Triode Dick's Page

Classic One

...A brand new line amplifier...

part 1

Classic One line amplifier

Wow, what's that? A new line amplifier? The successor of the Cleo 6? Yes and no, to answer both questions at once. The Classic One is indeed a new line amplifier, but side by side to the Cleo 6, not as an upgrade or replacement.

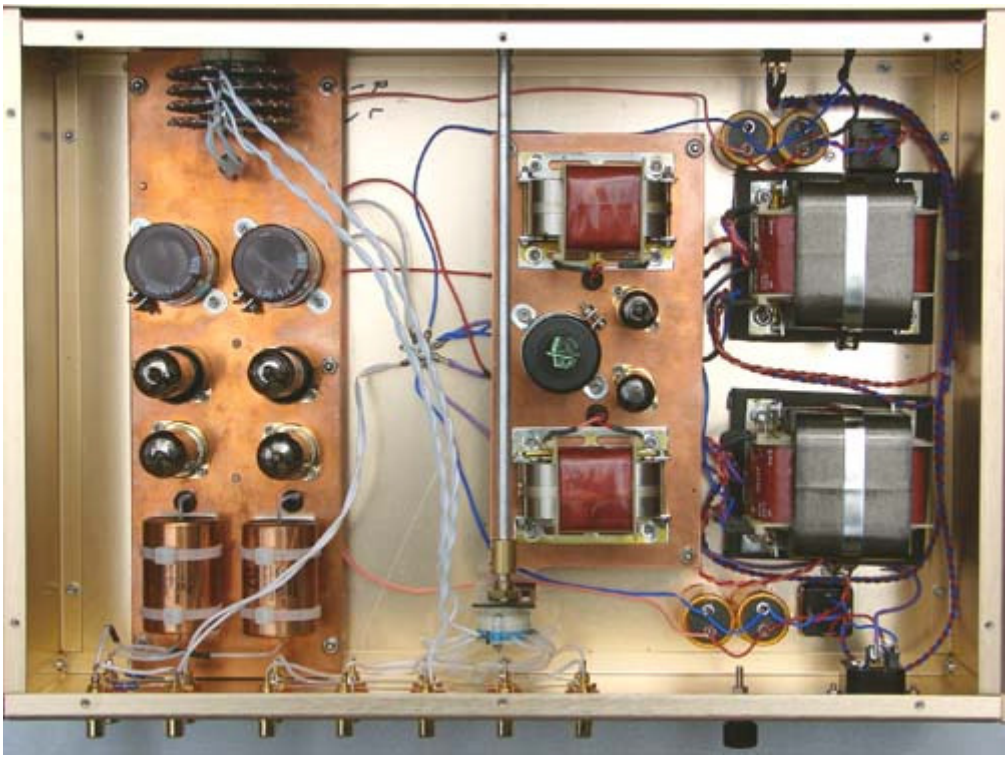
Exit 6072 line amp...

What really was up to a replacement, was the old 6072 line amplifier. It raised more and more questions. The gain (amplification factor) is rather high, what makes it often too sensitive to drive a highly sensitive power amplifier. The power supply is not according to my 2007 specs and last but not least: the 6072 tube is hard to get the last couple of years. However, I just stumbled over a remake by Electro Harmonix. I don't know what the quality is of this tube in comparison with the old US production, but my positive experience with this brand, is reason for hope. If the 6072 is replaced by the ECC83, a technical good solution in this circuitry, the gain will be even higher as we started out. Then there is the possibility to use a lower gain tube, but that means that there must be changed al lot in the amplifier itself. By doing this we would move slowly towards another amplifier and still facing the same problems with the power

supply. The 6072 line amp will move to the archives after many years of good service and is making place for the Classic One. And this would bring a couple of nice surprises….. very positive surprises. …

The setup…

The Classic One gives me the opportunity to step away from the open chassis with tubes on top, to a closed aluminum enclosure. Ideal to place into an audio rack and not sensitive to children's little hands. Not that important for me, but very handsome for the tube man with growing up children.

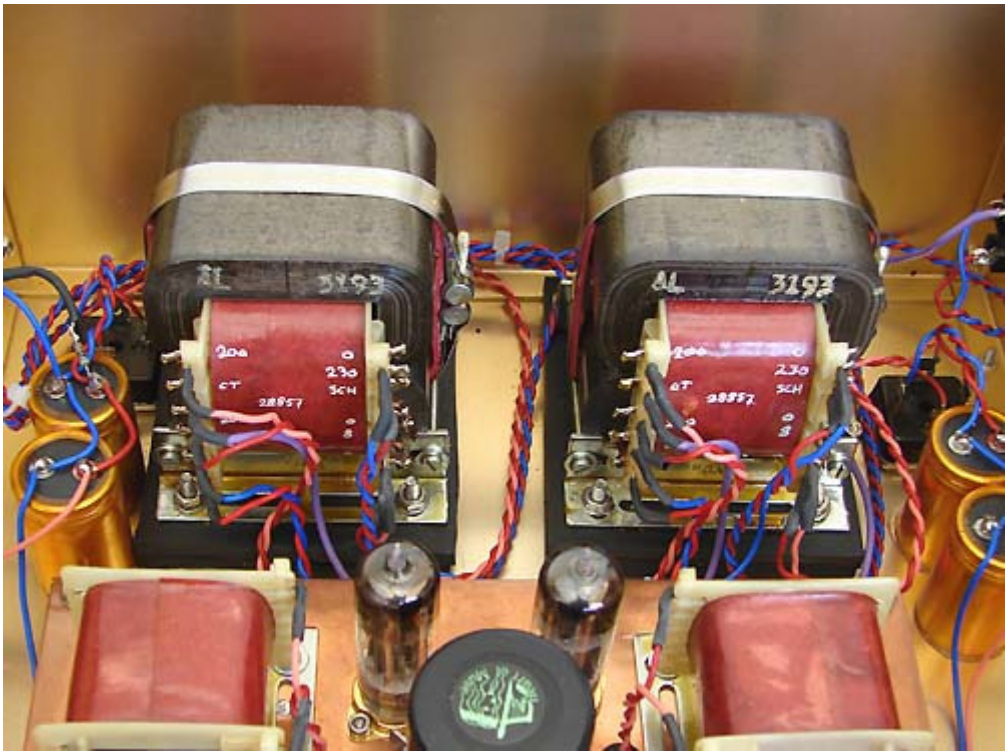


Next to that: a closed enclosure can also be nice and handy to use, surely when we are talking about a line amplifier. For power amplifiers I like the old fashion 'on top' setup by far and in addition to that; it is the most practical way to go with the large transformers and tubes on top of the chassis and the wiring and components below..

There is of course nothing against building the Classic One the same way as I did with the Cleo 6, with transformers and tubes 'on top'. The transformers and chokes can also nicely being casted within a nice enclosure. Follow your personal preferences

Design issues…

There are two ways to test a new (line) amplifier.. Take a dive in your personal stock for a couple of fitting transformers and chokes plus a handful of resistors and capacitors. Screw the lot on a shelf, solder everything together and come to the conclusion that it don't sound as good as the, with quality components build, line amplifier that's playing in your set. There is no use to try out something new with low quality components and compare it (listening and judging wise) with a well built amplifier with high quality components. It can be very handy for just checking the parameters or working out some ideas, but to obtain a definite judgment, there must be done a lot more. For that reason the new line amp is populated with the good stuff right from the start.



There will be used a pair of special luxury band core power transformers and the same quality amorphous core chokes as applied in all the other amplifiers. The power supply has to "stand up" right away and will be built from the specs obtained from Duncan PSU designer. The Classic One line amplifier has a relative low voltage of 225 volts (DC)..

The rectifier tube is the more often used 6x4, and it is performing well on his spot also.

The elco after de choke must have a capacity from approx. 500 µF. That is possible with f.i. a JJ elco which I also used in the Bill and MonoBill power supply. But I also had some 470 µF/450 volt elco's mode by Nippon Chemicon, the well known brown types, that often can be found in expensive brand amplifiers. They are fine capacitors. They sound somewhat more robust than the silky like JJ caps. Vishay BC components elco's, formerly Philips, are also good useable, but they have the tendency to sound icy. I never was in favor of these caps, but when they come on my path, I will use them. You have to compensate the more direct sound somewhere else and that is not easy when you use only a few parts, like in this amp. Use them with prudence and it is good useable stuff. Not too expensive, very reliable and long life.

I had build the Anastasia's power supply also with Philips or BC elco's. And that didn't disgust me at all. But a second Anna amplifier, with the same parts, transformers and tubes identical to the first one, but with a power supply that is modeled like the Bill amplifier with JJ Elco's, presented a leap in sound quality. With the JJ Elco's, the amplifier sounds smoother and the high frequencies are more detailed and more in balance. At this spot, the silky sounding JJ caps are compensating the more straight forward sound of the output tubes used. This is called 'voicing' the amplifier or audio device. Beautiful work to do, but it cost a lot of time and components.

The Nippon Chemicon 470 µF/450 volt capacitor that is used in the Classic One power supply is so compact build, that it could be placed close to the circuitry. This results in beautiful short power supply cabling.

The amplifier circuitry

It would be the easiest thing to do, to make a somewhat modified clone of the Cleo 6, maybe with a cost effective solid state current source instead of the D3a penthode. But lets keep it cozy ☺ … No, without fooling around, I had some inspiration from somewhere else. Recently I had a very beautiful, very expensive Japanese amplifier staying over. Together with its companion: a much more expensive power amplifier. For me, a natural thing to do is to check the interior. Checking the circuitry is a very easy task when it is completely hardwired. Even more when the circuitry is very simple. By the way: that will tell you nothing

about its sounding qualities. It happened to be nothing new. I also found it in another famous (Japanese) amplifier. It was applied earlier by one of my big tube heroes, the formerly Hiroyasi Kondo.

Is the sum higher than the parts count?

The first stage we encounter is a straight on SRPP. I used it a lot in the past with various results. But the special thing, (however, how special can you call a classic circuit) is in the second stage.. the familiar old fashion Cathode follower. Direct coupled with the SRPP that is, without the coupling capacitor in between. The bias of the second stage won't be determined by the SRPP. Both are 'hard' connected. And maybe you can also see the resemblance with the old 6072 amplifier, which has the cathode of the first tube connected to mass and is directly coupled to a cathode follower.

Why is this apparently simple buffered SRPP stage sounding so good? And next to that, the results of the measurements are okay. The distortion is very low, even when driving it harder. With 30 volt output I measure only 0,6 % distortion (THD+n). With a more down to earth 1 volt it is something like 0,03%. There are men who can't care less about the distortion numbers, but it tells me everything about the clean and good behavior of the amplifier. There will be little added to the original signal, what makes the amplifier a very nice music passing device and not a Aural Exiter of harmonicer.

The with a very high impedance closed SRPP stage, is feeling comfortable without any form of stress. I have used some SRPP's in the past, but it seemed to produce a somewhat strange sound when it was driven hard. There is even a possibility to tune the distortion of the SRPP even lower by selecting a load resistance (with a pot probably) till there will be a distortion dip. You can end up with a value of several Kilo Ohms. But do you expect an optimal sound from such a squeezed SRPP stage? Can you count?

In my opinion the very high load impedance (several Mega Ohms) of the cathode follower stage is the 'secret weapon' to obtain such a excellent audible qualities. What's be fun also, is that the cathode follower doesn't have a very good reputation, but when properly applied, it isn't that bad at all.

Tubes requested…

What kind of tubes we will use? In the original circuitry I found a ECC82 and a 12BH7. I always have some problems with the first one. There are some which sounds nice, but most of them sounds dead. The 12BH7 is a tuned up ECC82-like

tube and I have several of them in stock. 'Isn't that a tube like the JJ ECC99' you would say? Yes, they are close on an electrically level, but the 6N6 that I used with success in the MonoBill-I seems also very close, and I have obtained fantastic results with that one. So, that will be the one that I use in the cathode follower, with both tube half's parallel connected. That means that the output impedance will be very low and that its low frequency is fully depending on the single coupling capacitor in the amplifiers output. The output impedance will be around the 100 Ohms.

The first voltage amplifying tube I had already in mind: The superb 6N30P, a fantastic tube. Depending on the application you always have to wait and see how it behaves in a particular application, but the tube performs very well on this spot.

I am not an enthusiast of pushing line amplifier tubes to it limits by running high currents trough them. It is becoming clear to me that an average setup (a bias at half the max. value from the datasheet or somewhat lower), provides in the best sounding amplifiers. I like next to a good sound, also stabile operating tubes. Also on the long term.

The other components…

There are really not much other components. For the resistors I choosed Kiwame's this time. The green colored carbon resistors are on the market for many years.. some people like them and some people don't.. A good reason to try them out myself. And they didn't disappoint me at all, otherwise they wouldn't stay in the amp for more then half a year.

The well known alternatives becoming scarcer and scarcer. The classic Allen Bradley is many years out of production and the stocks are decimated. The stability of these old resistors is far from optimal. I have some left myself, but some of them are far out of their tolerance ranges. And more than some of them are sizzling like hell. Even on line level. If they are good, they are really good, but the age of the AB doesn't help.

Riken Ohm is also stopped with resistors a while ago. Beautiful resistors, not really cheap, but modern production, well sounding, precise and stabile. Everything you buy nowadays is coming from residual stock, often in values you don't need.

The current production carbon resistors, that I also use regularly in my power amplifiers, are cheap, have no sizzling problems and are nice sounding. But the seasoned/dummy (take your pick) audio men distrust things that are not expensive enough and leave them for what it is…. Suckers…. But do understand that components that are not (yet) labeled "for audio" are several factors cheaper to buy. It is unbelievable how the prices are sky rocketing when a normal component is discovered and labeled by the Audio Community. However, some standard parts are also subject to questions about pricing. But sometimes you can sit first rank for a dime.

China made ?…

There is more to get your hope up! More and more components are produced in China, amongst them several types that are very suitable for tube amplifiers. There is some excellent stuff and the prices are nice. Don't hesitate when you see the "C" word. Think about the fact that a large percentage of the current electronic components are made in China, with licenses from the well known brands. Look at your beautiful chips in your CD player. Or in your PC or GSM, but don't open the last one please… ☺

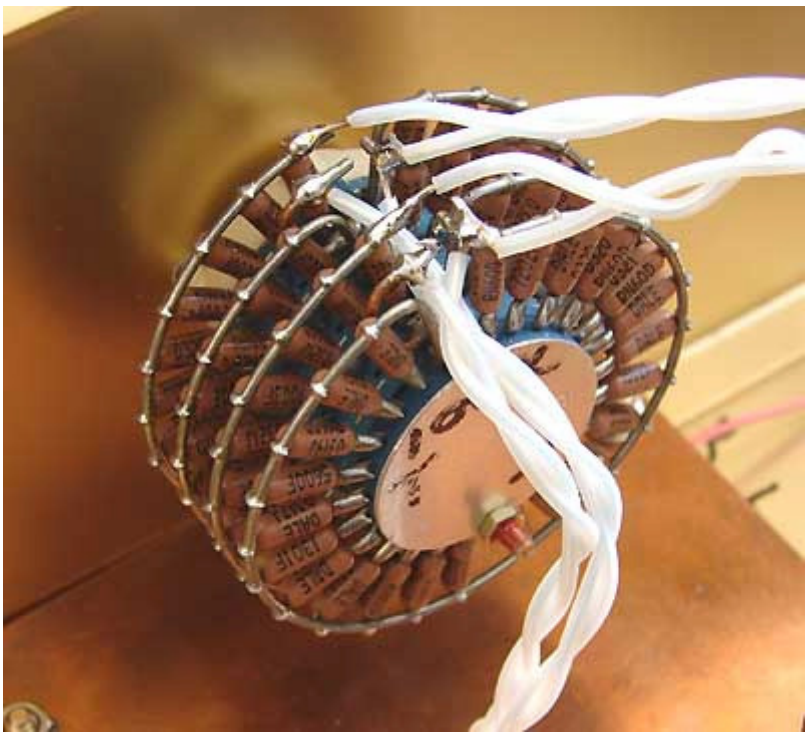
… I am still busy to prepare a resistor listening test (and a new coupling capacitor test) and the Classic One amplifier seems to be very well suited for that.

Coupling capacitor..

There is only one in the Classic One, an that is determining the sound. I am still busy with swapping this single C. The first months I played with a Russian mil spec paper in oil capacitor (K40Y or K42Y serie) with a value of 0,47 µF. A very nice capacitor I can say. Since 3 weeks, I connected the much more expensive Audio Note paper in oil copper foil capacitor on this spot. It is just a bit smoother and more straightforward than the Russian is. But the differences are not really big. Very surprising! The AN copper foil cap is one of my favorites for a long time. But just as I told you before: the real coupling C test is coming soon. But I can recommend you the Russian pio's. I had also listened to them in my other amplifiers, with the same positive results.

Building in three partitions…

Definitely the amplifier enclosure is partitioned in three building area's. Seen from a front view, both power transformers are on the right, the power supply with rectifier tube, capacitor and chokes is placed in the middle, all built on a separate sheet of copper. A sheet of aluminum is also perfect.



On the left we find the amplifier circuit, with the buffer elco's close to the amplifier stages. It is completely build dual-mono. The attenuator is bought on eBay from a seller in Hong Kong. For an price that is only possible in that kind of countries. Welded very nicely. When this was US made, you would pay the 3 of 4 fold. It is a 24-stepped ladder attenuator, completely made with Vishay Dale resistors. The linearity is almost absolute, what is logical with its 1% type resistor where the tolerances are often smaller in practice. The Dale resistors I know is a resistor that is neutral and somewhat vibrant. Using the ladder configuration, there is always one resistor in series to the signal path and one parallel.

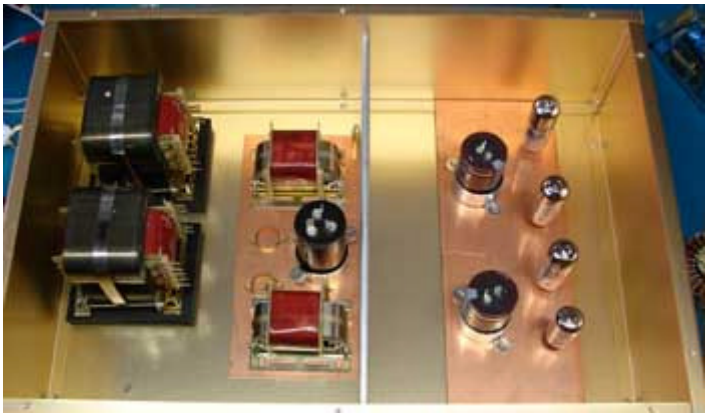
Variations to a theme…

A good alternative for the ' not so easily found" 6x4 rectifier is the EZ81. This tube is current production by manufacturers as JJ and others and have a very good quality. But the old production EZ80 or EZ81 tubes are easily found also and maybe you have some left yourself.

The Black Gate WKZ in the power supply could (if preferred) be replaced with a double JJ 47/47µF. That leaves a lot of money in your wallet and the audible quality won't suffer too much.

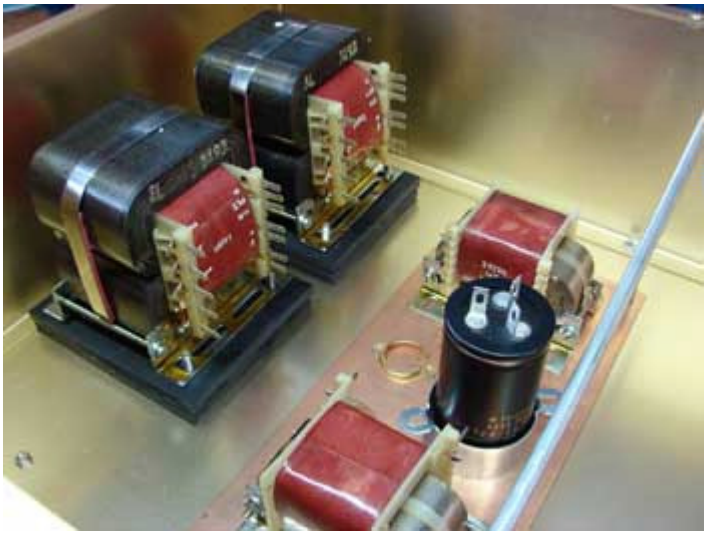
Part 2

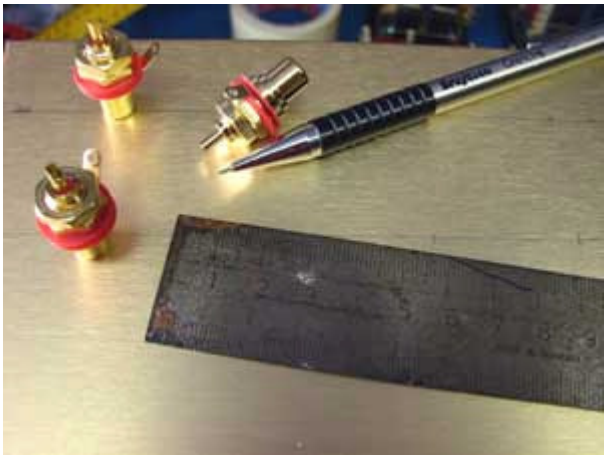
The building process...



It always starts out with measuring and fitting. Here you can see the 3 separate components, The power transformers, the power supply and the amplifier. Each on its own sub chassis.

In this case on sheets of copper. But as the copper prices are going up, aluminum is a perfect alternative.





This always feels like one of the most gruesome jobs, but afterwards it is always easier than presumed: Building in the IEC power connector.

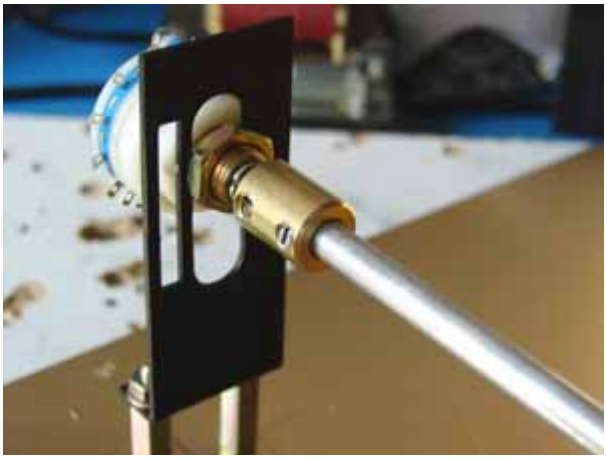
Measure the chassis part precisely, draw the outlines with a pencil on the chassis plate and drill the holes. Within the part that have to go that is ☺ .

If you make the hole big enough to stick a saw blade in, you can saw out the lot from hole to hole. After that you can smooth everything with a file. In aluminum and copper this is a task that you can do within 15 minutes. Not so bad after all...

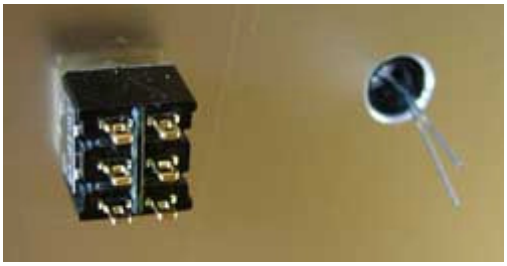
The holes are drilled for the RCA cinch connectors.

To avoid a thick bundle of sensitive input cabling from the back to the front, the input selection switch is placed as close as possible to the RCA input connectors. The switch is operated with a long axel. That's a task of precise outlining to prevent mechanical stress. The long holes in the mounting profile are helping out.

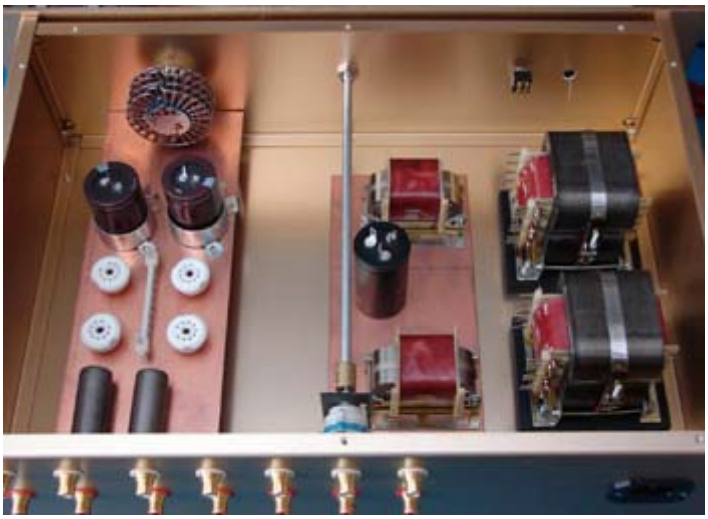
(below) The pass-trough hole on the front panel is provided with a neat axel holder. A little bit of grease on the axel and everything will run smooth. Don't try it without the axel holder.



The attenuator used is provided with an axel that is long enough to mount directly on the front. Here below you find some picture to get a good impression of the setup. Work precisely and everything will work fine.



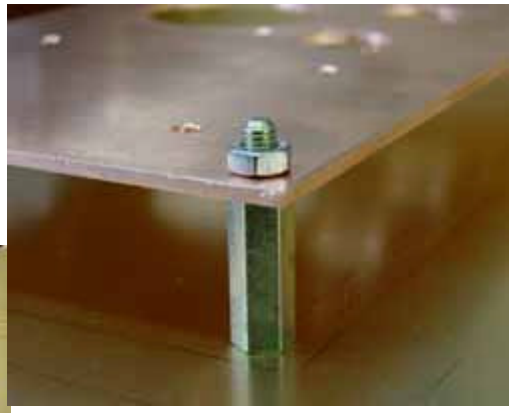
(above) The front exists of two separate panels. The switch will be mounted on the inside panel. In the thick front plate we drill a hole that is big enough to move the axel freely. I used a long toggle switch (bought from Conrad). The LED holder is mounted on the front. Drill a somewhat bigger hole in the back panel to prevent a short circuit.

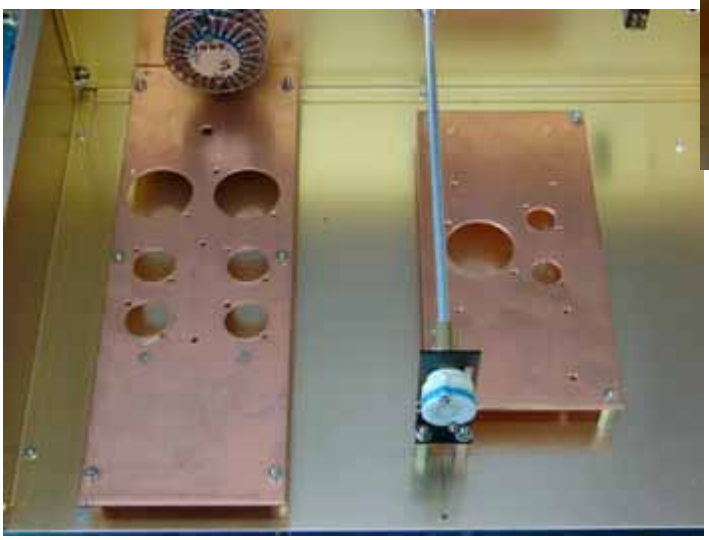


It looks that we are on track. This is how far we are now.

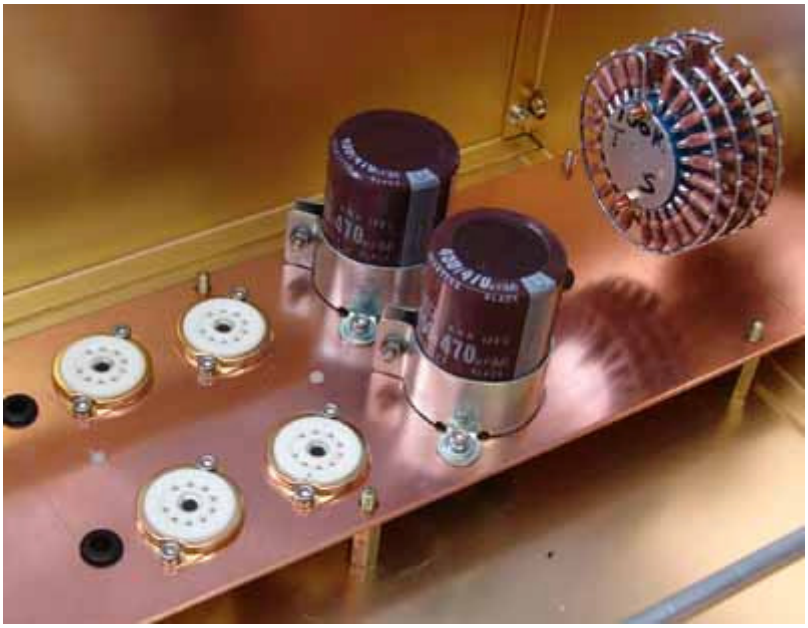
The amplifier module will be provided with holes and mounted on spacers.

And two more pictures, a birds view and one close to the ground





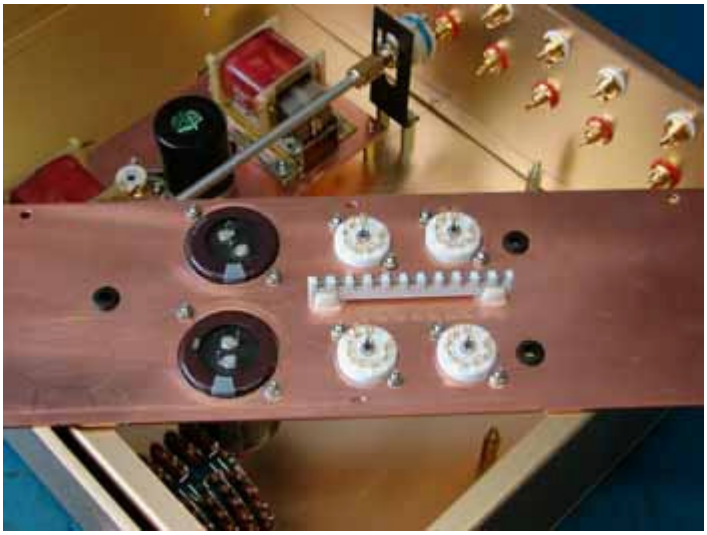
There are a lot of stains now, so... Some polishing will do the trick...

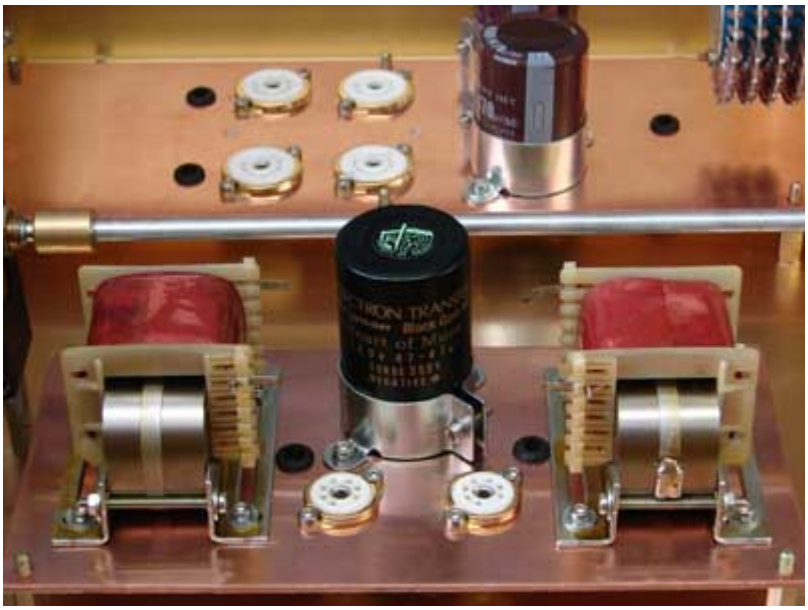


The parts can be mounted now. The elco's will be mounted with the well known clamps.

Between the elco's and the volume attenuator and at the very left side, you see rubber tules. The first is for wiring the attenuator and the last is for the throughput of the wires towards the coupling capacitors.

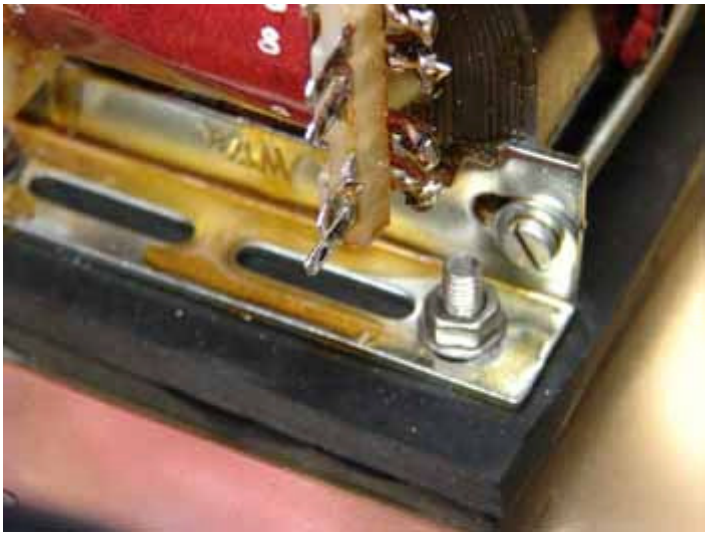
A view below the panel. A long wire support will help to build the circuit in a precise and save manner. Here you can see how close the leveling capacitors are to the amplifier circuit, providing a nice and short signal path.





The power supply module makes a synoptic presentation. Everything can be mounted and wired before the definitive built-in.

The power supply transformers are placed...



A detailed view of the mounting brackets of the power supply transformer. I glued 2 thick rubber flaps together. Before gluing them together, one half is used to glue-in the bolts for mounting it to the chassis. The other half is used to glue in the bolts for mounting the transformers. With this, the transformers are nicely mechanically decoupled from the chassis. As it later turned out, there is no hint of a vibration to be found. The transformers are complete noiseless when operating. Probably were my attempts to decouple the transformers somewhat excessive... but better somewhat too much than somewhat to little. And it looks sturdy too ☺