The HOJ mod

Build the High Octane inside your
Epiphone Valve Junor / Harley Benton GA5
Compiled by zzzap-fizzz

IMPORTANT

This HOJ mod project is not supported by the AX84 community
If you need any help please post to an Epi VJr mod forum
Might I suggest sewatt.com ?

DANGER - HIGH VOLTAGE

This should not be your first Epi VJr modification

Rev. beta 0.04 - 2007.08.05

This project is a rebuild of the Epiphone Valve Junior so the High Octane can fit inside the original Epi VJr chassis with it's stock transformers and stock pcb with minor modifications.

As I needed to sort out my notes for this rebuild I'll figured I might as well try to make them clear enough for others to read.

Revision one stay true to component values as shown in High Octane schematics version 06.02.23. There are two important exceptions though. Voltage in the High Octane is not the same as in the VJr. And I've decided to leave the stock filter caps in the power supply. They're values are proximally half of what the HO schematic dictates

An optional bypass switch for the third gain stage borrowed from The Lead Preamp schematics is implemented as an option (same source as the High Octane).

There is a redrawn schematic availably that shows the High Octane with VJr component labels.

Please note I'm not an trained EE, and this guide here is not the only way to do this modification. But I do try to give advice that make sense to me. And I do try to stay ahead so we don't solder a cable to a resistor we later on might have to swap several times.

Hi-Octane's schematics show how to wire an octal output tube to the amp, but I don't think this is considered to be accurate these days as the vote seems to be that we need different values for R14, R15.

Disclaimer

You already know hight voltage can really hurt you - even kill you. You also know that taking your amp apart will ruin any warranty. I do not take any responsibility for any error I've might have made in this document other than I try to correct the text if you let me know where I did wrong. Seriously, - I do not take any responsibility for what you do with yourself or you amplifier after reading this document. USE AT YOUR OWN RISK!

Project notes

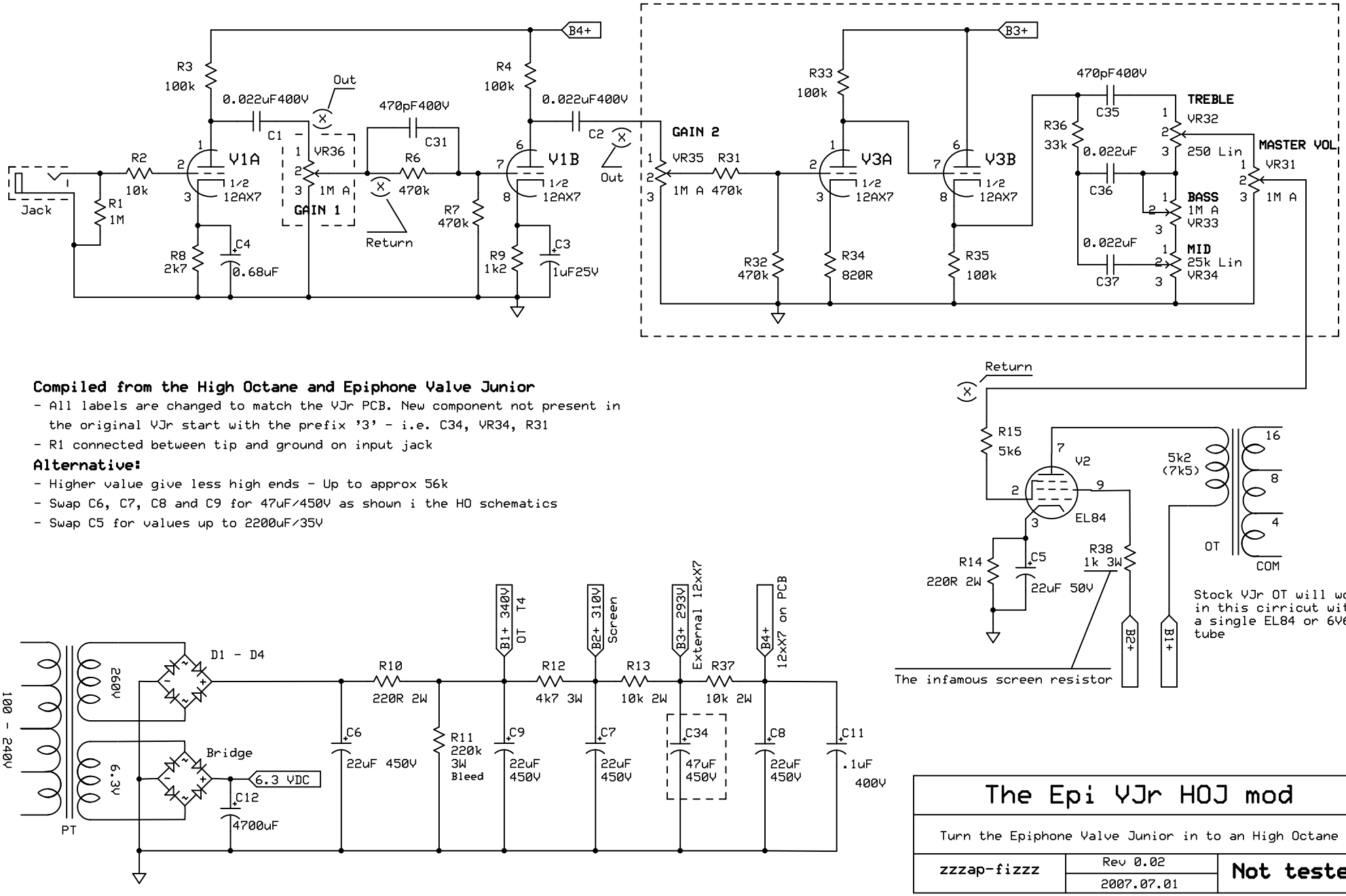
Task - Build the High Octane Amp in the Epi VJr chassis
       with the original PCB and trannies in place.

All new components will be labeled with the prefix '3' - VR34, C35
Components we swap for new HOJ values will still have they're
original VJr naming.

7 resistors on PCB swapped for new values
1 resistor added to PCB + 1 'optional' screen resistor R38
1 resistor on PCB removed
2 capacitors on PCB swapped for new values
2 capacitors on PCB lifted - one leg only
1 capacitor added to PCB
6 cables soldered to PCB + 1 optional for bypass switch
0 traces on PCB must be cut to make the HOJ mod. But the
    screen resistor for EL84 is a highly recommended modification
    and this mod require a trace cut
2 Voltages might have to be adjusted

7 hole in metal chassis - Six hole in the face plate for
    potentiometers - 2 gain, 1 main volume and 3 pc tone stack
    One hole for the new 12AX7 tube + other rearrangement you
    need to do to fit the six pot in the face plate

As hi gain amps can be very prone to noise all signal cabling have
be done with shielded wire. And all wires kept as short as possible.
Implementation of all those gizmo space shuttle switches have to
wait to after the amp is up an running. Thats why the 'must have'
bypass switch for the third gain stage is considered an option
throughout this project. First we make it work, then we can add
functionality and options.



Compiled from the High Octane and Epiphone Valve Junior

- All labels are changed to match the VJr PCB. New component not present in the original VJr start with the prefix '3' - i.e. C34, VR34, R31
- R1 connected between tip and ground on input jack

Alternative:

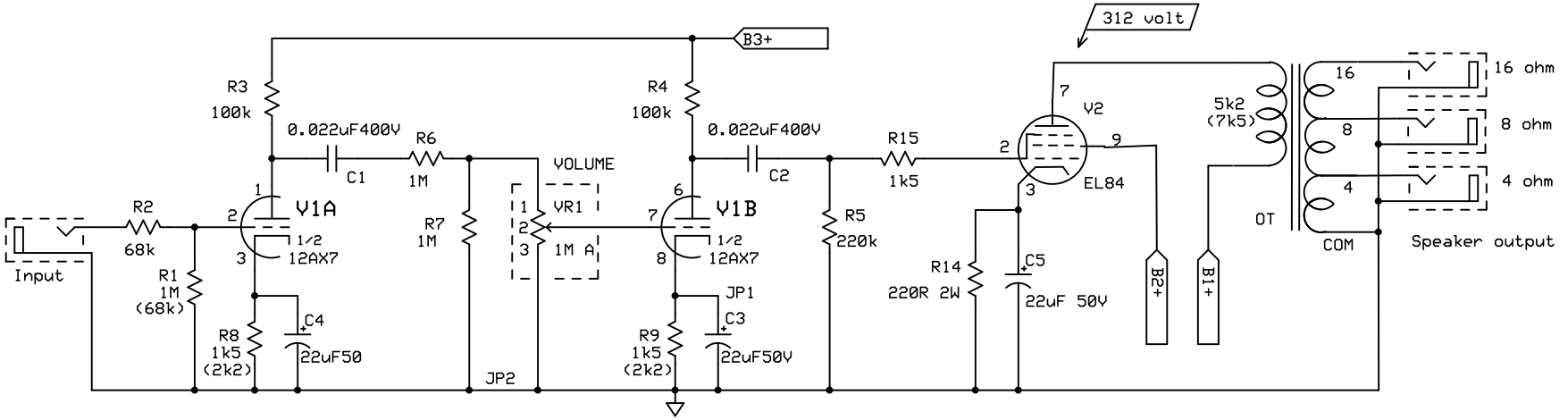
- Higher value give less high ends - Up to approx 56k
- Swap C6, C7, C8 and C9 for 47uF/450V as shown i the HO schematics
- Swap C5 for values up to 2200uF/35V

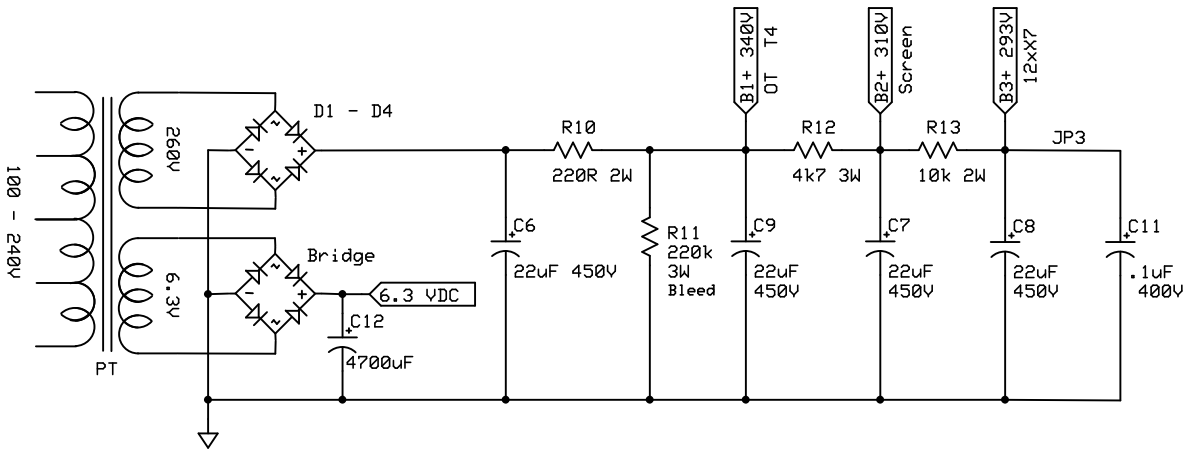
The Epi VJr HOJ mod

Turn the Epiphone Valve Junior in to an High Octane

zzzap-fizzz	Rev 0.02 2007.07.01	**Not tested**

The original cirricut design is taken from the legendary 'High Octane' project
Visit http://ax84.com.to learn more about they're great work





Alternative:

Thanks to Phil

- Move R1 to input jack between tip and ground and reduce R2 to 10k
- Insert screen resistor 1k/3W in the B2+ line
- For more juice in the power supply
  swap C6, C7, C8 and C9 for 47uF/450V
- Higher value give less high ends - Up to approx 56k
- Swap R6/R7 for better gain and noise, try values around 100k
- Swap C5 for values up to 2200uF/35V to smooth the distortion tone
- Changing C4/R8 - C3/R9 set the distortion and low
  frequency cutoff point. Here are some to try
  C4 = 1uF / R8 = 1k - C3 = removed / R9 = 1k
  C4 = 1uF / R8 = 1k - C3 = 0.68uF / R9 = 820R
- Increase R10 if B1+ is over 310-315V
- E14 adjust the EL84s dissipation 240-270R/1W
- Replace OT with Hammond 125ESE, DSE or CSE

Values in brackets are found in revision prior to rev 2.b

Epiphone Valve Junior

Stock Epiphone Valve Junior

zzzap-fizzz	Rev 2.b 2007.07.01	**Not tested**

Bill of Materials

Quantity	Reference	Value
4	VR31, VR33, VR35, VR36	1Meg LOG (A)
1	VR32	250K LIN
1	VR34	25K LIN
1	R1	1M metalfilm
1	R2	10k metalfilm
4	R6, R7, R31, R32	470k metalfilm
1	R9	1k2 metalfilm
1	R15	5k6 metalfilm
2	R33, R35	100k metalfilm
1	R34	820R metalfilm
1	R36	33k metalfilm
1	R37	10k/2W
1	R38	1k/3W
1	C3	1uF 25V
1	C4	0.68uF 25V
2	C31, C35	470pF/400V (tone stack)
2	C36, C37	0.022uF (tone stack)
1	C34	47uF/450V
1 feet	Interconnect	shielded wire (mic or hi-fi cabel)
1 feet	Interconnect	single wire for filamet, B3+
1	Soldering strip	4 lug soldering strip
1	Socket V3	9 pin tube socket
1	V3	12AX7 tube
6	Knob	Knobs at your liking

Get started

Step 01 - Removal:

If not already done - remove the amp chassis from the wooden box. Remove backplate. There is four screw hidden under the plastic buttons on top. With some force slide metal chassis out back.

Step 02 - Measuring:

With speaker connected (not the guitar) power on the amp and measure all key voltages. All these voltages will must likely drop after the new tube is activated. Remember to take notes for later reference.

This part can be is very dangerous, and if you don't know the rules that apply for this task - please STOP right now. Working with high voltage can kill you. I repeat, - it can KILL you as in DEAD. General rule is to keep one hand in the pocket when you work inside a live chassis with power on. Some of these voltage can be tricky to measure without both hand, or some preparation. Better leave them be than kill yourself, - agreed?

   # VAC (wall outlet)
   # Cathode voltage - Pin 3 to ground (ref 9,43V)
   # Plate to cathode voltage - Between pin3 and pin7 (ref 292V)
   # B1+
   # B2+
   # B3+
   # Filament - Measure plus side of C12 to ground (ref 6.3V)
   # B+: Higher side of R10
   # B1: Lower side of R10 or Higher side of R12
   # B2: Lower side of R12 or Higher side of R13
   # B3: Lower side of R13 or Higher side of R3/R4

EL84 Plate voltage: EL84 pin 7
EL84 Cathode voltage: EL84 pin 3
12AX7 (1) Plate voltage: 12AX7 pin 1
12AX7 (1) Cathode voltage: 12AX7 pin 3
12AX7 (2) Plate voltage: 12AX7 pin 6
12AX7 (1) Cathode voltage: 12AX7 pin 8

Step 03 - Remove PCB:

Turn power off and unplug the amp.
Remove tubes from they're socket and store them in a safe place.
Disconnect plugs for volume and input jack. Unscrew the six black screw that holds the PCB in place.
It's not necessary to disconnect wires to and from the transformers. But you might find it easier to swap components on the PCB and drill the chassis if you do. If you decide to remove all connectors remember to mark them so you know where to reassemble them.

Step 04 - Line up the potentiometers and tube socket:

All potentiometer must be fitted in fixed position before any soldering can start. If you're not ready to drill your chassis just yet you still need to make a temporary fix for all six pots as many of the new components added to this project is asambled on the potentiometer legs.

Mount tube socket as you like. There isn't enough room on the chassis when the stock pcb are in place to actially give any good advice. Normally you don't wont to place tubes to close together or to near any of the transformers. If you plan to upgrade to better OT later on remember most of them take considerately more space than the stock OT (125ESE total width is 4.5")
See image of the 125 series at http://www.sewatt.com/comment/101647

If you plan to use a soldering strip (ground strip) mount it close to the tube socket. You should be able to use one of the fixing screw used for the tube socket. Remember this strip must be isolated from the chassis. Later on you will solder a wire from the strip to the star ground point.

Tip - Fix a piece of wood on the back where you shall drill hole in the metal chassis. If you stop drilling before you're through the wood there is not going to be any metal chips inside the chassis.

Step 05 - PCB mod on Epi VJr 2b(a) / HB-G5 rev board:

R1 = 1M - Remove from PCB and solder to input jack
R2 = 10k - Replace stock 68k
R5 = NC - Remove R5
R6 = 470k - Replace stock 1M
R7 = 470k - Replace stock 1M Solder R7 a couple of millimeters over the pcb. We will solder a cable to this resistor later on (from the pcb top side)
R8 = 2k7 - Replace stock 1,5k (earlier version had 2,2k)
R9 = 1k2 - Replace stock 1,5k (earlier version had 2,2k)
R15 = 5k6 - Replace stock 1,5k. This resistor also work as a hi-cut filter valid values up to proximally 56k

VR1 = NC - Remove (*1) and short connector on main PCB
- Locate the pin in the connector where the shield is connect (ground). Then short the two other pins.

C3 = 1uF/25V - Replace stock 22uF
C4 = 0.68uF - Replace stock 22uF

C31 = 470pF/400V - Solder C31 over R6 on pcb component side

R37 = 10k/2W - Lift the leg on R13 going to C8 and solder the free end to new resistor R37. Then solder the free end on the new resistor R37 back to PCB from where you lifted R13. From the resistor junction now in the ear solder a wire. This wire is the B3+ for the new tube.
- We will solder the needed C34 47uF filter cap from B3+ to ground directly on the tube socket.

R38 = 1k/3W - Screen resistor. Cut trace on pcb from pin 9 on power tube and solder resistor R38 over the cut trace. Solder directly to pin 9 might make this more easy. Amp will work without this mod as stock VJr do, but it is highly recommended to protect the tube with this resistor.

C1 - Here we connect VR36 Gain1 to the pcb
Unsolder and lift free C1's leg going to R6.
Cut a piece from a 2 lead shielded cable long enough for interconnection from C1 to VR36 on front panel. The original cable for the volume control fit the bill nicely.
Solder one wire to the free leg on C1. This wire goes to pin 1 on VR36
Solder the other wire to the hole on pcb where you lifted off the leg for for C1. This wire goes to pin 2 (viper) on VR36
Shield goes from pin 3 on VR36 to ground end on R7
- Remember to swap R7 first :)
- Except for VR36 all potentiometers will have a common ground point. I hope wirering ground for VR36 back to R7 like this will keep the ground potential inside the cirricut it belongs to. If you find you have problem with hum og noise try to move this ground wire to the star ground point.
- If you can't find a 2 lead shielded cable two shielded single lead cable will work just fine.

C2 - This position connects to VR35 Gain2 and rest of the new stuff
Unsolder and lift free C2's leg going to R5/R15.

Cut a piece from a 1 lead shielded cable long enough for interconnection from C2 to VR35 on front panel. Solder the wire to the free leg on C2. This wire goes to pin 1 on VR35. Solder the shield to pin 3 on VR35. Other end of the shield shall not connect to anything. Just make sure it is insulated and does not make a short on the pcb side.
Cut a piece from a 1 lead shielded cable long enough for interconnection from C2 to VR31 on front panel.
Solder this wire from the free hole in PCB to pin 2 viper on VR31 MASTER.
Solder the shield to pin 3 on VR31. Other end of the shield shall not connect to anything. Just make sure it is insulated and does not make a short on the pcb side.
- Hole on pcb from where you liftet C2 is now the input for the power tube via R15
- If you plan to implement the bypass switch you want to lift the C2 leg soldered to pcb so you later on can solder a wire to this leg from the pcb side.

Before you assemble the PCB inside the chassis again make sure you have not made any soldering error. Remember minor error can be fatal. Also check that the following wires are soldered to PCB.
- Shielded wire from C1
- Shielded wire in hole where you lifted C1 leg
- Shielded wire from C2
- Shielded wire in hole where you lifted C2 leg
- Filament wire soldered to V1 pin 5
- Filament wire soldered to V1 pin 9

(*1) Order a better quality potentiometer with soldering loops

Step 06 - Solder content on tube socket and soldering strips:

R31 = 470k - Solder one end to pin 2 on tube socket
Solder shielded cable from C2 on PCB to the other end of R31

R32 = 470k - Solder one end to pin 2 on tube socket
Solder the other end to ground strip

R33 = 100k - Solder one end of R33 to pin 1 on tube socket
Solder other end of R33 to pin6 on tube socket
Solder a short wire from pin 1 on tube socket to pin 7 on tube socket (cathode follower)
Solder wire B3+ from PCB to pin 6 on tube socket See R37

R34 = 820R - Solder one end to pin 3 on tube socket.
Solder other end to ground strip.

R35 = 100k - Solder one end to pin 8 on tube socket.
Solder other end to ground strip.

R36 = 33k - Solder one end to C35 (470pF) on tone stack
Solder other end to C36 (.022uF) on tone stack
Solder shielded wire from pin 8 on tube socket

C34 = 47uF/450V - Solder positive (+) leg to pin 6 on tube socket
Solder negative (-) leg to ground strip

C35 = 470pF/400V - Solder one end to pin 1 on VR32 TREBLE
Solder other end to R36

C36 = 0.022uF/400V - Solder one end to pin 3 on VR32 TREBLE
Solder other end to R36
Solder short wire from pin 3 on VR32 to VR33 BASS - Solder pin 1 and pin 2 on VR 33 BASS together.

C37 = 0.022uF/400V - Solder one end to pin 2 viper on VR34 MID
Solder other end of C37 to R36/C36 joint
Solder pin on VR34 MID to ground strip

Filament supply:

Solder the two wires from PCB (from V1 pin 4 and pin 9)
to pin 4 and pin 9 on tube socket.

<more to come>

Master Volume:
Solder pin 1 on VR32 MASTER to pin 2 viper on VR32 TREBLE
Solder the shielded wire from the hole on PCB where you liftet C2
to pin 2 viper on V31 MASTER.
Solder pin 3 on V31 MASTER to star ground
- The C2 hole is the input to the power tube through R15 on PCB.