The Trinity Amps

18 WATT

Amp Builder's Guide

January 2022, Version 22.1

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www.trinityamps.com

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Thank You!

Thank you for purchasing your kit from Trinity Amps. We truly hope that you enjoy building it. If you have any questions please do not hesitate to contact us.

We are always looking for feedback form our Customers on our products. We have checked the build instructions over thoroughly and are confident in our product. However, mistakes do happen so our advice is that as you connect each wire and part according to the layout, cross-check against the schematic. If you find any inconsistencies, or have any concerns, please let us know. Do not hesitate to contact us! We want this build to be successful for you and for Trinity Amps!

Please check over your parts carefully and the Bill of Materials and notify us of anything that does not seem correct.

We're confident that you will like our product and our support and when you're completed, we'd appreciate your comments posted on any of the internet forums such as thegearpage.net, 18watt.com, AX84.com or trinityamps.com. You will find some extra business cards in the package. Please keep one and pass the rest around.

We know you have a choice in suppliers and we do appreciate your business.

Have Fun!!

Cheers,

Stephen Cohrs,

Trinity Amps

Web site: www.trinityamps.com

email: **stephen@trinityamps.com**

Introduction

This guide has been prepared for builders of Trinity Amps Kits. It is always being improved and we would appreciate your feedback and comments to: stephen@trinityamps.com

Accordingly, content and specifications are subject to change without notice.

We do try to make it as accurate as possible, but it is sometimes hard to keep up with the changes. Therefore, if you do find an error, please let us know about it and we will correct it. Suggestions are welcome so if you have one, please get in touch with us.

Sources of help.

Forums: Please use the various forums to get help. They are an excellent resource and can be found at trinityamps.com, AX84.com, the Gear Page etc..

Color assembly pictures and the latest drawings, tips, techniques are all in the Trinity Amps Forum, in the Resources Forum.

Email: We can't help with every problem but if you cannot get your problem resolved, email us and we'll do our best to help.

Phone Call: If your problem can't be solved, email for a phone appointment.

Acknowledgements

Much of the content in this document is original. Rather than reinvent content, some parts are based on content from other excellent sources and are hereby acknowledged.

R.G. Keen's site www.geofex.com - Tube Amp FAQ, Tube Amp Debugging

AX84.com site www.AX84.com - Gary Anwyl's P1 construction guide version 1.0

GM Arts website http://users.chariot.net.au/~gmarts/index.html - Guitar Amp Basics

www.18watt.com - website for various content and diagrams – Richie TMB

Aron from diystompboxes.com

WARNING

Please Read this Information Carefully

The projects described in these pages utilize **POTENTIALLY FATAL HIGH VOLTAGES.** If you are in any way unfamiliar with high voltage circuits or are uncomfortable working around high voltages, **PLEASE DO NOT RISK YOUR LIFE BY BUILDING THEM.** Seek help from a competent technician before building any unfamiliar electronics circuit. While efforts are made to ensure accuracy of these circuits, no guarantee is provided, of any kind!

USE AT YOUR OWN RISK: TRINITY AMPS EXPRESSLY DISCLAIMS ALL LIABILITY FOR INJURY OR PROPERTY DAMAGE RESULTING FROM THIS INFORMATION! ALL INFORMATION IS PROVIDED 'AS-IS' AND WITHOUT WARRANTY OF ANY KIND.

REMEMBER: NEVER OPERATE YOUR AMP WITHOUT A LOAD. YOU WILL RUIN YOUR OUTPUT TRASNFORMER!

Version Control

Version	Date	Change
21.1	17Feb21	New Version
21.2	28Mar21	18 Watt Plexi 6V6 BOM updated for C2 .0022 to .02uf
21.3	6Jun21	Removed v6 Model documentation; added note on Terminal Strips (M. Westbrook)
21.3	26Nov21	BOM Updated
22.1	14Jan21	Added managing PT leads and addendum 1&2

Builders Guide General Theory

For a discussion on Guitar Amp Basics and Tube Amp Theory, please refer to our Web-Site Support Page document **Builders Guide General Theory**

Building an Amp

Warning: Do not attempt to build a guitar amp unless you know how to work safely with the dangerous voltages present in a tube amp. These voltages can exceed 700 volts.

Introduction

If you have purchased your Trinity Amp as a kit, this guide will help you build a tube guitar amplifier. It is oriented towards someone who knows a little about electronics but is new to do-it-yourself amps. It outlines a simple path to getting a quality amp build.

Switches and wire

Use standard UL approved switches with a 125V/3A rating for the Power and Standby switches. Use 22 or 20 Gauge insulated solid wire with a 600V rating. It is good to get a variety of colors so you can color code your wiring.

Physical layout

Make sure the jacks, sockets and pots mounted along the edge won't interfere with parts mounted on the underside of the chassis. Imagine how chassis will be mounted in the cabinet and make sure there is enough clearance for the speaker and mounting brackets. Trinity amp chassis are laid out with serviceability and neatness in mind.

Grounding

It is recommended that you follow the layout provided with your Trinity Amp. It has been tested and has proven reliable. If you choose to deviate, consider the following information.

Amps traditionally use the chassis for signal ground. This is not the best choice since it can create ground loops and bad ground connections may develop over time. It is better to use star grounding in which all of the local grounds are collected at a single 'star ground' point. With star grounding there is only one connection between the chassis and signal ground.

Here are some rules for laying out a star ground. More information on grounding can be found in the Tube Amp FAQ and the Tech Info page of Aiken Amplification.

(1) Connect the power transformer center tap directly to the negative terminal of the first power supply filter capacitor (cap) then run a separate wire from the negative terminal to the star ground point.

(2) Collect the ground points of each tube and its associated resistors and capacitors to a local ground point that is not connected to the chassis. Run one wire to the star ground point from each collection.

(3) Run exactly one wire from the star ground point to chassis.

(4) Insulate the input and output jacks from the chassis.

The safety ground wire from the mains is separate from the signal ground. Run a wire from the AC ground to the chassis near where the AC power enters the chassis.

Insulated jacks

To insulate the input and output jacks either use plastic insulated jacks or metal jacks with insulating washers. Some people prefer the increased durability of metal jacks. Insulating a metal jack requires a shoulder washer with a 3/8' internal hole that fits a ½' panel hole.

Minimizing transformer interference

To minimize coupling between the power transformer and output transformer orient them so their plates are at right angles. If possible, place them at opposite ends of the chassis.

Keep the input stage wiring short and away from the output stages. This minimizes the possibility of oscillations caused by coupling of the output signal into the input.

Mount the grid resistors as physically close to the grid pins as possible.

Use a twisted pair of wires for the tube filament wiring. Route it away from AC lines and close to the chassis.

Wiring

The traditional method of constructing amps involved mounting the components on tag board or fiberboard. This is the technique that is used for Trinity Amplifiers and is the recommended approach for service and reliability.

Assembling the amp

Before You Begin

When you first receive your kit, remove all of the parts from the shipping box and place them on a well-lit, clean surface. Check all of the parts against the parts list and verify that you have everything before you begin. Contact us at once if you are missing anything, or if something appears to be damaged**.**

Tools

To assemble the amp you need:

1. 25 watt pencil tip soldering iron. (Minimum for ROHS)
2. 60/40 rosin core solder .030" dia (lead-free 97/3 tin/copper for ROHS turrets)
3. wire stripper
4. wire cutter
5. needle nose pliers
6. small screwdrivers (Phillips, Standard)
7. multi-meter with minimum 500V range

Use a stand for the soldering iron, a sponge to keep the tip clean, de-soldering wick material and clip leads. You should also have a multi-meter with at least 500V range, preferably 1000V and an audible continuity checker. Try to get a multi-meter that measures capacitance. This lets you verify the value of your components before you install them.

Soldering

Soldering is accomplished by heating the components to be soldered and allowing the molten solder to flow onto them. Do not try to melt solder on the tip of the iron and transfer it to the solder joint. It doesn't work.

Follow these steps when soldering to boards. **Note ROHS instructions**:

1. Use 60/40 rosin-core solder. (use **lead free** when soldering ROHS boards.)
2. Keep the tip of the soldering iron clean. If it's dirty, wipe it on a damp sponge to clean it.
3. Set the temperature of your soldering iron to about 700F.

   ROHS: 725-750F when soldering ROHS turret boards, the dwell time (time to heat and complete the connection) is a little longer and temperature is set a little hotter. The solder used was Lead-free solder 97/3 formula tin/copper with a Rosin Core.
4. Melt some solder on the tip of the iron. The molten solder helps to efficiently transfer heat from the soldering iron to the component leads.
5. Make a good mechanical connection first, and then make a good solder joint.
6. Heat the leads to be soldered by touching it with the tip of the iron.
7. Touch the solder to the leads. The solder should flow onto the leads. Avoid breathing the fumes.
8. Remove the soldering iron and allow the solder joint to cool.

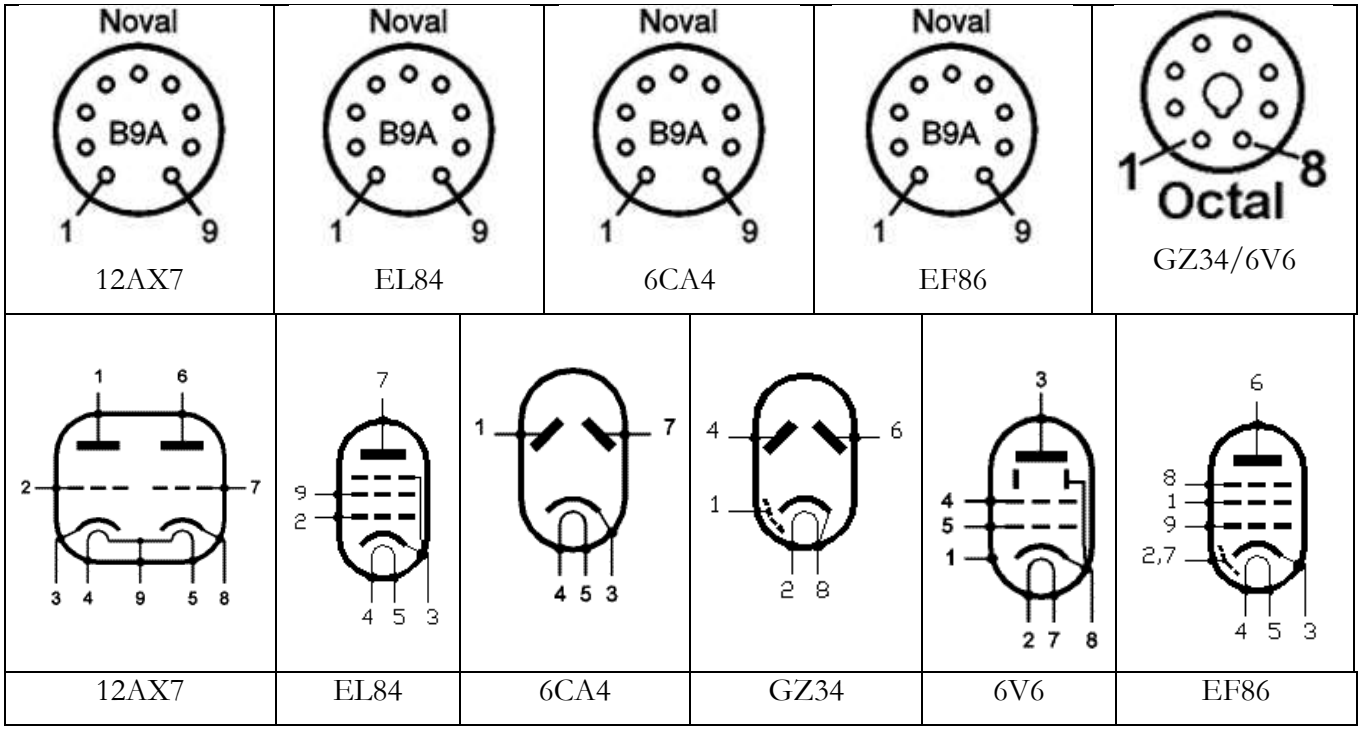
Note: Do not apply the tip of the soldering iron to the turret board any longer than it takes for the solder to flow.

Some people do have success using leaded solder on ROHS boards. Your experience may vary.

The solder joint should be clean and shiny. (ROHS joints are not as shiny as non-ROHS). If it is dull looking it may be a 'cold solder joint' which is not a good electrical connection. If a solder joint is suspect, heat it with the iron to reflow the solder.

Tube Pin Numbering

The pins on a 9-pin tube socket are numbered 1 to 9 in a clockwise direction when a tube or socket is viewed from the bottom. Note that there is a gap between pins 1 and 9. The pins on an 8-pin tube socket are numbered 1 to 8 in a clockwise direction when viewed from the bottom. Note that there is a gap between pins 1 and 8.



The pins on the potentiometers are numbered 1 to 3 from left to right when the shaft is facing towards you and the pins are at the top.

Tube Designations

There are several different tube numbering systems that you may see on tubes, which generally are a result of where they were built. Most commonly the numbers contain digits only (e.g. 5751), or are some combination of numbers and letters (12AX7, ECC83, CV4004). These different numbering systems may be from the American or British military, or from American or European industrial or consumer use, and then of course there are many strange exceptions. But to use the notation commonly seen in the United States, here is the meaning of "12AX7":

12 - the filament voltage

AX - an arbitrary model number

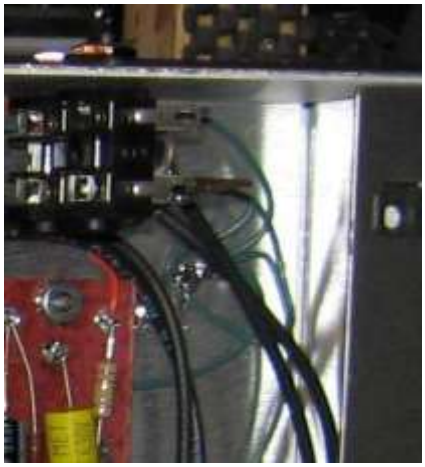
7 - the number of internal elements, including the filament

To make things more complicated, many tubes have letters after the name, such as 6L6WGB, 6L6GC. Sometimes these letters mean functionally nothing (design revisions) and sometimes they refer to different voltage capabilities of a given type.

NORTH AMERICA	*EUROPE*
12AX7	ECC83
6BQ5	EL84
6CA4	EZ81
5AR4	GZ34
6CA7	EL34
6L6GC	KT66
12AT7	ECC81
12AU7	ECC82

Grounding Scheme

To keep noise to a minimum, the Trinity Amps 18 watt layout uses a two point grounding scheme where the power side of the amp is connected to a single common ground point (Power Ground), and the pre-amp is connected to another point on the chassis that is located immediately beside the input jacks (Pre-Amp Ground).



For grounding these amps, we strongly recommend that you follow the layout provided. We don't recommend that you deviate.

For safety, we use a single Mains Ground point. No other components may be connected to this point.

Assembly Steps Summary

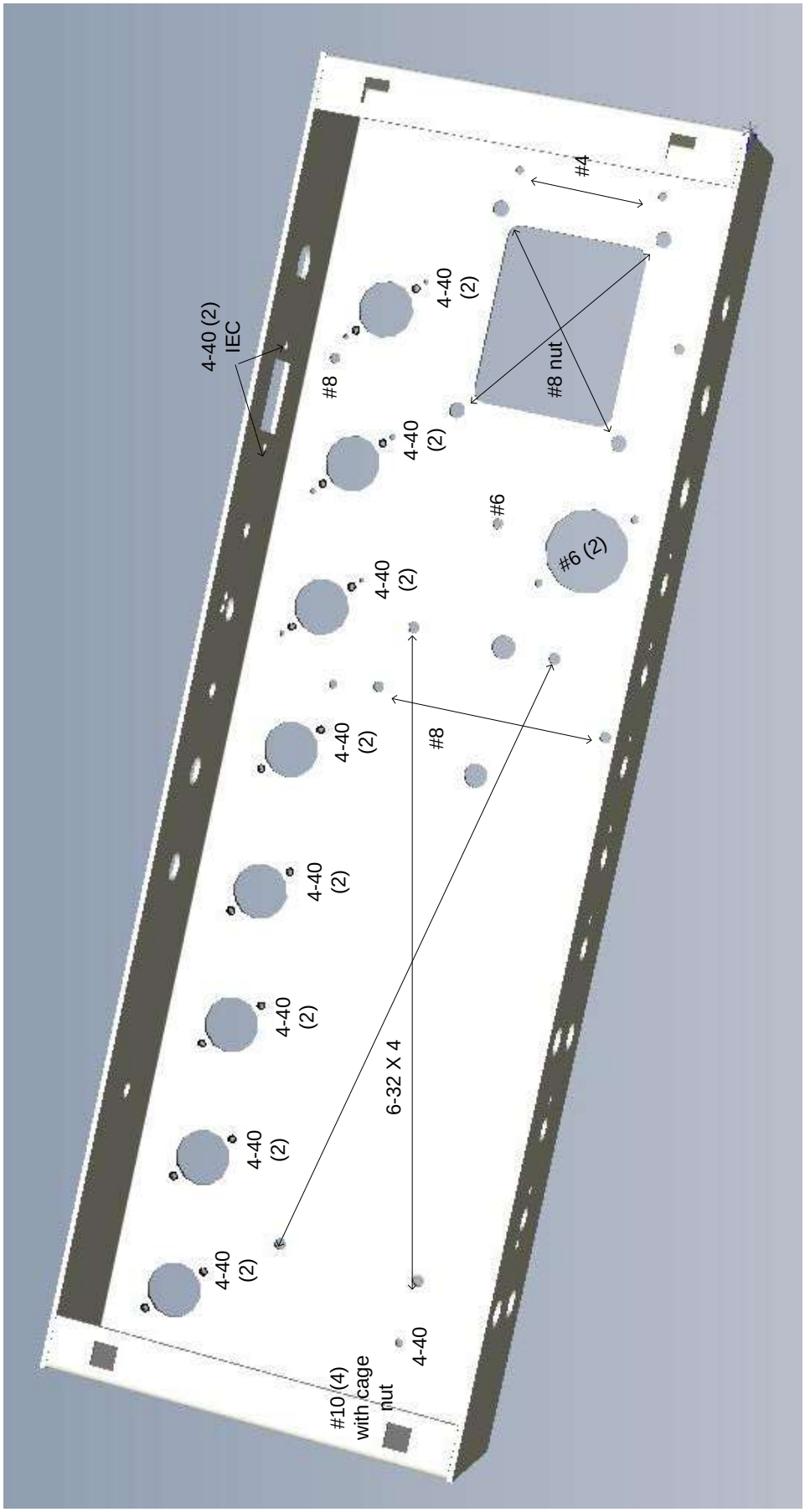
1. Install Hardware on the Chassis.
2. Wire up the heater wires to the sockets.
3. Install Transformers onto chassis.
4. Wire Power Supply - Mains, Transformer, Rectifier socket, Switches, Pilot light.
5. Assemble the turret board and install on chassis.
6. Connect turret board leads installing off-board parts as you proceed.
7. Wire up Impedance Switch and Output Jacks
8. Wire input jacks and shielded cable.
9. Check Wiring.
10. Follow Start-Up procedure.

Follow Pictorial on Forum – Resource Section – Topic: "18 Watt Plexi Pictorial Build"

1. Install the Hardware

There are many nuts bolts etc. required. Here are some guidelines.

Part	**Qty**	**Where to use**
4-40 X 5/16"	20-25	Holes are tapped so nuts are not required for tube sockets and IEC connector. Use KEPS nuts to hold terminal strip at tube locations. Use with nuts/lock washer to mount the 5 lug terminal strip and 1-#4 power amp screen resistor terminal strip.
6-32 X 3/8"	3	Mount 3 power ground # 6 chassis lugs with KEPS nut. Mount Capacitor clamp
6-32 X 3/4"	4	Mount turret board to chassis using stand-offs. Screw though board – spacer and into chassis tapped hole. Use a #6 lock-washer between the board and screw head.
8-32 X 3/8"	1	Mount Mains ground **ONLY**. Use any additional lock washers with #8 chassis lug.
8-32 X 3/8"	2	Mount Output trans. With KEPS lock nuts.
8-32 KEPS nuts	7	4 for power transformer (optionally remove Heyboer PT nuts as supplied); 2 for Output transformer; and 1 for mains ground bolt.
10-32 X 1-1/4"	4	Mount chassis to cabinet. Use cage nuts in square holes pressed into chassis.


4-40 (2)
IEC
#8
4-40
(2)
#4
#8 nut
4-40
(2)
#6
#6 (2)
4-40
(2)
#8
4-40
(2)
4-40
(2)
4-40
(2)
4-40
(2)
6-32 X 4
4-40
(2)
4-40
#10 (4)
with cage
nut

Tube Sockets - Install all the tube sockets. The chassis is tapped for #4 screws so that nuts are not required.

Align the #1 pins according to the layout to minimize lead length. RF shield's are supplied for pre-amp tubes, V1 to V3. These are mounted on top of the socket and held in place by the #4 screw that holds the socket in place.

Spring retainers are provided for power and rectifier tubes. These are mounted on top of the socket and are held in place by the #4 screw that holds the socket in place.

Can Capacitor - Install the dual capacitor can cap clamp with #6 X 3/8" bolt and KEPS nut. Loosen of the clamp screw and insert the dual capacitor JJ 32uF X 32uF can cap into the clamp. Align it so the 2 lugs are parallel to the chassis front. Tighten the clamp screw.

Grommets - Insert 2 - ½" grommets for wire leads passing through the chassis from the output transformer.

Front Panel - The front panel is installed and held in place by installing the pilot light, power switches, potentiometers and jacks. Ensure the potentiometers are located in the correct positions according their values and the layout. The locating tabs on the potentiometers are used to stop them from rotating and fit into the chassis.

For the input Cliff jacks you will probably need only 1 fibre washer to mount them flush.

Install all parts only finger tight until all parts are fitted, then tighten.

Trinity 18 sIII/TMB Front View

Terminal Strips - Inside the chassis, install the terminal strips (several solder lugs or 'tags' attached to an insulated strip).

5 tag terminal strip (not including 2 ground tags) is used for the power connections;

2 tag terminal strip (not including 1 ground tag) for 100R screen resistor to the EL84s;

2 tag terminal strip (not including 1 ground tag) for the two 68K grid stopper input resistors;

2 tag terminal strip (not including 1 ground tag)for the 470K TMB grid stopper resistor.

The terminal strip for the input to V1 is optional, but highly recommended.

The terminal strip for the TMB 470K grid stopper resistor is necessary to prevent excessive feedback squealing in the TMB channel. It is not required on the sIII or Plexi design.

Terminal strips are mounted using a nut over the socket mounting screw.
NOTE: DO NOT SOLDER COMPOMEMTS TO THE GROUND CONNECTED LUGS UNLESS DIRECTED TO DO SO!!

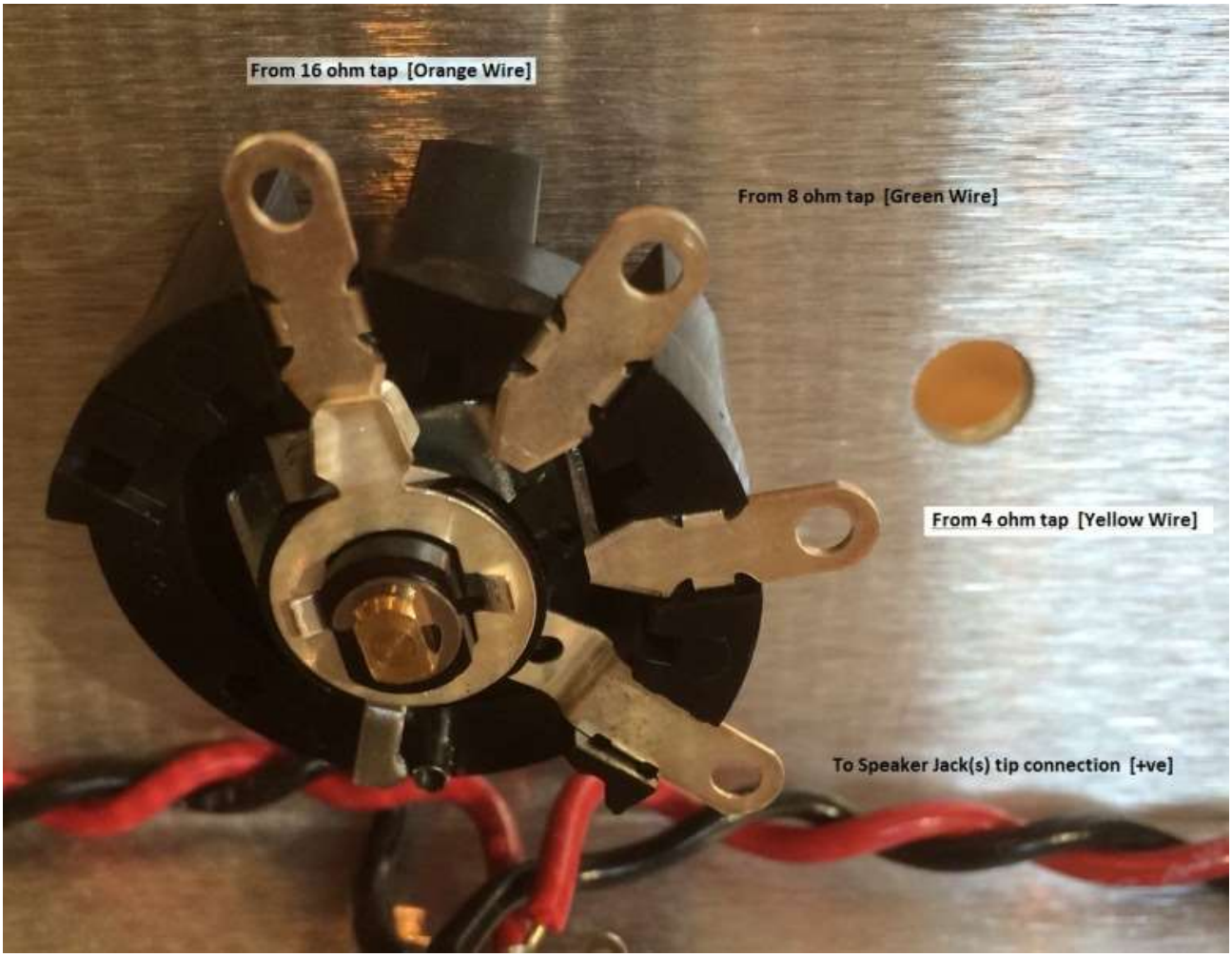
Ground Lugs - Install the ground lugs:

1 - #8 Mains chassis ground lug using 1 #8 bolt & KEPS nut;

3 - #6 Power chassis ground lugs using 1 #6 bolt & KEPS nut; and

2 - #4 preamp chassis ground lugs using 1 #4 bolt & KEPS nut

Impedance Switch – Install the Impedance Selector paying particular attention to the leads orientation for the correct impedance selection. Refer to the diagram below for the connections.



Output Jacks - You can install the output jacks, but they may need to be removed to provide good access to the tube sockets for wiring. You will probably need to use both spacers to ensure a flush mount of the jack on the chassis.

IEC Mains Socket - Orient the IEC socket so that the center ground lug points toward the top of the chassis. Install the IEC socket using 2 - #4 screws , screwed into the chassis which is tapped to accept them. Nuts are not required.

Fuse Holder - Orient the Fuse holder socket so that the center lug points away from the IEC socket. Fasten in place with the nut and washer provided.

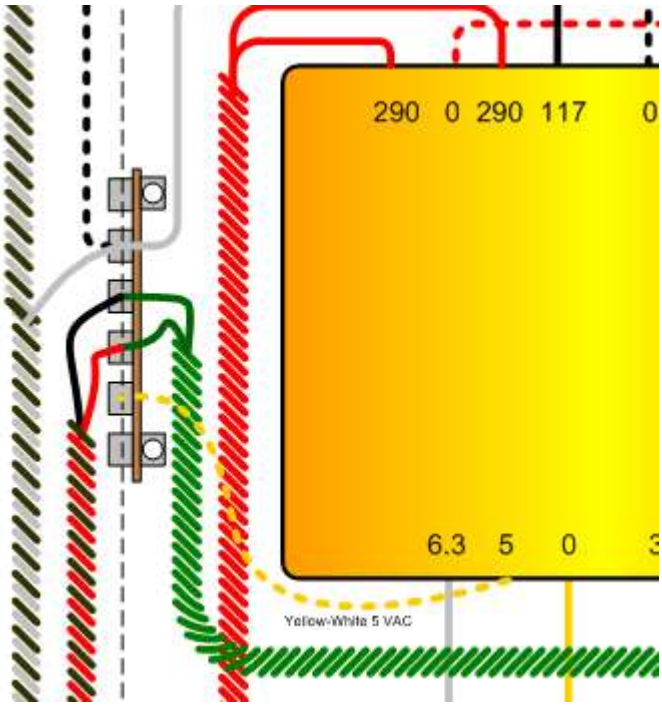
2. Heater Wiring

Here is a guideline for wiring the kits with the supplied wire:

- 22 gauge 600V solid for hook up from board to tubes
- 22 gauge 600V solid for hook up from board to pots/front panel
- 20 Gauge pre-twisted for tube heater wiring
- 20/18 Gauge, stranded, or solid 600V for power supply hook up to transformers, rectifier, standby etc. TIP: Re-use cut offs from transformers.
- shielded wire RG174U for inputs to V1 and some controls
- green wires for ground wires.

Heater Wires

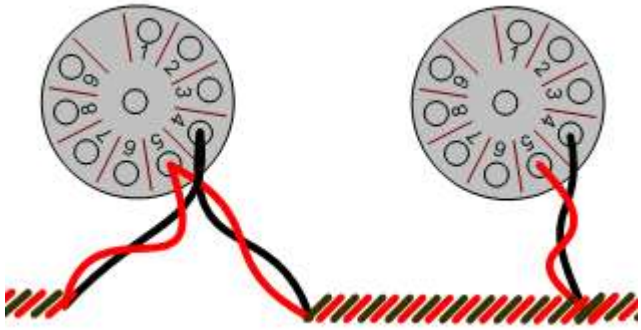
It is important to wire the tube filaments carefully. A long length of pre-twisted 1 pair (Red-Black) wire is supplied. This will help to minimize any hum. Solder each wire to the tag strip adjacent to the transformer. Now route the twisted pair wire around the perimeter of the chassis, following the layout diagram, pressing it flat against the chassis.



For the EL84 power tubes, the Red wire goes from the terminal strip to the first Power Tube to pin 5, the Black wire to the first Power Tube pin 4. Then these go to to pins 4 and 5 respectively of the second Power Tube.

From there, the wires daisy chain across the preamp tubes, with the Red wire to both pins 4 and 5 of each preamp tube and the Black wire to pin 9.

This 'Polarity' on the preamp tubes and heater tubes must be maintained to keep hum to a minimum. You must connect the same color heater wire to the same pin(s) as you progress from tube to tube e.g. black on pin 4 of both EL84 and red on pins 5. Do one tube socket at a time. Complete the 12AX7s using the same process. Red on pins 4 & 5 tied together and black on pins 9. Don't switch the heater wire polarity.



3. Install Transformers

Install the power transformer and output transformer.

Orient the power transformer so that the 6.3 VAC heater wires are facing the rectifier. You may prefer to remove the existing 4 nuts on the transformer and mount the transformer flush on the chassis surface. Either way, when mounting the transformers, use the supplied #8 KEPS lock nuts to hold transformers in place.

Orient the output transformer such that the leads to the B+ are closest to the filter capacitors. The Primaries (Brown, Blue, Red) wires should face the power transformer. Braid the Yellow, Green, Orange and Black secondaries together and feed them through the chassis grommets. Twist the Blue & Brown together and feed them through the other grommet along with the Red lead.

Note: On the outside of the Chassis, tie off the unused 5K Blue-White & Brown-White primary that is not required for the 18 watt build. Tie it off by cutting off any pre-stripped, exposed wire and then put heat-shrink over the end and tuck it away as it is not used.

4. Wire the Power Supply

Note: Managing Power Transformer extra leads.

When you go to wire up your amp transformer you are going to have some leftover leads which need to be insulated and tucked out of the way – i.e. Tied Off:

First, separate all of the primary leads from the secondary leads and put them into their respective bundles. To determine what's what, reference the wiring diagram that came with your kit. The primary leads will all be notated on the left side of the wiring diagram, and the secondary leads will be notated on the right. If you have already wired up all of the secondary leads, they would be permanently trimmed to length and out of the way.

Once you've determined the length of wire you need for all your primaries, trim off the excess. Using a set of wire cutters, trim the excess wire not only from the primary leads you'll be using, but from ALL primary leads.

Why not just trim the full excess of the unused leads all the way down to the transformer itself? There is plenty of room to store the excess leads in the chassis without messing anything up, and

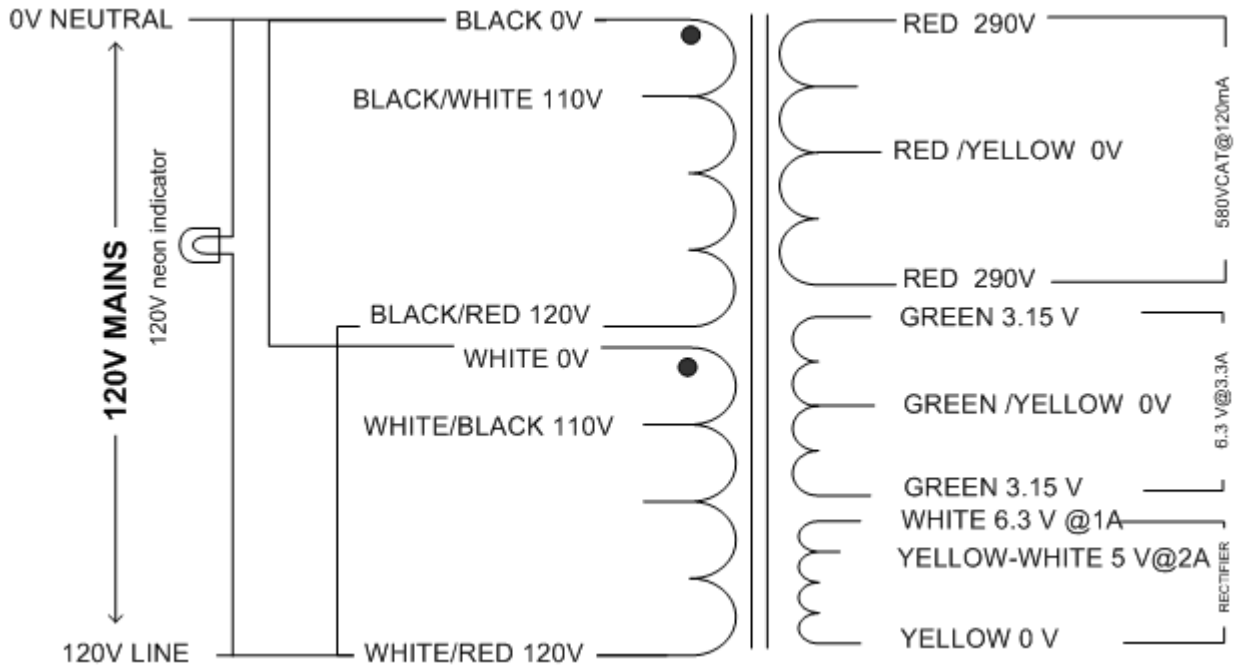
what if you move to a place where the power isn't 120V? It's best to leave yourself the option to rewire the primary leads for that country's power.

When the leads are trimmed to length, insulate the exposed ends of the unused wires. Insulate with shrink tubing, but this can also be done by wrapping electrical tape around the wires and over the top exposed side of them. Prevent those conductors from touching each other or anything else inside the chassis.

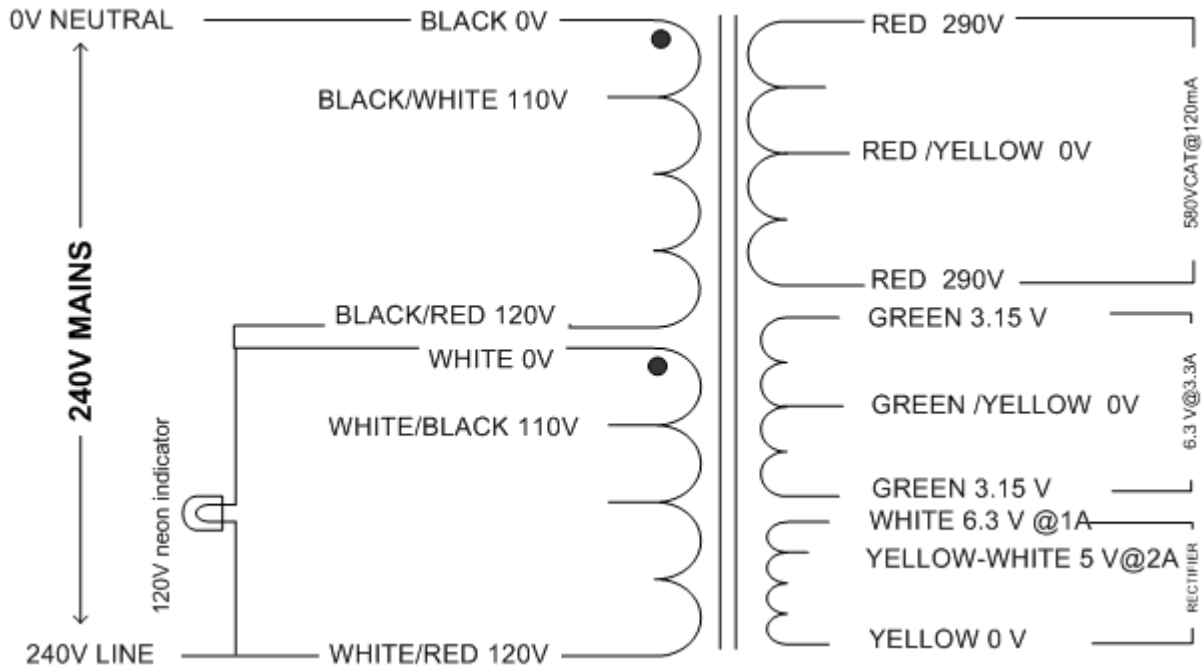
Finally, twist all of the wires together and tuck them down into the chassis next to the transformer. This little loom of wires is secure and will easily stay put on its own forever; you won't have to worry about them getting loose and messing things up or rattling around and making noise

Start with the IEC socket. Run a GREEN wire from the bolt/lug on the chassis immediately beside the socket to the GROUND LUG on the IEC socket. Solder both ends on place. Make sure to tighten the ground bolt / lug very tightly.

The Power Transformer utilizes two 120 VAC nominal primaries. These are ***connected in Parallel for North American*** mains voltages and ***in Series*** for 240 mains. 110, 220, 230 mains voltages are also supported. See Appendix for connection diagrams.



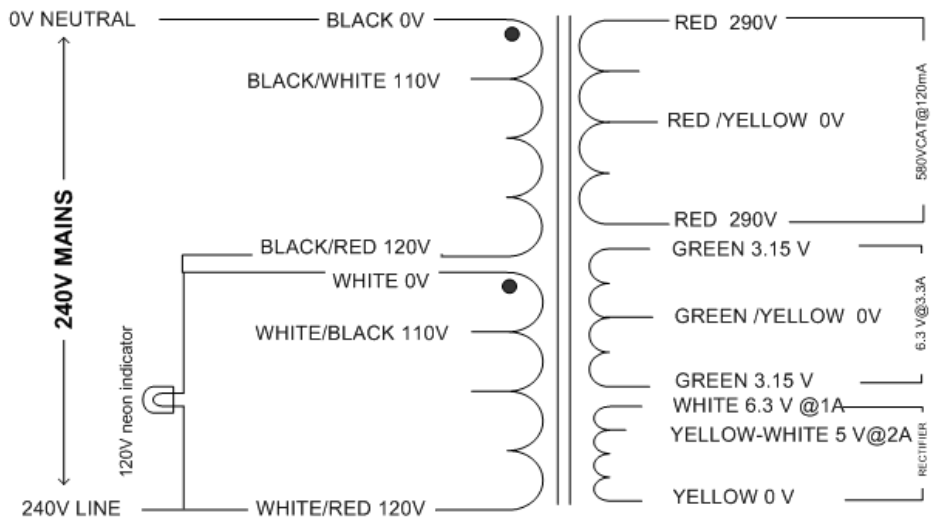
Trinity Amps Power Transformer 120 VAC Connection



Trinity Amps Power Transformer 240 VAC Connection

Wiring of Mains circuits: European vs North America			
	Ground	Hot (L)	Neutral (N)
Europe	Green/White or Green/Yellow	Brown	Blue
North America	Green [USA-plug round prong]	Black [Small flat prong]	White [Large flat prong]
European 240V	Green/White or Green/Yellow	It makes no difference how the other two wires are matched.	

Diagram for proper hook-up of 120V Neon indicator when using 220-240 VAC primary.



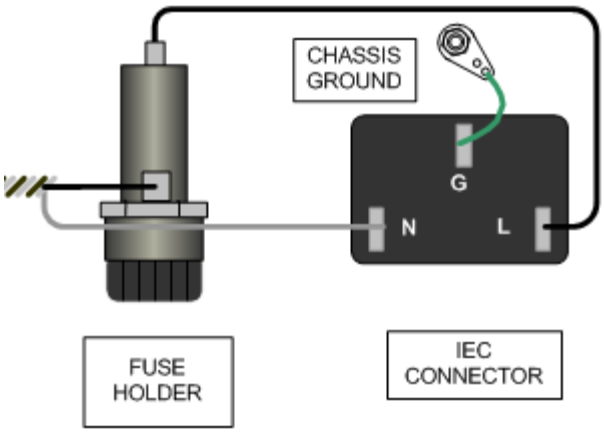
Twist and connect the two 6.3V heater wires from the transformer to the terminal strip where the twisted heater wires were connected. Connect the heater center tap ground to the #6 'Power' star ground point located between the power transformer and turret board.

Wire up the Transformer mains power supply.

Start with the IEC connector and ensure it is grounded to the #8 bolt/lug on the chassis immediately beside the socket. Liberally use star washers to lock this well into place.

Run a wire from the 'Line (L)' or 'Hot' side of the IEC connector to the lug on the END of the fuse holder and from the SIDE of the fuse holder to one of the Power switch terminals.

The other side of the IEC connector or 'Neutral (N)' gets routed to a tag on the terminal strip and then to the 'Common' point of the power transformer.



120V MAINS

All AC wires are twisted together to reduce hum.

Connect the Black and White transformer leads to the Common terminal on the 5-Lug terminal strip where the Line Neutral (N) was connected.

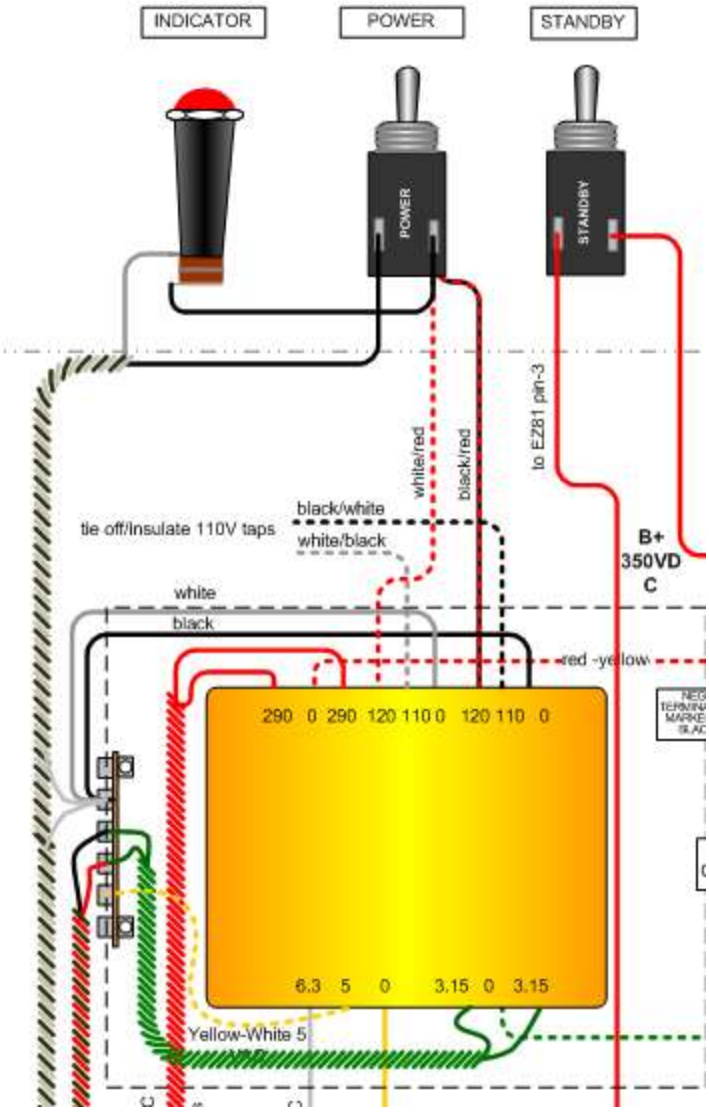
Make sure the switch is in the desired on position when the connection is 'made' (0 ohms resistance). The switch can be oriented so that it is 'On' in either 'Up' or 'Down' position.

Connect to the Line Lead from the IEC socket Line tab to one side of the switch.

Connect the power transformer Black-Red & White-Red transformer leads to the other lug. A second wire is attached to this same lug and runs to the 120V neon indicator light.

The other side of the indicator light goes to the 'Common' terminal on the 5-Lug terminal strip.

Twist all wires together and then solder the wires in place on the power switch lugs, indicator and terminal strip tags.



240V MAINS

All AC wires are twisted together to reduce hum.

Connect the White transformer lead to a terminal tag. This will be the Common or Neutral 'N' tag. Connect the IEC terminal 'Neutral (N)' to this terminal.

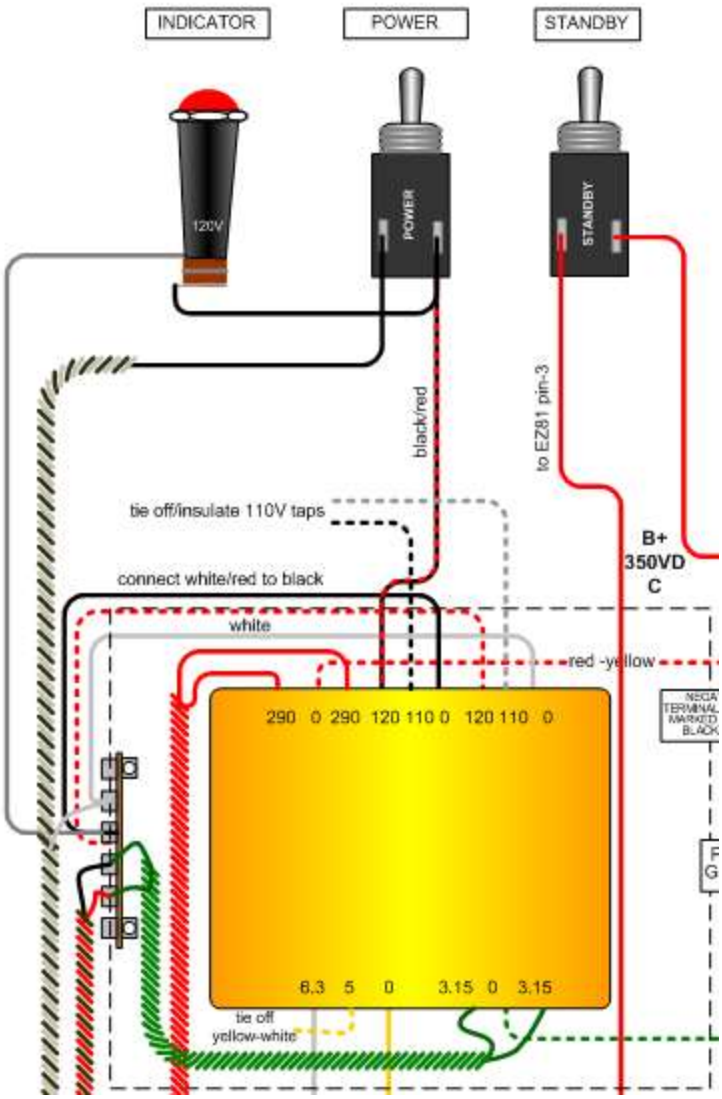
Connect the Black and White-Red leads to an unused terminal on the 5-Lug terminal strip.

Run a wire from this terminal tag to one terminal of the 120V indicator light.

Run a Black wire from one of the power switch lugs to the IEC socket Line lug.

Connect the Black-Red transformer lead to the other lug of the switch. A second wire is attached to this same lug and runs to the 120V neon indicator light.

Ensure you twist all wires together and then solder the wires in place on the power switch lugs, indicator and terminal strip tags.

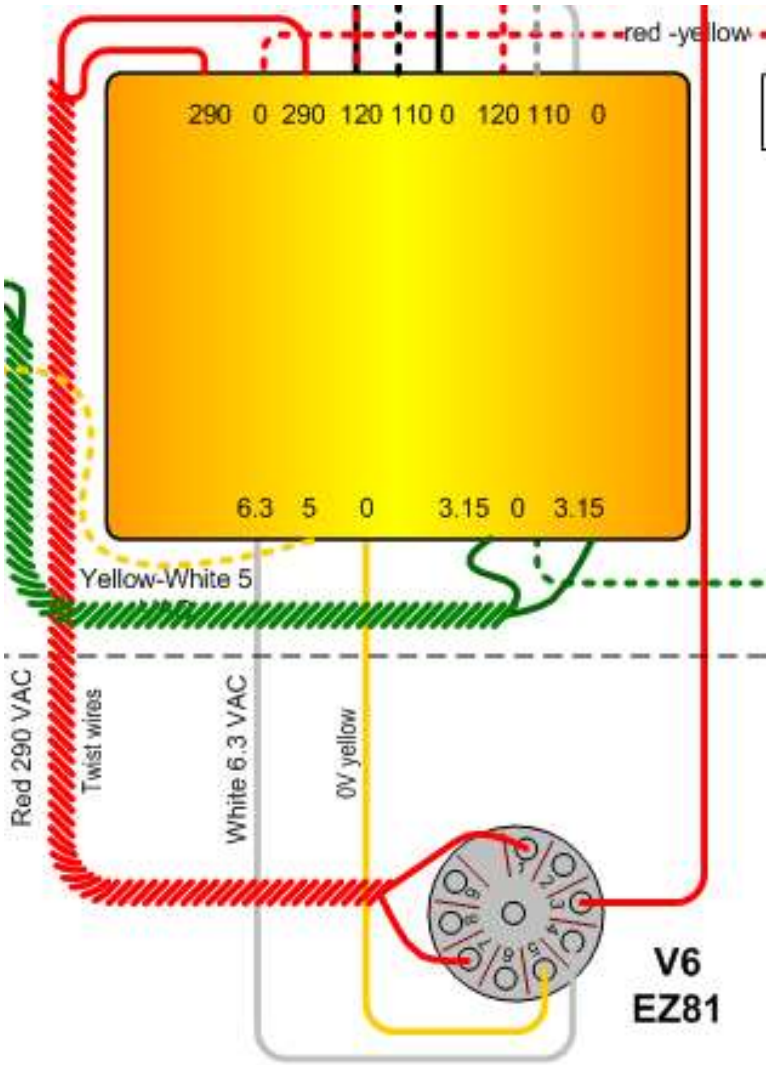


RECTIFIER WIRING (EZ81)

The Rectifier heater wires are identifed by colour and by the fact that there is no center tp. They are labelled 6.3, 5, 0 on

Twist and connect the two 6.3VAC Rectifier (White and and Yellow) heater wires to pins 4 and 5 of the EZ81 rectifier.

Connect the unused 5VAC Yellow-White lead to an unused terminal on the 5-lug terminal strip.



HV WIRING

Twist and connect the two Red Red, HV (high voltage) - 290VAC) wires to pins 1 and and 7 of the EZ81.

Route and connect the Red-Yellow center tap of the high HV leads from the transformer to the single star ground point.

Route the wire from pin 3 back to a terminal lug on the standby switch. Make sure the switch is in the desired on position, i.e. where the connection is 'made' . The switch can be ON in either 'Up' or 'Down' position.

Attach a wire to the other side of the standby switch and route it to the closest side of the 32uF/32uF can cap.

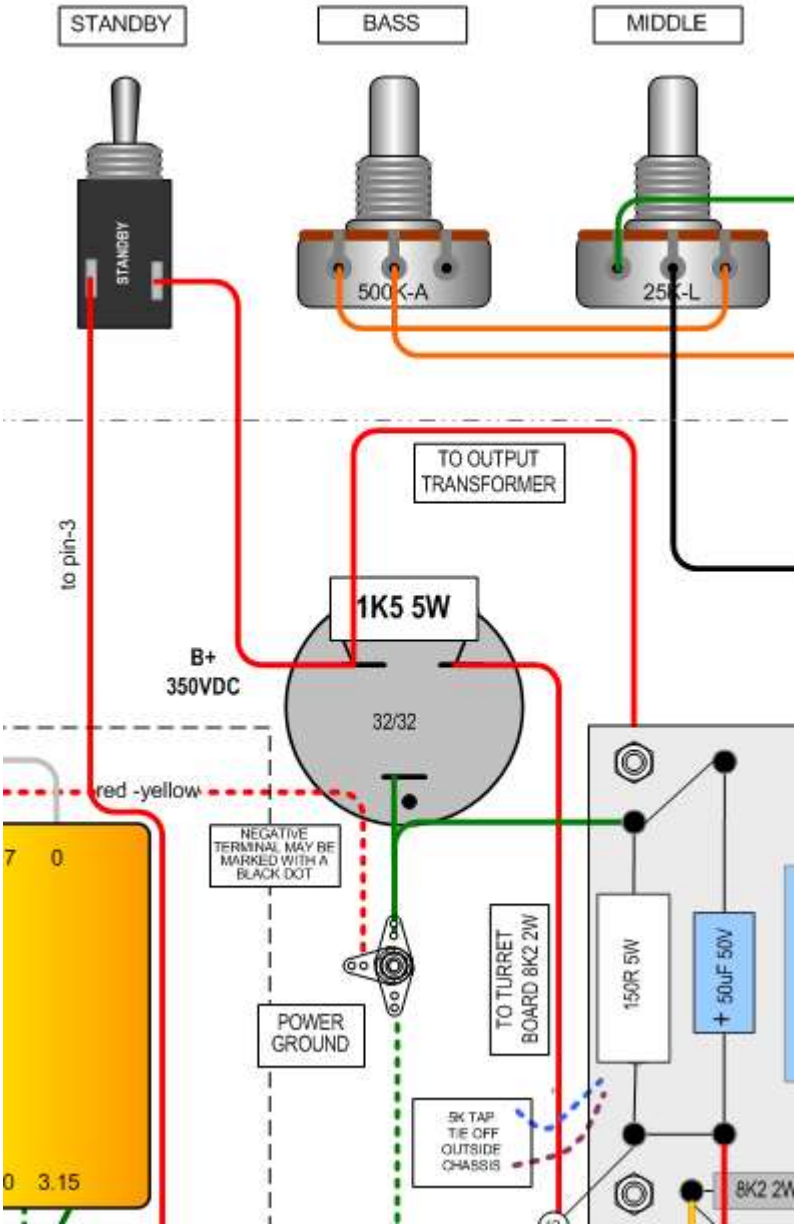
Route the Output Transformer Center tap lead along the chassis inside corners and connect this lead to the lug the Stand-By switch is connected to. This is B+.

Install a 1K5, 5W power resistor between the two positive Can Capacitor terminals.

Connect a lead from the other side of the Can Capacitor, and the 1K5 power resistor, to the turret board following the layout.

From the negative Can Capacitor terminal, run a green wire to the #6 Power Ground point.

Solder all the Can Capacitor terminals.



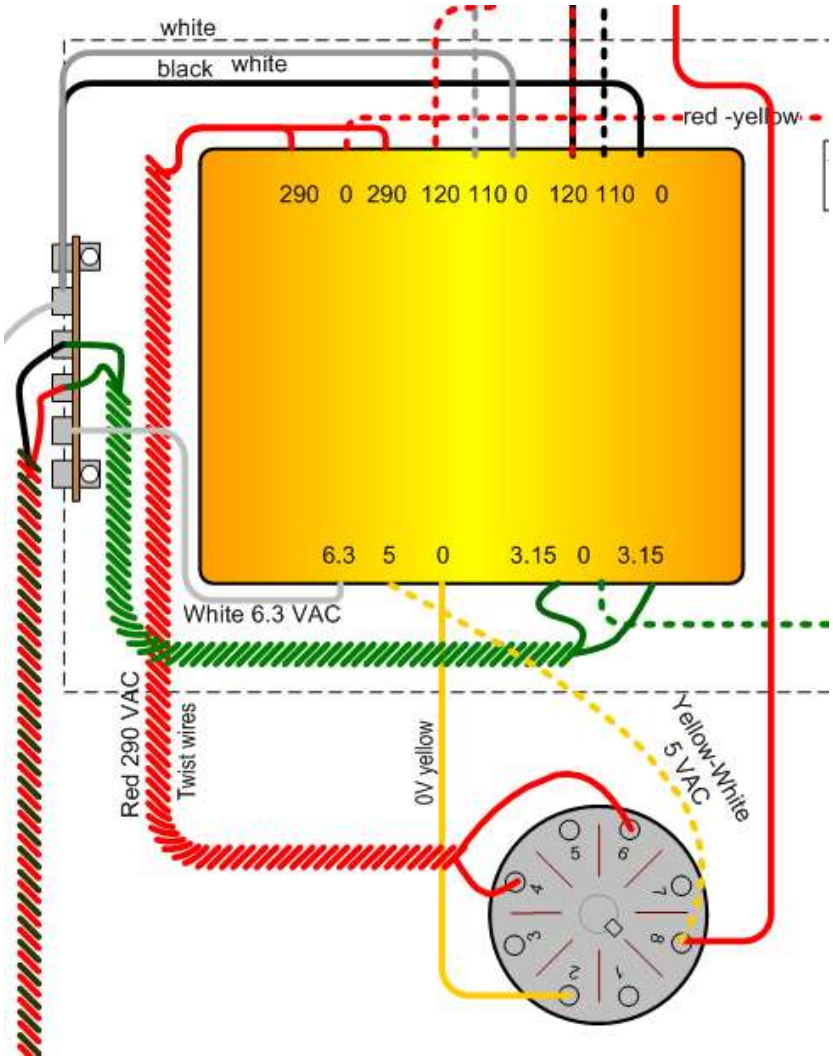
The layout drawing shows dotted green and dotted red wires from PT as well as the ground wire from the capacitor bank on the board being grounded together. This is this same as the star ground on the PT nut.

RECTIFIER WIRING (5AR4/SS)

The Rectifier heater wires are identifed by colour and by the fact that there is no center tap. They are labelled 6.3, 5, 0 on

Twist and connect the two 5VAC Rectifier (Yellow-White and Yellow) heater wires to pins 8 and 2 of the Octal rectifier socket.

Connect the unused White 6.3VAC White lead to an unused terminal on the 5-lug terminal strip.



HV WIRING

Twist and connect the two Red Red, HV (high voltage) - 290VAC) wires to pins 4 and 6 of the Octal rectifier socket.

Route and connect the Red-Yellow center tap of the high HV leads from the transformer to the single star ground point.

Connect a wire to Pin 8 of the socket. Route the wire from pin 8 back to a terminal lug on the standby switch. Make sure the switch is in the desired on position, i.e. where the connection is 'made' . The switch can be ON in either 'Up' or 'Down' position.

Attach a wire to the other side of the standby switch and route it to the closest side of the 32uF/32uF can cap.

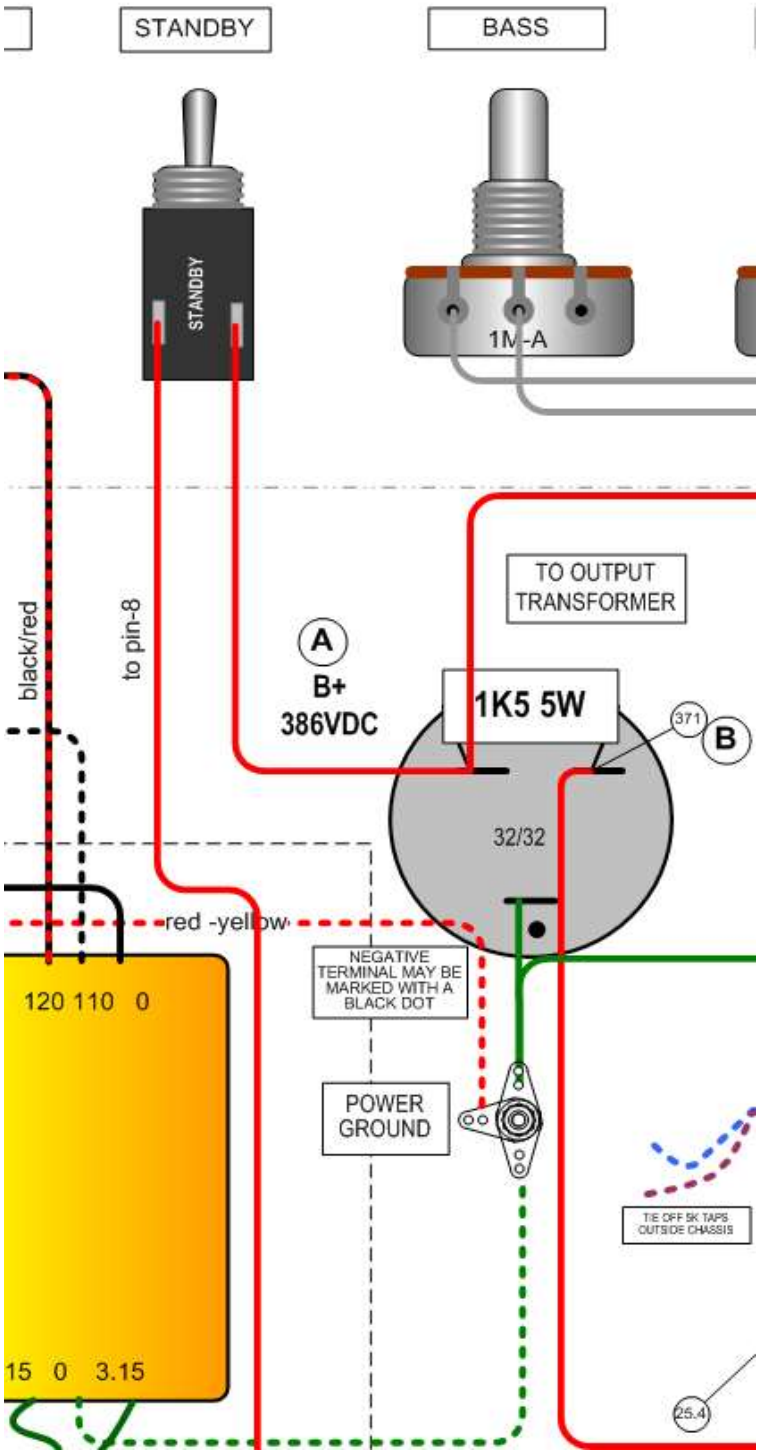
Route the Output Transformer Center tap lead along the chassis inside corners and connect this lead to the lug the Stand-By switch is connected to. This is B+.

Install a 1K5, 5W power resistor between the two positive Can Capacitor terminals.

Connect a lead from the other side of the Can Capacitor, and the 1K5 power resistor, to the turret board following the layout.

From the negative Can Capacitor terminal, run a green wire to the #6 Power Ground point.

Solder all the Can Capacitor terminals.



The layout drawing shows dotted green and dotted red wires from PT as well as the ground wire from the capacitor bank on the board being grounded together. This is this same as the star ground on the PT nut.

Test the Power Supply

Check your mains wiring to the power transformer and ensure all wires are correctly and safely connected or tied off. Make sure there are no loose ends.

First read the section on "***Making a Voltage Measurement***" later in this manual.

Install a fuse (2A if 120 Volts Mains, 1A if 220/240 Mains)

Do not install a rectifier tube.

Turn on the power.

Look for a glowing Indicator light and then prepare to measure the AC voltages to ensure they are within spec of the provided transformer schematics. Remember these are not under load (no tubes installed), so they will all be higher than expected.

Very carefully Measure AC Voltage as follows. There are lethal voltages in this Chassis.

Set your Meter to AC Volts:

Mains Voltage 120 or 220/240 VAC between lug N and L on the IEC socket

120 VAC across the 2 indicator terminals

6.3 VAC across pins 4 – 5 of the Rectifier socket (V6)

580 VAC minimum across pins 1 – 7 of the Rectifier socket (V6)

6.3 VAC across pins 4 – 5 of the EL84 sockets (V4, V5)

6.3 VAC across pins 4,5 – 9 of the 12AX7 sockets (V1, V2, V3)

These should all correspond approximately to the label on the Transformer.

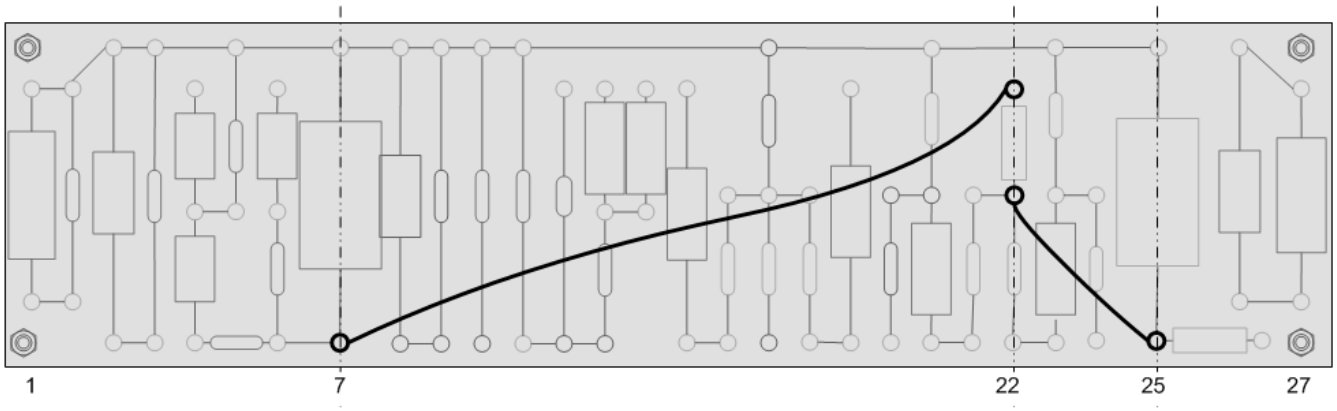
5. Assemble the Turret Board

If you do not have a pre-built Trinity amps turret board, now is the time to build it.

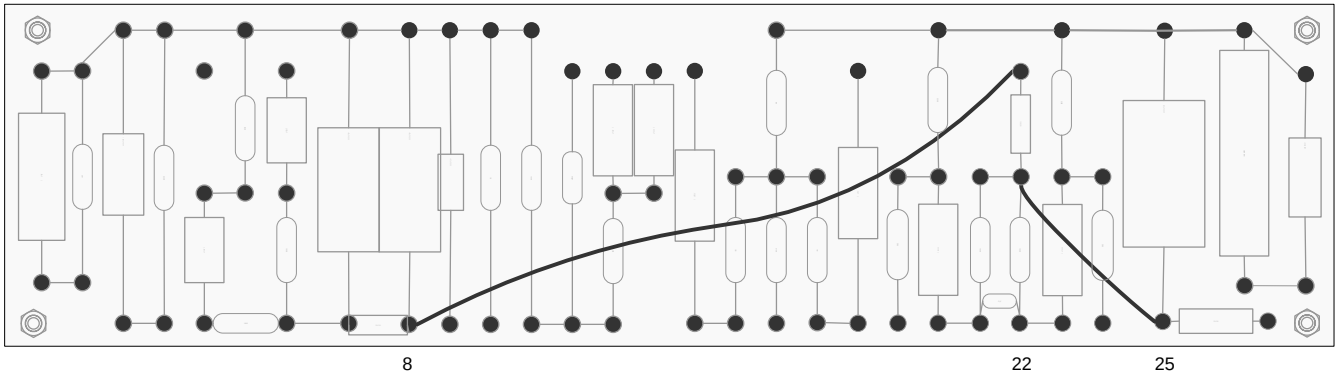
Identify if it is labeled as an ROHS board or not.

First, install jumper wires on the underside of the board. Follow the pictures below.

Note: Some builders prefer to install jumpers on the 'Top Side', to do that, just use the large, colour layout diagram provided and make the connections above board.



Trinity 18 sIII/Plexi/TMB Showing *Underside* Jumpers



Trinity 18 Custom Plexi Showing *Underside* Jumpers

Install Components on Turret Board

Carefully identify all the board components, their values and their orientation. See the section on how to read Resistor and Capacitor codes if you need help. It is very good practice to measure each part to confirm its value. At a minimum, confirm the resistor values.

For the electrolytic capacitors (used for power supply, bypass caps) identify the Positive and Negative ends. These must be installed using the correct polarity. There will be a '+' sign, or indentation to identify the positive end of an electrolytic capacitor.

SOZO non-polarized capacitors have a line identifying the 'outer foil'. Feeding the signal via the outer foil creates a bit of a shield, minimizing any possible induced noise interference such as the 60Hz (or 50Hz) to it. As a rule of thumb it would be best to connect the outer capacitor foil to the incoming signal. For tone stack capacitors or bypass capacitors, connect the outer foil to ground.

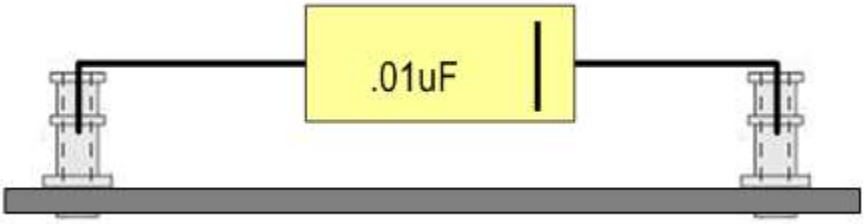
The polarity of the capacitor is therefore to be aligned according to the layout. Other non-polarized capacitors (Mallory, ETR) do not have this marking.

Resistors do not have a polarity, but it is good practice to align them so the colours can be read in a consistent direction e.g. Left to Right.

Align the board according to the layout diagram and follow the diagram that corresponds to your design exactly.

Prepare and place each component on the board by following the layout – from left to right.

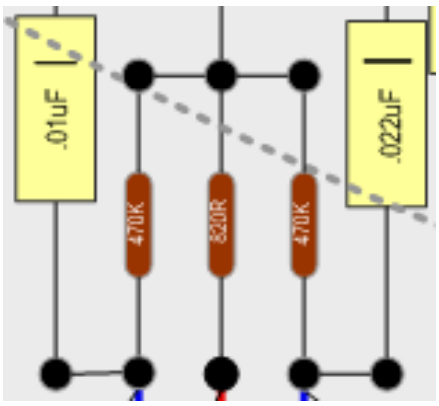
To prepare and place a component, center each component between the two turrets in the location it will be installed. Bend each component lead at 90 degrees so that it fits perfectly into the turret holes, squarely and neatly. Solder in place on the turret once all component leads and jumpers that connect in the one turret are in place.



For multiple component leads that must fit into one eyelet or turret, insert them all first and solder once when they are all in place.

It is good practice to work from one side to the other. Begin at the power supply end and start by installing R20 /150R 5W and then C10 / 50uF electrolytic capacitor, the connecting jumpers and continue to work from left to right.

Then install R22 / 8K2 2W and C11, 16uF capacitor, etc.



There are places where short jumpers are required to connect components together. To do this, strip bare, a piece of 20 gauge wire, bend each end about ¼" or 5 mm short at 90 degrees and insert into the turret and solder in place.

For example, around the Phase invertor components, notice the short pieces required to connect parts together.

Note: Missing a jumper anywhere will cause the amp not to work correctly, so take your time.

There is also some very long ground buss connections. To install this buss, strip a long 20 gauge wire, bend oine end over at 90 degrees and solder it in place in the last turret. Then, using a pair of needle nose pliers, pull the buss tight and align it over top and in-line with the turrets. Then solder the second last turret and finish of

the last turret with a small 90 degree bend into it and solder it in place. Now go back and solder all the turrets that the buss is supposed to touch. Cut away any that it is not supposed to touch.

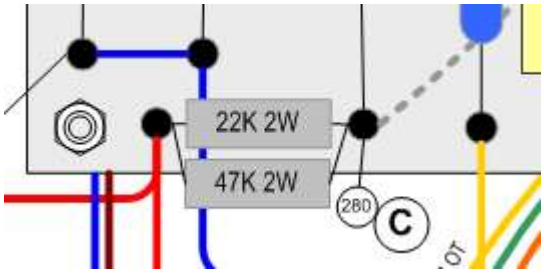
Continue to build the board from Left to Right until all the parts are installed.

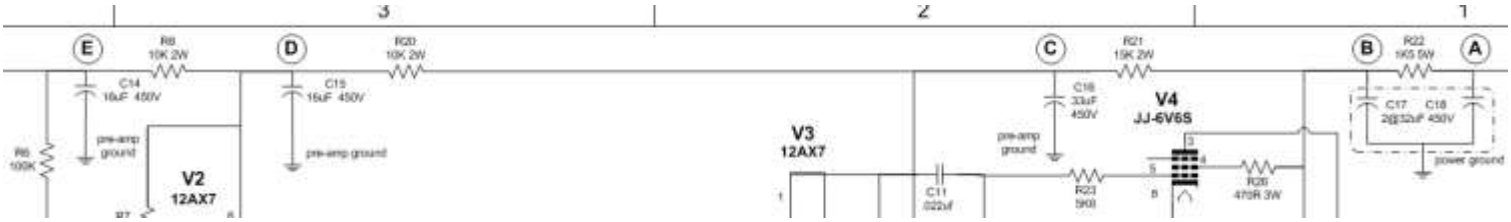
Continuously check the location, the part, orientation and value of each component as you install it.

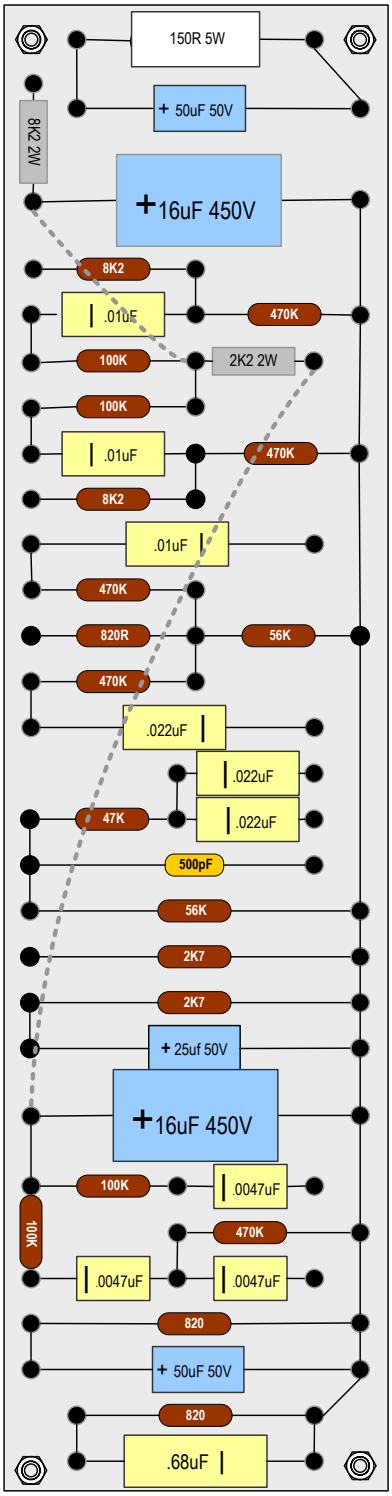
When completed, check against the layout, and then check continuity between parts and jumpers.

Plexi 6V6 Voltage Dropping Resistor

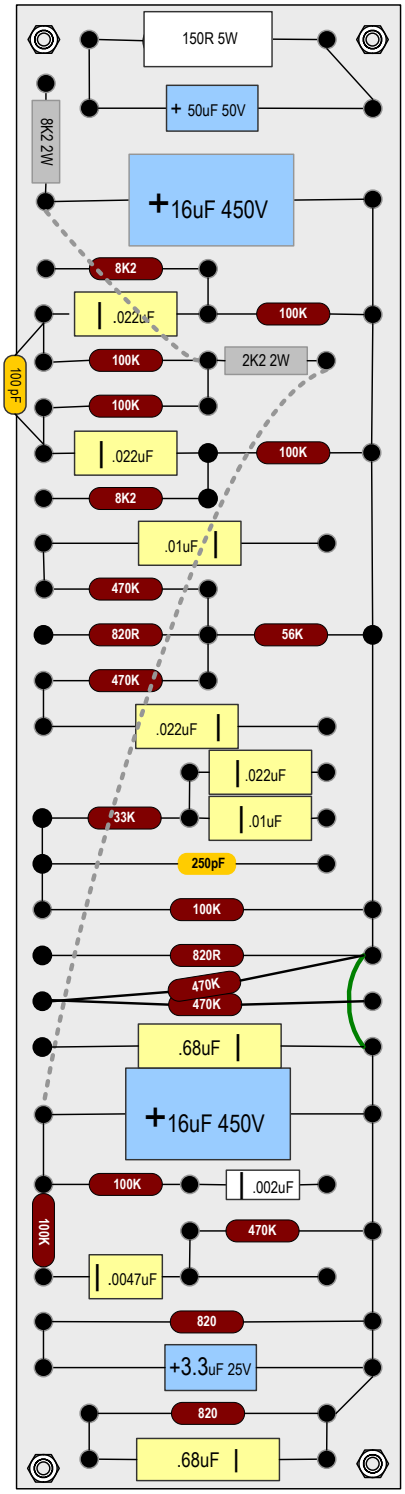
The Plexi 6V6 uses a unique voltage power supply with 5 voltage drops A → E as shown on the schematic. The layout places the extra filter capacitor at the preamp end of the board and uses a 15K dropping resistor to achieve VOLTAGE C. you mat have received a 22K and 47K power resistors and these are to be used in parallel to make up 15K required. The advantage is that is the voltages with a solid state rectifier are too high, you can substitute the 22K or use a 5AR4 tube rectifier.



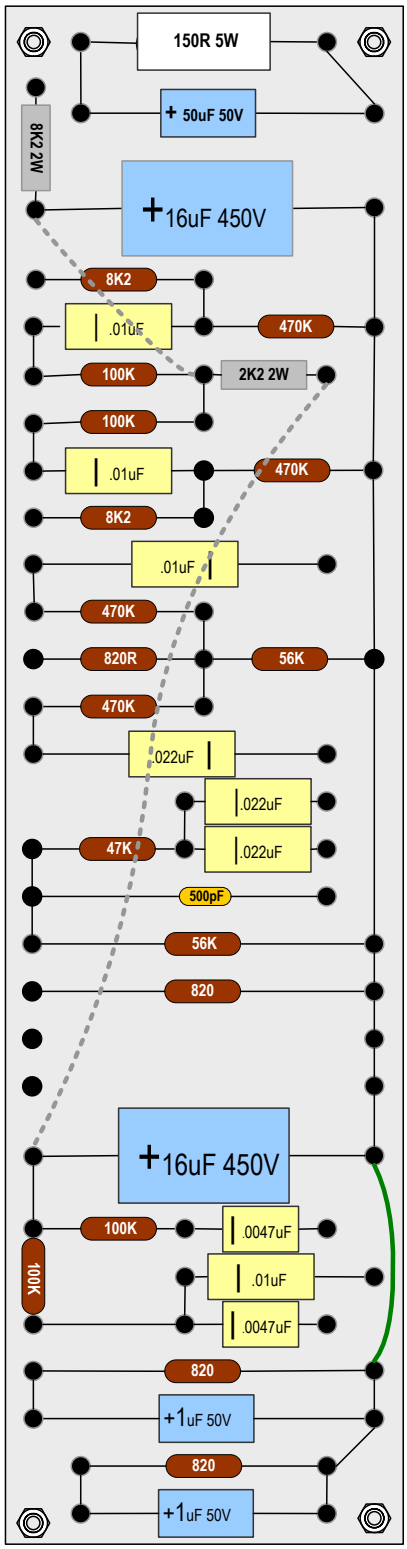




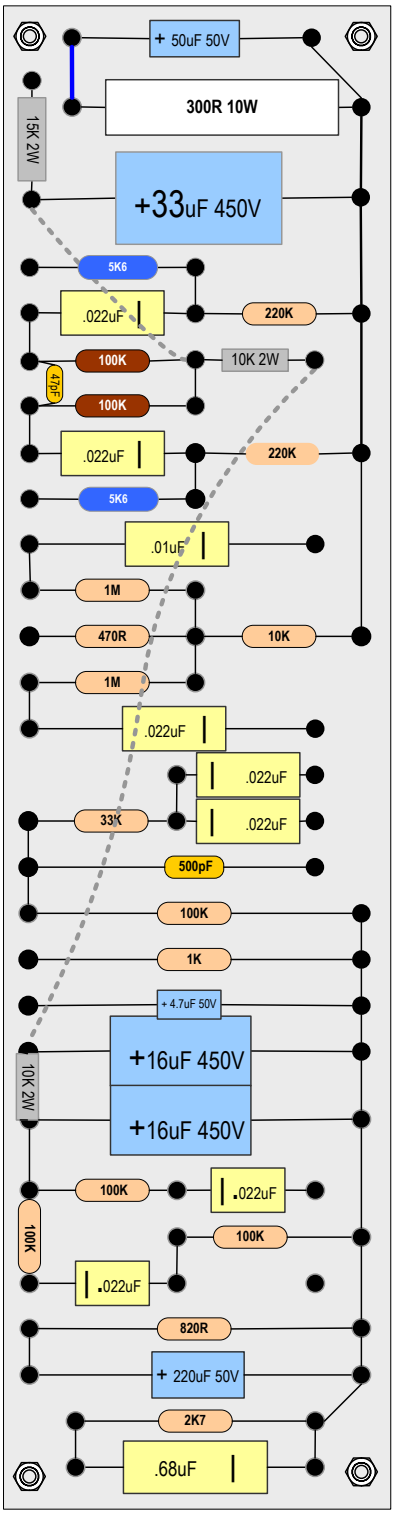
Trinity 18 sIII Board Top View



Trinity 18 Plexi Mk.II Board Top View



Trinity 18 TMB Board Top View

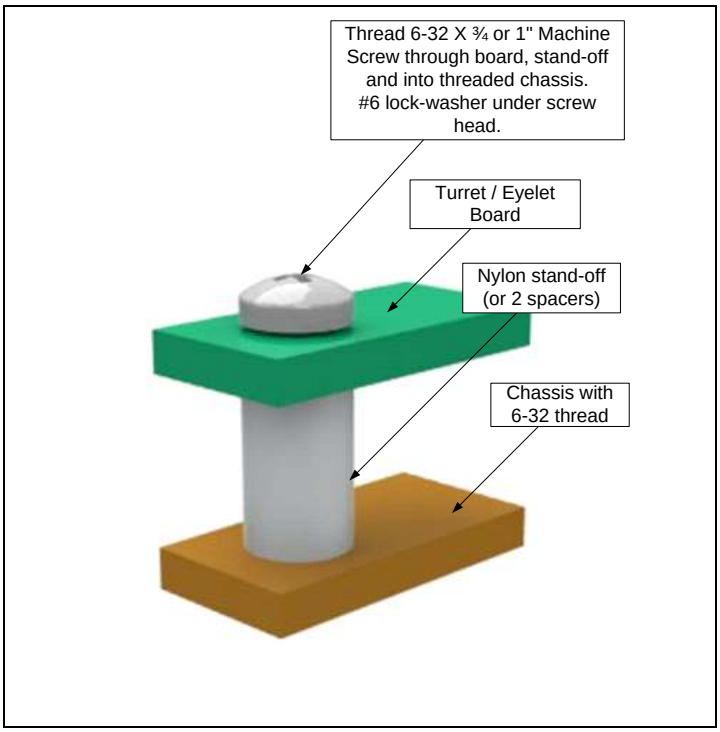


Trinity 18 Custom Plexi Board Top View

Install the Turret Board

The chassis is tapped to receive 4 - #6 machine screws. To mount the board, align the board mounting holes, stand-offs and tapped holes and then thread a #6 X 1" machine screw through board, stand-off and into the threaded chassis. Tighten to keep it in place and repeat for each corner.

Use a #6 lock washer under the head of the machine screw.

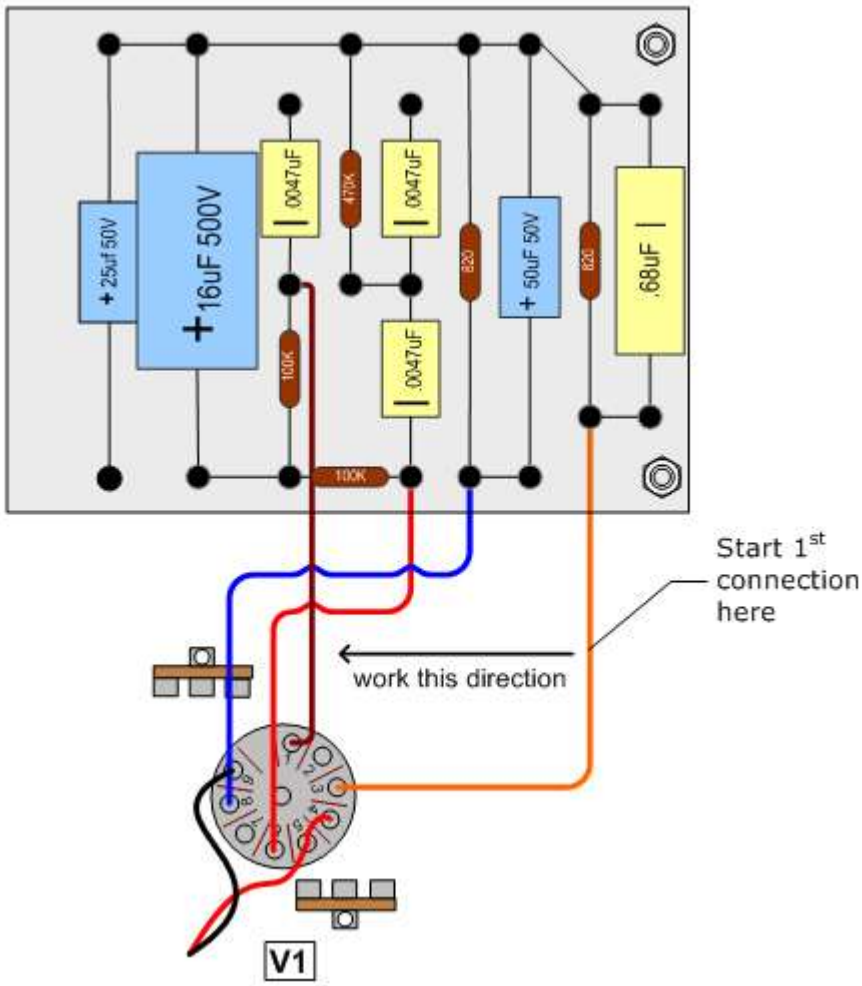


Alternative: You may be able to install the board using an alternate method: The #6 X 1" stand-off bolts are screwed into the chassis to hold them in place. Then the ½" nylon stand-offs are installed over them and finally the board over top held in place with #6 lock nuts. Install the turret board on the spacers and tighten in place with #6 KEPS nuts.

6. Connecting the Turret Board

Now is the time to make the connections from the turret board to the tube sockets and control pots. Again, you will start at one end of the board and work your way around the board doing the point-to-point wiring going from board to tube pin. Start at the first turret at the pre-amp end of the board and locate the destination point. That will be your first connection.

Tip: On a copy of the layout, highlight the connections as you complete them to make sure they are done correctly.

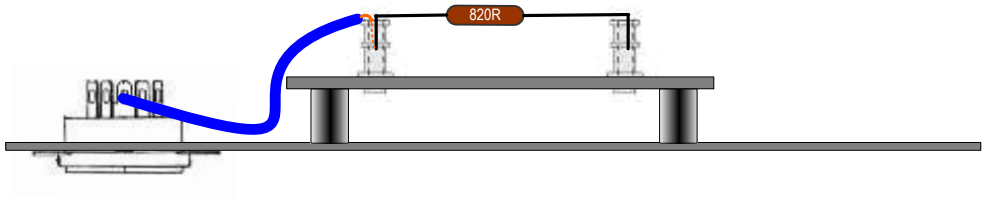


Tube Sockets

Identify the first turret and its destination socket pin. In this figure above, it is V1, pin 3.

Cut a length of the supplied solid core wire so it will easily reach (with some extra) from the turret to the correct tube socket pin while laying flat to the turret board and against the chassis.

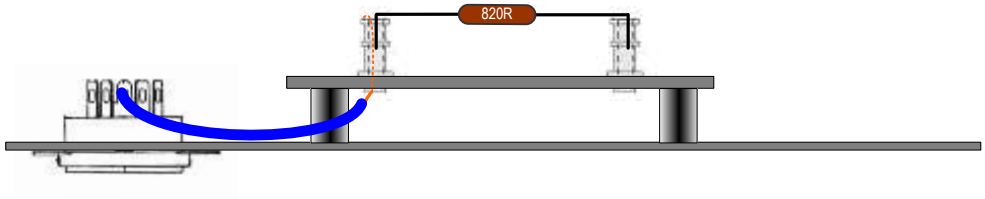
After installing the turret board on it mounting stand-offs, strip about 1/2" / 10 mm off one end and push it into the top of the turret so it touches the component lead. Then solder it well in place at the turret end only.



Once cool, press the wire so that it lies flat on the board and chassis with any excess tucked underneath the board.

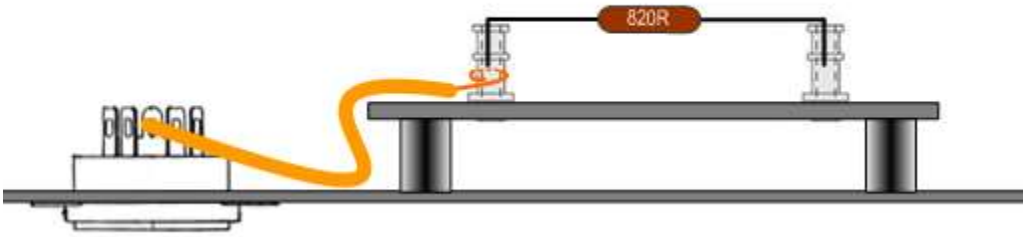
Repeat for each turret that has a connection to a socket pin or from the turret board to a Toggle Boost switch or terminal strip for screen resistor.

Alternative: Instead of connecting the leads to the top of the turret board, you may choose to install the leads before the board is installed, connecting the lead to the turret below the board and then to the tube pin or control. In this case, cut connecting wires to the control side in various colors to about 9" long each and to about 6" long to the tube pin side. Then, following the layout, install the connecting wires through the bottom, as described below, of the board leaving plenty of extra length, wire is cheap, and it'll save aggravation later. Then install the board and connect to the correct pins and control in sequence starting with V1, pin 1.



Strip about 3/4" / 15 mm off one end push it into the bottom of the turret so it touches the component lead and bend it over. Then solder it well in place at the turret top end only.

Alternative: Some people like to run the wire from the turret to the socket pin while laying flat to the turret board and against the chassis. Cut the wire about ½" / 10 mm longer and strip the end. Then make a hook at the end and put it through the socket pin. Squeeze the hook with a pair of needle nose pliers so that it is mechanically tight to the turret.

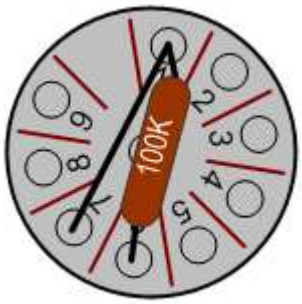


Solder it well in place. Trim off any excess wire.

Note: This procedure requires more soldering skill and may be more difficult to achieve than the previous methods.

Socket Mounted Resistors

Sometimes it is necessary to mount a resistor on a socket such as on V2 100K plate resistor. This needs to be done before connecting to the turret board.

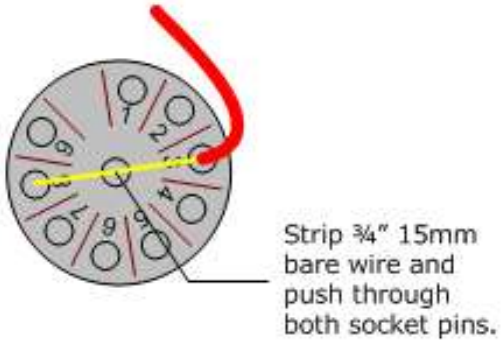


Take the correct resistor and bend one lead back towards the other. Now, slip the bent lead through the socket pin (1 in this case) while feeding the other two leads through the other pins (6 & 7 in this case.). Trim leads to within about ½" / 10 mm of the tube pin. Solder the apex of the bend (pin 1) to the socket and then solder the resistor lead that has no turret board connection (pin 7 in this case). Trim off excess.

Now, route and wire from the turret board to pin 6 and solder in place. Trim off excess.

Phase Inverter Socket

The PI requires the cathodes to be connected together. When connecting from the turret, strip an extra ¾" 15mm bare wire and push through both socket pins and then solder in place.



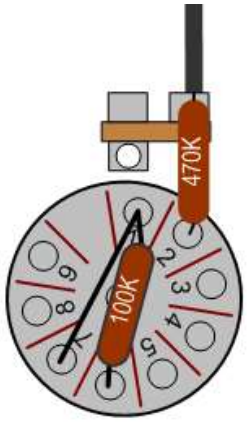
TMB Amp Grid Stopper

On the TMB model, on V2, there is an additional 470K grid stopper. Install an additional terminal strip using the socket mounting screw and an extra #4 KEPS nut. Cut off the extra tag if you prefer.

Attach a 470K resistor to the terminal strip tag at one end and pin 2 at the other. Try to get the resistor as close to the pin 2 as possible and then solder in place on the socket.

Prepare a co-axial cable to go from the Gain control wiper pot to the terminal strip to complete the assembly. (see 'Preparing Co-Axial Wire')

Connect the shield to the ground at the Gain pot. Connect the center core to the wiper of the Gain control and the tag of the terminal strip and 470K Grid stopper resistor.



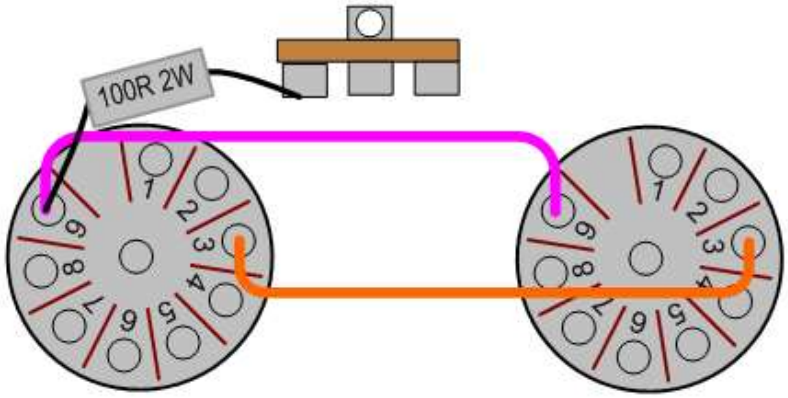
TMB 470K GRID STOPPER ASSEMBLY

Power Tube Wiring and Screen Resistor

Before connecting the power tubes to the turret board, some wiring is required. The tubes are connected as Push-Pull which requires the Cathodes and Screens be connected. Also, there is a 100R resistor feeding both screens. These should be done in advance of connecting to the turret board.

Fit a 100R 2W metal oxide resistor between an ungrounded tag of the previously installed terminal strip and pin 9 of one of the power tubes. Wrap the lead around the tag and pin 9 of the socket. Do no solder yet.

Cut a piece of wire to fit between pins 9 of both sockets, with a little extra. Strip ½" / 10 mm of one end, make a hook and hook it onto pin 9. Neatly route the wire to pin 9 of the other tube and repeat. Now, solder in place.



Cut a piece of wire to fit between pins 3 of both sockets, with a little extra. Strip ½" / 10 mm of one end, make a hook and hook it onto pin 3. Neatly route the wire to pin 3 of the other tube and repeat. Now, solder in place.

Now connect the turret board to the terminal strip.

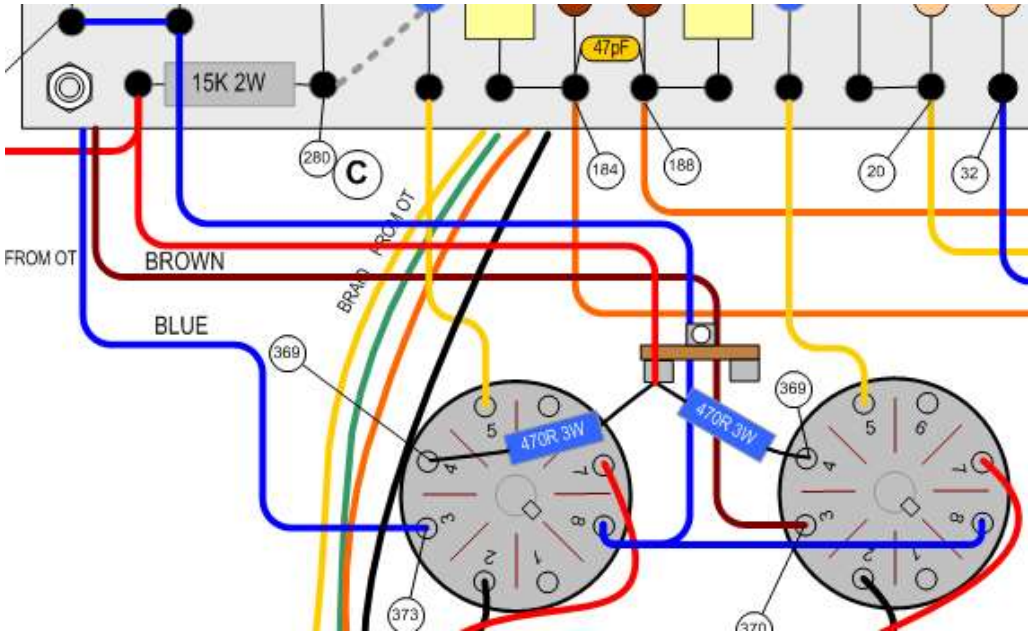
Custom Plexi 6V6 Power Tube Wiring – Grid Stopper, Screen Resistor

Before connecting the power tubes to the turret board, some wiring is required. The tubes are connected as Push-Pull which requires the Cathodes and Screens be connected. There are 2- 470R screen resistors feeding the screens of the 6V6. These should all be done before connecting to the turret board.

Fit the 470R 2W metal oxide resistors between an ungrounded tag of the previously installed terminal strip and pin 4 of one of the octal power tube sockets. Wrap the lead around the tag and pin 4 of the socket. Repeat for the other octal socket. Solder in place

Cut a piece of (blue) wire to fit between pins 8 of both octal sockets, with a little extra. Strip ½" / 10 mm of one end, make a hook and hook it onto pin 8. Neatly route the wire to pin 8 of the other socket and solder in place.

On V5, hook and solder the cathode wire from pin 8 to the turret board 300R /50 uf cathode pair and solder in place.



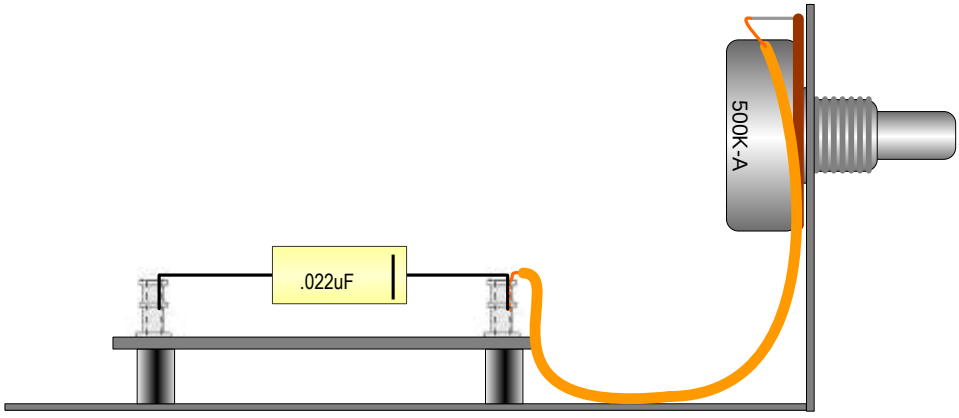
Connecting Controls - Potentiometers

The easiest way to connect these correctly is to follow the layout, and do one terminal connection at a time. Some of these terminals require more than one wire connection, so arrange them accordingly and solder only once.

Complete the ground control inter-connections and grounds first. Use Green wire as depicted in the provided colour layout.

Complete the control inter-connections next. Where such connection is also connected to the turret board, go ahead and make the connection using the following technique.

Review the diagram below showing a connection from a control terminal to the turret board.



Strip about 3/4" / 15 mm off one end and wrap it around the turret. Then solder it well in place at the turret end , then run the lead to the control terminal.

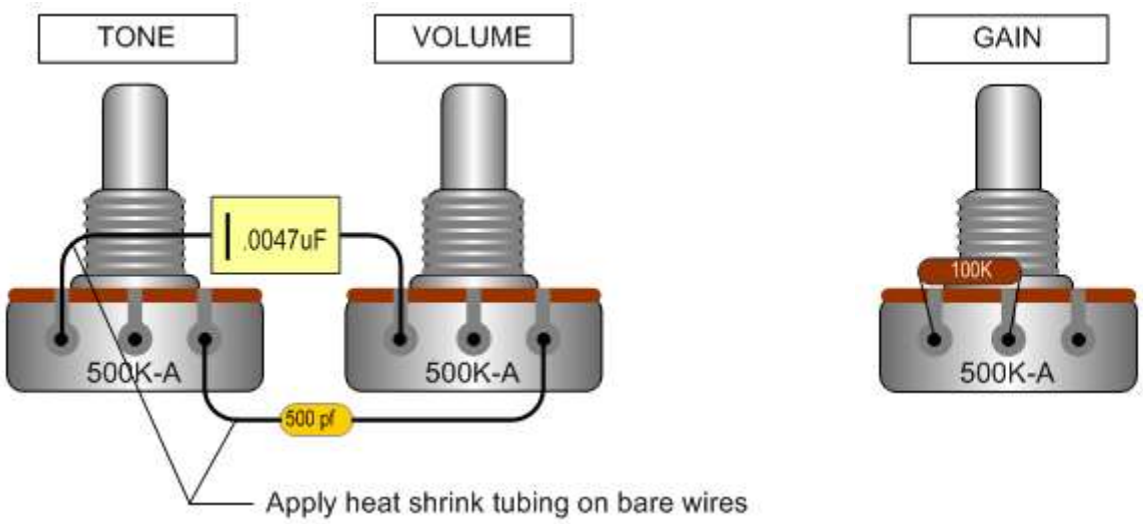
Run the wire from the turret to the control terminal while laying flat to the turret board and against the chassis. Cut the wire about ½" / 10 mm longer and strip the end. Make a hook at the end and put it

through the terminal pin. Squeeze the hook with a pair of needle nose pliers so that it is mechanically tight to the pin and solder it well in place. Trim off any excess wire.

Once the joint has cooled, press the wire so that it lies flat on the board and chassis with any excess tucked underneath the board.

Some controls require components that need to be installed for tone controls etc.. Pre-form these components to fit into place and use some heat shrink tubing to ensure they do not touch other parts.

Solder them in place following the layout provided once any lead to the turret board is also connected.



Finish off the remaining connections from the turret board to the controls using the same technique. Once a solder joint is cool, press the wire so that it lies flat on the board and chassis with any excess tucked neatly underneath the board.

7. Output – Transformer, Impedance Switch, Jacks

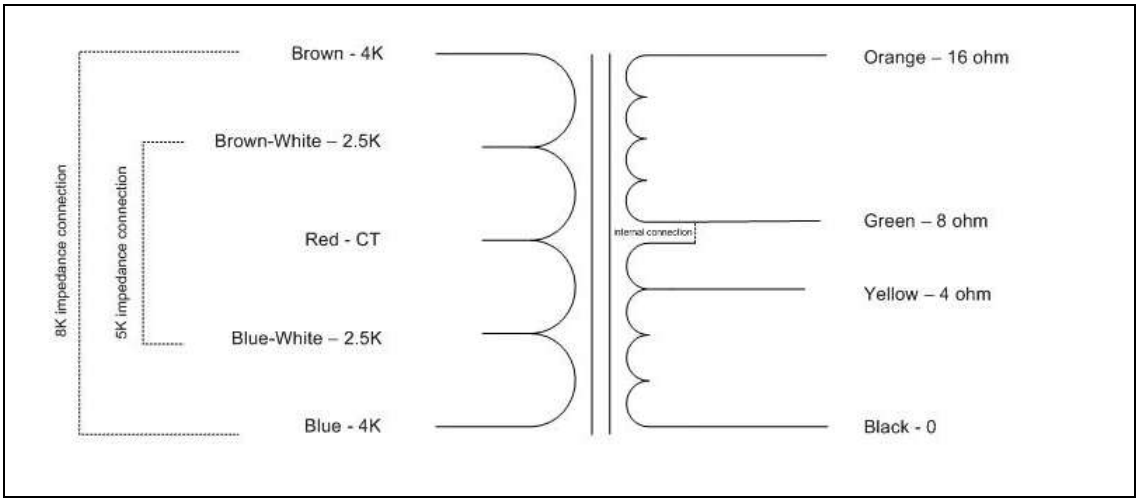
Refer to the Output Transformer schematic below.

The Primary 8K Impedance leads from the transformer should be twisted together and the secondaries braided and both fed through the two chassis grommets already.

Route the 8K Impedance leads (Blue & Brown) to pins 7 of each Power tube. Brown goes to V4 and Blue to V5. It is good practice to leave enough lead length to reverse the leads to power tubes if necessary to eliminate amplifier squealing.

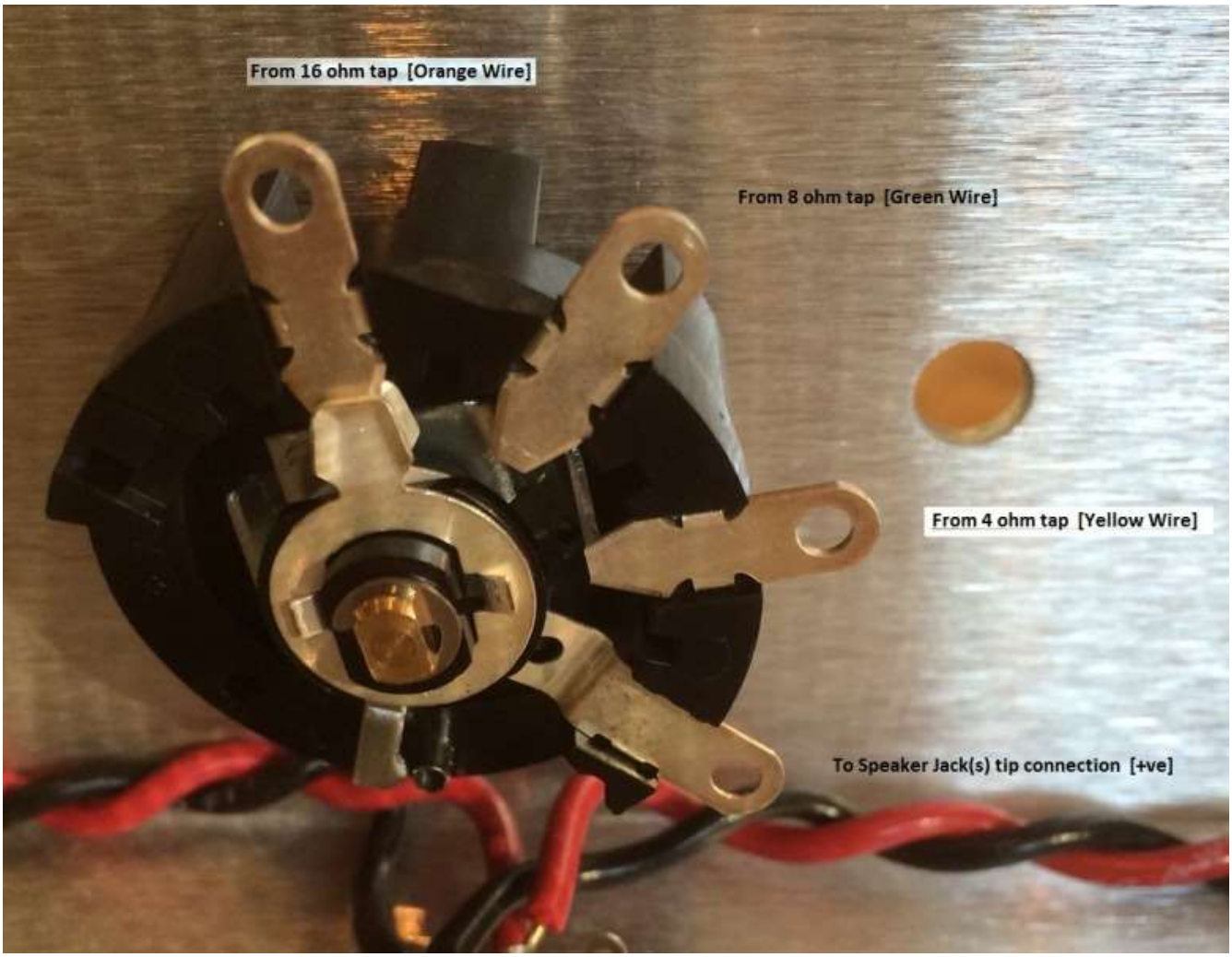
Solder the Brown output lead to V4 and the Blue to V5.

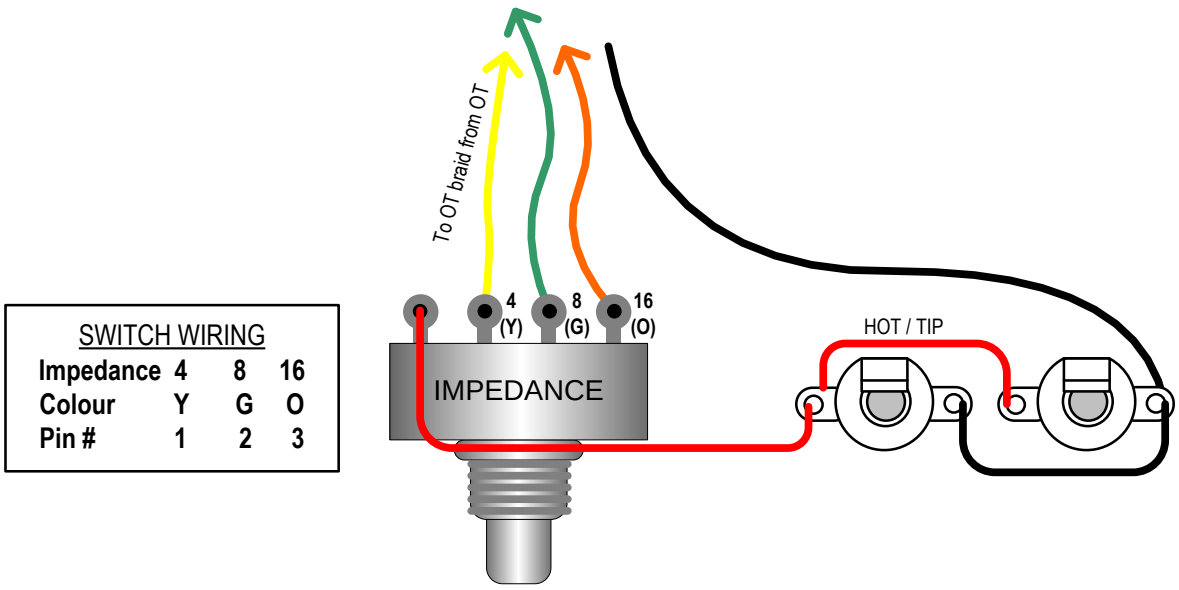
Refer to the Output Transformer schematic below and wire up the output impedance selector paying particular attention to the leads for the correct impedance.



Connecting the Impedance Selector

Referring to the Output Transformer schematic, wire up the Impedance Selector to the transformers and output jacks paying particular attention to the leads for the correct impedance. Refer to the diagram below for the connections.





Connect from the center pole of the switch to the Tip position of the pair of output jacks. Use some cut-off stranded wire and strip enough wire to bridge between both jacks. Connect from the output transformer's Common / Black lead to the Ring position of the pair of output jacks. Strip enough wire to bridge between both jacks. Follow the layout and remember the speaker jacks common are mechanically and electrically connected to the chassis ground.

Check your speaker jack with and without a speaker plugged in to make sure it isn't shorted.

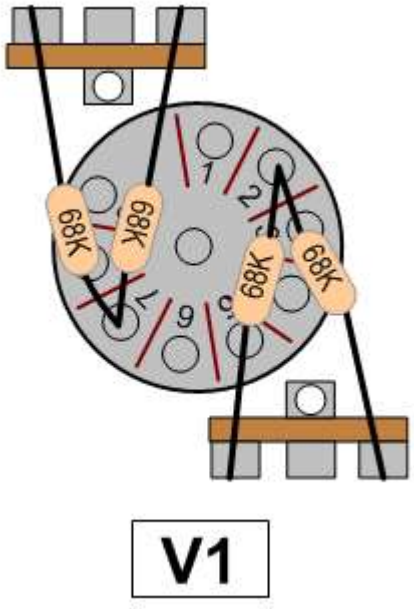
Output Jacks

The Switchcraft Output Jacks have 2 terminals. The contacts open when a ¼" plug is inserted into the jack. The Tip connection is at the very end of the plug and is normally 'positive' polarity. This is sometimes referred to as the 'Hot' side. The other part of the plug is typically ground or 'common'.

8. Input - Jacks and Input Grid Resistors

Input Grid Resistors

In step 1, 2 - 3-lug terminal strips were installed using the socket mounting screws and #4 KEPS nuts. These terminal strips will hold the 4 - 68K Input Grid resistors.



Connect two 68K Carbon film resistors between each of the two terminal strip tags and the Grid / input pin 2 of V1. Make the ends that connect to the pin 2 as short as possible. Solder pin 2 well. Do not solder at the terminal strip end yet.

Connect two 68K Carbon film resistors between each of the two tags and the Grid / input pin 7 of V1. Make the ends that connect to the pin 7 as short as possible. Solder pin 7 well. Do not solder at the terminal strip end yet.

The terminal strips will also provide an excellent mounting place for the co-axial cables coming from the input jacks in the next step.

Input Jacks

To wire up the input Cliff Jacks, it is easiest to remove the jacks, wire them with the resistors, jumpers and co-axial cables and then reinstall them. For reference, in the figure below, they are shown in position in the chassis.

Cliff Jacks have 2 normally closed contacts and 4 terminals. The contacts open when a ¼" plug is inserted into the jack. The Tip connection is at the very end of the plug and is normally 'positive' polarity. This is sometimes referred to as the 'Hot' side. The other part of the plug is typically ground or 'common'.

Set the spacing of two input jacks to be approximately equal to the spacing on the chassis and orient the two jacks so that the terminals face towards you.

Strip a 3" / 75mm solid wire and then bend 1" / 20mm at about 45 degrees. Install it through all 4 ground terminals closest to the front while feeding it into the lower, top- tip terminal. This is the Input Ground buss.

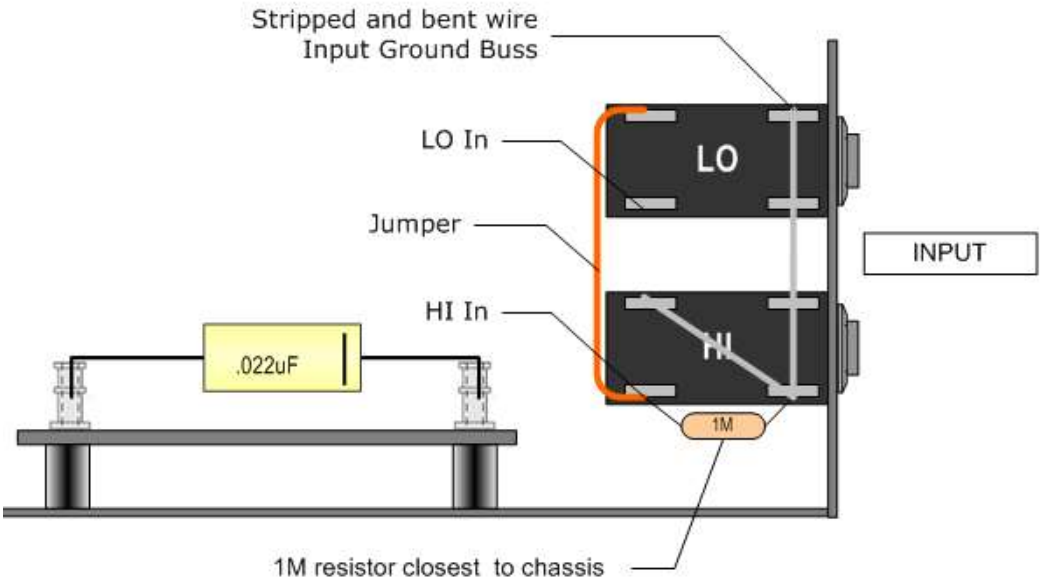
Install a 1M Carbon film resistor across the lower Tip and Sleeve terminals of the HI input jack.

Take a length of Green wire , long enough to reach the Pre-Amp ground or Ground buss on the turret board and strip one end, hook it into the point where the 1M and Input Ground buss connect on the HI input jack. Solder this joint well.

Cut another piece of Jumper wire long enough to reach the outer Tip terminals of both jacks. Strip each end, solder to the LO input only. Hook onto the HI input.

Use the pre-prepared piece of co-axial wire (follow Preparing Co-Axial Wire instructions below) and hook and solder the center core wire to the HI jack where the 1M and Jumper connect. Solder the outer shield to the Input Ground buss at a convenient ground buss location. Be very careful not to apply too much heat and melt the core insulation causing a short.

Use the other pre-prepared piece of co-axial wire and hook then solder the center core wire to the LO jack, Tip terminal. Solder the outer shield to the Input Ground buss at a convenient location.



Ensure all joints on the input jacks are well soldered and shiny.

Repeat the same procedure for the other pair of input jacks.

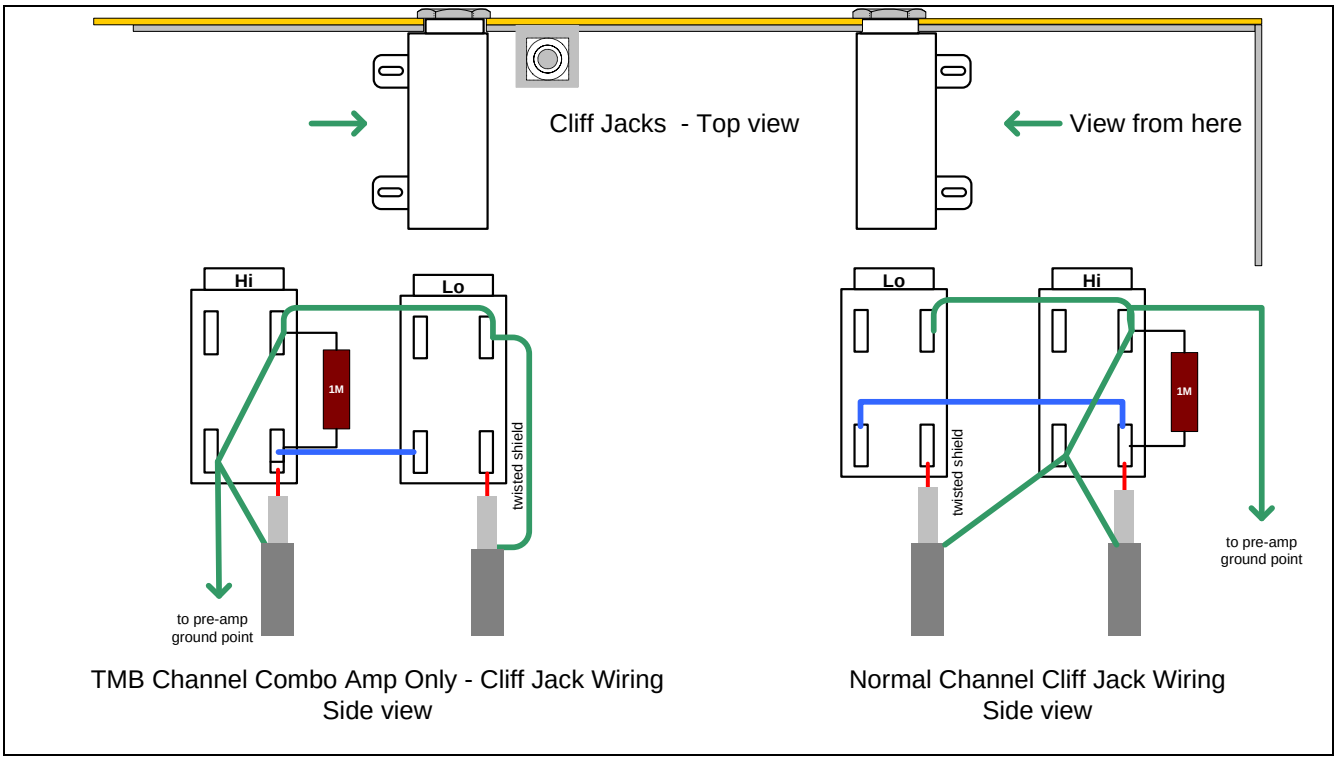
When all 4 jacks are assembled and all the leads attached, align and install them into the chassis in the correct locations. Only one spacer will probably be required to mount the jack flush with the panel, then insert the plastic grommet followed by the chrome nut.

Securely tighten the chrome nuts so the jacks will not come loose.

Do not connect the shields at both ends of the cable or you will induce hum.

Combo Chassis Cliff Jack Wiring

Important Note: Combo Chassis Cliff Jack Wiring is different on the TMB channel simply because the TMB channel jacks are reversed in order to avoid the mounting screw. For the TMB channel, follow the Combo Chassis Cliff Jack Wiring layout below.



Combo Chassis Cliff Jack Wiring

Route the co-axial cable around the end of the turret board as per layout provided, and then hook the center core wire and solder the correct input cable to the correct 68K Grid resistors – 2 for each channel, LO and HI.

Preparing Co-Axial Wire

Use RG-174U shielded wire from the input jacks to the tube.

The co-axial shield / ground wires on the input jacks go to the pre-amp ground along with the turret board ground at the pre-amp end.

To prepare the co-axial cable for connections:

1. Very carefully cut back the outside plastic covering at both ends by about 5/8" to reveal the braided shield.
2. At one end, pull back the shield and cut it off at the 5/8" mark. Put some heat shrink around the end covering the area where it was cut off so no shield 'whiskers' can short out the input signal.
3. At the other end, pull back the shield but poke a very fine screwdriver or a pick, into the braided shield and work out a 'hole'. Fish the inside conductor through this hole and pull it through.
4. Twist the braided shield together.

5. Take the Inside /Core and strip the plastic covering at both ends by about 1/4"
6. Apply some heat and solder to the core wires & braid just to stop them from fraying.
7. Put some 1/8" diameter shrink tubing over the jacket and core.

Final checkout

When you finish assembling the amp, double-check the wiring and the components.

Trace or highlight the connections and wires on a copy of the layout provided with the amp to ensure the amp is wired correctly. Check everything at least once!

Measure the resistance from each part that has a ground connection to the chassis. Put your probe on the parts lead. All readings should be less than 1 ohm, typically 0.5 ohms. Grounding is very important and often one connection is missed. Check thoroughly.

Make sure the #8 Mains Ground at the chassis and #6 Power Ground are **very** tight.

Power Up

****** RE-READ SAFETY WARNING AGAIN! ******

Working Inside A Tube Amplifier Safely

Working inside a tube amplifier can be dangerous if you don't know the basic safety practices. If you aren't prepared to take the time to learn and apply the right precautions to keep yourself safe, don't work on your own amp. You can seriously injure yourself or get yourself killed.

Unplug Pretty self explanatory. Do not, ever, ever, leave the equipment plugged in and start work on it. Leaving it plugged in guarantees that you will have hazardous voltages inside the chassis where you are about to work.

Sit If the amp has been turned on recently, the caps will still have some high voltage left in them after the switch is turned off. Let it sit for five minutes after you turn it off.

Drain When you open up an amp, you need to find a way to drain off any residual high voltage. A handy way to do this is to connect a shorting jumper between the plate of a preamp tube and chassis ground. This jumper will drain any high voltage to ground through the 50k to 100K 2W plate resistor on the tube. To do this successfully, you will need to know which pins are the plate pins. Look it up for the amp you're going to be working on. You'll need to know this for the work anyway. Leave the jumper in place while you do your work. Remember to remove it when you finish your work. You can also permanently install a 220K 2W resistor on the B+ line to chassis ground to do this.

Test Take your multimeter and ground the negative, black lead to the chassis. With the positive, red lead, probe the high voltage cap terminals or leads and be sure the voltage across them is low. Preferably to less than 10V.

Close First take the shorting jumper out. Put the chassis back in the cabinet, making sure all of your tools, stray bits of solder, wire, etc. are out of it. You don't have to actually put all the screws and so forth back in if you believe more work might be needed, but make sure that the chassis is sitting stably in the cabinet and won't fall out.

First note that most meters have three input jacks (some have four) one is marked COM, the BLACK lead goes there. Another jack is marked V, ohm, mA, the RED lead goes there for most measurements. The third jack is a high current jack usually marked 10ADC (sometimes it is 20 or some other number). This jack is used only for high current measurements. The four jack models use separate jacks for current measurements, this makes accidentally setting the meter to a current mode harder, but it still can be set to resistance. For vacuum tube electronics we can usually ignore the high current mode. Put your test leads into the COM and V(ohm)mA jacks and leave them there.

Making a Voltage Measurement

Before attempting to make a voltage measurement, think about the anticipated result.

- Is this a DC or AC voltage?
- How much voltage will be present?
- If things are not working correctly what is the highest voltage that I might find?

A voltage is ALWAYS measured between TWO points. Is one of those points CHASSIS GROUND? This is the most common case. If not, can you make a different measurement such that one of the measurement points IS GROUND? If your measurements are all referenced to CHASSIS GROUND, you can then connect the black lead (Negative or Common) to the CHASSIS with a clip and probe the other test point with the RED (Positive) lead.

1. Set the selector switch on the meter to the range that is higher than the maximum anticipated voltage of the appropriate type (DC or AC). If the maximum anticipated voltage is not known, set the meter to the highest range available.
2. Wherever possible connect the meter into the circuit when the circuit is OFF, then power up the circuit without touching anything.
3. Read the meter. If the reading is lower than the next available lower range on the meter you may set the meter to a lower range while the circuit is on. When doing this touch ONLY the meter with ONE hand, and be careful to only lower the meter one range, allow the readings to stabilize (2 or 3 seconds) before proceeding further.

Note: Accidentally setting the meter to a current or resistance range can damage the meter, and the circuit it is connected to. If the circuit has sufficient power the meter can explode or burst into flames. I know from experience that this will happen if you try to measure the resistance of the wall outlet. Most modern meters are "fuse and diode protected" this is to prevent fireworks, but will not usually save the meter from an overload of this magnitude.

REMEMBER: DO NOT OPERATE YOUR AMP WITHOUT A LOAD

Install a 2 AMP SLO BLO fuse. Use 1 AMP SLO BLO if operating at 220-240 VAC

Note: If you see or smell smoke when you turn on the amp, turn it off immediately and re-check the connections.

You should have previously tested the Power Supply AC voltages, so this step is included for completeness.

1. With no rectifier in place, apply power and test the High voltage AC and ensure that it is on the correct pins of the rectifier and in the correct voltage range (290 VAC). Test ALL the filament voltages (rectifier, power and pre-amp tubes) and ensure they correct are on the correct pins for all tubes.
2. If all is OK, then shut off, install the rectifier and apply power without the preamp or power tubes installed. Wait 10 seconds and turn on the Stand-By switch.

Check the B+ voltage at the first filter cap terminal before the 1.5K 5W filter resistor. Measure from the filter cap terminal with the positive or Red lead, to Chassis ground with negative or Black lead.

Check the plate voltages on the tube sockets. Measure from pin to Chassis ground.

12AX7, AY7, AT7 etc plates are pins 1 and 6; EL84 plate is pin 7 and 6V6, 6L6, KT66, EL34 etc plate is pin 8. **The plate voltages will be higher than the voltages listed on the schematic because there is no load provided by the tubes**.

3. If everything is okay, power off the amp. **Connect a speaker** or 8 ohm load. Install the three preamp (12AX7) and two power tubes (EL84) and power on again.
4. With all tubes installed, and **speaker connected**, volume setting at minimum and NO instrument plugged in, power up again. Listen for sounds that may indicate a problem. Loud transformer vibrations or humming or other crackling sounds. Observe if any of the components besides the tubes are getting hot – check the power resistors. Carefully check and make note of the voltages on all the tubes.

   This is the time to carefully check and make notes of the voltages on all the tubes.

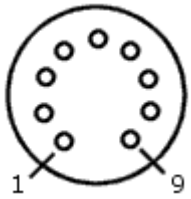
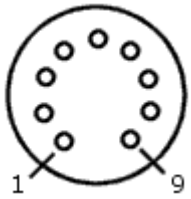
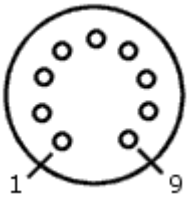
5. If all seems in order, and the fuse has not blown, turn the volume up a bit. Plug in a guitar cable. Touch the input with your hand to see if you can induce some hum, or static sound. If everything seems fine, it's time to plug in your guitar and take the amp for a test run.

Hopefully, there are no problems but if you think there are e.g. hum, squeal etc., then move on to the troubleshooting section of this manual.

Trinity 18 TMB / sIII / Plexi / Voltage Chart

(Use this Chart to record your measured voltages)

AC Mains Voltage	VAC
B+ No tubes installed	VDC
B+ All tubes installed	VDC

 12AX7/ECC83		 6BQ5/EL84				 EZ81			
TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1 (12AX7/ECC83)	155	--	1.0	--	--	155	--	1.0	--
V2 (12AX7/ECC83)	180	--	1.5	--	--	272	--	180	--
V3 (PI) (12AX7/ECC83)	220	52	75	--	--	217	62	75	--
V4 (6BQ5/EL84)	--	--	12	--	--	--	345	--	340
V5 (6BQ5/EL84)	--	--	12	--	--	--	345	--	340
V6 (EZ81)	292	--	350	--	--	--	292	--	--

Trinity 18 Custom Plexi 6V6 Voltage Chart

SOLID STATE RECTIFIER MODULE

(Use this Chart to record your measured voltages)

AC Mains Voltage	VAC
B+ No tubes installed	VDC
B+ All tubes installed	VDC

TRINITY PLEXI 6V6 CATHODE BIAS S.S. RECTIFIER (390 v b+, 300R, 1K5, 15K, 100K/15K PI)										
	1	2	3	4	5	6	7	8	9	
V1	168		1.5			127		0.8		
V2	145		0.9			239		146		
V3	188	20	32			184	32	20		
V4			373	369				25.4		JJ 6V6S
V5			370	369						100%
	A=386	B=371	C=280	D=240	E=202					

WARNING

Read this Information Carefully

The projects described in these pages utilize **POTENTIALLY FATAL HIGH VOLTAGES.** If you are in any way unfamiliar with high voltage circuits or are uncomfortable working around high voltages, **DO NOT RISK YOUR LIFE BY BUILDING THEM.** Seek help from a competent technician before building any unfamiliar electronics circuit. While efforts are made to ensure accuracy of these circuits, no guarantee is provided, of any kind!

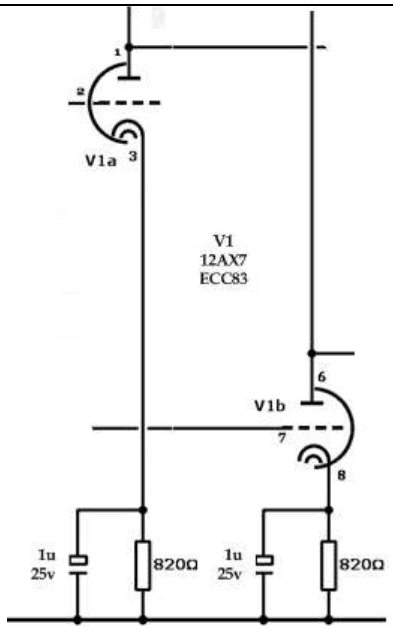
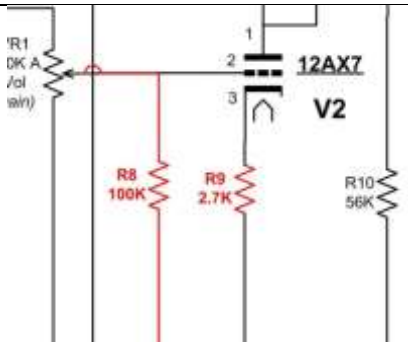
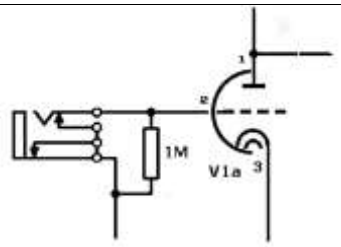
USE AT YOUR OWN RISK: TRINITY AMPS EXPRESSLY DISCLAIMS ALL LIABILITY FOR INJURY OR PROPERTY DAMAGE RESULTING FROM THIS INFORMATION! ALL INFORMATION IS PROVIDED 'AS-IS' AND WITHOUT WARRANTY OF ANY KIND.

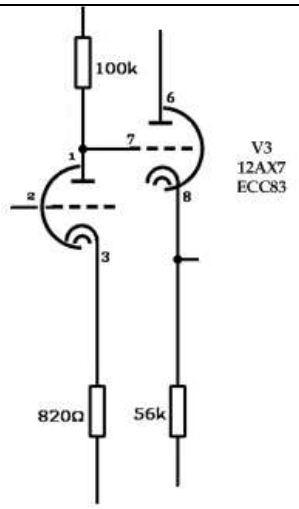
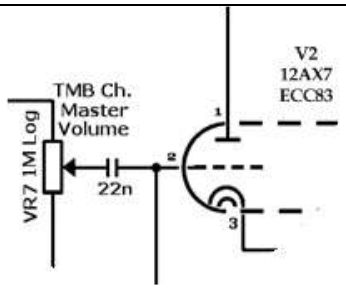
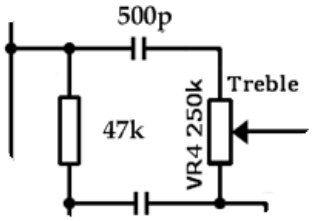
Builders Guide General Troubleshooting

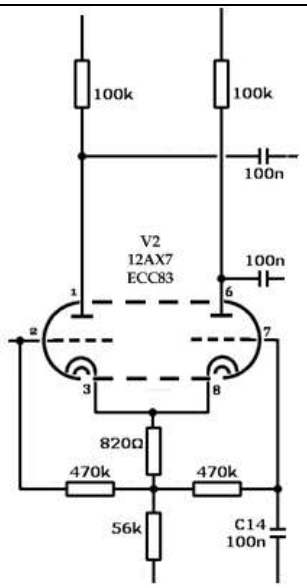
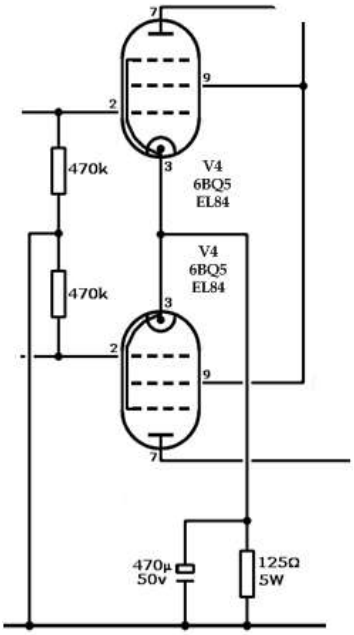
For a discussion on Guitar Amp Troubleshooting, please refer to our Web-Site Support Page document **Builders Guide General Troubleshooting**

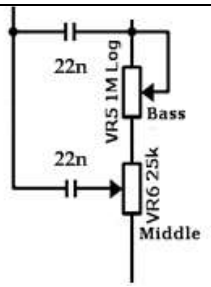
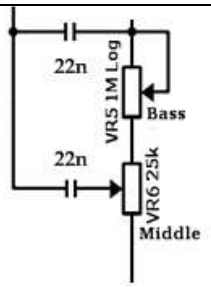
18 Watt Tone Tweaking

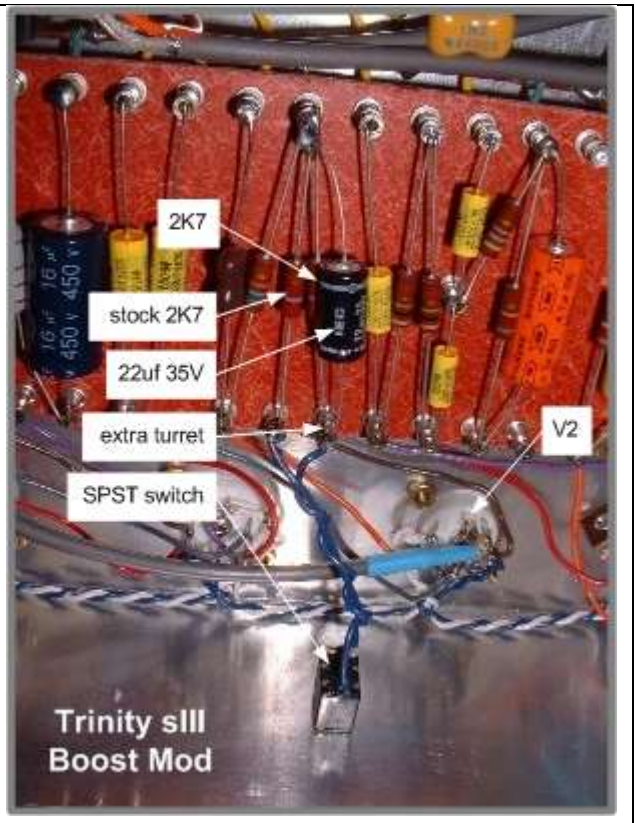
Below are some modifications you might choose to implement in order to change the tone and response of your Trinity 18 Watt amp. There are several 18 Watt interest groups on the Internet who can provide some direction.

Front End Bass Roll-Off On the 2 cathodes of V1, the R-C filter is set to 1uF X 820 ohms. This will roll the bass off slightly. Increase the capacitance up to 25uF to increase bass response of the front-end pre amplifier. Try the following combinations for the pair for the TMB channel connected to V1a. 2.7K/68uF; 1.5K/25uf; 2.2K/2.2uf; The lower the capacitor value, the less bass response.	
TMB channel gain To change TMB channel gain, reduce R9 in increments of 820 ohms.. the lower the value, the more the gain. 820 would be the lowest value, highest gain for this tweak. For more gain, eliminate R8 altogether. We expect that adjusting R9 downward will provide sufficient gain.	
TMB channel input impedance To change TMB channel input impedance, replace the 1M resistor with 820K; 560K or 470K resistors. This may be necessary for particular instruments.	

V3 Bias – Dirty Sound Change the 56K cathode resistor on V3 to 47K. This changes the bias, and operates the tube in a different part of its operating curve and it will not sound as clean.	
Master Volume Range To change the range of the Master Volume, reduce the MV potentiometer from 1M Log/Audio, to 500K.	
Increased Treble Control For modified Treble control, try the following modification to the R-C filter around the Treble control potentiometer. 33K /250pf– more gain and treble; 47K/330pf - middle of the road; 56K/500pf – bassier slope, less gain	

Gain and Biasing of the Inverter To change the gain and biasing of the phase inverting stage, reduce the resistors in the chain to the following: Change the two 100K resistor to 82K or 68K (add a 100pf cap between the plate resistors). Change the 470K resistors to 330K or 220K for cleaner sounds.	
Low Frequency Response of the Output Stage Output tubes, cathode bypass filter: The original Marshall 18Ws used 500uF, and the Watkins Dominators they derived from used 50uF, there is no right value. Larger values will give more bass response. What is used depends on the type of speakers, cab, OT and even guitar. The -3db low frequency cutoff point is approximately 1/(2 x pi x R x C), so for example, 125 ohms and 50uF has a lower cutoff of 25 Hz. Try either a 50 or 100uF. Some people find that lower values keep the low end from getting muddy or boomy. This is not like a conventional high pass filter in that there is still some gain/band pass at Low Frequencies. Instead of a continuous cutoff there is a step in the gain response, lower gain below the crossover point, and higher above.	

Bass and Midrange Control Filter If you want to modify the frequency of the control, change the 22n capacitors. Try 10n for the Bass and 47n for the Middle.	
Bass Control Effect If you want to modify the effect that the Bass Control has, change the value of the potentiometer to 500K or 250K.	

Channel Boost Switch Start with one 2K7 in parallel with the V2 cathode resistor and a 1 uf as well. Put both in parallel with R9 on the turret board. This is from V2 , pin3 to ground. Just solder it across the Trinity Amps turret board because there is an extra turret there to use if you want to. 1 uf works fine. It accentuates the high end. 47 is also fine but allows a lot more signal through - good and dirty. 22 uf seems to be just right. This uses a toggle switch though, not a foot switch.	
To Increase Gain on **sIII Channel**	1. Remove R8 2. Change VR1 to 1M-A 3. Change R9 to any value between 470R and 2.7K--lower values = more gain

	4. Bypass R9 with a cap between 0.68uF and 47uF. Higher values = more bass 5. Increase R4 to 220K 6. Increase R7 to 220K 7. You may need to change VR7 to 250K-A or 100K-A to keep the PI from overloading from the increased gain
To Fatten Tone on sIII Channel	1. Change C1 to 0.022uF 2. Change C2 to 2.2uF -OR- change R5 to 2.7K -OR- both 3. Change R11 to 33K 4. Change VR5 to 500K-A or 250K-A to give the bass control more useful range
The **Normal channel** configuration is the original 18 Watt Tremolo Channel without the tremolo.	
For less distortion in Normal Channel	The normal channel uses two capacitors in series (.0047 uF) off V1b 12AX7 plate with the junction of them going to a 470K bleeder (R29) then to ground. The bleeder resistor from the coupling cap to ground is R29. Replace it with a 100K or 56K.
Gain in Normal Channel	Changing the cathode resistor by itself won't lower gain if it is bypassed by a capacitor (C16). If you lower the bypass capacitor you will filter out certain low frequencies, which will lower gain a tiny bit. Another option is to just remove the cathode bypass cap C16. Then maybe also increase the Cathode resistor R27 to 1k, 1.5K.
Bass Response in Normal Channel	To tighten up the bass (e.g. for humbuckers), drop the cathode cap C16 from 47uF to something like 2uF, 1uF, or .68uF

More Tips for fine tuning your amp

Reprinted with permission from Aron from diystompboxes.com

These are very simplistic modifications you can do to your amp, let your ears be your guide:

- Change coupling caps; changing to smaller values reduces bass, changing to larger values adds more bass. Reducing the value of coupling caps can help eliminate "flabby" bass syndrome.
- Change cathode bypass caps. Adding a cathode bypass cap to a stage that doesn't have one will let the stage have more gain. Just like coupling caps, making the value larger adds bass - generally 25uF allows almost all bass through, .68uF are used in some Marshalls for a more midrange boost and 1uF and 5uF are used in some high end fusion type amps. Again, smaller values can help reduce "flabby" bass.
- Change cathode resistors - larger values reduce gain, smaller values give more gain. A "trick" is to connect a 5K+pot wired as a variable resistor instead of the standard cathode resistor - now you can turn the pot and dial in the perfect tone. After dialing the sound, remove the resistor and pot and measure it. Substitute the nearest standard value resistor in place of the pot plus a resistor.
- Add grid stopping resistors to help tame oscillation. If you have oscillation with your amp, you can sometimes help it by installing grid stopping resistors. The grid stoppers can also subtly roll off high end as well.
- Add high frequency roll off caps in parallel with the plate resistor. This is sometimes used to "mellow" out a stage (reduces highs).
- Adjust the grid leak resistor. Reduce the value to attenuate the signal into the stage to control the gain.
- Use a shielded cable from your input jack to the first gain stage. This can reduce RF, buzz and general reduce noise.
- Replace all plate resistors with metal film types. This can help reduce hiss..

Tube Substitutions

Preamp and driver tube substitutions: 12AX7 (high gain dual triodes with pin out 9A)

12AD7*	12DT7	7729
12AU7#	5751*	B339
12AU7A#	5751WA*	B759
12AX7	6057	CV4004
12AX7A	6681	E83CC
12AX7WA	6L13	ECC803
12BZ7*	7025	ECC83
12DF7	7025A	M8137
12DM7*	7494	

EF86 - high gain pentode Close or identical 6267, 6F22, CV10098, CV2901, Z729

Different rating or performance EF806S

6BQ5/EL84 (miniature pentode with pin out 9CV)

6267	7189	EF86
6BQ5	7189A	EL84
6BQ5WA	7320	N709
6P15	E84L	Z729

* means appropriate for parallel filament circuits

means may not work in all circuits

How to read Resistor Color Codes

First the code

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

How to read the Color Code

First find the tolerance band, it will typically be gold (5%) and sometimes silver (10%).

Starting from the other end, identify the first band - write down the number associated with that color; in this case Blue is 6.

Now 'read' the next color, here it is red so write down a '2' next to the six. (you should have '62' so far.)

Now read the third or 'multiplier' band and write down that number of zeros.

In this example it is two so we get '6200' or '6,200'. If the 'multiplier' band is Black (for zero) don't write any zeros down.

If the 'multiplier' band is Gold move the decimal point one to the left. If the 'multiplier' band is Silver move the decimal point two places to the left. If the resistor has one more band past the tolerance band it is a quality band.

Read the number as the '% Failure rate per 1000 hour'. This is rated assuming full wattage being applied to the resistors. (To get better failure rates, resistors are typically specified to have twice the needed wattage dissipation that the circuit produces.) 1% resistors have three bands to read digits to the left of the multiplier. They have a different temperature coefficient in order to provide the 1% tolerance. At 1%, most error is in the temperature coefficient - i.e. 20ppm.

How to Read Capacitor Codes

Large capacitor have the value printed plainly on them, such as 10.uF (Ten Micro Farads) but smaller disk types along with plastic film types often have just 2 or three numbers on them?

First, most will have three numbers, but sometimes there are just two numbers. These are read as Pico-Farads. An example: 47 printed on a small disk can be assumed to be 47 Pico-Farads (or 47 puff as some like to say)

Now, what about the three numbers? It is somewhat similar to the resistor code. The first two are the 1st and 2nd significant digits and the third is a multiplier code. Most of the time the last digit tells you how many zeros to write after the first two digits, but the standard (EIA standard RS-198) has a couple of curves that you probably will never see. But just to be complete here it is in a table.

milli, micro, nano, pico

1 mili Farad (or any other unit) is 1/1,000th or .001 times the unit. (10^{-3})

1 micro = 1/1,000,000 or 0.000 001 times the unit (10^{-6})

1 nano = 1/1,000,000,000 or 0.000 000 001 times the unit (10^{-9})

1 pico = 1/1,000,000,000,000 or 0.000 000 000 001 times the unit (10^{-12})

Table 1 Digit multipliers	
Third digit	Multiplier (this times the first two digits gives you the value in Pico-Farads)
0	1
1	10
2	100
3	1,000
4	10,000
5	100,000
6 not used	
7 not used	
8	.01
9	.1

Now for an example: A capacitor marked 104 is 10 with 4 more zeros or 100,000pF which is otherwise referred to as a 0.1 μF capacitor.

Most kit builders don't need to go further but there is sometimes a tolerance code given by a single letter.

So a 102K is a 1,000 pF with +/-10% tolerance

Typical Capacitor Markings			
Code	pf	nf	uF
510	51	0.051	.0000510
181	180	0.18	.00018
501	500	0.5	.0005
102	1000	1.0	.001
122	1200	1.2	.0012
152	1500	1.5	.0015
202	2000	2.0	.002
222	2200	2.2	.0022
472	4700	4.7	.0047
502	5000	5.0	.005
103	10000	10	.01
123	12000	12	.012
203	20000	20	.02
223	22000	22	.022
104	100000	100	.1
684	680000	680	.68

Table 2 Letter tolerance code	
Letter symbol	Tolerance of capacitor
B +/	0.10%
C +/	0.25%
D +/	0.5%
E +/	0.5%
F +/	1%
G +/	2%
H +/	3%
J +/	5%
K +/	10%

FAQ

Q: Where can I find more help and support?

A: Sign up at the Trinity Amps Forum and check the "Resources" section or post a question in the Lightning Strikes, 18 Watt forums.

Q: What does B+ stand for

A: B+ stands for Battery Plus == B+ and came from the old days of tubes. B+ is measured at the intersection of the rectifier DC output and the first filter cap.

On a Trinity 18, it is measured between the lower left lug of the 32/32 cap and chassis ground. It should be about 440 VDC w/o tubes, 350 VDC with tubes with 120 VAC mains.

On a Trinity 15, it is measured at the first 32 uf capacitor. It should also be about 440 VDC w/o tubes, 360 VDC with tubes with 120 VAC mains.

Q: The pictures show the power and standby switches as "top and bottom" on the back of the switch, the layout shows them as "front and back" and I have back mounted "left and right". Does it make a difference as to what orientation I choose to make sure the switch operate correctly, i.e. on is on and off is off?

A: It does it make a difference as to what orientation you choose to make sure the switches operate correctly. Put a switch in any position and measure the resistance across two terminals. "ON" is where resistance is zero. Then rotate the switch so that DOWN is ON (UK style).

Q: Can I run the ground to the common star ground that the power transformer, 32/32 cap can and the 125 Ohm 5 watt resistor turret

A: No. Connect the 120 V ground to a bolt that fastens the Chassis. This is next to the IEC plug. **Don't run the 120 V ground to the common star ground**.

Q: A picture showing the TMB pots shows shielded wire from the 500k TMB volume pot to V2. It looks like the core wire goes to the center pot lug and the shield wire goes to the (left on layout, right as shown on picture) lug, correct?

A: Yes

Q: I assume that the shield is only attached to the pot; it is NOT connected to the tube socket?

A: Yes. Do not connect shield at both ends on the TMB volume pot OR input cables.

Q: For the impedance switch, do I use the 5 amp or 20 amp wiring? From the layout I would guess the 5 Amp.

A: Use 5 A for the impedance switch. The amp is fused at 2A anyway, so 5 is plenty.

Q: The wire looks to be two basic sizes, "thin" and "thick". From the pictures, it looks like the "thin" is used for the pot wiring and the "thick" is for the tube sockets. Is this correct?

A:

Use 22 Gauge solid for hook up to tubes;

Use 20 Gauge, twisted tightly for tube heater wiring;

Use 20 Gauge solid/stranded for hook up to pots/front panel; and

Use 18 gauge, stranded, 600v for power supply hook up - to transformers, rectifier, standby etc.

Tip: Re-use cut-offs from the transformers for power supply hook up.

Q: What should I use for the jumper wires on the back of the turret board?

A: Use the provided solid 20 ga or the stranded supplied for jumpers, it is not critical.

Q: For the input jacks:

a): I should be using the shielded wire which is the thick gray/black wire that you supplied about 3' of. Does the shield braid from both lines go to the common tip lug on the lower jack while the core line goes to the individual tip lugs on both jacks? I want to make sure I am interpreting the drawing correctly.

b). The other end of the shield does NOT get connected to the tag strip at V1, correct?

c). Each pair of input jacks gets only one resistor, correct? Can I lace one lead of the resistor through both jacks for the connection?

A: Take a look at the drawing of the input jacks. That should help you out. Use the shielded wire which is the heavy grey wire. The core goes to the hot. At the other end, the shield does NOT get connected to the tag strip at V1.

Q: How are the three terminal tag strips next to V1 supposed to be mounted, looked at the pictures on line and found they go under the V1 socket mounting nuts.

A: Tag strips are held in place by the socket mounting nuts.

Q: I assume you don't have to use both of the fiber/rubber washers when mounting the cliff jacks; I can get only one on, is this normal?

A: Yes

Q: Is there hardware provided for the grounding? Screws, star washers, nuts, etc.?

A: Yes, these should be in the kit.

Note: The power grounds should go to the separate hole to mount the grounding points.

Q: Is the voltage chart for the TMB the same as the SIII? I would think so, but just checking.

A: Yes. These are posted on the Trinity Forum as well.

Q: Is it easier to wire the pots up outside of the chassis on a cardboard with the pots spaced correctly, or can it be done easily in the chassis?

A: You can wire them in place, it's not too difficult. It is recommended that you wire the input jacks outside of the chassis with the approximate spacing to fit the panel.

TIP: It is easy to solder up the input jacks by putting them "inside out". Use a set of jack locations to the right of the normal channel and mount the jacks in their final orientation, but mounted outside of the chassis with the mounting screw inside the chassis. This keeps the orientation and spacing correct and provides a lot of room to solder the resistor, jumpers grounding wire and shielded wires. Then, when done, remove the completed jacks, mount them correctly inside the chassis and tighten up the mounting screws and solder up the other end of the shielded wires to the tag strips at V1.

TIP: More, larger format, colour pictures and the schematic & layout that are helpful in the build are posted on the Trinity Forum & 18 Watt forum. Right click on them to download if you want print in large, colour format.

TIP: Sometimes carbon comp resistors are hard to decode the colours. It is a good idea to check the resistances of these parts before assembly.

TIP: Use insulation tubes from the wiring on the resistor / cap leads around the tubes and pots by using longer pieces of insulation stripped from the supplied 22 or 20 ga wire.

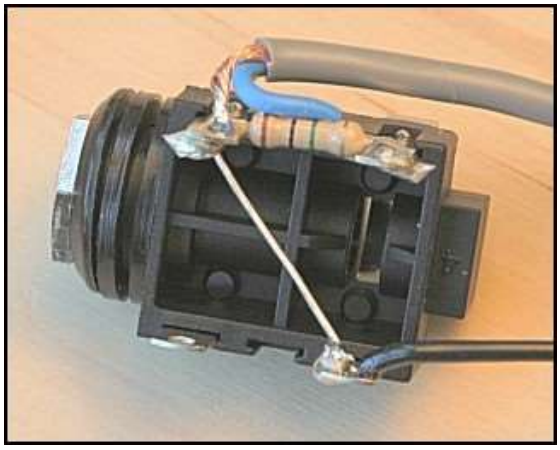
TIP: There is no bleed resistor in the sIII. You don't need to worry about this unless you are going to poke around inside after it's shutdown.

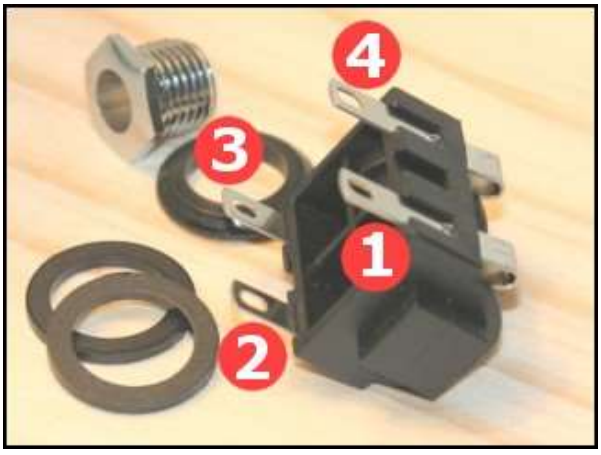
For safety, unplug the amp, then turn on the stand-by switch for a minute to help drain the caps. If you want to check them, measure B+ after you've done that. If there is still high voltage there, drain it again.

TIP: Heater Wires: Stranded wire is very hard to twist tightly. Stranded or solid doesn't make much difference. Solid wire stays in place better once it's positioned and a bit easier to feed through holes. If they aren't well twisted make sure they are tight against the chassis. You can use 22 ga solid for heaters. It is rated for more than 5A anyway.

Cliff Jacks Explained

Here's a Cliff-style jack wired for a single input.





With no guitar plugged in, there's continuity to ground for lugs 2 and 4 (a direct connection) and also for lug 1 (it's not switched and therefore mechanically connected to lug 2 with the crossover wire). With a guitar plugged in, the switching breaks, and now there's only continuity between lugs 2 and 4 and ground. Of course, with a guitar plugged in, you'll read a resistance of 6-12K for lug 1 to ground - depending on your pickups. If your guitar's Volume pot is at zero, you'll find continuity to ground instead.

You should get continuity between the tip and chassis with nothing plugged in because of the shorting jack and the cross over wire. From 18W Forum – loverocker & ebe

18 Watt Bill of Material (BOM)

BAG	ITEM	18 WATT COMM.	SIII	PLEXI	TMB	PLEXI MkII
MEDIUM (29)	100 2W METAL OXIDE RESISTOR	1				
	150 5 WATT WIREWOUND RESISTOR	1				
	1K5 METAL OXIDE 5 WATT WIREWOUND RESISTOR	1				
	2K2 METAL OXIDE 2 WATT RESISTOR	1				
	2K7 OHM CARBON COMP 1/2 WATT RESISTOR	2				
	8K2 OHM CARBON COMP 1/2 WATT RESISTOR	2				
	8K2 OHM METAL OXIDE 2 WATT RESISTOR	1				
	47K OHM CARBON COMP 1/2 WATT RESISTOR	1				
	56K OHM CARBON COMP 1/2 WATT RESISTOR	2				
	68K OHM CARBON FILM 1/2 WATT RESISTOR	4				
	100K OHM CARBON COMP 1/2 WATT RESISTOR	6				
	470K OHM CARBON COMP 1/2 WATT RESISTOR	5				
	1M OHM CARBON FILM 1/2 WATT RESISTOR	2				
SMALL ***(UNCOMMON)***	*250 5 WATT WIREWOUND RESISTOR*					
	470 OHM CARBON COMP 1/2 WATT RESISTOR			*1*		
	820 OHM CARBON COMP 1/2 WATT RESISTOR		*3*	*2*	*4*	*4*
	1K5 CARBON FILM 1 WATT RESISTOR					
	22K OHM CARBON COMP 1/2 WATT RESISTOR (PI TAIL)					
	33K OHM CARBON COMP 1/2 WATT RESISTOR					*1*
	100K OHM CARBON COMP 1/2 WATT RESISTOR					*2*
	200K OHM CARBON COMP 1/2 WATT RESISTOR					
	220K OHM METAL FILM 1/2 WATT RESISTOR (v6 SWITCH)					
	270K OHM CARBON COMP 1/2 WATT RESISTOR					
	470K OHM CARBON COMP 1/2 WATT RESISTOR				*1*	*2*
	1M OHM CARBON COMP 1/2 WATT RESISTOR				*1*	
LARGE ***(UNCOMMON)***	*16UF 450V ELECTROLYTIC CAPACITOR*		*2*	*2*	*2*	*2*
	100PF SILVER MICA CAPACITOR					*1*
	250PF SILVER MICA CAPACITOR					*1*
	500PF SILVER MICA CAPACITOR		*2*	*3*	*1*	*2*
	.0022UF MALLORY AXIAL CAPACITOR					*1*
	*.0047UF MALLORY AXIAL CAPACITOR**		*4*	*1*	*2*	*2*
	*.01UF X MALLORY AXIAL CAPACITOR**		*3*	*1*	*4*	*2*
	*.022UF X MALLORY AXIAL CAPACITOR**		*3*	*7*	*3*	*4*

	.68UF X 100V AXIAL CAPACITOR		*1*	*1*		*2*
	1UF 50V AXIAL ALUMINUM ELECTROLYTIC CAPACITORS				*2*	
	3.3UF 50V AXIAL ALUMINUM ELECTROLYTIC CAPACITORS					*1*
	25 UF 50V AXIAL ELECTROLYTIC CAPACITOR		*1*			
	50UF 50V / 47UF 63V ELECTROLYTIC CAPACITOR		*2*	*1*	*1*	*1*
	220UF 50V AXIAL ELECTROLYTIC CAPACITOR			*1*		
MED	32UF X 32UF 450V JJ ELECTROLYTIC CAN CAPACITOR	1				
	1-3/8" ELECTROLYTIC CAN CAP CLAMP	1				
MEDIUM	25K-LINEAR POT MID	1			1	
	250K-LINEAR POT TREBLE	1			1	
	500K-AUDIO POT VOL, TONE, SIII MASTER VOL, BASS	5			4	
	1M-AUDIO POT TMB MASTER VOL				1	
	ROTARY SWITCH BLACK 3 POS 10A	1				
MED	KNOB - LARGE, INDICATOR LINE, SET SCREW, BLACK	1				
	MARSHALL KNOBS	7			7	
LARGE (21)	IEC SOCKET	1				
	PANEL MOUNTED FUSE HOLDER SCREW 1/4X1.25" FUSES	1				
	FUSE 2A SLO BLO	1				
	INDICATOR LAMP XICON NEON 110V RED	1				
	CARLING SPST TOGGLE SWITCH 125V 5A 2 NUTS, L.WSHR	2				
	SPDT SWITCH INCL. NUT, L.WSHR, WSHR	1				
	CHASSIS GROMMETS	2				
	TERMINAL STRIP 5 LUG SOLDER TYPE	1				
	TERMINAL STRIP 3 LUG SOLDER TYPE	3				
	CLIFF 1/4" JACK MONO SWITCHED	4				
	SWITCHCRAFT #11 1/4" JACK MONO UNSWITCHED	2				
	PLASTIC CAPS FOR CHASSIS	2				
LARGE	9-PIN SHIELD RETAINER	3				
	9-PIN TUBE EL-84 SPRING RETAINERS	3				
	9-PIN BELTON TUBE SOCKET	6				
	8-PIN BELTON OCTAL SOCKET					
	8-PIN RETAINER					
SMALL	#4 X 5/16" MACHINE SCREW	25				
	#4 HEX NUTS	7				
	#4 CHASSIS LUGS	2				
SMALL	#6 X 3/4" MACHINE SCREW	4				
	#6 X 3/8" MACHINE SCREW	3				

	#6 HEX NUT	1				
	#6 LOCK WASHER	4				
	#6 CHASSIS LUGS	3				
	#6 STANDOFFS NYLON 1/4" OD 1/2"	4				
SMALL	#8 X 3/8" MACHINE SCREW, GROUND BOLT, OT MTG.	3				
	#8 HEX NUT	7				
	#8 CHASSIS LUGS	1				
MED	#10 X 1-1/4" MACHINE SCREW	4				
	10-32 (M5) CAGE NUTS	4				
LARGE	22 GAUGE SOLID WIRE, VARIOUS COLOURS (FEET)	10				
	22 GAUGE SOLID TWISTED WIRE (FEET)	3				
	18 GAUGE TWISTED WIRE BLACK, WHITE (FEET)	2				
	SHIELDED CABLE (FEET)	5				
	HEAT SHRINK TUBING - 1/16" 4"	1				
	HEAT SHRINK TUBING - 1/8" 4"	1				
	HEAT SHRINK TUBING - 1/4" 4"	1				
	TIE WRAPS	6				
	18 WATT TURRET BOARD	1				
	IEC POWER CORD 8', 18/3	1				
	FRONT PANEL - 18 WATT	1				
	ALUMINUM CHASSIS	1				
	18 WATT BUILDERS GUIDE	1				

*Note - Some #8 hardware may be used to ship transformers in place.

Some of the parts contained in this kit are subject to availability. Trinity Amps reserves the right to change or substitute any and all of the parts contained in this amplifier kit without notification. Part substitutions made by Trinity Amps are guaranteed not to affect the integrity or operation of your amplifier kit.

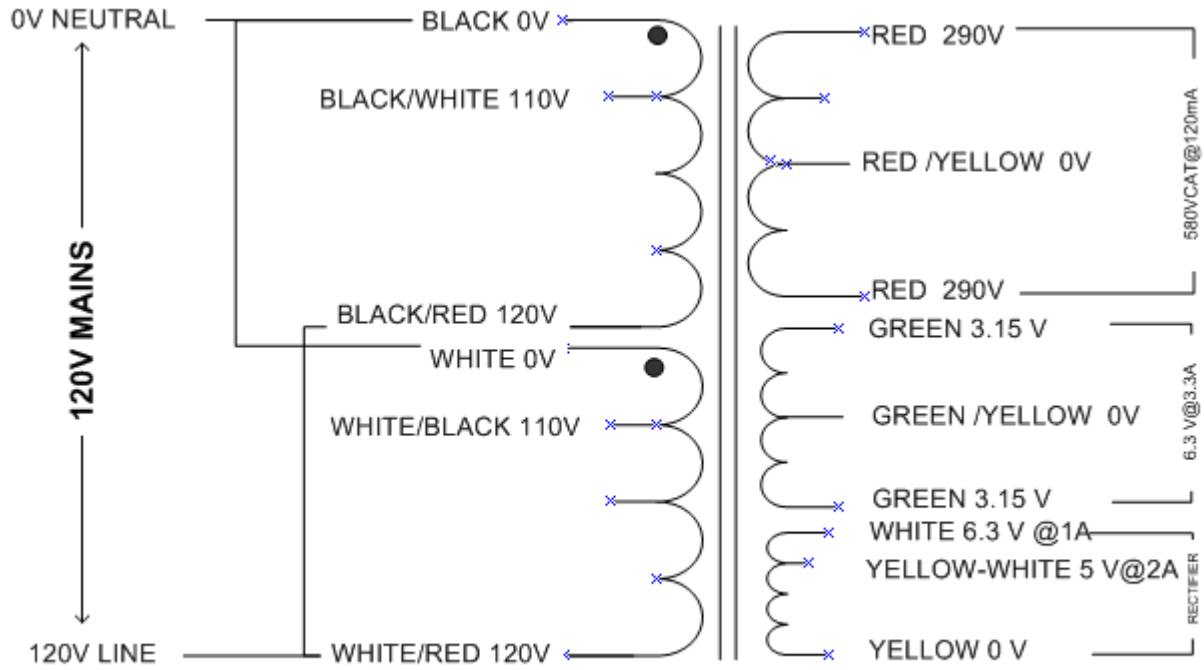
18 Watt Plexi 6V6 Bill of Material (BOM)

DESCRIPTION	QTY	CHECK
18W 6V6 PLEXI KIT WITH TRANSFORMER SET, CHASSIS, PANEL		
18W 6V6 PLEXI RESISTORS	1	
WIREWOUND RESISTORS - THROUGH HOLE 300 OHMS 5% TOL	1	
CARBON FILM RESISTORS- THROUGH HOLE 470 OHMS 5%	1	
METAL OXIDE RESISTORS 470 OHMS 5% TOL	1	
CARBON FILM RESISTORS- THROUGH HOLE 820 OHMS 5%	1	
CARBON FILM RESISTORS- THROUGH HOLE 1K OHMS 0.05	1	
WIREWOUND RESISTORS - THROUGH HOLE 1.5K OHMS 5% TOL	1	
CARBON FILM RESISTORS- THROUGH HOLE 2.7K OHMS 5%	1	
CARBON FILM RESISTORS - THROUGH HOLE 5.6KOHMS 5%	2	
METAL OXIDE RESISTORS 10K OHMS 5% TOL	2	
CARBON FILM RESISTORS - THROUGH HOLE 15K OHMS 5%	1	
METAL OXIDE RESISTORS 15K OHMS 5% TOL	1	
CARBON FILM RESISTORS- THROUGH HOLE 33K OHMS 5%	1	
CARBON FILM RESISTORS- THROUGH HOLE 100K OHMS 0.05	5	
CARBON COMPOSITION RESISTORS 100K OHM 5%	2	
CARBON FILM RESISTORS- THROUGH HOLE 68K OHMS 0.05	4	
CARBON FILM RESISTORS- THROUGH HOLE 220K OHMS 0.05	2	
METAL OXIDE RESISTORS 220K OHMS 05% TOL	1	
CARBON FILM RESISTORS- THROUGH HOLE 1M OHMS 5%	4	
18W 6V6 PLEXI CAP	1	
CAPACITOR - 500V SILVER MICA ± 5% 47 PF	1	
330 PF 500V SILVER MICA	1	
CAPACITOR - 500V SILVER MICA ± 5% CAPACITANCE: 500 PF	2	
CAPACITOR - MALLORY 630V 150S AXIAL LEAD CAPACITANCE: .0047 UF	1	
CAPACITOR - MALLORY 630V 150S AXIAL LEAD CAPACITANCE: .01 UF	1	
CERAMIC DISC CAPACITORS .375LS .01UF 1KVDC 10% 8MM LEAD DIA	1	
CAPACITOR - MALLORY 630V 150S AXIAL LEAD CAPACITANCE: .022 UF	7	
FILM CAPACITORS 100V .68UF 5%	1	
50V, AXIAL LEAD ELECTROLYTIC 4.7 UF	1	
CAPACITOR - 475V AXIAL LEAD ELECTROLYTIC CAPACITANCE: 16 UF	2	
CAPACITOR - JJ ELECTRONICS 500V 32/32UF ELECTROLYTIC	1	
CAPACITOR - 450V AXIAL LEAD ELECTROLYTIC CAPACITANCE: 33 UF	1	
CAPACITOR - 50V, AXIAL LEAD ELECTROLYTIC 50 UF	1	

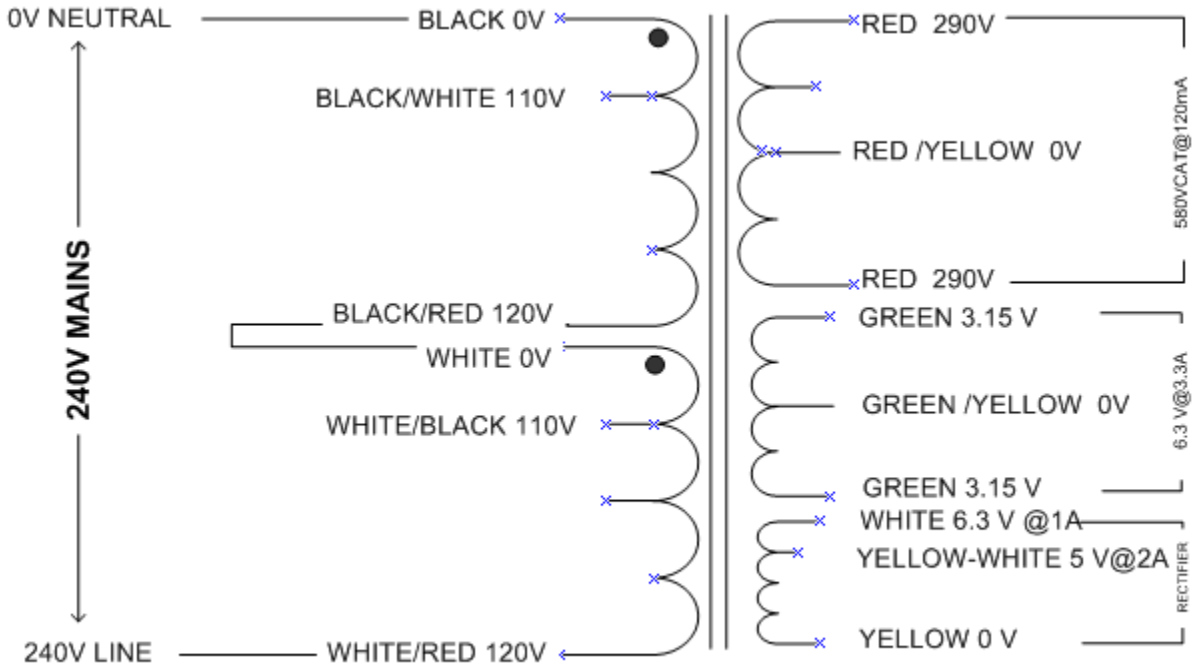
CAPACITOR - 50V, AXIAL LEAD ELECTROLYTIC 220 µF	1	
CAPACITOR CLAMP - 1.375" DIAMETER	1	
18W 6V6 PLEXI POT	1	
POTENTIOMETER - ALPHA AUDIO 3/8" BUSHING RESISTANCE: 1 MOHM	4	
POTENTIOMETER - ALPHA AUDIO 3/8" BUSHING RESISTANCE: 500 KOHM	1	
POTENTIOMETER - ALPHA LINEAR 3/8" BUSHING RESISTANCE: 250 KOHM	1	
POTENTIOMETER - ALPHA LINEAR 3/8" BUSHING 25 KO	1	
MARSHALL STYLE GOLD KNOBS	7	
KNOB - CHICKEN HEAD SET SCREW COLOR: BLACK	1	
18 WATT PLEXI 6V6 SOCKET	1	
SOCKET - BELTON 9 PIN MINIATURE TOP MOUNT	3	
TUBE SHIELD - FOR 9-PIN MINIATURE ALUMINUM MULTIPLE COLORS COLOR: ALUMINUM	3	
TUBE CLIP - BELTON FOR OCTAL SOLD INDIVIDUALLY	3	
SOCKET - BELTON MICALEX 8 PIN OCTAL MIP	3	
18 WATT COMMON JACKS	1	
JACK - CLIFF 1/4" MONO SOLDER LUG	4	
JACK - SWITCHCRAFT ¼" MONO 2-CONDUCTOR OPEN CIRCUIT	2	
18 WATT COMMON HARDWARE	1	
SWITCH - ROTARY 1 POLE 3 POSITION	1	
IEC RECEPTACLE - FOR POWER CORD	1	
SCREW TYPE FUSE HOLDER 10A 250VAC CSA	1	
FUSE - SLOW-BLOW 250V MINIATURE 5MM X 20MM 2 AMPS	1	
NEON INDICATOR 120VAC RED	1	
SWITCH - CARLING TOGGLE SPST ON-OFF SIDE SOLDER LUGS	2	
SWITCH - CARLING MINI TOGGLE DPDT 2 POSITION	1	
GROMMETS & BUSHINGS GROMMETS & BUSHINGS SB 500-6 BLK	2	
TERMINAL STRIP - 3 LUG 2ND LUG COMMON HORIZONTAL	4	
TERMINAL STRIP - 5 LUG 0 COMMON HORIZONTAL	1	
CONDUIT FITTINGS & ACCESSORIES DP 875 BLK DOME PLUG	1	
18 WATT COMMON FASTENERS	1	
MACHINE SCREW PHILLIPS PAN HEAD 4-40X5/16 L	25	
HEX NUT EXT TOOTH LOCKWASHER 4-40	7	
TERMINALS TERMINALS LUG LOCKING MATTE TINNED#4	2	
MACHINE SCREW PHILLIPS PAN HEAD 6-32X3/4 L	4	
MACHINE SCREW PHILLIPS PAN HEAD 6-32X3/8 L	3	
HEX NUT EXT TOOTH LOCKWASHER 6-32	1	
INTERNAL TOOTH LOCK WASHER #6 CHROME	4	
STANDOFFS & SPACERS .375 STD SPACER	4	
TERMINALS TERMINALS LUG LOCKING MATTE TINNED#6	3	
MACHINE SCREW PHILLIPS PAN HEAD 8-32X3/8 L	3	

HEX NUT EXT TOOTH LOCKWASHER 8-32	7	
TERMINALS TERMINALS LUG LOCKING MATTE TINNED#8	1	
MACHINE SCREW PHILLIPS TRUSS HEAD 10-32X1-1/4 L	4	
ANCHOR (CAGE) NUT 10-32	4	
18 WATT COMMON WIRE	1	
22 GUAGE SOLID CORE WIRE (VARIOUS COLOURS)	10	
22 GAUGE TWISTED PAIR RED/BLACK	4	
BELDEN RG174/U COAXIAL CABLE	4	
18 GUAGE STRANDED WIRE BLACK	1.5	
18 GUAGE STRANDED WIRE WHITE	1.5	
HEAT SHRINK TUBING 1MM	4	
HEAT SHRINK TUBING 3MM	4	
HEAT SHRINK TUBING 6MM	4	
CABLE TIE 4 IN BLACK 18 LBS	6	
18 WATT TURRET BOARD	1	
CHASSIS 20 IN ALUM HEAD	1	
PANEL GOLD 18 WATT	1	
CORD - POWER 18 AWG 3 CONDUCTOR DETACHABLE BLACK IEC LENGTH: 8 FEET	1	
TRANSFORMER POWER 290-PT	1	
TRANSFORMER OUTPUT 8K/5K	1	

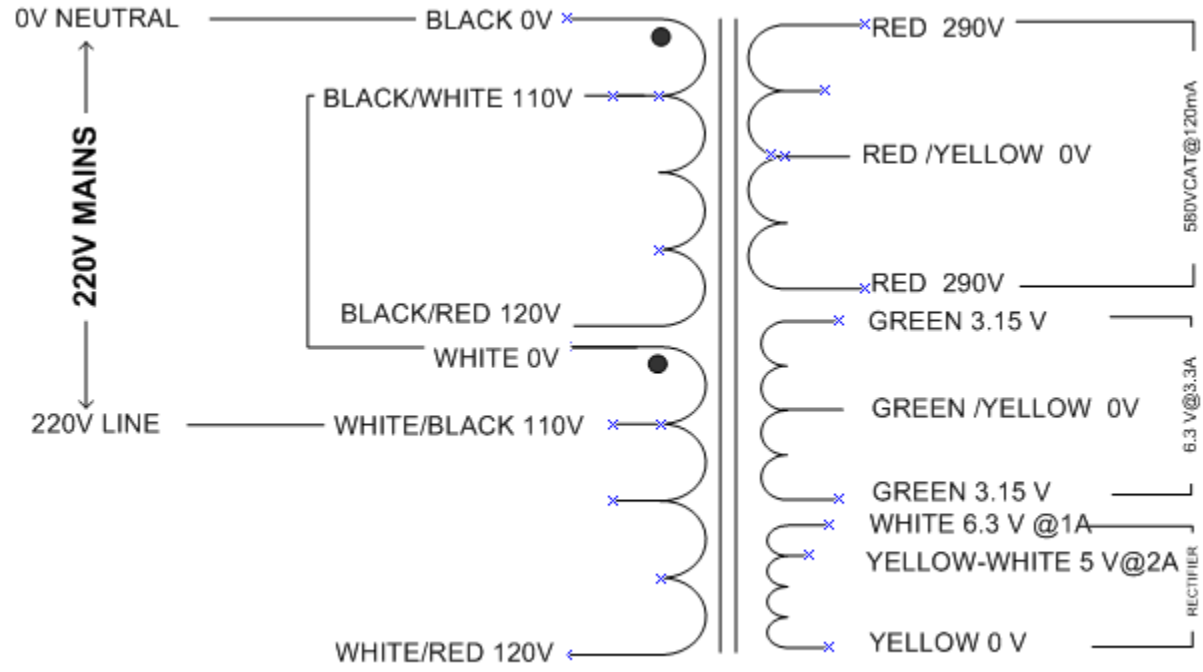
18 Watt Transformer Hook Up Schematics



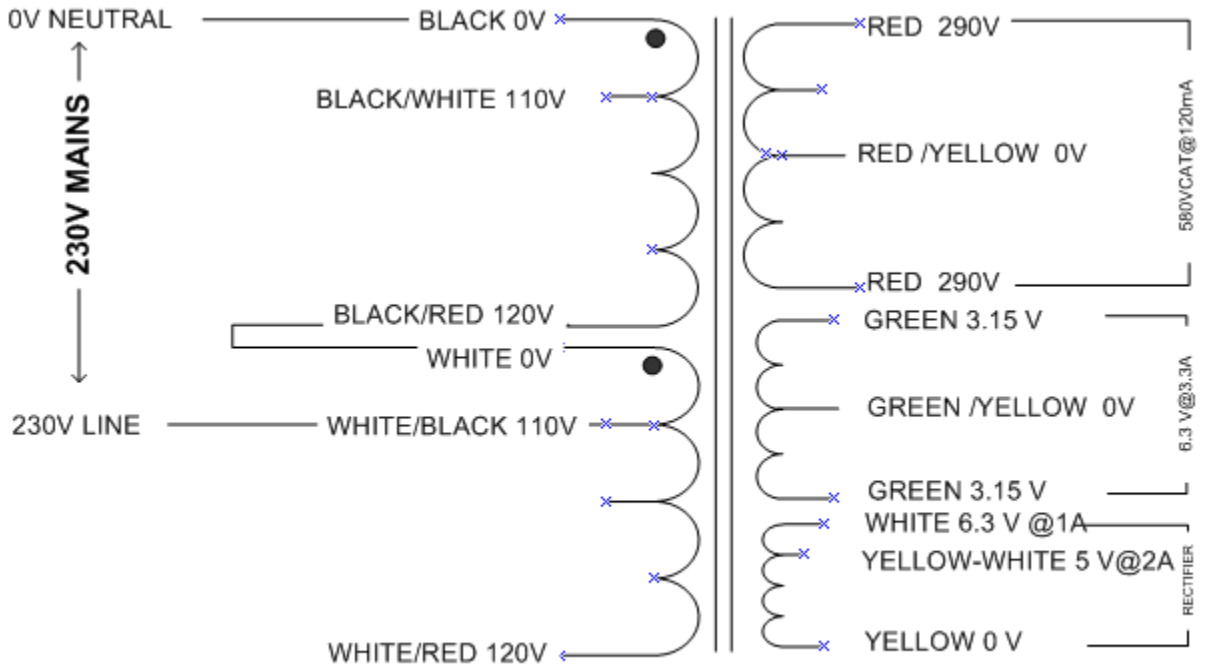
18 POWER TRANSFORMER 120V HOOK-UP



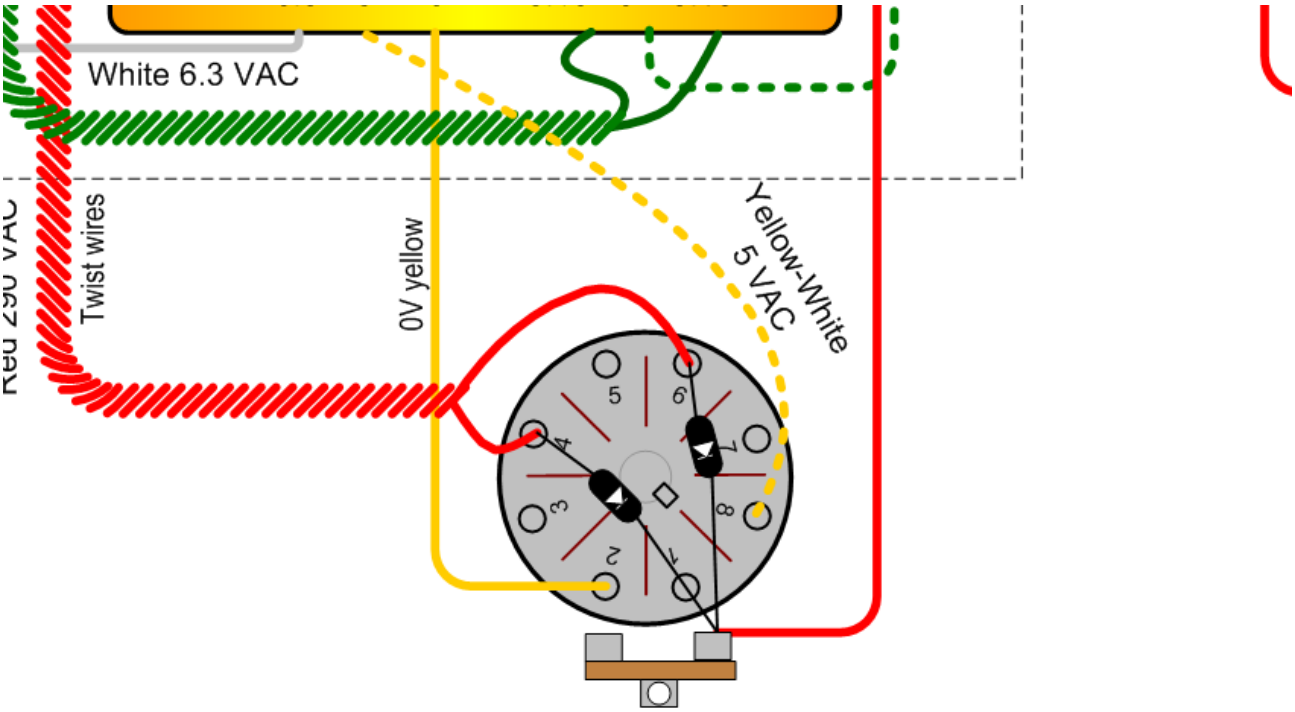
18 POWER TRANSFORMER 240V HOOK-UP

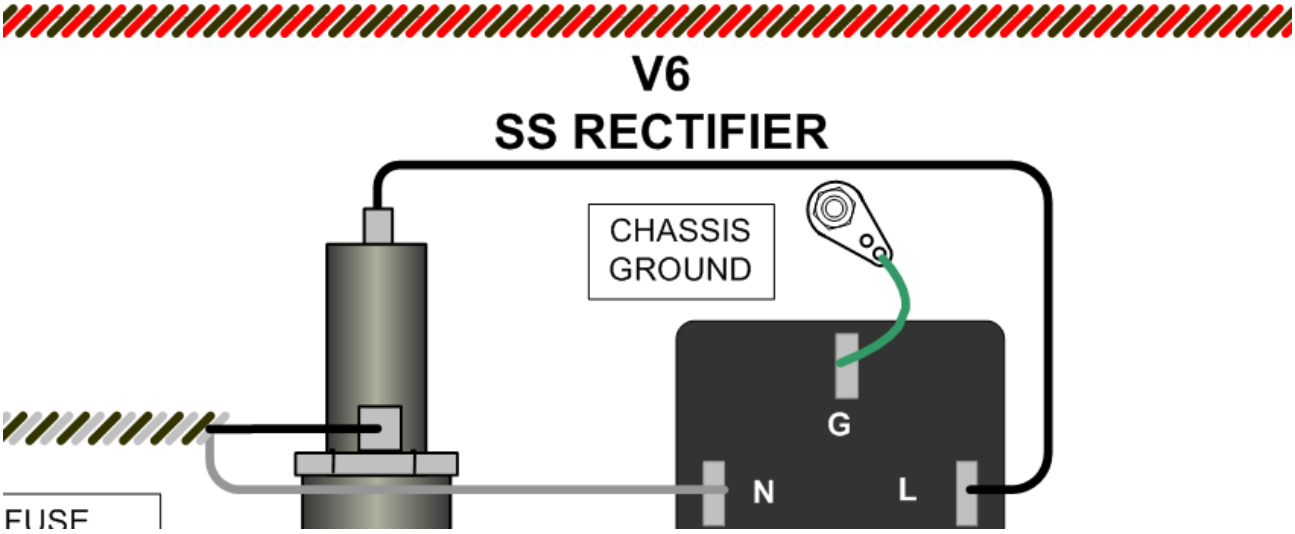


18 POWER TRANSFORMER 220V HOOK-UP



18 POWER TRANSFORMER 230V HOOK-UP

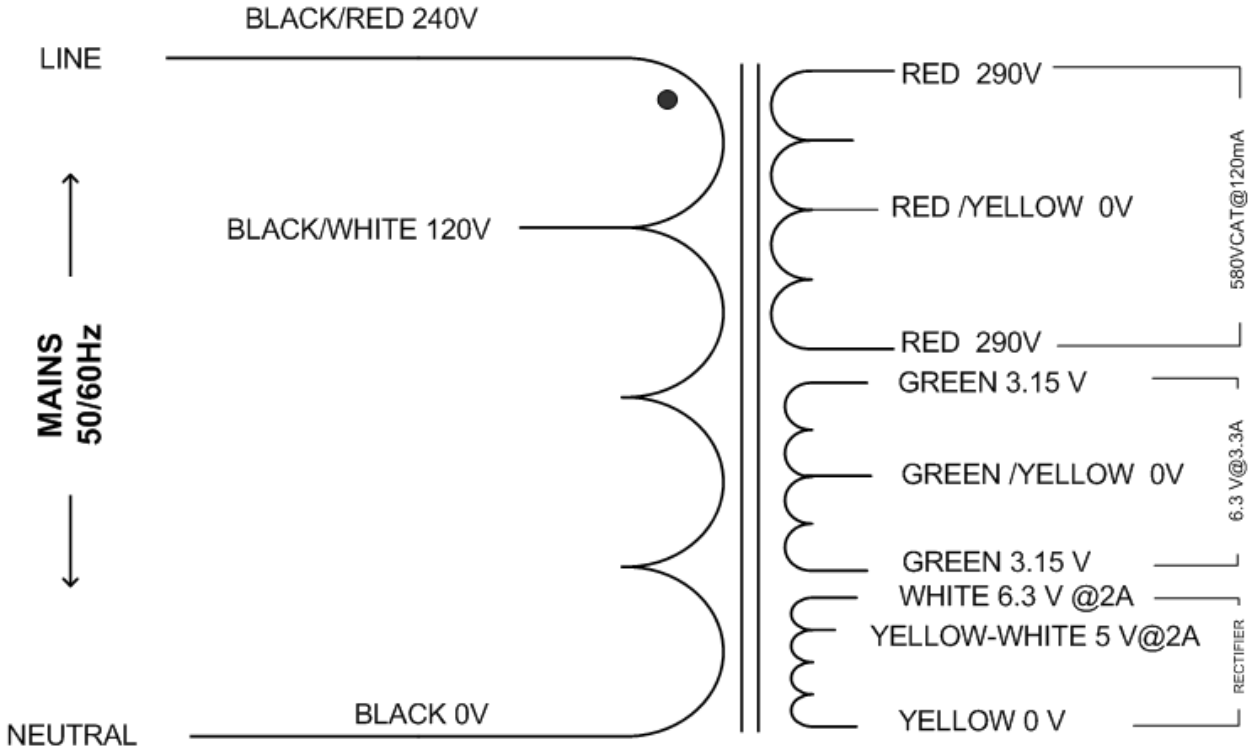


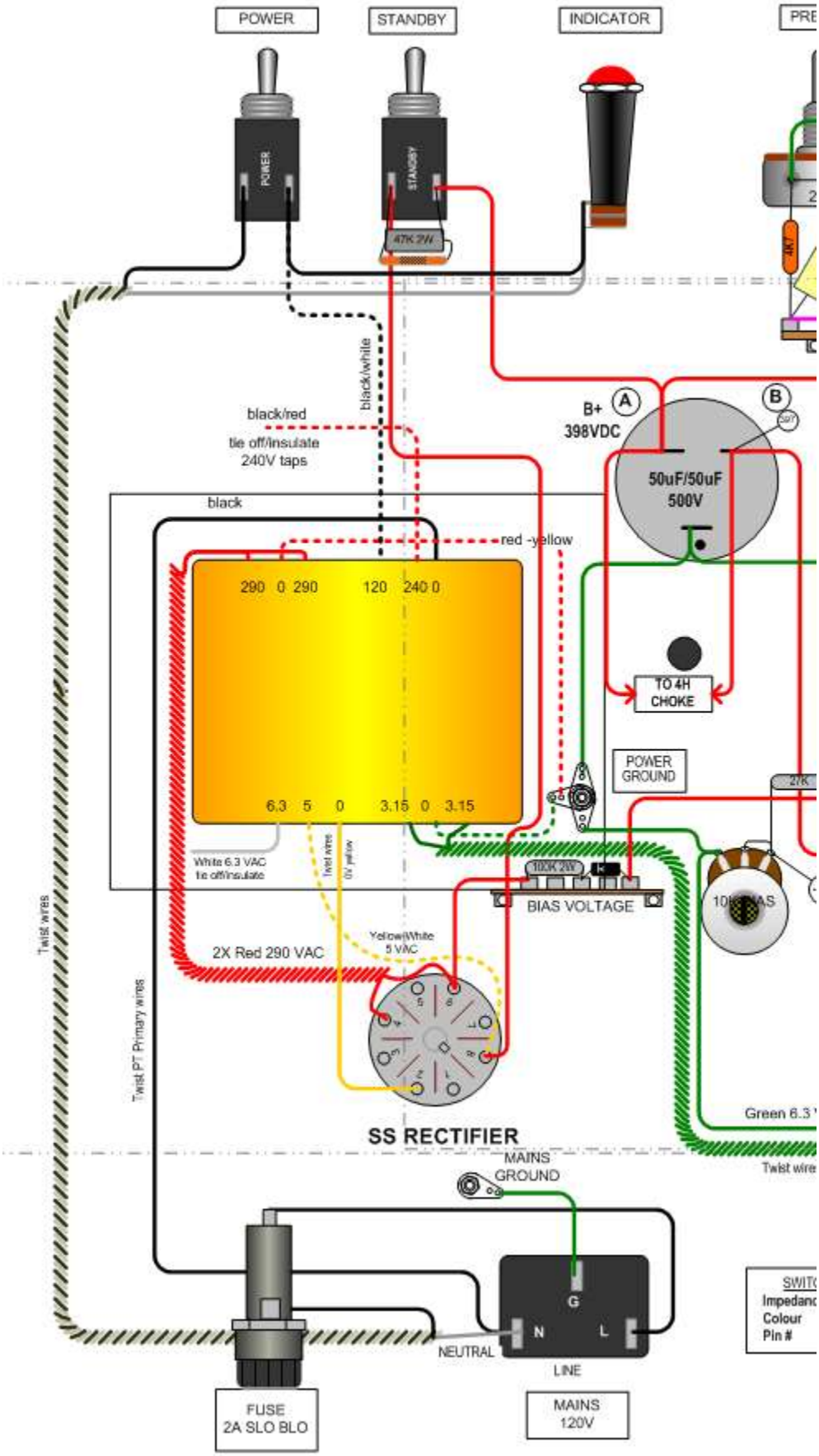


Using UF4007 Diode Rectification

ADDENDUM 1 - DUAL PRIMARY POWER TRANSFORMER

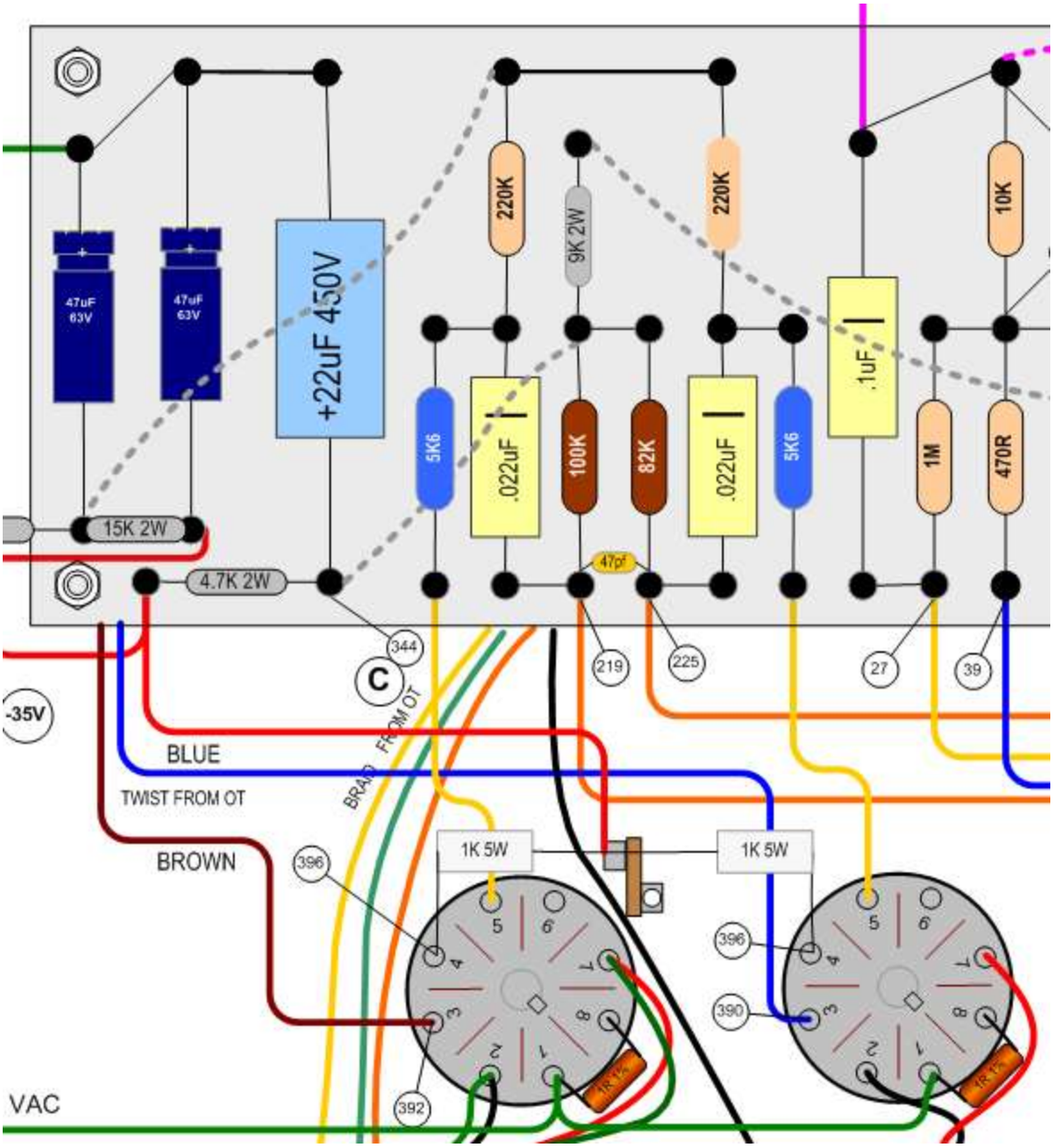
The Heyboer Power transformer with a dual primary may be supplied in which case the primary wiring is somewhat simplified. Use the Schematic and Dual Voltage Layout below.




POWER
STANDBY
INDICATOR
47K 2W
black/white
black/red
tie off/insulate
240V taps
black
red -yellow
290 0 290 120 240 0
6.3 5 0 3.15 0 3.15
White 6.3 VAC
tie off/insulate
B+
398VDC
A
B
50uF/50uF
500V
TO 4H
CHOKE
POWER
GROUND
100K 2W
BIAS VOLTAGE
2X Red 290 VAC
Yellow/White
5 VAC
Twist wires
Twist PT Primary wires
SS RECTIFIER
MAINS
GROUND
G
N
L
NEUTRAL
LINE
FUSE
2A SLO BLO
MAINS
120V

ADDENDUM 2 - 5K TAP REMOVED

The Heyboer Output transformer with a single 8K primary may be supplied so the 5K taps do not need to be tied off.



Trinity Amps Schematics and Layouts