Tweed 5E3 PCB

Valve Junior Conversion Build Manual

1. Introduction

This manual contains instructions to convert an Epiphone Valve Junior, Harley Benton GA-5 or Legacy Valve Edition into a 14-18 watt Push Pull tube amplifier modeled after the legendary Fender Deluxe Model 5E3 (AKA Tweed Deluxe 5E3). The heart of the amp is the Tweed 5E3 PCB, which conveniently lays out the circuit in a printed circuit board, PCB, package.

This manual provides instruction for the assembly of version 3.3 & 3.4 of the Tweed 5E3 PCB.

To simplify things,

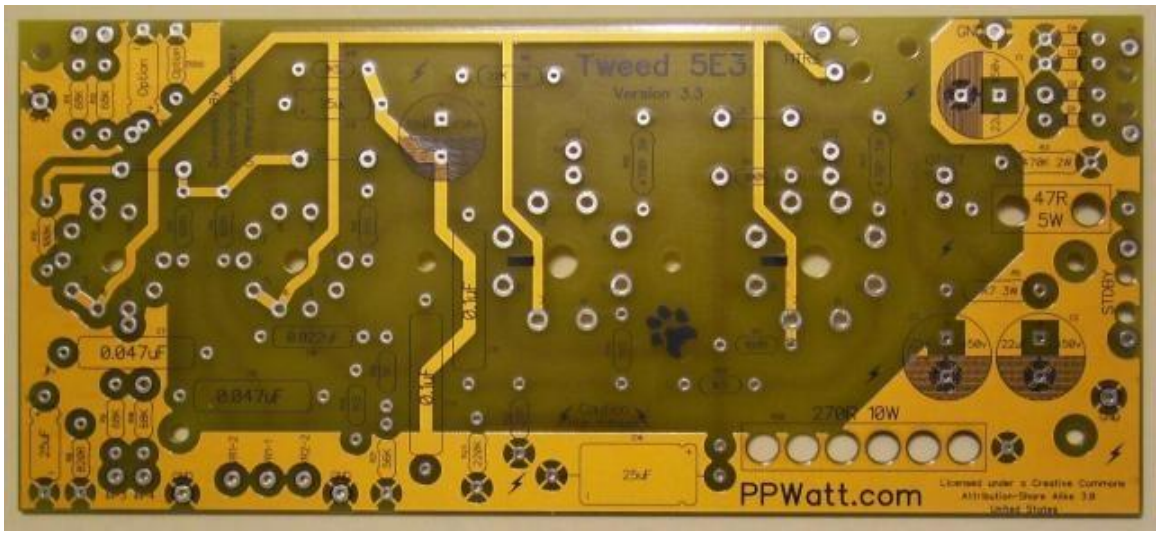
- The Epiphone Valve Junior, GA-5 & Legacy Valve Edition will collectively be referred to as the EVJ or VJr

This manual guides you through the conversion which includes:

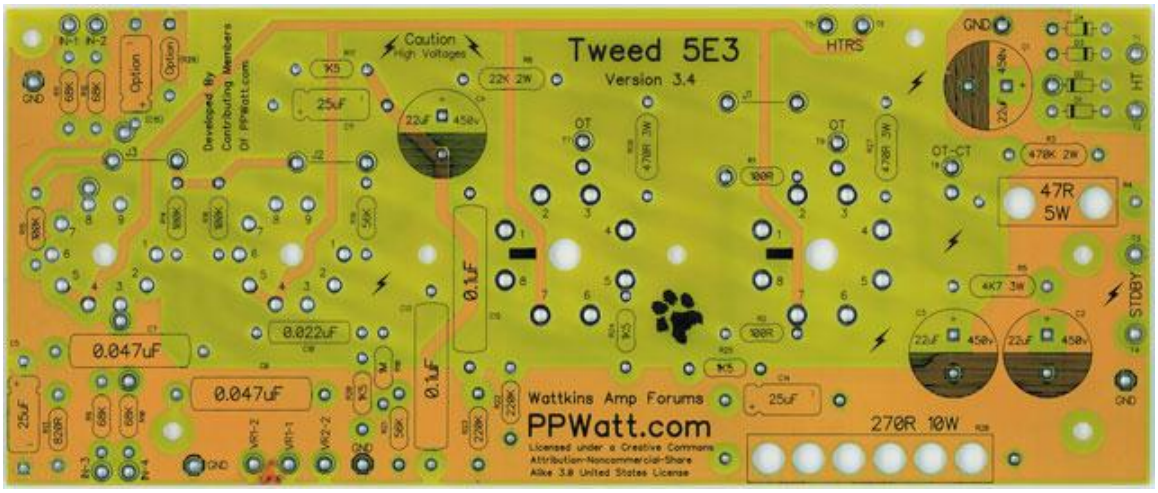
- removing the stock EVJ chassis from its cabinet,
- extracting the stock EVJ PCB,
- drilling the chassis,
- assembling the Tweed 5E3 PCB,
- installation and hookup of the Tweed 5E3 PCB into the EVJ chassis,
- initial power-up and testing, and
- re-installing the chassis back into the EVJ cabinet to finish up the job.

Here's the Tweed 5E3 PCB v3.3.

Whilst it is labeled Version 3.3, it is the first 'production' release of the board. There were a number of prior prototypes that led to this.



Here's the v3.4 PCB.



They're very similar. The newer PCB is a little narrower allowing it to fit more easily in VJr chassis.

They also work really well as the basis for a scratch build in a 16x8x2 chassis.

2. Electrical Shock Warning

Building tube amplifiers involves working with, or around, high voltages. Working inside a tube amplifier can be dangerous if you don't know the basic safety practices. Building, modifying, or repairing tube amplifiers should only be performed by trained personnel.

3. Disclaimer of Liability

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PPWatt.com reserves the right to make design changes or improvements without obligation to revise prior versions.

All specifications are subject to change without notice.

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4. Project Overview

You'll find that this is a fun project that can be completed by an inexperienced builder in a day or two.

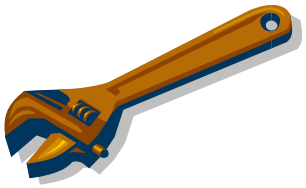
This manual has been put together specifically for the novice builder. So, anyone can do it. Really, it's simple and it doesn't require expensive tools or complex equipment. Even an experienced builder will get value out of reading it through. C'mon, I spent ages writing this !

4.1 Here's what you'll need:

4.1.1 Parts:

- The Tweed 5E3 PCB
- Misc. parts and components (refer to the Tweed 5E3 PCB parts list document for a full listing of what parts are needed and where you can buy them)

4.1.2 Tools:



- Phillips head screw driver
- Standard screw driver
- Needle nose pliers
- Adjustable wrench
- Power drill (corded or cordless)
- 3/16", 5/16", 7/16", 1/2" Metal cutting drill bit
- Unibit, stepbit or punch to drill two 1¼" / 28mm & one ¾" / 20mm holes)
- Soldering iron (30-40 watt power rating)

4.1.3 Supplies:

- Fluxed solder
- Roughly 6 ft. 600v rated wire (22-18 AWG)

5. Let's get started…

OK. So you have all the parts and are ready to start. Let's get that EVJ chassis out of the cabinet.

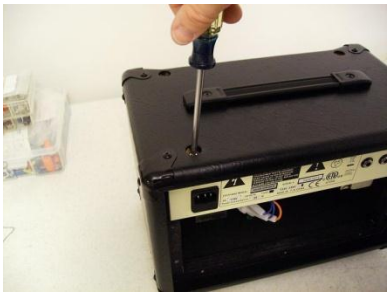
5.1 Remove the EVJ chassis

Take off the back panel by removing the seven (7) screws using a Phillips head screw driver.

Be careful pulling off the back panel. They are typically stuck onto the chassis. Slowly pull from each side to prevent the tolex from lifting off the panel.

Locate the screw caps on the top of the EVJ. Using a standard screw driver, the smaller the better, pry up the caps until you can pull them out of their sockets.

Remove the four chassis screws and pull out the chassis.



5.2 Remove the EVJ's Stock Components

A few of the stock EVJ parts have to be replaced. The tubes, tube retainers, and stock circuit board need to be removed.

5.2.1 Remove the Tubes and Tube Retainers

It's as simple as:

- lift the tube retainer off the power tube,
- turn the retainer shield until the spring lifts the shield off the per-amp tube,
- pull the tubes out, and
- unclip the power tube retainer.

These items can be discarded. They will not be used later in the build.

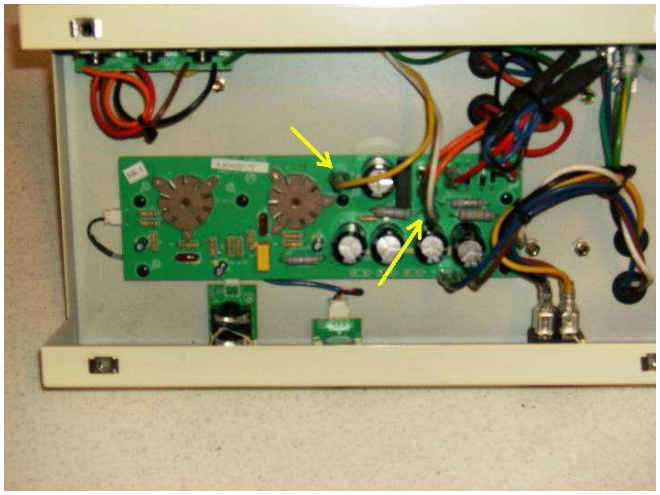
Now that the tubes and their hardware have been removed we can take a look inside. This is a version 2 EVJ. You can tell by the green board and the rectified DC heater supply. Version 3s have a black board.

5.2.2 Remove the Output Transformer from the Chassis

To remove the output transformer, disconnect its wire leads from the main amp circuit board and the output jack circuit board.

Pull these two spade connectors from the main circuit board.

You don't need to label the leads since we're going to use a Push/Pull OT in the build rather than the Single Ended OT used in a VJr.



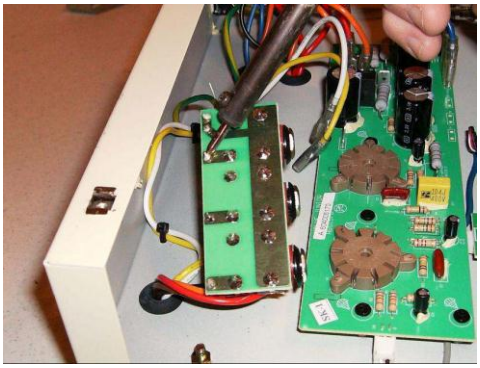
However, you might want to label them (Input 1,Input 2, 4 out, 8 out, 16 out & Ground) just in case you want to use it in another SE build at a later time.

(I've never bothered ! It's an OK OT as long as you're using a V3 Epi, but the earlier versions are really not so good.)

Unscrew the output jacks from the chassis and separate the board from the chassis. The board will be glued to the chassis.

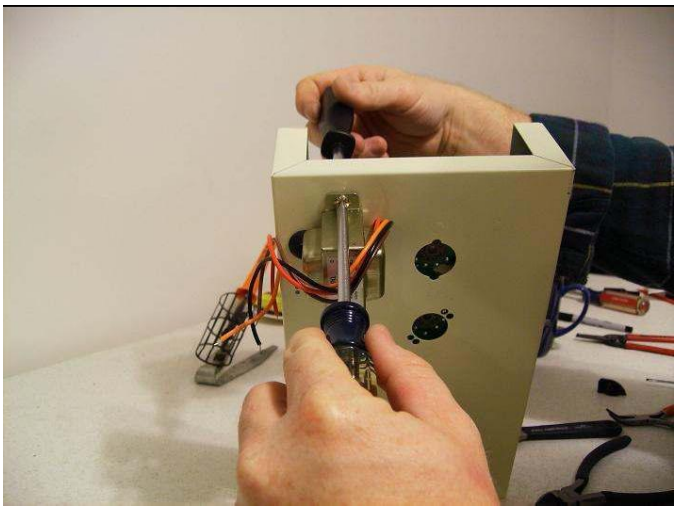
It may require some extra work to pick the glue off. Be careful not to damage the board or the output jacks. They will be reused later.

Flow the solder to each transformer lead on the output jack board and pull the lead out. Remove the fastening nut at the star grounding post and remove the output board's ground wire.

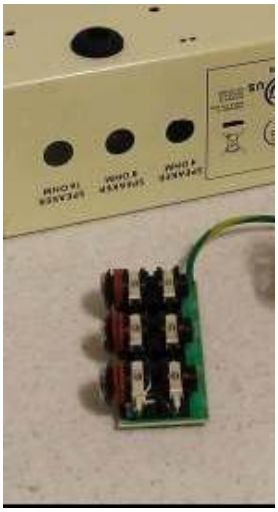


Clean up any remaining solder off the board to assist in the installation of the new transformer later in the build. Now that all of the leads are free, remove the mounting bolts to seperate the transformer from the chassis.

Keep the nuts & bolts. We use them for the new OT.



Keep the output jack board with it's ground wire attached.



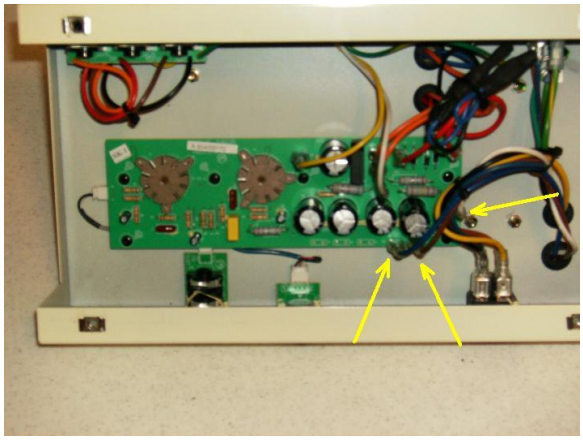
The new OT you are going to use will need a new chassis mounting hole as it is almost certainly going to be larger than the stock VJr one.

Continue to use the hole closest to the edge of the chassis, and mark where the new one needs to be drilled. You could drill it now, or do it along with the rest of the drilling later.

5.2.3 Clean up the Power Transformer

The stock EVJ's power transformer provides leads for various mains supply voltages. The extra leads are fastened to dead posts on the stock circuit board for storage. We are going to clean up the inside of the chassis by pulling any unused power transformer leads outside of the chassis cavity.

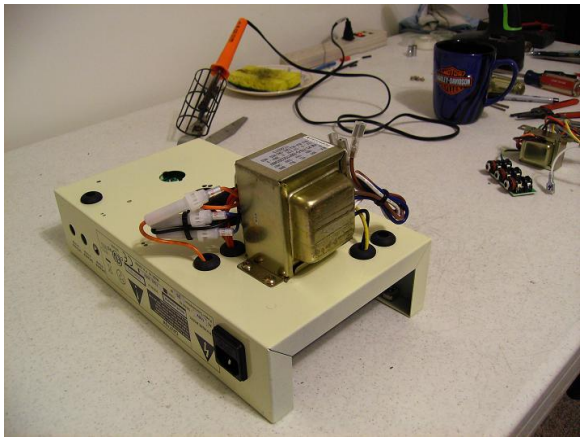
Disconnect these three (3) leads from the stock EVJ circuit board.



Version 1 and 2 EVJ will have 12v secondary taps tied off and tucked inside the chassis. These need to be pulled outside and secured as well.

After the leads are all pulled outside the chassis, bundle them together and tie them off.

You'll have to unscrew the PT from the chassis to provide enough room to use the PCB as the drill hole guide.



If you have the money we strongly advise you to buy a more suitable PT than the stock unit.

A 300 - 325v CT @ 125mA+ PT will give you a far better sounding amp.

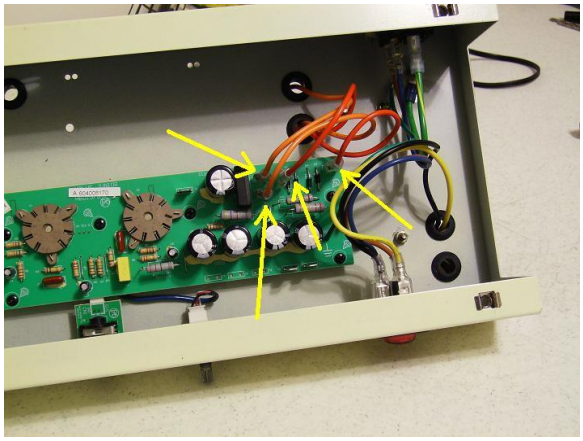
5.2.4 Remove the Volume Potentiometer

Unscrew the fastening nut from the volume potentiometer.

Pull the volume pot back into the chassis. Leave it connected to the stock EVJ circuit board.

The volume pot will be glued to the chassis. This part will NOT be used later in the build, so use whatever force you need.

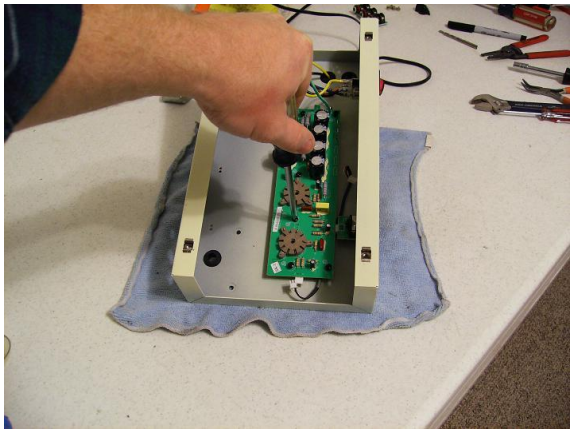
5.2.5 Remove the Stock EVJ Circuit Board



Disconnect these four (4) leads from the stock EVJ circuit board.

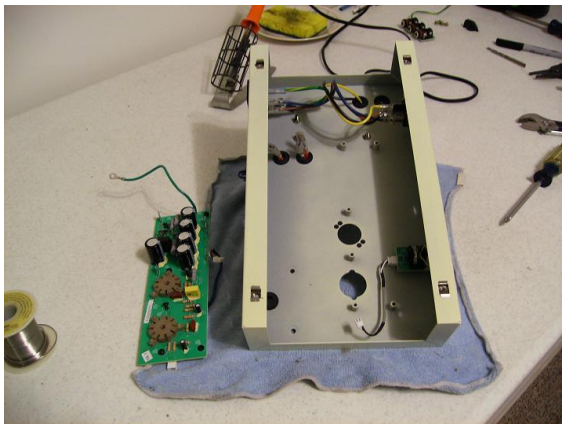
Lift the ground wire from the star ground post.

Unplug the input jack wire at the circuit board.

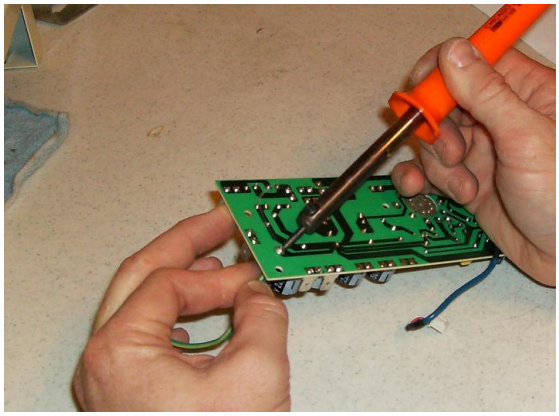


Remove the six (6) screws fastening the circuit board to the chassis. Keep them. You'll use them to attach the new PCB.

Remove the stock circuit board and pull all of the power transformer leads to the rim of the chassis.



Salvage the ground wire from the stock circuit board for use later.



Unscrew the input jack and remove it from the chassis. Set it aside for use in another build. You'll construct a completely new input jack complex for this project.

6. Prepare the Chassis

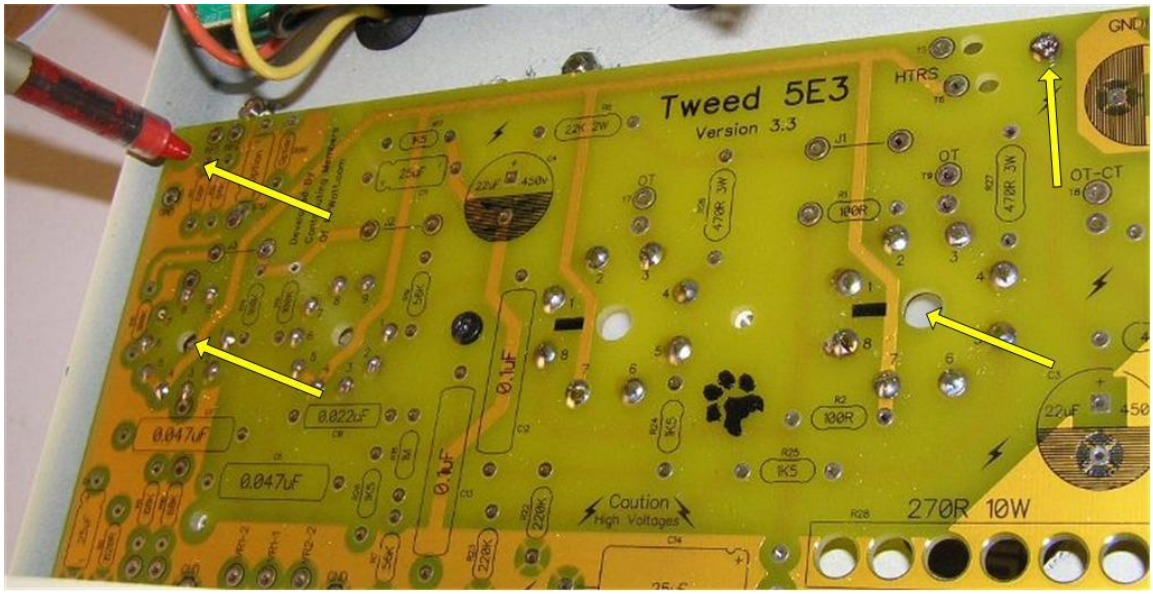
6.1 Layout and Drill

The Tweed 5E3 PCB, and control potentiometers require some drilling of both the front panel & bottom of the chassis.

6.1.1 Layout the Tweed 5E3 PCB for Drilling

Since the Tweed 5E3 PCB was designed to use the stock EVJ chassis standoffs, one method to mark the additional chassis holes is to install the board.

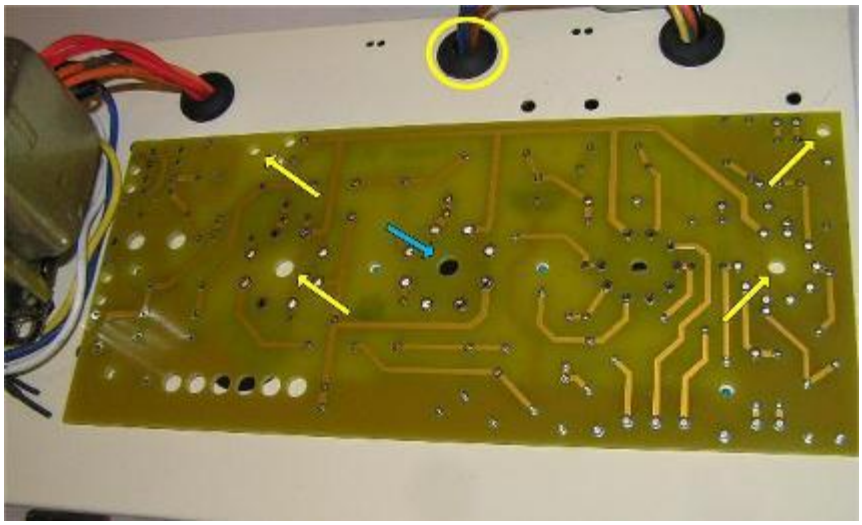
Lay the circuit board in the chassis, align the stock mounting studs, and install two or three screws to fasten the board. With the board aligned to the chassis, mark the two additional stand-off & tube socket drill locations as shown.



You will also drill out the existing EL84 hole to make it wide enough for the second octal base.

I prefer laying the PCB on the outside of the chassis & marking the new drill holes on the outside as I only have a hand drill to use.

Notice the PT has been unbolted from the chassis so that it can be moved over enough that the PCB can be lined up correctly with the existing stand-offs. You could just remove it entirely at this stage.



Mark the existing stand-offs so that you can use them to line up the PCB & then lightly tape it to the chassis.

Use a felt tip marker to then mark where the new drill holes are to go.

This way you will be able to drill the chassis holes from the outside of the chassis with a hand drill and not drill holes in the top of your workbench!

The blue arrow points to the existing power tube hole that you'll need to enlarge to cater for the Octal base.

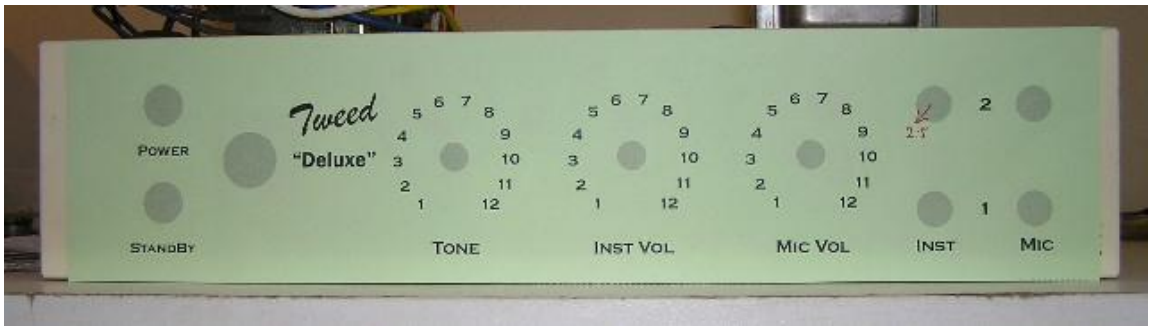
Note the circled grommet. This is a new hole that you should drill to take the OT 'input' wires that connect to the PCB. I find it a bit of a squash trying to get all of the wires from the new OT through the one existing hole.

6.1.2 Layout the Faceplate for drilling

We have developed a number of professional grade faceplate options for the Tweed 5E3 PCB. The information is on the web site. We highly recommend you buy or fabricate one of these faceplates and use it to layout the front panel drill locations. It's much more accurate to use the actual faceplate than it is to use a drill plan printout.

If you have a faceplate, align the faceplate with the front of the chassis and trace each drill location.

If you are going to use one of the faceplate designs & get it fabricated yourself at your local Trophy Store (but haven't got it yet) and are desperate to drill the front panel you could print a copy from your Laser printer & stick it on the chassis front instead of using the actual plate itself.



I find I still need to use my Dremel (with grinding stone bit fitted) to get the drill holes 'perfect' even when I use the actual faceplate, so don't be too stressed doing this if you really want to get on with things.

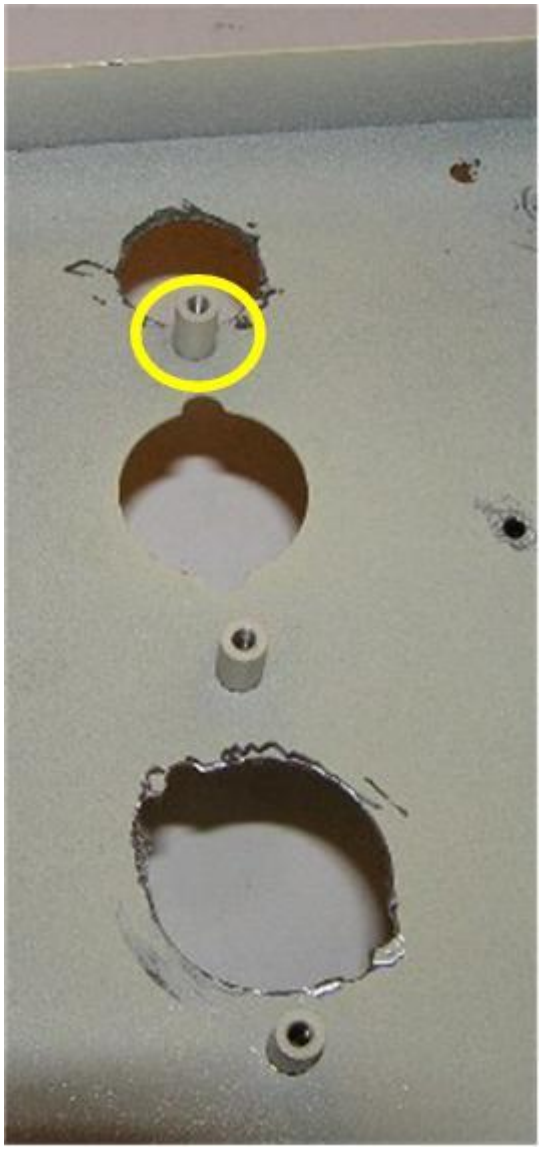
Affix the printed copy to the chassis with a generous amount of glue stick or tape. Drill the holes using the print out as the guide.

If you are using the real panel, once you've marked the circles on the chassis where you will need to drill, remove the panel, & then go for it.

6.1.3 Drilling the Chassis base

Start by setting the center of each hole to be drilled. A center punch is often used. If you don't have one, use a really small drill bit first to set the 'centre'.

Then use the 'right' size drill bit to enlarge the hole appropriately. I use a step bit (AKA Unibit) to do the really large holes.



You want to drill the Noval (9-pin) holes so that the socket 'lip' rests against the chassis. The Octal (8-pin) socket holes need to allow the socket to slip all the way through.

Deburr or countersink each hole to ensure no sharp edges will cause injury or component failure. I use a Dremel with a grinding stone bit.

Notice that the existing VJr EL84 power tube hole needs to be enlarged to cater for the Octal socket.

The second Octal socket hole isn't shown here. It's started from fresh.

Make sure that the Octal sockets can fit through the hole. The Noval socket wants to rest up against the chassis, but the Octal is 'thicker' & needs to actually pass through for everything to fit nicely.

When doing a scratch build, both Noval's will fit snug against the chassis. When doing a VJr conversion, the second is going to be 'free' as the pre-drilled hole is quite wide.

Whilst the 5E3 PCB uses the stock stand-offs, the circled one still needs to be removed. It's too close to the hole for the first noval socket. Don't worry though. We add two more stand-offs to more than make up for it.

7. Tweed 5E3 PCB

7.1 Assemble the Tweed 5E3 PCB

The anticipation has been killing you, hasn't it? Finally, the assembly of the Tweed 5E3 PCB begins.

Did you check you make sure you have all of the parts you'll need to complete the assembly?

I wish I did.

The graphics used in the assembly of this circuit board will NOT always be an exact reflection of what your board will look like. Various parts may have changed. The order of installation may vary from the picture and this manual. Pictures were taken during various stages of the first production build. This manual reflects the lessons learned during that build.

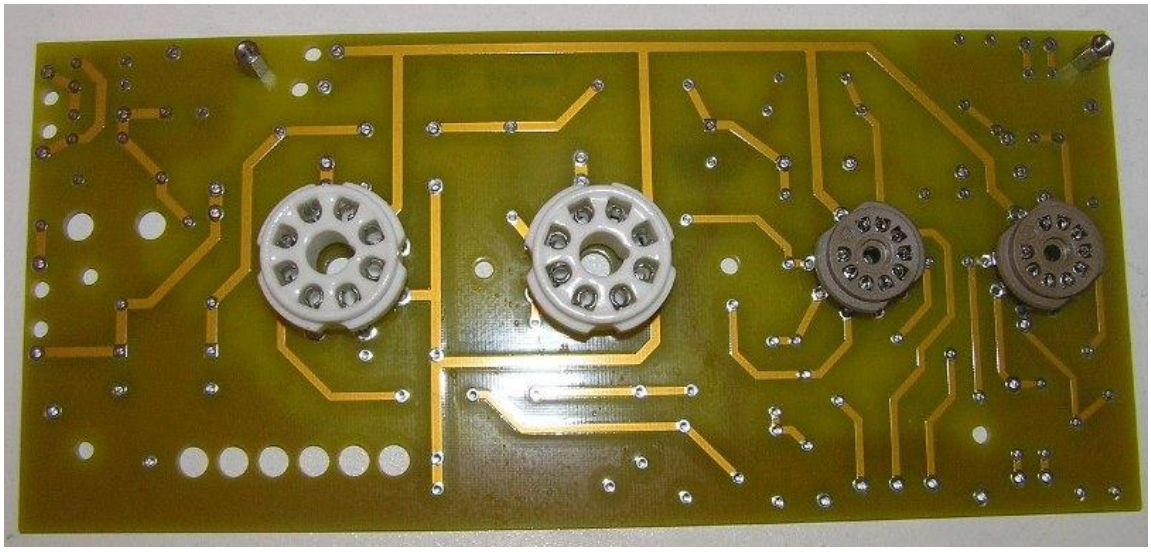
Don't necessarily use the pictures to compare the progress of your build. Follow the instructions at each stage of the build and compare your work when the manual specifically calls out a comparison check against a picture.

7.1.1 PCB Standoffs

Install the two (2) additional PCB standoffs on the back side of the board.

7.1.2 Tube Sockets

The tube sockets get installed on the back side of the board, too.



The tube sockets are installed as shown. The noval sockets only go in one way (on the back side). However, the octal sockets need to be properly oriented with the circuit board. Position the notch in these sockets so that they are pointing toward the two noval sockets.

Do not solder them into the board yet !

If you are doing a VJr conversion you only need put in the 'first' noval socket. If you are doing a scratch build, put in both novals. Lift the PCB up into the chassis guiding the tube socket(s) into the newly drilled out holes into the chassis.

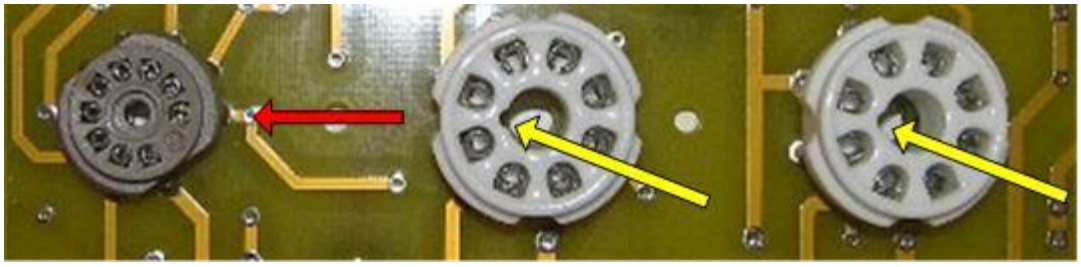
Align the standoffs with their respective chassis holes and fasten them with a couple of screws.

Now that the tube sockets are sandwiched between the circuit board and the chassis, flip the chassis over and rest its top side (face down) on your work bench.

We want to fit the socket(s) to the chassis drill holes. In a sense, it (they) will be custom, or perfectly, fit to how you drilled the chassis.

The other sockets need to be ‘dropped’ through the chassis holes into the PCB pin connectors.

Make sure you orient the Octal socket the right way with the notch facing the Noval sockets !



Tape the sockets (with sticky tape) ‘flat’ to the chassis. You are going to invert the chassis back up to solder them on to the PCB, so if you don’t the tube sockets will fall back out again !

Try and tape the sockets such that when the tubes are installed, they will point up nice & straight. It will look ‘neater’.

Flip the chassis. Sit it on a couple of blocks on your work bench so the sockets are ‘free’ & sitting correctly with respect to the chassis. Solder the socket lugs to the circuit board. The holes are through plated so the solder will flow into the hole and through to the other side of the socket leg creating a very durable connection.

Use a fair bit of solder, but not too much. Think of the three bears…

If you just keep pushing solder into the joint it will run down the socket lug on the other side of the board and may short out across a neighboring lug or run into the socket itself.

When all of the socket lugs are soldered, remove the circuit board from the chassis and touch-up any solder joints on the other side (or socket side).

7.1.3 Spade Connectors

Install the three male spade connectors as indicated. These are for the Output Transformer (OT) leads. The Power Transformer (PT) high tension & heater leads will be soldered directly to the PCB.

Extra solder time is necessary to heat the spade connector before solder will flow. Hold the iron on the connector. Feed the solder when the joint is hot enough to flow. Straighten the connectors as the solder joint sets, or hardens.

7.1.4 Diodes

Install the four (4) rectifier diodes.

Orient the diodes as indicated on the circuit board.

Bend the leads over, insert them into the board, and bend them to the side.

Solder them to the board.

Trim the leads off at the top of each solder pool.

If you are using a center-tapped PT, like the MPS 325.2, Weber 025130 or Edcor XPWR107 you only use the 'first' two diodes, D1 & D2. (If you use all 4, you'll put way over the top voltages into the circuit… Don't do it !)

If you are using Tube rectification you don't install the Diodes. Instead you'll connect the HT wire from the tube to the 'large' D2 pad.

7.1.5 The "Cascade Preamp" option

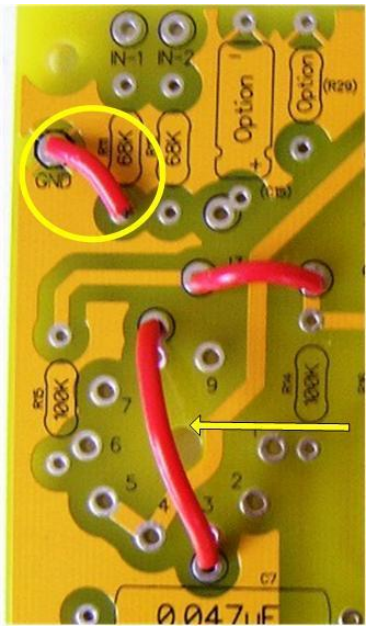
The Tweed 5E3 PCB can be configured to have a cascaded V1 gain stage along with many other configurations including tube tremolo & higher power 6L6 versions.

Look in the 5E3 section of PPWatt.com and ask for help from the friendly folk over there ;-)

(There are many really cool options)

7.1.6 The Jumpers

Use 4 short pieces of insulated wire to connect the 3 jumper runs, J1, J2 & J3 and the V1 cathode connection.



Don't forget the jumper to connect v1's pins 3 & 8 ! I did…

The amp will still work for the Instrument channel, but the Mic inputs won't produce any sound.

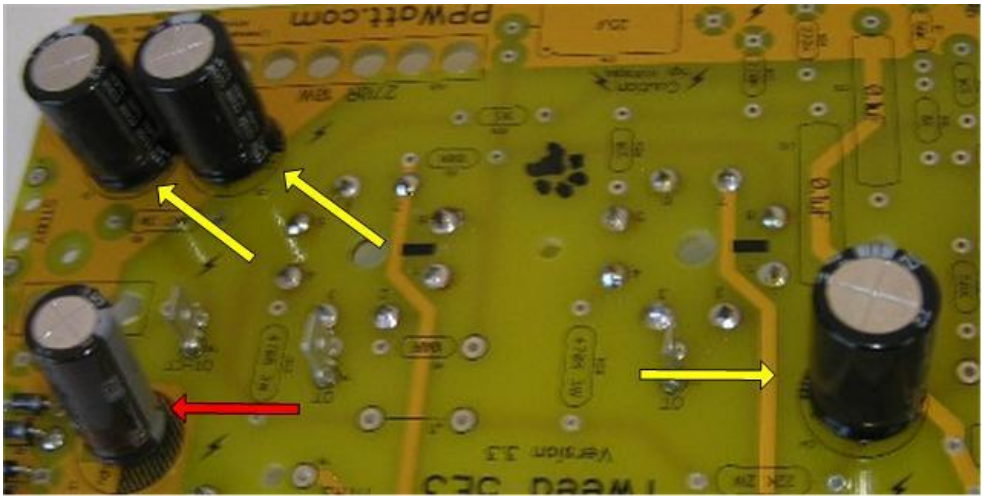
Note the circled jumper going from the 'bottom' solder pad of R11 to the nearby grounding pad.

You only use this if you DO NOT want a pair of Mic channels but only want the 2 Instrument channels.

7.1.8 Filter Capacitors

Insert the four (4) filter capacitors in their locations as indicated on the board.

These capacitors are polarized. Be careful to install them by inserting the positive lead (the longer one) into the square pad and the negative lead (as indicated by the downward arrow and "-" symbol) in the round pad.



Note that C1 – pointed to by the red arrow, may be a larger capcity cap than the other 3 22uF caps.

I used a 33uF, though you could well use a 47uF or even a 100uF if you really wanted to though it would be overkill. The greater capacity capacitor will provide slightly better power filtering; though will also put more of a strain on the Power Transformer.

You may prefer the characteristics of a lower value filtering cap. It's really a matter of personal choice.

If you are using tube rectification, your choices are more restricted. You should probably stick with a 22uF. You'd probably get away with a 33uF, but a 47uF would be really pushing it, & you'd potentially chew through rectifier tubes at a rapid rate.

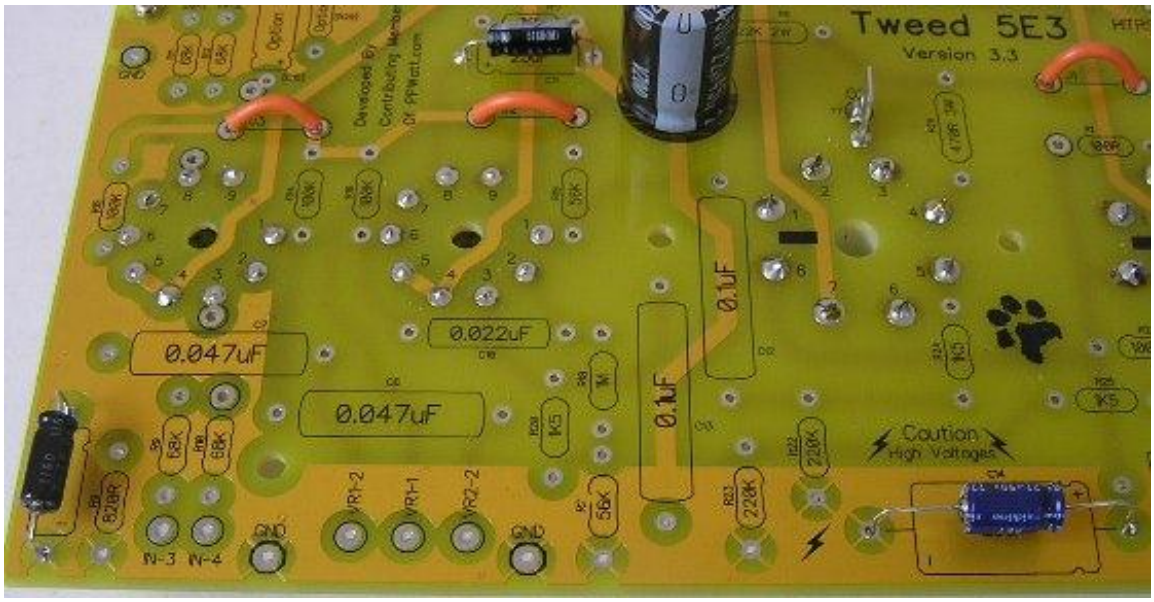
Solder and trim the leads.

7.1.9 Bypass Capacitors

Install, solder and trim the 3 bypass capacitors as shown.

These capacitors are polarized. Be careful to install them by inserting the positive lead (the longer one) into the square pad and the negative lead (as indicated by the downward arrow and "-" symbol) in the round pad.

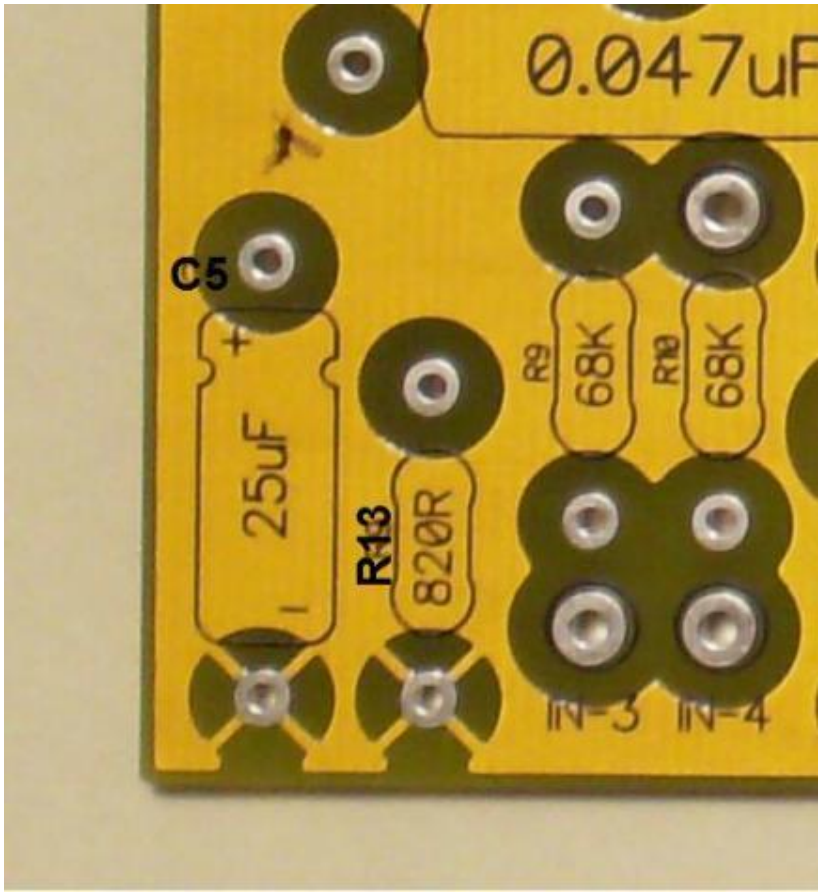
Not all of the components in this picture will look like what's called for in the current parts list. I used 22uF bypass capacitors rather than the stock 25uF in this build.



7.1.10 Install the Remaining Components

Install, solder and trim all of the remaining components in the circuit.

Refer to the latest version of the schematic or chassis layout drawing on PPWatt.com in the FAQ, the Tweed 5E3 PCB, and/or the component package to identify, locate and position component values.

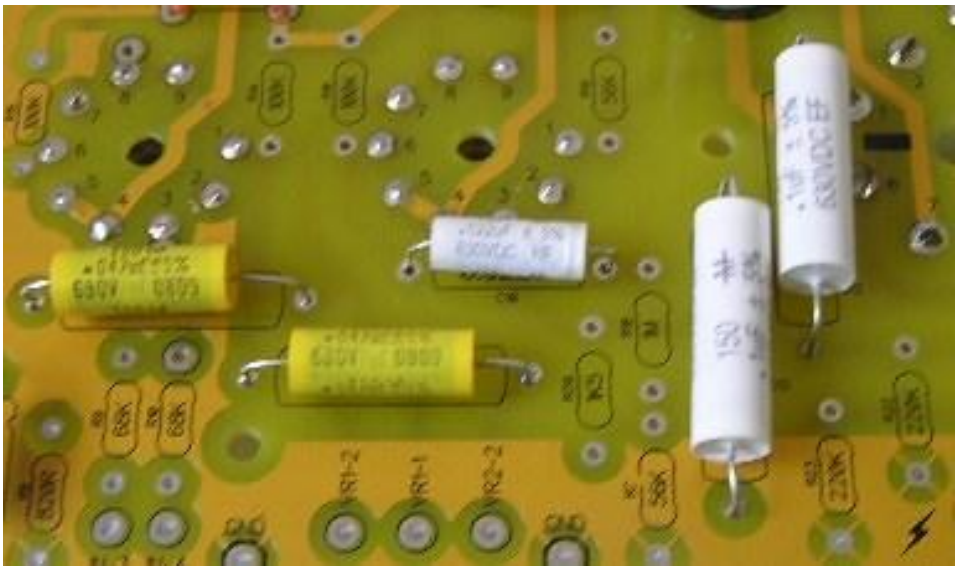


If you have one of the first batch of PCBs (version 3.3) there is a labelling error to two of the components in the bottom left.

No certain order needs to be followed.

I generally do the coupling caps next. It's just a habit I'm in.

N.B. C8 & C9 – the tone control caps are not installed on the PCB. They are attached between the Tone & Volume Pots.



Then do the power resistors

Finally, the last of the resistors ! Note that R7 & R8 are not installed on the PCB. They are part of the input jack complex.

I use metal film resistors for the 64K & 1M input resistors rather than carbon comps. It's just personal preference & I have a bunch of them that I want to use up !

Here's what the finished Tweed 5E3 PCB should look like.

7.1.11 Input Jack complex

The VJr has only one input jack. The Tweed 5E3 has 4. You may as well make the whole input jack complex with new materials. Save the original VJr input jack for another project !

Look at the Chassis Layout diagram to see how you are going to wire together the input jacks. I find it easier to wire them together when they are connected to the outside of the chassis in their actual mounting holes.

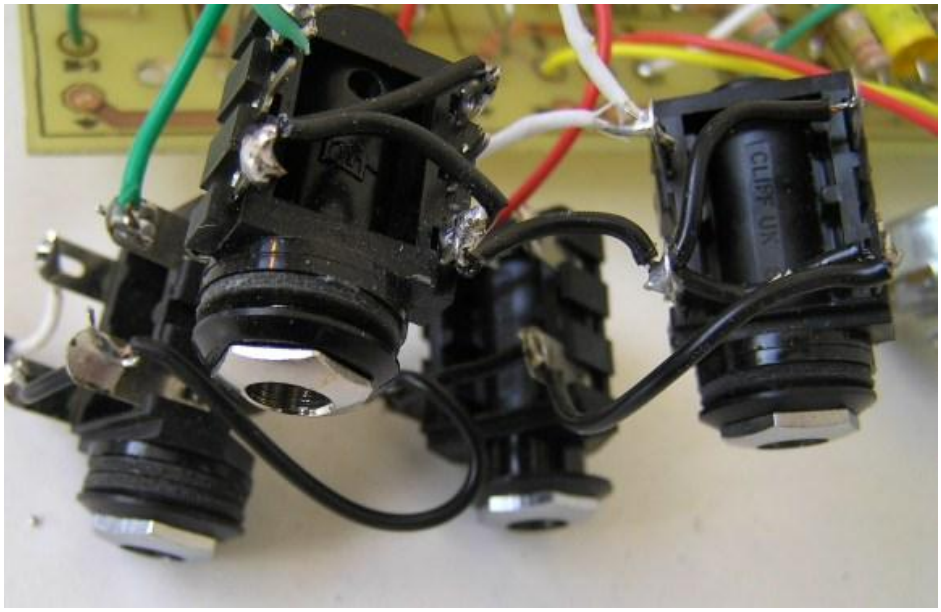
The first picture shows my use of a different input jack to the 'standard' cliff jack used on VJrs.

I used them because they look more 'authentic' to a vintage 5E3 from the outside.

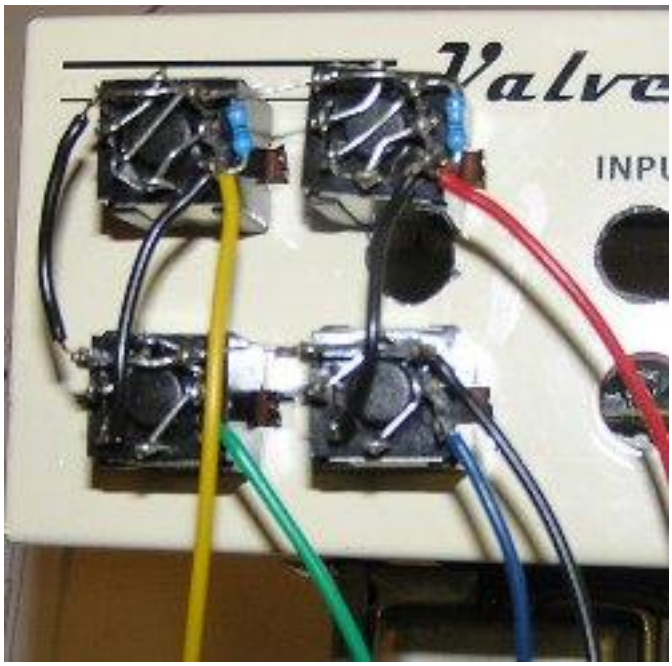
It happens to be stereo jack with a DPDT switch mechanism. Took me ages to work out how to wire it correctly… and I'm still not 100% sure I've done it correctly !

With conventional cliff jacks, you will end up with something like this…

This is a picture of the input jack complex for the prototype 5E3 I assembled where the 1M resistors were on the PCB – hence you don't see them here.



With my “Fenderish” looking sockets it looks *like* this. Note !



This is not the ‘correct’ wiring. I had to rewire it after doing some testing…

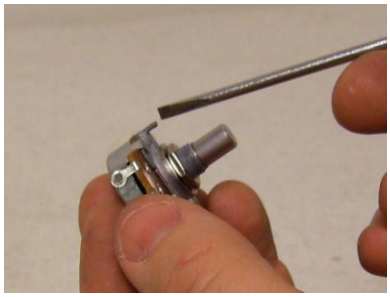
Such are the trials & tribulations of the hobby amp builder ;-)

Use the “cliff” jacks… They’re much easier to wire.

7.1.12 Tone & Volume Potentiometers

I find the easiest way to wire the pots is to mount them on the chassis as well.

Use the layout diagram again to see how the lugs & the tone capacitors are wired together.



Cut the tab off of each of the pots with a pair of cutters (side cuts). A pair of pliers can also be used to bend the tab over and break it off. That’s what I do.

You should end up with it looking like this: -

This time I did do it right the first time…

7.1.13 Connect the Control Leads

Hooking up the circuit board is almost done. We now need to solder the wire leads from the control potentiometers and input jack complex & the ground wire.

Here's where all of the lead connections are.

The input jack wires connect to the pads marked in yellow.

The volume / tone pot wires connect to the pads marked in green.

The ground wire connects to the pad marked by the blue circle.

You should solder on the ground wire you salvaged earlier now.

This will be connected to the existing ground post. You will note that the mains ground wire from the IEC connector also connects to this post. Some people say it is better practice to have a separate ground for that wire than the star ground for all the others.

If you do choose to use a separate ground, do NOT use one of the transformer bolts. Personally, I just use the existing star ground.

The populated PCB is now ready to be placed in the chassis so that the leads can be cut to their correct length & soldered to the PCB.

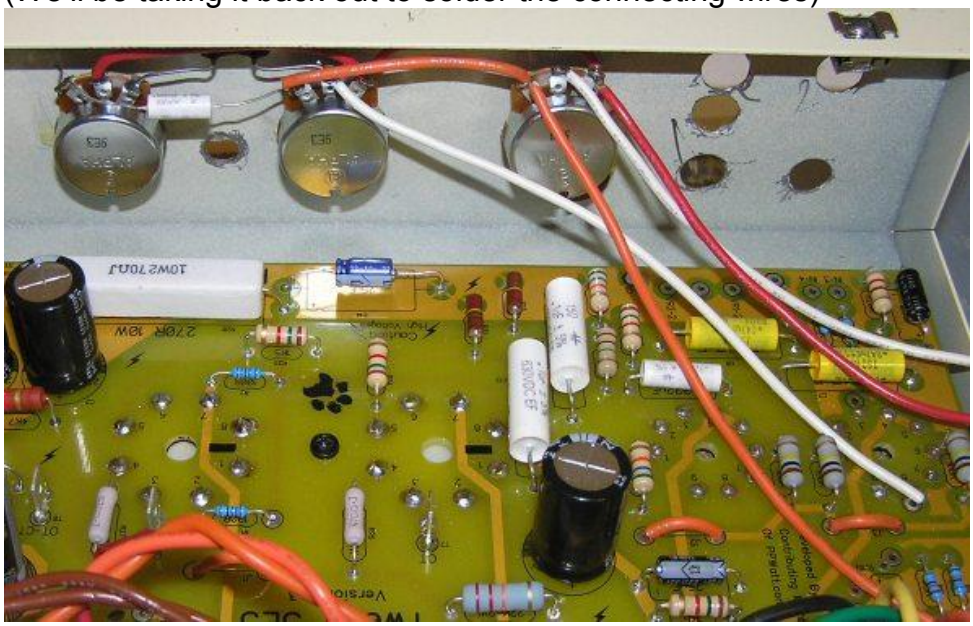
8. Putting it all together

8.1 Install the New Components

Now that everything is out of the chassis that we don't need, the chassis has been drilled, and the Tweed 5E3 PCB has been assembled, we can prep the chassis and install all of the new components.

8.1.1 Hookup the Tweed 5E3 PCB

Place the circuit board into the chassis, align the mounting standoffs to their respective chassis holes and lightly fasten the board to the chassis with a screw. (We'll be taking it back out to solder the connecting wires)



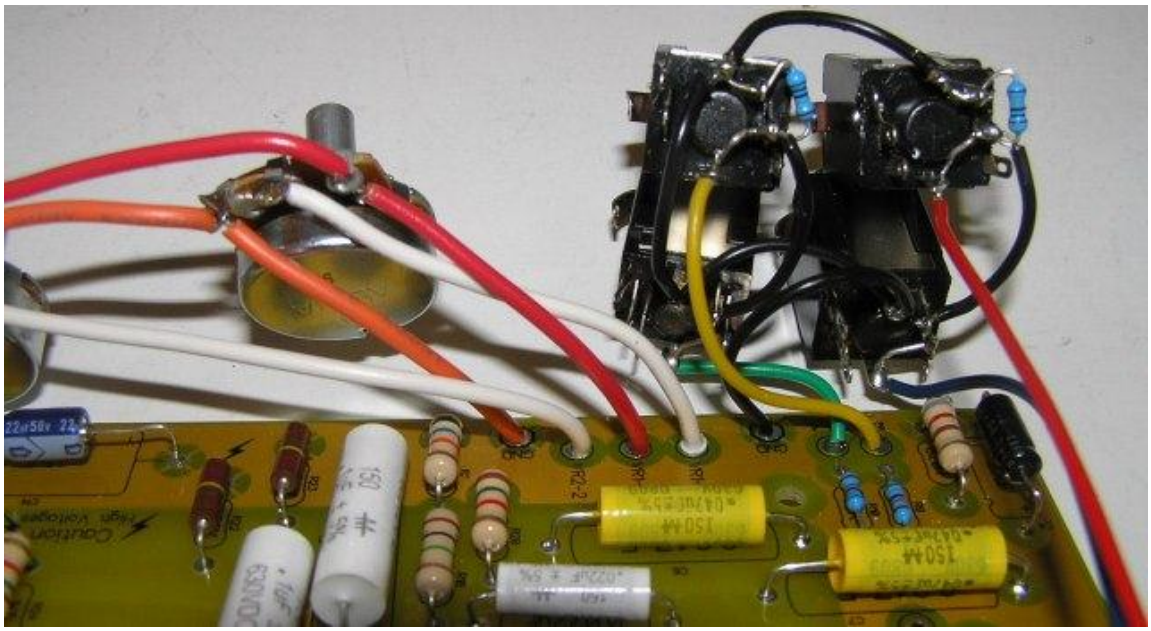
Mount the pots inside the chassis as shown: -

Guide the wires from the pots to their respective solder pads on the PCB. Trim the wires to length – not too short, nor too long. You want them to end up nice & neat.

Repeat the process with the Input Jack complex. The two Instrument channel wires & ground are short & connect at the front of the PCB. The two Mic channel wires are longer, and connect at the back.

Same principle applies though. Keep the wires as short as possible – but not too short ;-) You really don't want to redo one of the flying leads because you cut it ¼" too short !

Take the PCB, control pots & input jack back out of the chassis & solder them together.



It should look like the picture above when you're done.

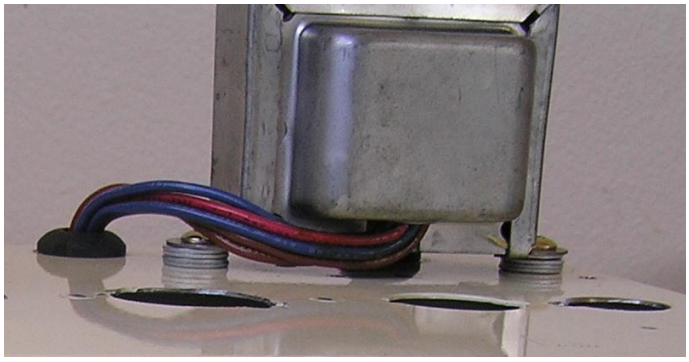
We're almost there now… Just the power leads & switches to go…

Guide the PCB, Pots & Jacks back in & loosely fit them. They'll be coming back out after this last lot of measuring & wire cutting.

Power Supply, Standby, Heaters, and Output Transformer

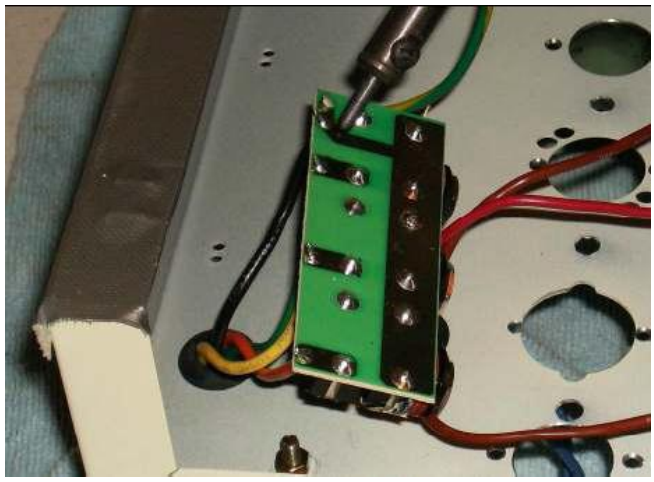
Have you connected the OT & PT back to the chassis yet ? If not, now would be a good time !

8.1.2 The New Output Transformer



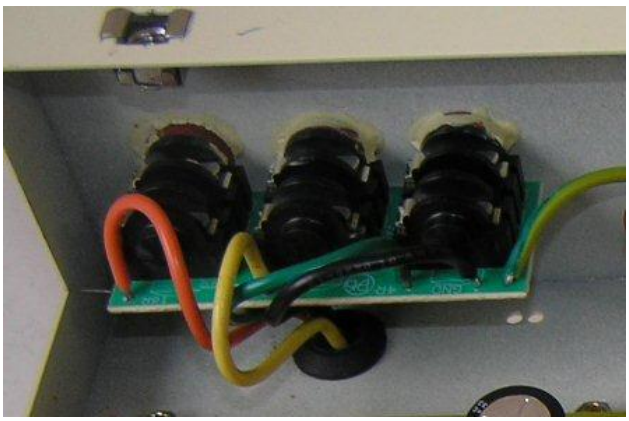
Relocate the extra power transformer grommet from the left-front to the new hole drilled for the output transformer.

Guide the leads through the grommets and seat the output transformer in place. Position the output transformer with its primary to the front and secondary to the back such that the output wires go through the original hole & the input wires go through the new hole as shown. I use a couple of washers with the bolts to raise the OT up from the chassis a little. I find it sits better this way with the wires not squashed up against the chassis.



Guide all of the wires through the chassis. (Learn from our mistakes.) The extra wires will be secured and stowed inside the chassis. Their location outside the chassis is too susceptible to the heat from the tubes. Secure the output transformer to the chassis using the stock nuts & bolts that you kept !

Cut and solder the output transformer leads onto the output jack board. Refer to the PPWatt.com layout diagram, transformer hookup diagram, and output jack board for hookup details.



Re-Install the output jack board into its stock location. Guide the ground wire from the output jack board to the star grounding stud. This will be secured to the stud later.

Solder a ‘female’ spade quick connect to each of the brown & red OT primary ‘input’ wires.

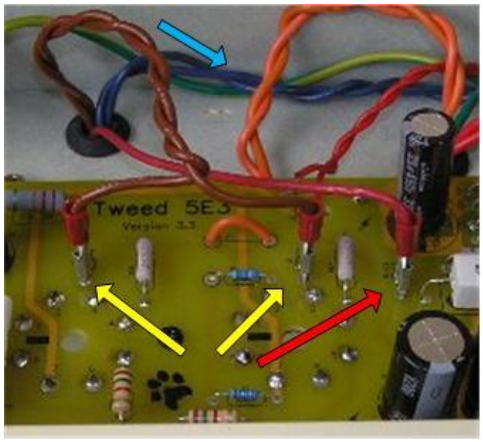
This shows the wire colours of the MPS OT15PP output transformer. The red is the B+ lead (T8) & the brown are the 8K leads. The blue wires are the 7K taps. Other OTs are likely to have different coloured wires.

The MPS OT20PP 8K tap is brown & blue & the 6.6K tap is white & grey.

8K is the recommended impedance, but you may prefer the sound from the lower impedance taps. It won’t hurt the OT (or tubes) at the lower value. You could put them on a switch. Just make sure not to flick the switch with the amp on full blast. You could damage the OT…

Twist the brown wires as shown & slide the newly soldered spade connectors onto the Tweed 5E3 PCB spade connectors as shown.

Insulate & tie off the blue OT wires out of the way.



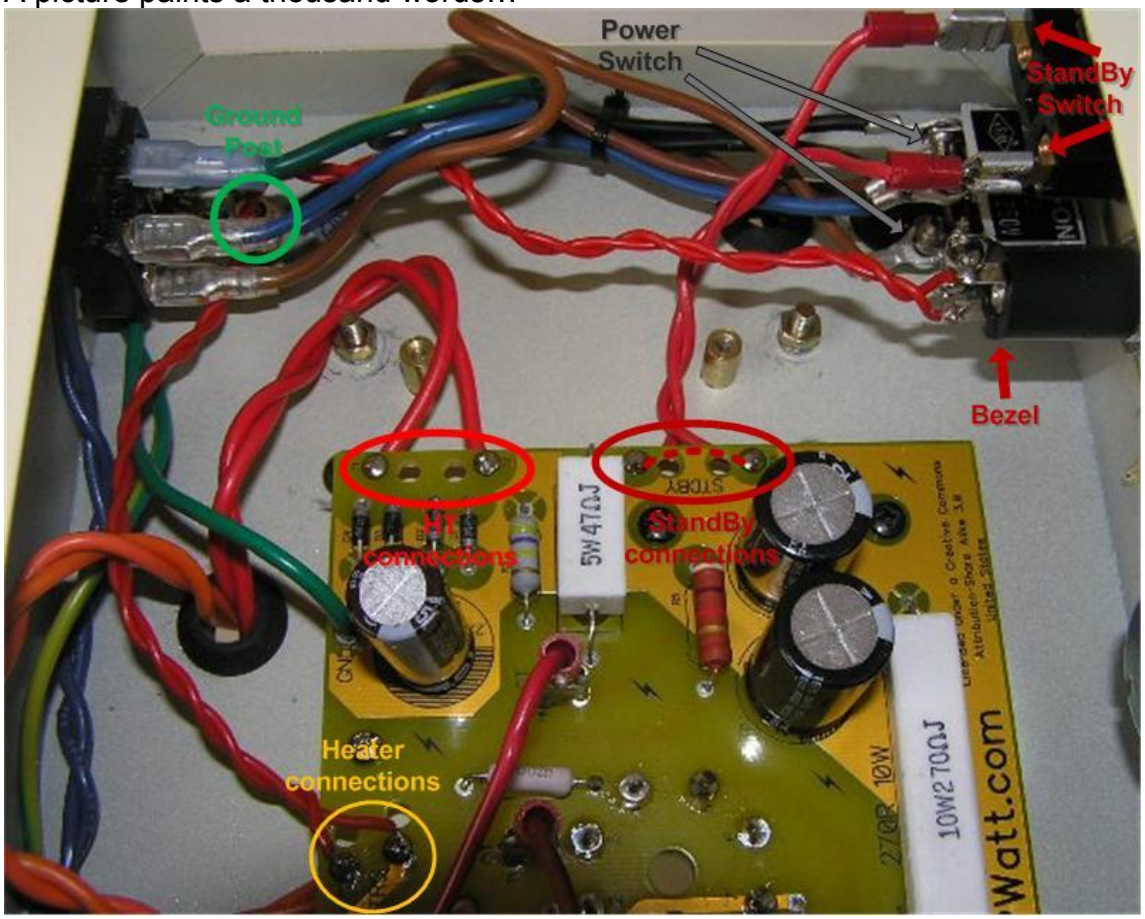
8.1.3 The Power Supply connections

So close now !

We now need to connect the heater & main HT power to the PCB. These wires are soldered directly to the PCB. No 'quick connects' for these.

Again, neatness is important. If cleanliness is next to godliness, neatness is next again ! We want these 'noisy' wires well twisted & routed well away from the circuitry.

A picture paints a thousand words…



The orange wires from the PT go to the heater pads. I route them from underneath & up, soldering from the top side of the PCB. The thin wires you can see soldered to these same pads go to the 6v Bezel. If you have a 120/240v lamp you'd take some taps from the power switch.

If you are using a stock VJr power switch, you won't bother with either option.

The two red wires from the PT go to the HT pads, T1 & T2. (It really doesn't matter which. We don't use negative feedback in this circuit.)

If you are using the stock VJr power switch just solder a jumper between the standby pads, T3 & T4. If you are using a Stand By switch, wire a pair of connecting leads as shown.

When wiring the main power switch, remember that the main Active & Neutral wires go to the 'center posts' on the switch, and the wires to the PT go from the 'outside' lugs. Use the appropriate PT wires for your countries voltages. (The U.S. would use the 115v taps, yellow & black. Australia & most of Europe would use the 240v taps, Brown & Black or 230v taps, Blue & Black)

Fasten the ground wires from the Tweed 5E3 PCB and the output transformer to the star ground screw post.

Good Job!

You're almost done. But, before you start celebrating, you still have to review your work, start it up and test the voltages.

9. Turn on the Power

9.1 Check Your Work

9.1.1 Take a Break

Now is a good time to take break. Rest your mind and gather your thoughts. You don't want to be tired or rushed while performing the following steps.

9.1.2 Visual Inspection

When you are ready, step through the instructions in this manual again and verify each step was performed and completed properly.

Look for the following:

- Missing components
- Damaged components or leads
- Solder joints that may have spilled over onto a nearby component or solder pad.
- Loose connections.
- Stray bits of wire from trimming wire and/or components.
- Components or wire leads shorting against each other or the chassis.

Pay special attention to the volume and tone controls and the sag resistor.

- Check that the IEC mains power connector is equipped with a good fuse. The fuse should be rated for 2A Slo-Blo. (1A with 230/240v Mains)
- If you've used a VJr PT & kept the heater tap (orange wires) fuse, check its fuse. The fuse should be rated for no more than 4A Slo-Blo. I personally don't use a heater supply fuse & get rid of it. I'm not convinced that it serves a useful purpose. This fuse assembly is a common cause of problems. Make sure there is continuity across it.

9.2 Power Up without Tubes

9.2.1 The First Power Up

Make sure you are working is a safe area free of any flammable chemicals or vapors. An assembly error may result in the emission of sparks.

The tubes should NOT be installed during the initial power up.

Plug the amplifier into a speaker cabinet. Match the speaker impedance with the appropriate output jack. Failure to connect a speaker will cause harm and eventual failure of the output transformer.

Verify the amp's power switch is in the "Off" position. Insert the mains power cord in the IEC mains connector.

Secure the black ground lead of your voltmeter to the chassis star ground lug.

Switch the power switch to the "ON" position. With your voltmeter, check the following voltages. If a significant deviation from these readings is observed, turn off the amp, unplug the mains power and investigate.

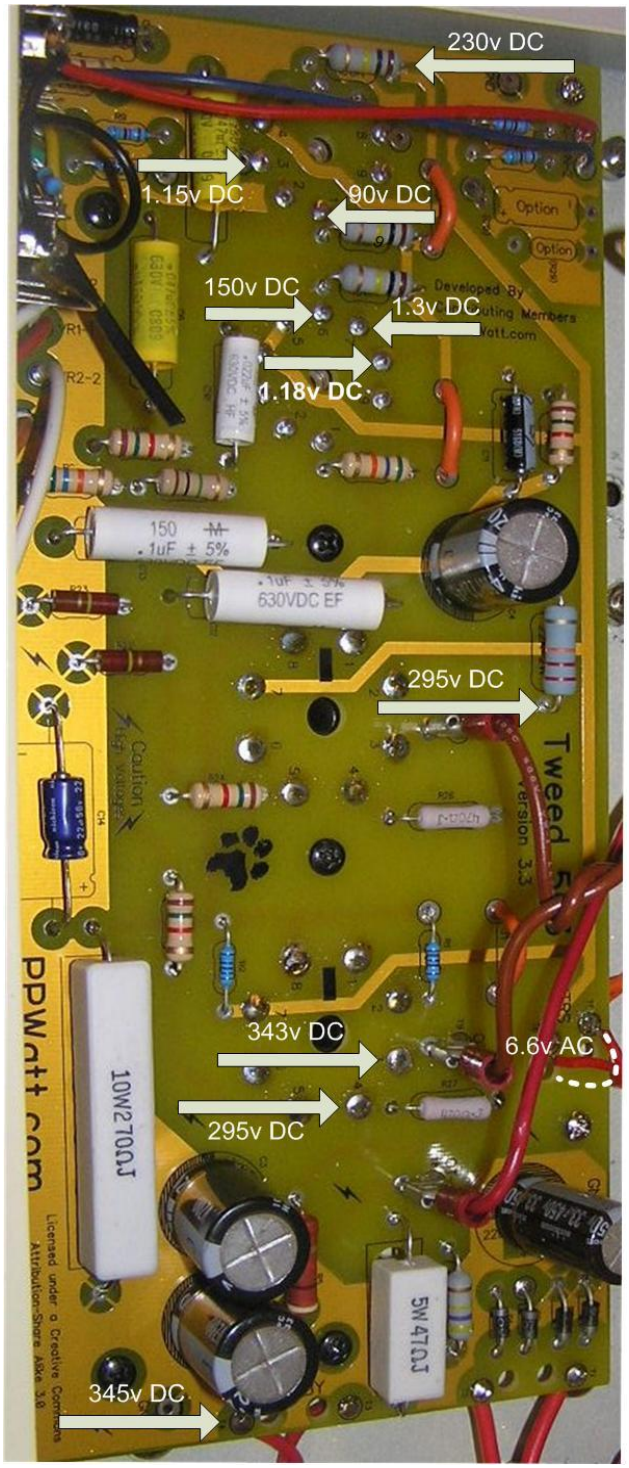
These measurements will read high since there is no load on the transformer.

The unloaded B+ voltage should measure the same all the way up the power rail. A slight fluctuation is normal. If a difference greater than 5-10 Vdc is measured, something is drawing current when it shouldn't. Turn off the amp and troubleshoot the problem.

Turn OFF the amplifier.

9.3 Power Up with Tubes

9.3.1 The Real Test



Install the tubes! Aren't they pretty?

Verify the amp's power switch is in the "OFF" position. Insert the mains power cord in the IEC mains connector.

Secure the black ground lead of your voltmeter to the chassis star ground lug.

Plug the amplifier into a speaker cabinet. Match the speaker impedance with the appropriate output jack. Failure to connect a speaker will cause harm and eventual failure of the output transformer.

Switch the amp's power switch to the "ON" position. With your voltmeter, check the following voltages. Your voltages will be different !

(Note !!! The picture shows 1.3v at V2's pin 7. This is a mistake. Instead you should find that probing here causes 'scratchy noise' out of the speaker. This is the signal path.)

However they should be of the same order. If a significant deviation from these readings is observed, turn off the amp, unplug the mains power and investigate.

To check the heater voltage you need to measure across the two pads, where shown. You can't check with reference to ground. It's elevated – by design.

It's AC too !

Turn the power off, disconnect the black ground lead from the star ground lug, then power back on & probe with the two. Be careful ! You'll probably need to use both hands.

10. Finish Things Up

10.1 Re-Assemble the Amp

Slide the chassis back into the stock cabinet. Fasten the chassis to the cabinet with the stock bolts. If you have used a StandBy switch in the position shown by the faceplates, you'll almost certainly have to use a shorter bolt than the stock one in that "position". The stock one may push on to the switch & short. Nasty !!!

Others have had success replacing the standard bolt in this case with one known as an "M6 x 16 Pan Head machine screw". They're cheap… Otherwise, just don't use one. You'll still have 3 of the 4 in use. Should be OK…

Insert the bolt caps back into the sockets. Press them in until they are flush with the cabinet surface. Attach the back panel with the stock screws.

Congratulations! Your have successfully converted your Epiphone Valve Junior into a Tweed 5E3. Plug in a guitar and enjoy your new amp.