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Legend Monoblock 300B-2A3 Parallel SET Amplifier



Construction Manual

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audionotekits@rogers.com

1-613-822-7188

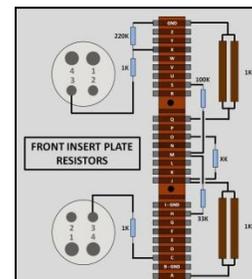
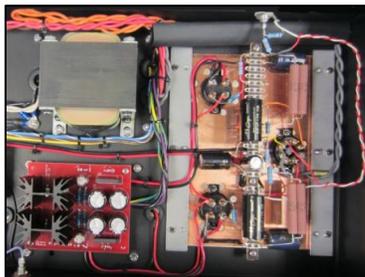


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Section 1

Introduction

Thanks for purchasing the ANK Audio Kits Legend Monoblock 300B-2A3 Parallel SET Amplifier. Our goal is to provide you with the highest quality kit that you will build from scratch with these instructions.

This is very high end and sophisticated piece of audio equipment that will surely become a showpiece of your sound system. We're excited that you have chosen to join us in enjoying and appreciating superb audio and we've created this manual to help guide you through each step of the assembly process with as much detail and clarity as possible. To facilitate the build process, the manual has been divided into a number of sections, each focusing on a separate aspect of the system: follow the sections in order and we guarantee you not only a problem-free experience, but a pleasant time doing so. If you are new to building kits, or if at any time you feel as though you need help or advice, feel free to contact us and we will do whatever it takes to get you on the right track.

1.1 About ANK Audio Kits

Audio Note (UK) started out in the early '90s developing several DIY audio kits while they were building up their finished product business. DIY Audio has a long history and it was an opportunity for knowledgeable customers to take advantage of world class designs and components. Audio Note (UK) was focused on using the very finest materials and components custom-made to their specifications, across their entire product line — from custom film and electrolytic capacitors to tantalum resistors, transformers, binding posts, wires, etc. The Kit1 300B single-ended integrated amplifier was born during development of the Meishu and it proved to be extremely popular worldwide. The ANKit business was born!

As the finished product business and dealer network started to flourish, Audio Note (UK) eventually moved the kit business off into a separate division; thus, in 2004, Audio Note Kits started up and was supported by a website so that customers not located near Audio Note (UK) dealers could order kits and have them shipped direct. Kit development continued in earnest during the 2000s with development assisted by Audio Note (UK) engineering. Audio Note (UK) parts were used throughout the kits, depending on the various levels and budgets. By 2013, ANK Audio Kits (as it came to be called) had developed a wide product range covering all areas of two channel audio: a single-ended 300B product line, an EL34 Class AB and single-ended product line, digital to analog converters, pre-amplifiers, phono stages, and Audio Note (UK) speaker kits. The end result today is that customers worldwide with DIY skills can now build an entire high end audio system to their liking. With the introduction of higher product levels in 2013 and the release of the Level 5 Mentor Pre-amplifier and the DAC 5.1 Signature, some customers wanted these high end products assembled by a professional builder. As a result, ANK Audio Kits began offering this service for some Level 4 and 5 products so that a significant investment in a kit could be turned into a work of art! Since ANK Audio Kits was born in 2004, over 2,500 kits have been shipped to customers worldwide. Clearly, there is a real demand for high end audio kits and ANK Audio Kits has been delivering the goods now for 15 years.

We believe and hope that you will have a great experience building your kit and we look forward to hearing from you about your experience.

Regards,

Brian Smith — Director ANK Audio Kits



1.2 Basic Operation of the Amplifier

ANK Audio Kits is proud to present the Legend Monoblock 300B-2A3 Parallel SET Amplifier. As anyone who has ever heard the transcendent musicality of a single-ended amplifier will tell you, there is something very special about the music that flows from (relatively) simple, classic Class A triode circuits. Perhaps it's the absence of crossover distortion, perhaps it's the gorgeous midband reproduction, perhaps it's the zero feedback design, perhaps it's the organic (even desirable) expressiveness of the second harmonic; more likely it's all of this and more.

ANK Audio Kits and SET amplifiers go a long way back, right to the beginning in fact, with our Kit1 300B, which has had successive and successful anniversary editions. It's no surprise then that these 300B Single and Parallel SET monoblocks are simply awesome! A pair of these power amplifiers are a perfect mate for the Mentor pre-amplifier and a path to truly exceptional audio enjoyment.

Design Elements

The Legend Monoblock 300B-2A3 Parallel Amplifier is a true high-end amplifier, a beautiful expression of single-ended amplification, reserved for the discerning audiophile.

The Legend series monoblock single-ended amplifiers employ a 6SH7 driver tube — selected by Andy Grove for reasons related to the input impedance and sensitivity in mating with a pre-amplifier — wired in a pentode configuration to drive a Parallel or Single triode 300B or 2A3 tube. It's the ultimate in configurability for anyone serious about SET amplification and is a class amplifier — a Legend in its own right! With 2 special Mains transformers, the T-194 and T-195, the following 4 options are available:

- ❖ Option 1 Single 2A3 amplification, 3.5W single-ended
- ❖ Option 2 Parallel 2A3 amplification, 7W single-ended
- ❖ Option 3 Single 300B amplification, 8.5W single-ended
- ❖ Option 4 Parallel 300B amplification, 18-20W single-ended

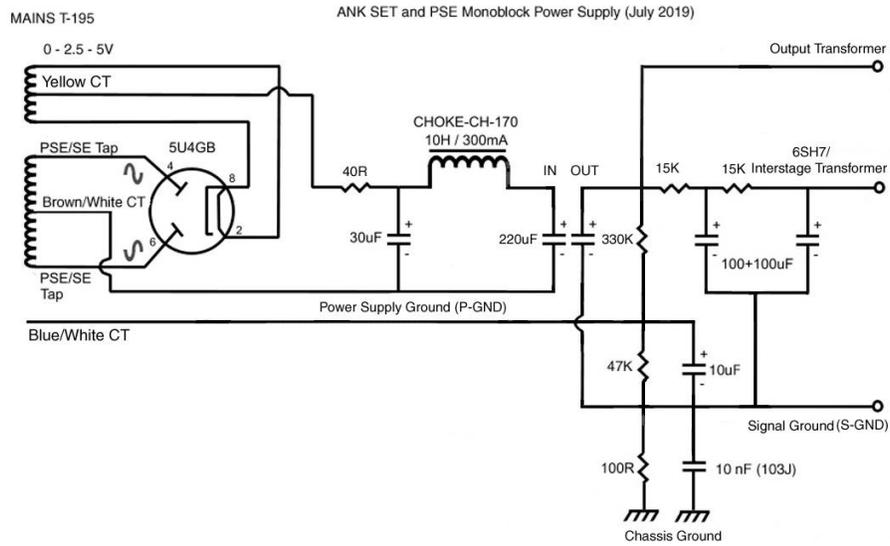
The Legend amplifiers deliver that gorgeous zero feedback single-ended triode sound. Simplicity is the key to the circuit of the amplifiers which are targeted at higher efficiency speakers. They provide remarkable sound quality to rival the best of SET amplifiers, yet they do this at a real world price. A remarkable achievement!

They are a pure power amplifier with approximately 2V sensitivity and are ideal when mated with our L2 or L3 pre-amplifiers. Among its high-end features are a classic 5U4-G rectifier tube, which smoothes the AC for the Power Supply; DC filaments; a large 300ma Power Supply Choke installed inside the chassis — assuring dead quiet operation; high quality black Teflon 4- and 8-pin valve bases; and Audio Note (UK) hardware tag strips.

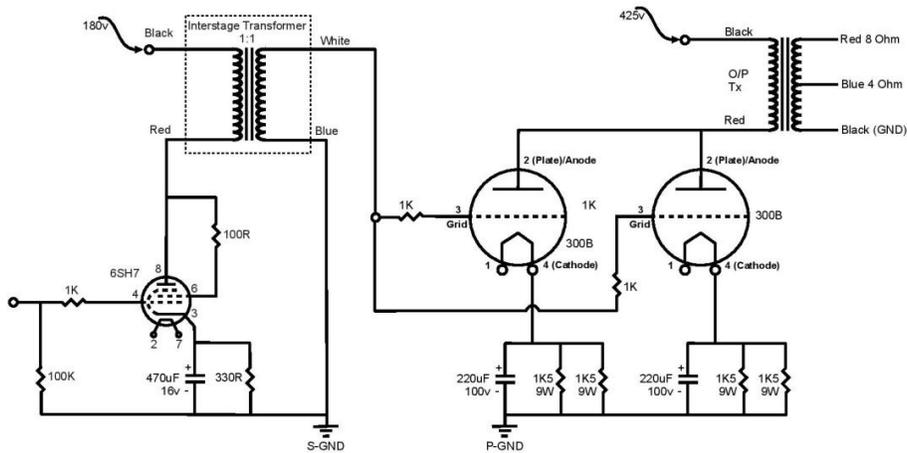


Here's a pair of completed Legend Monoblock 300B-2A3 SET Amplifiers

1.3 Schematic¹



AudioNote Mono Block 300B SET Power Amplifier	
Signal Path (Parallel)	Rev. 1.2 - 23rd Nov 2009



¹ From time to time revisions and upgrades to products result in circuit changes that are not always reflected in manuals. If you encounter any issues with how this schematic relates to your build that need clarifying, contact us at audionotekits@rogers.com.

1.4 Equipment

Here is the list of equipment that will be required:

- ❖ Philips screwdriver
- ❖ A pair of quality wire strippers
- ❖ A large, organized work area
- ❖ Soldering iron station with wet sponge
- ❖ Lead-based solder (4% Silver is recommended)

1.4.1 Overview of the Kit

In your kit you will find a series of kit bags containing all the hardware, wire, and parts for the associated sections of the amplifier. See the Parts List files on the disk to match up the parts in the kit bags with the lists. There is also a Master list for the kit.

1.5 Tips and Suggestions

We have learned a lot about kit building over the last decade from our customers and I'd like to share some tips with you to ensure a successful project. Please read through this section thoroughly, it will give you a good idea of what's ahead and help ensure your success!

1.5.1 Soldering

We highly recommend using lead-based solder with some silver content² on the build. You should use lead-free ONLY if you are experienced using it and confident. Lead-free solder requires a higher melting temperature and thus is more difficult to use. We don't recommend lead-free solder for first-time builders.

We suggest that you practice your soldering before starting on the kit. Feel free to request practice parts with your kit so that you can practice tinning wires and making nice solder joints. The key is a good soldering station with a sponge, the right temperature, a good size tip, and experience; remember, tips can wear out so make sure your tip is working. (You can also check out YouTube videos for soldering lessons and examples.) The solder should flow freely; if it's forming balls then there is likely a problem with the tip, the temperature, or (sometimes) the surface. Feel free to contact us for help!

² For example, WBT-0800.

1.5.2 Components

Using the Ohm setting on your multimeter is very useful when building a kit. It's a good, practical way of measuring resistors and continuity and is much easier than reading the color codes on the side. (With practice, the color codes can also be a good way to determine the resistance, but that method is better left to experienced builders.)

1.5.3 Resistor Sizes

Resistors today, particularly metal film resistors, are often smaller than you might expect. It used to be that the difference between a 1/2W and a 1W resistor was obvious: the 1W was considerably larger. That way of looking at things sometimes now no longer applies. Please be assured that all resistors supplied with ANK Audio Kits are rated at least per the specified wattage: in some cases, a higher than specified wattage may be supplied.

1.5.4 Capacitor Manufacturers and Voltage Ratings

Occasionally, depending on parts availability, we may use capacitors from different manufacturers. These will always be of equal or higher quality! As a result, some of the pictures in the manual may look a bit different at times. With regard to voltage ratings, normally, the voltage rating of the supplied capacitors will be exactly what you see on the parts lists. Occasionally, a part may be supplied with a higher voltage. Think nothing of it!

1.5.5 Electrolytic Capacitors

For those who have not built a piece of electronics before, here is a little lesson on capacitors. There are basically two types of capacitors that we use in the kits: electrolytic and signal capacitors. Of these, electrolytic capacitors require special attention. Electrolytic capacitors are "polarized," which means they have a POSITIVE (+) and a NEGATIVE (-) lead and typically have values like 100uf 450V, 10uf 160V, or 470uf 35V. *These capacitors need to be installed correctly or else they will possibly blow up at some point!*

Each electrolytic capacitor will have a *wide stripe* on the NEGATIVE side. Always ensure that this stripe (NEGATIVE) is positioned correctly. There are several keys on a printed circuit board to help you to know how to position the capacitor:

1. There may be a "+" on the board indicating where to position the POSITIVE lead.
2. The segmented half of the circular stencil on the board shows where to position the NEGATIVE lead. The unsegmented ('half-moon') part of the circle is where the POSITIVE lead goes.
3. The POSITIVE lead goes to a square solder pad while the NEGATIVE lead goes to a round solder pad.

1.5.6 Diodes

When installing diodes note that they are oriented with a stripe — *match the stripe on the diode with the banding (//) stencil on the board.*

1.5.7 Hardware/Mechanical

Not all of us are mechanically oriented. So, the kit is well laid out such that all the hardware is provided and bagged in individual sections, so things should make sense. Start thinking mechanically because about a third of the kit is mechanical. The first thing to remember is that good hardware is beautiful: we use all stainless steel metric hardware in the kits. It truly is a thing of beauty: don't rush your hardware! Here are a few helpful things to understand:

- ❖ We use British metric hardware (M3, M4, M5, screw size 10mm, 15mm, etc..) as opposed to the American imperial system (5/1000th or 50/1000th, 1 inch, 3/4 inch). Please familiarize yourself with the hardware in the kit.
- ❖ The screws will be called M3 or M4, which is the diameter of the shaft. The length of the shaft will be in millimeters, so you will encounter things like an M4 screw 16mm, a PAN head screw (which is a round spherical head), or a COUNTERSUNK or FLAT head screw (a screw head that needs to be flush with a surface — for example, under a transformer). So if you are asked to use an M3 16mm CSK screw, this is an M3 size (obviously), which is a thinner shaft diameter than an M4; 16mm is the length of the shaft; and the head type is CSK, which is a countersunk or flat head screw.
- ❖ Once you have the screws mastered, look at the matching nuts such as M4 nut or M3 nut and corresponding washers.
- ❖ Standoffs are common in the kits (again, they are either M3 or M4 size, with different lengths). They are typically threaded, so the screw goes into them.
- ❖ If any of the hardware is confusing or something is not fitting right, please email us.

1.5.8 Wire Stripping and Tinning

When it comes to wires, we typically use 18 gauge (thicker) and 22 gauge in the kits. It's PTFE: Teflon silver-plated copper wire. Basically this is classed as hook-up wire; we typically twist wire for you when it needs to be. The other wire we use is called shielded cable, like an AN-A (Audio Note (UK)) for signals. This is two-conductor wire: one is for the signal and the other (a big ground braid wrapped around the signal wire) is the shielding, which helps prevent the cable from picking up noise. You should practice stripping some 18g or 22g wire, and then try tinning this wire; this is the process of adding solder to the bare wire so that the invisible coating on the wire is burned off. This makes for easy soldering to a PCB, an RCA connector, or a transformer terminal. So it's a good idea to practice this a little before starting the kit.

1.5.9 Wire Color

In the earlier sections of this manual, particularly those sections dealing with the Mains transformer and Choke wires, the colors of the wires should match the color of the wires in your kit. If they don't, or if you're unsure about things, contact audionotekits@rogers.com. Later on, at the Interwiring stage, there may be some differences between the descriptions (or pictures) of the color of wires that you will connect and the color of the wires supplied with your kit; for example, depending on inventory, we may supply a Black-Red twisted pair instead of a Green-Red (or vice-versa). Don't worry! Just be sure to check the wiring diagrams carefully and connect the correct points together and all will be well!

1.5.10 Optional Finishing Touches

From time to time we get asked about some of the build details of the ANK Finished Products that you can see in the pictures in the "Assembled Kits Gallery!" (<https://ankits.smugmug.com/>) on our website. It's important to understand that these stunningly beautiful products were done by an accomplished professional builder with decades of experience and that some particulars of the build may be beyond most of us. However, experienced builders who want to incorporate some of these finishing touches should feel free to do so. While we don't officially support or supply parts for these optional enhancements, there's no reason why you couldn't or shouldn't do them if you want to and feel that you can handle them. Without getting into the details (you're on your own here), what you'll want to get hold of are: heatshrink (to bundle wires), cable ties (to secure large capacitors), stacked (male/female) standoffs and cable clamps (to elevate and secure signal cables), and cable sleeving. You can get some of these from your local hardware store (for example, 1/4" Cable Clamps) and other, more specialized, parts from online distributors such as Grainger, Digi-Key, Mouser, or Cable Ties and More. If you do decide to dress your build with some of these, please send us a picture or two. We'd love to see what you did!

1.6 Build Process

1.6.1 Some Good Rules of Thumb for Building Your Amplifier

- ❖ Take your time, prepare, and try and work on a small task each time you start to build the kit.
- ❖ Instead of rushing through another section — use the end of your session to check your work. Always ask yourself if the step you are performing makes sense.
- ❖ Have fun with your build and savour the experience. Take the time to do a really good job!
- ❖ Feel free to contact us via email audionotekits@rogers.com if you have any questions or suggestions during your build — and feel free to send us pictures, etc. We'd be pleased to give you tips along the way.

1.6.2 Organization of this Manual

Building an amplifier takes time and requires attention to detail and concentration. It's not something that you should rush: take the time, be patient, and give yourself a break when necessary. To help guide you through the process, we've divided the work into a number of discrete tasks, each with its own section in the manual. The big picture is simple: we'll begin with the mechanical assembly and then progress to the wiring. We provide easy to follow, step-by-step assembly and wiring instructions and we prepare the parts you'll need in 15 separate sections, with all IEC cabling and twisted wire prepared for you ahead of time, making it easy to work through each build stage. The result: we hope that your kit is a joy to build!

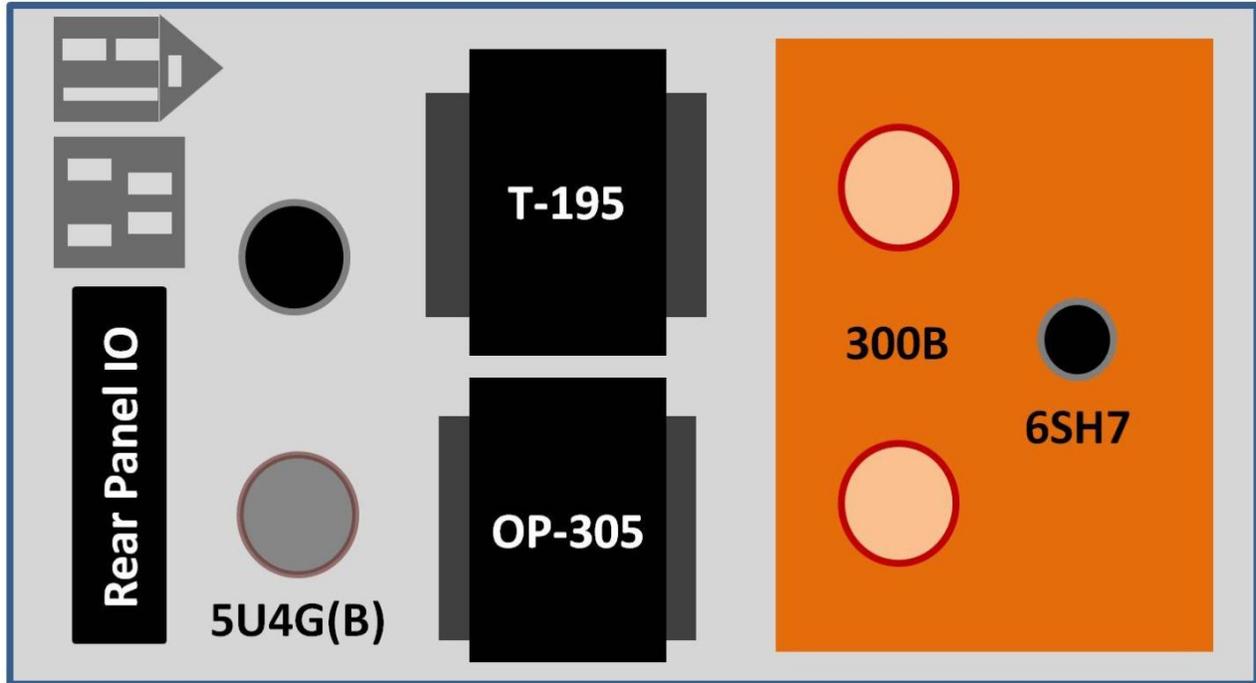
We've divided the build and the manual into the following sections:

1. Introduction
2. Mechanical Assembly
3. The Transformers
4. The Power Supply
5. The Filament Supply Board
6. Front Insert Plate
7. The IO Connections
8. Wiring Check Lists
9. Testing
10. Finishing Touches
11. Final Thoughts

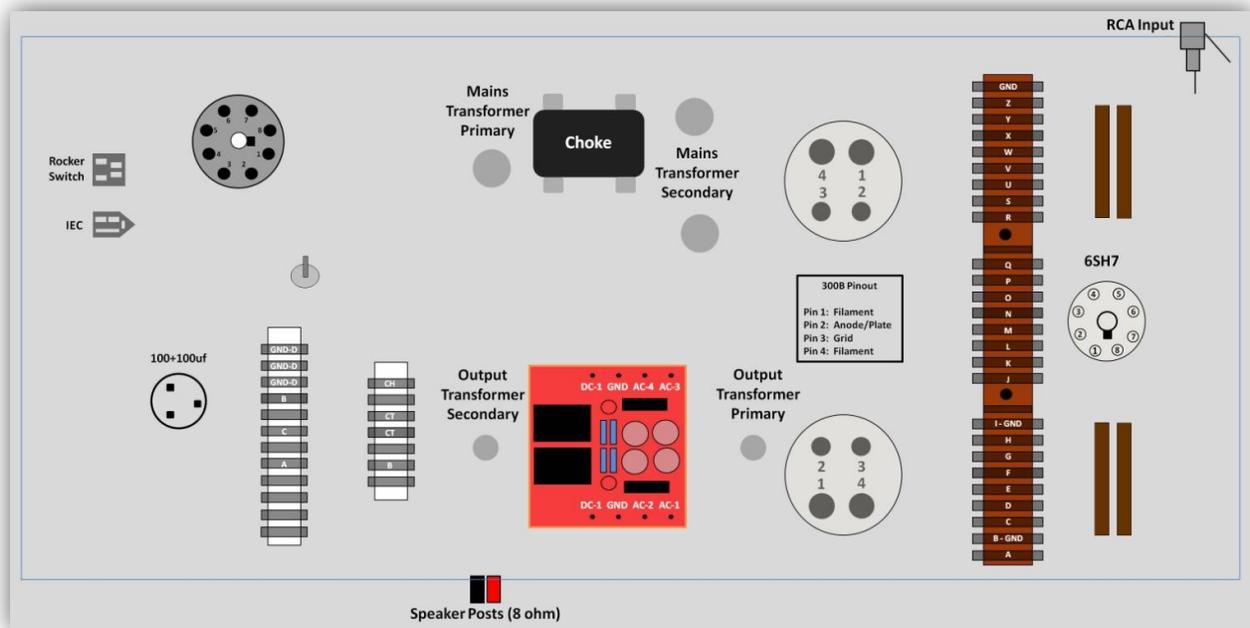
Appendix

Here's another way of looking at how the manual is organized and how the sections fit into the 'big picture': the main sections are mapped so that they mirror how the components will be positioned in the amplifier chassis, top and bottom, as shown below:

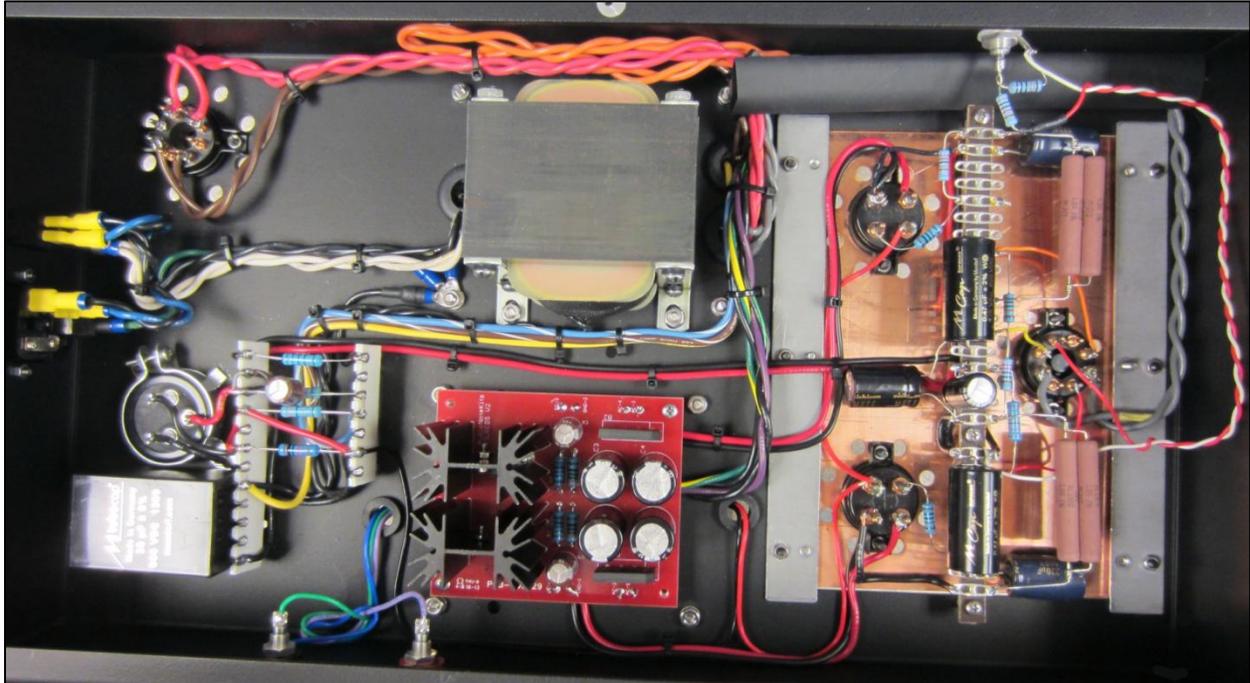
Top Side



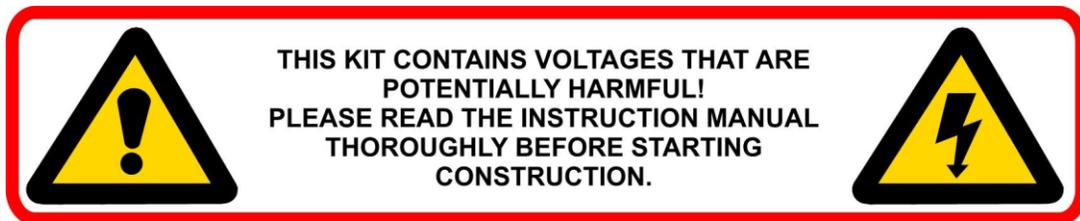
Bottom Side



The bottom-side view is used throughout the manual for the point-to-point wiring. *For the most part, each graphic slide shows only the wiring to be done in that sub-section and — not to have information overload — may not show wiring previously completed.* The overlaid routing of all the point-to-point wiring underscores why it's a good to go slowly, think carefully about wire length and routing, and use like heatshrink and cable ties to keep things neat and tidy, as in the picture below.



1.6.3 Electrical Safety Warning



Please be aware of proper electrical safety.

There are sufficient voltages in this kit to give you a very nasty and harmful shock, so be careful when powering on, debugging, and probing around.

Please contact ANK Audio Kits via phone or email (audionotekits@rogers.com) to discuss any precautions necessary when building the kit if you feel unsure about what you are doing at any stage of the build.

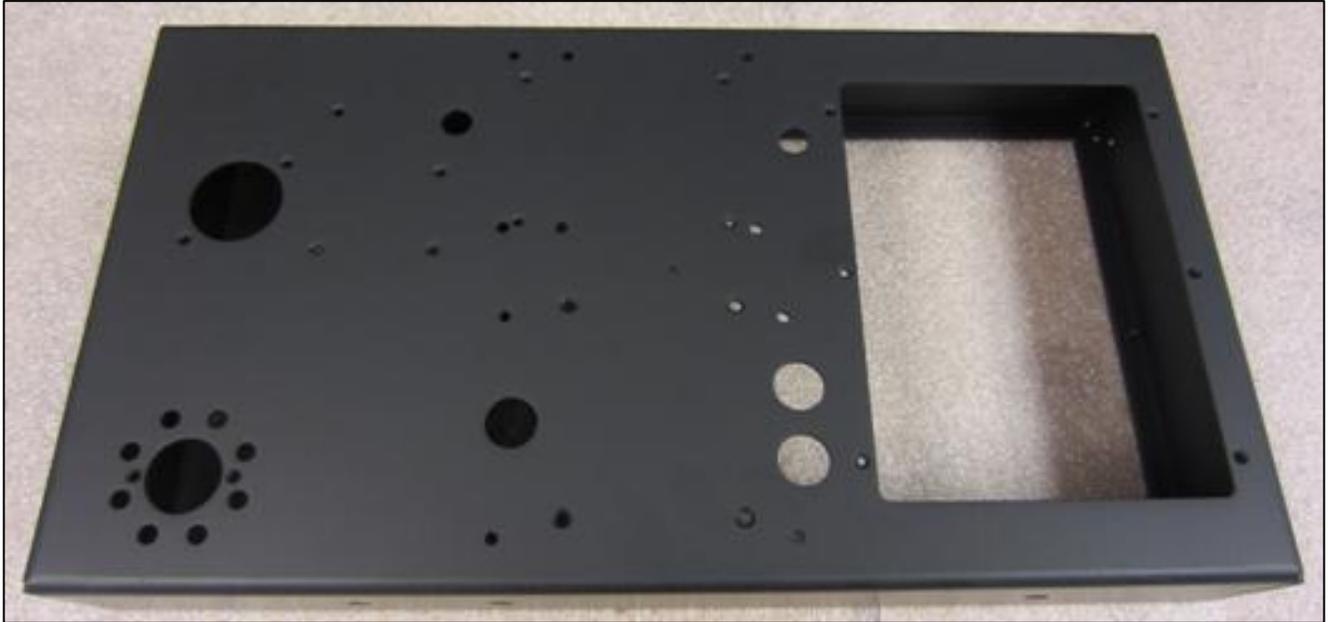
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Section 2

Mechanical Assembly

2.1 Overview

This is the latest version Legend Chassis. In this section we do the mechanical preparation required to get started on the kit.



Let's start with the chassis and install the:

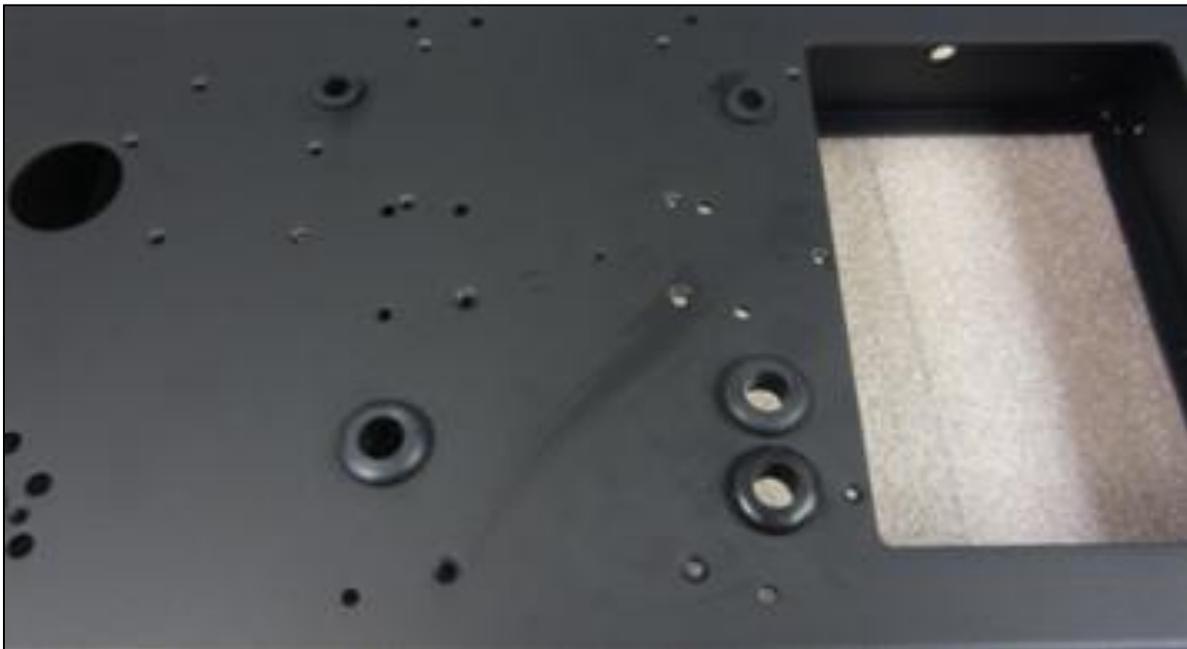
- ❖ rubber grommets
- ❖ 8-pin valve base
- ❖ Tang strips
- ❖ Capacitor clamp
- ❖ Ceramic Hardwiring Posts
- ❖ Filament Supply board hardware
- ❖ Choke

2.2 Installing the Rubber Grommets

Let's start by installing the supplied grommets in the appropriate holes. You'll find 3 large and 2 small grommets in your kit bag.



- Install the grommets in chassis. Take your time and push them in; they're a bit tight so you'll likely have to wiggle them into position from the top and the bottom of the chassis. *Be careful not to use a sharp object to push them in – just use your hands.*



Grommets installed

2.3 Installing the Valve Base

Now we'll install the Black 8-pin valve base for the rectifier tube, at the rear of the chassis. Here's a picture of the valve base, the Black ring, and the screws that we'll need.



- Position the KEY in the valve base so that it points to the front of the chassis, as shown below:



- Use the Black ring on the underside of the chassis to secure the valve base into position. *This view clearly shows the notch pointing toward the front of the chassis.*

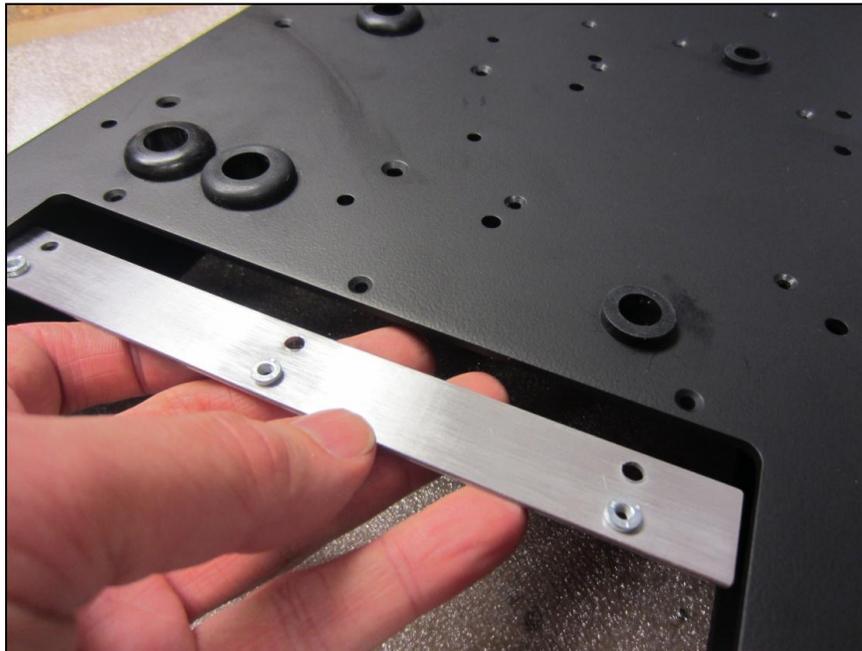


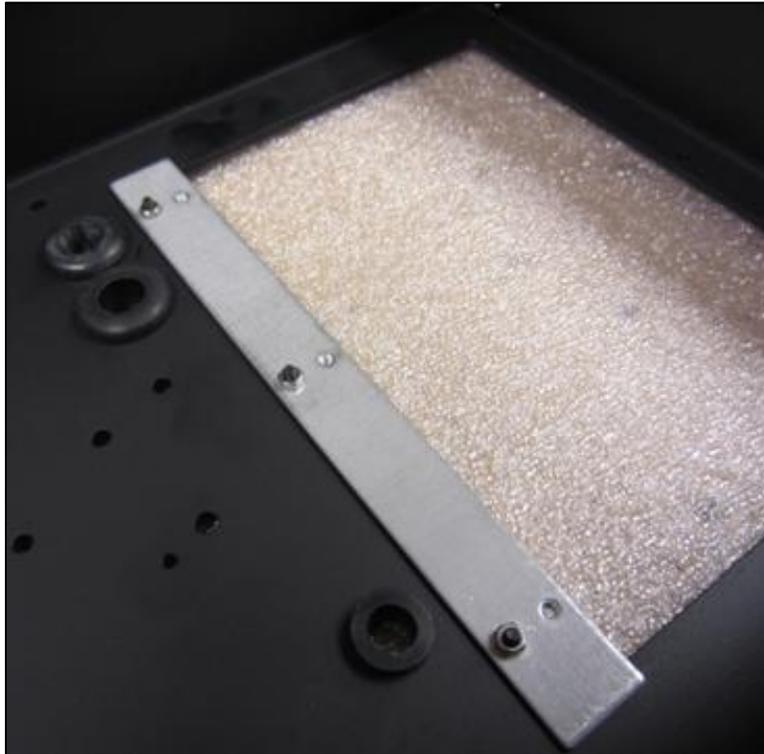
2.4 Installing the Tang Strips

Now let's install the Tang Strips; these are installed to support the Front Insert Plate.



- Position the Tang strips as shown and secure them with Black M3 10mm screws and nuts (on the underside of the chassis). Don't screw them too tight as they can be tightened later; keep them loose to start.





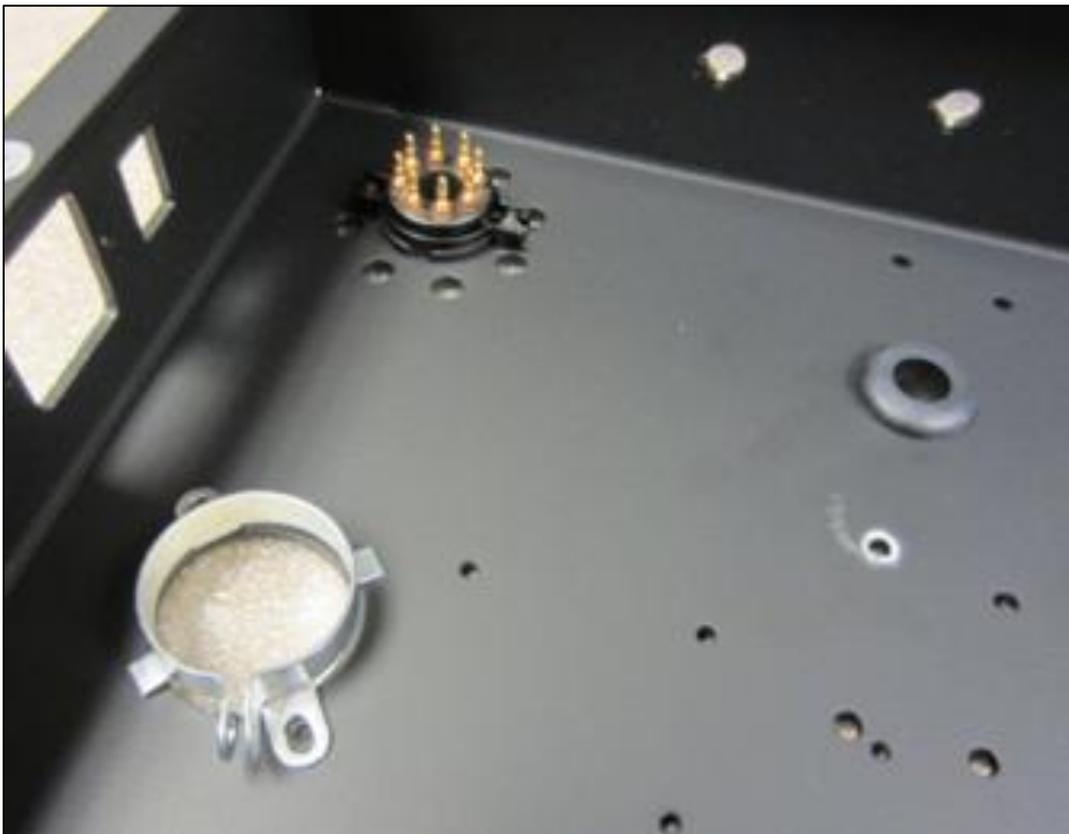
Tang strips installed (top and bottom views)

2.5 Installing the Capacitor Clamp

Next let's install the capacitor clamp.



- Install the capacitor clamp on the underside of chassis with the countersunk Black screws and nuts.



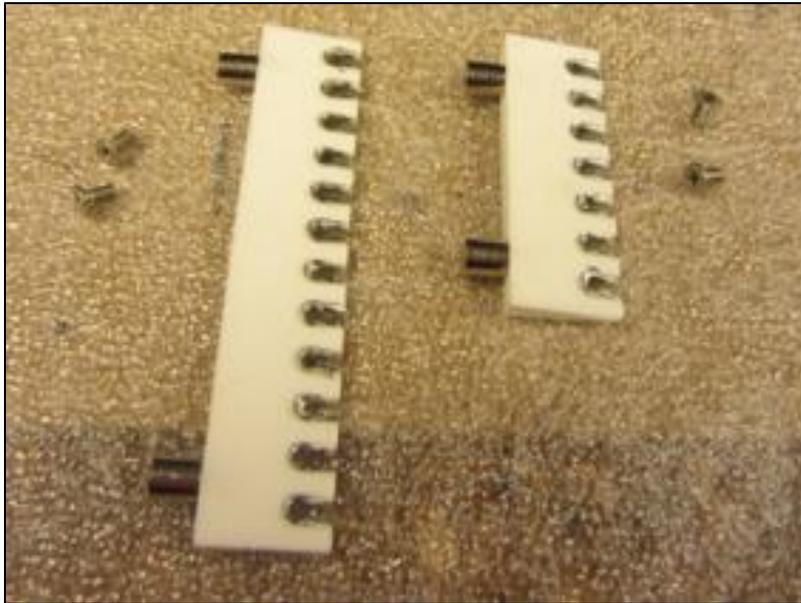
The clamp mounted on the inside of the chassis



Top view of capacitor clamp installed in the chassis

2.6 Installing the Ceramic Hardwiring Posts

We are now going to install the 12-position and 7-position ceramic hardwiring posts:



- Position the hardwiring posts in the chassis as shown below, then secure them with 6mm Silver M3 countersunk screws from the top side of the chassis.

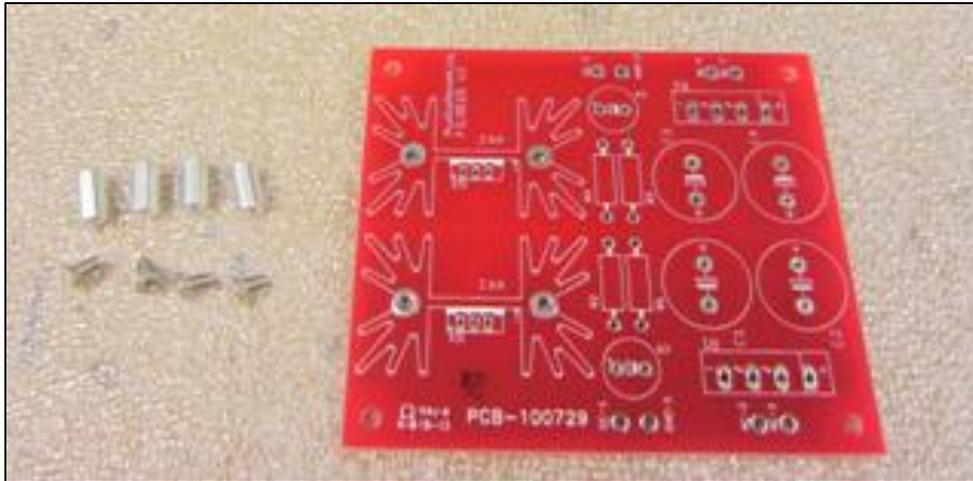




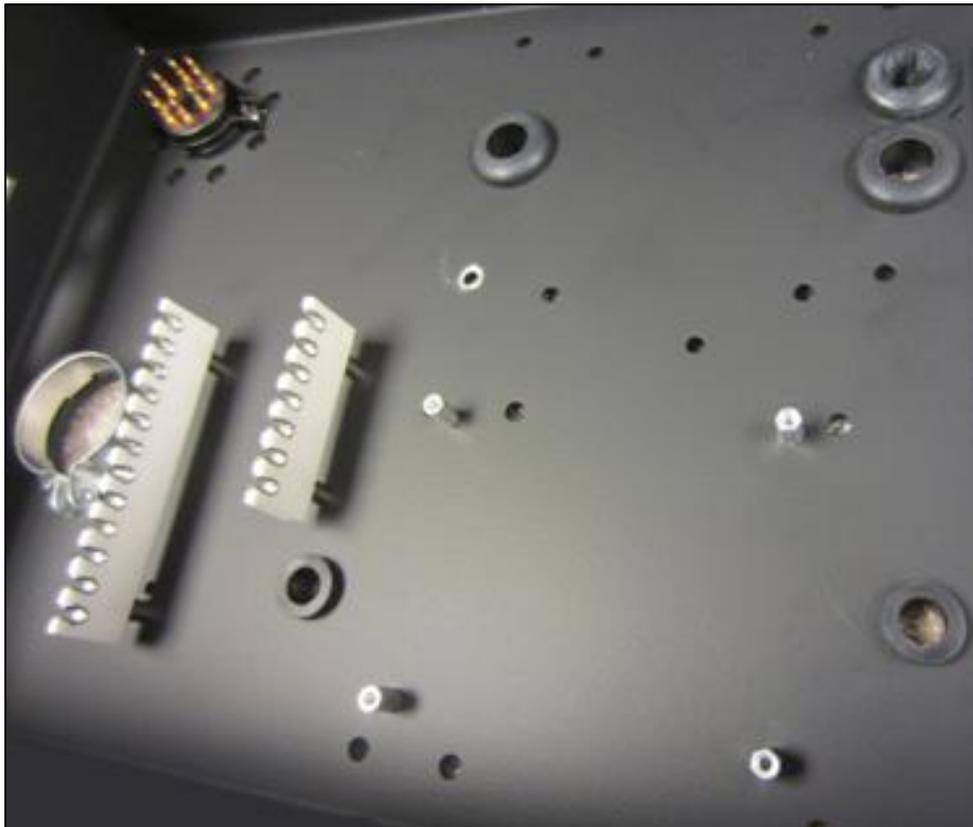
View from the top of the chassis

2.7 Installing the Filament Supply Board Hardware

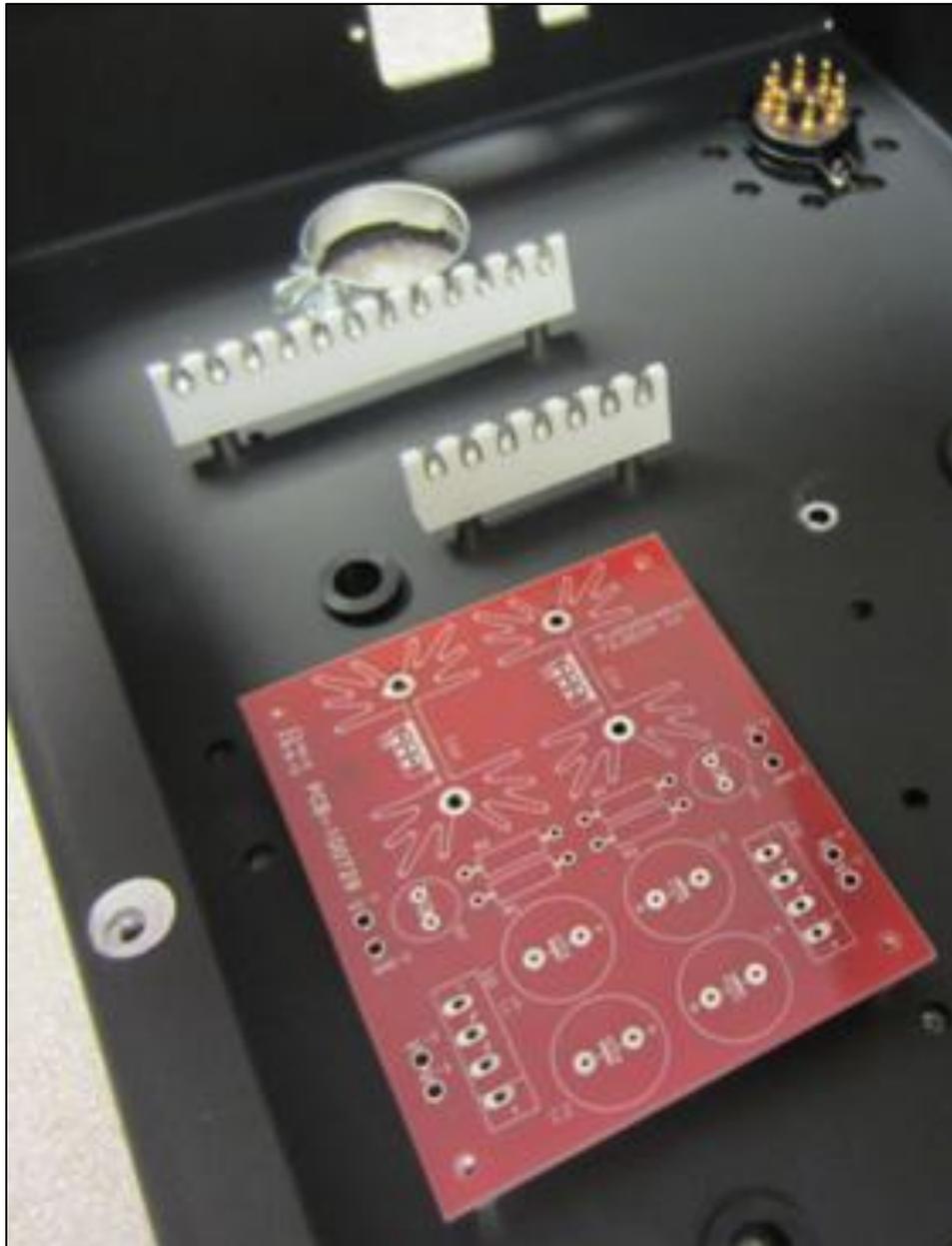
In this part we will install the standoffs to prepare for the Filament Supply board installation.



- Install 4 M3 10mm hex standoffs in the chassis as shown below and secure them with silver M3 6mm countersunk screws from the top side of the chassis.



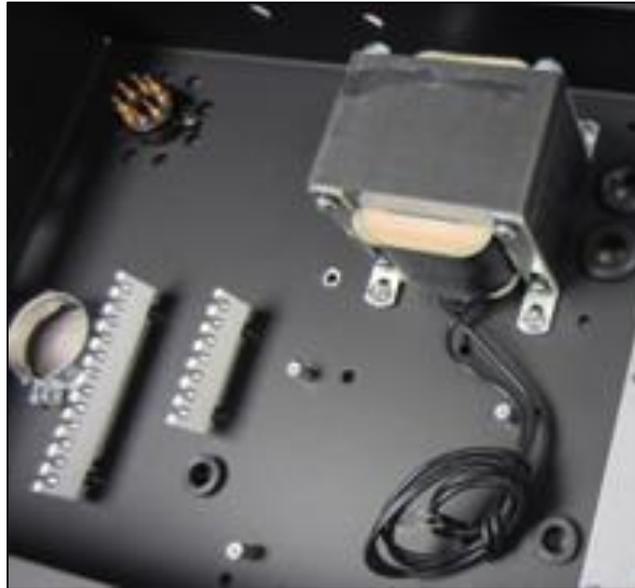
You can line up the Filament Supply board over the 4 standoffs just to make sure all is well, then put the Filament Supply board away for installation later, when it has been completed and the wiring that will connect it to the Mains Secondary and the 300B valve bases has been done.



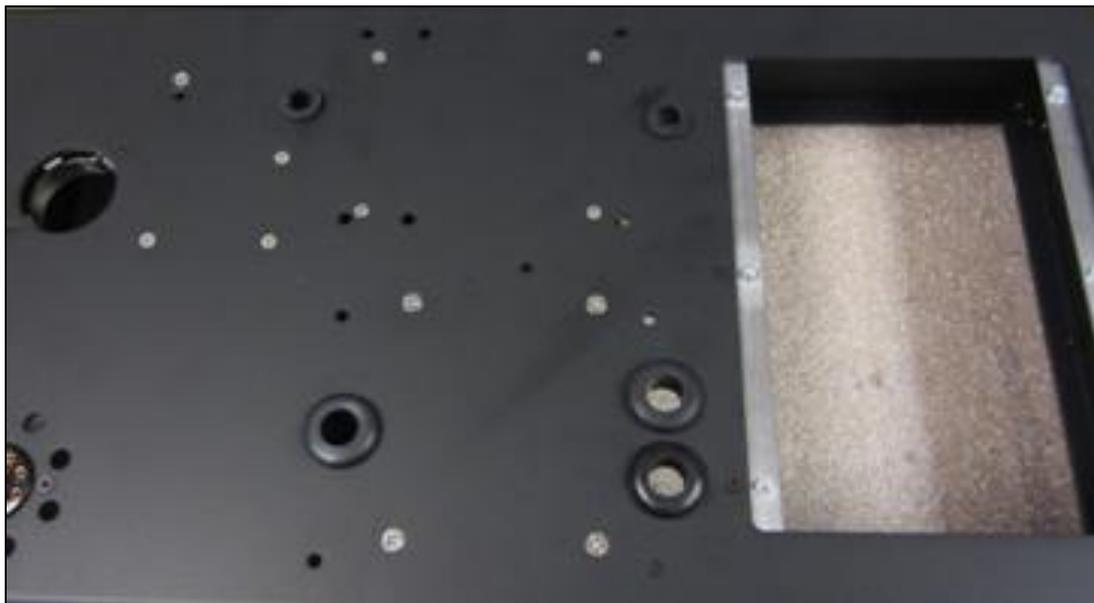
2.8 Installing the Choke

Our next job is to install the large 300ms CH-171L Choke on the underside of the chassis.

- Position the Choke into the chassis as shown below:



- Use the 4 M4 countersunk screws and install the Choke from the top of the chassis, securing it with washers and nuts on the inside of the chassis.



The view from above showing the 4 screws holding the Choke

2.9 Installing the IEC and Rocker Switch

First, let's install the IEC socket and Rocker Switch in the back of the chassis. Have a look at the picture below for the correct orientation.



- Install the Rocker Switch, which just snaps into position.
- Use M3 10mm CSK screws to Install the IEC socket.



Inside chassis view of installed Rocker Switch and IEC socket

Congratulations!

The chassis is now almost prepared for the rest of the build.

Time for a break!



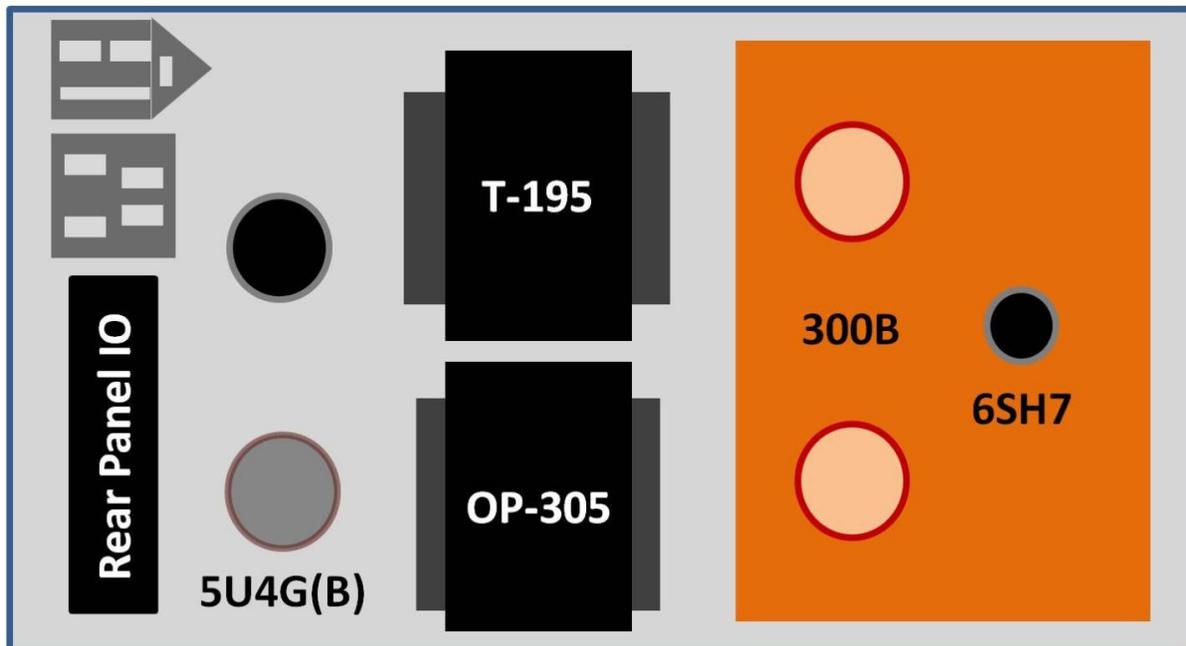
Section 3

The Transformers

3.1 Overview

In this section, having completed the main mechanical installation, we will install the transformers. We have 2 transformers to mount:

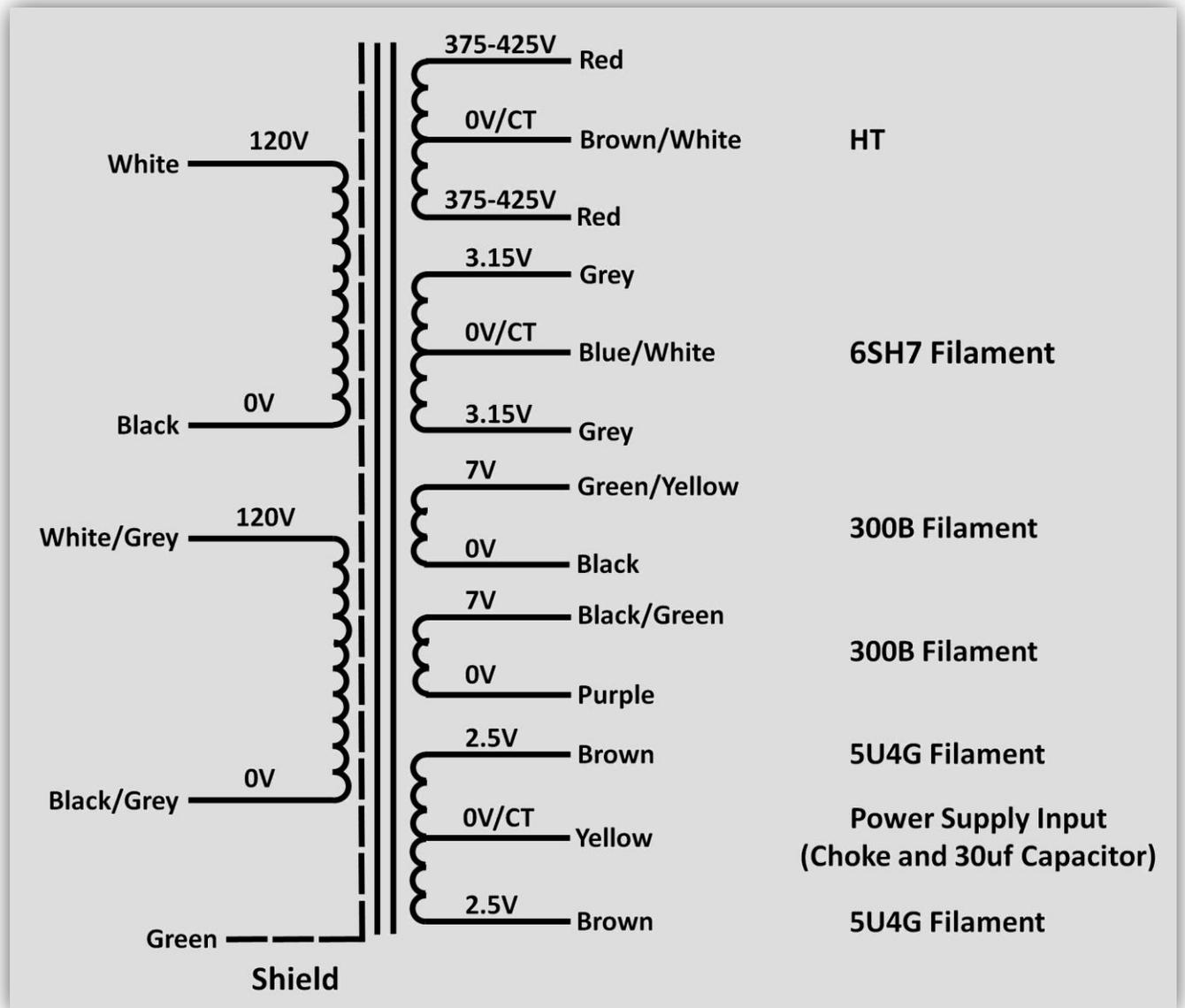
- ❖ T-195 Mains (Power) transformer
- ❖ OP-305 PSE 300B Output transformer

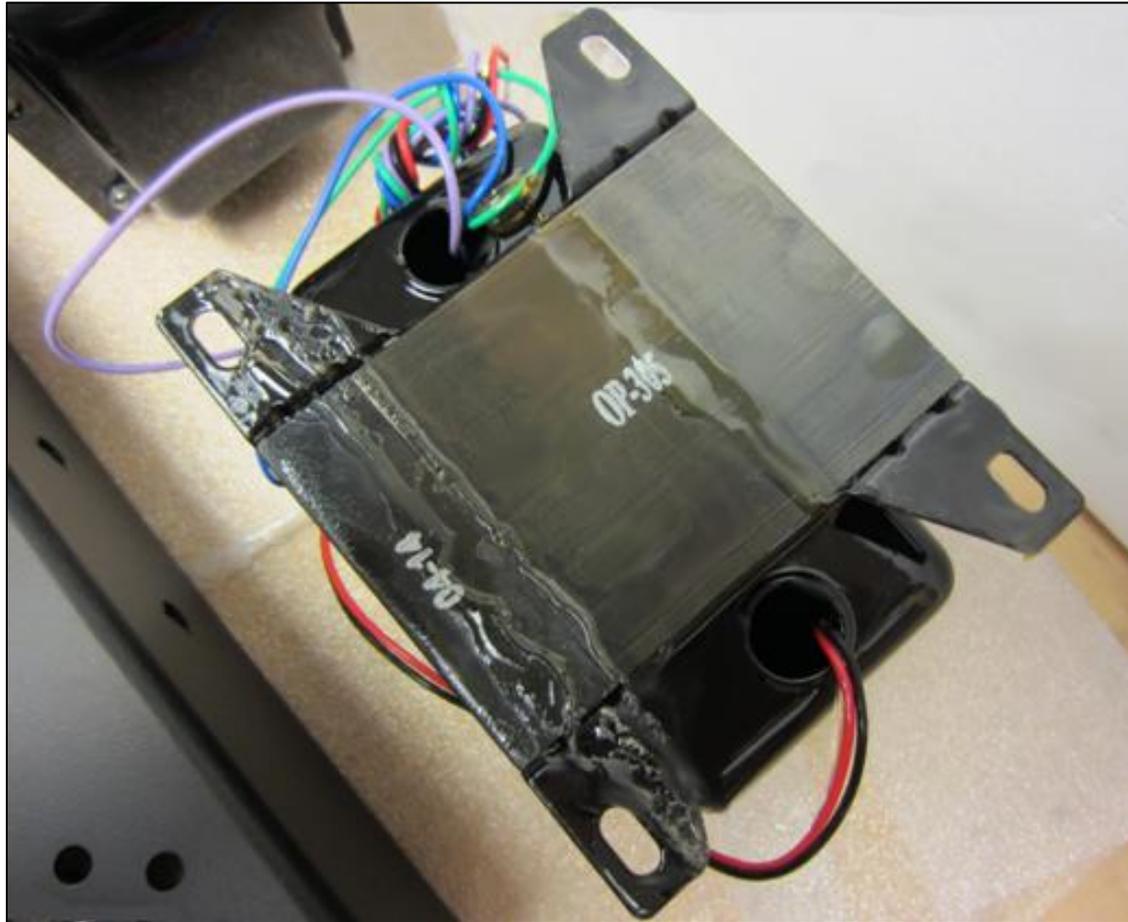


It's a good idea to read through this whole section prior to starting so you have a good idea of what is coming!

3.2 Installing the Mains Transformer

Let's start with the T-195 Mains transformer. This transformer has a Primary consisting of 5 wires (2 White, 2 Black, and 1 Green) and a Secondary consisting of 13 wires (a number of colors, as shown below).





A good first step is to bundle the Secondary wires together in 2 groups according to the different ways they are going to be used in the amplifier. This will make the wiring between components that we'll be doing later a whole lot easier.

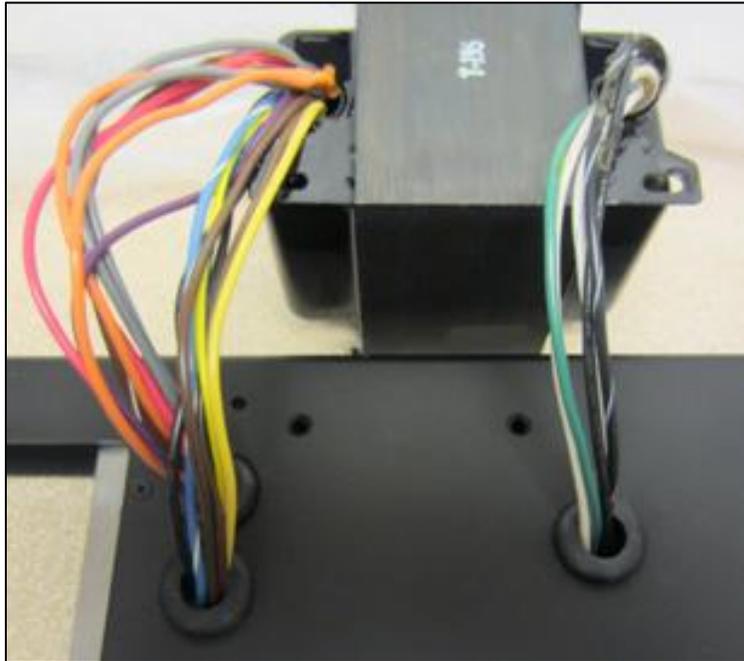
Bundle the following sets of Secondary wires together:

Bundle 1: 2 Red wires, 2 Orange wires, 2 Grey wires.

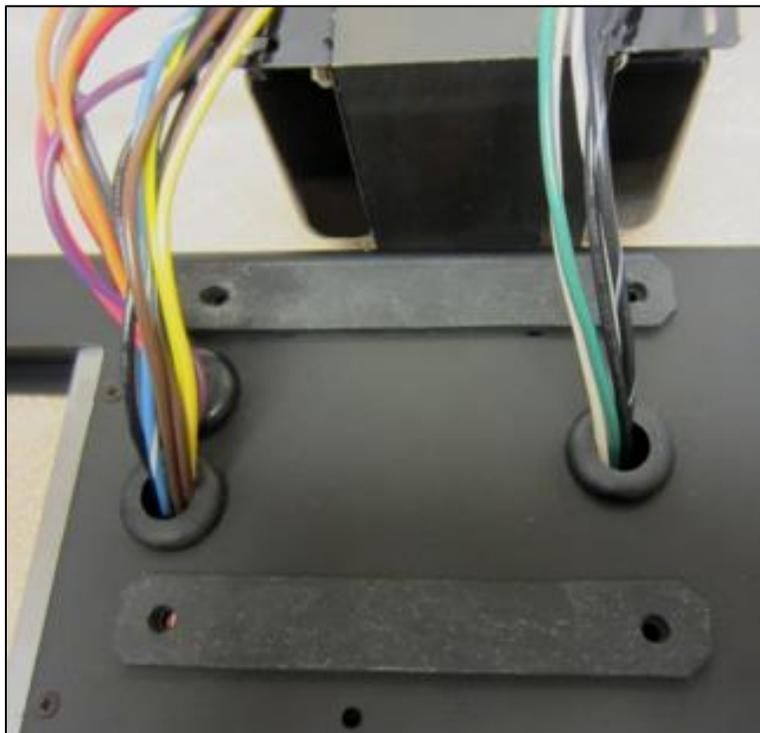
Bundle 2: The remaining Secondary wires.



While the Primary wires can be threaded through the grommet hole quite easily, the Secondary wires will need a little help: we suggest you give them a light spray with WD-40 so that they can slide through the grommet holes a little easier. Once all the wires are fed through you can use a cloth to wipe off any excess WD-40 spray.



- Lay the transformer down and feed the Primary wires through the single grommet and the Secondary wires through the two grommets, as shown above.
- Lay down the rubber strips under the Mains transformer as shown below — take your time and be patient.



- Feed the wires through the chassis and then carefully position the transformer over the rubber strips on the chassis, as shown below; it may seem difficult at first, but go slowly and be sure to position the transformer correctly.



Once the transformer is mounted on the chassis then put an M4 16mm screw into position and secure one corner of the transformer; keep it loose and continue to position the transformer so that the other screws will line up correctly.

Once the transformer is mounted on the chassis then put an M4 16mm screw into position and secure one corner of the transformer; keep it loose and continue to position the transformer so that the other screws will line up correctly.



Primary side



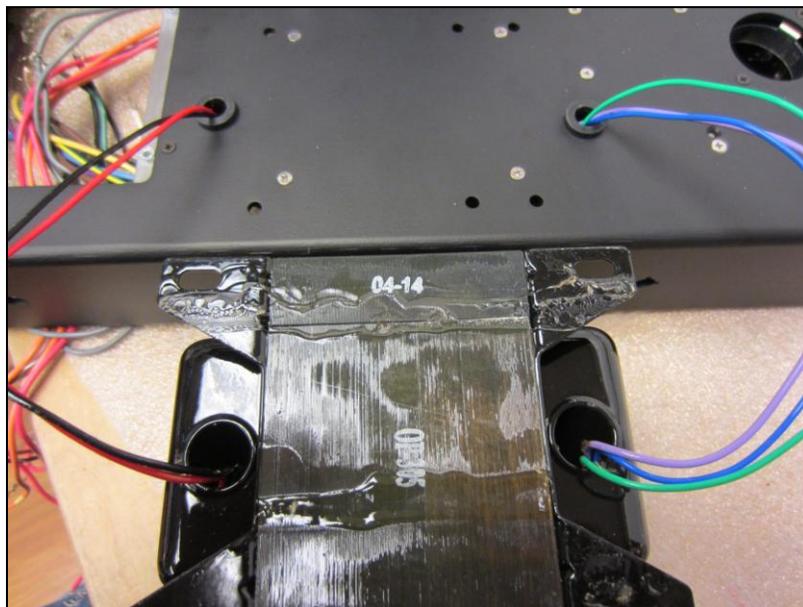
Secondary side



View of transformer bolted into position

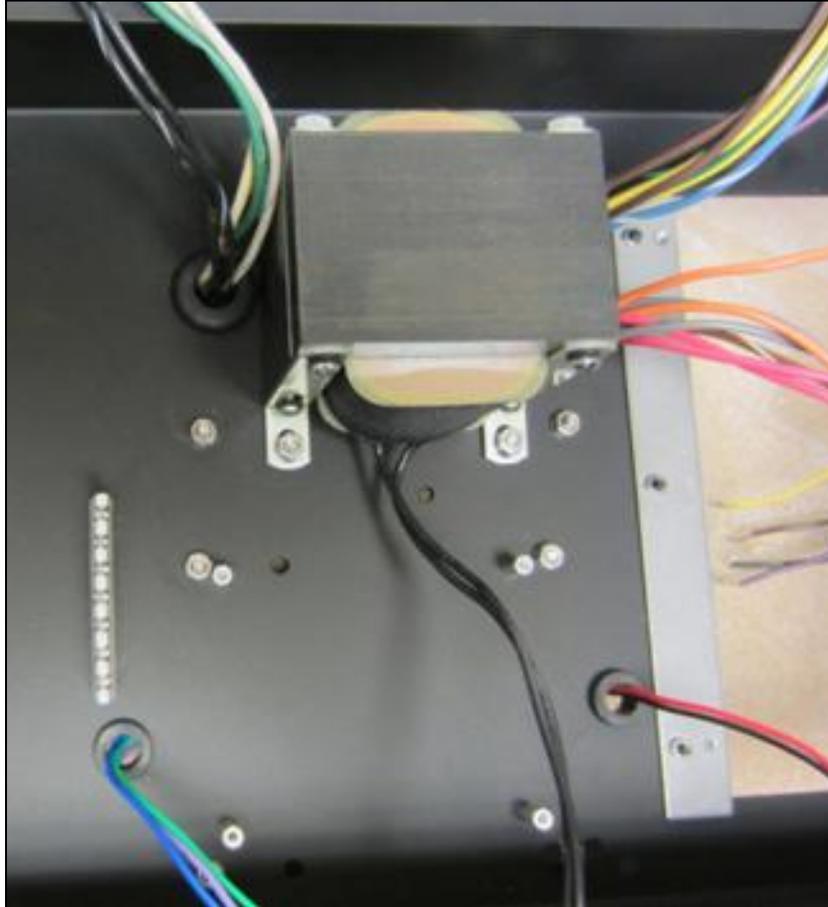
3.3 Installing the Output Transformer

Once the Mains transformer is positioned and secured we can install the much easier Output transformer. For the Parallel 300B/2A3 we use the OP-305 transformer and for the Single 300B/2A3 we use the OP-300 transformer.



- Install and secure the Output transformer as shown on the previous page. *Be sure to orient it such that the Primary (the Red and Black wires) is closest to the Front Insert Plate.*

Here's a view of the underside showing the transformer wires coming through the chassis.



Phew!

Congratulations on completing the Transformer installation section.

Another cup?



Section 4

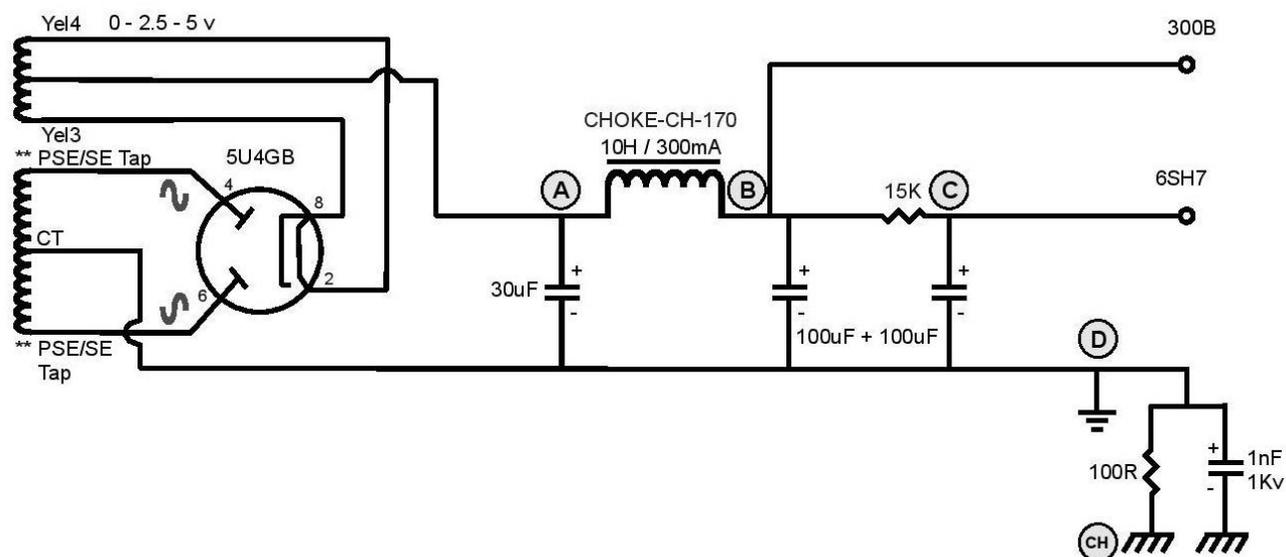
The Power Supply

4.1 Overview

In this section we will be installing and wiring the Power Supply. It's quite a long and fairly complex job, so be sure to tackle it when you're fresh.

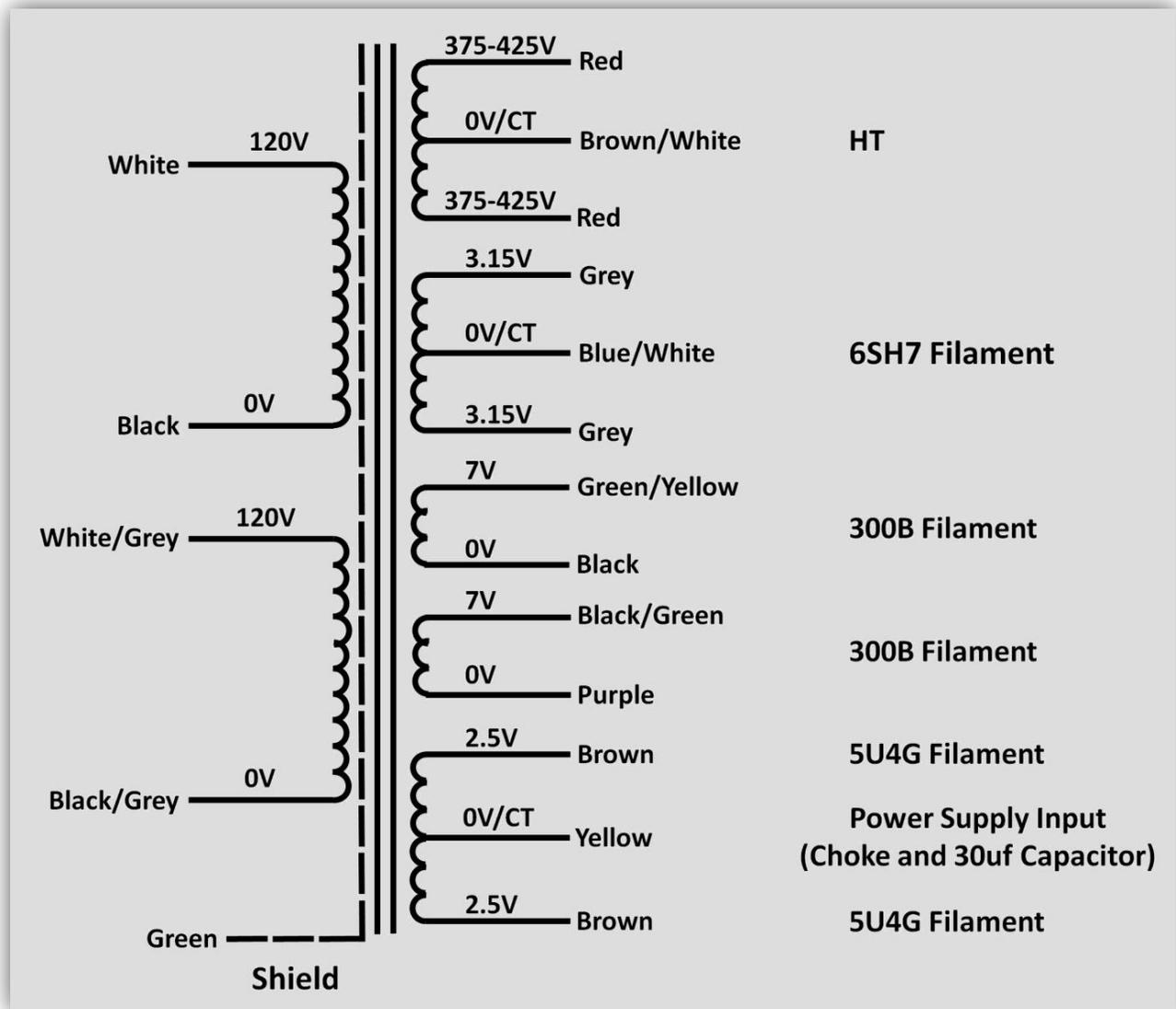
As we move forward with the wiring, there will be pictures and graphics in the manual to guide you. There are also higher definition pictures and graphics you can refer to on your disk. If you really value how your amplifier will look inside, you should take your time and consider how to route the many wires that will connect the transformers, Choke, ceramic posts, and the chassis mounted resistor and capacitors.

Here is a schematic and brief description of the Legend Power Supply:



A 5U4-G rectifier tube takes the high voltage from the Mains Secondary and passes it to a 30uF capacitor and a 10H/300ma Choke (A). On the output of the Choke (B) is a 100uf capacitor to ground, a 15K resistor, and another 100uf capacitor. The voltage after the Choke is sent directly to the Output transformer Primary to provide the B+ for the 300B tube and the voltage after the 15K resistor (C) is the B+ for the 6SH7 tube.

Let's have another look at how the Mains transformer is constructed:

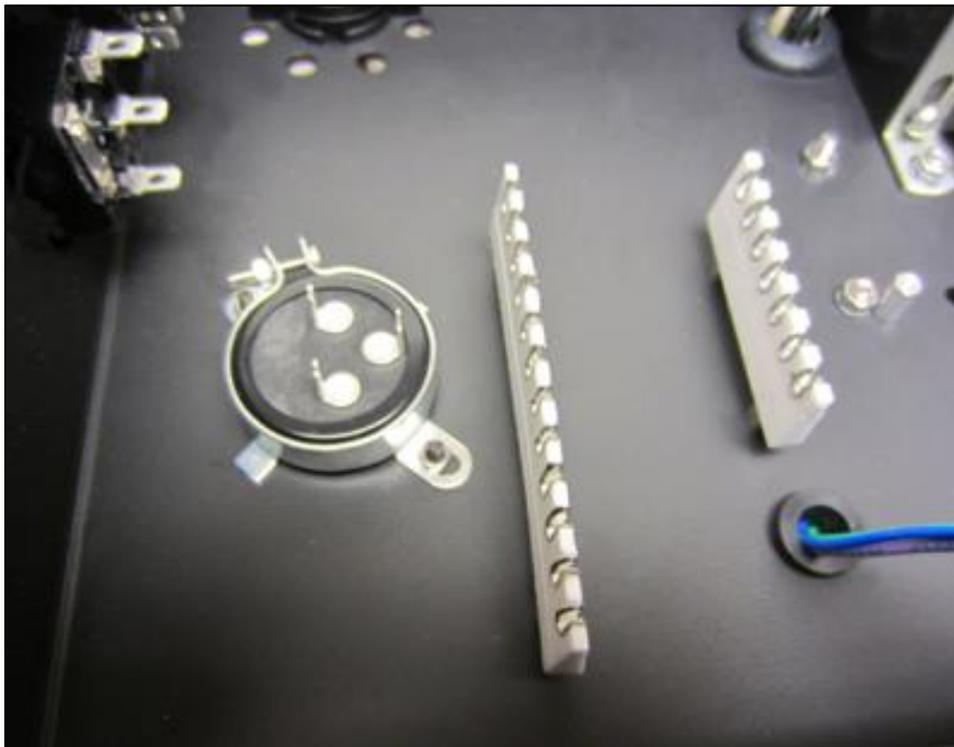


4.2 Installing the Chassis-Mounted Capacitor

- Install the 35mm capacitor clamp into position and secure with the supplied hardware.



- Position the 100+100uf capacitor as shown below:



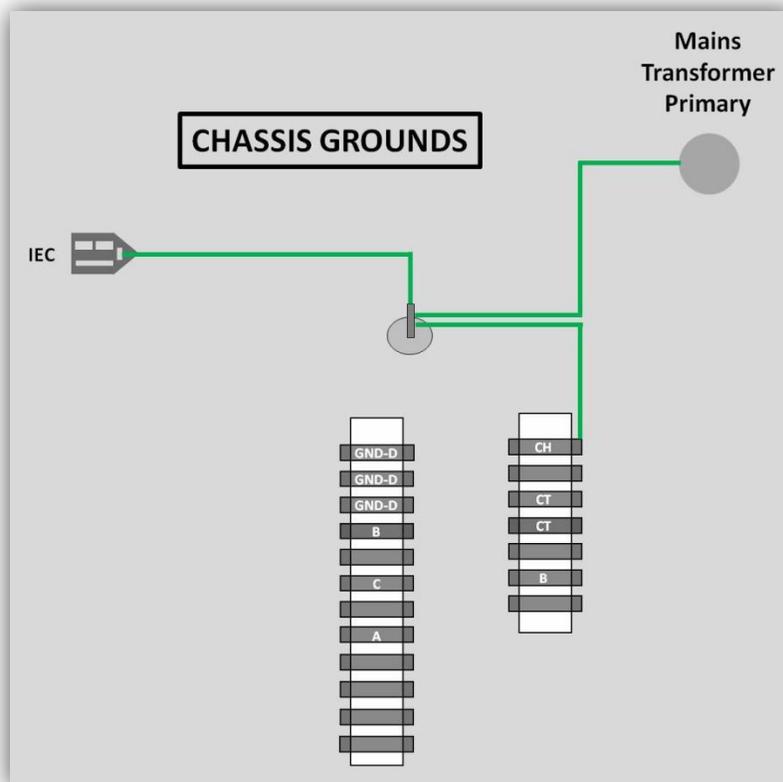
4.3 Preparing the Chassis Ground

Now we'll prepare the Green Chassis Ground wires that we are going to connect it to the Chassis Ground (the unpainted Mains transformer screw).

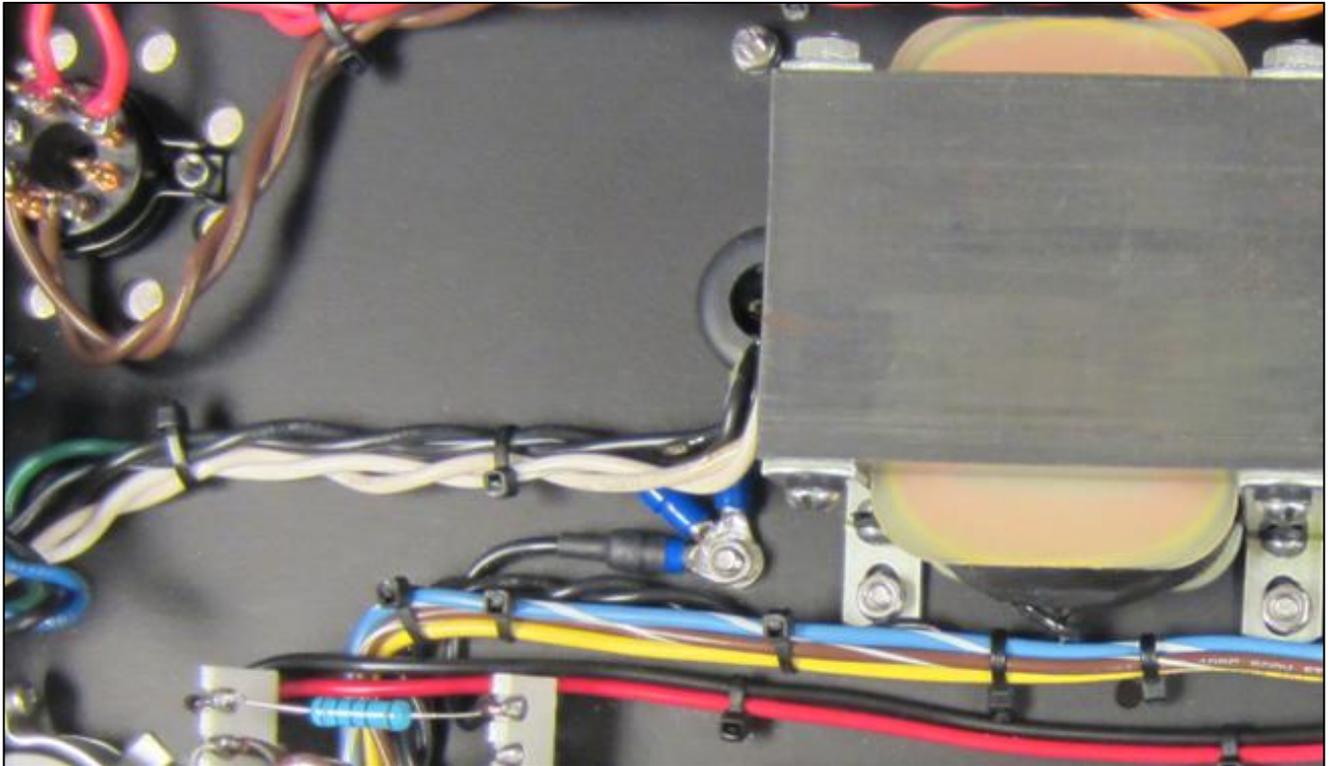
- Take the Green wire coming from the Mains transformer. Extend the wire past the Chassis Ground, then strip and tin the wire.
- Add a lug to the tinned wire and then solder the lug onto the wire. Do this by adding solder through the front of the lug, as shown below.



Referencing the following graphic:



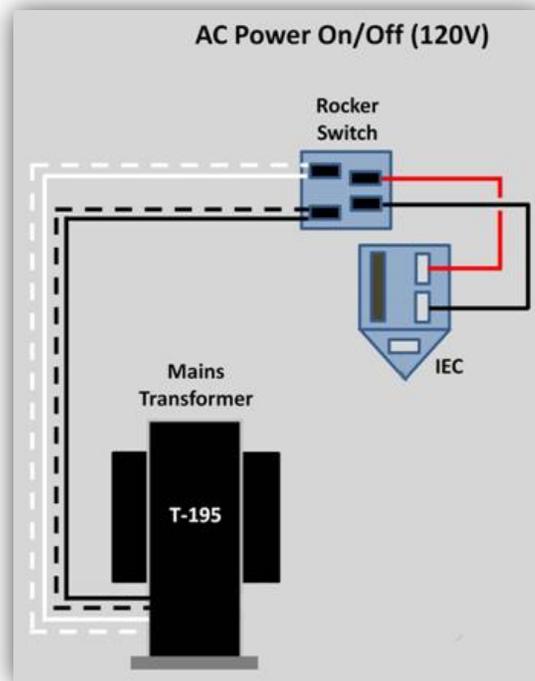
- Similarly, tin a Green (or Black, it doesn't matter) wire long enough to reach from the Chassis Ground to the CH of the 7-position ceramic post, add a lug to the tinned wire and then solder the lug onto the wire.
- Connect the wire you just prepared to CH of the 7-position ceramic post.
- Take the prepared Green wire with a crimp on one end and a lug on the other end and connect the crimped end to the GND post of the IEC socket.
- Now take the lug ends of the 3 Green wires and attach them to the Chassis Ground. Add a nut and gently tighten. We may be moving the wires a little later so there's no need to tighten it too much!



Here you can see the 3 wires attached to the Chassis Ground.

4.4 Wiring the IEC, Rocker Switch, and Mains Transformer

Let's have a look at how we're going to do this:



We've provided a number of pre-made cables and parts for this section to make it easier and neater:

- ❖ 2 crimps
- ❖ Heatshrink
- ❖ Red/Black twisted cable with crimps

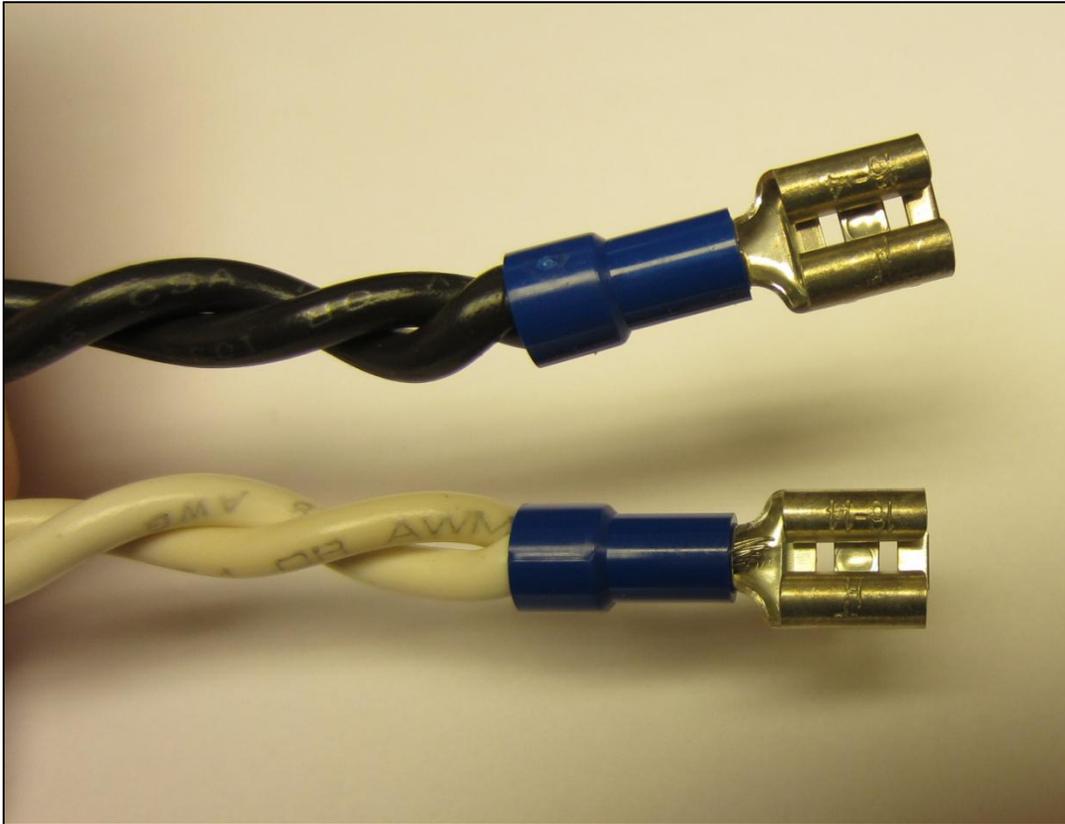
For 120V operation, take the twisted White/White-Grey and twisted Black/Black-Grey pairs of wires coming from the Mains.

Let's start with the White/White-Grey pair:



Have a look at the step below, then consider this tip. You may want to trim the tinned wire to the desired length and then place the crimp over the tinned bare wire. If it doesn't fit try smoothing out the tinned wire with soldering iron then add some solder in the hole showing: use a fine-tipped soldering iron and make sure the solder "takes" such that the solder is shiny and the wire has accepted the solder.

- Cut these wires³, strip the ends off, twist the two ends together, tin them, add a crimp to the end, solder the wires onto the crimp, and then install the heatshrink (👉)

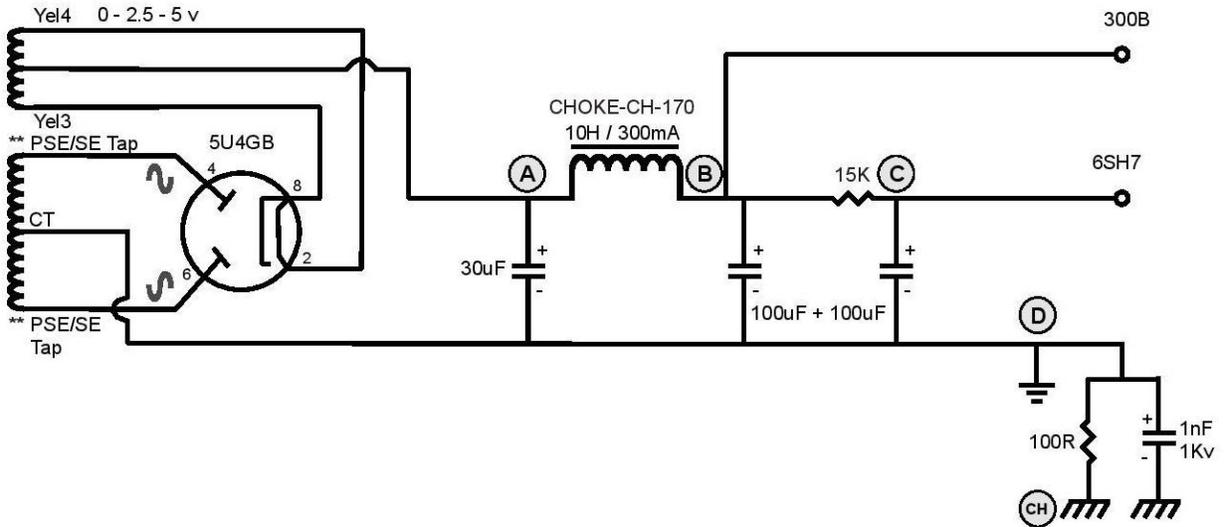


- Similarly, prepare the Black/Black-Grey pair.
- Push the crimped White/White-Grey and Black/Black-Grey Mains Primary wires that you've just prepared onto the wider spread lugs of the Rocker Switch, as shown in the graphic above.
- Take the prepared Red/Black twisted cable and complete the connections as shown in the graphic.

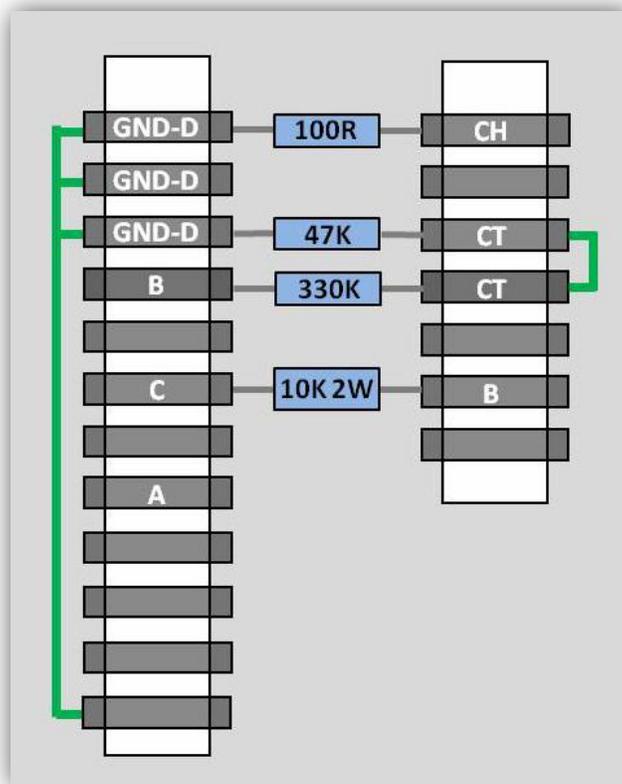
³ Leave about 5 inches of twisted White/White-Grey wire, at least.

4.5 Installing the Resistors

As you can see in this schematic, we've labeled key points A, B, C, and D. This should help us keep our bearings.



Have a look also at this graphic, which shows the job at hand. Note the points labeled A, B, C, and D.



A Word About the Aesthetics of Your Build

Now, as you begin to install resistors and capacitors — and wire the connections between the various parts of the amplifier, you'll soon realize (no surprise!) that you could complete the details of your build in a number of different ways. For example, you could use different wire colors; you could make short connections between lugs on a ceramic post (say between grounds) using bare wire instead of insulated wire; or you could install some components on the opposite side of a tag strip from what you see in a graphic or a picture. You should know that the graphic representation of how the wiring is done isn't a template; more often than not, the choice of how to position components and wires — and how to connect them — is made to keep the representation neat and readable. And the build pictures are simply a record of how one person did it; you may prefer to do it differently.

All that really matters is that you make the correct connections. The aesthetics of the build are yours to imagine and decide. Just do it your way; it'll turn out best that way.

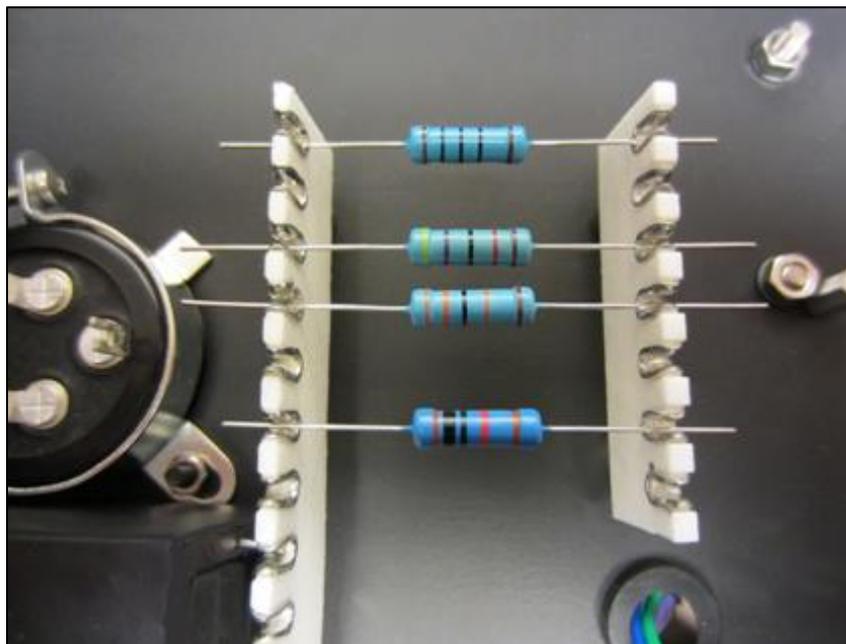


As you'll soon find out, there are multiple connections to a number of ceramic post points: as many as five! Therefore, take it easy — don't use too much solder and leave enough space as you 'climb higher' in the slot for the remaining connections. It may be helpful to have a look ahead now at the following summaries of the connections to be made to the ceramic posts:

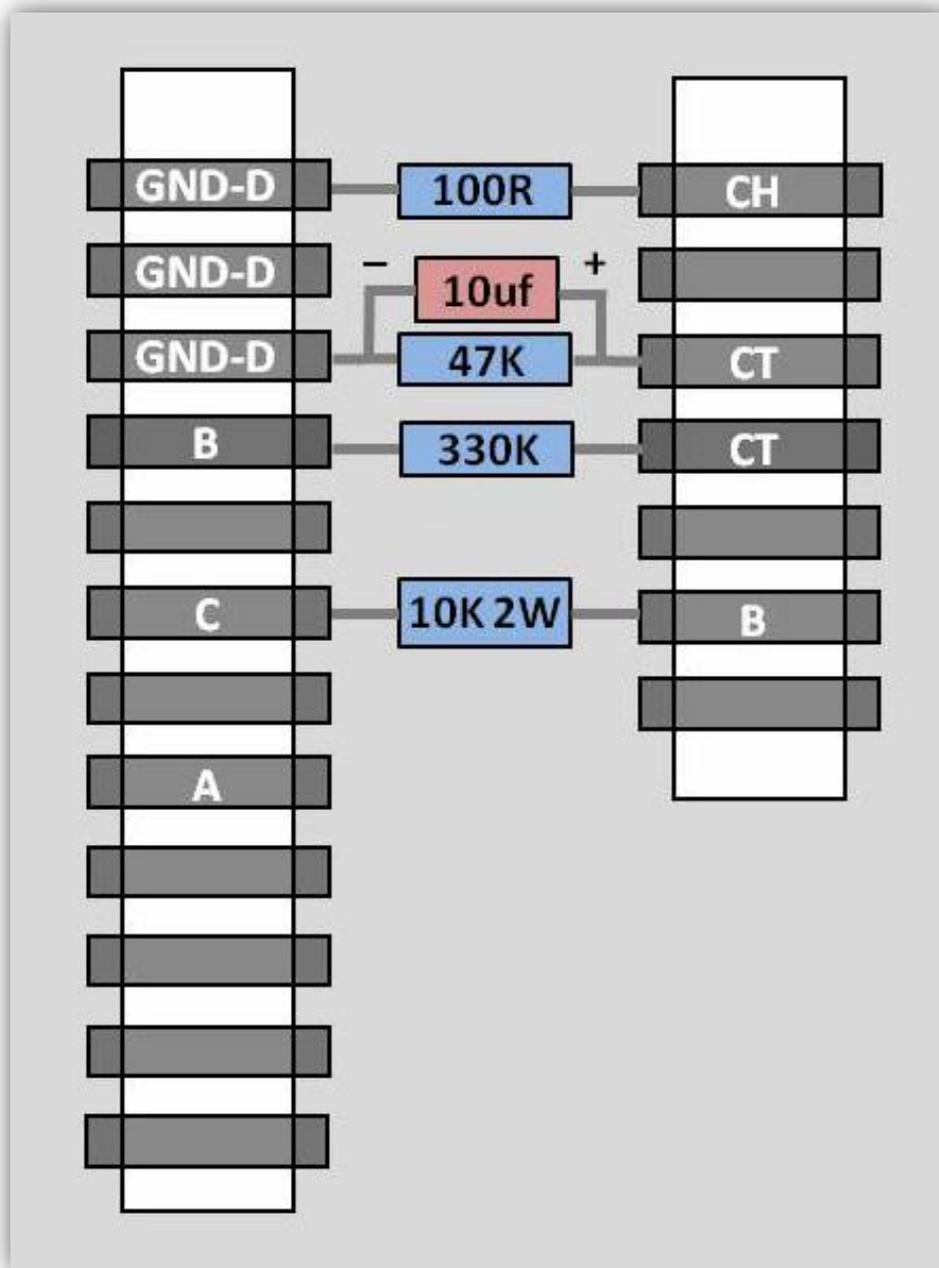
7-position Ceramic Post					
CH	Green wire to Chassis Ground		Thru 100R resistor to 12-position post top GND-D		
	Not connected				
CT	Green wire to next down CT	Thru 47K resistor to 12-position post third down GND-D	From Positive of 10uf capacitor thru to 12-position third down GND-D		
CT	Green wire to next up CT	Thru 330K resistor to 12-position post B		Blue/White wire from Mains Secondary	
	Not connected				
B	One Black wire from Choke	Black wire from Output transformer Primary	Thru 10K 2W resistor to 12-position post C	Red wire to 12-position post B	Black wire from 100+100uf capacitor Positive
	Not connected				

12-position Ceramic Post				
GND-D	Black wire to Tag Strip I-GND	Green wire to next down GND-D	Green wire to bottom post position	Thru 100R resistor to 7-position post CH
GND-D	Brown/White wire from Mains Secondary	Green wire to next up GND-D	Green wire to next down GND-D	
GND-D	Red wire from 100+100uf capacitor Negative	Green wire to next up GND-D	Thru 47K resistor to 7-position post top CT	From Negative of 10uf capacitor thru to 7-position post top CT
B	Thru 330K resistor to 7-position post bottom CT		Red wire to 7-position post B	
	Not connected			
C	Thru 10K 2W resistor to 7-position post B	Black wire from 100+100uf capacitor Positive	Red wire to Tag Strip M	
	Not connected			
A	Yellow wire from Mains Secondary	One Black wire from Choke	One end of 30uf Mundorf capacitor	
	Not connected			
	Not connected			
	Not connected			
	One end of 30uf Mundorf capacitor		Green wire to top GND-D	

- Position the resistors into the ceramic posts, as shown below, and solder the connections.

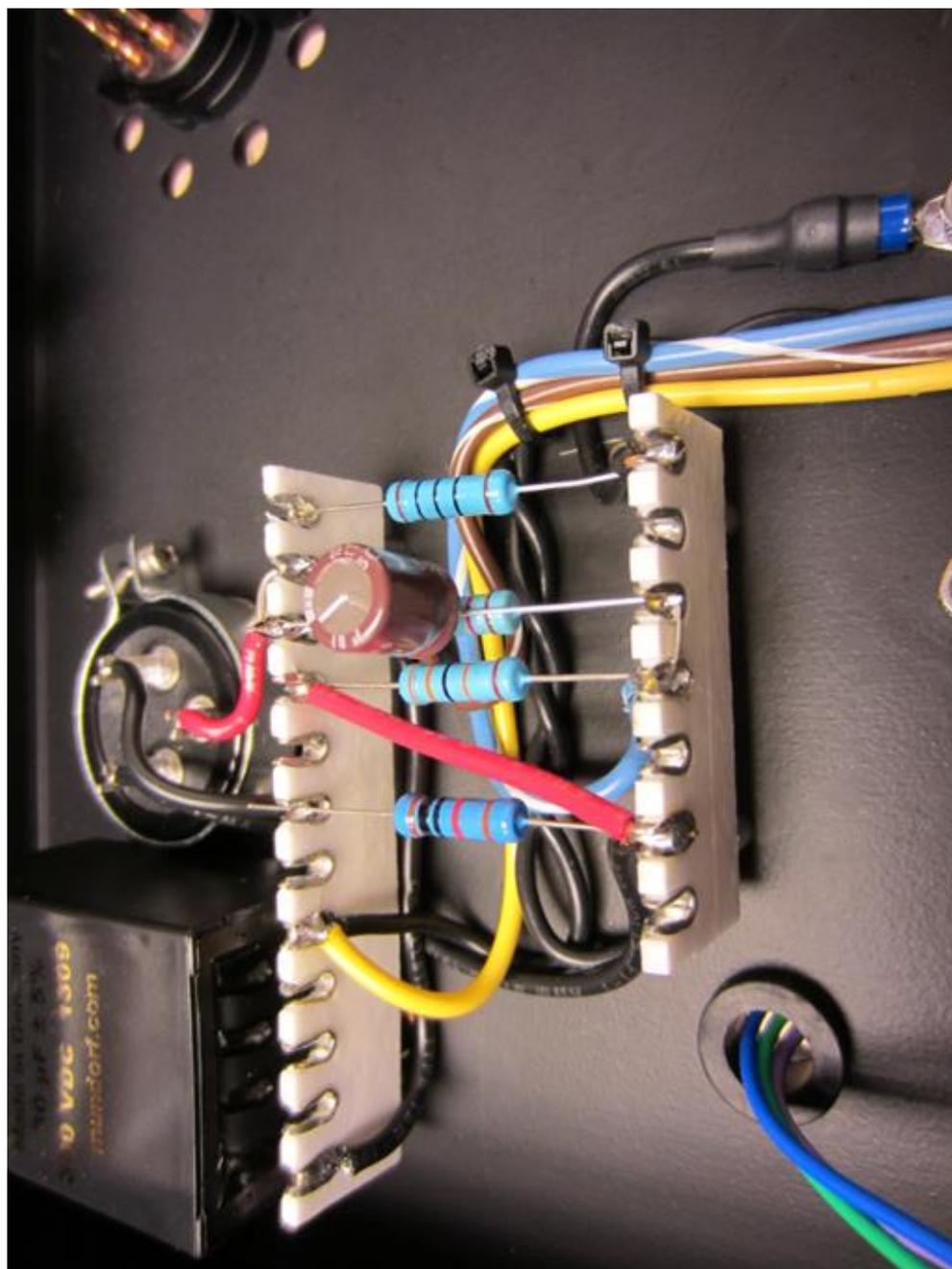


Now we'll add the 10uf electrolytic capacitor across the 47K resistor.

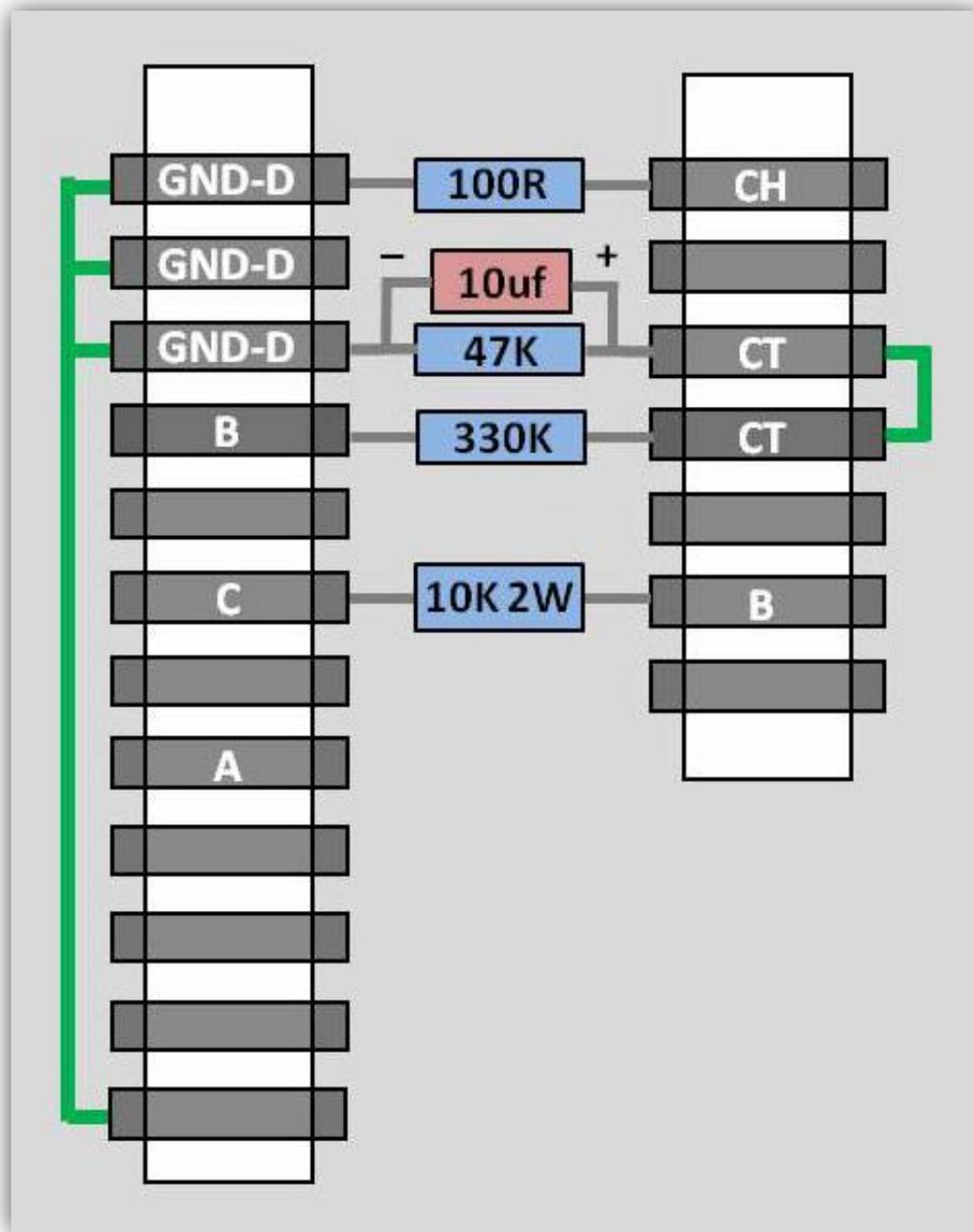


- Position and connect the 10uf electrolytic capacitor across the 47K resistor as shown above, with the **NEGATIVE** (wide stripe) lead connected to the third from the top GND-D on the 12-position post and the **POSITIVE** lead connected to the top CT on the 7-position post.

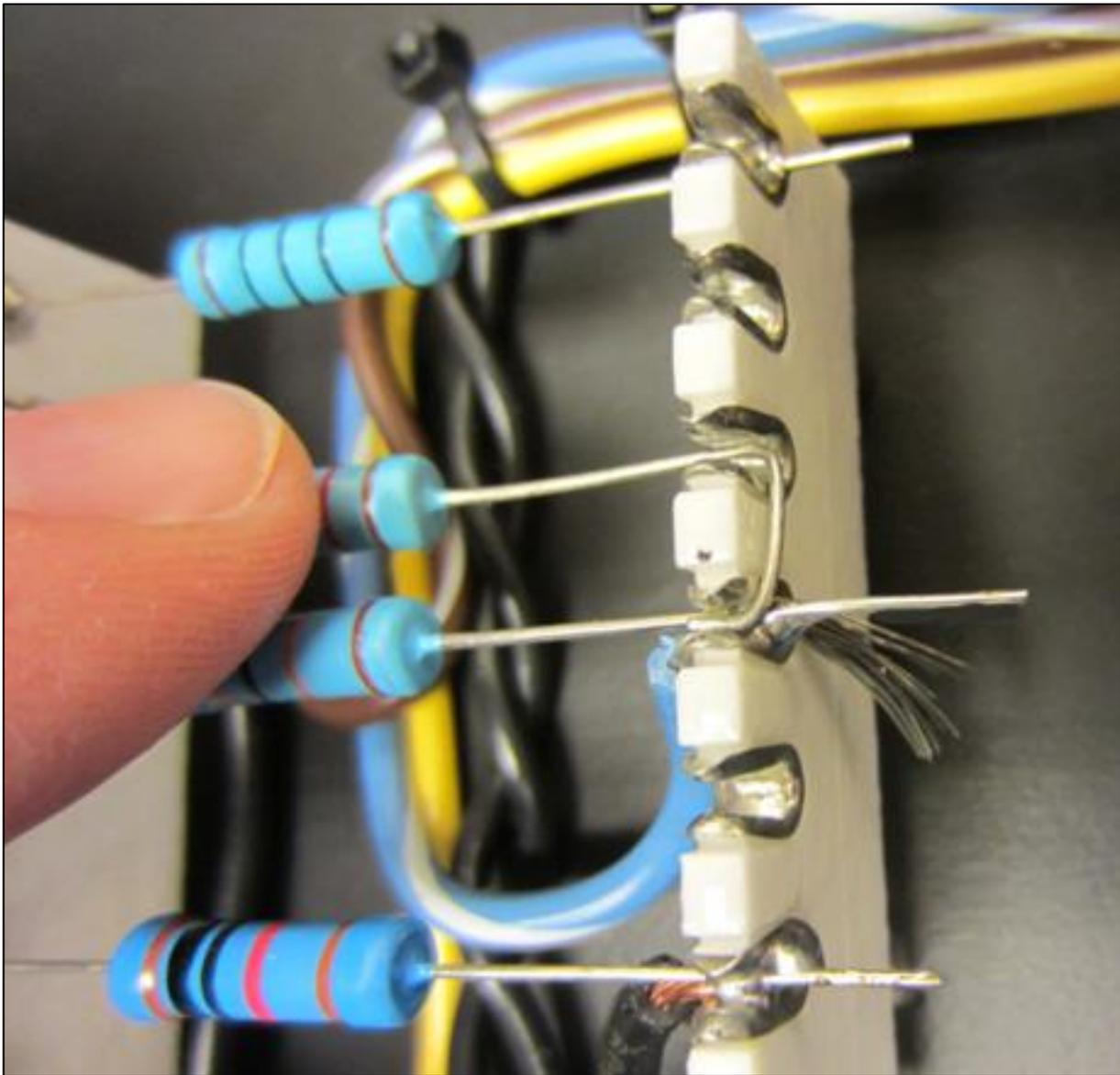
Here's a picture from the build:



- Finally, make the additional ground connections in both ceramic posts, as shown below. (You can use Green or Black wire — or, for the adjacent jumpers, you can just use bare wire.) Have a look at an imaginative way to make a jumper, on the next page.

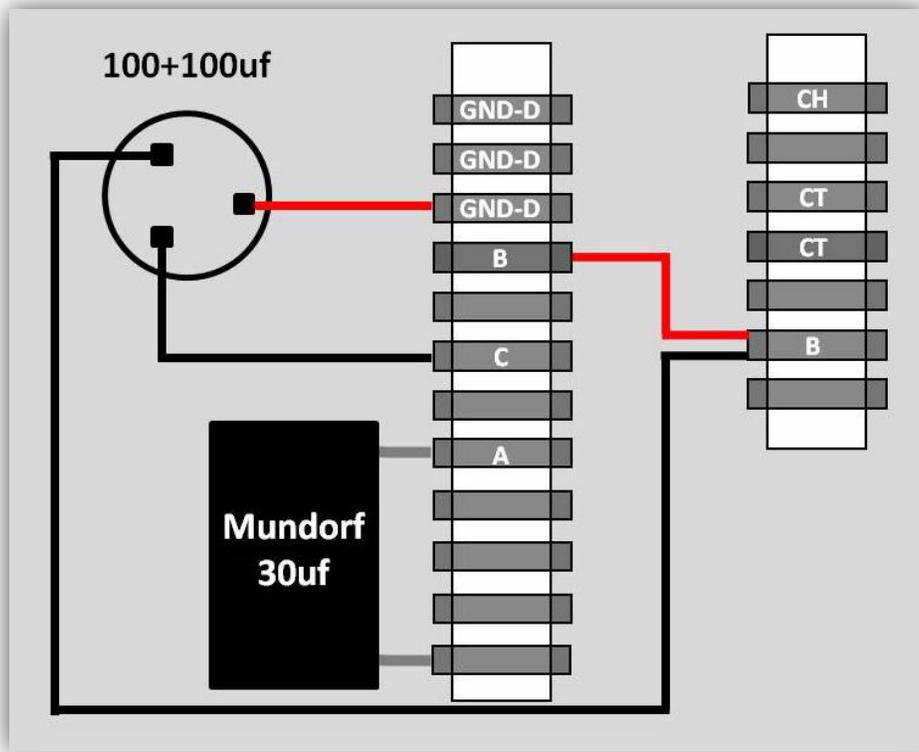


You can even make a jumper by bending a resistor lead. Here's a picture of the 47K resistor bent in such a way as to make the jumper on the 7-position post:

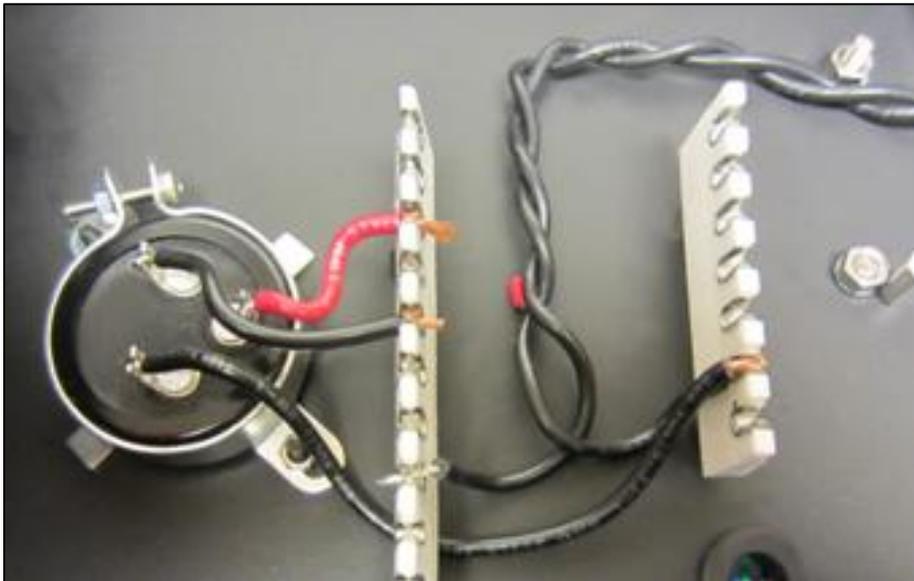


4.6 Wiring the Chassis-Mounted Capacitor

Referencing the following graphic:



- Take solid core Red and Black wire supplied in the wire bag and connect the 100+100uf capacitor into position as shown above and below.

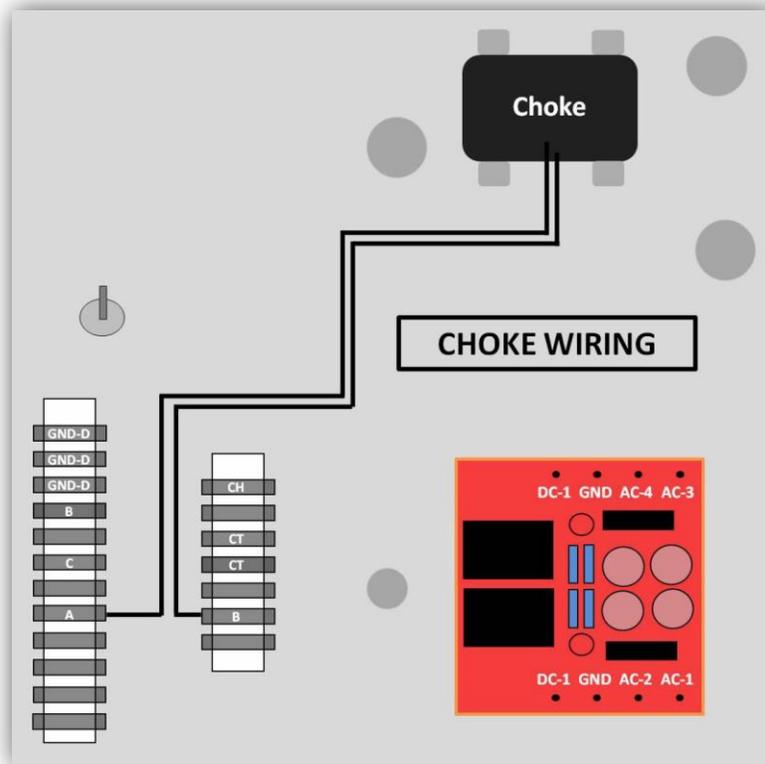


- Lay down a piece of Blue Tak on the chassis underneath where the rectangular Mundorf 30Uf capacitor will be installed.
- Install the 30uf Mundorf capacitor into position. This is a film cap so there is no polarity, but you may as well have the writing facing up towards you.

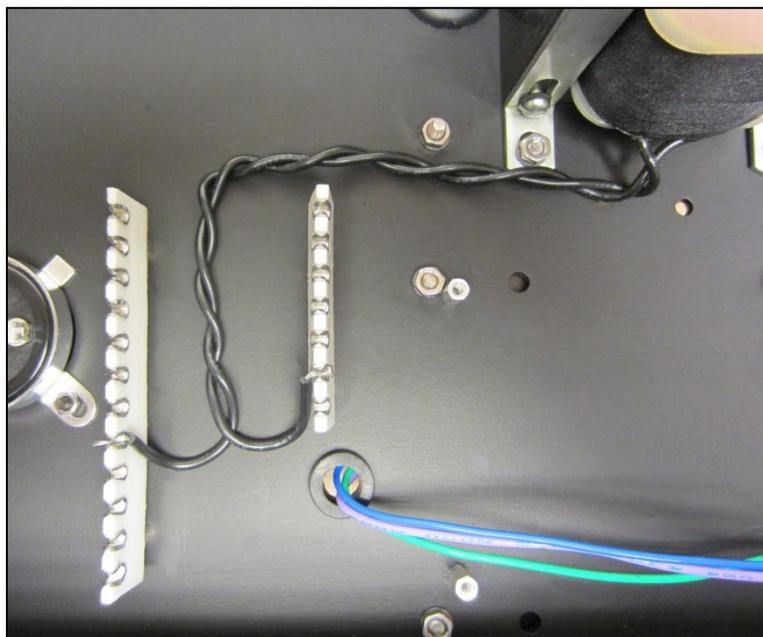


4.7 Connecting the Choke

Referencing the following graphic:

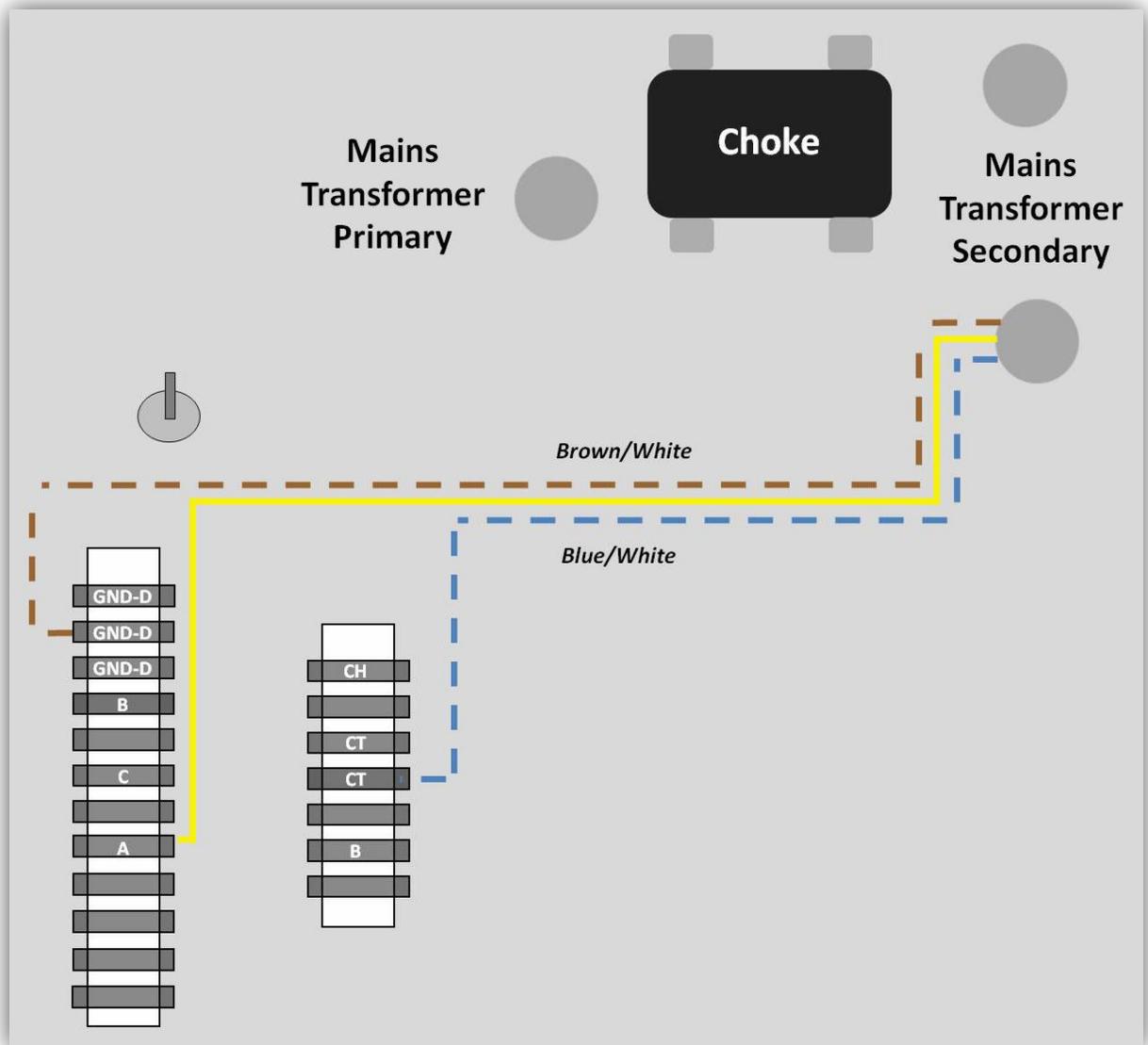


- Connect the 2 wires coming from the Choke, as shown above and below. Either wire can go to either post.



4.8 Initial Mains Secondary Wiring

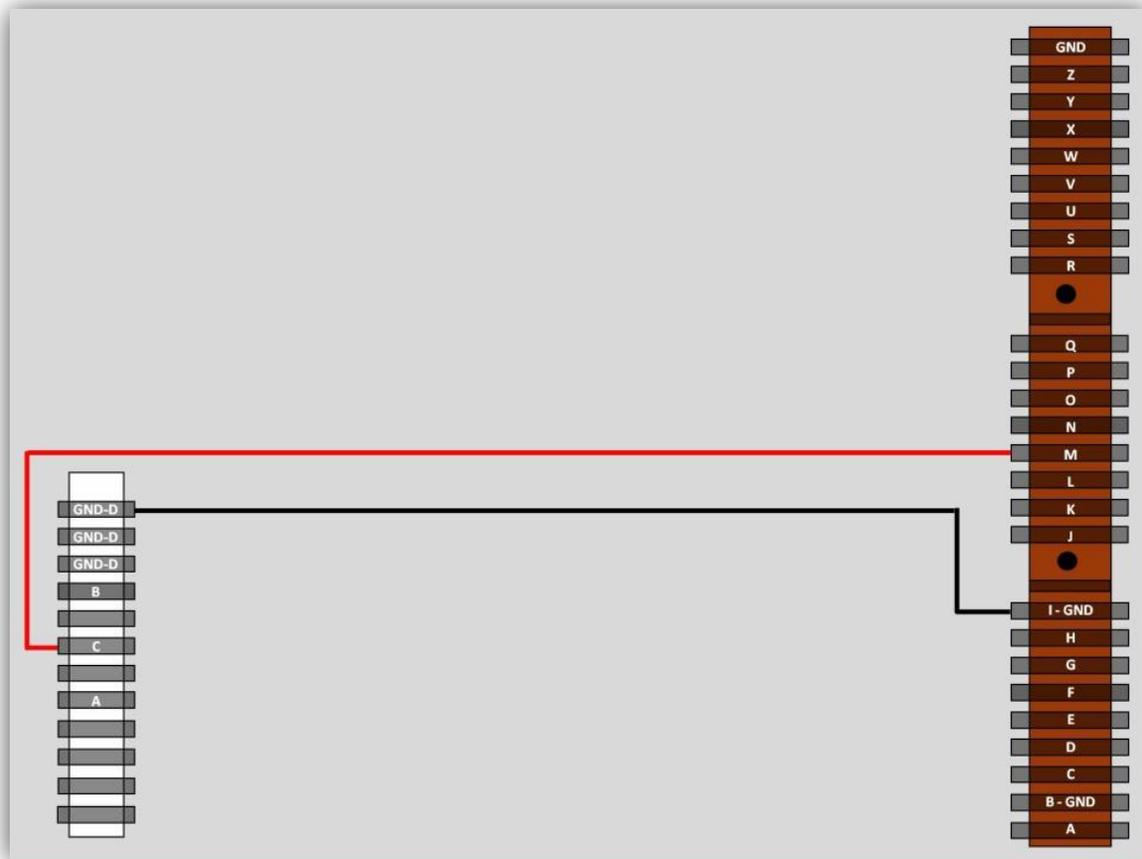
Now we'll connect three wires from the Mains transformer Secondary to the ceramic posts, as shown below:



- Connect the Brown/White wire from the Mains Secondary to the second from the top GND-D on the 12-position post.
- Connect the Yellow wire from the Mains Secondary to A on the 12-position post.
- Connect the Blue/White wire from the Mains Secondary to the bottom CT on the 7-position post.

4.9 Power Supply to Front Insert Plate Wiring

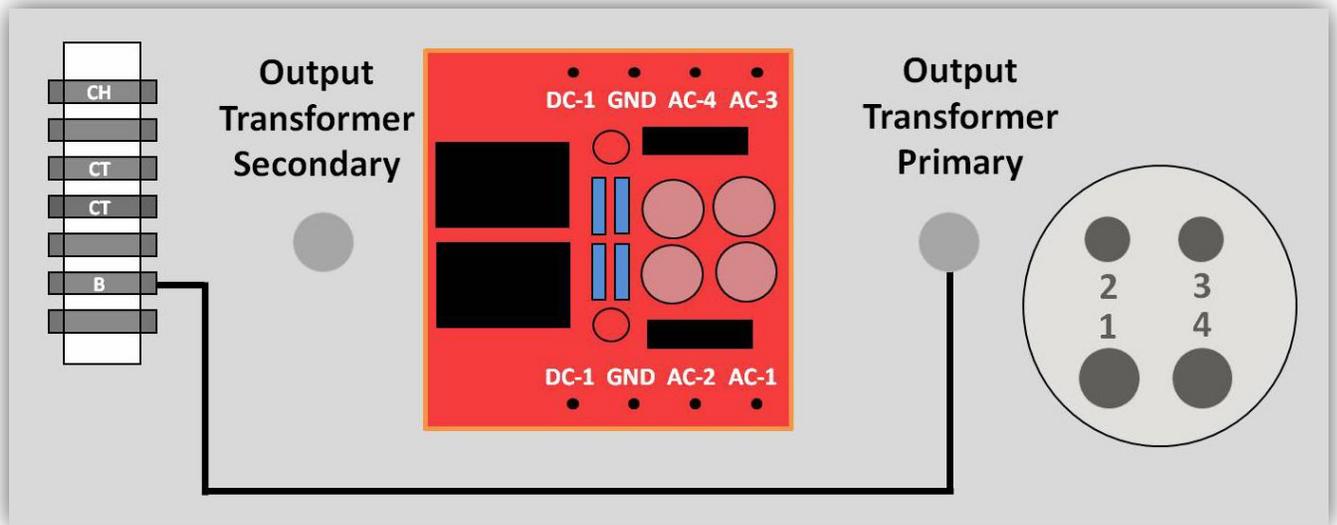
While we working around the Power Supply, let's prepare the connections to the Front Insert Plate. We'll only connect the wires at the ceramic post end for now.



- Cut 2 long pieces of 18g Red and Black wires. (Measure them to go to M and I-GND on the Front Insert Plate, and allow a fair bit extra as we really don't know at this point how wires will be routed.
- Connect one end of the Red wire to C on the 12-position ceramic post, as shown above.
- Connect one end of the Black wire to the top GND-D on the 12-position ceramic post.

4.10 Connecting the Output Transformer

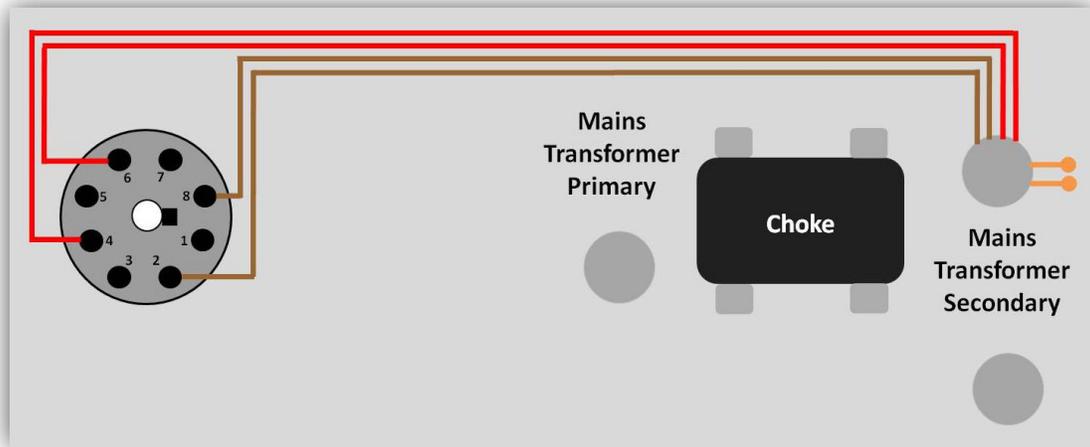
The last connection that we'll make to the Power Supply is the Black wire from the Output transformer. This wire comes from the grommet near the front of the chassis by the Filament Supply board.



- Connect this Black wire to B on the 7-position ceramic post.

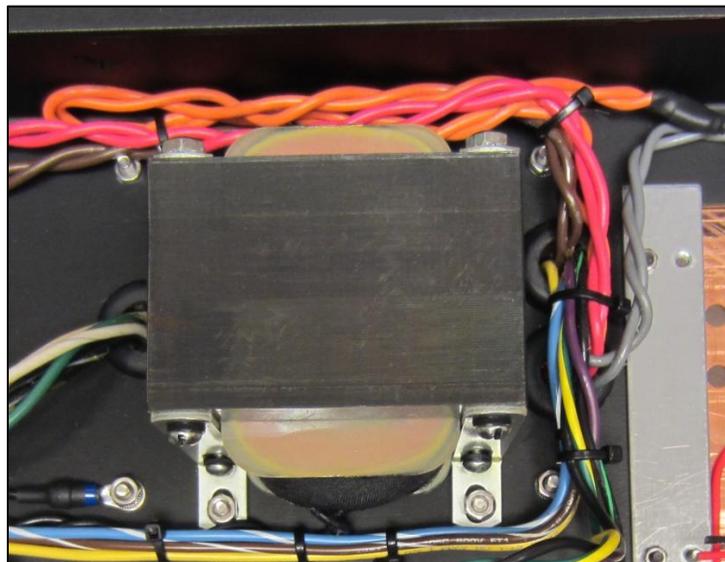
4.11 Wiring the Rectifier Filaments

The final step in completing the Power Supply is to connect the high voltage Mains Secondary to the 5U4-G rectifier's 8-pin valve base. Have a look at the following graphic and pay special attention to the notch in the valve base which serves as a reference point for the pin numbering:



- Connect the two Red twisted wires to pins 4 and 6 of the 8-pin valve base. It doesn't matter which of the Red wires goes to which pin since they both carry AC that is out of phase with each other.
- Connect the two Brown twisted filament wires to pins 2 and 8 of the 8-pin valve base. Again, it doesn't matter which of the Brown wires goes to which pin.

The two Orange wires will not be used for a 300B build. So, just cut the exposed end of the Orange wires off, cover the ends with a pair of small twist-on wire connectors or tape, and tie them with a cable tie. Position them out of the way — between the Choke and the side of the chassis, as shown below:



Congratulations! This completes the Power Supply section.



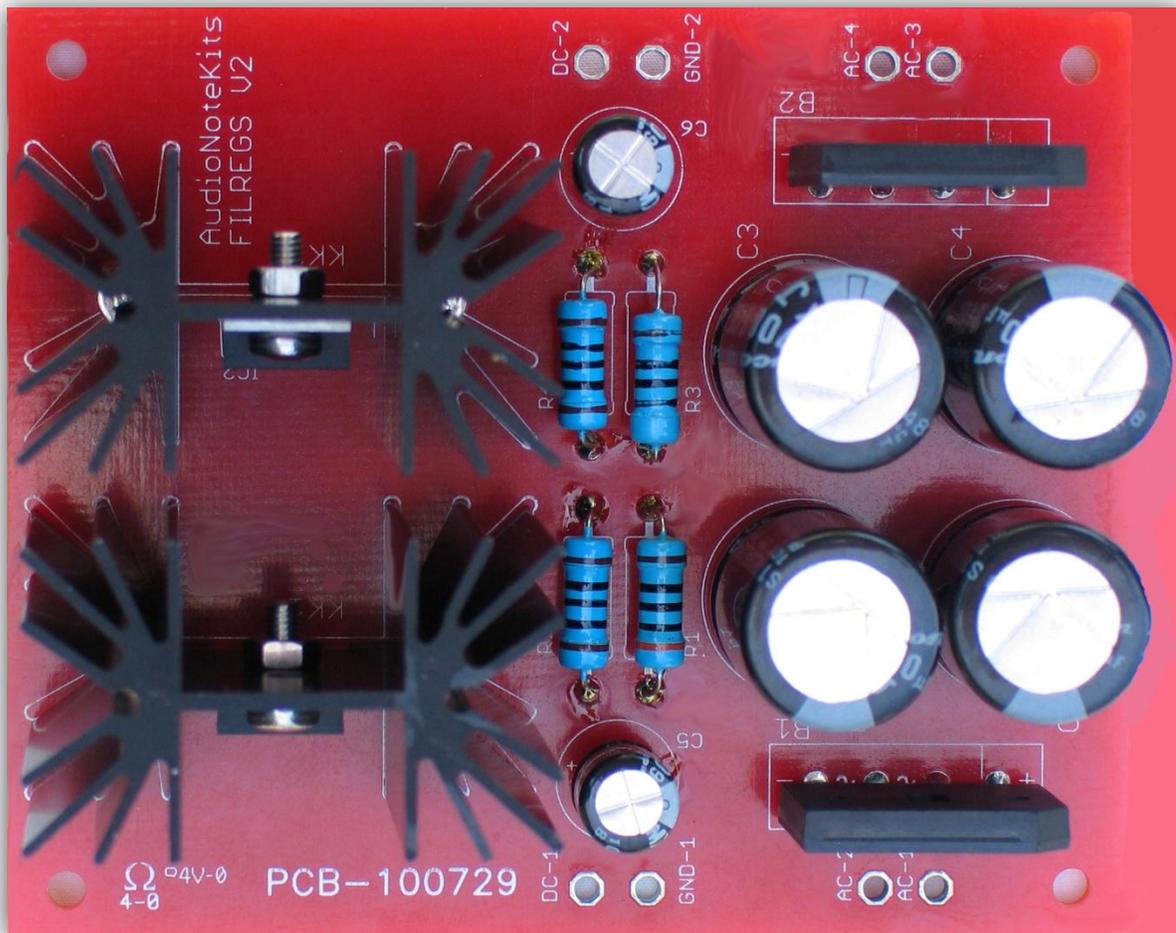
Before you go any farther, we strongly recommend that you go back to the beginning of the Power Supply section, and check every connection carefully!

Section 5

The Filament Supply Board

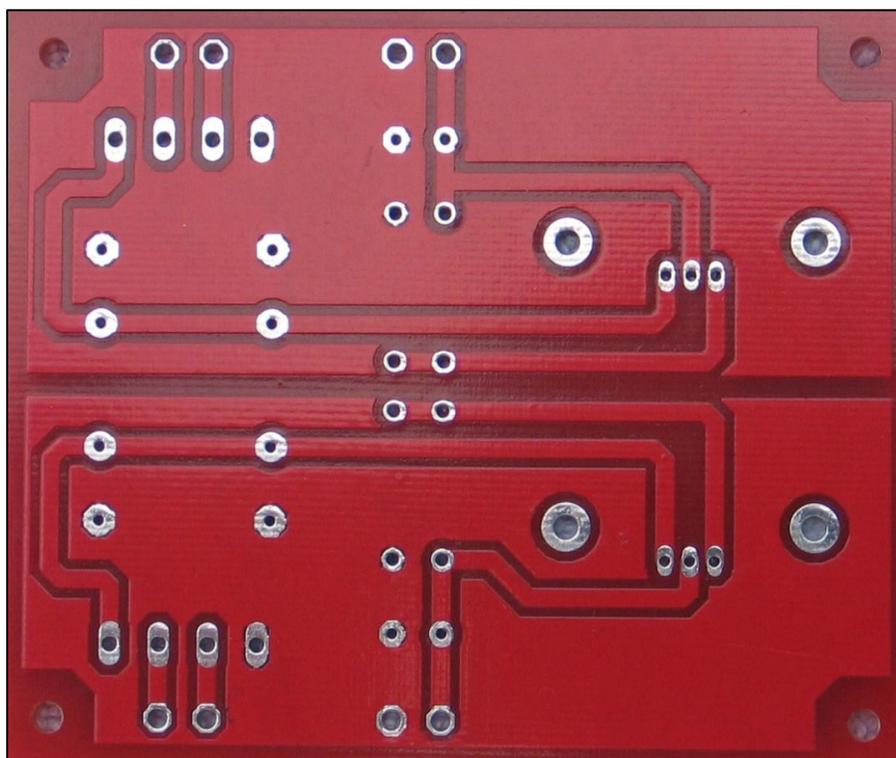
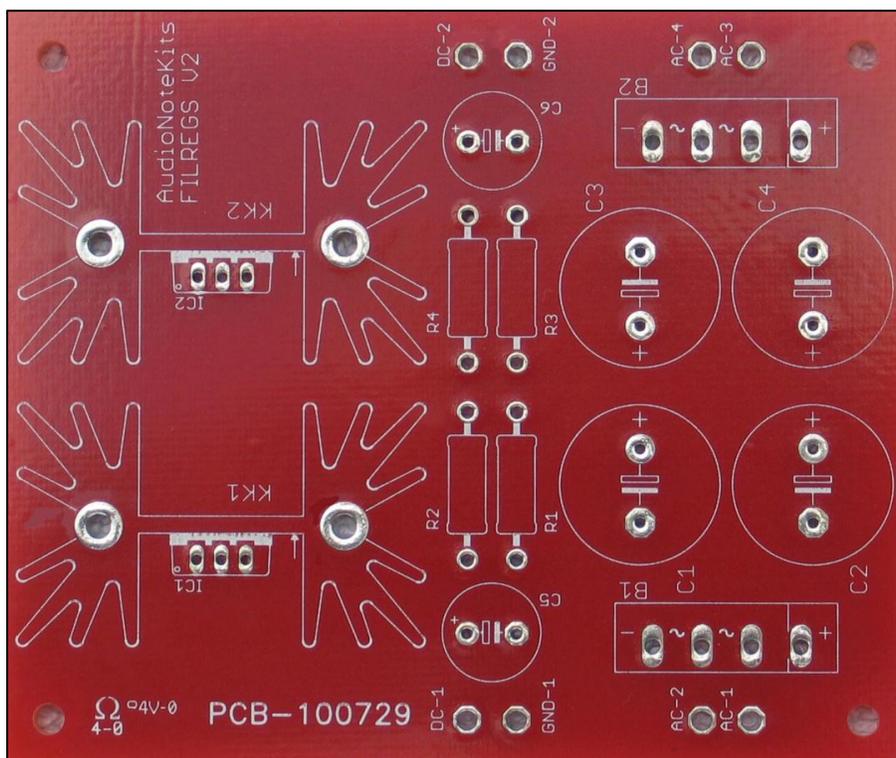
5.1 Overview

In this section we will be populating the Filament Supply PCB. This board will take the 7V AC voltages from the Mains Secondary and DC regulate them down to 5V which will be used to supply the 300B filaments.



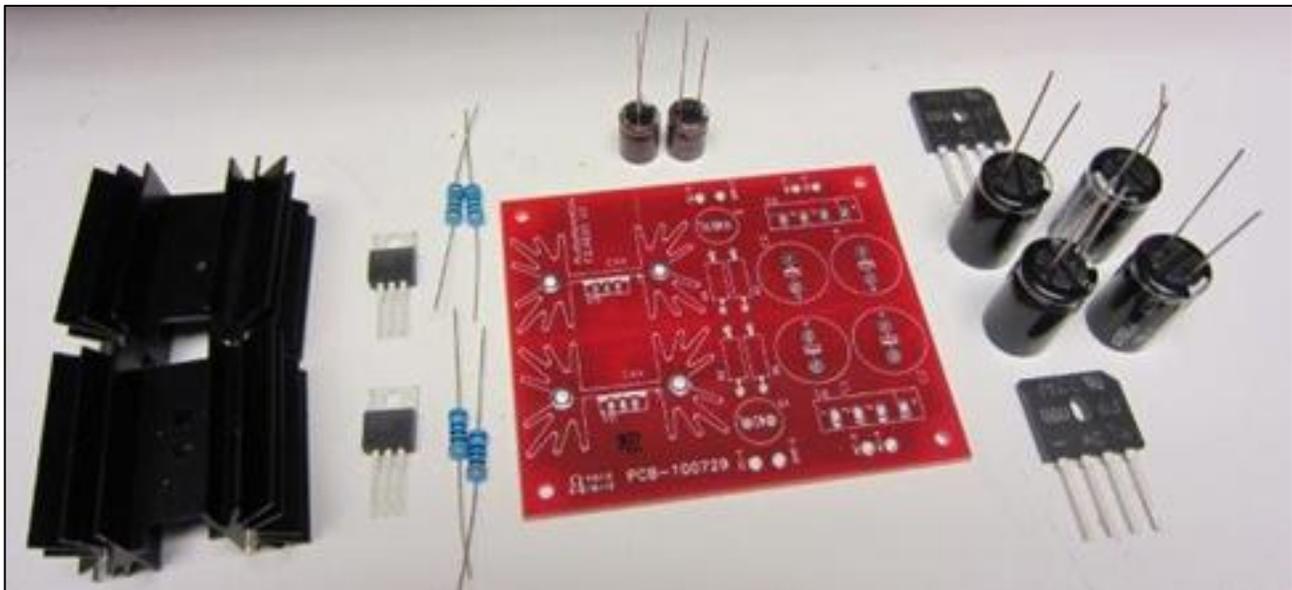
Filament Supply board

Here are a couple of pictures of the front and the back of the printed circuit board:



5.2 Parts List

Quantity	Type	Designator
1	Filament Supply Board	
2	Black Heatsinks	
4	4700uf 16V Electrolytic Capacitors	C1, C2, C3, C4
2	10uf 16V Electrolytic Capacitors	C5, C6
2	KBU6J Bridge Rectifiers	B1, B2
2	LM1084 ADJ 5V Regulators	IC1, IC2
2	300R Resistors	R1, R3
2	100R Resistors	R2, R4



Here are the parts ready for installation

5.3 Installing the Resistors

A quick lesson about resistors:

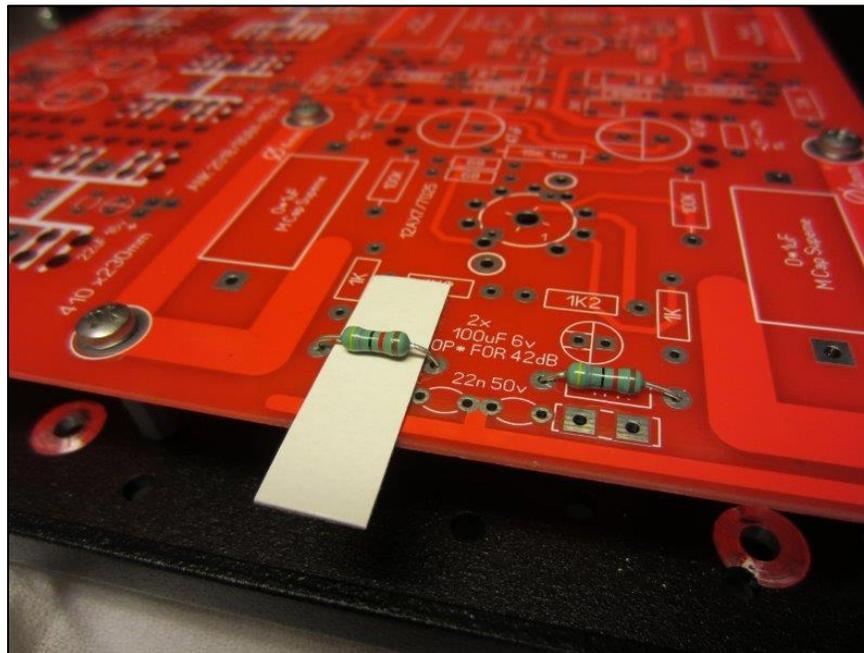
- ❖ A resistor that reads 100R means that it is 100 ohms; the 'R' stands for resistance
- ❖ A resistor that reads 2K7 means it is 2700 ohms ; the 'R' is assumed and the K (which stands for Kilo or 1000) is positioned like the decimal place, so it's like reading 2.7K ohms (K = multiplied by 1000) — but it's shortened to 2K7
- ❖ Another example like this is the 1M resistor, which is 1 Mega ohms

Use an ohmmeter to measure each resistor to verify its correct value. There's a resistor calculator chart on the audionotekits.com website and we've included a chart in Appendix A.1.



It's a good idea to orient your resistors so that the color codes can be read from left to right; it makes it easier to spot any issues.

It's also a good idea to not have the resistors installed right against the board, for a couple of reasons: 1) it's better for heat disposition, and 2) in some cases there are circuit traces running under the resistors and we really don't want resistors touching them. So, as shown below (on a board from a different kit), we use a narrow piece of cardboard cut to size as a 2–3 mm spacer: this will still let you solder while ensuring that the resistor is not pressing against the board.



Also, be sure to solder on the underside of the board and check that you have nice little “volcanoes” on each solder joint. And, when you go to clip a lead be sure to clip above the volcano so that you don’t slice off this nice joint.

- Install the 2 300R Resistors in R1 and R3.
- Install the 2 100R Resistors in R2 and R4.

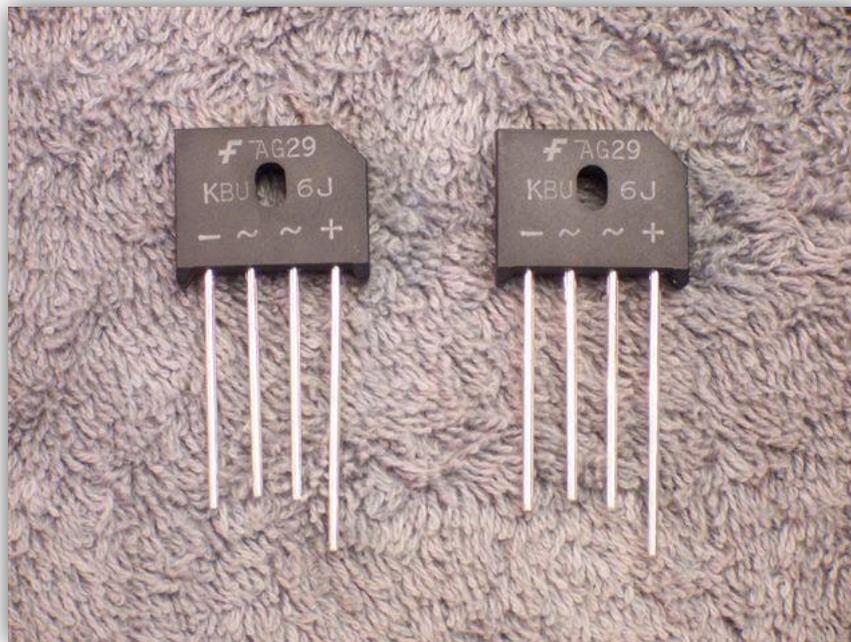
5.4 Installing the Capacitors

We'll start with the electrolytic capacitors. These are the type of capacitors like, for example, the 10uf 16V capacitors at C1 and C20, which have a stripe down one side. You'll remember from the Introduction to the manual that the stripe denotes the NEGATIVE side. On the board you'll see a + sign which denotes the POSITIVE side. Be sure to align the capacitors correctly into position.

- Install the 4 4700uf 16V Electrolytic Capacitors at C1, C2, C3, and C4.
- Install the 2 10uf 16V Electrolytic Capacitors at C5 and C6.

5.5 Installing the Bridge Rectifiers

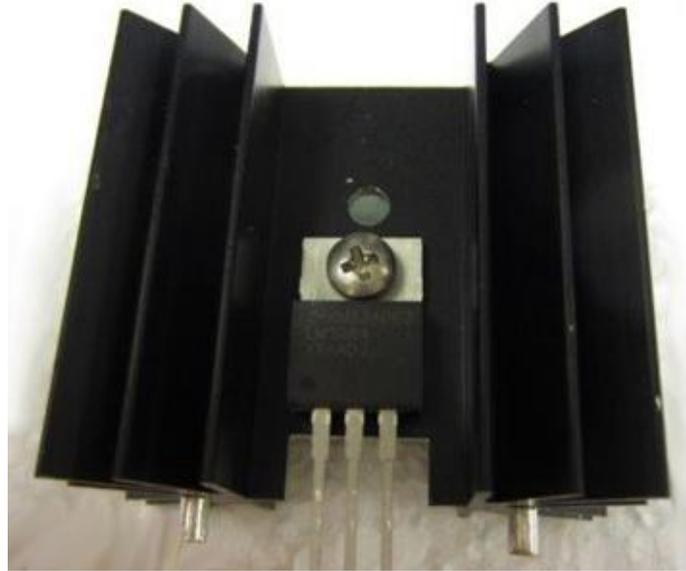
The Bridge Rectifier accepts AC voltage and generates a DC voltage which will be used to create the DC filament voltages. You'll see a notch on the Bridge Rectifier (part number: KBU6J): match the notch with the '+' (POSITIVE) stencil on the board.



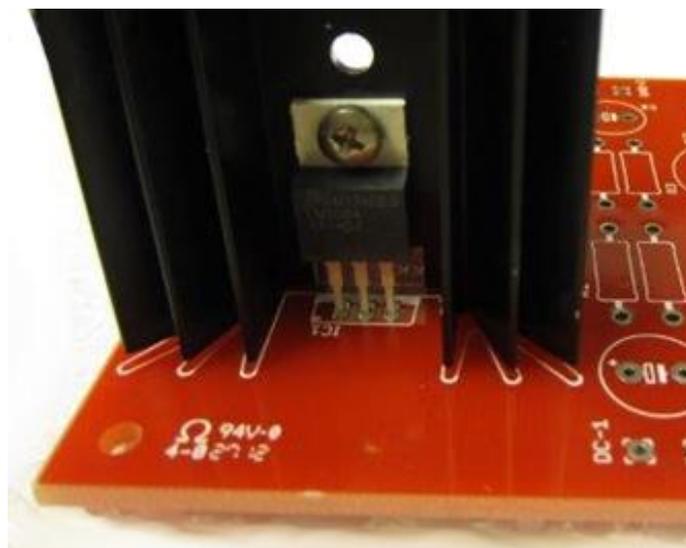
- Install the 2 KBU6J Bridge Rectifiers at B1 and B2.

5.6 Installing the Regulators

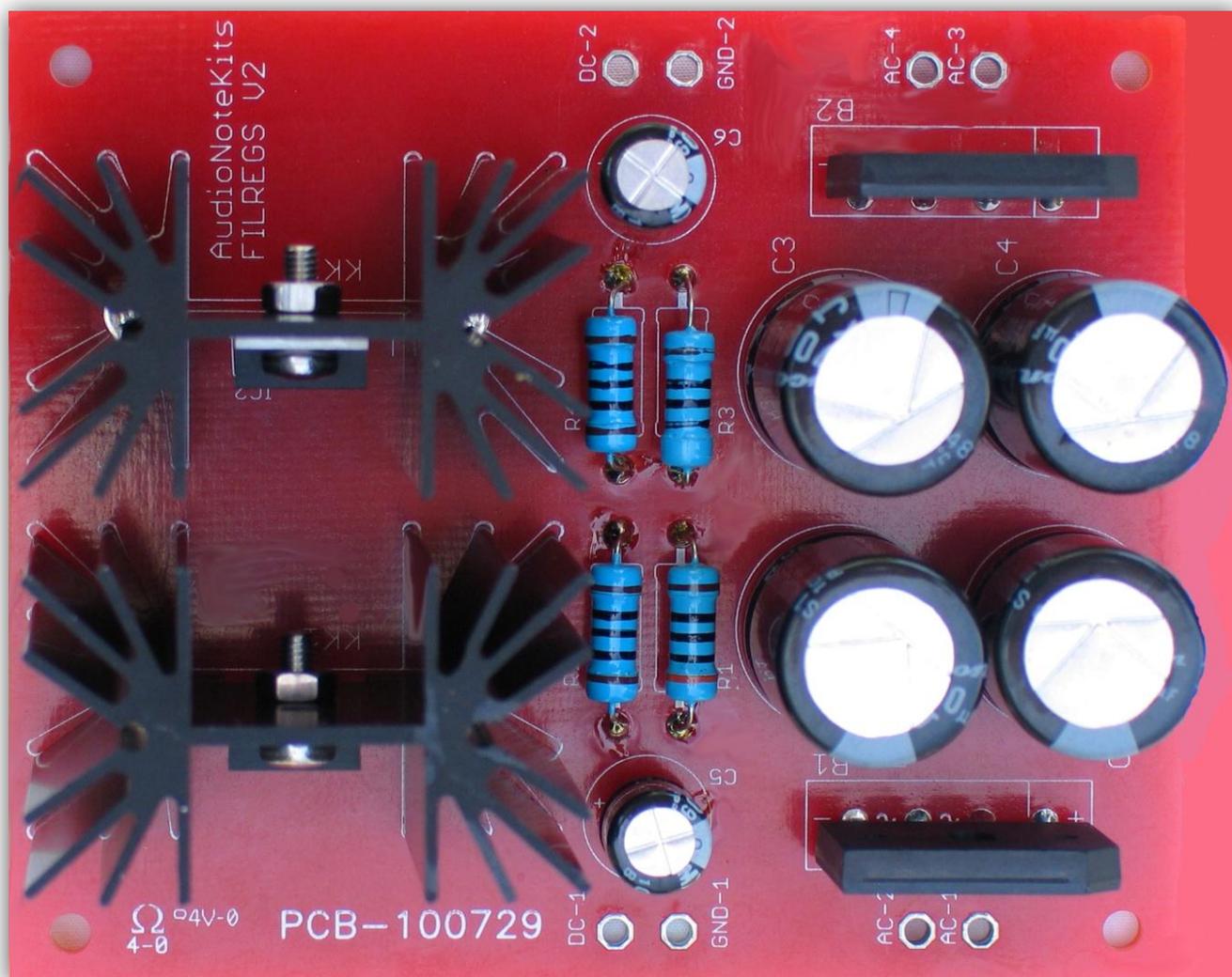
First, let's have a look at how a regulator is attached to a heatsink.



- Take an M3 PAN head screw and connect the regulator as shown in the picture. The heatsink is the same front and back but position the regulator pins and the heatsink pins in the same direction. Make sure that the regulator is straight — by doing the final tightening of the screw while holding the regular and heatsink in position on the board where it will go.
- Insert the regulators and heatsinks into the board at IC1 and IC2 as shown in the picture below and on the next page. Note that they are oriented in the same direction. Solder the 3-pin regulator and the heatsinks from underneath the board.



Congratulations! You've now completed the Filament Supply PCB.

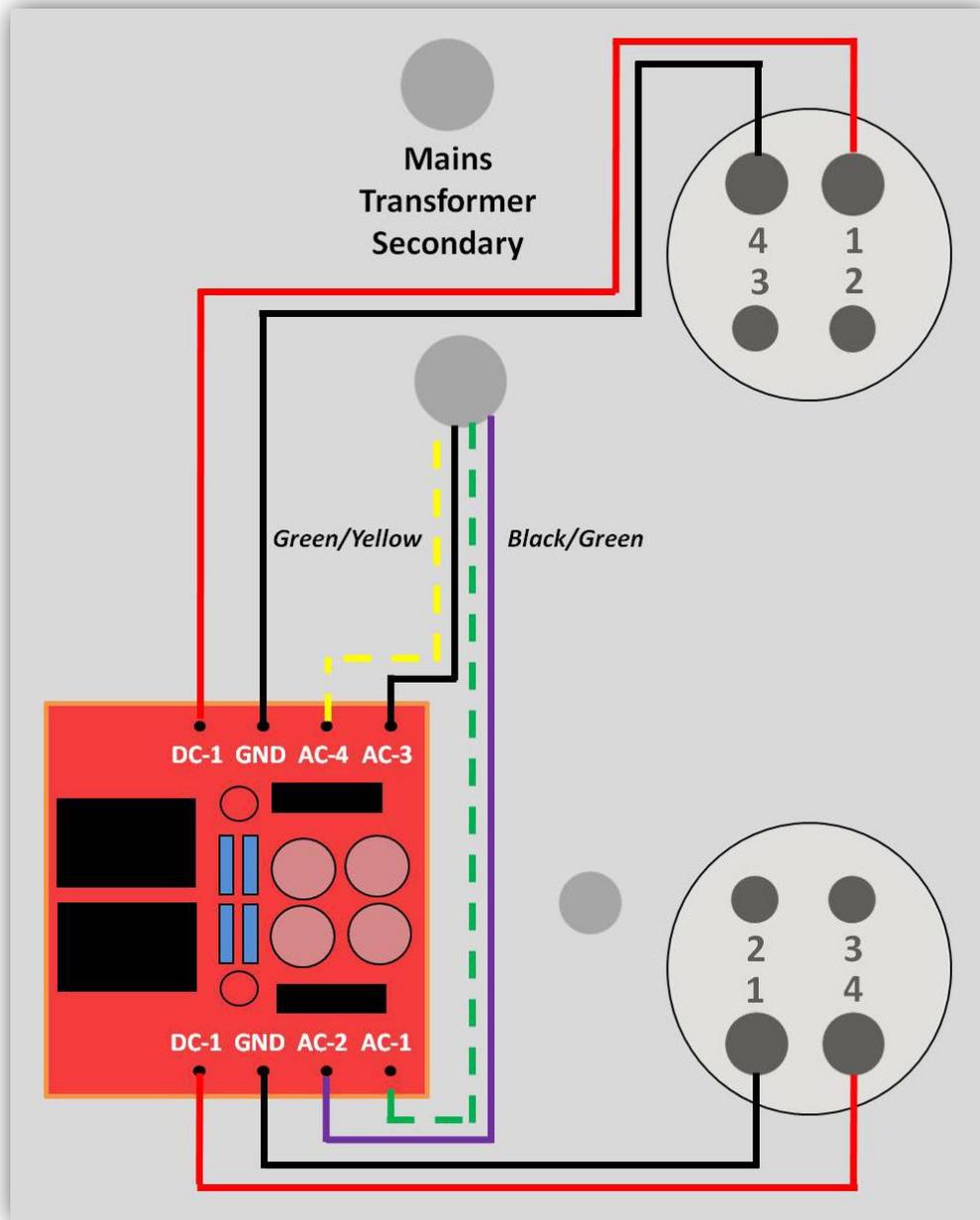


Before we install the board, we'll want to make the AC connections to it from the Mains transformer and prepare the DC connections for the Front Insert Plate.

5.7 Connecting the Filament Supply Board

We'll start by connecting the Mains Secondary AC wires that go to the Filament Supply board.

Referencing the following graphic:

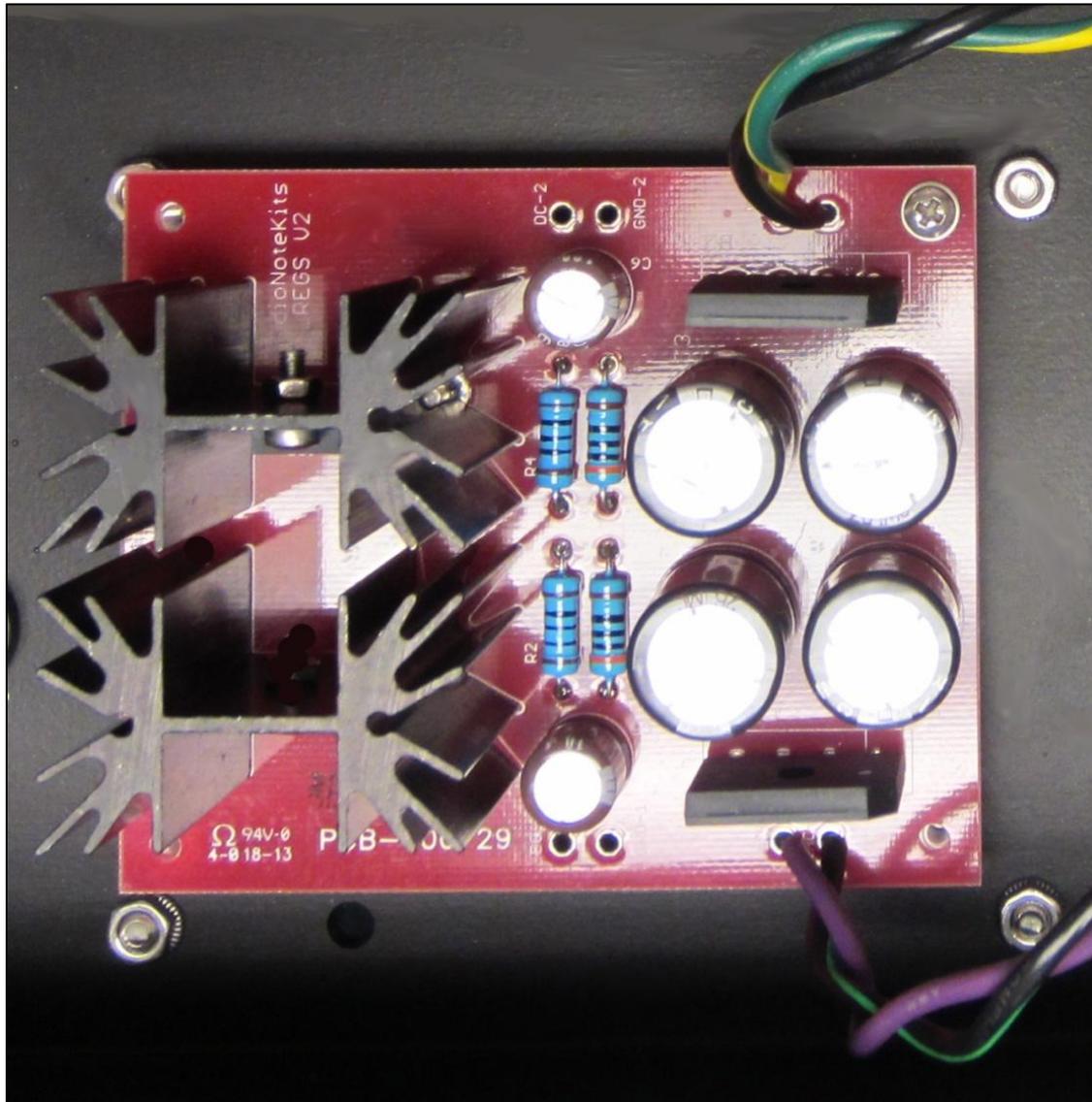


- Take the Black wire, the Purple wire, the Black/Green wire, and the Green/Yellow wire and position them for the connections that we'll make. Cut the wires to the lengths needed, strip about 1/4" of insulation off the wires and tin them.

Make the following connections from the underside:

- Black/Green wire to the AC-1 solder tab.
- Purple wire to the AC-2 solder tab.
- Black wire to the AC-3 solder tab.
- Green/Yellow wire to the AC-4 solder tab.

Here's what it looks like:

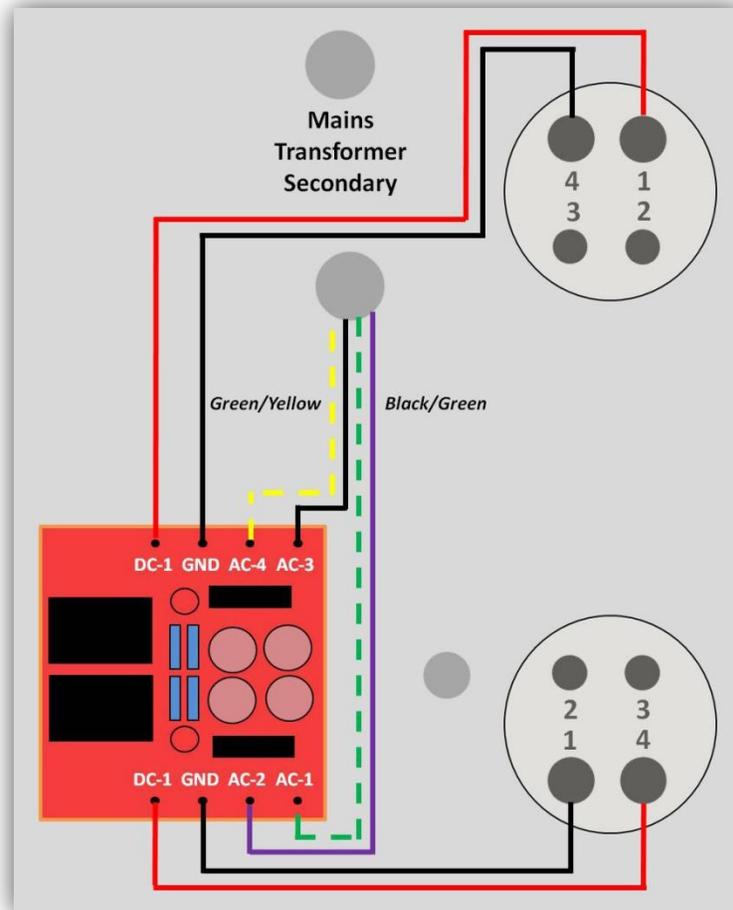


Trim off the excess wires on the top of the board.

Now we'll prepare the DC connections for the Front Insert Plate.

Take the twisted 18g Red and Black wire and measure off lengths sufficient to connect the DC-1 and GND solder tabs on the Filament Supply board to pins 1 and 4 of the 2 300B valve bases. At this point, we are only going to make the Filament Supply board connections. The connections to the 300B valve bases will come later in the build.

Again, referencing this graphic:



- Connect a Red and Black twisted pair to the 2 DC-1/GND solder tabs, from the underside, as shown. Trim off the excess wires on the top of the board.
- Add 4 M4 standoffs to the board.
- Position all the wires going to — and coming from — the Filament Supply board as you like and install the board in the chassis by attaching it with 4 M4 screws into the standoffs from the underside of the chassis.

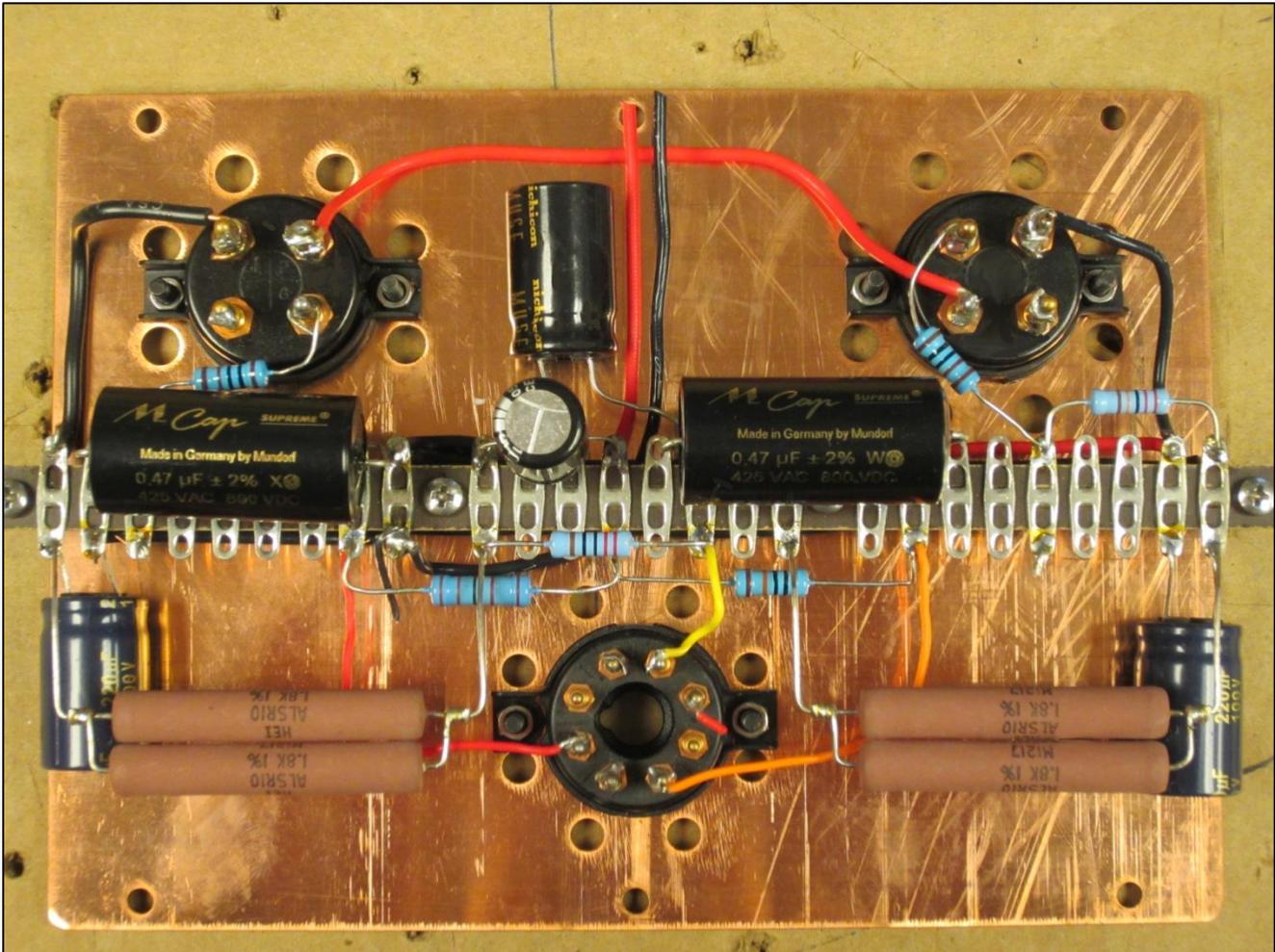
With that completed we can now move on to the front Insert Plate.

Section 6

The Front Insert Plate

6.1 Overview

In this section we will be working on the Front Insert Plate wiring. This is our goal:



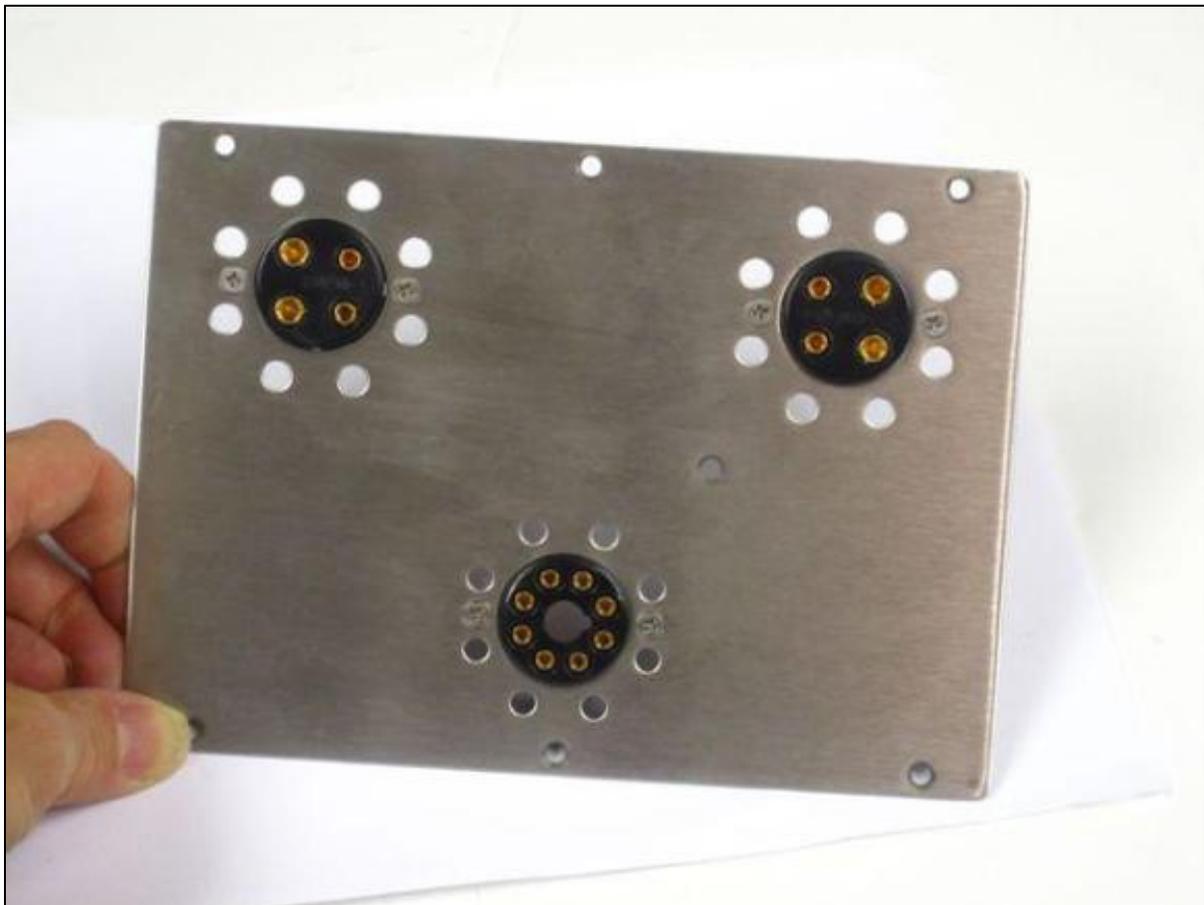
➡ *The top of the copper plate is shiny and "good." We recommend leaving the protective coating on the copper shield while you are working with it and prior to installing in the chassis. We also recommend that you buy a spray-on copper protector to seal the copper plate; otherwise it will slowly tarnish over a couple of years. Spraying the copper plate will help it retain its shine!*

6.2 Installing the Valve Bases and the Tag Strip

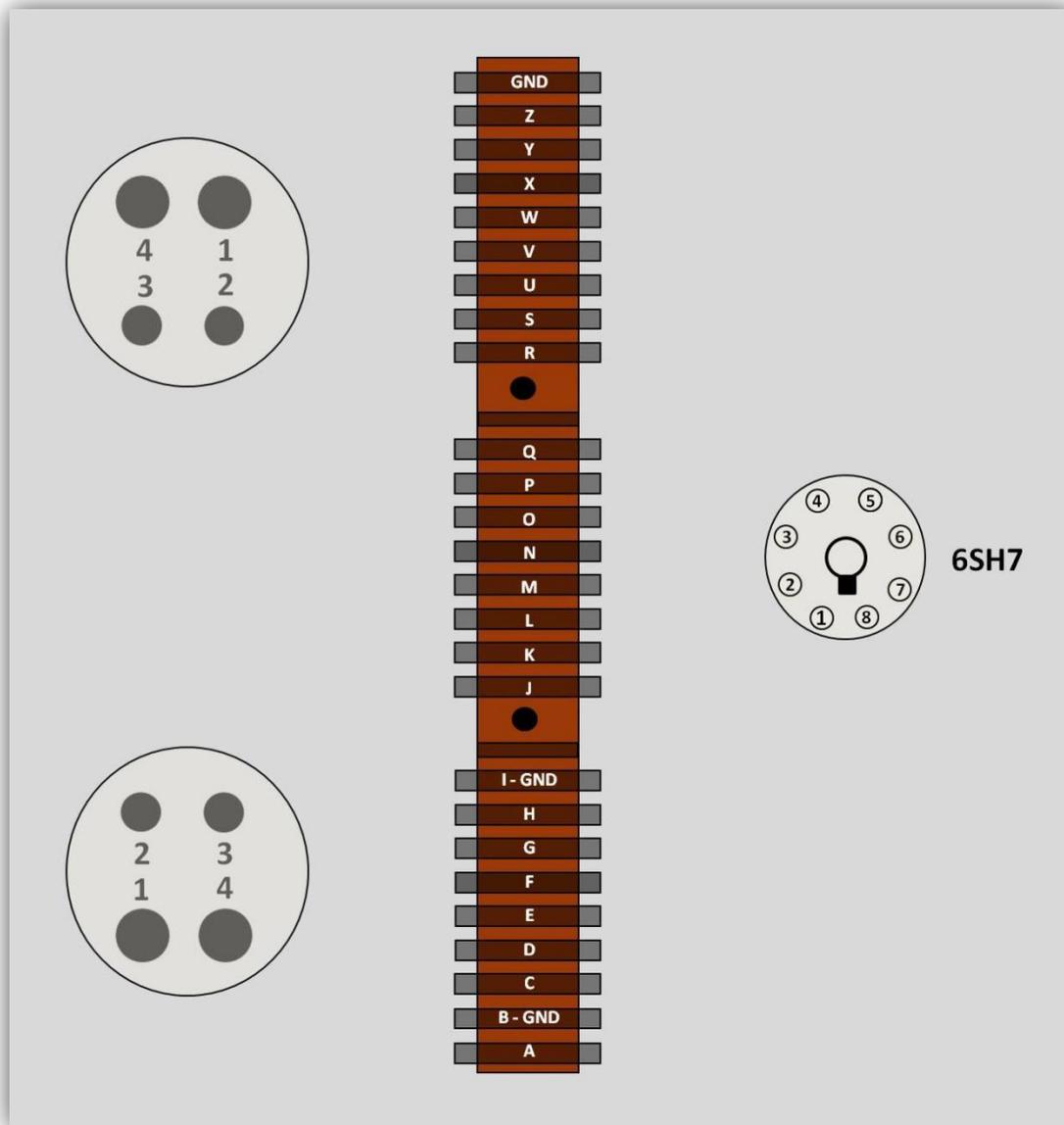
Quantity	Description
1	6SH7 tube
2	300B tubes
1	CMC Black Teflon 8-pin Valve Base
2	CMC Black Teflon 4-pin Valve Bases
1	26-position Tag Strip

Let's begin by installing the valve bases. You can work on the insert plate outside of the Monoblocks and then when we get to a certain point we will install into the chassis. The valve base rings will support the base from under the insert plate.

- Using the designated hardware, install the 3 valve bases in their correct positions, as shown in the pictures above and below (the picture below shows an earlier version of the insert plate, but the orientation, which is *critical*, is correct).

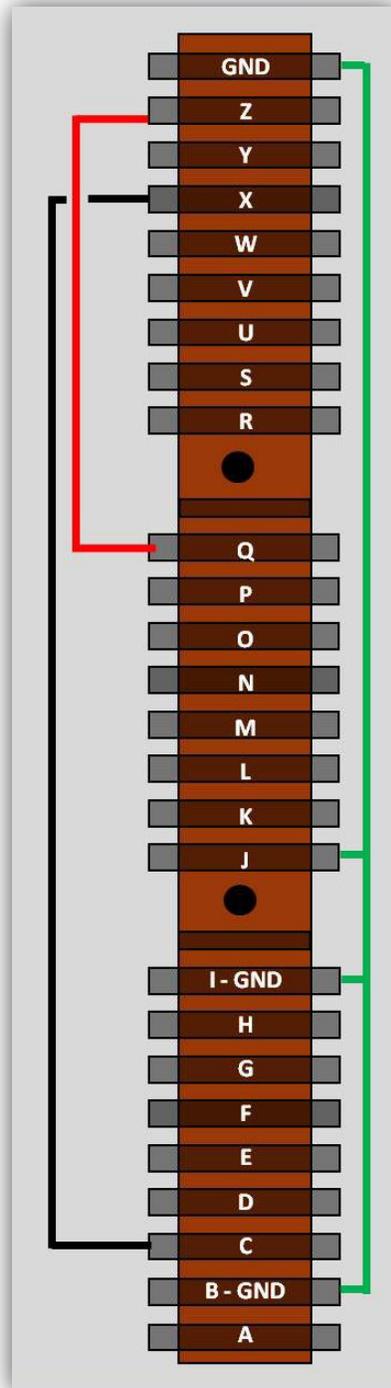


- Install the tag strip with 4 countersunk 6mm M3 screws from the top, then use 4 10mm hex standoffs and 4 M3 6mm pan screws from the underside.



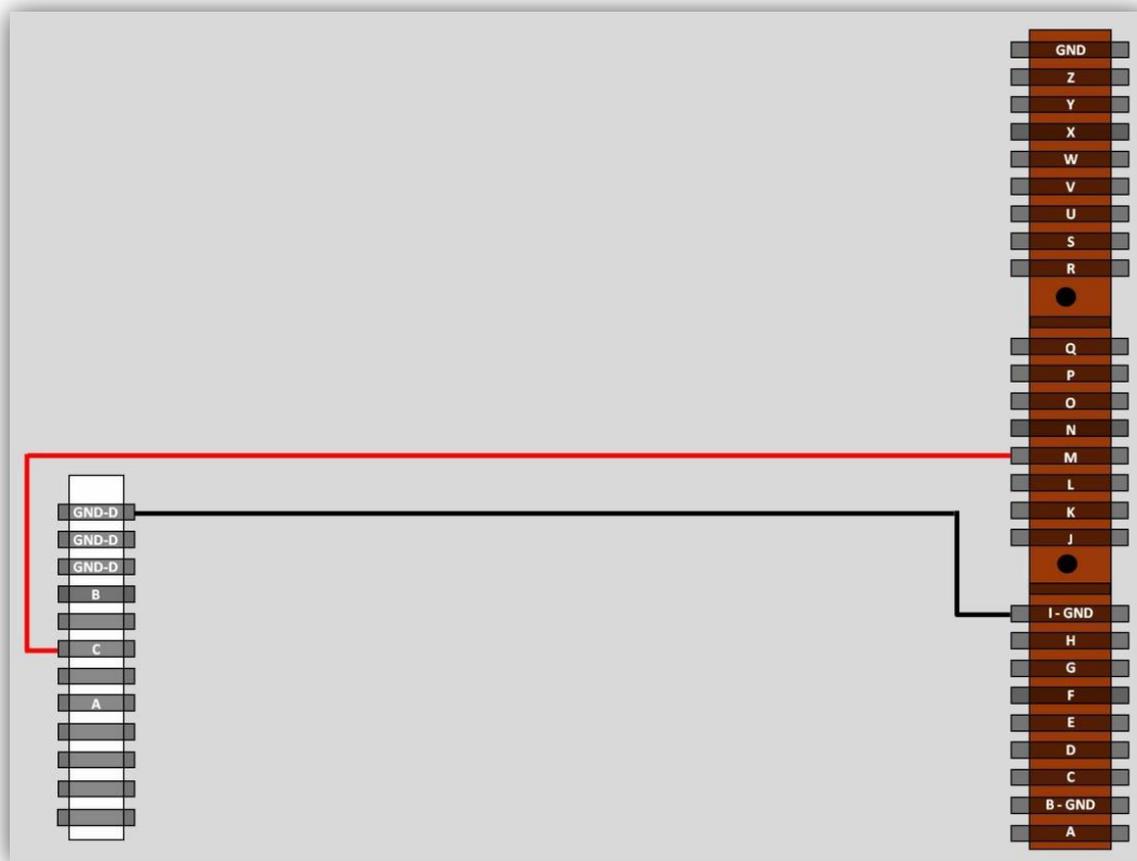
6.3 Installing the Jumper Wires

Before we install the resistors and capacitors and wire the valve bases, let's add some jumpers to the tag strip. This is quite straightforward: just take your time and be sure to use the correct tab. (The color of wire you use doesn't matter.)



- Connect a jumper between GND and J.
- Connect a jumper between GND and I-GND.
- Connect a jumper between I-GND and B-GND.
- Connect a jumper between Z and Q.
- Connect a jumper between X and C.

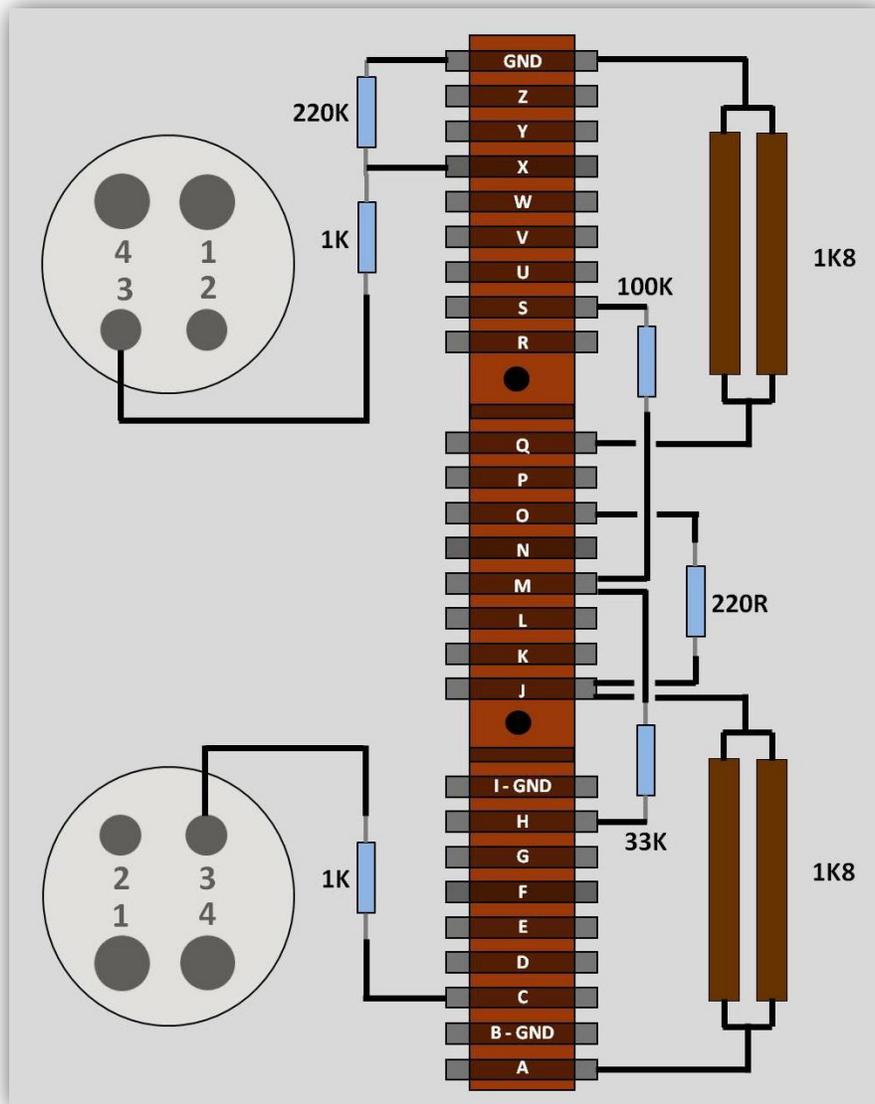
Now, while we're in the neighborhood, let's connect the Red and Black wires coming from the Power Supply, as shown below:



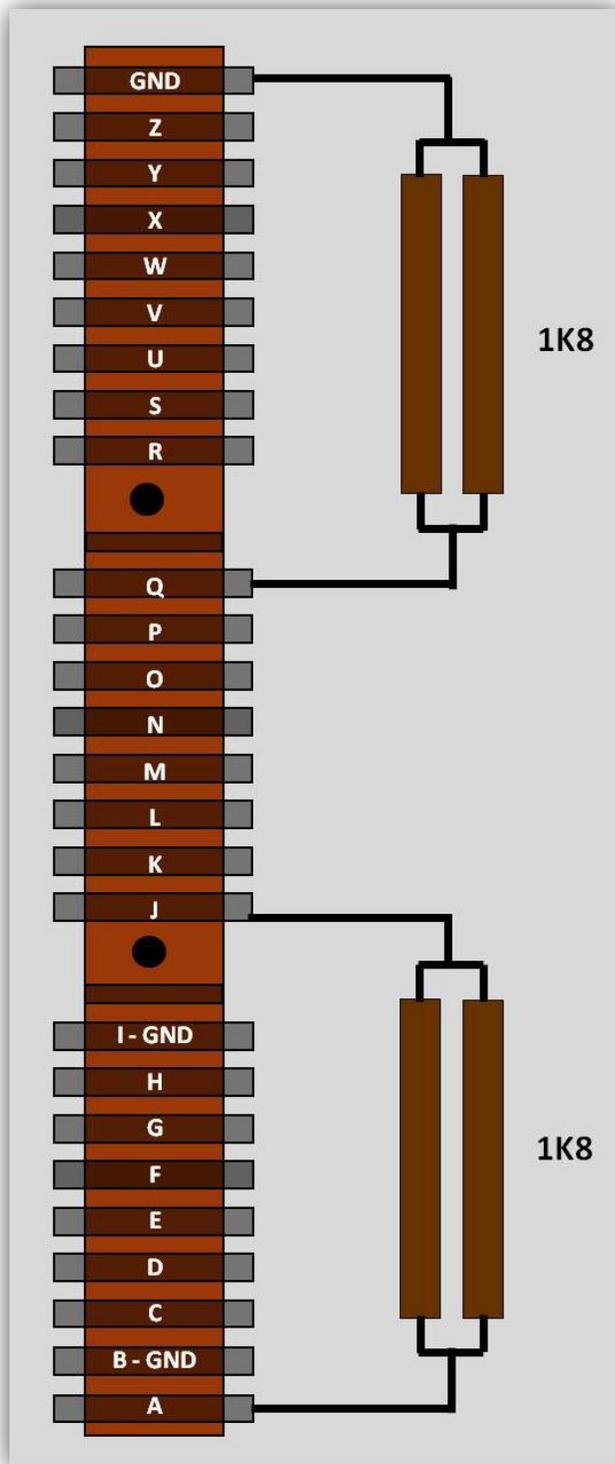
- Connect the Red wire coming from C on the 12-pin ceramic post in the Power Supply to M.
- Connect the Black wire coming from the top GND-D on the 12-pin ceramic post to I-GND.

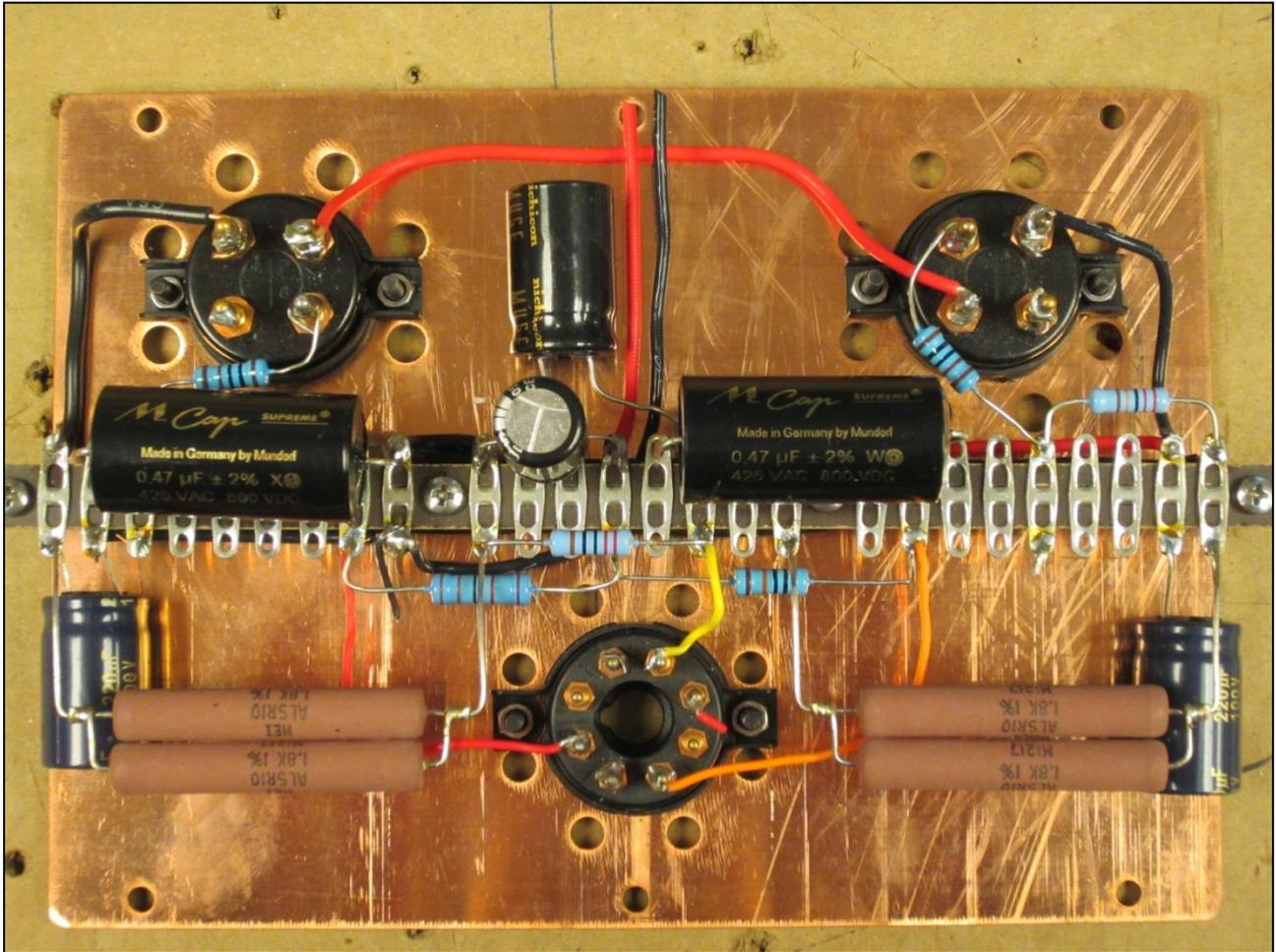
6.4 Installing the Resistors

Quantity	Description
4	1K8 Ohmite Power Resistors
2	1K 1/2W AN Tantalum Resistors
1	220K 1/2W AN Tantalum Resistor
1	100K 1/2W AN Tantalum Resistor
1	220R 1/2W AN Tantalum Resistor
1	33K 1/2W AN Tantalum Resistor

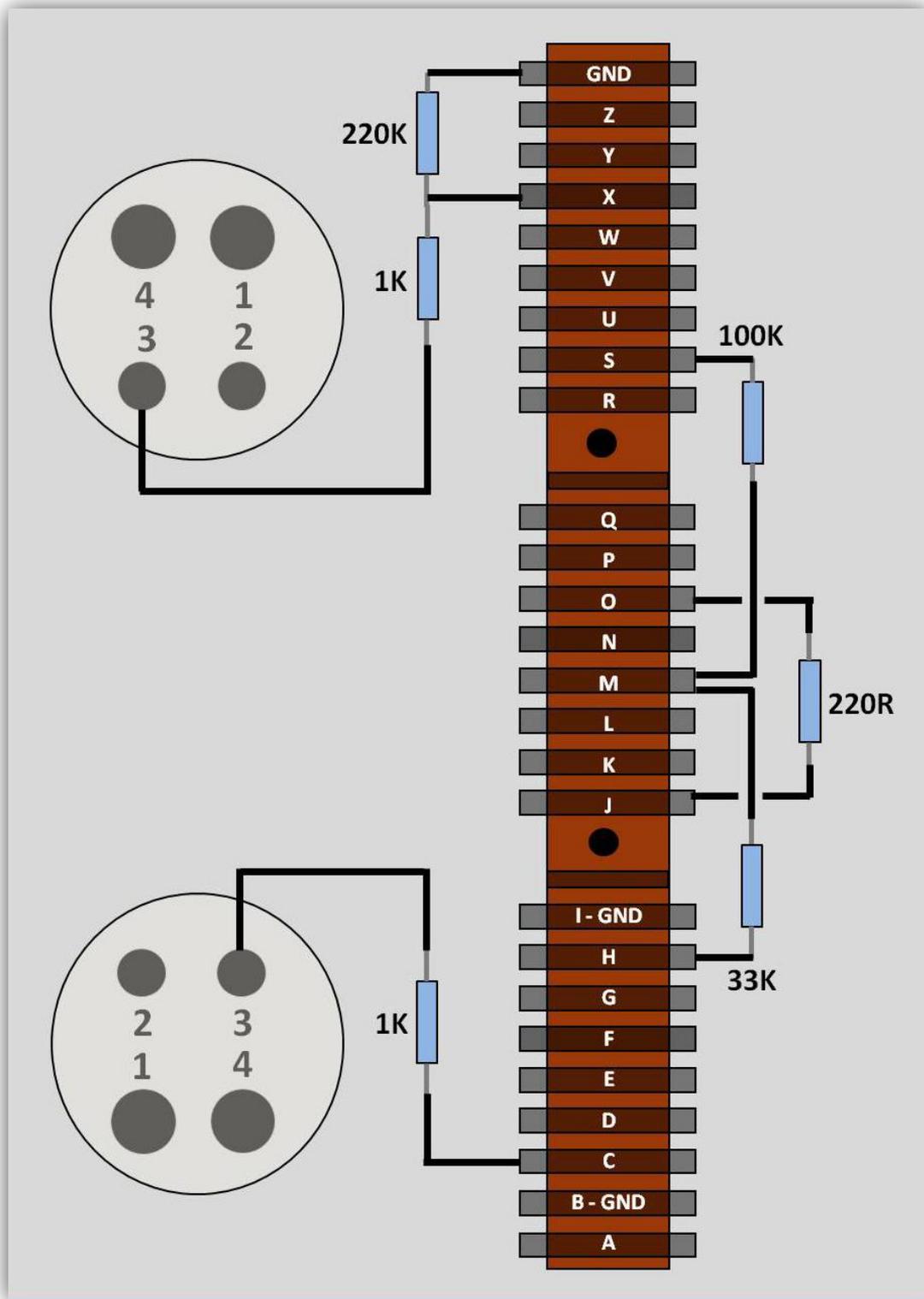


- Referencing the graphic and picture below, install the Ohmite 1K8 Cathode power resistors. Note how the leads are carefully wrapped. Don't cut the lead you want to wrap too short! Take your time and *be sure to solder them to the correct tab positions*.





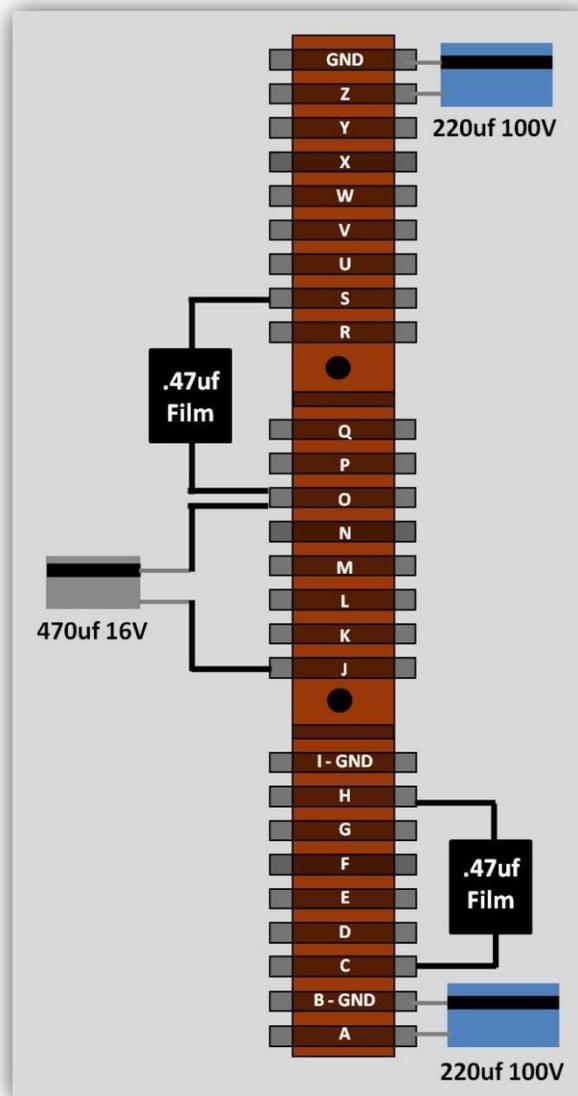
- Referencing the picture above and the graphic on the next page, install the remaining resistors. Again, take your time and do a neat job.

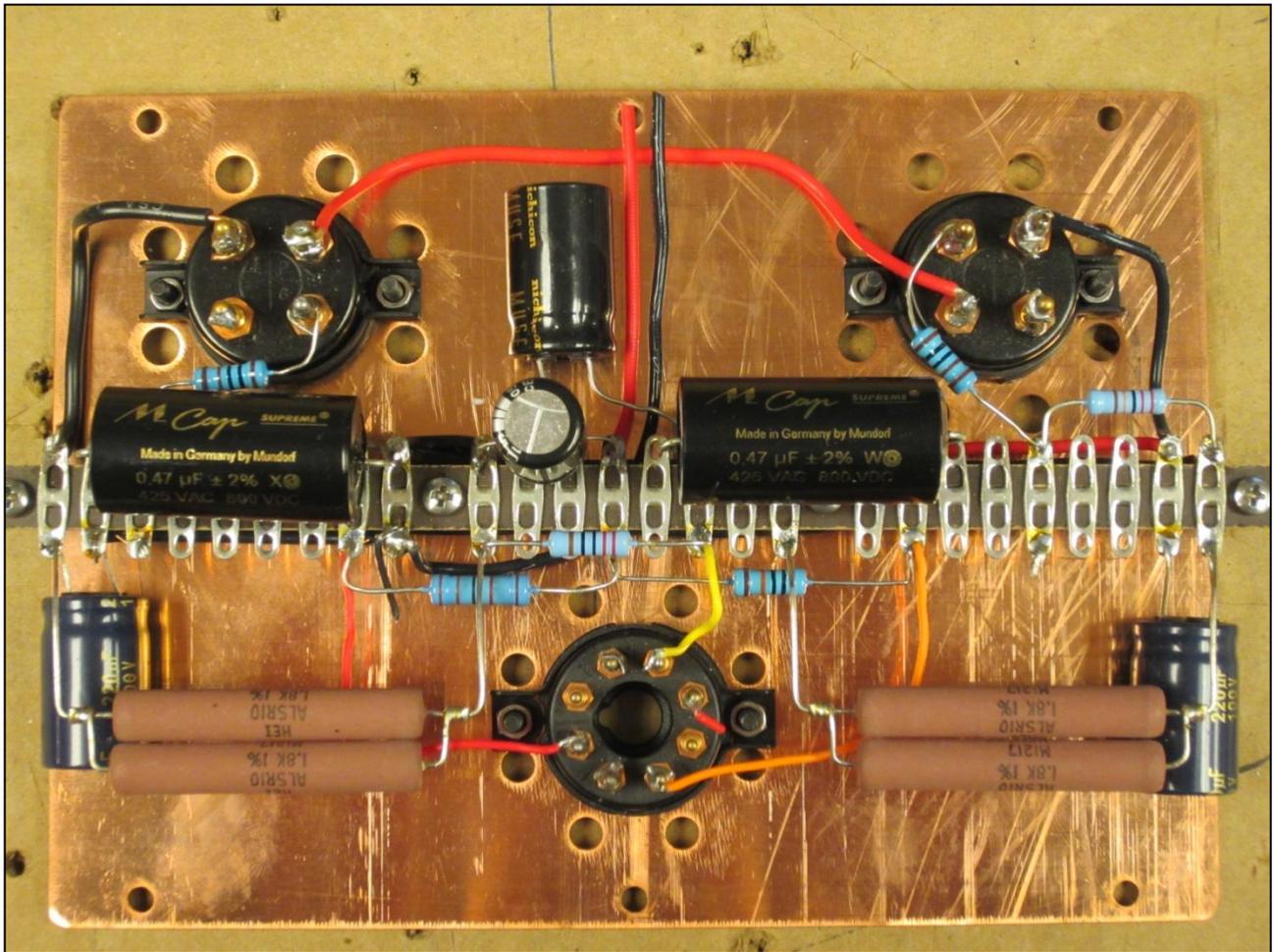


6.5 Installing the Capacitors

Quantity	Description
1	470uf 16V Elna Cerafine Electrolytic Capacitor
2	220uf 100V Elna Cerafine Electrolytic Capacitors
2	.47 Film Capacitors

- Referencing the graphic below and the picture on the next page, install the capacitors. Again, take your time and do a neat job. *Take very careful note of the NEGATIVE (the one with the stripe) and POSITIVE leads of the electrolytic capacitors.* The film capacitor is non-polarized and can go either way; for aesthetics, we've installed them so as to be able to read the labelling.

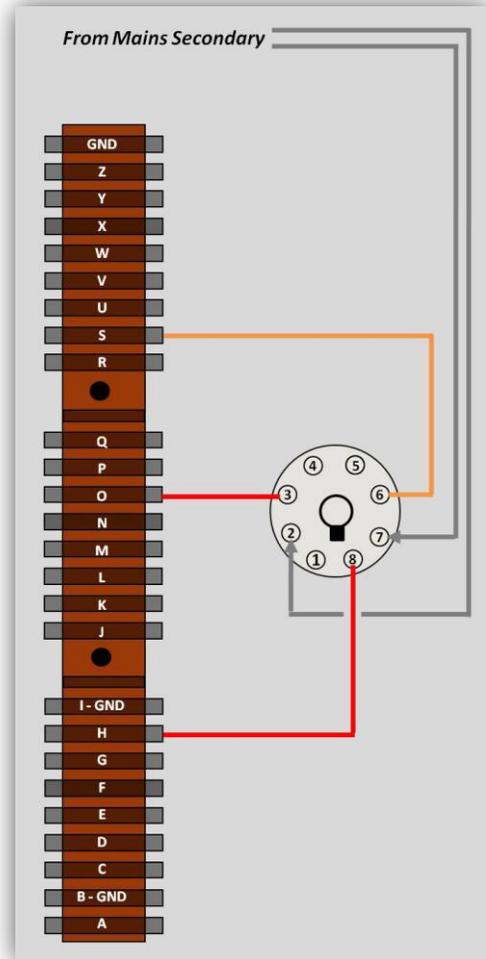
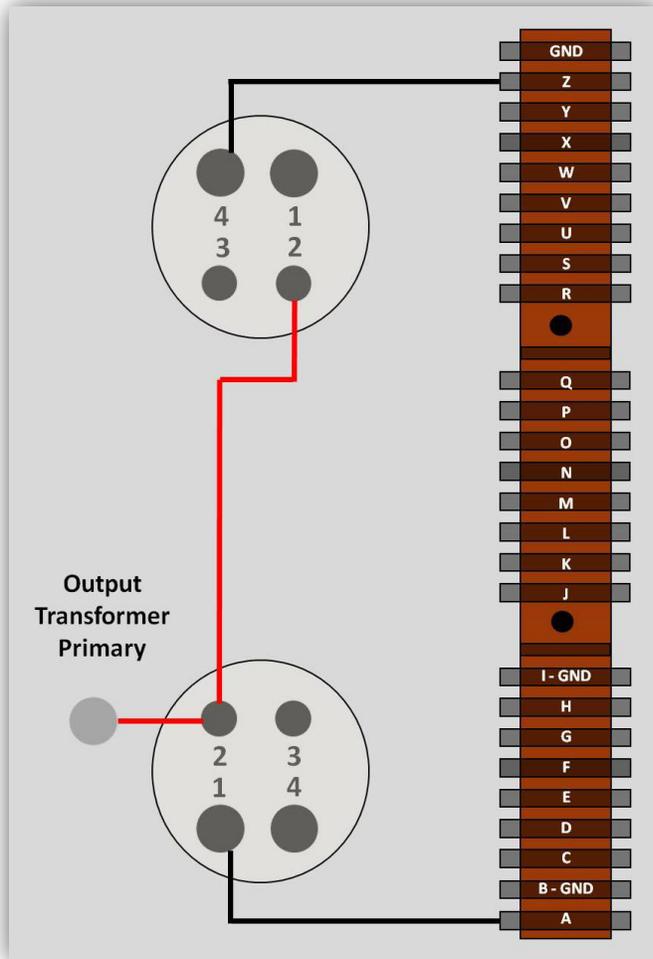


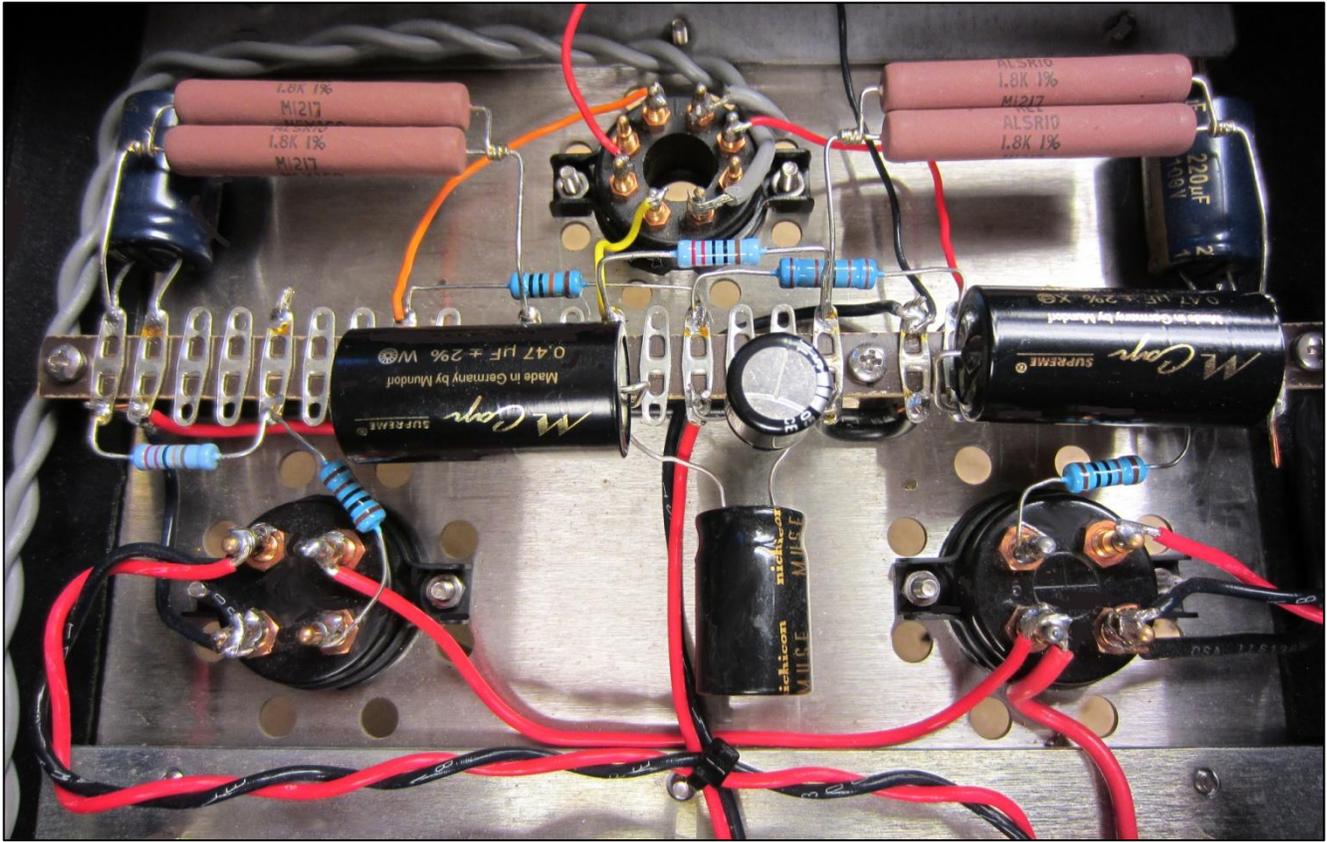


6.6 Additional Front Plate Insert Wiring

Finally, before we mount the Front Insert Plate, there are a couple of additional connections we need to make between the tag strip and the 6SH7 and 300B valve bases.

Referencing the following graphics and the picture on the next page:





- Connect a Black wire from A to pin 1 of the bottom 300B.
- Connect the Red wire from the Output transformer Primary to pin 2 of the bottom 300B.
- Connect a Red wire from pin 2 of the bottom 300B to pin 2 of the top 300B.
- Connect a Black wire from Z to pin 4 of the top 300B.
- Connect a Red wire from H to pin 8 of the 6SH7.
- Connect a Red (or Yellow) wire from O to pin 3 of the 6SH7.
- Connect an Orange wire from S to pin 6 of the 6SH7.
- Connect the 2 Grey wires bringing 6.3V AC from the Mains Secondary to pins 2 and 7 of the 6SH7.
The orientation doesn't matter.

That's it!

Section 7

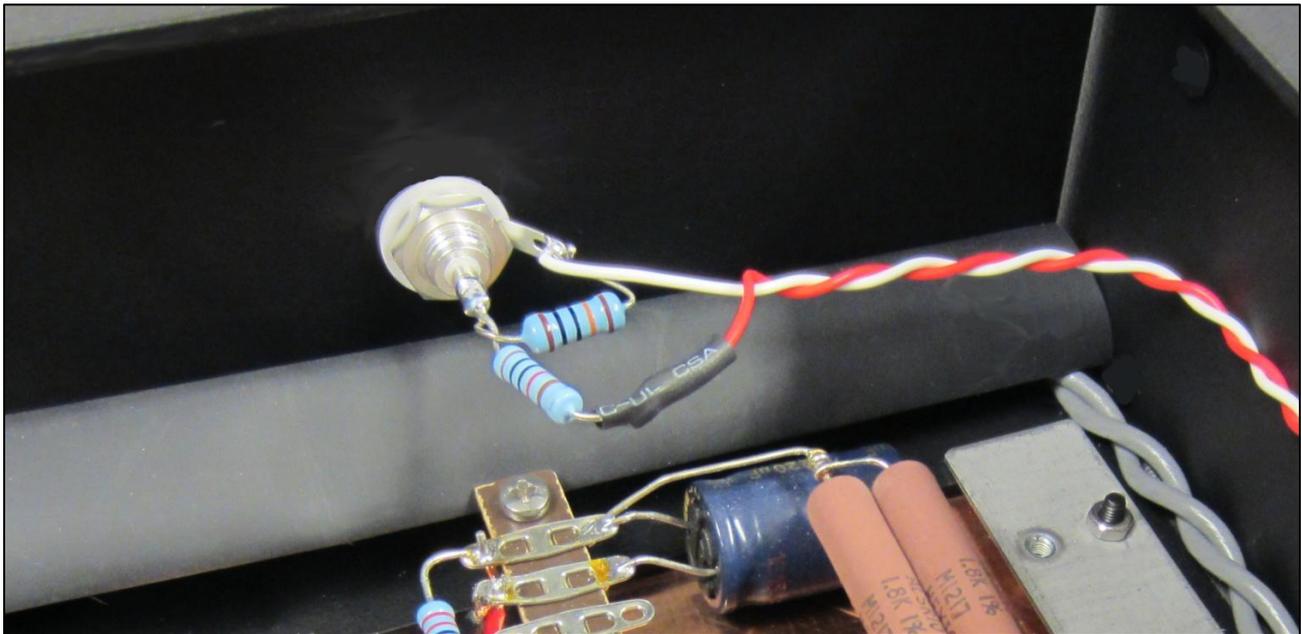
The IO Connections

7.1 Overview

At this point we just need to install and connect the RCA input jack and the Speaker Posts. You can build the monoblocks as identical with the RCA and Speaker Posts on whichever side you choose — or you can position the RCAs in such a way that they are closest to your pre-amplifier and the Speaker Posts closest to the speakers on the outside edge of the chassis. It's up to you.

7.2 Installing the RCA Input Jack

Let's begin by installing the input RCA jack. Here's a picture of the RCA installed and wired:



Insert into the chassis from the outside:

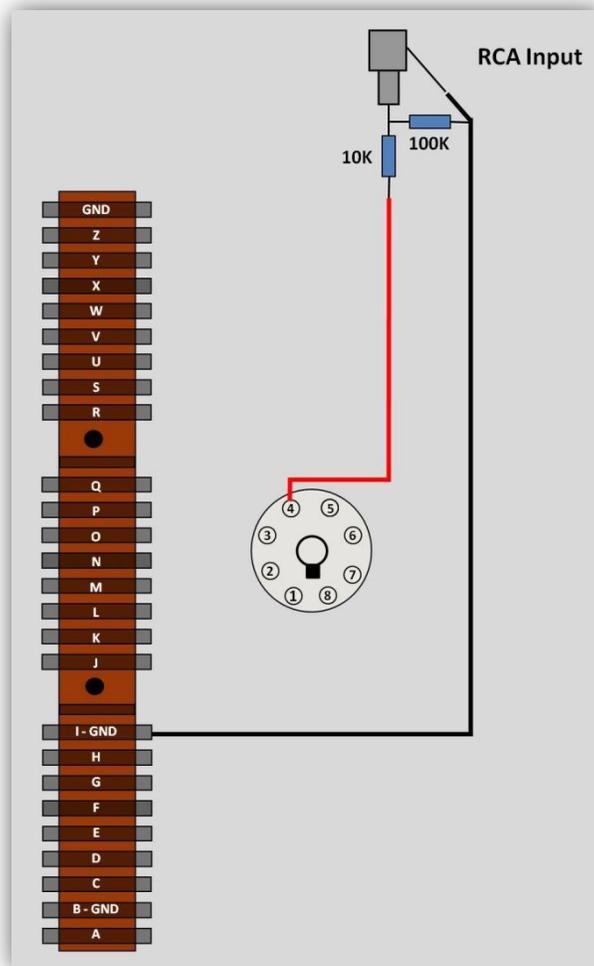
- ❖ The white insulating washer with the raised ring facing inwards into the hole
- ❖ The RCA jack

- Attach, from the inside of the chassis, onto the protruding jack:
 - ❖ The other white insulating washer
 - ❖ The ground lug
 - ❖ The nut (don't immediately tighten this more than one or two turns)
- Bend the ground lug up about 30–45 degrees and position at about 3 o'clock. *Make sure it is away from the chassis.*
- Tighten the jack *such that the inner lug is facing up/open*; it'll make soldering much easier in that position.

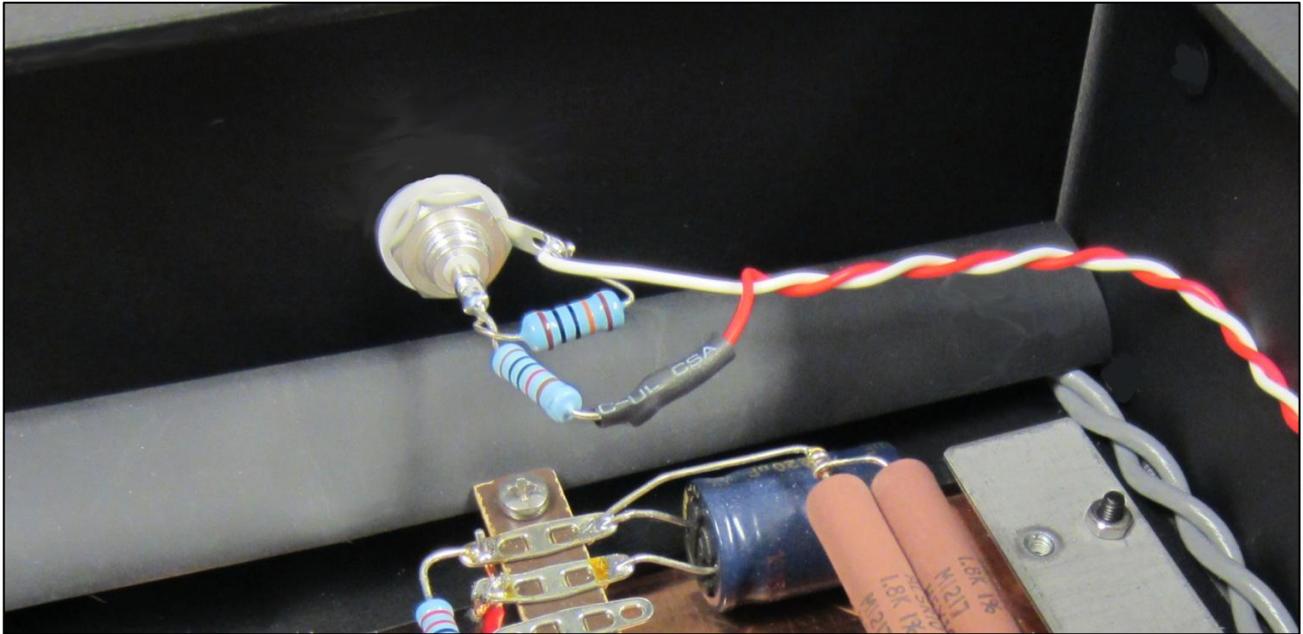
Make sure everything is snug and well tightened.

7.3 Wiring the RCA Input Jack

Now we'll add the input resistors and wire things up:



This wiring is a bit tricky. We'll do it step by step; let's see that picture again:



- Put a puddle of solder in the center of the RCA jack.
- Tin one end of each of the 10K and 100K resistors. You can twist them together first, if you like.
- Heat the solder puddle and slide the ends of the 10K and 100K resistors into the center of it. They should adhere easily.
- Measure the lengths of the Red and Black wires that you'll need to make the connections. Allow a little extra.
- Tin the ends of the twisted 22g Red and Black wires.
- Using the Red wire, connect the free end of the 10K resistor to pin 4 of the 6SH7 valve base.
- Connect the free end of the 100K resistor to the ground of the RCA jack along with one end of the Black wire.
- Connect the other end of the Black wire to Tag I-GND.

7.4 Mounting the Front Insert Plate

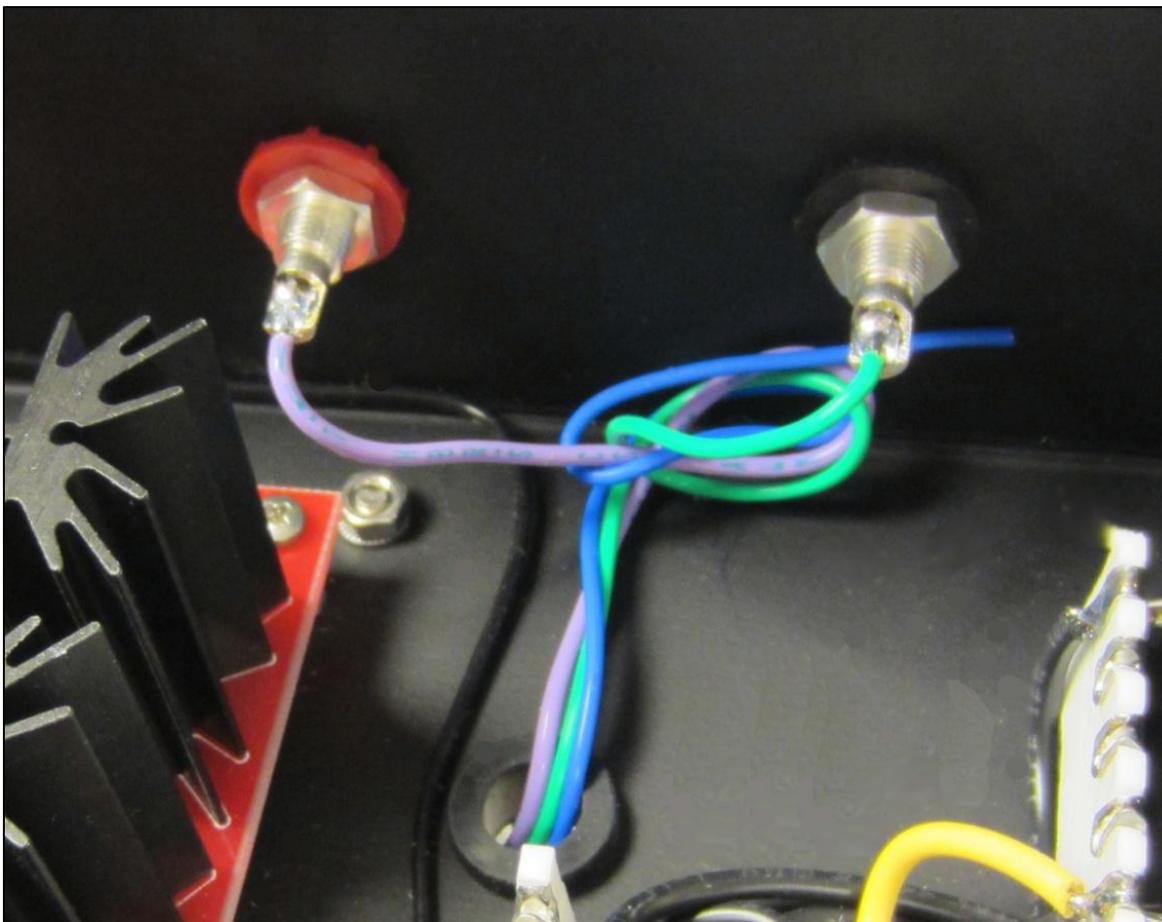
At this point, before we install and wire the Speaker Posts, we'll want to mount and secure the Front Insert Plate to the chassis.



- Mount the Front Insert Plate using the supplied hardware.

7.5 Installing the Speaker Posts

Referencing the following picture:



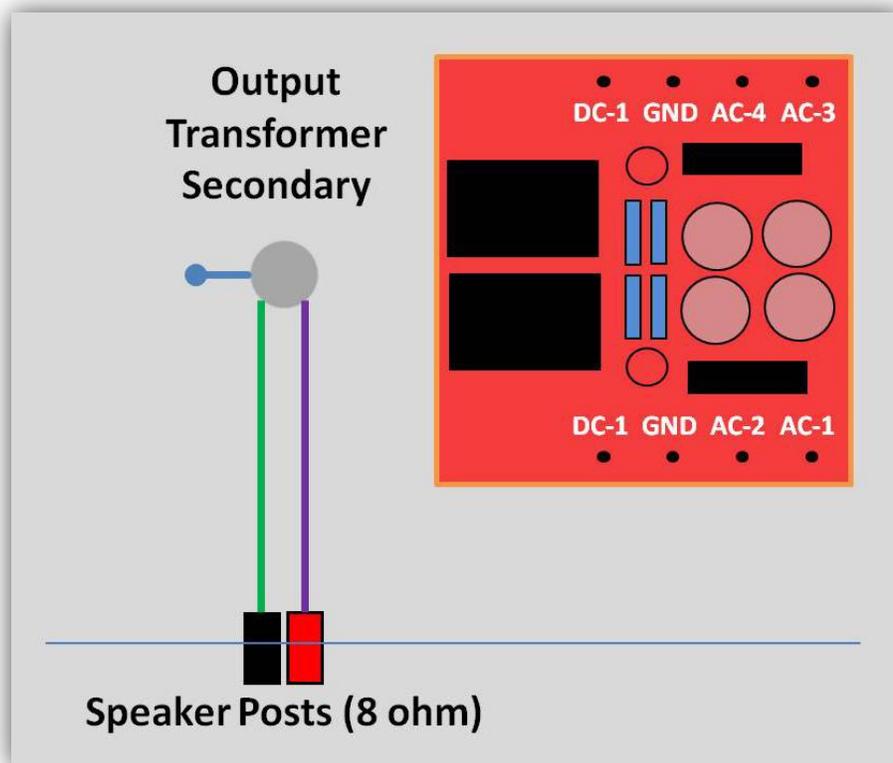
- Install the Red and Black speaker posts on the side of the chassis, as shown above.

7.6 Wiring the Speaker Posts

The Output transformer has three wires: ground, 4-ohm tap and 8-ohm tap. Choose the tap that you'll be using and follow the wiring steps below. Usually we use the following wire colors: Green = ground, Purple = 8-ohm tap, Blue = 4-ohm tap. If the colors of the transformer wires in your kit don't match, contact us at audionotekits@rogers.com to find out the colors of your transformer.

- Put a puddle of solder in the center of each speaker post.

8 ohm Speaker Wiring



- Connect the Purple wire to the Red speaker post.
- Connect the Green wire to the Black speaker post.
- Cut the end of the Blue wire cleanly and cover it with a small plastic wire connector.

4 ohm Speaker Wiring (not shown)

- Connect the Blue wire to the Red speaker post.
- Connect the Green wire to the Black speaker post.
- Cut the end of the Purple wire cleanly and cover it with a small plastic wire connector.

Section 8

Wiring Check Lists

The following lists should help you check the wiring of your amplifier. We recommend that, at this point — before we power-up, you print them out and carefully check off each item.

5U4-G		
<input type="checkbox"/>	Pin 1	Not connected
<input type="checkbox"/>	Pin 2	Brown filament wire from Mains Secondary
<input type="checkbox"/>	Pin 3	Not connected
<input type="checkbox"/>	Pin 4	Red filament wire from Mains Secondary
<input type="checkbox"/>	Pin 5	Not connected
<input type="checkbox"/>	Pin 6	Red filament wire from Mains Secondary
<input type="checkbox"/>	Pin 7	Not connected
<input type="checkbox"/>	Pin 8	Brown filament wire from Mains Secondary

6SH7 Tube		
<input type="checkbox"/>	Pin 1	Not connected
<input type="checkbox"/>	Pin 2	AC Grey Filament from Mains Secondary
<input type="checkbox"/>	Pin 3	Red Wire to Tag Strip O
<input type="checkbox"/>	Pin 4	Red Wire to 10K on RCA jack
<input type="checkbox"/>	Pin 5	Not connected
<input type="checkbox"/>	Pin 6	Orange Wire to Tag Strip S
<input type="checkbox"/>	Pin 7	AC Grey Filament from Mains Secondary
<input type="checkbox"/>	Pin 8	Red Wire to Tag Strip H

Top 300B			
<input type="checkbox"/>	Pin 1	Red wire to Right DC-1 on Filament Supply board	
<input type="checkbox"/>	Pin 2	Red wire to Pin 2 of bottom 300B (HT)	
<input type="checkbox"/>	Pin 3	Black wire thru 1K resistor to Tag Strip X and thru 220K resistor to Tag Strip GND	
<input type="checkbox"/>	Pin 4	Black wire to Right GND on Filament Supply board	Black wire to Tag Strip Z

Bottom 300B			
<input type="checkbox"/>	Pin 1	Black wire to Left GND on Filament Supply board	Black wire to Tag Strip A
<input type="checkbox"/>	Pin 2	Red wire to Pin 2 of top 300B (HT)	Red wire from Output transformer Primary
<input type="checkbox"/>	Pin 3	Black wire thru 1K resistor to Tag Strip C	
<input type="checkbox"/>	Pin 4	Red wire to Left DC-1 on Filament Supply board	

7-position Ceramic Post						
<input type="checkbox"/>	CH	Green wire to Chassis Ground		Thru 100R resistor to 12-position post top GND-D		
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>	CT	Green wire to next down CT	Thru 47K resistor to 12-position post third down GND-D		From Positive of 10uf capacitor thru to 12-position third down GND-D	
<input type="checkbox"/>	CT	Green wire to next up CT		Thru 330K resistor to 12-position post B		Blue/White wire from Mains Secondary
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>	B	One Black wire from Choke	Black wire from Output transformer Primary	Thru 10K 2W resistor to 12-position post C	Red wire to 12-position post B	Black wire from 100+100uf capacitor Positive
<input type="checkbox"/>		Not connected				

12-position Ceramic Post						
<input type="checkbox"/>	GND-D	Black wire to Tag Strip I-GND	Green wire to next down GND-D	Green wire to bottom post position	Thru 100R resistor to 7-position post CH	
<input type="checkbox"/>	GND-D	Brown/White wire from Mains Secondary		Green wire to next up GND-D	Green wire to next down GND-D	
<input type="checkbox"/>	GND-D	Red wire from 100+100uf capacitor Negative	Green wire to next up GND-D	Thru 47K resistor to 7-position post top CT	From Negative of 10uf capacitor thru to 7-position post top CT	
<input type="checkbox"/>	B	Thru 330K resistor to 7-position post bottom CT			Red wire to 7-position post B	
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>	C	Thru 10K 2W resistor to 7-position post B	Black wire from 100+100uf capacitor Positive		Red wire to Tag Strip M	
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>	A	Yellow wire from Mains Secondary		One Black wire from Choke	One end of 30uf Mundorf capacitor	
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>		One end of 30uf Mundorf capacitor			Green wire to top GND-D	

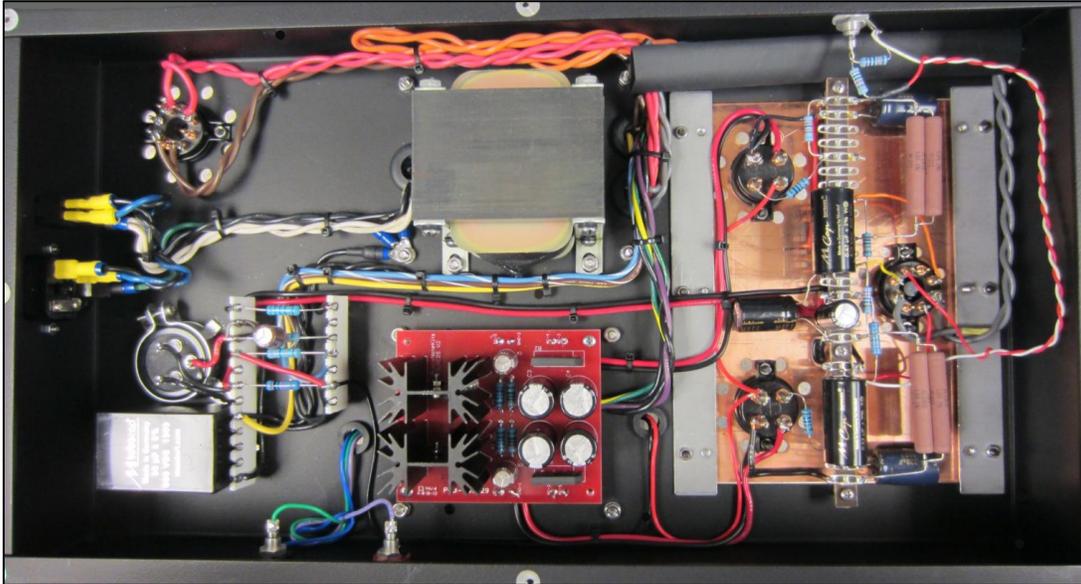
26-position Tag Strip						
<input type="checkbox"/>	GND	Black wire thru 220K resistor to Tag Strip X	Green wire to Tag Strip J	Black wire to top of top 1K8 resistor pair	Negative lead of 220uf 100V capacitor	
<input type="checkbox"/>	Tag Z	Black wire to top 300B Pin 4	Positive lead of 220uf 100V capacitor		Red wire to Tag Strip Q	
<input type="checkbox"/>	Tag Y	Not connected				
<input type="checkbox"/>	Tag X	Black wire thru 1K resistor to top 300B Pin 3	Black wire thru 220K resistor to Tag Strip GND		Black wire to Tag Strip C	
<input type="checkbox"/>	Tag W	Not connected				
<input type="checkbox"/>	Tag V	Not connected				
<input type="checkbox"/>	Tag U	Not connected				
<input type="checkbox"/>	Tag S	Orange Wire to 6SH7 Pin 6	Black wire thru 100K resistor to Tag Strip M	One end of top .47uf Film capacitor		
<input type="checkbox"/>	Tag R	Not connected				
<input type="checkbox"/>	Tag Q	Black wire to bottom of top 1K8 resistor pair		Red wire to Tag Strip Z		
<input type="checkbox"/>	Tag P	Not connected				
<input type="checkbox"/>	Tag O	Red Wire to 6SH7 Pin 3	Black wire thru 220R resistor to Tag Strip J	Negative lead of 470uf 16V capacitor	One end of top .47uf Film capacitor	
<input type="checkbox"/>	Tag N	Not connected				
<input type="checkbox"/>	Tag M	Black wire thru 100K resistor to Tag Strip S	Black wire thru 33K resistor to Tag Strip H	Red wire to 12-position Post C		
<input type="checkbox"/>	Tag L	Not connected				
<input type="checkbox"/>	Tag K	Not connected				
<input type="checkbox"/>	Tag J	Green wire to Tag Strip GND	Green wire to Tag Strip I-GND	Black wire to top of bottom 1K8 resistor pair	Black wire thru 220R resistor to Tag Strip O	Positive lead of 470uf 16V capacitor
<input type="checkbox"/>	Tag I - GND	Black wire to 12-position Post top GND-D		Green wire to Tag Strip J	Green wire to Tag Strip B-GND	Black wire to RCA input GND
<input type="checkbox"/>	Tag H	Red Wire to 6SH7 Pin 8	Black wire thru 33K resistor to Tag Strip M		One end of bottom .47uf Film capacitor	
<input type="checkbox"/>	Tag G	Not connected				
<input type="checkbox"/>	Tag F	Not connected				
<input type="checkbox"/>	Tag E	Not connected				
<input type="checkbox"/>	Tag D	Not connected				
<input type="checkbox"/>	Tag C	One end of bottom .47uf Film capacitor	Black wire to Tag Strip X	Black wire thru 1K resistor to Pin 3 of bottom 300B		
<input type="checkbox"/>	Tag B - GND	Green wire to Tag Strip I-GND		Negative lead of 220uf 100V capacitor		
<input type="checkbox"/>	Tag A	Black wire to bottom 300B Pin 1	Black wire to bottom of bottom 1K8 resistor pair	Positive lead of 220uf 100V capacitor		

Section 9

Testing

9.1 Overview

The amplifier build is complete and you've checked the wiring carefully. Here's where we are:



It's time do to some testing to make sure that amplifier has been correctly wired and that things are working the way they're supposed to.

Our plan is as follows:

- ❖ With no tubes installed, power the amplifier on to verify that the fuse does not blow.
- ❖ Make a number of voltage measurements — particularly filament voltages and the B+ (or HT), to assure ourselves that the amplifier is running as expected.
- ❖ Test with a 'cheap' speaker for sonics and hum. If all is well, play in a proper system, enjoy!



Before testing, it's a good idea to blow some air into the unit and make sure that there are no small pieces of wire or solder floating around.

9.2 Installing the Fuse

Tubes Installed At This Point: None

Let's start by installing a 1A Slo-Blo fuse (from the IEC bag) into position as shown below⁴.

- If the fuse holder is already installed in the IEC plug, use a screwdriver, a flat edge, or your fingers to pull it out — you'll need to squeeze it to completely remove it.
- Install the fuse in the small plastic fuse holder and insert it into the IEC. (You can ignore any lettering like '240V only' — there is only one fuse holder type for all world voltages.)



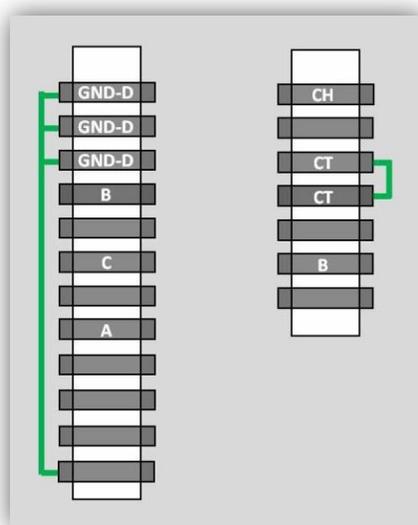
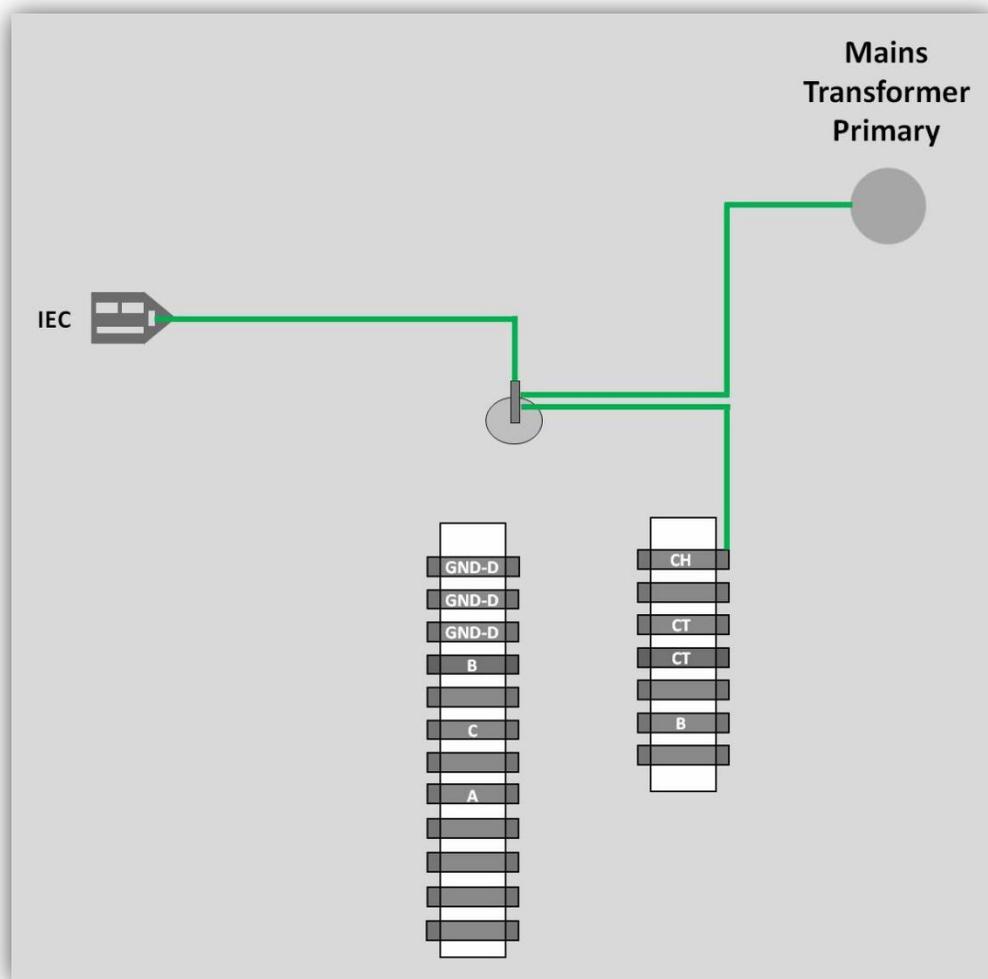
9.3 Initial Tests

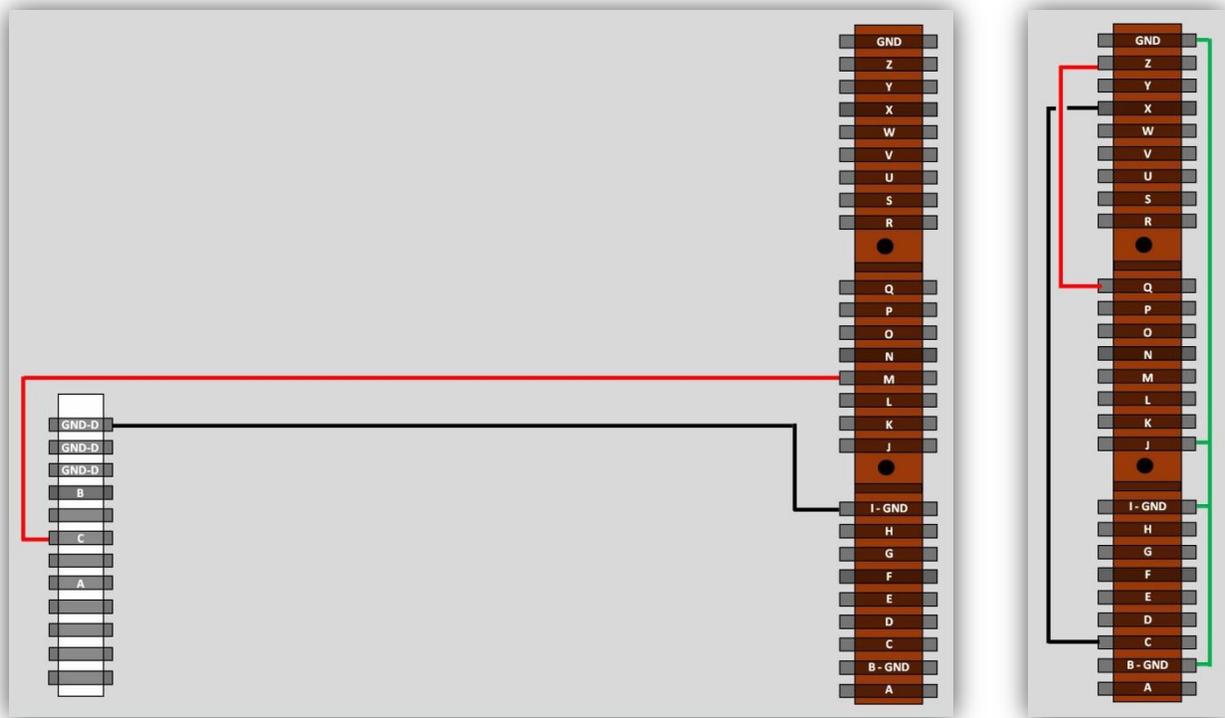
Let's begin by doing some basic tests, with the amplifier off.

A good place to start would be to measure continuity: let's test the Chassis and Signal Grounds, the jumpered (*and unconnected!*) connections on the ceramic hardwiring posts and the tag strip. That should help check some key connections and/or possible shorts.

⁴ The picture is from a different build, but it's the same procedure.

Using your multimeter in Continuity mode verify the following Chassis and Signal Grounds:





It's not a bad idea, also, to test all valve base pins and ceramic post tags and tag strip positions that are marked 'Not connected' to make sure that, indeed, that are not connected. These are:

5U4-G		
<input type="checkbox"/>	Pin 1	Not connected
<input type="checkbox"/>	Pin 3	Not connected
<input type="checkbox"/>	Pin 5	Not connected
<input type="checkbox"/>	Pin 7	Not connected

6SH7 Tube		
<input type="checkbox"/>	Pin 1	Not connected
<input type="checkbox"/>	Pin 5	Not connected

7-position Ceramic Post						
<input type="checkbox"/>	CH	Green wire to Chassis Ground	Thru 100R resistor to 12-position post top GND-D			
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>	CT	Green wire to next down CT	Thru 47K resistor to 12-position post third down GND-D	From Positive of 10uf capacitor thru to 12-position third down GND-D		
<input type="checkbox"/>	CT	Green wire to next up CT	Thru 330K resistor to 12-position post B		Blue/White wire from Mains Secondary	
<input type="checkbox"/>		Not connected				
<input type="checkbox"/>	B	One Black wire from Choke	Black wire from Output transformer Primary	Thru 10K 2W resistor to 12-position post C	Red wire to 12-position post B	Black wire from 100+100uf capacitor Positive
<input type="checkbox"/>		Not connected				

12-position Ceramic Post					
<input type="checkbox"/>	GND-D	Black wire to Tag Strip I-GND	Green wire to next down GND-D	Green wire to bottom post position	Thru 100R resistor to 7-position post CH
<input type="checkbox"/>	GND-D	Brown/White wire from Mains Secondary	Green wire to next up GND-D	Green wire to next down GND-D	
<input type="checkbox"/>	GND-D	Red wire from 100+100uf capacitor Negative	Green wire to next up GND-D	Thru 47K resistor to 7-position post top CT	From Negative of 10uf capacitor thru to 7-position post top CT
<input type="checkbox"/>	B	Thru 330K resistor to 7-position post bottom CT		Red wire to 7-position post B	
<input type="checkbox"/>		Not connected			
<input type="checkbox"/>	C	Thru 10K 2W resistor to 7-position post B	Black wire from 100+100uf capacitor Positive		Red wire to Tag Strip M
<input type="checkbox"/>		Not connected			
<input type="checkbox"/>	A	Yellow wire from Mains Secondary	One Black wire from Choke	One end of 30uf Mundorf capacitor	
<input type="checkbox"/>		Not connected			
<input type="checkbox"/>		Not connected			
<input type="checkbox"/>		Not connected			
<input type="checkbox"/>		One end of 30uf Mundorf capacitor	Green wire to top GND-D		

26-position Tag Strip		
<input type="checkbox"/>	Tag Y	Not connected
<input type="checkbox"/>	Tag W	Not connected
<input type="checkbox"/>	Tag V	Not connected
<input type="checkbox"/>	Tag U	Not connected
<input type="checkbox"/>	Tag R	Not connected
<input type="checkbox"/>	Tag P	Not connected
<input type="checkbox"/>	Tag N	Not connected
<input type="checkbox"/>	Tag L	Not connected
<input type="checkbox"/>	Tag K	Not connected
<input type="checkbox"/>	Tag G	Not connected
<input type="checkbox"/>	Tag F	Not connected
<input type="checkbox"/>	Tag E	Not connected
<input type="checkbox"/>	Tag D	Not connected

If all is well, let's move on to our first power-up.

9.4 First Power-Up

IMPORTANT NOTE

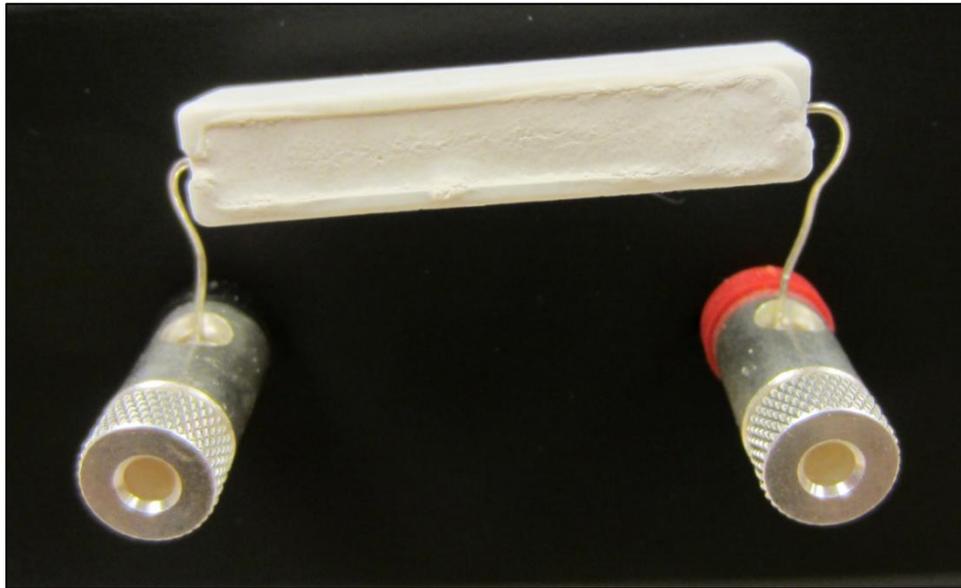
Follow the turn-on procedure carefully. **DO NOT AT ANY TIME ONLY INSTALL THE 5U4-G TUBE WITHOUT ANY OTHER TUBES (SUCH AS THE 300Bs) INSTALLED.** The reason for this is that the 5U4-G tube is counting on having a specific load to drive. If the 5U4-G is used without other tubes installed then the amplifier will 'see' significantly higher DC voltages, which can overextend the Power Supply capacitors. You could possibly start hearing cracking noises and then who knows what, as they are beyond their maximum voltage ratings.



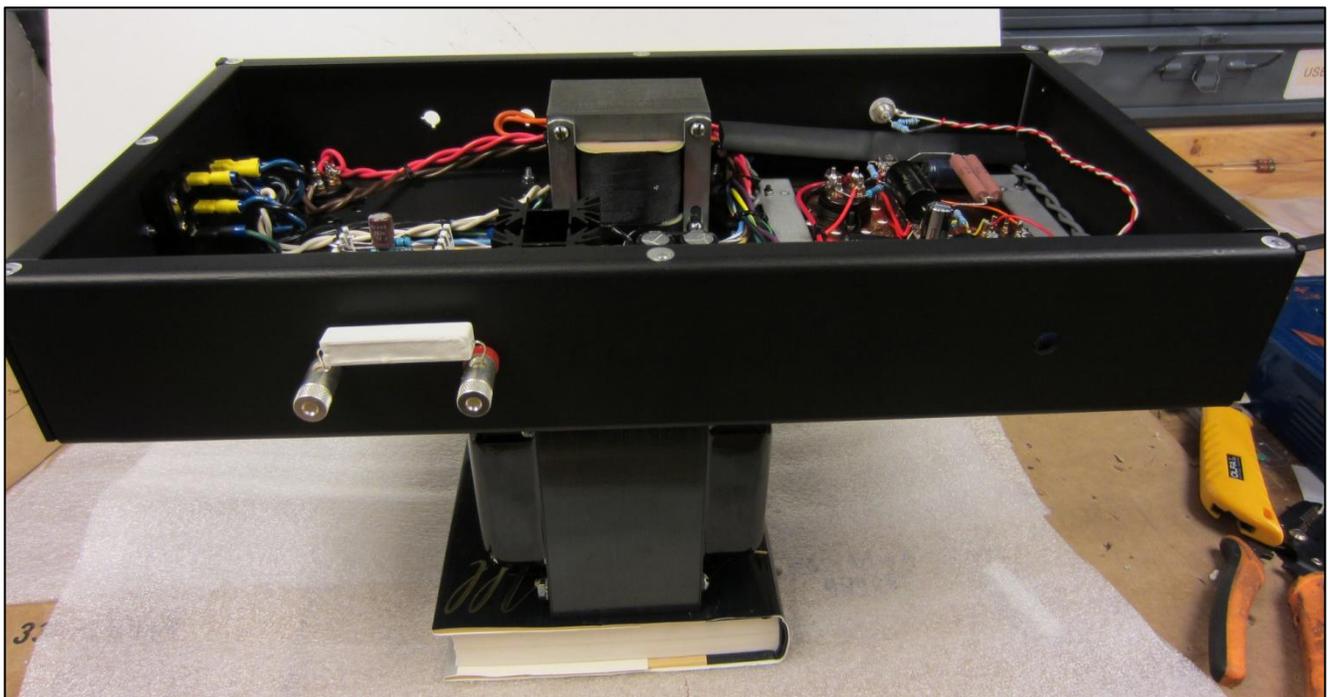
Just a reminder to please be aware of proper electrical safety.

There are sufficient voltages in this kit to give you a very nasty and harmful shock, so be careful when powering on, debugging, and probing around.

For the power-on test you will want to place the 8-ohm dummy load provided onto the speaker posts:



Now let's position the amplifier on our work area with the inside up; notice how I've used a book under the transformers.



If you have a Variac then it's worthwhile to use it: a Variac is used to slowly apply the AC voltage from the wall outlet to the amplifier; you can control this and as you are slowly powering up you can check to see if filaments are lighting up, etc.

Now we're going to measure key voltages. If you're using a Variac take into consideration that the voltages you'll be measuring are going to be a percentage of the full DC voltages: for example, with the Variac at 90V AC instead of 120, you can factor in that the DC voltages will be down by 25%.

- Turn the amplifier on. If the fuse does not blow, continue to the next step and more comprehensive testing. If it does, jump ahead to "Debugging." Turn the amplifier off.

9.5 Voltage Tests

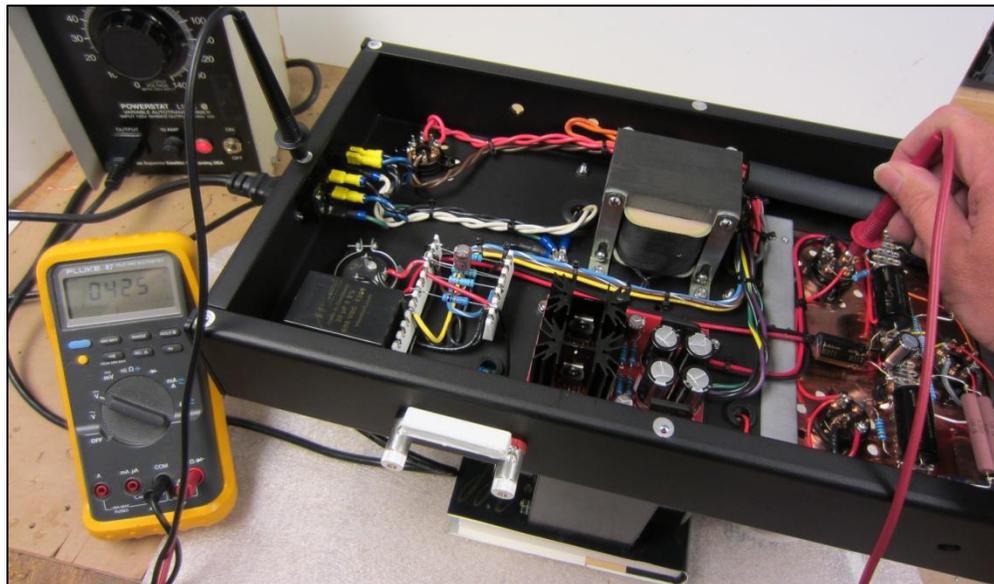
Install the tubes. The 6SH7 tube is keyed and you need to match up the notch on the 8-pin valve base with the tube base. *Make sure you don't mix it up with the 5U4-G tube which is also an 8-pin valve base tube.* The 300B tubes can only be installed one way in the 4-pin valve bases.

Tubes Installed At This Point: All



You may find when you go to make a reading that the multimeter reads 0; you may want to press just a little harder with the probe (sometimes probes do not make great contact with the actual surface).

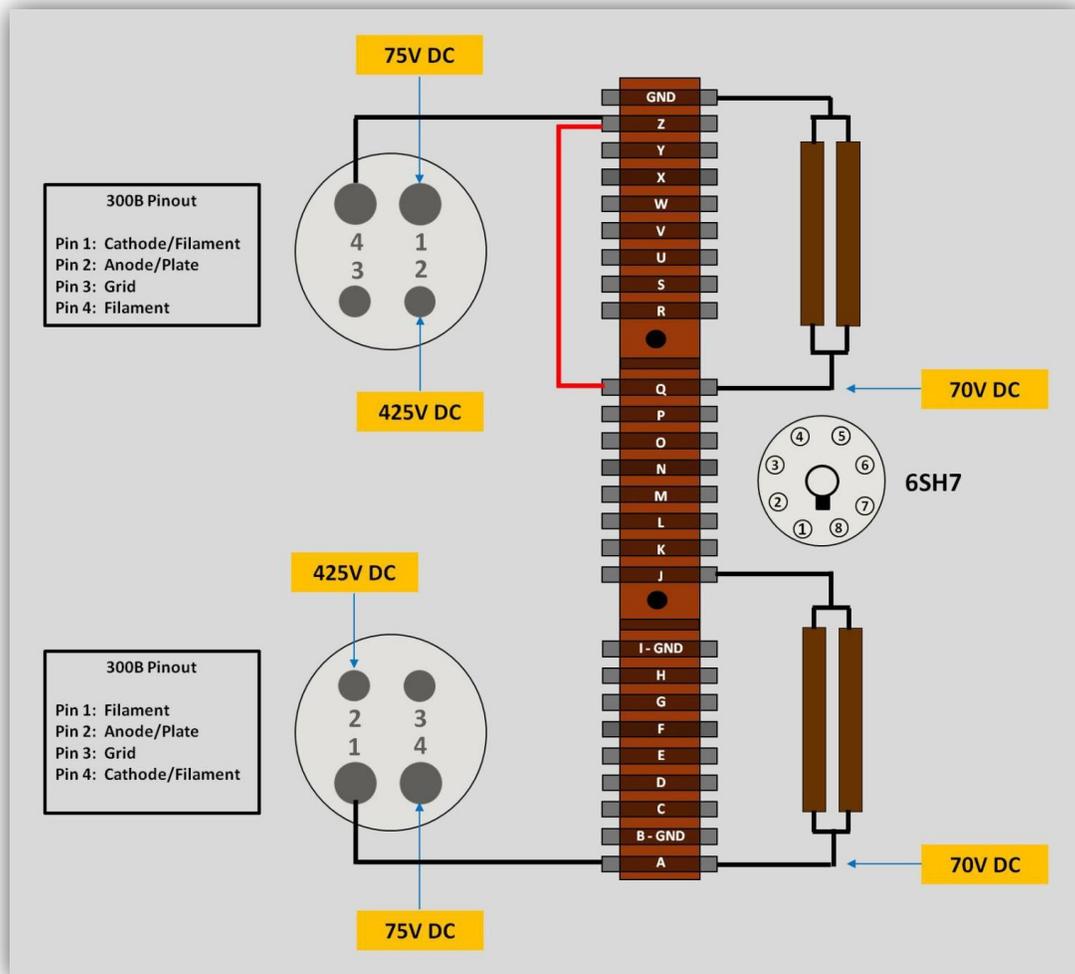
Referencing the picture below and the table and graphic on the next page:



Turn the amplifier on and perform the following tests:

Multimeter Setting	Black Lead	Red Lead	Approximate Reading
DC	Chassis Ground	Cathode/Filament (Pin 1) of top 300B	75V ± 5%
		Anode (Pin 2) of top 300B	425V ± 5%
		Filament (Pin 4) of top 300B and Tag Strip Z or Q	70V ± 5%
		Cathode/Filament (Pin 4) of bottom 300B	75V ± 5%
		Anode (Pin 2) of bottom 300B	425V ± 5%
		Filament (Pin 1) of bottom 300B and Tag Strip A	70V ± 5%

Incidentally, the difference between the 70V and 75V DC measurements is the 5V 300B filament voltage, offset by 70V.

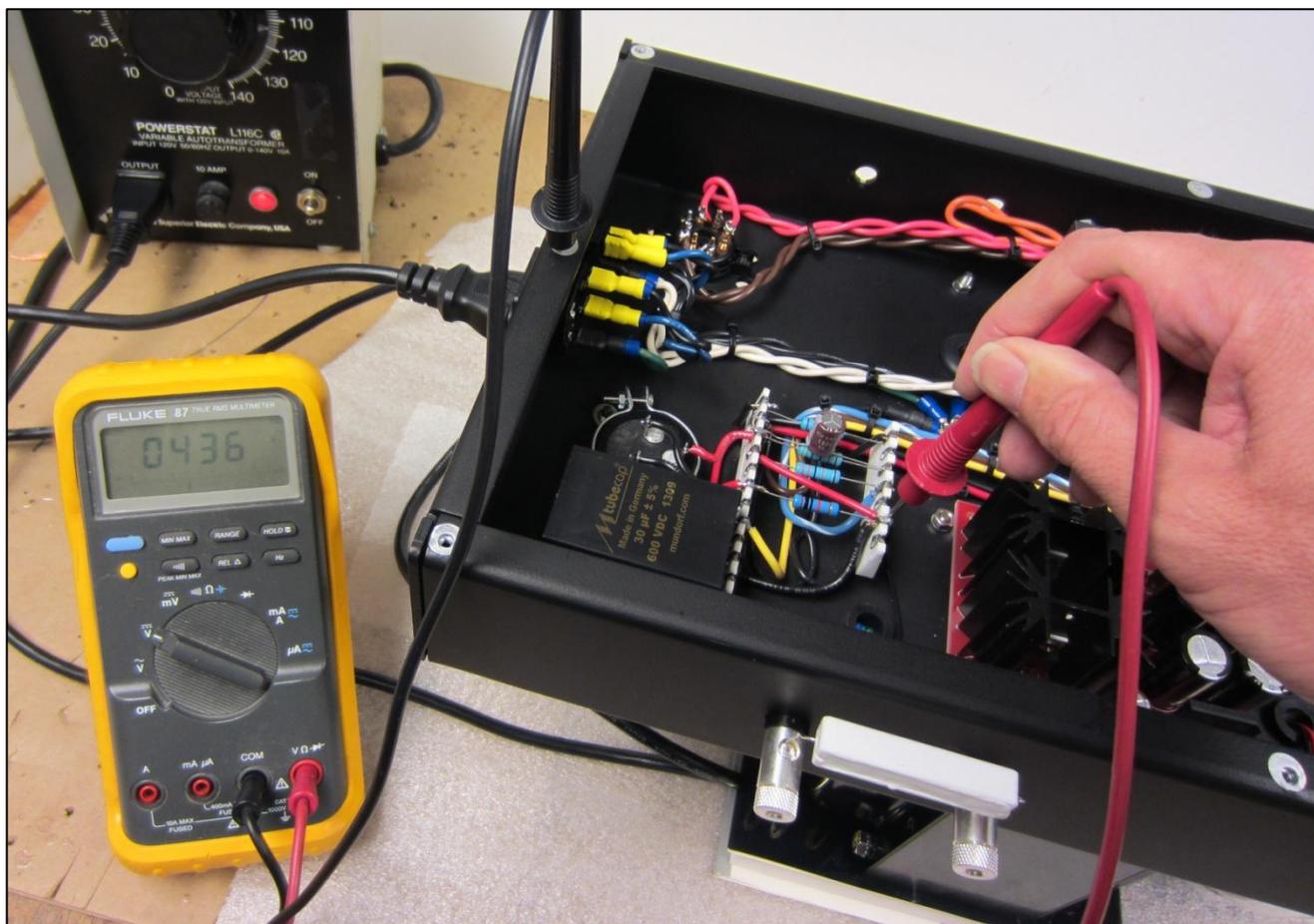


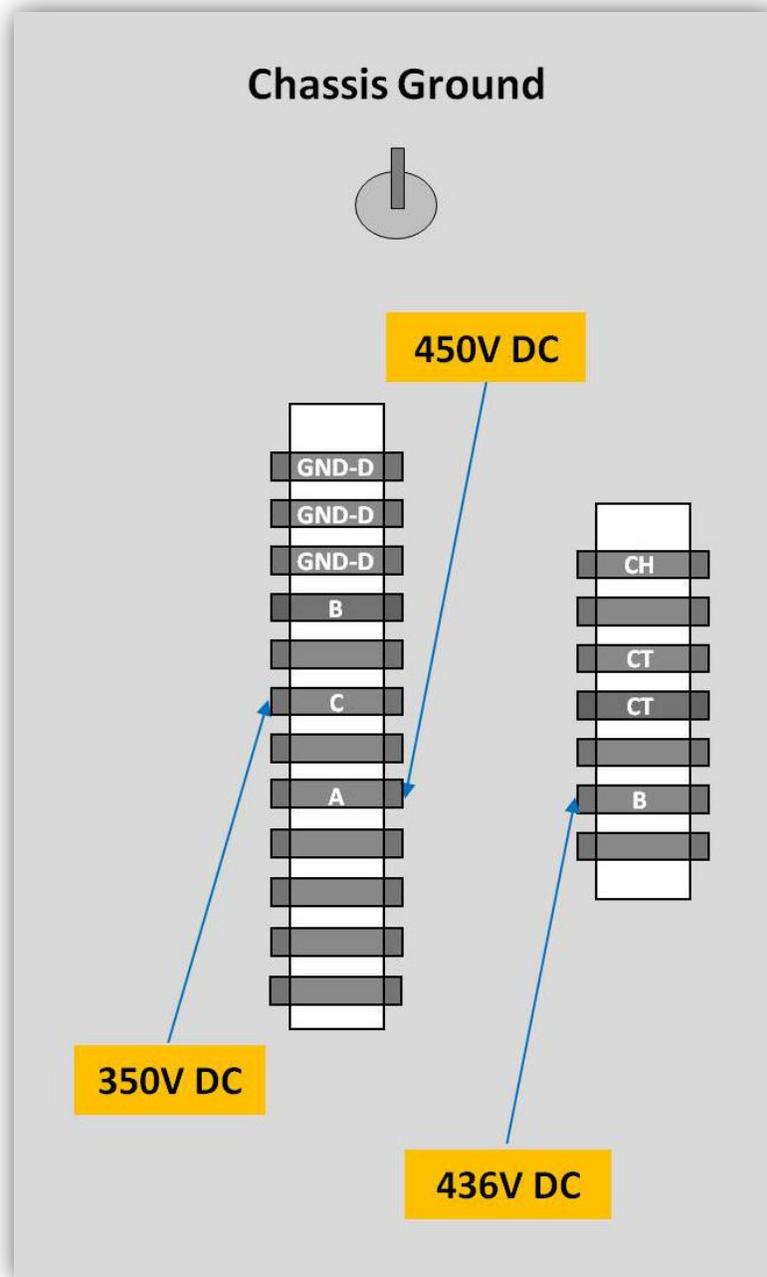
If these voltages are good your amp is 99% working. If not, see 'Debugging' below.

Worst Case Scenario

Installing the 5U4-G rectifier provides the amplifier with the various DC voltages (including the B+ or HT) that it needs to operate; usually, if there is a problem with the build, then it's going to be noticed here. *It's possible that, if there is a major problem, the fuse will blow — or you may get a burning resistor or even see some smoke.* If anything alerts you that there is something drastically wrong then turn off the unit ASAP, unplug it, and contact us at audionotekits@rogers.com before proceeding. We'll be happy to provide you with advanced troubleshooting advice. Note: we may ask that you send us high quality digital pictures of the internals of the amplifier.

Let's also measure three important Power Supply voltages:





Multimeter Setting	Black Lead	Red Lead	Approximate Reading
DC	Chassis Ground	12-pin Ceramic Post A	450V
		12-pin Ceramic Post C	350V
		7-pin Ceramic Post B	436V

Well done if all these voltages are good! Let's move on to the sound check.

9.6 Sound Check

If you feel that your amp is working, plug a CD player into your pre-amplifier and measure the AC voltage across the speaker posts. When it is playing you should see 10-15V AC and the dummy load resistor will start getting hot. Make sure when there is no music playing you read 0V AC across the dummy load. *Just try this for a minute or so and don't burn yourself when unhooking the resistor!*

Now that we have an amplifier with correct DC conditions it's time to see if we can get some sound. We recommend hooking up a pair of "cheap" speakers to verify that it is working correctly.

 *When you turn the amplifier on you'll hear a hum for about 15 seconds; then it will disappear. The reason for this is the voltages are settling: it's kinda like throwing a rock in a swimming pool; it takes a bit of time before the ripples (or, in our real world case, the DC voltages) settle. And, while you can certainly listen right away, the amplifier likes 30 minutes to warm up.*

If this checks out, congratulations! — you have a working amplifier. If you have no sound coming out of your amplifier then the best place to start is by doing some basic checks:

- ❖ Make sure you have a signal entering the amplifier and that your speakers are connected.
- ❖ Make sure that the fuse is inserted in the IEC socket and has not blown.
- ❖ Follow the steps in 'Debugging,' below.

9.7 Debugging

If you are having any problems let's try and debug things.

First, let's check two key AC voltages on the 5U4-G rectifier. These are the filament voltages for the 6SH7 and the 300Bs. Since the maximum voltage on many multimeters is 600V and the filament voltage between pins 4 and 6 is $850V \pm 5\%$, we'll measure the AC voltage for each pin referenced to the Chassis Ground; this halves the voltage to $425V \pm 5\%$. For the 5V measurement, you can simply position the probes as shown: one on Pin 2 and one on Pin 8 (the orientation doesn't matter).

Multimeter Setting	Black Lead	Red Lead	Approximate Reading
AC	Chassis Ground	5U4-G Pin 4	425V \pm 5%
		5U4-G Pin 6	
	5U4-G(B Pin 2	5U4-G Pin 8	5V AC

If the 300B tubes are not lighting up, check that there is 5V DC across the filament pins; if there's no voltage there, try removing the tube, power-on again, and see if there is 5V without the tube in place.

If things are still not working, contact ANK Audio Kits at audionotekits@rogers.com. We'll figure things out. Please have a few telling digital pictures ready to share with us.

Section 10

Finishing Touches

We have now verified proper AC conditions and done a sound check.

Before closing the amplifier up, it's not a bad idea to install the base plate and turn the amplifier right side up to make sure that it works properly in the standard position.

10.1 Installing the Front Faceplate

- Remove the protective films from the front and back of the front faceplate.
- Install the front faceplate using four Black M4 CSK flat head screws.

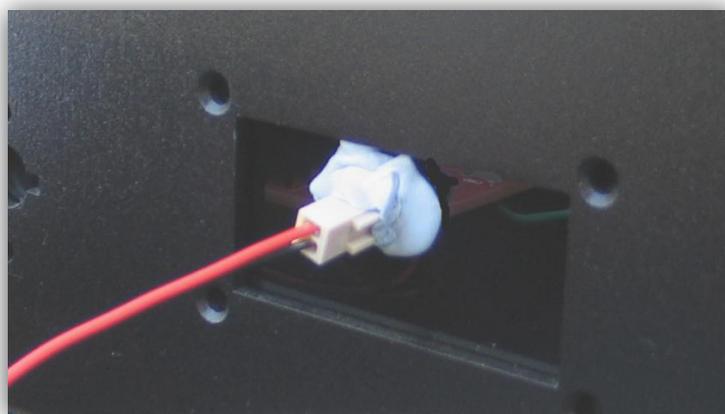
10.2 Installing the LED

- Carefully trim the LED leads so that they are not exposed.



It's a good idea to trim the NEGATIVE lead a bit shorter than the POSITIVE lead so that, if you need to remove the LED later for any reason, you'll know which is the POSITIVE lead (the longer lead) and will be able to reinsert it correctly.

- Glue or attach (with some Blu Tack) the LED holder to the front panel so that the LED protrudes through the designated hole, as shown below:



10.3 Installing the Chassis Top

- Install the chassis top using the provided hardware.

Section 11

Final Thoughts

11.1 Congratulations

If you've made it to this point then CONGRATULATIONS! — you are ready to insert your Legend Monoblock 300B-2A3 Parallel SET Amplifiers into your real system, sit back, and enjoy the music.



11.2 Break-in

Amplifier manufacturers and most audiophiles agree that a new amplifier takes time to break in. While a few people pooh-pooh the idea, our experience is that amplifiers do need some time to 'bloom' and show what they're truly capable of. The changes which evolve over the first few weeks typically result in a more refined and stable mid to mid-higher spectrum and more overall 'body' to the sound.

The reasons for this are the subject of much debate and are unresolved. Many people feel, and we would agree, that this phenomenon is due to two correlated factors.

Firstly, a number of components, particularly tubes, larger capacitors (both electrolytic and film), and transformers physically change when energized. Some say that the science behind this phenomenon is related to cyclic heating and cooling having an effect on the metallurgy of vacuum tubes, chemical changes that effect capacitors (often called 'forming'), and, particularly in our amplifiers, the large metal cores we use in our transformers.

Secondly, there's no question that sometimes we, as listeners, need some time to become familiar with a 'new' sound, particularly if that new sound is based on a circuit topology that we're unaccustomed to. There are significant differences, for example, between the sounds of amplifiers based on push-pull vs. single-ended topologies as well as those which use different output tubes: 2A3, 300B, EL34, EL84, etc., each of which has a distinctive character.

So, our recommendation is to give your amplifier some time to define itself and become more refined and to give yourself time to become acquainted with it. Like life, sometimes it's "love at first sight"... and sometimes it just takes time.

11.3 Cables

In our experience, a high quality power cable and good interconnects and speaker cables make a noticeable improvement to the sound.

11.4 Tube Rolling

We feel that the sound of the ANK Audio Kits Mentor SET Power Amplifier is truly sublime and that is destined to become a popular kit. It provides a highly detailed and transparent presentation with gorgeous sonics. Rolling some quality new production tubes and/or some nice NOS tubes will allow you to tailor the sound to your particular preferences.

11.4.1 5U4-G



The directly-heated 5U4-G full-wave rectifier is a 1930s design and there are classic era NOS 5U4-G tubes available at reasonable prices. Of course, audio lore is that the one to have is the Western Electric 274B rectifier, if you can find one and have \$1,000 or so burning a hole in your pocket. Alternatively, you can use the Chinese 5Z3P(A); a well regarded NOS military grade version made by Shuguang may still be available. *Beyond these, do not substitute any other 5V rectifier for the 5U4-G type for which this amplifier was designed; there are some significant differences between a 5U4-G and other rectifiers, with respect to voltage drop and current specifications, and the result of a substitution is unpredictable and could damage your amplifier.*

11.4.2 6SH7



NOS sharp cut-off 6SH7 (driver) pentodes are readily available at very affordable prices from many tube suppliers. The 6SH7 comes in a glass tube version or with a black metal case. Opinions are all over the map as to which is the one to have!

11.4.3 300B and 2A3



The directly-heated 300B and 2A3 power triodes are in current production and available at various prices. NOS tubes are quite rare and the prices can be astronomical.

11.5 Thanks

Thank you for investing in the ANK Audio Kits Legend Monoblock 300B-2A3 Parallel SET Amplifier and congratulations on working your way through the build. The manual is new and we would welcome your feedback. Please email us at audionotekits@rogers.com and let us know how everything went: were there any errors in the manual or instructions, parts lists, etc.? Your ideas regarding greater clarity or tweaks will also be truly appreciated.

If you have some suggestions that you feel would help other kit builders please also let us know. We can put them on a support page for other users. We'd also like to see some great pictures of your build process or your final build. We can post them on our website or on our Facebook page. And we'd love a review from you regarding the sound.

We hope the unit brings you many years of joy and we look forward to hearing from you.

Appendix

Resistor Color Codes (5 band)

	Black	- 0
	Brown	- 1
	Red	- 2
	Orange	- 3
	Yellow	- 4
	Green	- 5
	Blue	- 6
	Violet	- 7
	Grey	- 8
	White	- 9

Resistor color codes are read from the color that is nearest the edge of the resistor - that is treated as the first column.

The first column of a 5-band resistor is the 100's column, followed by a 10's column, followed by a units column.

The fourth band is a multiplier (or decimal point shifter). The multiplier can use the additional colors silver and gold. These are used for very small values and turn the multiplier into 0.01(silver) and 0.1 (gold). For the standard colors, it determines how many times the column value is shifted to the left (i.e. multiplied by 10)

The fifth column is a tolerance value. These can be quite complex but we will not concern ourselves with these.

Examples



1 0 0 x 1



6 8 0 x 1



8 2 0 x 1



1 0 0 x 10



2 2 0 x 10



2 7 0 x 10



3 3 0 x 10



1 0 0 x 100



6 8 0 x 100



8 2 0 x 100



3 3 0 x 1,000



2 2 0 x 1,000



4 7 0 x 1,000



1 0 0 x 10,000

You can also find an 'Interactive Resistor Color Code Calculator' on our website (available from the [Links page](#)).

Mains Wiring for 240V

