

DCX2496 Linear Power Supply mod by

Linear Audio

Construction Guide – Linear Power Supply for the DCX2496

Introduction. One of my more rewarding modifications to the DCX2496 was the replacement of the stock I/O board by my very high quality active output board with integrated remote level- and volume control. To complete the transformation to a high-quality preamp-type digital crossover, this mod describes the installation of a linear power supply to replace the stock Switched-Mode Power Supply. The new power supply further reduces noise and high-frequency ripple on the supply lines, leading to more quiet active circuitry. There is now less noise and hf junk on the outputs with better low-level reproduction.

The new supply can be implemented without mechanical modifications to the DCX chassis. It uses existing holes for mounting the new unit and a new mains filter. Two small brackets are used for the PCB board, while a small piece of aluminum is used for the strain relief or plug for the external AC wall-wart. If you purchase a kit from Pilgham Audio, the metalwork is included.

The mounting brackets and screws are important for getting the heat out of the supply and onto the chassis and to the ambient air. Take care with that part of the mod as it is important to keep the heat inside the case to a minimum. That part of the mod is a bit tricky, so it needs attention, but the work itself is pretty straight forward.

The rest of this document will give step-by-step guidance on assembling the unit. It is not a guide of the variety: "Take the screw driver in the right hand, hold the kit in the left hand, and carefully turn the screwdriver clockwise thereby taking care not to slip out of the screw slot"... This kit assumes that you have done some electronic assembly, soldering and such. You have to use your own brain and common sense as well!

If you have a simple multimeter to measure DC volts and resistances, that's good. It is not absolutely required, but it will make it so much easier to verify correct mounting, check for shorts and insure correct operation before powering it up and before connecting

it to the DCX2496. Useable multimeters can be had for less than 50 \$ or €. This may be a good opportunity to buy that meter.

At several points in this guide I recommend to check a voltage or for the absence of a short. I don't say what you need to do when the test gives a wrong result. In such a case, what you should generally do is go back to where things were still OK and carefully verify all steps after that. If that isn't possible, there's no other way than to meticulously verify each step; check diodes and capacitors for polarity, check for bad soldering or shorts between solder pads. Check that the various regulators are at the correct position. If all that doesn't help, collect as much pertinent information as possible and email me for advice. But, be aware, a mail with the text: "It doesn't work, now what" isn't likely to be answered quickly. This IS diy after all...

I had a lot of fun developing this, documenting it and, above all, using it daily when listening to music. I'm sure you will enjoy it as well! Comments invited!

Jan Didden (jan@linearaudio.nl)
Linear Audio (www.linearaudio.nl)

Preparation of the battlefield ;-))

Before you start: check at my website for any last-minute changes or updates that didn't make it into this Guide!

First remove the power cord (and any other cabling, of course). Open up the DCX2496 by removing the top cover. Be sure to save all screws that you remove because you will need them again later to reassemble your unit.

Unplug the 2-pin AC input (from the supply) and the 7-wire DC output plug (from the DSP board) and remove the existing SMPS by loosening the four screws at the bottom. You may need to remove some glue that sits on the connectors; pull it off with a set of tweezers.

There are two items on that SMPS we need to recover: The 2-pin PCB entry socket for the mains, and the 7-wire supply cable. The 2-pin socket can be removed best by pulling off first the plastic guide part, and then removing the two pins one after the other. The 7-wire cable can be removed best by using a heat gun on the underside of the board until the whole 7-pin assembly lifts off. Set these two items aside for now.

Next remove the mains entry socket on the rear panel. Carefully remove the cabling from the socket; slice the wrap tape and heat shrink tubing on the contacts and de-solder the cables. DO NOT cut them off; de-soldered they are *just* long enough to connect to the new board. Since you have some space now, sand off the paint from the two ridges where the supply was mounted. (Take care not to get the dirt in the unit). That way, there will be better heat transfer later with the new supply. When you are done the unit should look like the pic at the right.



The mains filter can be delivered either with a mounting bracket or with a piece of double-sided sticky tape. If you have the bracket, mount the mains filter with the ground lug screw as shown in the picture at the left. You may need to bend the mounting lug 90 degrees. If you have the one with the sticky tape, firmly press the filter with the tape at the side panel of the chassis in the same position as shown in the picture. Keep the filter as close as possible to the rear panel side because otherwise your cabling will be too short.

Using the existing earth wire, connect the filter earth lug to the chassis earth point. Wire the two remaining wires to the output lugs of the filter.

Prepare the small aluminum piece for the AC input. Depending on the type of wall-wart you have, either put in the AC input plug or feed in the cable from the wall-wart with a suitable strain relief. Mount the assembly over the hole of the main entry panel, using the saved screws. Wire the input connections to the input lugs of the mains filter.



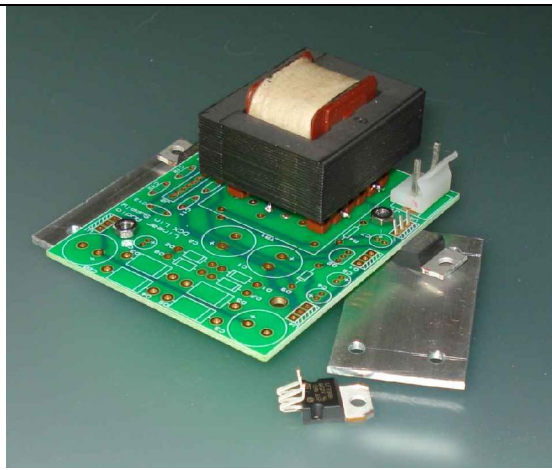
With a multimeter set to 20 or 25V AC and the wall-wart plugged into the mains, measure that the voltage at the 2-pin socket is around 12VAC and can be turned on and off by the mains pushbutton on the front panel. Set aside the unit for now, we will proceed to the supply board.

Stuff the PCB with all parts except the 4 large electrolytics, the transformer and the regulators and MOSFET. Check with the Stuffing Guide at the end of this document. **Note: D10, D11 are on the solder (bottom) side!**

Next, solder input socket J1. This is best done by sliding the two pins in the plastic retainer and then solder the assembly to the board.

Solder the 7-wire output cable to the board with the RED wire towards the diodes.

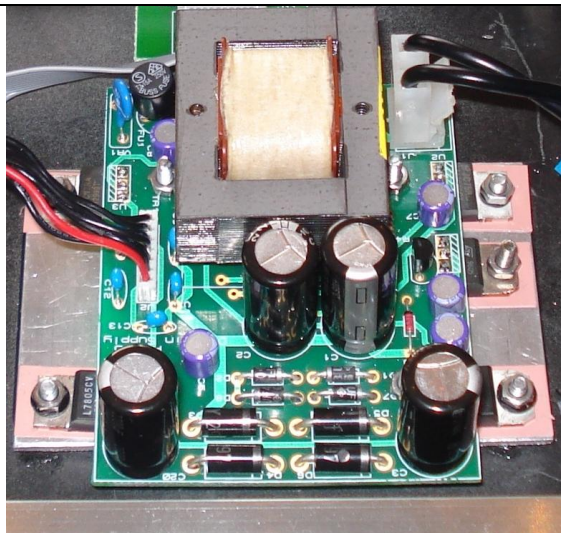
Now we need to prepare the regulators and the MOSFET for mounting. Start by temporarily mounting the two brackets on the PCB as shown, using 5mm plastic standoffs. Using a set of pliers carefully bent the pins of all regulators and the MOSFET as shown on the picture. Take your time, it is a bit tricky. The idea is that at final assembly there is no mechanical stress on the pins. Verify (using eyeball calibration 😊) that the pins and the mounting hole for the regs line up with the bracket holes and the PCB pads. Don't solder them yet! To do this, in turn, remove a bolt on one side of a bracket, turn it away, insert the regulator (or the MOSFET) re-connect the bracket. Then temporarily screw the whole assembly to the DCX chassis.



Verify, and correct if necessary, that the regulator and MOSFET pins are not under too high mechanical stress and that all holes line up. Remove the whole assembly again but leave the brackets attached to the board.

Solder the transformer and the 4 large electrolytics to the board. At this point, the only parts not soldered yet should be the regulators and the MOSFET. Screw the MOSFET to the bracket with a countersunk 3m screw from the bracket underside. Since the MOSFET in the Pilgham Audio kit is a 'full pack' isolated package, no isolation pad is required. Check with the multimeter that the MOSFET pins are isolated from the bracket.

Make sure the brackets are tightly mounted on the board. If you have some silicon grease, put a *very thin* layer on the chassis mounting ridges to facilitate heat transfer. Now mount the complete assembly to the chassis bottom, in the process using TO220 isolation pads and shoulder washers to isolate all regulators from the brackets. For each regulator, carefully verify that there is no connection between the metal tab or any of the pins to the metal of the bracket.



If all is well, solder all regulator and MOSFET pins.

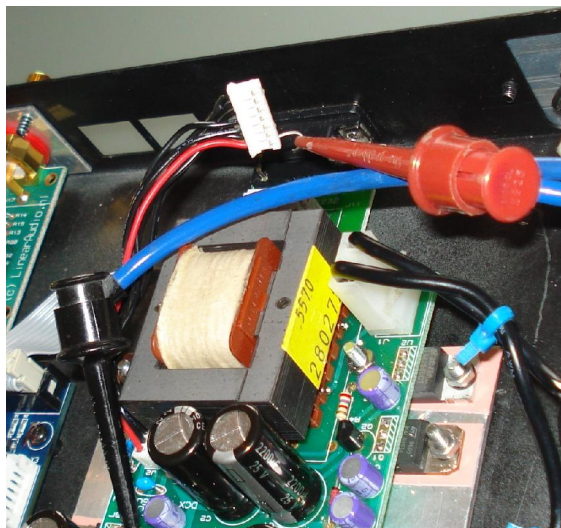
It's testing time! Set the power switch to off. Connect the power connector to the 2-pin socket on the board. DO NOT connect the 7-way cable to the DSP board yet! Insert the fuse in the fuse holder.

Connect the multimeter to ground on the board (the anode, non-banded side of D3 or D4). Then, using a thin

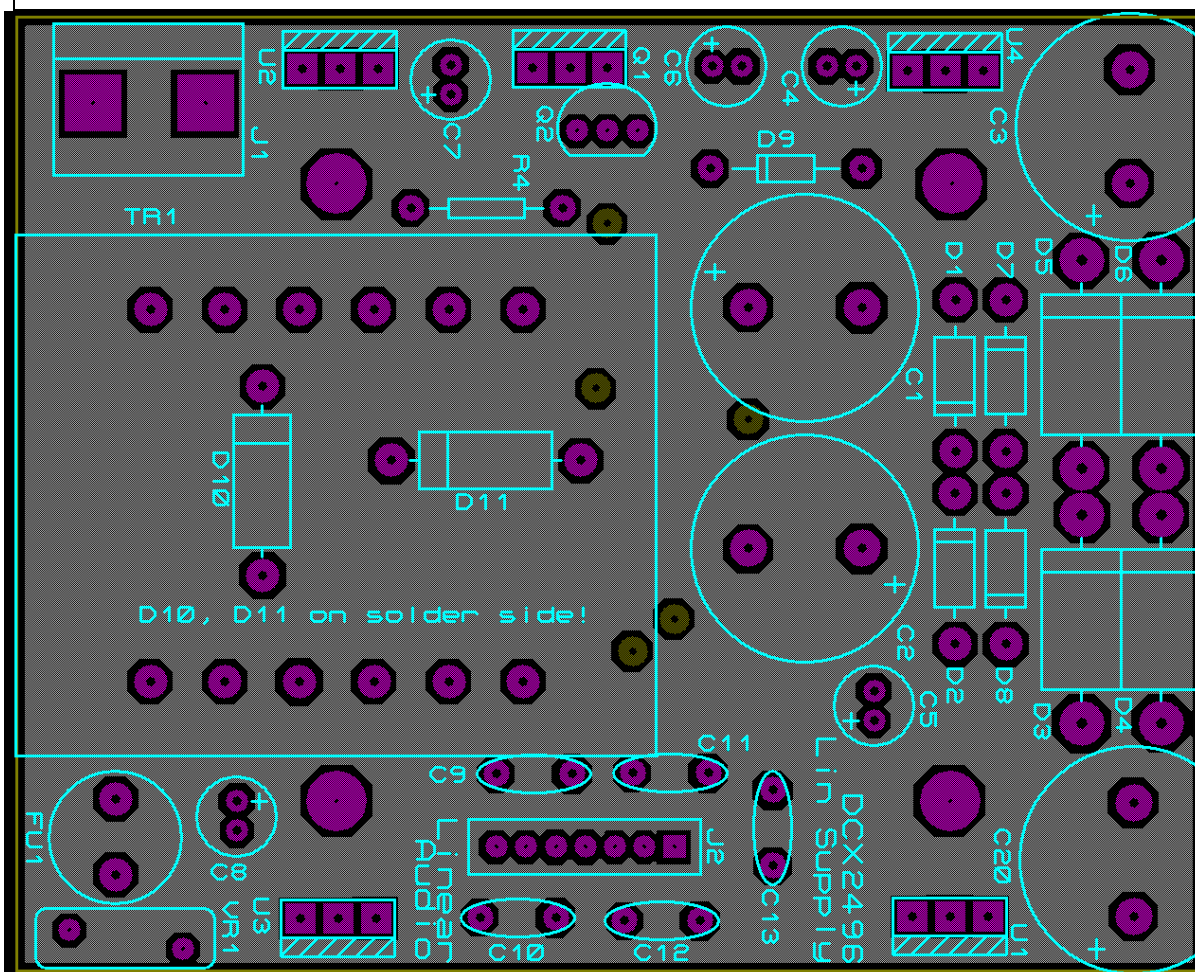
Pin 1 RED	+15 (+/- 0.5V)	Pin5 BLACK	0 (ground)
Pin 2 BLACK	-15 (+/- 0.5V)	Pin6 BLACK	+5 (+/- 0.1V)
Pin 3 BLACK	+8 (+/- 0.25V)	Pin7 BLACK	+3.3 (+/-

piece of wire on the multimeter lead, connect the hot multimeter lead to the RED wire of the supply output connector. Switch on the power and verify that you read about 15V on the meter. Then verify all the other output voltages as follows:

0.1V)
Pin4 BLACK 0 (ground)



Well, that's it! Switch off the unit, and connect the 7-way power cable to the DSP board. Switch on the unit, and it should work as before with the SMPS. The reward for this work will be quieter supplies and quieter, more noise-free sound reproduction. In use, the brackets and the regulators will get hot to the touch. But be aware that what is hot for us is a cool day for a regulator! I have done some temperature measurements and haven't found anything over 55 degrees Celsius at 25 degrees ambient, so the delta-T is around 30 degrees max. Cool enough for normal use!



DCX2496 Linear Supply PCB stuffing guide