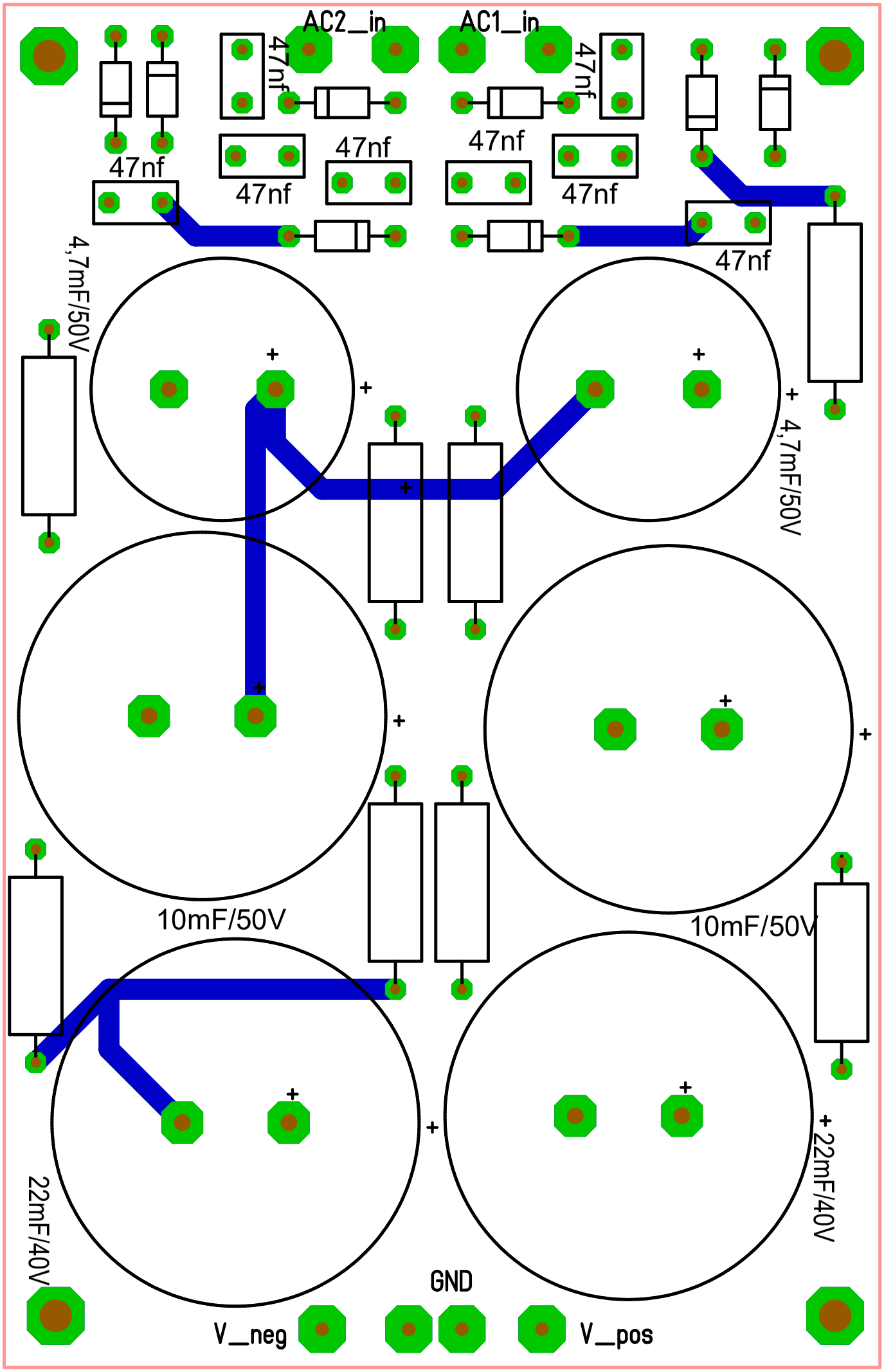
Remember to use a cabinet screw. This screw represents the electrical connection of the shielding. This connects everything that represents shielding. All shielded cables, the housing and the protective conductor of the mains voltage. Any shielding of the mains cable must also be connected here.
The electrical connection between this screw is made with a strong rectifier and an NTC. This connection prevents mains hum 100%. This is very important. By the way, a capacitor has no place at this point. I have also provided you with an illustration of this connection.
Now the output:
I mount the cinch socket to the right of the output capacitor; there is the corresponding solder pad. However, I always solder the 150Ohm capacitor there, which is needed for the connection, directly to the capacitor. Connect the other side of the resistor to the hot side of the RCA socket. Now mount the 10nf capacitor with GND (directly to the socket) from here. The other side belongs in front of the 150 Ohm resistor. Then solder a 100k resistor in parallel to the capacitor. There is also an illustration for this. However, the negative side of the XLR socket is also explained there.
If you are building the XLR version, do the assembly according to the illustration. The negative side is wired similarly. However, a 680pf capacitor is used here.

Now switch on the amplifier, set the supply voltages of both channels again, -29.5V and +29.5V respectively. Now readjust the voltage around R36 (350mV between TP1 and TP2). After a warm-up period (you can use the amplifier during this time, but the sound will be much better when the amplifier is really hot) of one to two hours, readjust all voltages again.

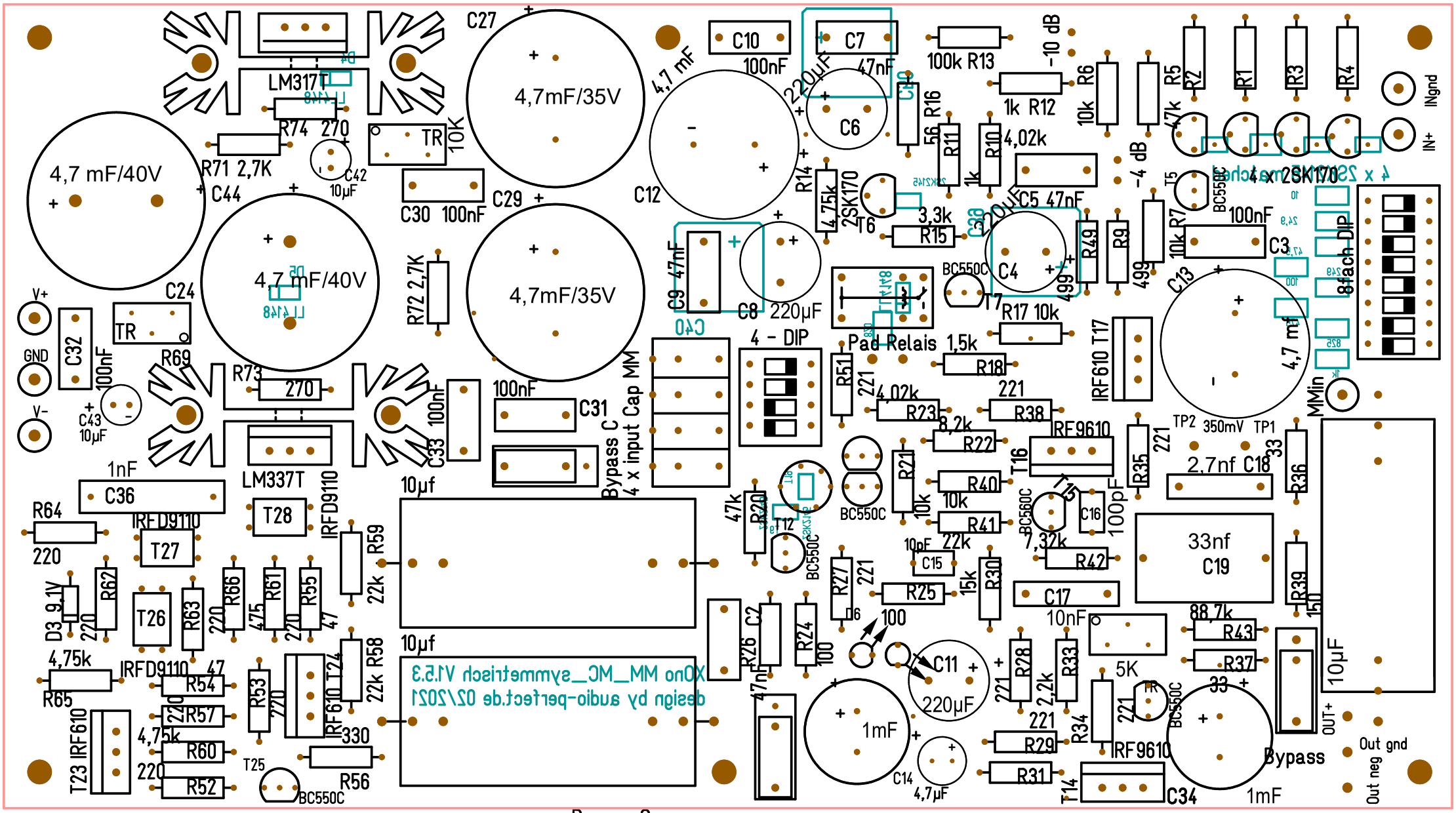
Done.

Greetings Frank

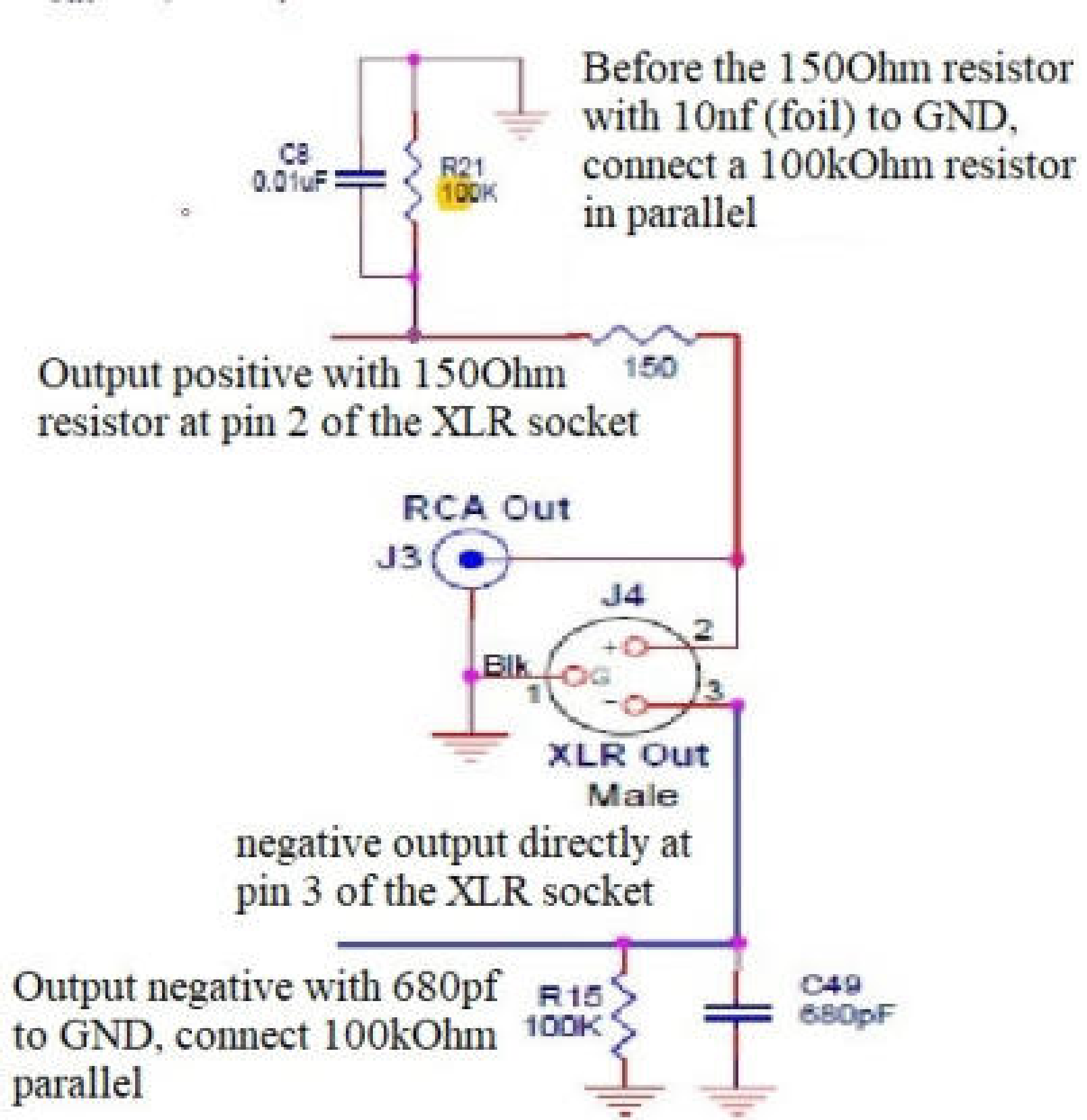
You should not have hum problems at all. The unit does NOT hum! NEVER!
Questions: frankwilker@web.de

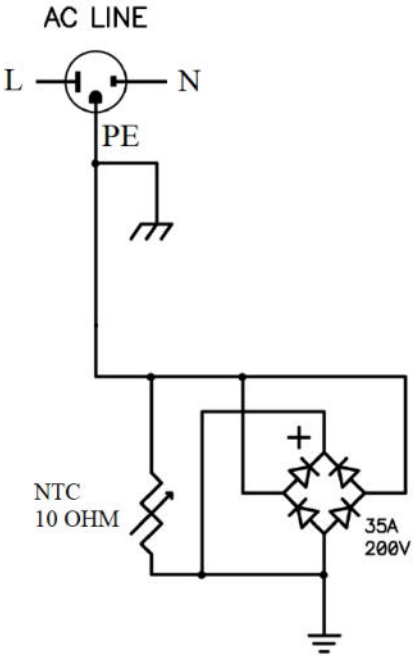

AC2_in
AC1_in
47nf
47nf
47nf
47nf
47nf
47nf
47nf
4,7mF/50V
4,7mF/50V
10mF/50V
10mF/50V
22mF/40V
22mF/40V
GND
V_neg
V_pos

AktuellesProjekt von TARGET NC-Version: Kommerzielle Nutzung ist strafbar!



Bypass C


C8
0.01uF
R21
100K
Before the 150Ohm resistor with 10nf (foil) to GND, connect a 100kOhm resistor in parallel
150
Output positive with 150Ohm resistor at pin 2 of the XLR socket
RCA Out
J3
J4
2
Blk
1
3
XLR Out
Male
negative output directly at pin 3 of the XLR socket
Output negative with 680pf to GND, connect 100kOhm parallel
R15
100K
C49
680pF


AC LINE
L
N
PE
NTC
10 OHM
+
35A
200V