Quad 606 MK I and II DIY upgrade illustrated guidelines version 2.6

These are the illustrated step-by-step guidelines for upgrading your Quad 606 MK I or 606 MK II with the Dada Electronics upgrade-kit.

This kit can also be used for the 707 and 909; the 707 and 909 is basically a 606 MKII with the extra Quad Bus input circuit.

The 606 MKI has a square casing; the 606 MKII has chamfered edges like the 707 and 909 (Quad never used the term MK I or MKII, the only difference is the casing the input circuit and the Power Supply, but there were also MK II's in square cases….)[1].

This kit is based on the highly successful one we developed for the 306 range of amplifiers.

We will replace all electrolytic capacitors on the amplifier boards, some resistors and capacitors in the input- and feedback circuit like Quad did in the 606 MKII.

Also we replace the RCA input connectors. Low quality capacitors are replaced by high quality capacitors. All the cabling in the MK I will be replaced by Hi Q cabling in the original colors.

We will also adapt the input-sensitivity (as an option) by increasing the local feedback in the input-circuit. This further increases the signal-to-noise ratio and makes the amplifier better adapted to modern sources.

We strongly advise to replace the power supply capacitors, but these are depending on the type of 606.

[1] If your "MK I" has a serial number between 19900 and 21600 it's an MK II, as the replacement tooling producing chamfered edge cases wasn't ready, so a couple of thousand "MK II's" were made in old style square edged cases.

In some 606 amplifiers there is a mechanical hum. This is generated by the transformer. Although Quad tried to solve this with a special suspension kit, there is in most cases only one solution, replacing the transformer with a toroidal, like Quad did in the 606 MKII, 707 and 909. We sell a complete PSU upgrade kit for this in the Dada Electronics webshop.

We will do the revision step-by-step. For every step these guidelines will tell you what to do (in Underline) and give you some tips, tricks and advice (in Italics). You should have some soldering-experience to bring this project to a good end, but you don't have to be an electronics-expert.

When there are any problems, send an e-mail to info@dadaelectronics.eu with a good description of the problem. Some pictures may help us understand the problem better. We will do our best to answer within 24 hours 7/7.

When the project is a success you will be listening to one of the best high-end, high-powered, current-dumping amplifiers ever made with a better-than-original Quad-sound. For identifying your 606 and additional information, downloading the service manual is mandatory; the information from the service manual is not repeated in this manual.

Components and values may change without notice; always download the latest upgrade manual and service manual. If you buy a kit and plan the upgrade in the future, store the upgrade manual and service manual with the kit. We don't keep older versions of the manuals online! Before you start, read this manual first, to get an idea of the work, tools and skills needed to do the job.

Stefaan & Joost june 2019

Step 1 – The tools & the Components

The tools you need:

- A good quality soldering iron with a fine point (max 30) Watt or a soldering-station.
- A desoldering-pump or desoldering station
- A micro cutting nipper, a wire-stripper and a miniature pliers
- A long Philips n° 2 and n° 1 screwdriver and a small flat screwdriver
- Tin/lead solder wire (no unleaded solder!)
- A digital multimeter

If you don't have these tools you can order them in the Dada Electronics webshop.

You should also have the 606 schematic and the corresponding Pcb (Printed Circuit Board) layout at hand. You will find them in the service manual. The versions are related to the serial number of the unit, but double check this on the amplifier modules themselves! On the Pcb the issue number is marked on the copper side. You can download the document from our website.

There is one version of the 606 upgrade-kit, and three options. We strongly advise to use the basic kit and option 2 as a minimum set.

1. The **Basic version** includes the input connectors, internal cabling, capacitors for the driver-boards, PCB-connectors and other small components.
2. The **PSU Capacitor option** contains 4x BHC (Kemet) Aerovox 10.000µF 63 V capacitors (or 4x BHC (Kemet) Aerovox 15.000µF 63V for the 606 MKII).
3. The complete **MKII Psu option**.

The components in the 606 **basic upgrade-kit**:

Cables, connectors & mechanical components:

- 4x 0.75M flexible 0,75mm² flexible cable for internal wiring (Orange for mass, Yellow for the LS-outputs, Black for – DC-current, Red for + DC current).
- RCA input chassis connectors (red and black, or white)
- Shielded audio-cable, 50cm
- 12x Faston connectors, female
- Thermal insulation-tube, 30cm

Components to be mounted on the driver-boards:

- 2x R 62K 1% for R5 (blue-red-black-red-brown)(only needed in a MKI)
- 2x R 12R 1% for R11 (brown-red-black-gold-brown) (*)
- 2x R 15R 1% for R11 (brown-green-black-gold-brown) (*)
- 6x C 330pF polystyrene for C1 / C4 / C6
- 2x C 330nF MKT for C2 (only needed in an MKI)
- 2x C 1µF MKT for C3 (only needed in an MKI)
- 8x C 100nF ceramic (Additional decouple caps for the zener diodes D1, D2, D12 and C7, **not replacements for the zeners or C7!**)
- 2x C 100uF 63V for C7
- 4x C 470µF 63V for C9 & C11

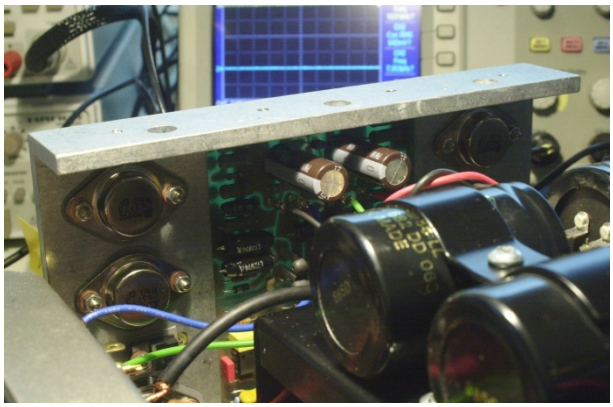
(*) Only needed if you want to change the input sensitivity! 12R for 775mV, 15R for 1000mV sensitivity.

Separate components and parts (you can order these from *the Dada Electronics webshop*

- 4x BHC (Kemet) Aerovox 10.000µF 63V capacitor for the 606-I power-supply
- 4x BHC (Kemet) Aerovox 15.000µF 63V capacitor for the 606-II power-supply
- Dada Electronics DC-protection / delay, mono, the best! (two needed)
- Complete MKII Psu with toroidal transformer
- all other 606 electronic components are also available

See also *the Quad Spot weblog*.

Step 2 – Dismantling the 606 MK I



- *Remove the bottom-cover (Philips n°2, 8 screws including 4 feet, also two screws on the back Philips n° 1), see exploded view in the service manual*
- *Remove the wires from the 2 driver-boards (6 connectors/wires per board)*
- *Remove the driver-boards (2x 3 screws)*
- *Remove the 4 PSU capacitors mounting-rings, desolder the caps from the pins. Make pictures or notes concerning the polarity!*

Step 3 – Cabling

We'll start by cabling the power-supply. For internal cabling counts: the shorter the better. We'll use high-quality flexible 0.75 mm² in 4 colors for everything except the 230 Volt lines.

We'll use the following colors:

- Red for the +50 Volt line
- Black for the -50 Volt line
- Orange for the output-mass and PSU mass
- Yellow for the LS-output lines

For the inputs we'll use shielded cable between the RCA-connectors and the driver-circuits.

Use the heat shrink tube to cover the soldering eyelet and give them a neat appearance.

Before connecting the power, re-check the polarity of the power supply caps. Compare with the schematics and the wiring diagram in the Service Manual.

Warning If the polarity of the caps is wrong they will explode!

It is better to twist all cables that have to be soldered to the same point together before tinning them, it makes soldering a lot easier.

Foresee cables to the boards as well.

We can now connect the + and - power-lines to the boards (don't switch them or you'll kill the output-transistors!) as well as the LS-output cables to the red LS output-plugs.

It is no luxury to use some Raychem (or other) Heat Shrinkable Tubing for insulating the +, - and output connections, as there are large voltages between them.

- *Connect the "+" and "-" leads from the power-supply to the boards*
- *Connect the LS-outputs of the boards to the circuit-boards*
- *Connect the inputs to the RCA-plugs with shielded cable*
- *Re-assemble the amplifier in reverse order*

Before connecting mains-voltage we should check all cabling again with the Ohm-meter. After connecting the power we should also re-check that each channel uses 120 .. 130 mA in the + and the - power-line and that there is less than 0,01 Volt DC on the outputs (typically 0.007 or less Volts).

If it passes these final tests we can rebuild the unit and finally connect the speakers and the preamp and... Enjoy the music ;-)

Step 4 - Fitting in the Power Supply capacitors and the connectors

It's important to do these steps in the right order as it makes it more practical to reach certain components. Use the exploded view as a reference; also check the T board layout. Place the capacitors on the metal top plate. Watch the polarity! Place the mounting rings, secure them, but not too tight! Solder the capacitors to the pins.

Step 5 – Revision of the circuit boards.

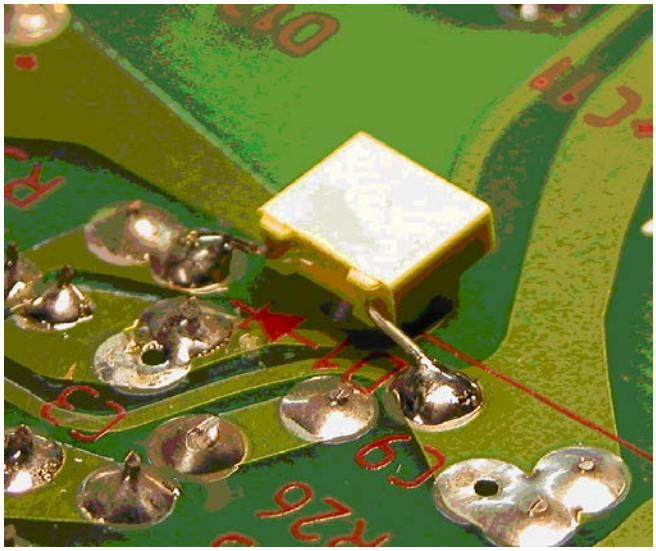
If you have a stabilized power-supply (+ 57 and – 54 Volt), a function-generator and a scope you might test the boards before upgrading them. If you don't, no problem, you can upgrade the boards without them.

When you connect a dual power supply to the board (+ and – voltage to the PCB-connectors, mass to the aluminum heat-sink (don't use the input mass for this!), you should read about 110 mA in the – power-line and 120 mA in the + power-line. This means the power- and driver-transistors are OK.

It is a good practice to do the revision of the boards one by one. Tis way we can compare between the boards if we want to see the polarity of capacitors or diode's or if something goes wrong.

Replace all the components in the above component-list, except the 8 decouple caps, these are extra components. Solder the small decouple capacitors on the copper side of the PCB, do not remove/replace the zeners! See the picture below for an example. Use the PCB layout from the service manual to check the position of the components, the layouts are copper trackside, not component side!

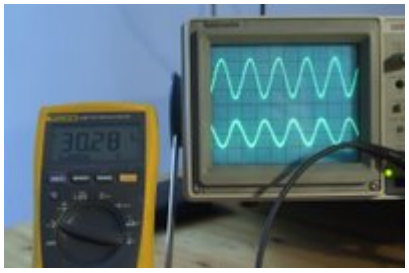
The issue number of the PCB is also on the copper side.



If you want an input-sensitivity of 0 dBm (775 mV), 1mWatt in 600 ohms, which is standard, replace R11 with 12 Ohm. If you leave R11 in place the input-sensitivity will be 500mV. If R11 is replaced with 15 Ohm, the sensitivity will be 1000mV (for professional use).

Step 7 - Testing the circuit boards

When both boards are upgraded we'll connect them to a sinus-generator and to the scope. We'll connect + and - 50 Volt with our lab power-supply and connect a true-RMS multimeter to check the input- and output voltages.



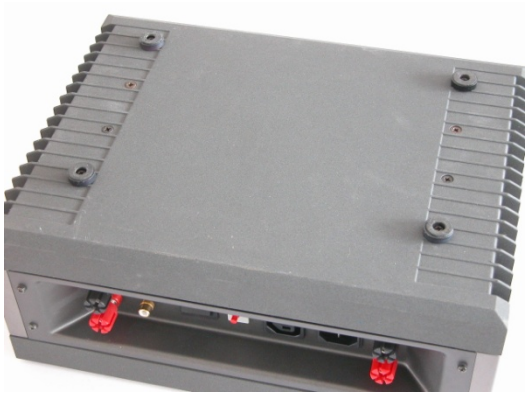
Following measurements are OK:

- 0.01 Volt (max) DC on the outputs
- 32 .. 36 Volt AC on the outputs before clipping, no load on the output. This corresponds with 130 .. 150 Watt into 8 Ohm.
- 0.775 (or 0.5 or 1) Volt AC on the input before clipping.

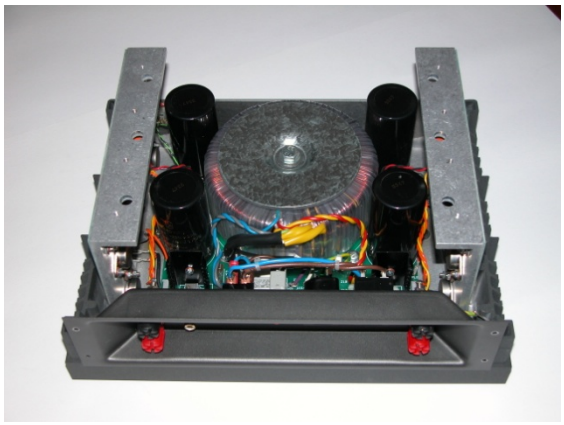
If you don't have all this lab-equipment, skip this step. If the measurements are not in line or the module is not functioning, you have to trouble shoot the module, this work is beyond the scope of this manual.

Re-check both sides of the boards to make sure that the polarity of the electrolytic capacitors is correct and that there are no soldering short-circuits between the PCB tracks.

The 606 MKII, also very useful information for the 707 and 909.

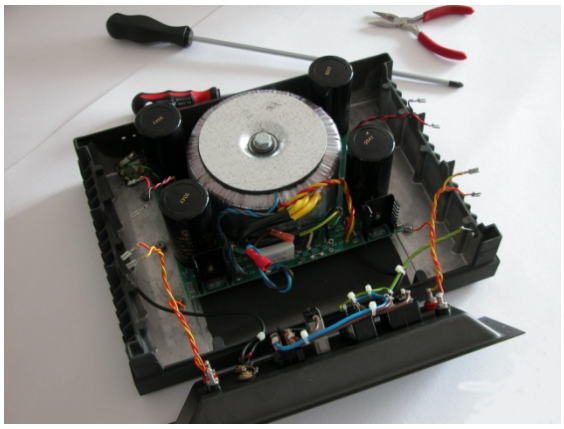


Remove the 8 screws on the bottom and the 4 screws from the rear panel. Remove the bottom and the U shaped chassis part.

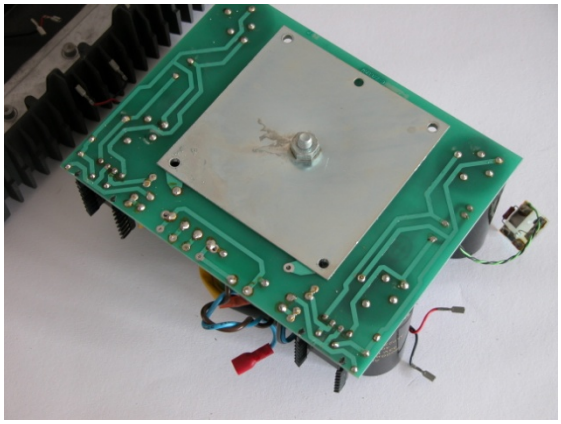


The unit will looks like this. Remove the amplifier boards with a long Philips (posidriv no 2) screwdriver; be careful not to make contact with the components on the boards. Remove (loosen) the connectors on the boards with small pliers. Make notes about the position and the colors, or pictures.

Remove the led circuit board from the front of the amplifier



Remove the connectors from the PSU, make notes, or pictures! There is no need for soldering here. There are four large posidriv screws around the transformer, remove those. Be careful, sometimes they are a little bit covered by the transformer.



Now the Psu caps can be replaced. The revision of the amplifier boards is not different from the MKI, the MK II has already the input and feedback modification implemented. Rebuilt in reverse order. No need to upgrade the wires in a MKII.

Color coding of resistors.

To distinguish left from right there is a larger gap between the D and E bands.

- band **A** is the first significant figure of component value (left side)
- band **B** is the second significant figure
- band **C** is the third significant figure
- band **D** is the decimal multiplier
- band **E** indicates tolerance of value in percent

Color	**A** First figure	**B** Second figure	**C** Third figure	**D** Multiplier		**E** Tolerance
Black	0	0	0	×1		–
Brown	1	1	1	×10		±1%
Red	2	2	2	×100		±2%
Orange	3	3	3	×1K		–
Yellow	4	4	4	×10K		–
Green	5	5	5	×100K		±0.5%
Blue	6	6	6	×1M		±0.25%
Violet	7	7	7	×10M		±0.1%
Gray	8	8	8	×100M		±0.05%
White	9	9	9	×1G		–
Gold	–	–	–	×0.1		±5%
Silver	–	–	–	×0.01		±10%
None	–	–	–	–		±20%

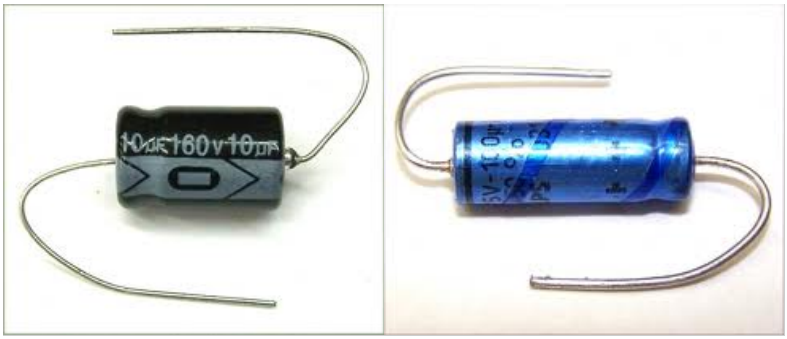
Example: Red, Red, Black, Red, Brown
220 X 100 = 22Kohm and 1% tolerance
If a resistor has 4 bands, discard column C

The indentification of the plus and minus of electrolyte capacitors.

In allmost all cases the minus is indicated with a long stripe with symbols at the side of the can in the color of the printed text.

Also if the capacitor has wires, the minus wire is the shortest one!

Capacitors with srcew terminals will have sometimes the stripe indication or have indications on top of the capacitor, if any doubts, contact us! Connecting capacitors in the wrong way could give a lot of damage.



With axial capacitors there is an extra arrow indicating the minus wire, or there is a printed small line (ring) around the body indicating the minus wire. Also the minus wire is direct connected to the aluminium body. The plus wire is sticking through the black plastic cap.

Indication of the cathode of diodes and zener diodes

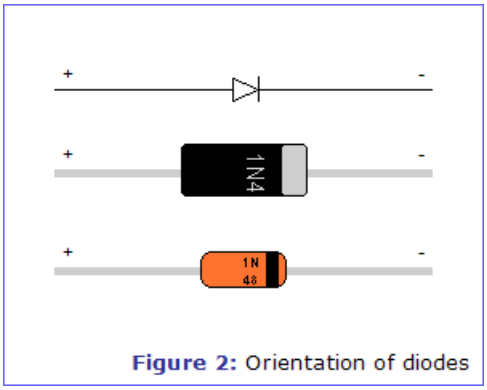


Figure 2: Orientation of diodes

The cathode will be indicated by a white, silver or black line on the body of the diode.