

# Checking out the Xiang Sheng 728A pre-amplifier.

## G4CNH – APRIL 11<sup>TH</sup> 2021

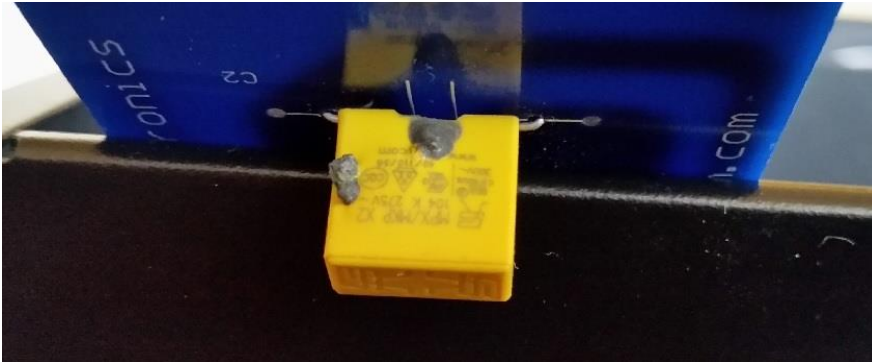
Findings on a recent 728A that came in for repair

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## Mains Filter Notes.

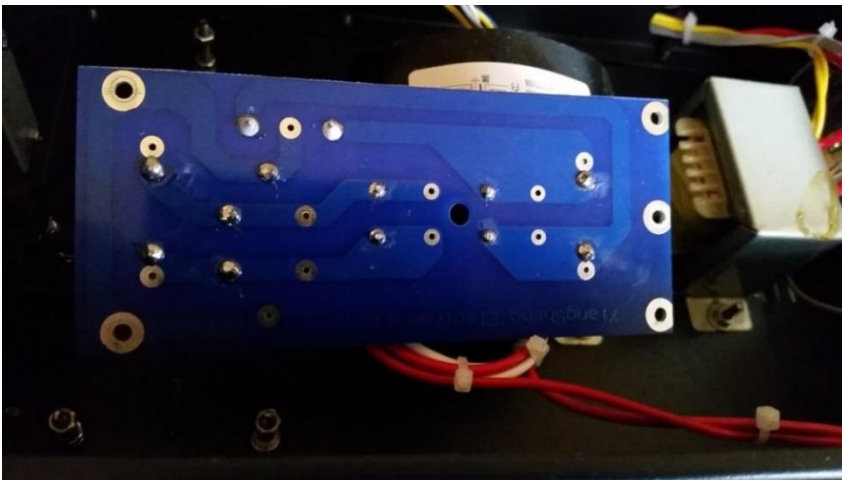
Capacitor C2 found blown, a 100nF 275V X2 capacitor. C1 and C2 replaced with RS Stock No. 220-7786 Mfr. Part No. F1772 410-2000 Brand Vishay. X2 class anti-interference capacitors, series F1772-2000 310 V ac. Metallised film capacitors for interference suppression installed between phases or between phase and neutral. Epoxy resin-sealed, flame-retardant case.



Supply Ground wire does not go directly to case earth, but via a compression between board and a fixing nut.

This is not acceptable and a new additional Ground Wire was fitted to take the Input Ground connection directly to the metalwork.

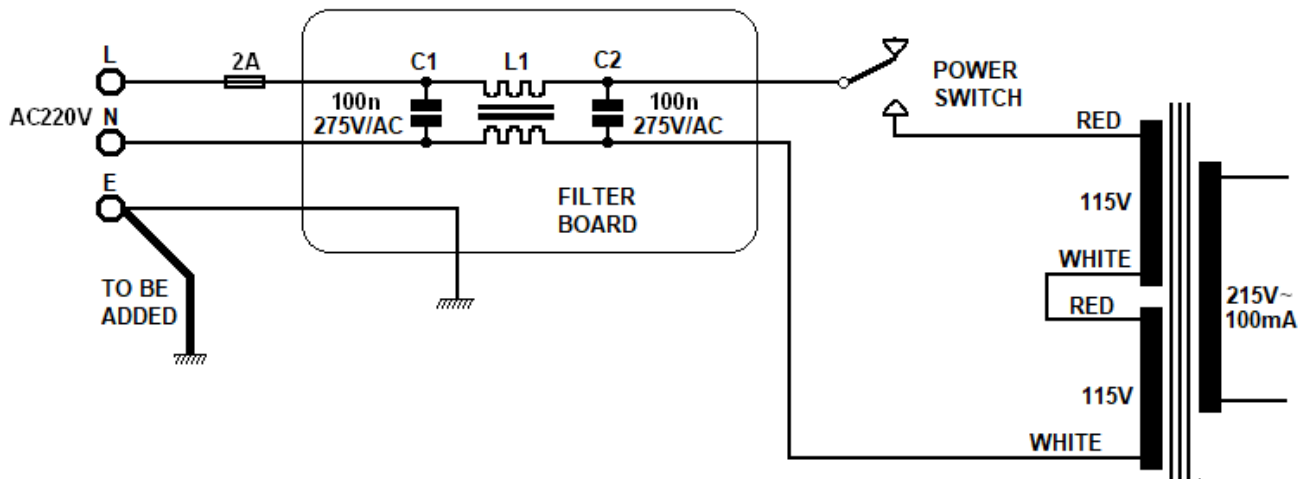
Top left hand fixing hole is the only safety Ground connection by way of pressure contact with a fixing nut!



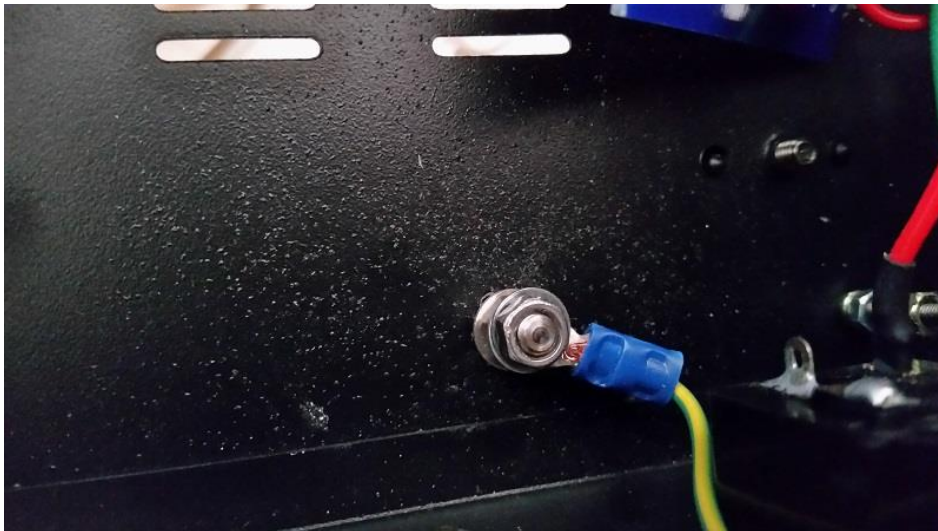
Top View



## Circuit of Filter



New additional and much safer Grounding point.



Proper Yellow/Green Ground wire fitted to PCB.



## Re-worked PCB with new capacitors.



The board is now bolted down onto three proper brass stand-off pillars, rather than be sandwiched between two nuts at each point. A small spot of Loctite thread lock was applied to each top fixing nut.

Prior to further investigation, all of the valves were tested, these being:-

- V1 – ECC81 Mullard NOS
- V2 – ECC81 Mullard NOS
- V3 – ECC82 Mullard NOS
- V4 – ECC82 Mullard NOS

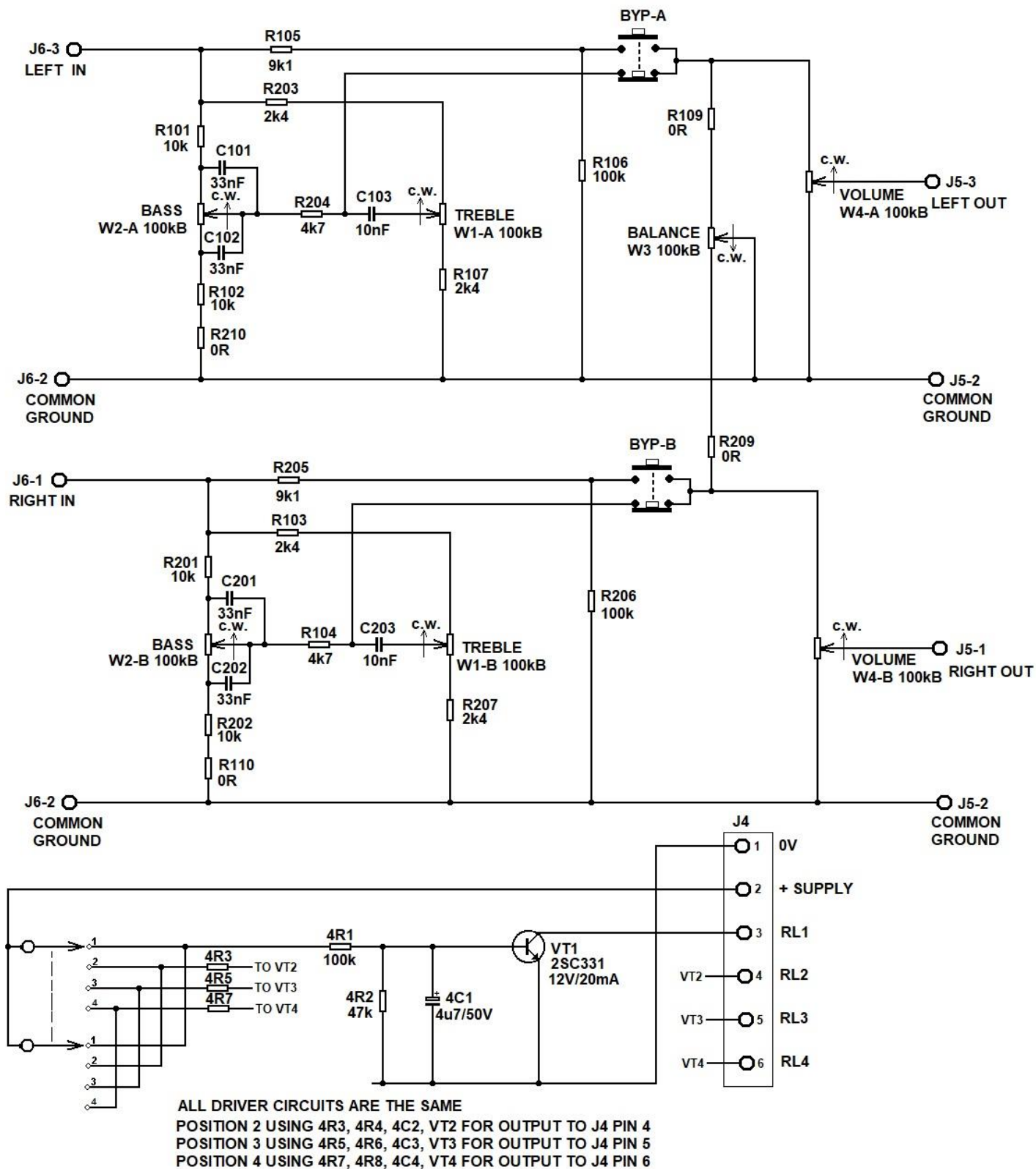
Two rectifiers are fitted being Chinese 6Z4. These differ completely to the American 6Z4. These appeared slightly blackened but tested well at 50mA which is the test current used. As insurance, two Russian 6C4P-EV equivalents were ordered.

V1 and V2 were virtually useless with hardly any emission. This must have been disappointing to the owner of the pre-amp as he had invested some money in what were advertised as good NOS Mullard valves.

Next task was to reverse engineer and map out the Tone control, volume and balance circuits as no information is available. The task was made more difficult due to the manufacturer mixing up component designations. It is usual to number all parts for say the Left channel as R1xx and use R2xx for the Right channel. In this circuit, R103/R203 and R104/R204 were swapped over. They also used zero Ohm links for R110/R210/R109/R209 and note that R110 and R210 are also switched over.

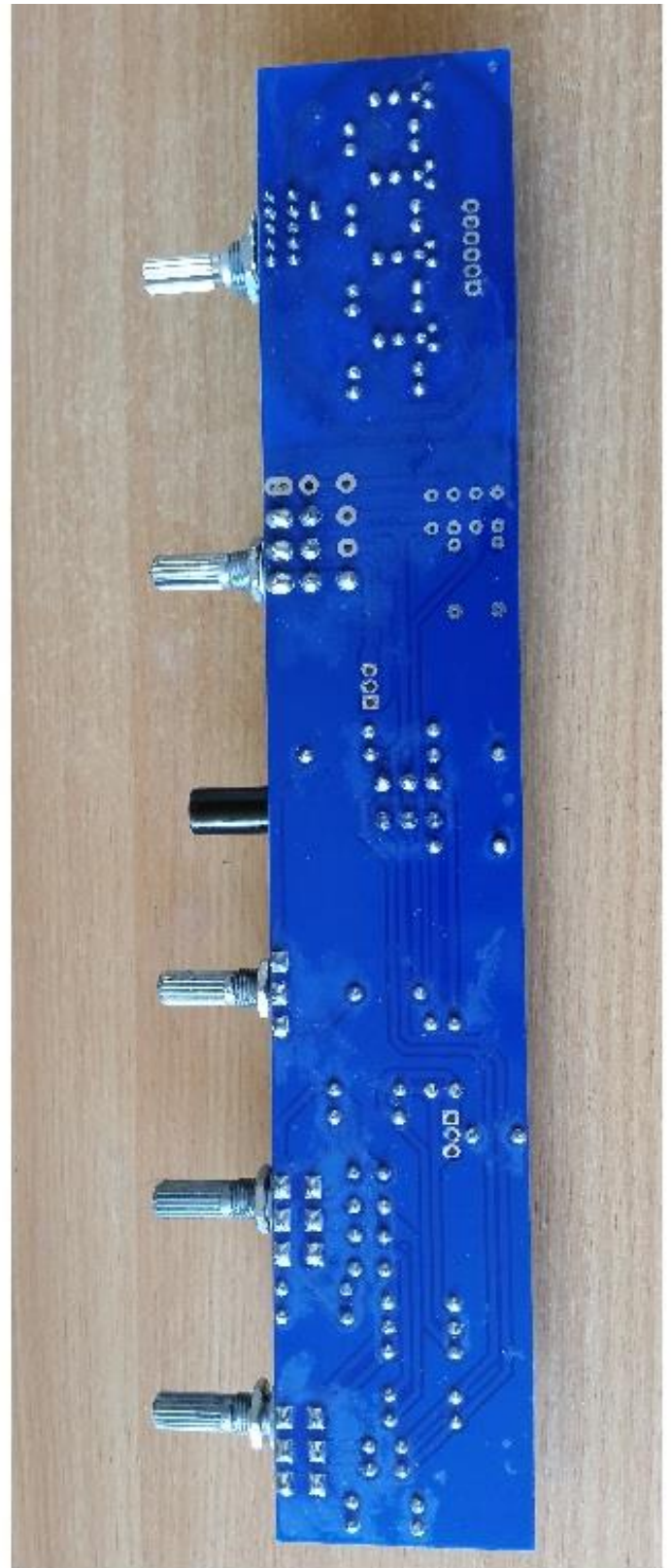


## EQ Circuit.



The + Supply on pin 2 of J4 is 12V from a 7812 regulator which also feeds the 12V Relays on the main board.

## EQ Circuit Board Lay-out.



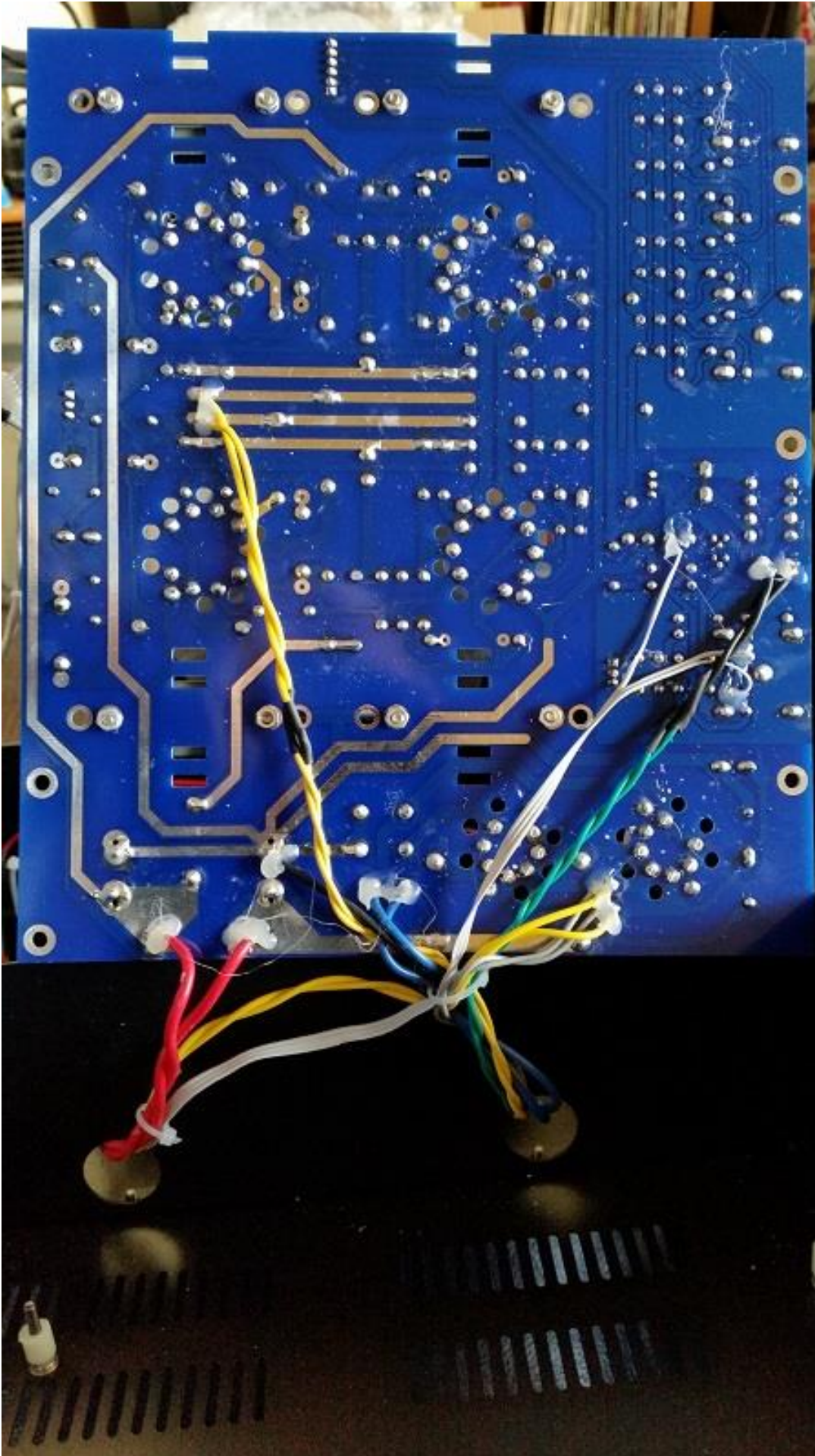
I had to unsolder all flexible cable connectors as I could not determine any way of actually disconnecting them. Was I missing something here 😊?

This board was a mess with lots of flux everywhere; the manufacturers should invest in a de-fluxing bath.

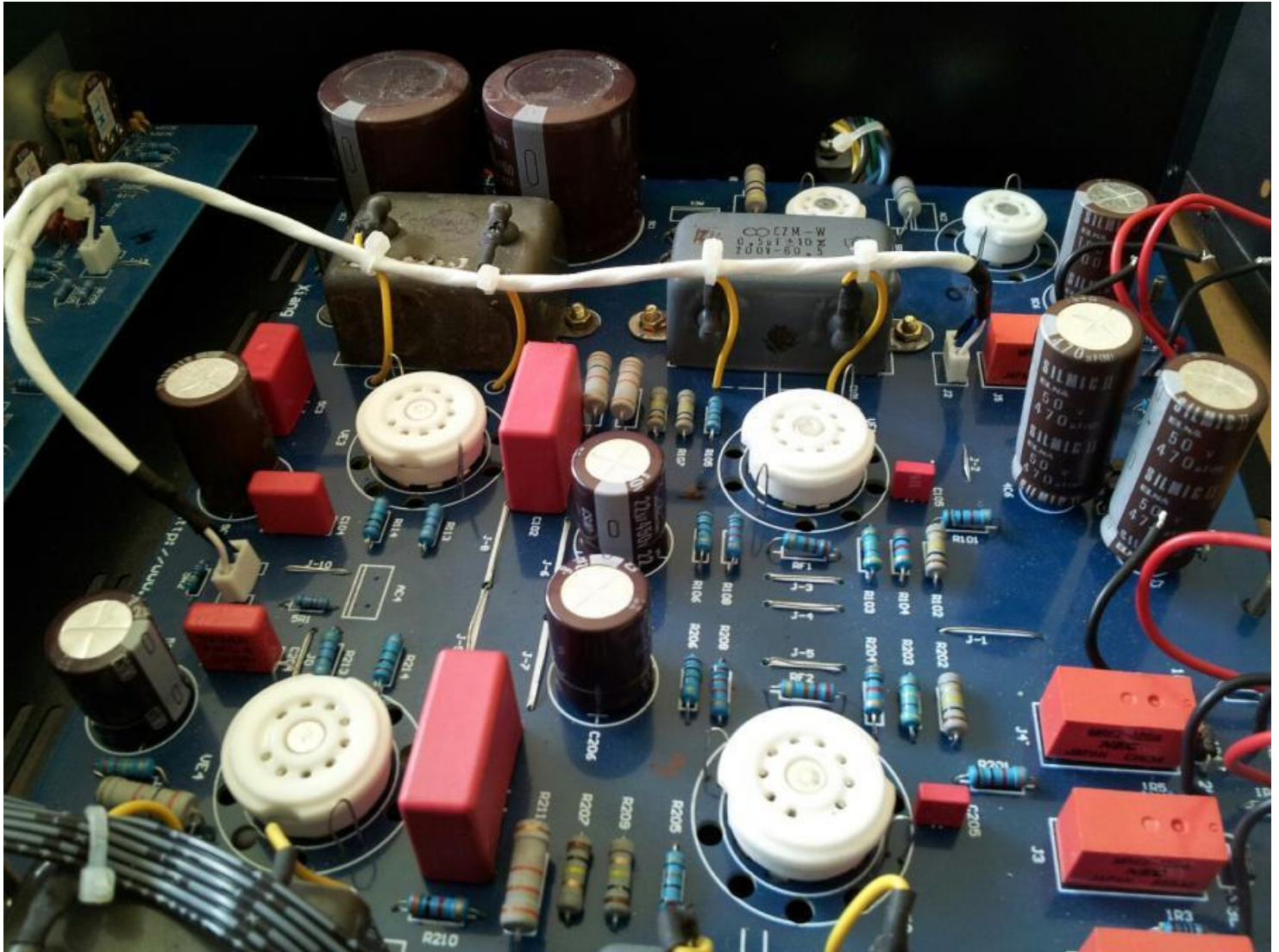
Next task was to reverse engineer and map out the main circuit board.



The Mess underneath, may prove very difficult to reverse engineer.



## The task ahead.



I insulation tested the square Paper In Oil capacitors and they tested OK for capacitance and leakage.

I replaced the small Wima capacitors (C106,C206) at the front end with some Audyn's.

C106 and C206 were hard to replace owing to the Audyn's amazing difference in size, but with the help of some 20 a.w.g. copper wiring, sleeving and tie-wraps, this was achieved. The tie-wraps were essential in keeping these two bulky capacitors anchored to the board, I did not want to use hot glue like the Chinese did, but care was needed to find a suitable mounting position and holes for the tie-wraps.

The same applied to the output capacitors (C104,C204) but these were not tie-wrapped as their leads were more than adequate for support.

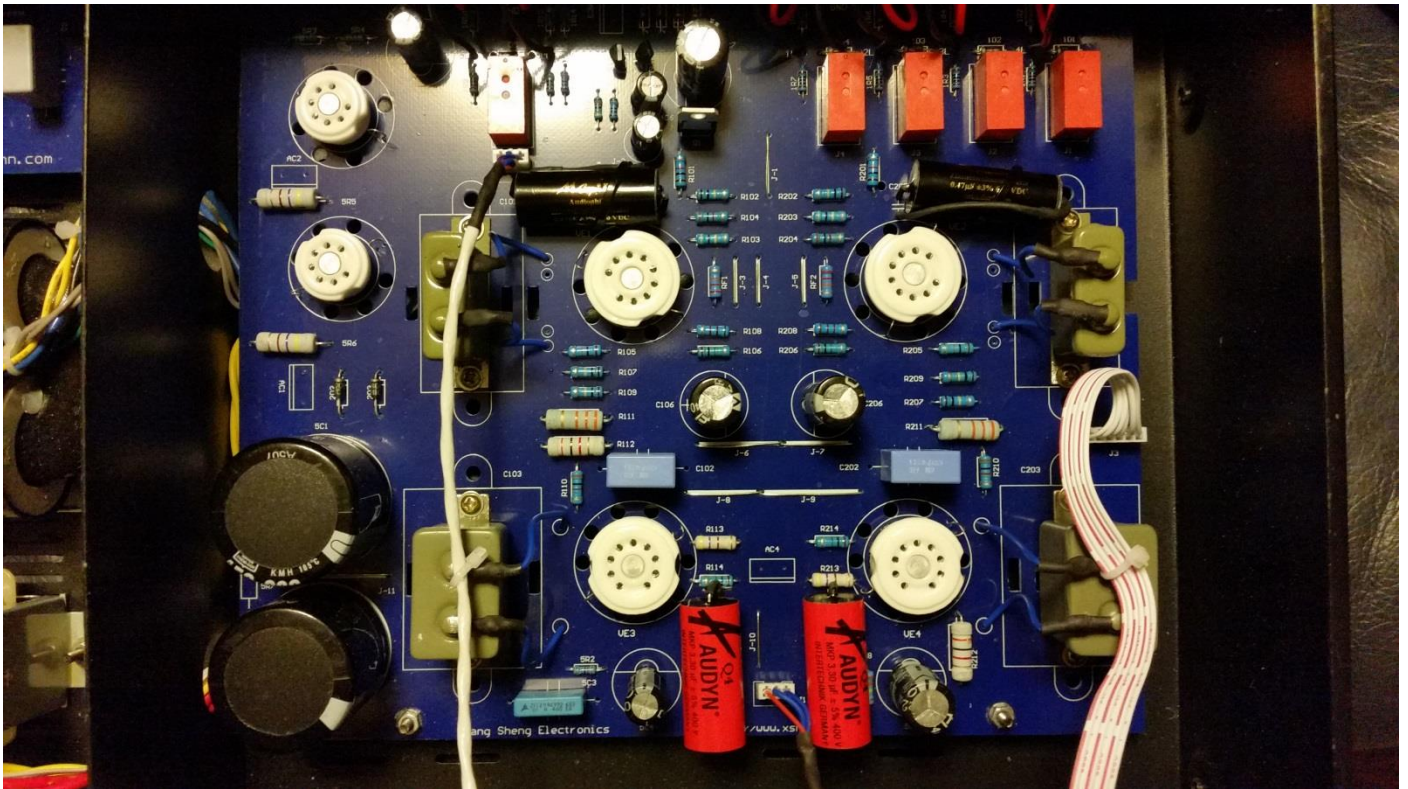
The full circuit is on the following page, I cannot guarantee it is 100% correct but I have not found an error yet and it is better than nothing I suppose.

Please note that the filter board is not included to save drawing space.





## View of Main board, new capacitors and prior to fitting valves and Tone Control panel.



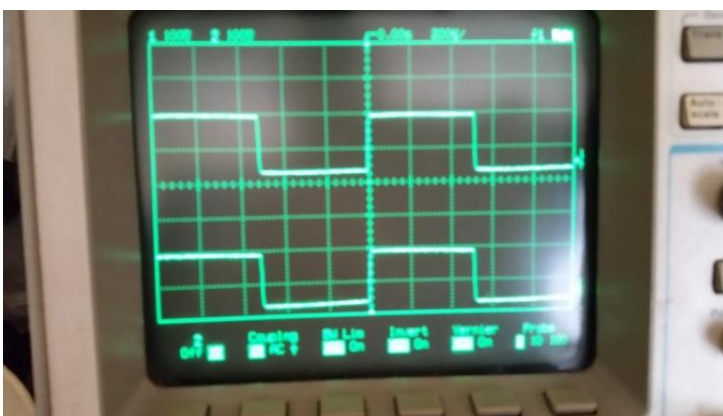
Power up tests seem to be OK, the heater voltages were right at their top end, tolerance wise, but I decided to accept this as the unit had otherwise given flawless operation. So the next thing was to try some dynamic tests to make sure the Tone controls and Balance/Volume controls were working correctly.

The Tone controls were a problem in as much as I had no information on the circuit arrangement used in the 728A though it looks like the classic Baxandall but with a slight difference. As Wiki puts it, "Baxandall's original had two capacitors per potentiometer, but it is possible to use only one at either the treble or bass potentiometers, or both".

Here are some photos of the EQ section in operation. Notice that you do not get a flat response with Bass and Treble set to mid-position! This phenomenon is well documented on the internet; I have included first of all, a photo showing the control positions that actually give the best 1 kHz square wave i.e. flat response.

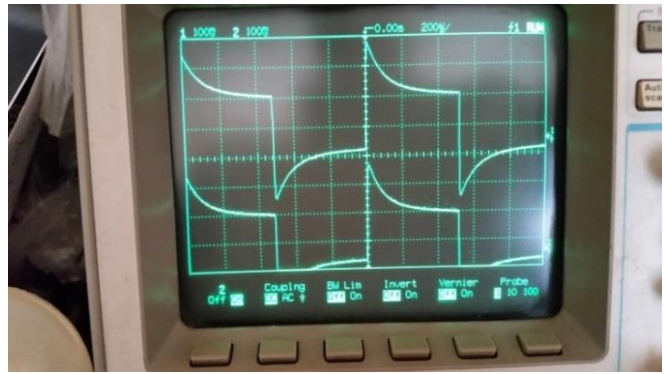
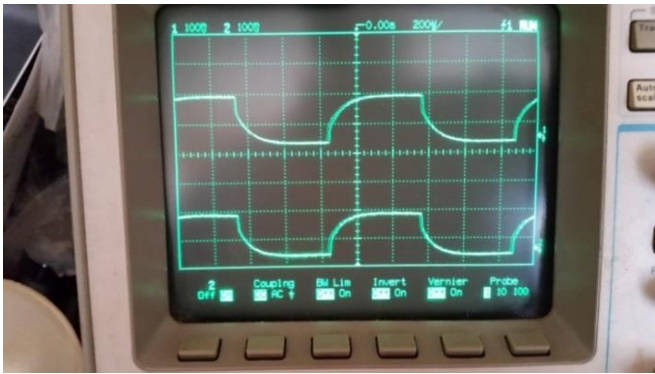
Both channels are virtually identical as you can see in the photographs.

## Flat Response at 1kHz square wave and the Control settings required to achieve it.

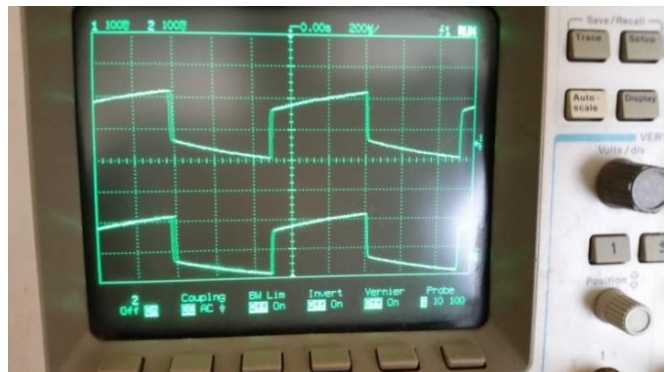
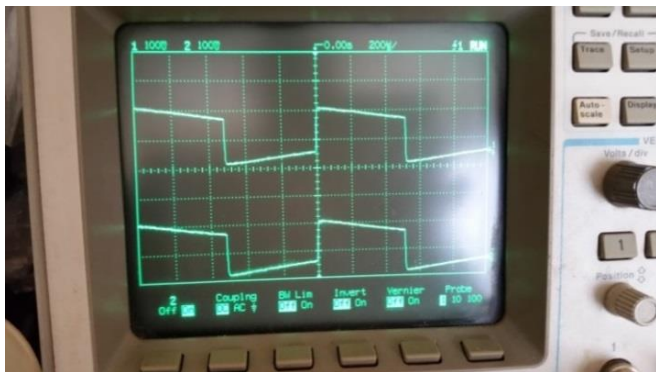




## Treble at minimum and at maximum.



## Bass at minimum and at maximum.

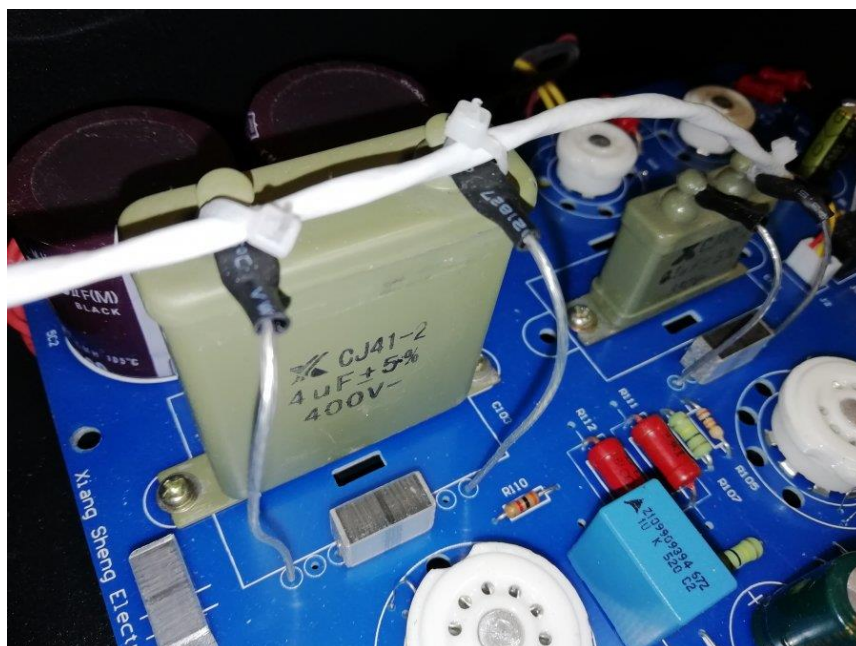


It is true that the levels are not the same when you bypass the tone controls, there is an approximate 7dB increase!

## Changes found on later models.

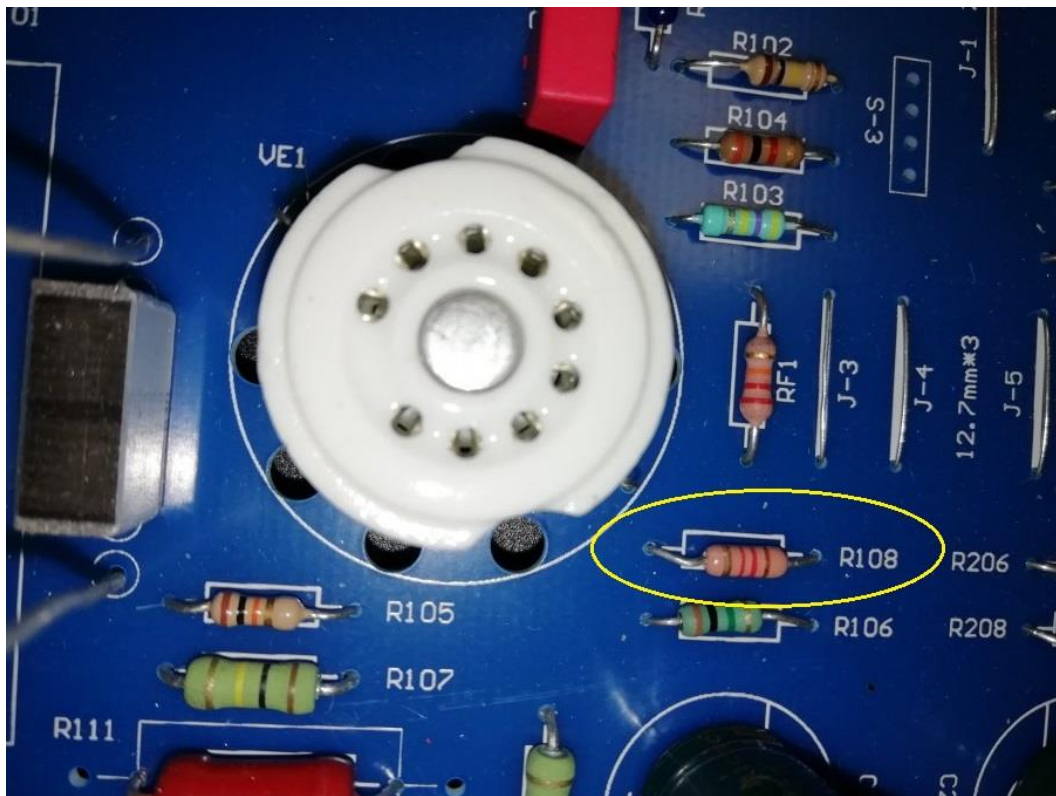
Many thanks to Mauro Perry for the information regarding change of capacitor and resistor values as described on page 8. He sent the following photographs:-

C103 & C203 were 2.5uF. They are now 4uF with a parallel connected 150nF across each one.

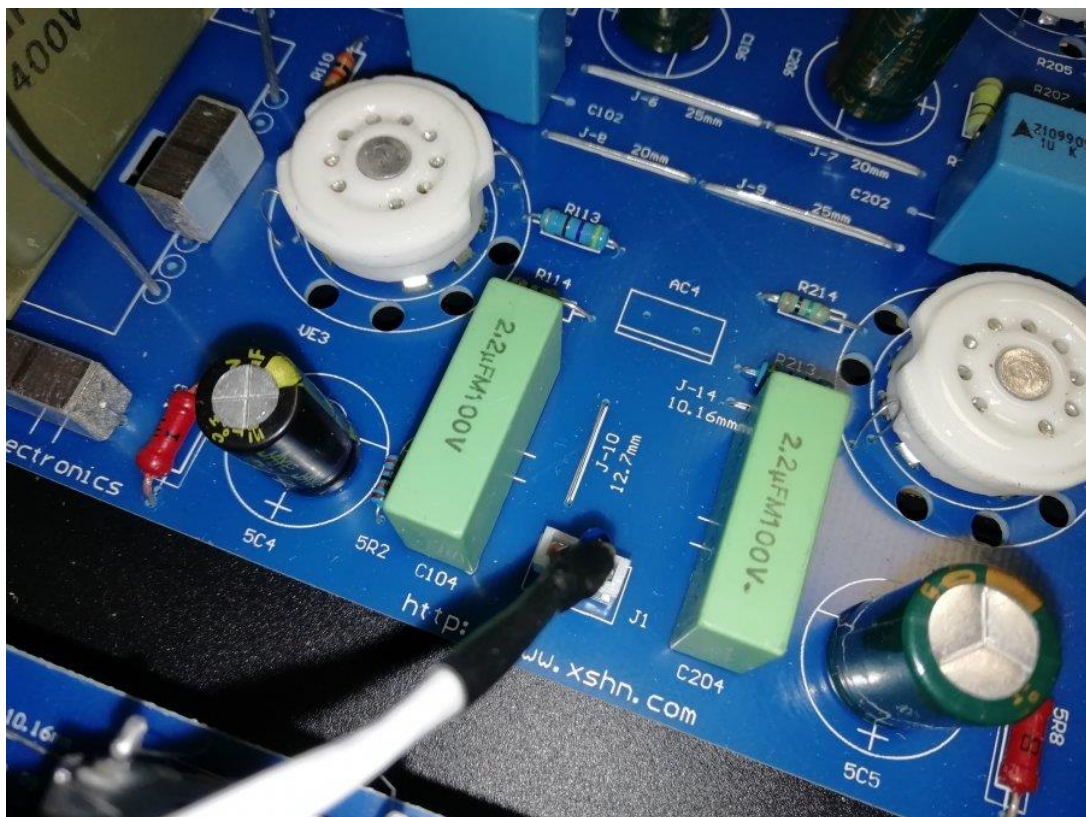




R108 & R208, they are now 1k2 instead of 8k2.



C104 & C204 1uF have been increased to 2.2uF.



He also advised that the front panel has changed and sent in the following photos to show an extra 'Middle' control'. The main circuit board is probably different and the front panel circuit board is obviously very different. I shall have to wait until someone provides me with this newer version so that I can reverse engineer the whole unit. I wonder if Xiang Sheng have designed-out the 7dB change in volume when the Tone Controls are switched out?



I do have to smile about the comments regarding the 'Amsterdam Hooker Window' 😊 😊