



# Plexi SE PCB

## Valve Junior Conversion Build Manual

## 1. Introduction

This manual contains instructions to convert an Epiphone Valve Junior into a 5 watt single ended tube amplifier modeled after the legendary Marshall 1959 Super Lead (Plexi). The heart of the amp is the Plexi SE PCB, which conveniently lays out the circuit in a printed circuit board, PCB, package.

This manual provides instruction for the assembly of version 1.0 of the Plexi SE PCB.

To simplify things,

- The Epiphone Valve Junior will be referred to as EVJ, and

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 Plexi SE PCB,
- installation and hookup of the Plexi SE PCB into the EVJ chassis,
- initial power-up and testing, and
- reinstalling the chassis back into the EVJ cabinet to finish up the job.

Here's a look at the Plexi SE PCB if you haven't purchased yours yet.

Version 1.0





## *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*

GuitarAmplifierPCBs.com assumes no liability or responsibility, under any circumstance, for personal injury or damage to property or personal property.

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

All specifications are subject to change without notice.

## *Table of Contents*

---

1.	Introduction .....	2
2.	Electrical Shock Warning .....	3
3.	Disclaimer of Liability .....	3
4.	Project Overview .....	5
4.1	Here's what you'll need: .....	5
4.1.1	Parts: .....	5
4.1.2	Tools: .....	5
4.1.3	Supplies: .....	5
5.	Let's get started .....	6
5.1	Remove the EVJ chassis .....	6
5.2	Remove the EVJ's Stock Components .....	7
5.2.1	Remove the Tubes and Tube Retainers .....	7
5.2.2	Remove the Output Transformer from the Chassis .....	7
5.2.3	Clean Up the Power Transformer .....	8
5.2.4	Remove the Volume Potentiometer .....	9
5.2.5	Remove the Stock EVJ Circuit Board .....	9
6.	Prepare the Chassis .....	11
6.1	Layout and Drill .....	11
6.1.1	Layout the Plexi SE PCB for Drilling .....	11
6.1.2	Layout the Faceplate for drilling .....	12
6.1.3	Drilling the Chassis .....	13
7.	Plexi SE PCB .....	13
7.1	Assemble the Plexi SE PCB .....	13
7.1.1	PCB Standoffs .....	14
7.1.2	Tube Sockets .....	14
7.1.3	Spade Connectors .....	15
7.1.4	Diodes .....	16
7.1.5	The "Plexi Preamp" .....	17
7.1.6	The "Cascade Preamp" .....	18
7.1.7	Wiring the Heaters .....	19
7.1.8	Filter Capacitors .....	21
7.1.9	Bypass Capacitors .....	22
7.1.10	Install the Remaining Components .....	23
7.1.11	Input Jack .....	24
7.1.12	Control Leads .....	25
8.	Putting it All Together .....	26
8.1	Install the New Components .....	26
8.1.1	Hookup the Plexi SE PCB .....	26
9.	Turn on the Power .....	29
9.1	Check Your Work .....	29
9.1.1	Take a Break .....	29
9.1.2	Visual Inspection .....	29
9.2	Power Up without Tubes .....	30
9.2.1	The First Power Up .....	30
9.3	Power Up with Tubes .....	32
9.3.1	The Real Test .....	32
10.	Finish Things Up .....	34
10.1	Re-Assemble the Amp .....	34

## *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. We at GuitarAmplifierPCBs.com wrote this manual specifically for the novice builder. So, anyone can do it. Really, it's simple and it doesn't require expensive tools or complex equipment.

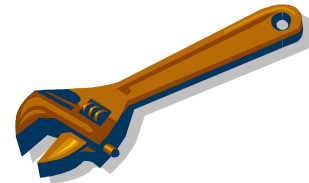
### **4.1 Here's what you'll need:**

#### *4.1.1 Parts:*

- The Plexi SE PCB
- Misc. parts and components (refer to the Plexi SE 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 or punch (one 1¼ in. 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.

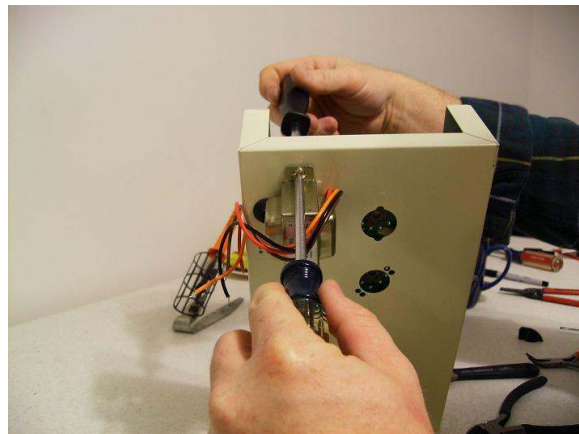
These items can be discarded. They will not be used later in the build.

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*

One mounting location for the circuit boards falls near the edge of the stock output transformer. So, the output transformer needs to be unscrewed from the chassis and pushed aside.



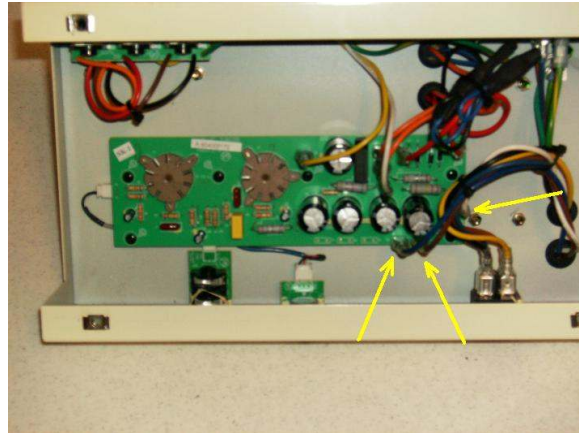
### *5.2.3 Clean Up the Power Transformer*

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.

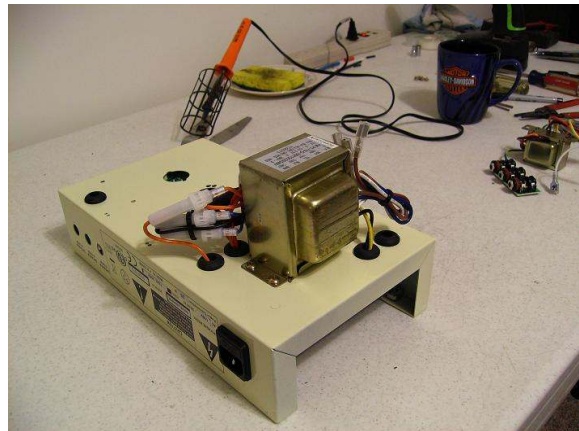
Disconnect these three (3) leads from the stock EVJ circuit board.



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.





### *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.

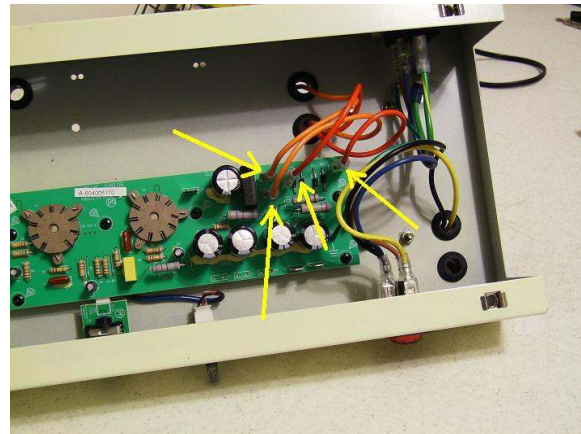


### *5.2.5 Remove the Stock EVJ Circuit Board*

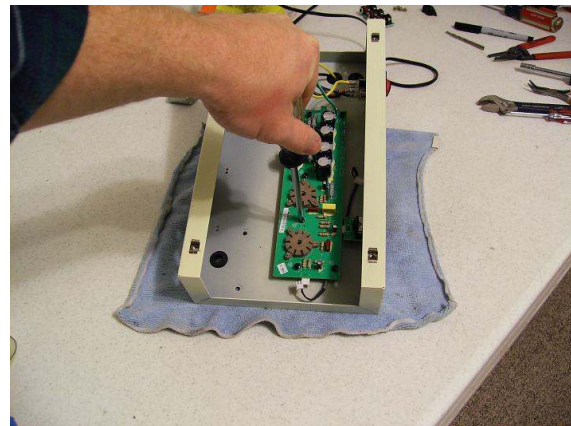
Disconnect these four (4) leads from the stock EVJ circuit board.

Lift the ground wire from the star ground post.

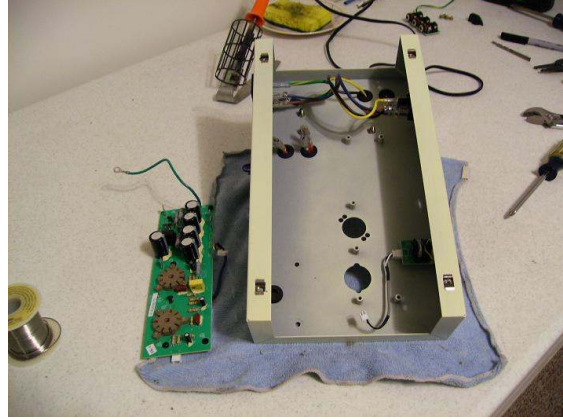
Unplug the input jack wire at the circuit board.



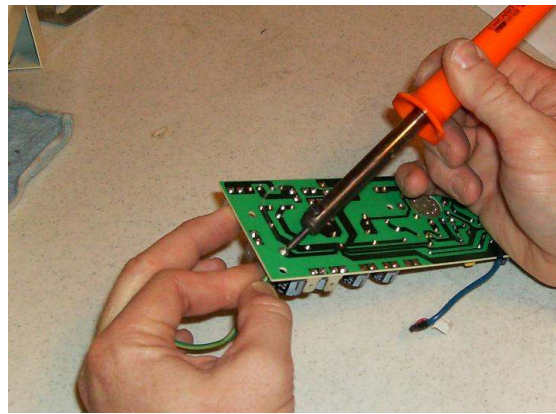
Remove the six (6) screws fastening the circuit board to the chassis.



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 later.

## 6. Prepare the Chassis

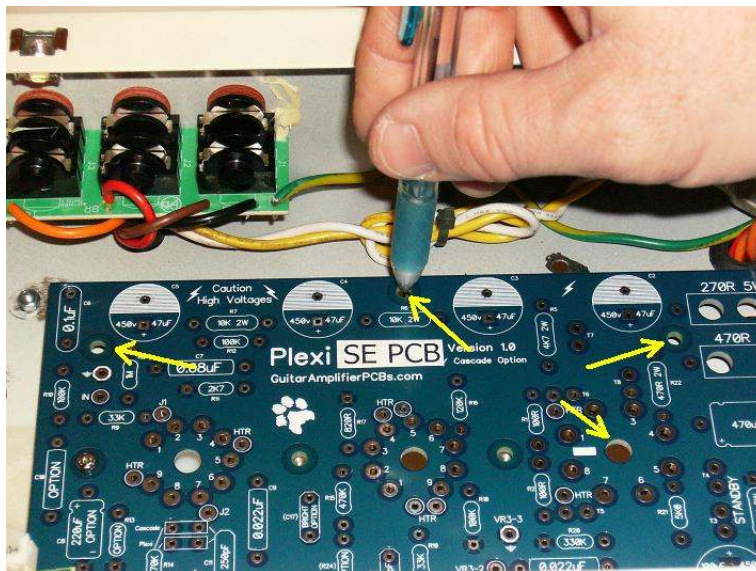
### 6.1 Layout and Drill

The Plexi SE PCB, and control potentiometers require some drilling in the chassis.

#### 6.1.1 Layout the Plexi SE PCB for Drilling

Since the Plexi SE PCB was designed to use the stock EVJ chassis standoffs, the best 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 to three screws to fasten the board. With the board aligned to the chassis, mark the four additional drill locations as shown.



## 6.1.2 *Layout the Faceplate for drilling*

We worked with BNP Lasers to supply a professional grade faceplate for the Plexi SE PCB. The information is on our web site. We highly recommend you buy this faceplate 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 must use a printed copy of the drill plan...



Always verify you are using the latest version of the drill plan posted on [GuitarAmplifierPCBs.com](http://GuitarAmplifierPCBs.com).

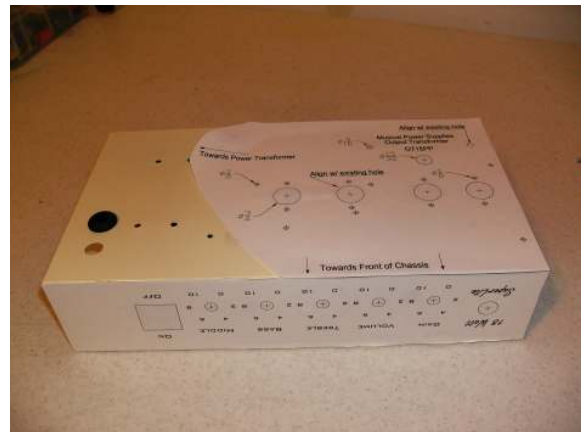
If you can not print onto 11x17" paper, you can take an electronic version of the drill plan to Kinkos. They will print it professionally for under \$1.

Print out a copy of the VJ Conversion Drill Plan. Make sure it is printed to scale.

Cut away the unused portion of the drill plan as shown. The mounting hole near the back of the power transformer is optional. It's very close to the rubber grommet. It's not used in the picture shown.

Align the drill plan to the chassis using the alignment holes indicated on the plan.

Affix the plan to the chassis with a generous amount of white glue or tape.



Note: This is not a picture of the Plexi SE PCB drill plan. Instead, it is a drill plan of a similar build. But it adequately represents the front panel of the Plexi SE PCB. Since we used a BNP Lasers faceplate to mark the front panel, we did not photograph the printed drill plan method.

### *6.1.3 Drilling the Chassis*

Start by setting the center of each hole to be drilled. A center punch is often used. Use the appropriate drill bit size as prescribed by the drill plan.

Deburr or countersink each hole to ensure no sharp edges will cause injury or component failure.

## *7. Plexi SE PCB*

### **7.1 Assemble the Plexi SE PCB**

The anticipation has been killing you, hasn't it? Finally, the assembly of the Plexi SE 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 be an exact reflection of what your board will look like. Various parts will 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.

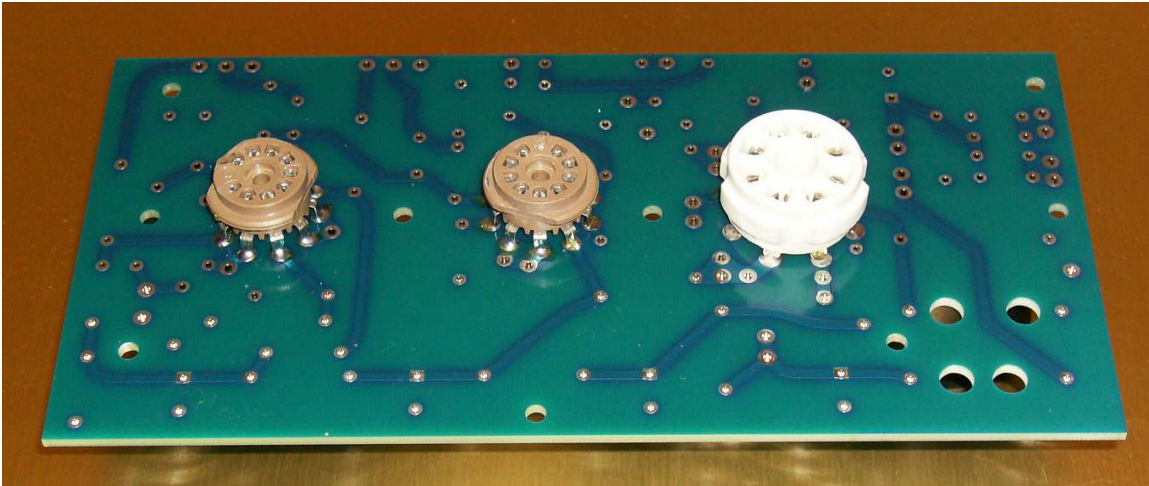
Don't use the pictures to compare the progress of your build. Follow the instructions at each stage of the build and compare your work when the manual calls out a comparison check.

### 7.1.1 PCB Standoffs

Install the three (3) PCB standoffs on the back side of the board.

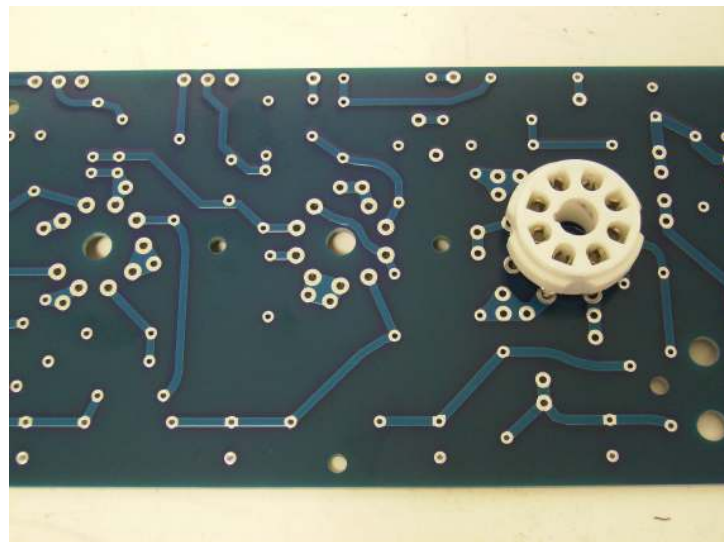
### 7.1.2 Tube Sockets

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



Insert the tube sockets as shown. The noval (9-pin) sockets only go in one way (on the back side). However, the octal (8-pin) socket needs to be properly oriented with the circuit board. Position the notch in this socket so that it is pointing toward the two noval sockets.

Solder them into the board.



### 7.1.3 Spade Connectors

DO NOT install ANY male spade connectors in board.



The use of spade connectors with version 1.0 of this board may result in arcing between the spade connectors and the ground plane. This may result in charring of the circuit board, poor amplifier performance, transformer damage, and may pose a safety and/or fire hazard.

Again, DO NOT install ANY male spade connectors in board.



Instead of using spade connectors, the wire leads should be soldered directly to the board in location marked above. Don't worry about this now. It will be covered later when the board is installed in the chassis.

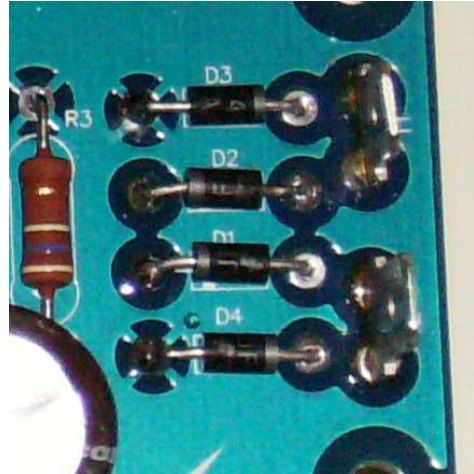
### 7.1.4 Diodes

Install the four (4) rectifier diodes.

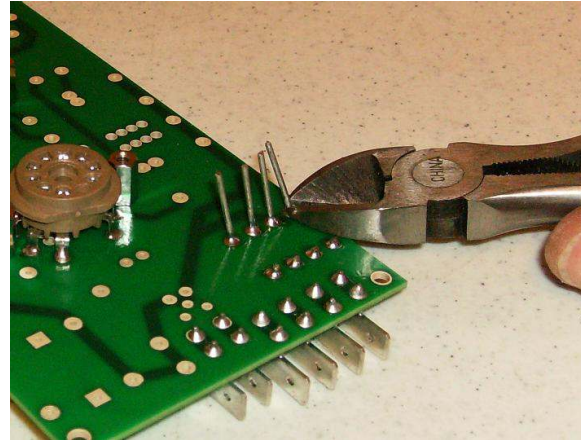
Orient the diodes as indicated on the circuit board.

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

Solder them to the board.



Trim the leads off at the top of each solder pool, like this.

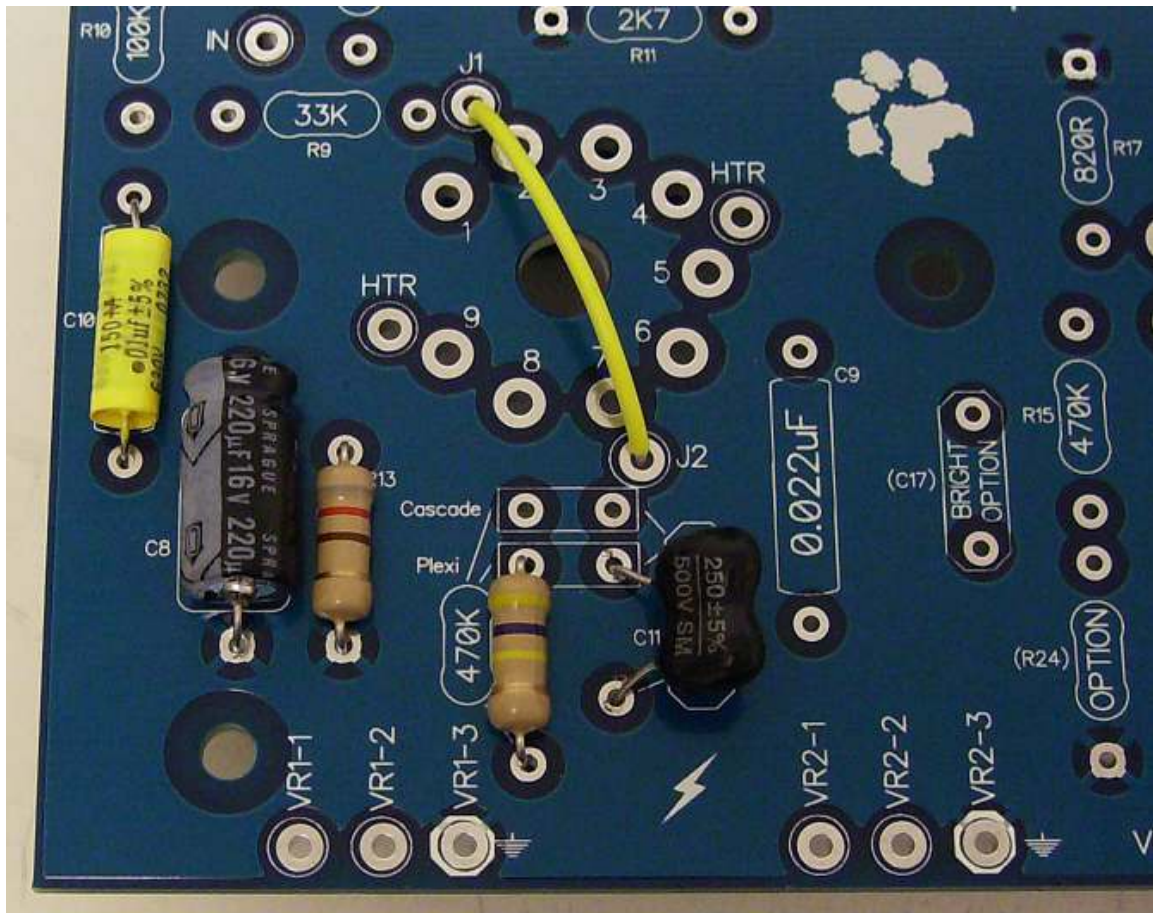




### 7.1.5 The “Plexi Preamp”

To configure the Plexi SE PCB to have a 1959 Super Lead “Plexi” preamp, install the various components as shown in the picture below. Determine the component value from the schematic and/or chassis layout drawing.

Notice how the leads of the 470K resistor and 250pF capacitor are inserted in the Plexi solder pad locations.

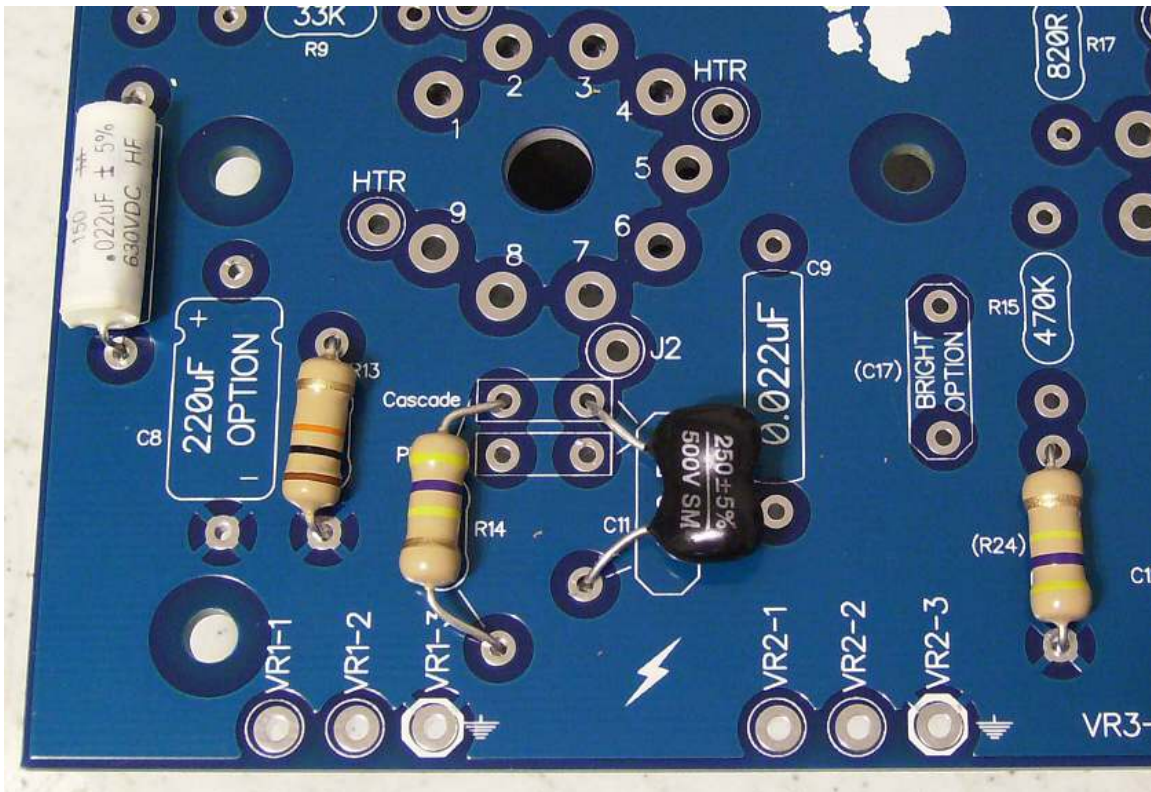


Wiring the control potentiometers is discussed in a later section.

## 7.1.6 The “Cascade Preamp”

To configure the Plexi SE PCB to have a Cascade (or JCM800) preamp, install the various components as shown in the picture below. Determine the component value from the schematic and/or chassis layout drawing.

Notice how the leads of the 470K resistor and 250pF capacitor are inserted in the Cascade solder pad locations.



Wiring the control potentiometers is discussed in a later section.

### *7.1.7 Wiring the Heaters*

Cut two 12" lengths of wire and twist them together as shown.



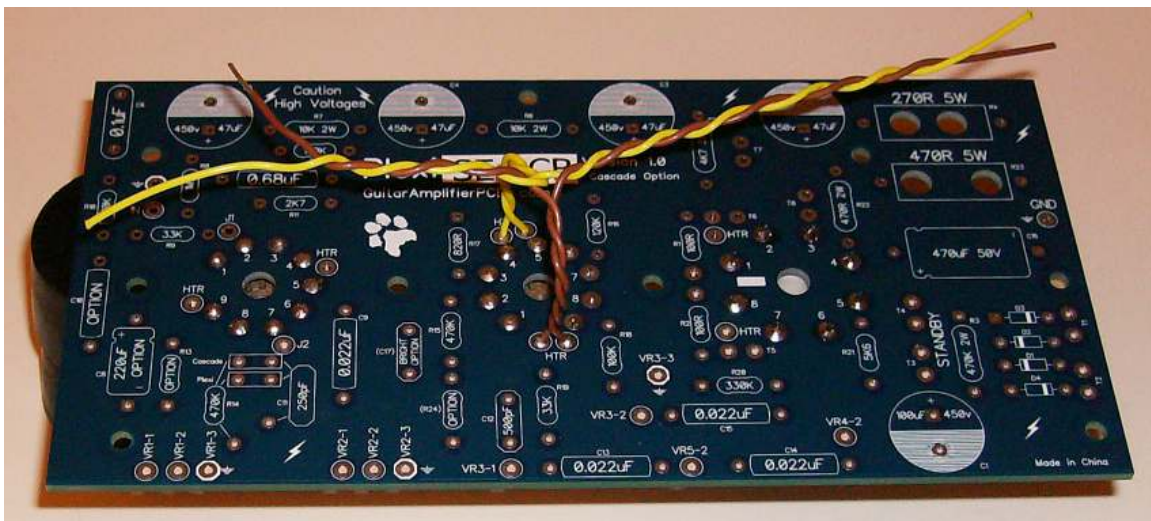
Cut this twisted pair in half.



Twist the wires together as shown.



Strip ¼" of the insulation off of the ends of the wires. Insert the leads into the solder pad locations on the middle tube socket labeled "HTR" for heaters.



Route the four remaining wire leads to the tube heater (HTR) locations. Trim for length, strip the insulation, and solder in place.

Here's what the heater wiring should look like when properly installed.

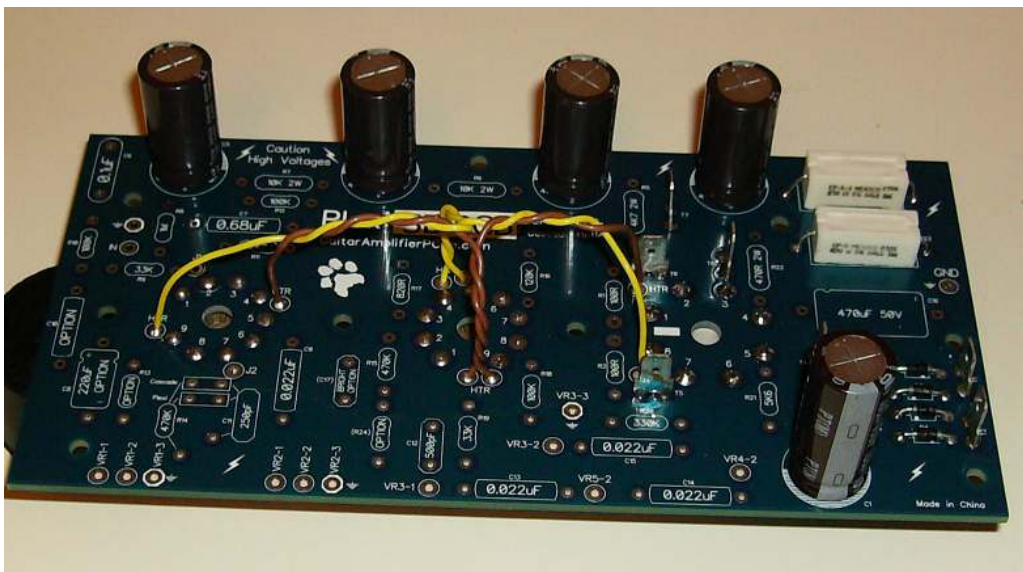


### 7.1.8 Filter Capacitors

Insert the five (5) 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.



Solder and trim the leads.

## 7.1.9 Bypass Capacitors

Install, solder and trim all of the 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 will look like what’s called for in the current parts list. The bypass capacitors have changed since the construction of this documentation 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 [GuitarAmplifierPCBs.com](http://GuitarAmplifierPCBs.com), the Plexi SE PCB, and/or the component package to identify, locate and position component values.

No certain order needs to be followed.

Here's what the finished Plexi SE PCB should look like.



Note: This is the “Plexi Preamp” configuration.



## 7.1.11 Input Jack

The VJ Conversion only calls for one input jack. Prepare the stock input jack by cutting off the stock connector.



Cut off the connector that plugged into the stock EVJ circuit board. Leave the input connector plugged into the input jack board.



Strip the insulation from the leads.

Insert the white lead into the "IN" pad and the black lead into a ground pad. Solder and trim.

The input section is done.





## 7.1.12 Control Leads

The circuit board is almost done. The only thing left is the wire leads control potentiometers and ground lug.

Here's where all of the lead connections are.



You should install the ground wire now.

I highly recommend that you clean the solder flux residue from all of the solder joints. Use a good quality flux cleaner and spray the board liberally to ensure all of the flux residue is flushed off of the board. All of the solder joints should be shiny.

It's now ready to be installed in the chassis.

## *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 Plexi SE PCB has been assembled, we can prep the chassis and install all of the new components.

#### *8.1.1 Hookup the Plexi SE PCB*

Place the circuit board into the chassis, align the mounting standoffs to their respective chassis holes and fasten the board to the chassis.

#### Control Potentiometers

Cut eleven (11) pieces of wire in lengths of seven (7) inches. Strip the ends of the wires clean and install them in the locations marked above.

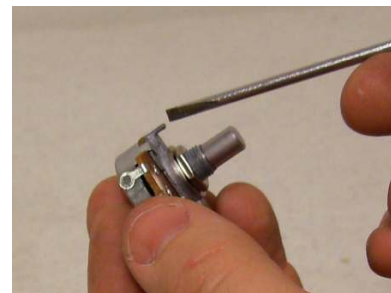
Twist the three VR1 (Volume I) wires together.

Twist the three VR2 (Volume II) wires together.

The color of the wires is not important as long as you can determine where each wire goes.

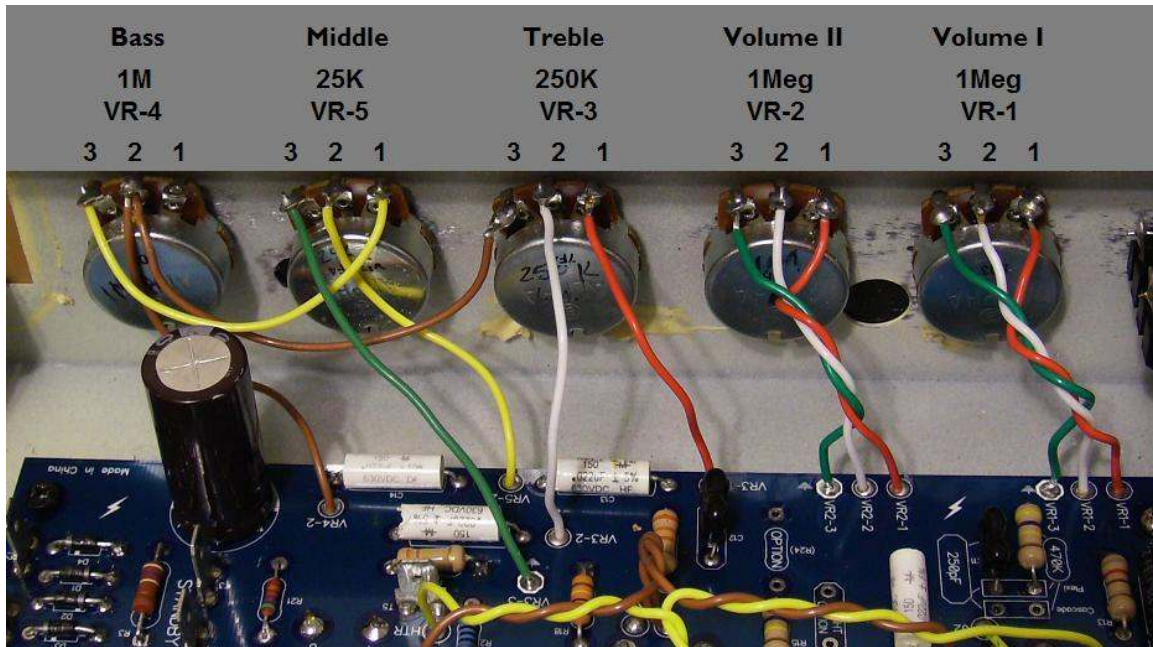
Sort the five (5) pots and check their values – 1Meg, 25K, 250K, 1Meg and 1Meg.

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.



Remove the nut and one of the washers and install each pot in its corresponding hole in the front panel. It helps to write the value and taper on the back of each pot since the value is hidden when pushed into the chassis.

Refer to the layout diagram for the location of each pot. This picture might help, too.



Guide the wires from the circuit board to their respective solder posts on the control potentiometers. Trim the wires to length, strip the insulation from the ends, and solder the wires in to place on the control pots. Refer to the schematic and layout diagram for additional information regarding the wiring hookup locations.

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

## Power Supply, Standby, Heaters, and Output Transformer

With wire cutters, cut the spade connectors off of the ends of all of the wires.

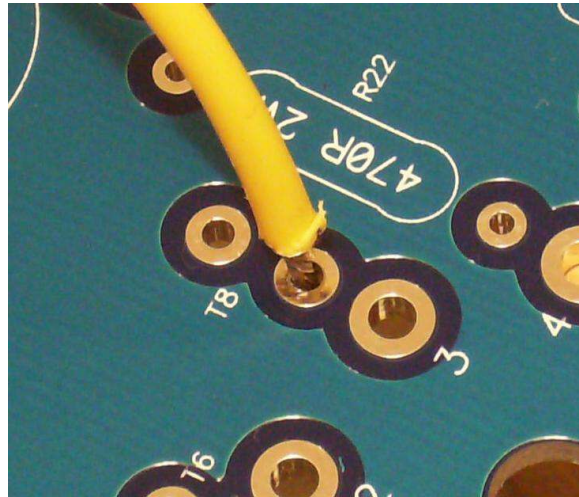
Strip the wire insulation off of  $\frac{1}{4}$ " of the end of the wire. Twist the end of the wire and tin it with a hot soldering iron and a bit of solder.

Insert each wire lead into its respective solder pad location. Do not insert the wire lead too far into the board. The wire may make contact the metal chassis underneath.

Solder each wire lead to the board.

Here's a representation of how to install the wire lead.

Clean all solder connections with a good quality solder flux remover. Inspect the board for any solder that may have splashed during this procedure.



Fasten the ground wires from the Plexi SE 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.
- Check that the heater element supply (orange wires) is equipped with a good fuse. The fuse should be rated for no more than 4A Slo-Blo.

## 9.2 Power Up without Tubes

### *9.2.1 The First Power Up*



Make sure you are working in 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.



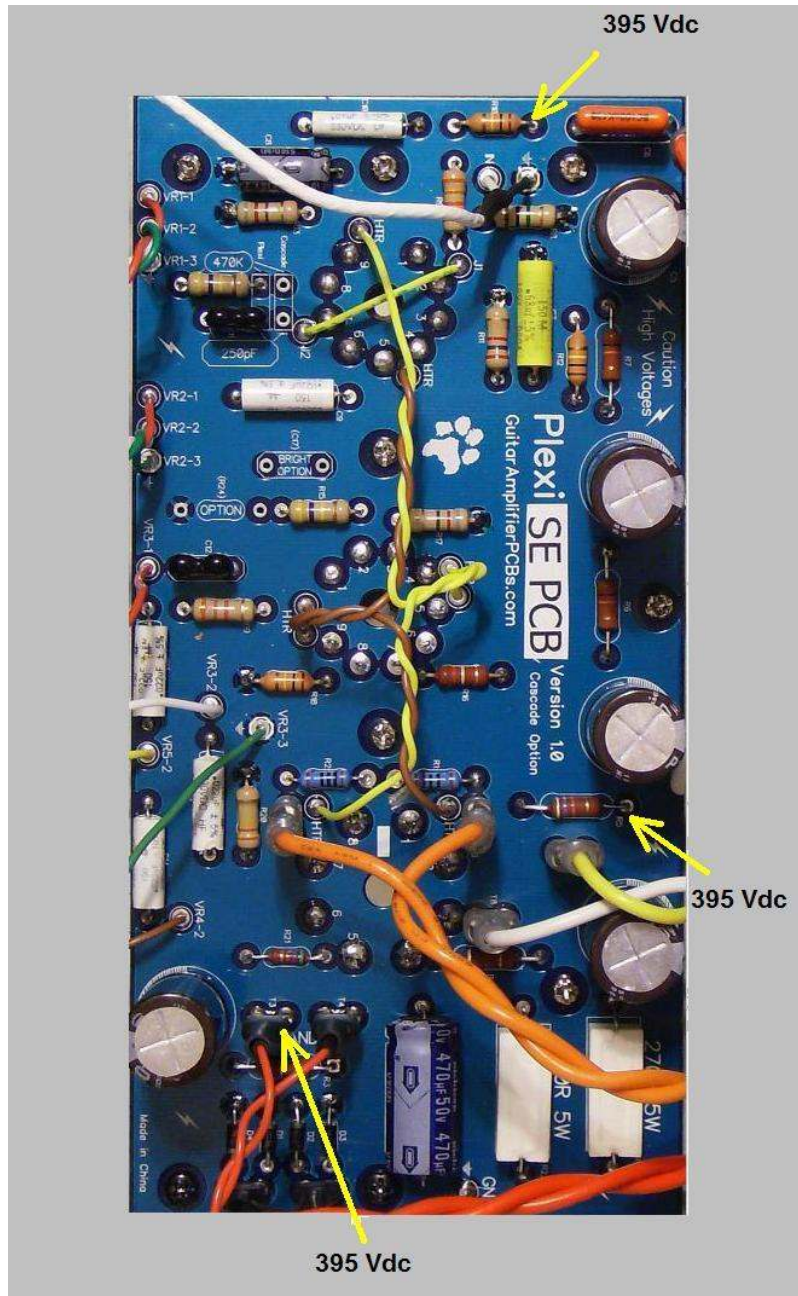
Plug the amplifier into a speaker cabinet. Match the speaker impedance with the appropriate output jack. Failure to connect a speaker will cause harm and eventual failure of the output transformer.

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.

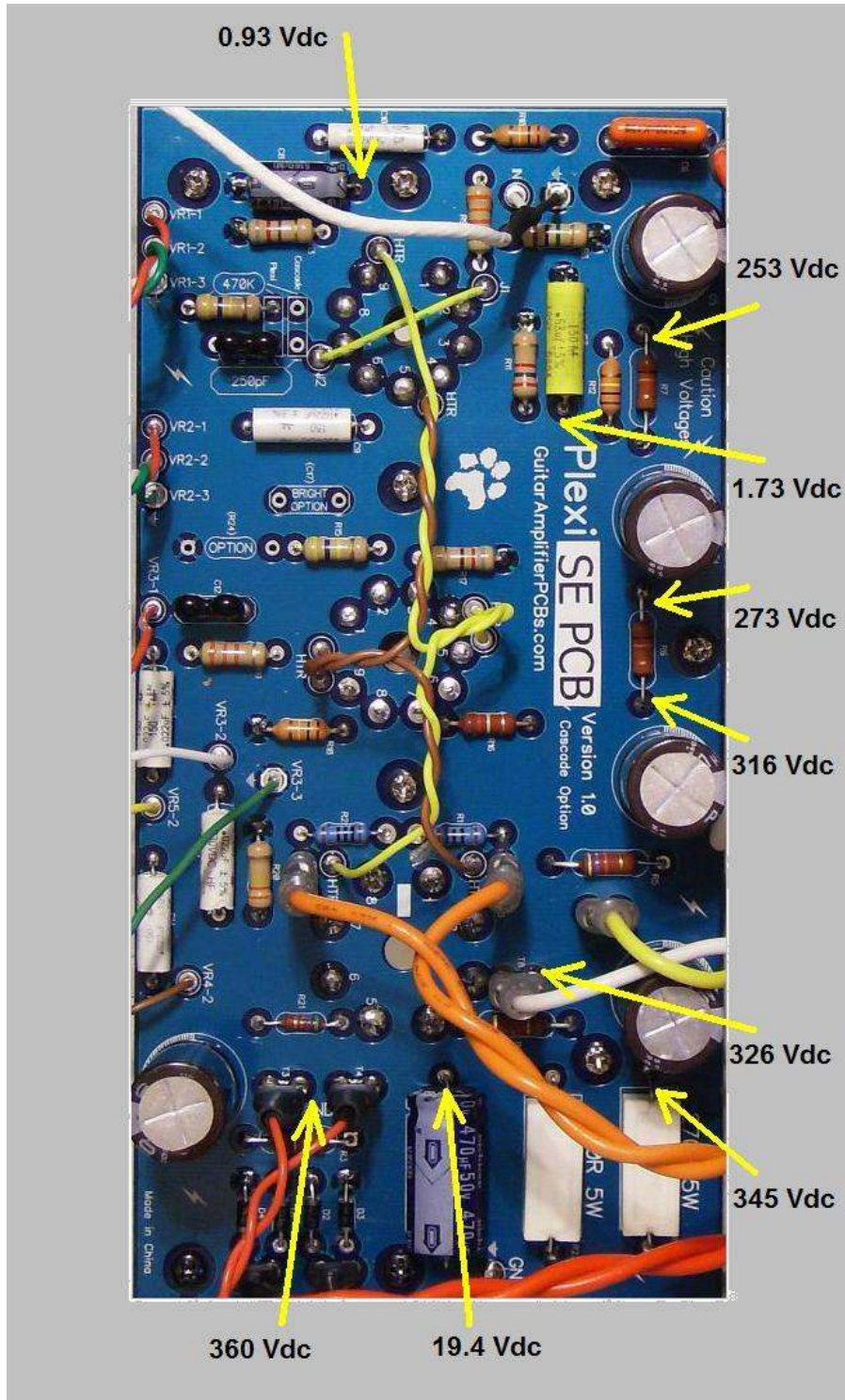
Secure the black ground lead of your voltmeter to the chassis star ground lug.



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. If a significant deviation from these readings is observed, turn off the amp, unplug the mains power and investigate.





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

Congratulations! You have successfully converted your Epiphone Valve Junior into a Plexi SE. Plug in a guitar and enjoy your new amp.