The Trinity Amps

Tramp

Amp Builders Guide

www.trinityamps.com

Contents

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 Fender forum.

The Fender Amp Field Guide is a terrific resource for all amps Fender

Email: We can't help with every problem but if you can not 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

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 DISCLAIM 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!

Thank You

Thank you for purchasing your kit from Trinity Amps. We truly hope that you have fun building it. If you have any questions please do not hesitate to contact us by email or on the forum for help.

We are always looking for Customer feedback. We have checked the build instructions thoroughly and are confident in our product. However, mistakes do happen so our advice is to cross-check against the schematic as you connect each wire and part according to the layout. 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!

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

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

Sincerely,

Stephen Cohrs,

Trinity Amps

Web site: www.trinityamps.com

email: **stephen@trinityamps.com**

Version Control

Version	Date	Change
1.99	28Sep12	Changed 0.47uf cap from 600V to 100V in BOM
	17Jan13	Updated BOM with 0.47uF/0.5uf, 22/20 GA & 530 VCT
1.99	20Aug13	Updated board picture;changed wording around "Connect the first volume control to V2, pin 2…"
1.991	7Feb14	Updated BOM & some assembly notes
1.992	12May14	PAB Mod added in Tweaks
2.0	3Aug14	Added VRM Bypass mod; changed OT impedance switch schematic
2.1	31Jan15	Updated BOM
2.2	31Mar16	Updated underside of board view
2.3	12Jun16	Updated Mains Power wiring to match revised layout
2.4	29Nov16	Updated for IEC Mains socket connection
2.5	9Dec2016	Updated Impedance switch instructions.
2.6	23April 2017	Updated Bill of Materials (BOM)
2.7	29Ju2017	Note to tie off and insulate the unused Yellow wires for a Tube rectifier.
2.8	20Jul17	Added and updated Voltage Chart with 6V6, 6L6 measurements.
2.9	12Oct2017	Updated board layout, BOM (220K CF 1W, added EL34 & PAB mod layouts
3**.0**	2**3Nov18**	Updated for new Power Transformer Design
3.1	13May19	Updated BOM.
3**.2**	1**4Jun19**	C**orrected OT secondary schematic**
3.4	11Jul19	Added Squeal troubleshooting tip
3.5	25Jul19	Added note on installing optional Impedance switch.
3.51	19Sep19	Fixed Board Layout 100K (hankules)
3.52	1Oct19	Corrected B+ test C/R location to C12 / R19 (jmczaja)
3.53	14Feb20	New BOM added
3.54	14May20	Alternate Impedance Switch added.
3.55	13Sep20	Corrected board assembly drawing. (R. Gwynn)
3.6	26Oct20	Updated **BOM**
21.1	24Feb21``	New Version
21.2	4Mat21	Added tube bias settings table
21.3	14May	Board mod for Head build added
21.4	30May21	Mains Power Connection corrected
2**1.5**	28Jul21	Updated Board assembly drawing and clarified board jumpers (W. Ferrell)
2**1.6**	25Aug	Clarified Output Transformer installation)(Bob S)
21.9	4Dec21	Many Revisions per R. Silverstein review

About the Tramp

The Tramp began as a low-powered, practice-bedroom amp concept that turned into a full blown practice-home-studio-gigging amp. Why would we bother? Well, there are lots of 2-tube amps out there, from the famous Fender Champ to the Epiphone Valve Jr, and many more. These amps have a sweet vibe but are challenged in what they can do; whether the amount of break-up they can provide in the case of some amps, or their tonal versatility in the case of others. The Tramp was designed to address this shortcoming and provide extreme versatility while still keeping to the format of a two-stage preamp and only two tubes. The Tramp also features a Master Volume control that doesn't make the tone suck as you turn it down, as well as a variable power level control, allowing you to have almost any tone right down to bedroom volume levels you can comfortably talk over.

The Tramp is a brand new design that incorporates extreme, useful flexibility with distinct amp voices and plenty of features. With a simple pull of a switch, you can go from Tweed to 'Tude; another pull switch and you can play Fat or Thin. Using the Volume, Master Volume and Power Level controls along with Bass and Treble, achieves tonal nirvana! The design supports 6V6, 6L6, KT66, EL34, 6CA7 and KT88 power tubes so you can swap the single power tube for added gigging volume and headroom. Power output is approximately 6W with a 6V6, or 12W with the bigger tubes.

The Tramp is effectively two amps in one, which you can alternate between with the simple pull of a switch. It was intended to cover all the bases from Clean to Dirty, and all the possible shades in-between - and it delivers an amazing tonal range in doing so.

In Tweed mode, it's heritage is 3Fx series Tweed Princeton or Champ, with the additional benefit of Treble-Bass tone controls. Tweed is smooth and creamy with a welcome warmth, vintage voice but with a little more solidity and clarity. It is full of soul and you can really hear the Fender heritage. In Tweed mode, the Volume control is usable through its entire travel - gorgeous cleans around 5/6 on the dial, slight break-up around 7/8, and an amazing humming drive at 9/10. Everything you want in the classic Tweed amp spectrum, from clean to dirty, is right here.

In 'Tude mode, the Tramp exceeds what you could traditionally achieve with the simple two-tube amp format. The sound opens up with an astonishing clarity, and extended range of clean and distorted sounds. 'Tude glows with all of its harmonic content, and grinds when the guitar gets wound up.

'Harmonic haze' is what it's all about in the clean parts of 'Tude - gorgeous! Just a little hair on the tone for presence with all these overtones swirling around it and a nice solid foundation. Cranked up, it's complex, raw and edgy but still under control, and smooth but in an aggressive way - there's tone right to the top. Using Fat or Thin settings doesn't matter - it holds together but in a really primal raw "teeth gritting" way... with a P-90 Les Paul - it rocks in a Neil Young kind of way... Bass dimed, Bass at zero, it doesn't matter. With big humbuckers driving it, and the Volume cranked right up, you get modern rock distortion tones. At the same time the natural tone of the guitar really comes through, and you get a completely different vibe from this amp between a Strat or an ESP.

With the Volume all the way up Power Level acts like a "presence" control - not in a "top end" sort of way, but more in a "brings the tone out of the speaker" wider, more comprehensive

way. Because the tone is fairly compressed with Volume cranked, moving power from 10 to 5 on the power level doesn't really make it much quieter, just darker and warmer, but still with all the beef.

As you increase the Tramp's Power Level, the tone comes forward with highs and high mids becoming more prominent. At full power and bass down, you can get a real edgy, ringy, "transitory" kind of tone, and as you roll the bass up, Neil Young and his very large "tone" show up. With power level below 5 the tone gets quieter, but it still has all the rage. As an added bonus, players can switch back and forth from Tweed to 'Tude without having to adjust the Treble or Bass - the tones just work without having to move a knob... so good news for those that dream of switching between Tweed/'Tude on a gig - you can just 'Set it and forget it!'

Tramp Specifications

1. Controls: Power/Level, Volume, Bass, Treble, Master Volume, 1 input
2. VRM [power scaling] incorporated into design. 'Brown out' the amp.
3. Drive octal tubes with OT & bias resistor changes (6V6, 6L6, KT66, EL34,6CA7 ,KT88)
4. Cathode Bias
5. Solid State rectifier
6. 2 tubes (3 max)
7. 1 additional Noval socket hole punched (power or pre-amp)
8. LED Power Indicator
9. Tweed/'tude push/pull switch on Gain control for clean/dirty preamp
10. Thin/Fat push/pull switch on Bass control
11. Bias resistor switch to accommodate two power tubes
12. One Input jack; Two Output jacks
13. Impedance Selector (4,8,16 ohms)
14. Dual Impedance Heyboer custom Output Transformer - 5K AND 2.5K

Power / Level control – Rotary ON-OFF switch with 1M control for VRM*.

Actions: Off – On (low level is standby. Turning control further effects the VRM control and the power level of the amp (power scaling).

*VRM– components mounted on eyelet board. MOSFET mounted immediately beside board & leads soldered in directly.

Volume control – to adjust amount of volume and overdrive. The Tramp able to go from Clean to Dirty. The Tramp plays like a vintage Tweed Champ/Princeton when in Tweed mode. When played this way, the Master Volume would be on max, and then the Volume control becomes the amp's Volume control. Incorporates a push/pull Tweed / 'tude switch for Clean / Tweed // Dirty / Marshall range

Tone Controls:

Bass – Cut/Boost. Incorporates a push/pull Thin/ Fat switch for enhanced voicing

Treble - Cut/Boost

Master Volume control – overall volume level control.

Builders Guide General Theory

For a discussion on Guitar Amp Basics and Tube Amp Theory, please refer to our support page document **Builders Guide General Theory**

Building an Amp – General Guidelines

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 20 or 22 gauge insulated solid wire with a 600V rating. It is good to get a variety of colors so you can color code your wiring.

Use 18 Gauge stranded for mains 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 in. internal hole that fits a ½ in. 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
2. 60/40 rosin core solder .030" dia
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:

- Use 60/40 rosin-core solder.
- Keep the tip of the soldering iron clean. If it's dirty, wipe it on a damp sponge to clean it.
- Set the temperature of your soldering iron to about 700F.
- 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.
- Make a good mechanical connection first, and then make a good solder joint.
- Heat the leads to be soldered by touching it with the tip of the iron.
- Touch the solder to the leads. The solder should flow onto the leads. Avoid breathing the fumes.

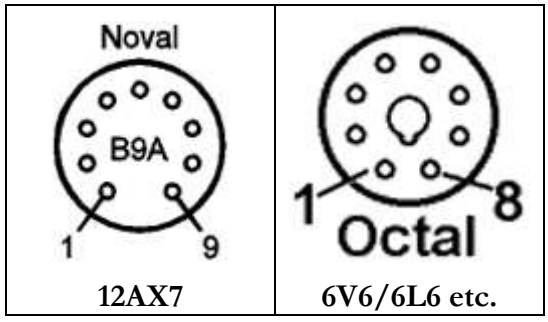
- Remove the soldering iron and allow the solder joint to cool.
- Note: Do not apply the tip of the soldering iron to the eyelet board any longer than it takes for the solder to flow.

The solder joint should be clean and shiny. 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.

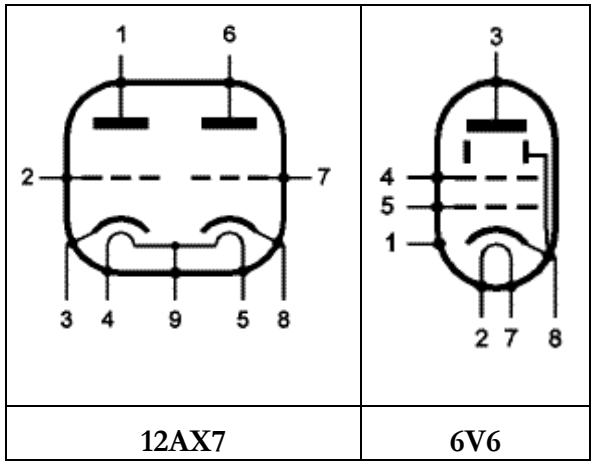
Tube Pin Numbering

The pins on a 9-pin tube socket are numbered 1 to 9 in a clockwise direction when 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.



12AX7 | **6V6/6L6 etc.**



12AX7 | **6V6**

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.

Assembly Steps Summary

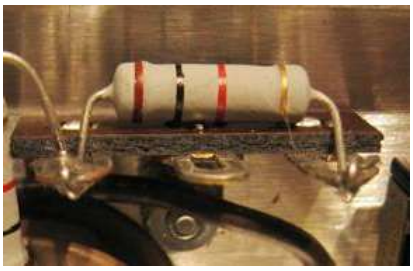
1. Install tubes sockets and all terminal strips on the Chassis.
2. Wire up the heater wires tight to chassis corner bend; Wire up the LED pilot light.
3. Install remaining hardware onto chassis except the two pull switches.
4. Wire Mains cord.
5. Install transformers. Wire power transformer; Connect to terminal strip.
6. Attach resistors to Octal / Noval terminal strips.
7. Wire impedance switch; output jacks; output transformer.
8. Assemble the eyelet board; attach connecting wires to top of board.
9. Assemble & install Tweed / Tude pull switch; Fat / Thin pull switch.
10. Wire input jack; install on chassis.
11. Install VRM MOSFET onto chassis.
12. Install the board in the chassis.
13. Connect the 2 high voltage power red leads to board; connect power grounds.
14. Connect the eyelet board wires to: tube sockets, controls, and all jacks.
15. Finish off wiring from sockets to controls (shielded cable and leads) output jacks.
16. Check Wiring.
17. Follow Start-Up procedure.

Install Tube Sockets and Terminal Strips

Install the sockets onto the chassis using the #4 screws into the threaded holes in the chassis. Align the sockets so that the Octal (8) pin #1 is oriented toward the lower left, and Noval (9) Pin #1 is oriented toward the left, when facing the inside of the chassis into which the tubes are mounted.

Install the 4 terminal strips according to the layout. The LED mounting strip requires #4 nut/bolt and the and power ground requires a #6 nut/bolt

The Octal & Noval terminal strips are held in place with a #4 nut installed on the tube mounting screws.



Insert the grommets for wire leads passing through the chassis from a choke or output transformer. Use ½ " size for the Output Transformer (OT) and ½" for the Power Transformer (PT).

Heater Wires

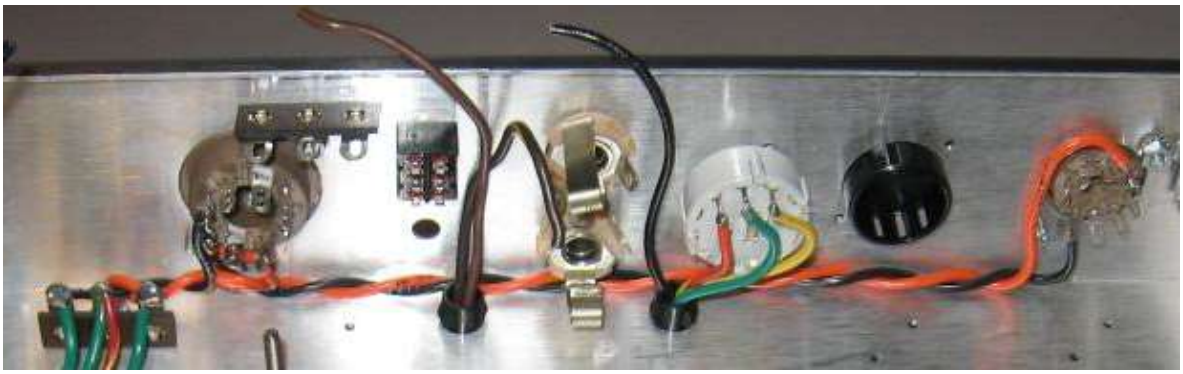
It is important to wire the tube filaments carefully. Use the Black-Red 20 gauge pre-twisted wire to do this. If you need to make up some heater wire, tightly twist two lengths of wire together. This will help to minimize any hum.

Solder each wire to either side lug of the Power Ground Terminal strip.

It is imperative that where possible, the signal wires run close to the chassis, while the heater wires run as far away from the signal wires as possible. Make sure the signal wires hug the chassis and the heaters have a tight twist on them. For the 12AX7 and power tube, we have had success running the connection wires as shown in the layout.

Note: Don't substitute smaller gauge heater wires. The wires need to be big enough to carry the current back to ground and keep hum low.

Route the twisted pair wire from the Power Ground Terminal strip around the perimeter of the chassis, following the layout diagram.



One wire comes from the Power Ground Terminal strip to the Octal power tube socket to pin 7, the other wire to Octal power tube socket pin 2. Then these go to the 12AX7 preamp tube, one wire to both pins 4 and 5 of the preamp tube and the other wire to pin 9. Connect Black on pin 7 of 6V6 and Orange on pins 2. Complete the 12AX7 using the same process. Black on pins 4 & 5 tied together and Orange on pins 9. Don't switch the heater wire polarity.

Once soldered, in place at each tube socket, press it flat, tight against the chassis.

Install the LED Indicator mounting terminal strip if you haven't already. ***NOTE*** – *For ease of construction, align the strip so that the terminal lugs are closest to the chassis.*

Install the LED bezel mount from the outside of the chassis, then a nut on the inside.

Using needle nose pliers, carefully bend the LED leads at 90 degrees toward the terminal strip.

Solder one lead to the terminal strip. Solder the 270R resistor to the other lead and then to the other terminal lug. It doesn't matter which lead goes to which lug.

Now, use some of the twisted wire to connect the 6.3VAC from the Power Ground Terminal strip to the Indicator mounting terminal strip.

Install Chassis Hardware

Install all remaining hardware, grommets, ground lugs and control potentiometers except the Volume - Tweed / Tude pull switch and the Bass - Fat / Thin pull switch. The solder lugs of the hardware should face you to make it convenient to connect to them.

Ensure the potentiometers are located in the correct positions according their values and the layout. Trim the locating tabs on the potentiometers so they don't damage the front panel. For the Power switch you may need some washers to locate it so the end of the shaft is even with the other controls. Also, some push-pull switches require an extra nut to do the same.

When you mount the fuse holder and pots, make sure that they are tight so if they come loose in the future they can't 'windmill' around. There are locating holes that will fit the lugs on the control pots to help with this. The pots and input/output jacks must also be tight.

Note: Because of the position and shape of the fuse holder, relative to the terminal strip just below it (heater wire strip/power ground), it may be easier to install the fuse holder after the power transformer heater wires are wired up.

Important Note: Trim the locating tab on some control pots so that they don't push through into the front panel and damage it.

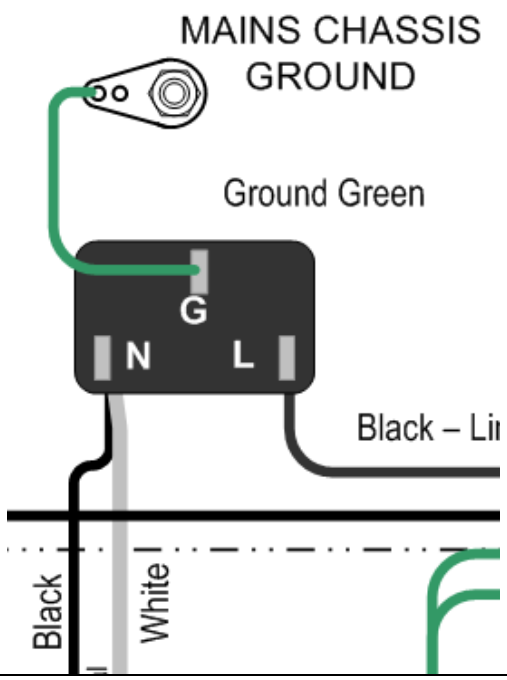
Mains Ground, power ground and preamp ground lugs need to be very tight to provide good conductivity, safety and low noise.

The output jacks also depend on a tight mechanical connection for grounding and proper operation.

Mains Power Connection

Install the Mains IEC Socket with two #4 machine screws.

Attach the ground lug to the chassis immediately beside the socket and ensure it is grounded well. Tighten as much as possible with the #8 KEPS lock nut.. The #8 hole is on the side perpendicular to the socket.

Connect a Black/Hot line from the IEC Line (**L**) lug to the fuse holder. Run a wire from the lug on the side of the fuse holder and from the end of the holder to the power switch lug. From the other side of the switch, connect to the transformer 120V input wires i.e. Black/Red and Black . The other side of the IEC socket (**N**) connects to the 'Common' side of the power transformer at the socket. For 120V, Twist the Black and White wires together. Connect all the N lug of the IEC socket and solder the connection. If you have to tie off any unused taps , do this by cutting off the exposed wire and then put heat-shrink over the end and then tuck it away as they are not used.	

Install the Transformers

Ensure all 4 nylon grommets are installed. Then align the Power Transformer wires so that the mains connecting wires go through the ½" grommet closest to the power switch. Align the mounting bolts for the power transformer and fasten it in place with the #8 nuts.

NOTE: For safety reasons, connect the black 18 ga. Lead from the IEC Line to the fuse holder at the **END** of the fuse holder, not middle lug.

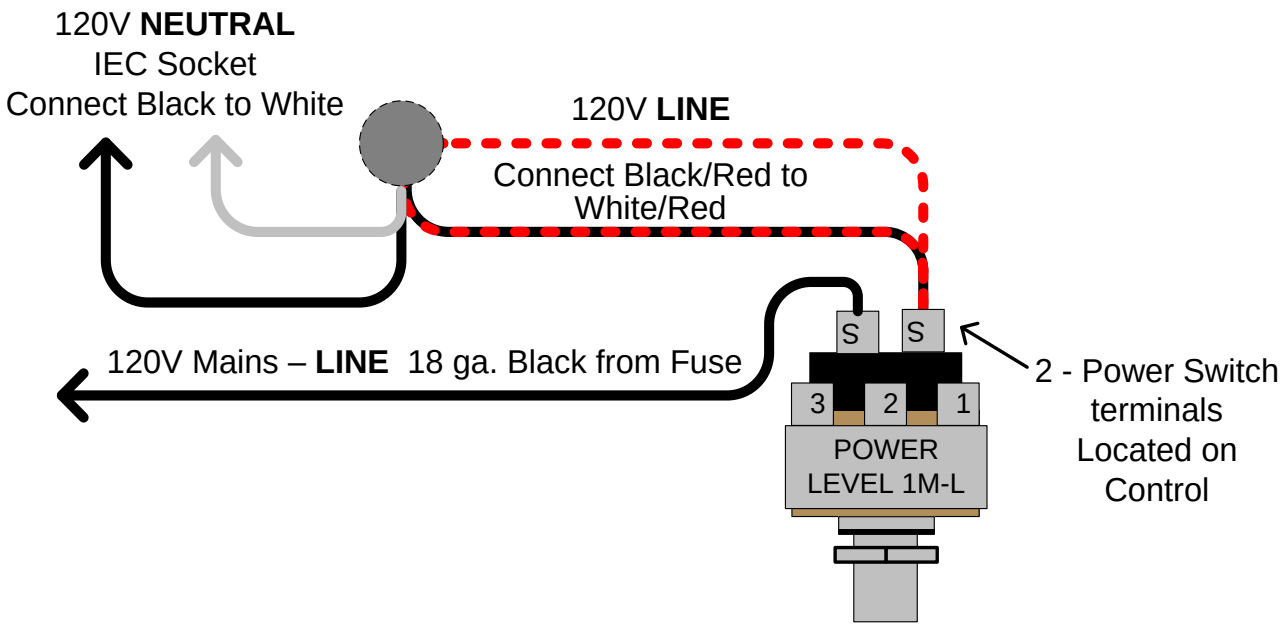
FOR 120 V OPERATIONS:

Connect some **BLACK** 18 ga. wire from the IEC Socket **LINE** to the fuse holder at the **END** of the fuse holder, not middle lug.

Run some **BLACK** 18 ga. wire from the **MIDDLE** lug of the Fuse holder, along the chassis corner, to a switch terminal located on the Power Level Control.

Twist together the **BLACK/RED** and **WHITE/RED** power transformer leads and connect to the remaining switch terminal located on the Power Level Control. This is the **LINE** side.

Twist the **BLACK** and **WHITE** power transformer leads. Run in the corner of the chassis to the IEC socket and connect them to the IEC Socket **NEUTRAL** lug.



FOR 240 V OPERATION:

Connect some **BLACK** 18 ga. wire from the IEC Socket **LINE** to the fuse holder at the **END** of the fuse holder, not middle lug.

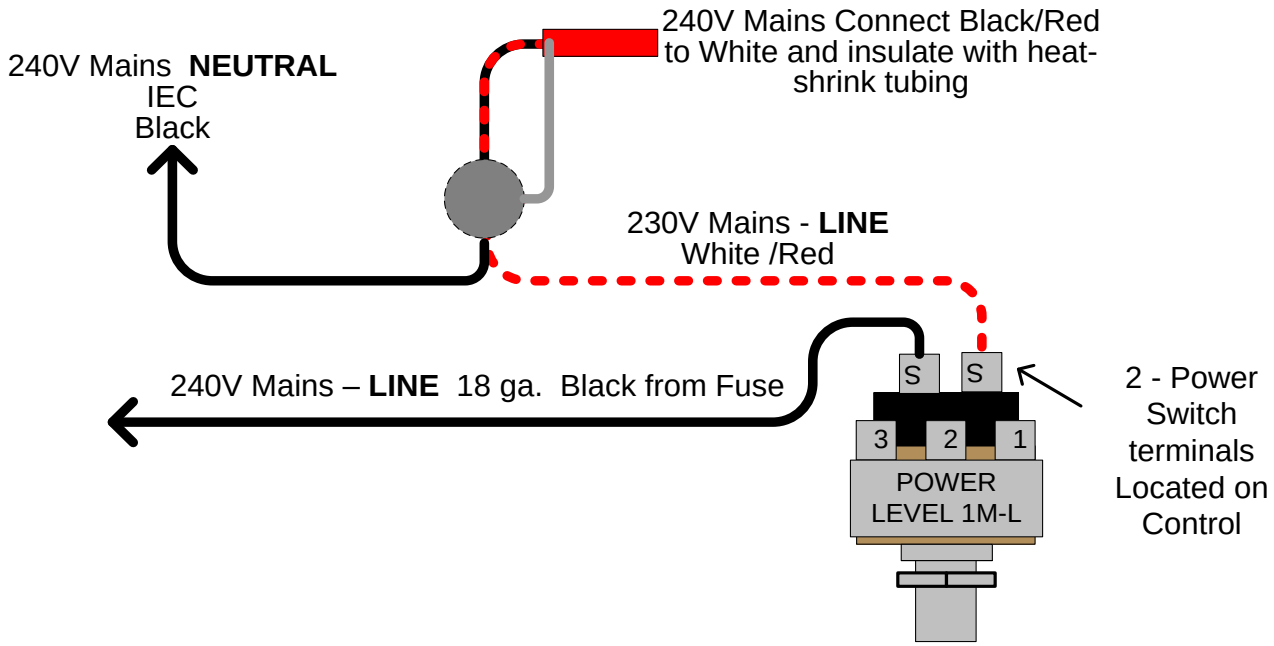
Run some **BLACK** 18 ga. wire from the **MIDDLE** lug of the Fuse holder, along the chassis corner, to a switch terminal located on the Power Level Control.

Twist together the **BLACK/RED** and **WHITE** power transformer leads and with provided heat-shrink tubing**.**

Connect the power transformer **WHITE /RED** lead to a remaining switch termial located on the Power Level Control. This is the **LINE** side.

Run the **BLACK** transformer wire in the corner of the chassis to the IEC socket and connect it to the IEC Sokcet **NEUTRAL** lug.

.



Install Output Transformer

Align the output transformer so that the Black, Orange, Green, Yellow leads come out closest to the impedance switch. Feed the 5K primary through and bolt the OT in place with #8 X 3/8" bolts & nuts. Unless you intend to use the 2.5K primary tap (for EL34), put heat shrink over the unused lead and tie off outside of the chassis.

Wire Up the Transformers

Power Transformer

Connect the Green-Yellow 0V 6.3V center tapped wire to the center lug of the "Power" ground terminal strip connected to the chassis.

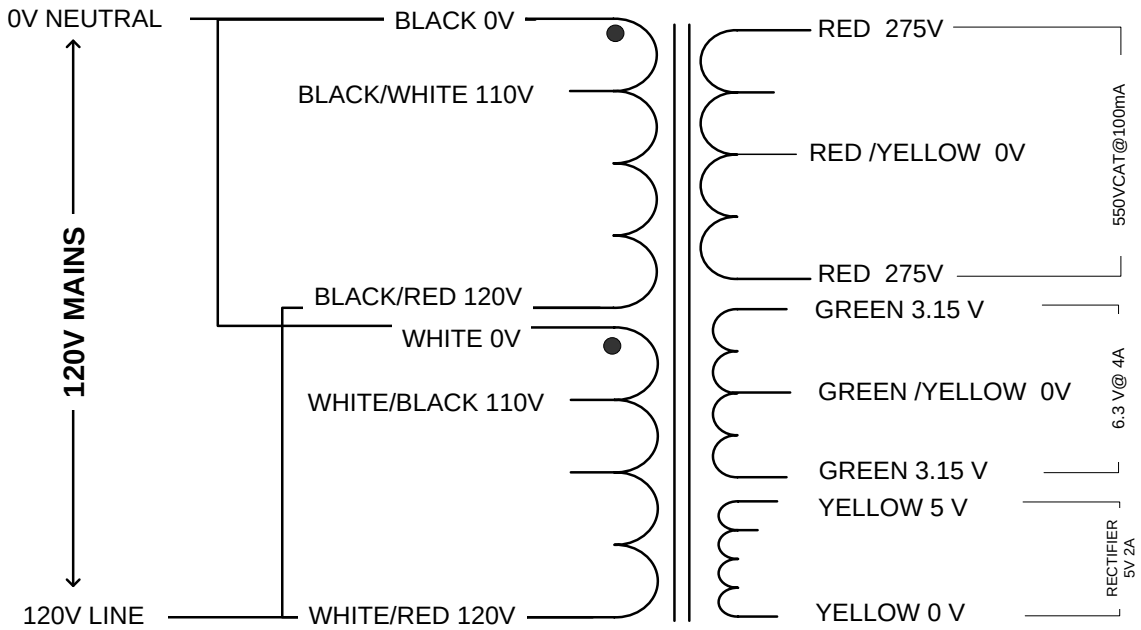
Then connect the Red-Yellow 0V 630V center tapped wire to the center lug of the "Power" ground terminal strip.

'Tack' Solder the grounds in place. It may just be easier to wrap the lead around the center lug of the power ground terminal strip and leave it until all the remaining wires are connected and then solder the center terminal when soldered

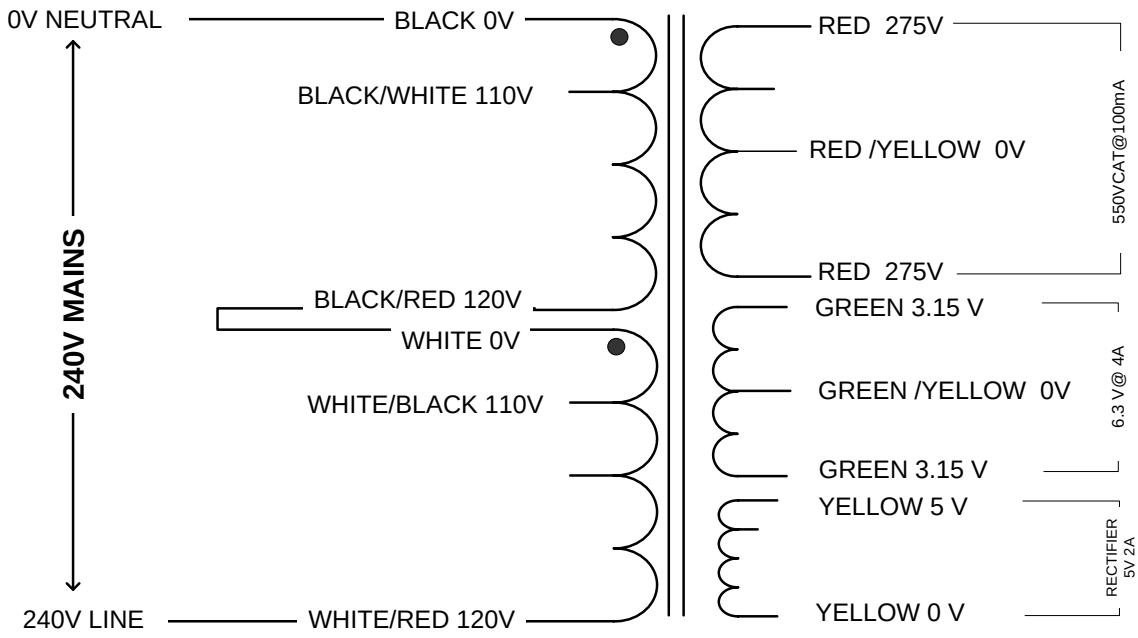
Note: Two more ground connections will be required. One to the board and one to the power tube. So don't fill in the ground connection entirely.

Note: Tie off and insulate the 2 unused Yellow wires. These are for a Tube rectifier.

Now, twist the 6.3 VAC heater wires from the power transformer and solder to the Power" ground terminal strip two Outer Lugs. Soldering to the left outer lug of the terminal strip is pretty tricky given that it is situated under the fuse holder so be careful,



TRAMP POWER TRANSFORMER 120V HOOK-UP



TRAMP POWER TRANSFORMER 240V HOOK-UP

120V - use the primary in parallel hooking Black/Red to White/Red and Black to White. Connect mains to White/Red and Black.	**240V** - use the primary in series hooking Black /Red to White. Connect mains to White/Red and Black

Install the two 1K 2W resistors on the tag strip and to pin 4, that feeds the Output transformer and power tube. Also install the 10K 2W grid resistor across pins 5 and 6.

Connecting the Impedance Selector

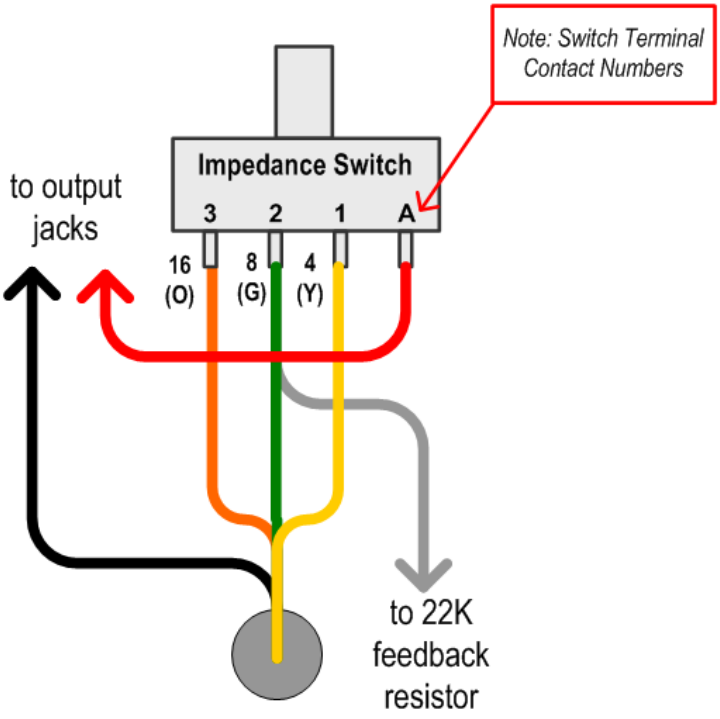
You may receive a White impedance switch or a Black one. If you received the White one:

Ensure that the impedance switch is installed correctly.

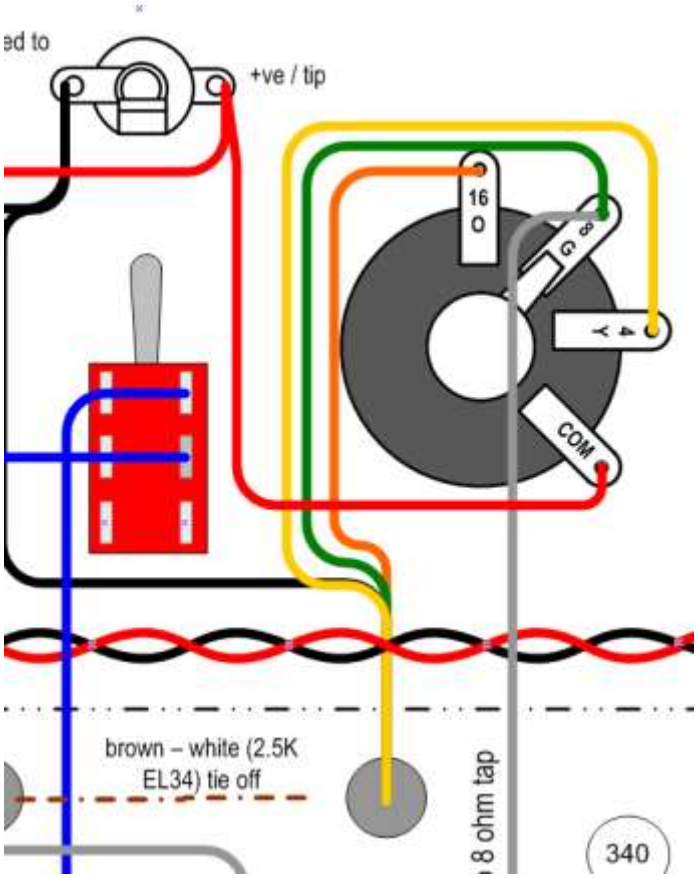
Important Note: Set the switch to 3 positions only. If not pre-set to three positions, then adjust the number of positions by turning the switch fully anti-clockwise and then rotating the tang washer provided to adjust number of positions (3). The tang on the flat side sets the switch for three positions. Align the tang into slot #3 Put the nut back on to hold the tang in place.

Note the impedance Switch Contact number locations: 1, 2, 3 and A. Take the 3 secondary leads (yellow, green, orange) of the Output Transformer cut them so they fit nicely fanned out to the correct lugs of the impedance switch and solder them in place. Yellow to 1, Green and lead to the 47K feedback resistor to 2 and Orange lead to 3.	

Output to speaker jack goes to A. (see below)



If you received the Black alternate impedance switch with four terminal lugs with 3 switched and 1 common, connect as shown below. Route the transformer secondary wires between the bias switch and impedance switch. Do the COM first, then 4, 8, 16 ohm connections.

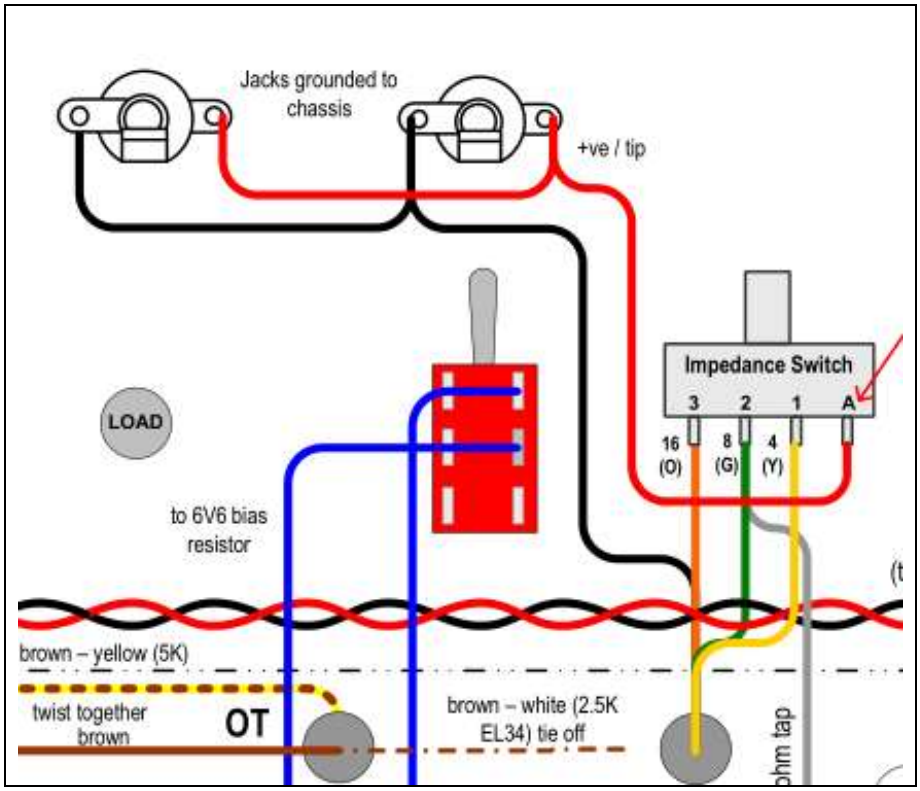


Output Jacks

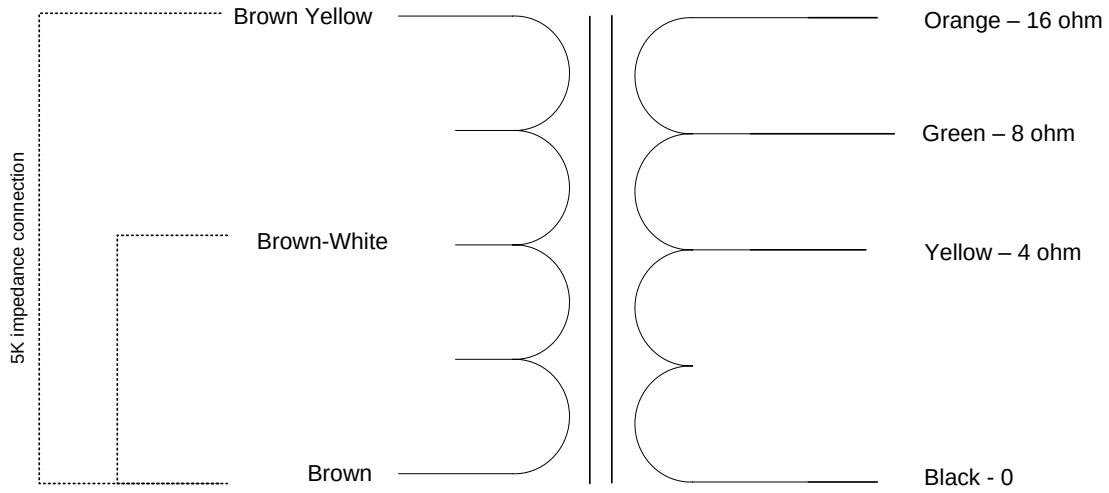
The output jacks are 'connected' or 'grounded' to the chassis. Refer to the Output Transformer schematic for details. Twist the output leads from the transformer to the output tube and to the board.

Connect a lead that goes from the center lug "A", of the impedance switch to one positive / tip of the two output jacks and then jump to the other jack.

Take the black, common secondary lead of the Output Transformer and route it to the negative / lugs of both output jacks. This is grounded to the chassis by the jacks themselves.



Output Transformer Primary Connections



Connect the OT primary brown-yellow (5K) lead to pin 3 (plate) of the octal socket. Connect the brown lead to the first 1K 2W resistor on the terminal strip and also run a 6" lead from that connection point on the terminal strip lug for subsequent connection to the installed eyelet board.

Run a wire that goes from the left side of the terminal strip (B+2) to reach the the +ive side of the first 33μF capacitor.

Tie off the Brown/White (2.5K lead) outside the chassis and put insulating heat shrink over the end.

Note: If you plan to do the Load mod for EL34s, it is easier for to do this now rather than attaching the primary to the Octal Plate and then needing to subsequently rework it.

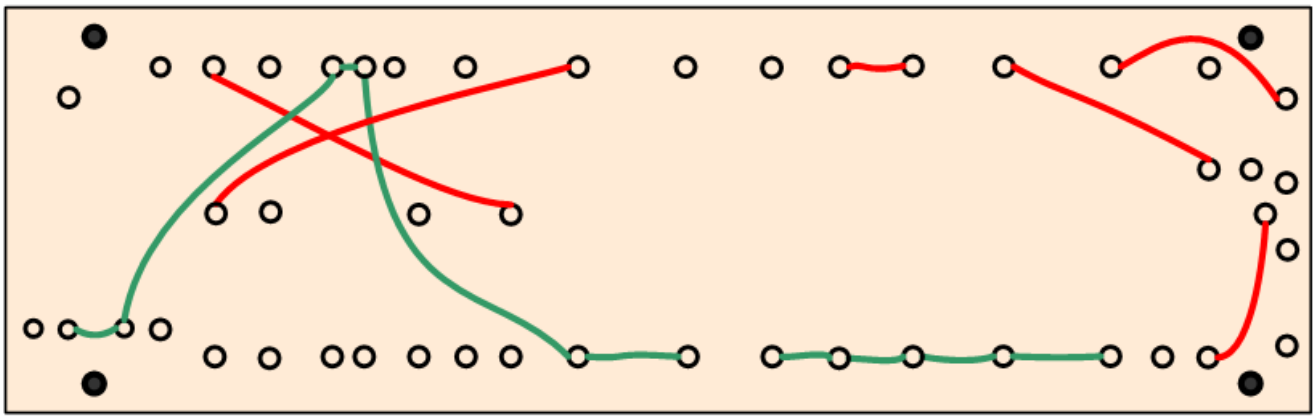
If you do this mod, be sure to INSULATE THE LOAD SWITCH TERMINALS

Eyelet Board Construction

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

Note: For multiple component leads that must fit into one eyelet or eyelet, insert them first and solder once when they are all in place. You can bend each component lead at 90 degrees so that it fits into the eyelet squarely and neatly. Solder each eyelet once all component leads that connect to it are in place. This can include the flying lead to the controls and tube sockets.

Install the Jumpers – Install the jumper wires on the underside of the board [Note: some people prefer to locate the jumpers on the top of the board). These leads go under the board (these are the dashed lines on the layout diagram). Follow the picture below and the layout. Strip ½" off the end of the jumper. Push the bare lead through the eyelet and then 'hook' it over the other (top) side to prevent it from coming off. Trim off any excess lead after it is soldered in place.



Trinity Tramp Board Underside

Install the Components - Align the board according to the layout diagram and follow the diagram closely.

Carefully identify the board components and their values. Measure those that you can to confirm the values. See the section on how to read Resistor and Capacitor codes. Ensure that electrolytic capacitors (power supply, bypass caps) are aligned with the correct polarity on the board. There may be a '+' sign, or indentation to identify the positive end of the capacitor.

Note: We mostly use the international notation for resistance. Here, 2K7 is a 2.7K resistor or 2,700 ohlms.

Install the components on the board by following the layout from left to right. Solder in place as you move along. Mount and solder ALL of the components and wires that belong there. Start with the bigger parts on the power supply side of the board. Then, work your way over to the signal components. Make all of your connections as neatly as possible. Crimp all wires tightly at the connection point before soldering. Remember, if your solder joints are not bright and shiny; do them over until they shine like jewels. Double check all of your connections for shorts against adjoining components or terminal posts.

Follow the board assembly diagram below.

Note: Make sure the cathode bias resistors for the power tubes are separated from the bypass cap and slightly raised off the board as this resistor can emit some heat.

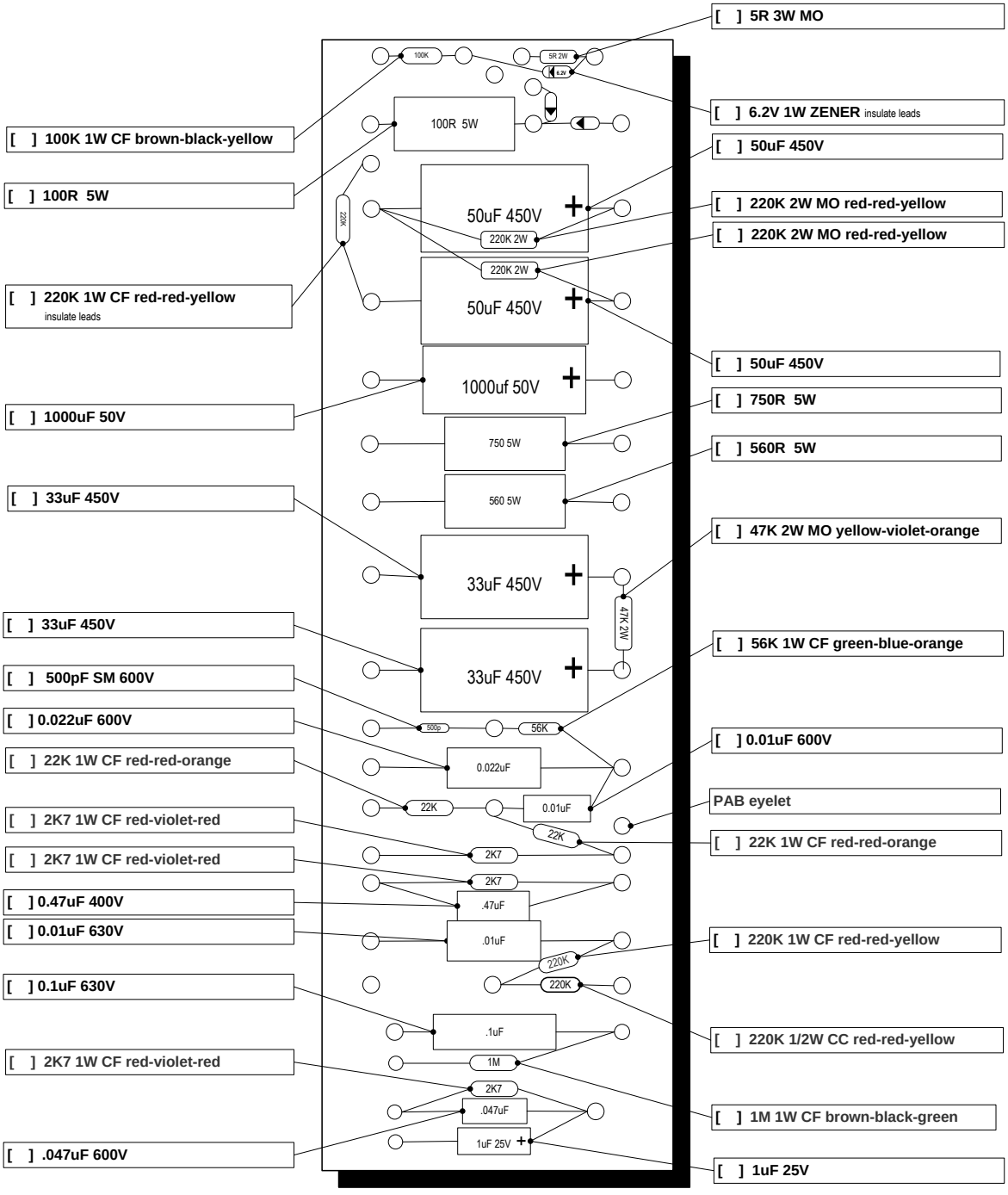
Note: For multiple component leads that must fit into one eyelet or eyelet, insert them first and solder once when they are all in place. You can bend each component lead at 90 degrees so that it fits into the eyelet squarely and neatly. Solder each eyelet once all component leads that connect to it are in place.

Tip: Circle each "eyelet" on a printed copy of the layout as you complete each connection to that point to track progress and confirm that all parts are in the correct orientation and position. It's well worth the time to re-check the eyelet board layout before installing it in the chassis.

Once the parts are on the board, the 'flying' leads are installed. Cut these connecting wires in various colors and about 6" minimum long each.

Following the layout, install the connecting wires to the top [or bottom] of the board leaving plenty of extra length, wire is cheap, and it'll save aggravation later

Tip: Some people prefer to wire the board after it is installed into the chassis.



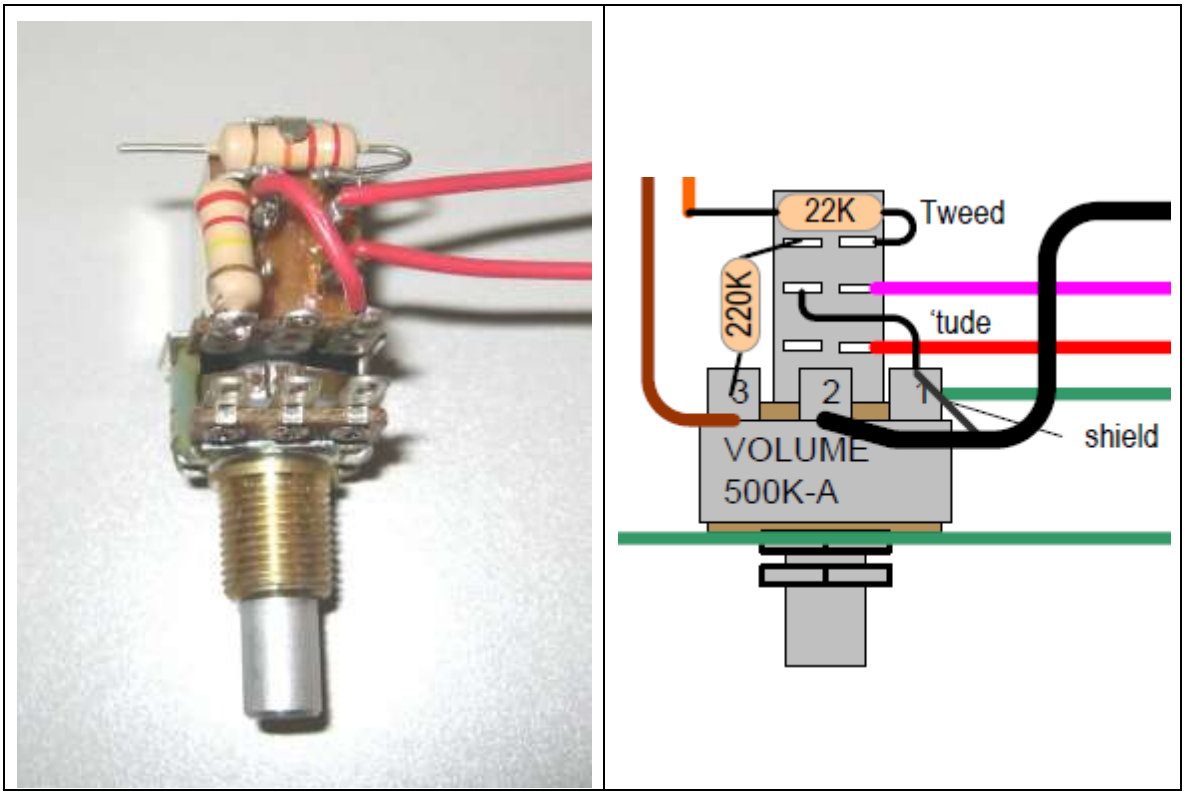
MEASURE COMPONENTS TO CONFIRM VALUES

Assemble Volume Pull Switch

It is best to install parts to the pull switch before installing in the chassis.

Volume Control

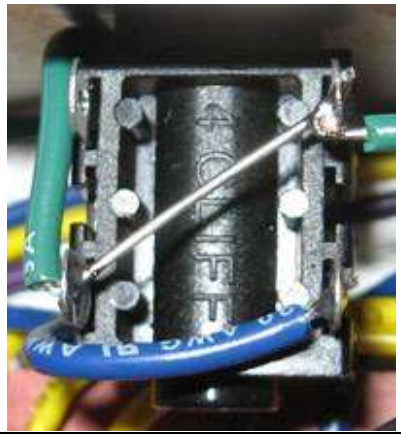
It is easiest to install the two resistors and connectors to this switch outside of the chassis. The 47K feedback resistor is held neatly in place by the tab at the end of the switch. Leave about ½" of flying lead on the end to connect to the feedback cable. Carefully put the jumper wire from the middle lug of the switch to the pot lug and ensure it does not touch any other parts. Insulate it with heat shrink or use a short piece of insulated wire. Install the last resistor from the third switch lug to the pot control lug. Once complete install the control onto the chassis.



Volume Control

It is easiest to install the connecting wires to this switch outside of the chassis. Cut enough wire to the two terminals to go to the pre-amp end of the board. Strip on end and make a hook with the connecting wire and wrap each wire around a switch terminal. Once complete install the control onto the chassis.

Input Jack

Wire up the input jack. You may choose to remove the jack, wire them with the jumper and then reinstall them. Install the Cliff switched input jack and tighten securely. The ground wire on the input jack goes to the pre-amp ground along with the board ground at that pre-amp ground lug and to the ground of the Volume pot. Use standard wire to connect input jack to the eyelet board. Estimate the length and install them before installing the input jack. The cross-jack ground jumper can be an extra long lead from one of the ground wires.	

Install VRM

Note: Ground your body before handling the MOSFET. Touch a water pipe or a grounded outlet box or electrical apparatus

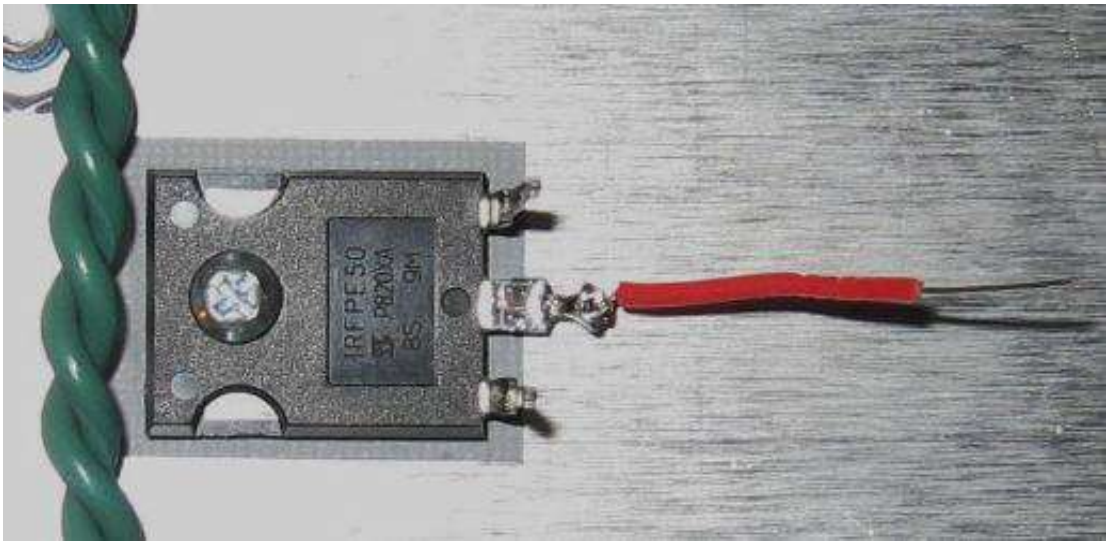
<u>This is the tricky part!</u>

Carefully bend the two outside leads of the MOSFET at 90 degrees to the body CLOSE to the MOSFET body. For reference, these will protrude into the eyelet board when it is installed on 'top' of it. Bend the middle MOSFET lug ¼" further away and solder a short lead to the middle terminal.

If you find it easier, you can mount the MOSFET on the chassis clear of the board and run short leads to the board.

Install MOSFET onto chassis.

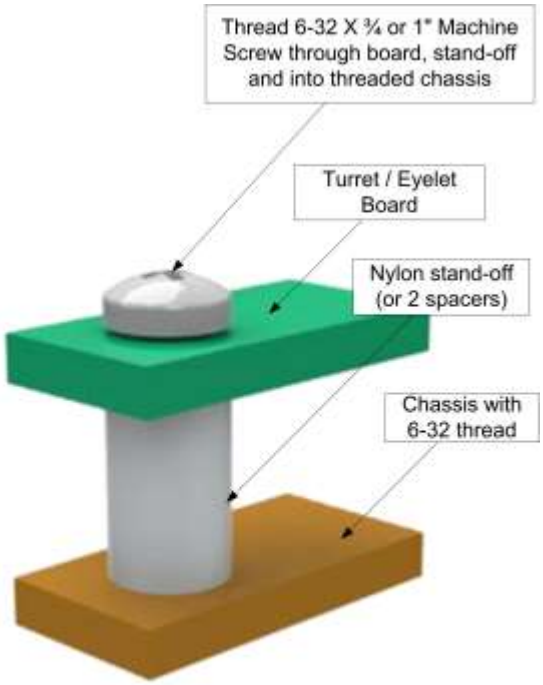
To electrically insulate the MOSFET from the chassis, use the supplied grey Sil-Pad. Do not use grease OR a mica insulator. Use a 3/8" #4 screw to fasten the MOSFET to the chassis, sandwiching the insulator between. Note: Again, for reference, these will protrude into the eyelet board when it is installed on 'top' of it.



Install Eyelet Board

The Fender style 'point to point' eyelet board used in this project is mounted on stand-offs to the chassis.

Installing the board and stand-offs



The chassis is tapped to receive 6-32 machine screws. To mount the board, align the board mounting hole, 3/8" stand-off and tapped hole and then thread a 6-32 X ¾ / 1" machine screw through board, stand-off and into threaded chassis. Tighten to keep it in place and repeat for each corner. Use #6 lockwashers uner the screw head.

Trick: Use a tiny amount of superglue to attach the nylon standoff spacers to the bottom of the eyelet board, so that when you put the screws and board in, there's no need to worry about holding or aligning multiple parts. Just drop the screws through the board and the glued spacers, and they line up easily with the chassis holes.

Connecting the Board

General Wiring

Power and preamp star grounding is used in the Tramp and the mains ground is bolted to the chassis. We run the pre-amp grounds directly to a separate star to reduce noise.

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

- Use 22 gauge solid for hook up to tubes
- Use 22 gauge solid/stranded for hook up to pots/front panel
- Use 22 Gauge Red/Black pre-twisted for tube heater wiring
- Use Red and Black or cut-offs, 20 Gauge, stranded or solid, 600v for power supply hook up - to transformers, rectifier, standby etc.
- Re-use cut offs from the transformers.

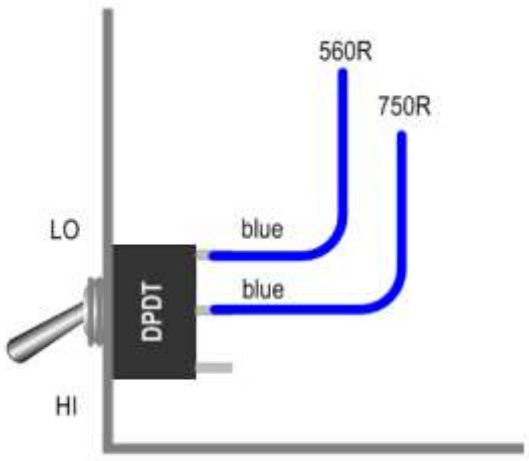
Now is the time to make the connections from the eyelet board to the tubes and controls.

Bias Switch Wiring

Note the orientation of the bias switch. Note that the LO position solder lugs are diagonally opposite to the position of the toggle.

Connect the blue lead from the 750R 6V6 cathode resistor eyelet to the two centre lugs (tie lugs together with the core wire).

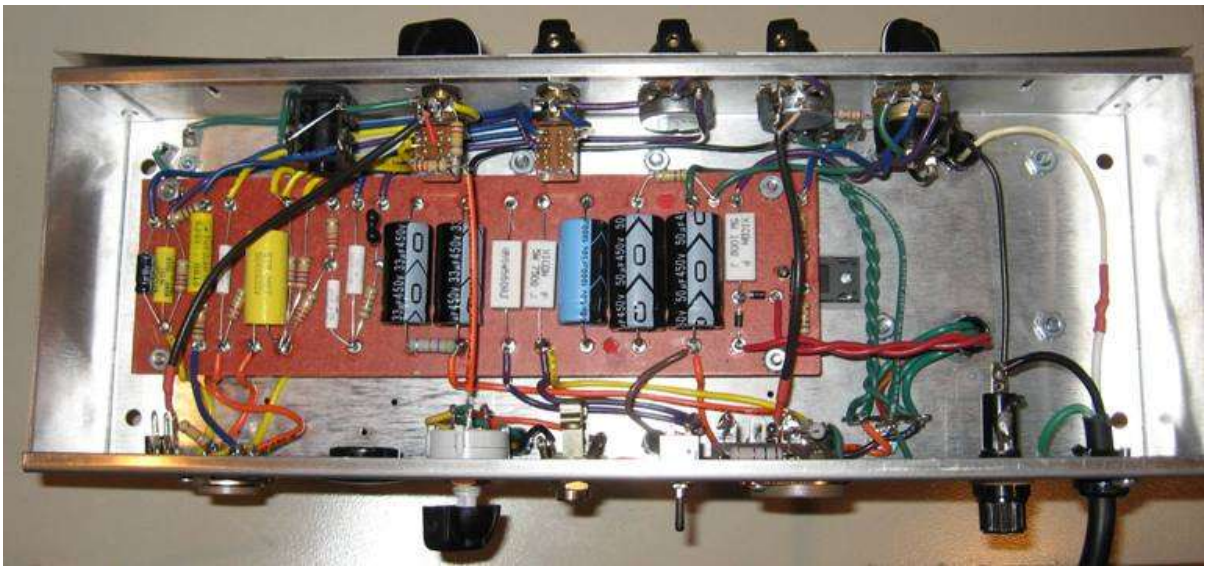
For the HI position, connect a Blue lead from the (diagonally opposed) two lugs (tie lugs together with the core wire) to the 560R cathode resistor on the board. This will tie the two cathode resistors in parallel when in the HI position providing for more current to flow through the high powered tubes.



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

Start at one end of the board and work your way sequentially around the board doing the point-to-point wiring. Board to tube pin; board to tube pin etc. Start at V1, pin 1 and move to the far end of the board to V2.

Connect the Master Volume control to V2, pin 2 . The shielded cable should be grounded only at the volume control.



Potentiometers

The easiest way to wire 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 these accordingly and solder once.

Also, some require components to be installed for tone controls etc.. Pre-form these components to fit into place and use some heat shrink tubing make ensure they do not touch other parts. Solder them in place following the layout provided.

Preparing Shielded Cable

Prepare the shielded cable for connection and put some heat shrink over the end to ensure there is no chance the shield will connect to ground or touch the tube pins.

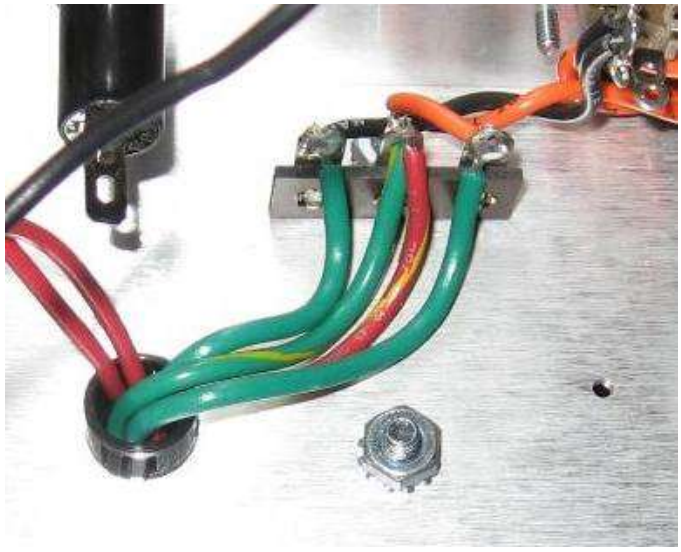
Shielded cable goes from the gain pot to V1 and from the master volume to V2

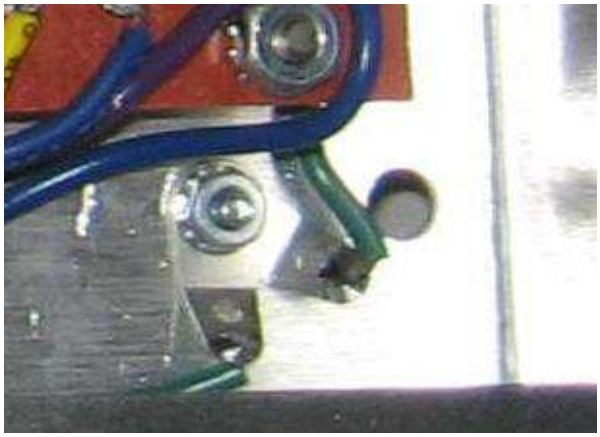
Do not connect the shields at both ends or you will induce hum.

Tramp Grounding Scheme

Our amps use a two point grounding scheme where the power side of the amp is connected to a single common ground point, and the pre amp part is connected to another point on the chassis that is located immediately beside the input jacks.

Note: For grounding these amps, we strongly recommend that you follow the layout provided. We don't recommend that you deviate but if you do, use a collected one-point star grounding scheme. Everything connected together and marked with the 'earth' symbol on the schematic is connected together locally, and then that local common is connected to the star point.





Power Side Ground **Pre-Amp Side Ground**

Connect the power ground from the board to the power ground lug.

Connect the 2 high voltage power red leads from power transformers to the diodes on the board.

For mains connections, refer to the Power Transformer schematic.

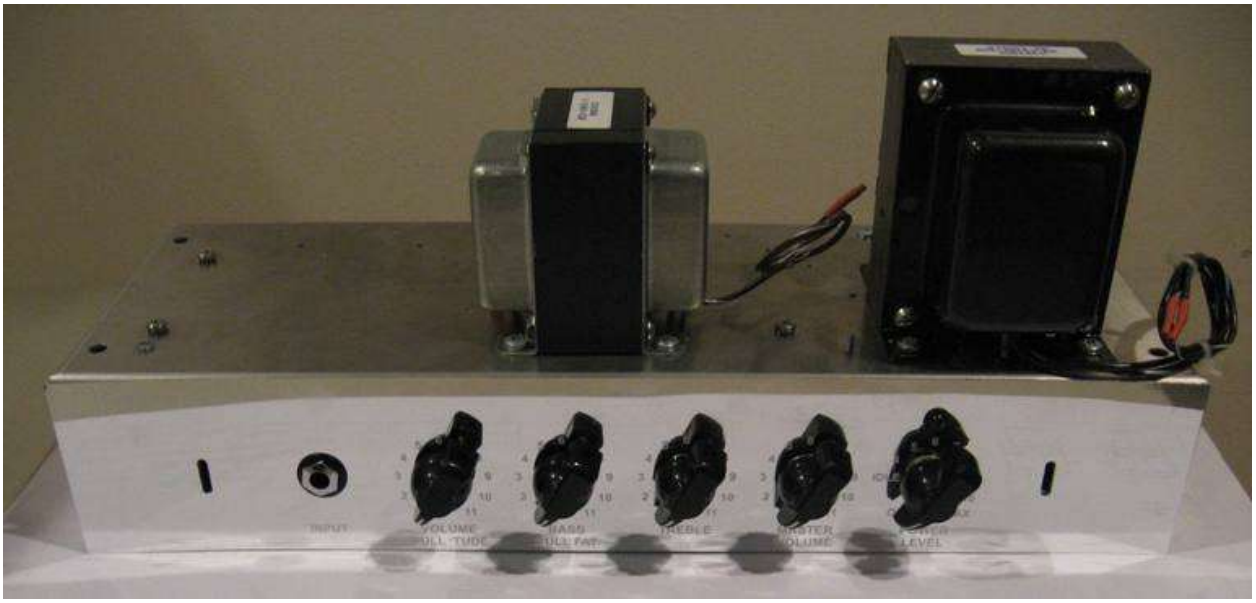
Connect the Octal ground to the same lug.

Final checkout

When you finish assembling the amp, double-check the wiring and the components. Trace or highlight the connections 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.

Make sure the Mains ground at the chassis is **very** tight.


INPUT
VOLUME
BASS
TREBLE
MASTER
VOLUME

Power Up

SAFETY WARNING READ THIS FIRST!!!!!

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 1 AMP SLO BLO fuse.

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

With no tubes installed, apply power. Leave VRM at idle and measure the DC voltage at the positive terminal of the SECOND 50 uf filter capacitor on the eyelet board. It should be over 400 VDC.

Note: Variable voltage only appears at the FIRST 50 uf filter capacitor on the eyelet board

Measure the AC voltage. Ensure the multimeter is set to AC. Measure across the rectifier pins where the transformer secondary was connected. It should read (630 VAC minimum). Test the filament voltages and ensure they are on the correct pins for all tubes. 3.15 from each pin to ground or 6.3 across the heater wires on the tubes sockets.

If everything is okay, power off the amp, install the 12AX7 and the 6V6 power tube and power on again.

Plug in a speaker, install the tubes and turn it back on again. Leave VRM at idle while tubes warm up. Ensure all settings are at Tweed, Thin. Then measure the DC voltage at the SECOND 50 uf cap on the + terminal. As you turn the VRM, the voltage should rise. Test to see if it increases as the Level control is very slowly turned clockwise. If this doesn't happen, turn off immediately and recheck the connections.

With tubes installed, and a **speaker or load connected**, with volume setting at minimum and NO instrument plugged in, 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. With the VRM, set the B+ to about 400VDC as measured at the 50uf filter capacitor C12 / R19 connection. Carefully check and make note of the voltages on all the tubes. The plates of V1, pin 1 & 6 should have a voltage of about 203 & 191 respectively in the Clean mode. Cathode voltage on the 6V6 (pin 8) should be 29V. Compare voltages to the manual and layout.

If all seems in order, and the fuse has not blown, turn the volume up a bit. If everything seems fine, plug in a cable, and touch one end to see if you can induce some hum, or static sound. You should get a loud hum, this is a good sign. If you get this far, 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.

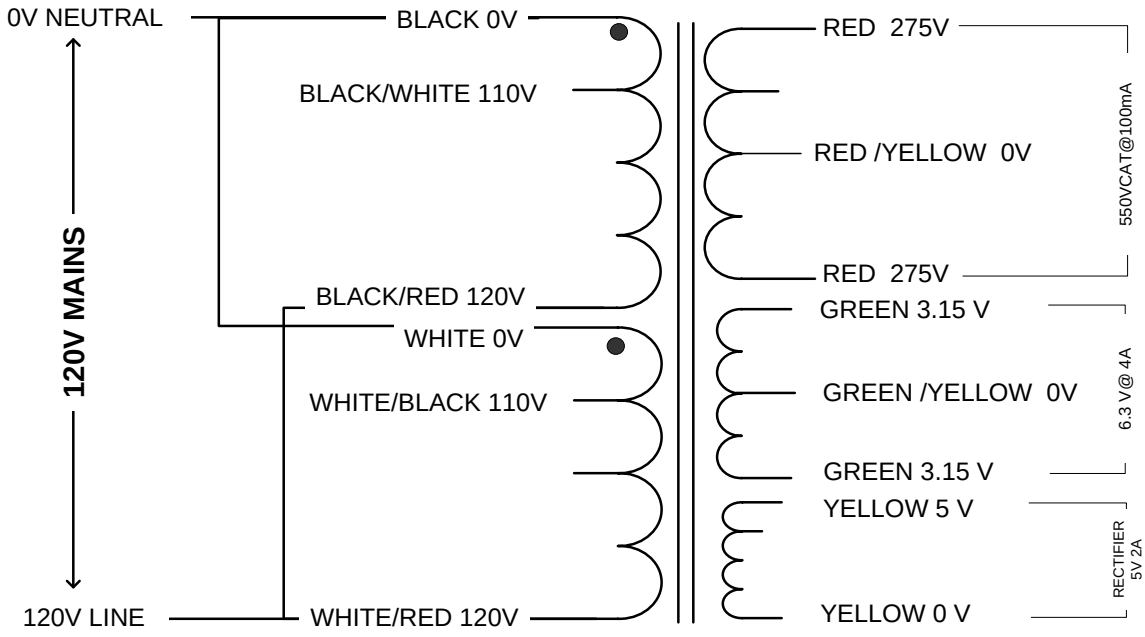
TUBE BIAS SETTINGS

6V6	5K LOAD	LO BIAS
6L6	5K LOAD	HI BIAS
KT66	5K LOAD	HI BIAS
EL34	2.5K LOAD	HI BIAS
KT88	2.5K LOAD	HI BIAS

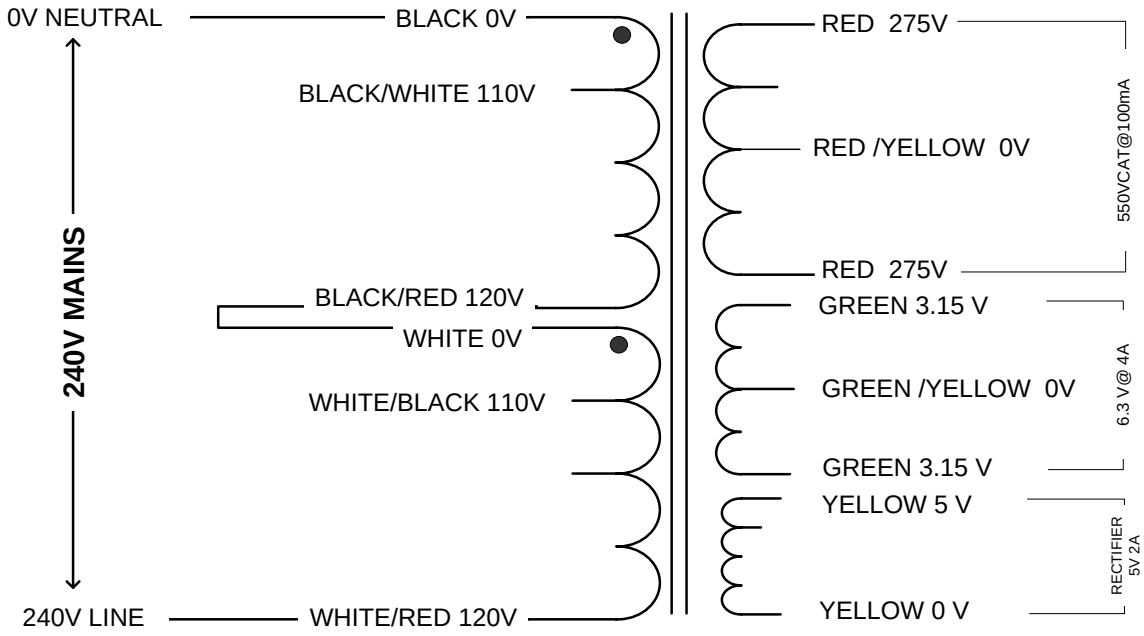
Lo Bias is 750 ohms

Hi Bias is 750//560 in parallel = 320.61 ohms

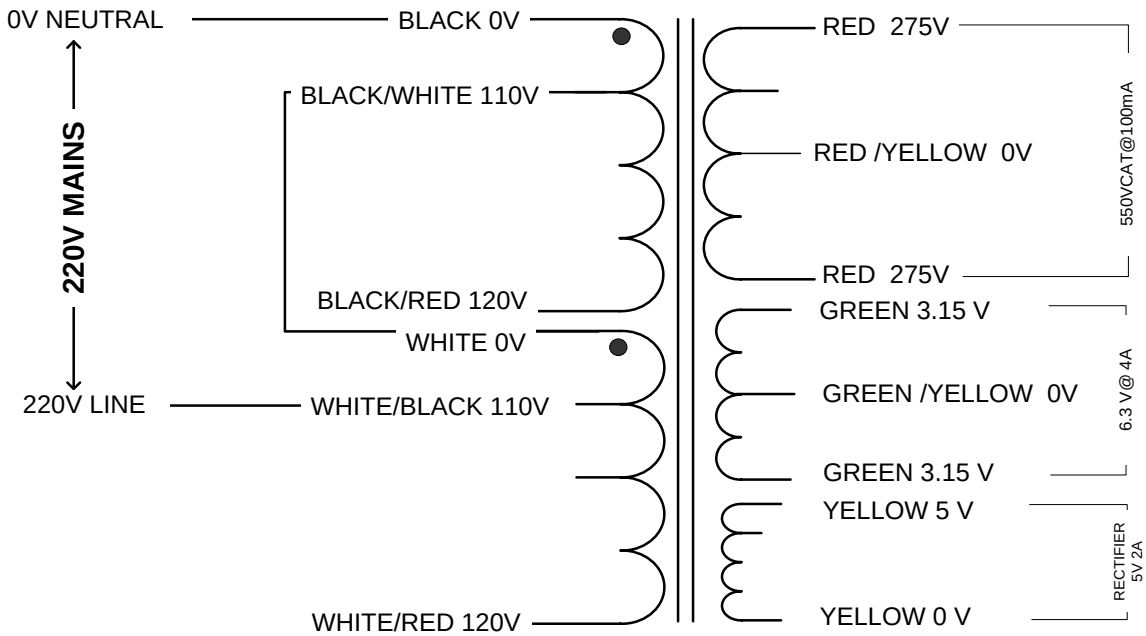
POWER TRANSFORMER HOOK-UP



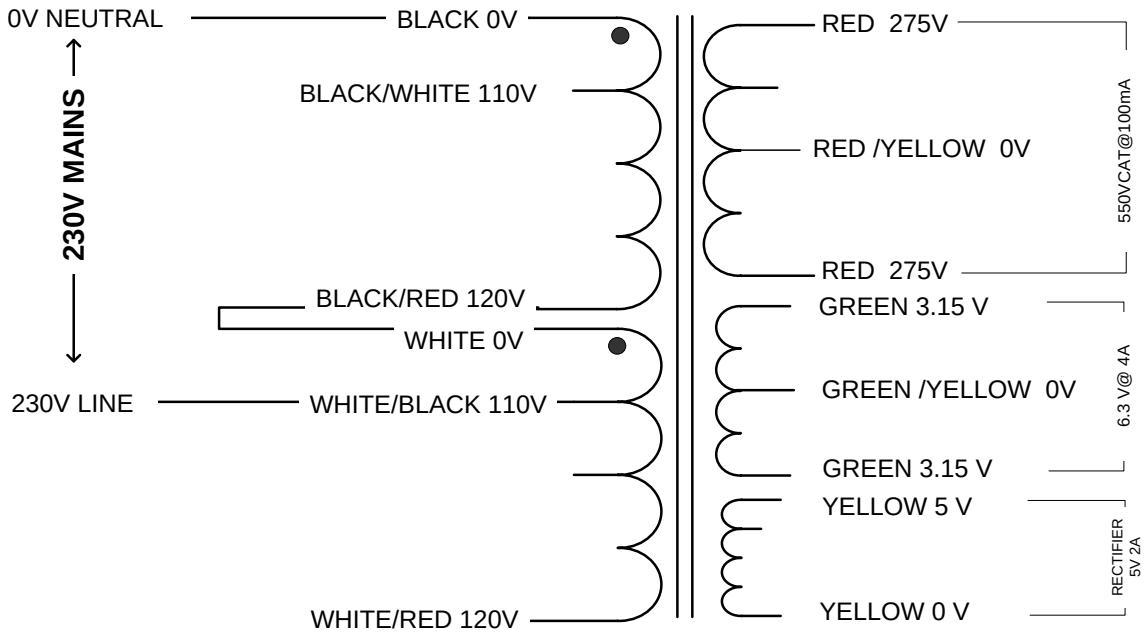
TRAMP POWER TRANSFORMER 120V HOOK-UP



TRAMP POWER TRANSFORMER 240V HOOK-UP



TRAMP POWER TRANSFORMER 220V HOOK-UP

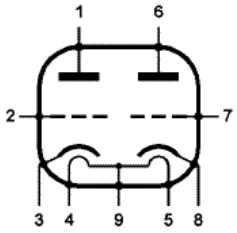
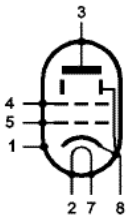


TRAMP POWER TRANSFORMER 230V HOOK-UP

Trinity Tramp Voltage Chart

(Used to record your measured voltages)

AC Mains Voltage	120 VAC
B+ No tubes installed	VDC
B+ All tubes installed	SET TO 400 VDC WITH VRM

 12AX7	B+ 400 V B+2 397 V B+3 327 V	 6V6 / 6L6

TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1 **12AX7**	203	grid	1.7	heater	heater	191	grid	1.5 off 1.0 on	heater
V2 **6V6-14W @10 (Lo Bias)**	0	heater	398	395	grid	n/c	heater	29.6	
V1 **12AX7**	143	grid	1.6	heater	heater	127	grid	1.4 off 0.9 on	heater
V2 **6V6-10W @9 (Lo Bias)**	0	heater	334	332	grid	n/c	heater	24	
V1 **12AX7**	171	grid	1.8	heater	heater	154	grid	1.7 off 1.2 on	heater
V2 **6L6GC-30W @max (Hi Bias)** **6L6-18W@max (Lo Bias)***	0	heater	392	390	grid	n/c	heater	27	

6L6, 76L6G, 6L6GB are only 18W capable tubes. In this case, use the low bias setting.

THE ABOVE DC VOLTAGES ARE MEASURED FROM TUBE PIN TO CHASSIS GROUND

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 DISCLAIM ALL LIABILITY FOR INJURY OR PROPERTY DAMAGE RESULTING FROM THIS INFORMATION! ALL INFORMATION IS PROVIDED 'AS-IS' AND WITHOUT WARRANTY OF ANY KIND.**

Trinity Tramp Design Voltages

AC Mains Voltage	**120 VAC**
B+ No tubes installed	**VDC**
B+ All tubes installed	**400 VDC**

Power Amp

B+	Plate 6V6 pin 3	Screen current	Cathode voltage	6V6 Current	V anode	6V6 Dissipation	NOTES
V	V	ma	V	ma	V	Watts	
400	398.7	1.14	29	0.0378	369.7	14.0	(VRM@PA)

Pre Amp with 753 ohm 6V6 Cathode Resistor

		Gain OFF		Gain ON	
B+	R10/C6 Volts	V1 pin 1	V1 pin 6	V1 pin 1	V1 pin 6
V	V	V	V	V	V
400	340	203	191	199	152

Builders Guide General Troubleshooting

For a discussion on Guitar Amp Troubleshooting, please refer to our support page document **Builders Guide General Troubleshooting**

Squeal

When you test the amp, make sure it doesn't feedback and squeal when Gain , Fat and PAB are pulled, Vol is on max. and guitar plugged in. If it does, it is probably the wire dressing around V1. Particularly in a Head format build.

Pushing the wire connected to pin 6 towards pin 2 and 3 will induce squeal. When the wires almost touch, the squealing starts. Pulling the pin 6 wire as far from pins 2 & 3 wires as possible eliminated the squealing. Shorten these wires and secure them so they won't move around during transit and end up moving and repeating the squeal conditions.

If you need to stop any remaining squealing. Put a .001uF - .0015uF poly cap (Mallory 150) between grid pin 2 to the ground lug of the terminal strip.

At maximum volume & power, the squeal should be gone.

Troubleshooting the VRM

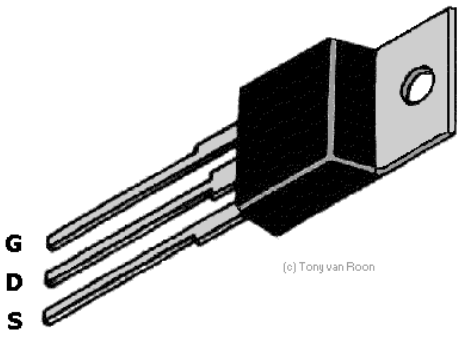
These are some basic steps in troubleshooting the VRM

- If the VRM is doing nothing it's good to check the Zener diode out. Use a continuity tester and see if it conducts. If it does conduct it's bad.
- If the VRM wont pass voltage check the 5W 100R resistor. You can measure it in the circuit to see if it reads correctly or it has opened up.
- Other than triple checking all your wiring, jumpers and component values then suspect the MOSFET.

Testing a MOSFET

This test is as good as any if all you have is a DMM [digital multi meter]. It's not 100% but it's a basic good/bad test. The MOSFET should be disconnected from the circuit.

This testing procedure is for use with a digital multimeter in the diode test-range with a minimum of 3.3 volt over d.u.t. (diode-under-test)



1. Connect the 'Source' of the MOSFET to the meter's negative (-) lead
2. Hold the MOSFET by the case or the tab but don't touch the metal parts of the test probes with any of the other MosFet's terminals until needed.
3. First, touch the meter positive lead onto the MOSFET'S 'Gate'.
4. Now move the positive probe to the 'Drain'. You should get a 'low' reading. The MOSFET'S internal capacitance on the gate has now been charged up by the meter and the device is 'turned-on'.
5. With the meter positive still connected to the drain, touch a finger between source and gate (and drain if you like, it does not matter at this stage). The gate will be discharged through your finger and the meter reading should go high, indicating a non-conductive device.

Such a simple test is not 100% -- but is useful and usually adequate.

When MOSFETS fail they often go short-circuit drain-to-gate. This can put the drain voltage back onto the gate where of course it feeds (via the gate resistors) into the drive circuitry, possibly blowing that section.

Testing Zeners / Diodes

If you just want to know if a Zener diode has opened-up or shorted-out, then test it as described below as for standard diodes. Remove it from the circuit or lift one end off the board.

- To test a silicon diode all you need is an ohm-meter. If you are using an analog VOM type meter, set the meter to one of the lower ohms scales, say 0-2K, and measure the resistance of the diode both ways.
- If you get zero both ways, the diode is shorted. If you get INFINITY both ways, the diode is open. If you get INFINITY one way but some reading the other way (the value is not important) then the diode is good.
- If you use a digital multi-meter (DMM), then there should be a special setting on the Ohms range for testing diodes. Often the setting is marked with a diode symbol 
- Measure the diode resistance both ways. One way the meter should indicate an open circuit. The other way you should get a reading (often a reading around 600). That indicates the diode is good. If you measure an open circuit both ways, the diode is open. If you measure low resistance both ways, the diode is shorted.

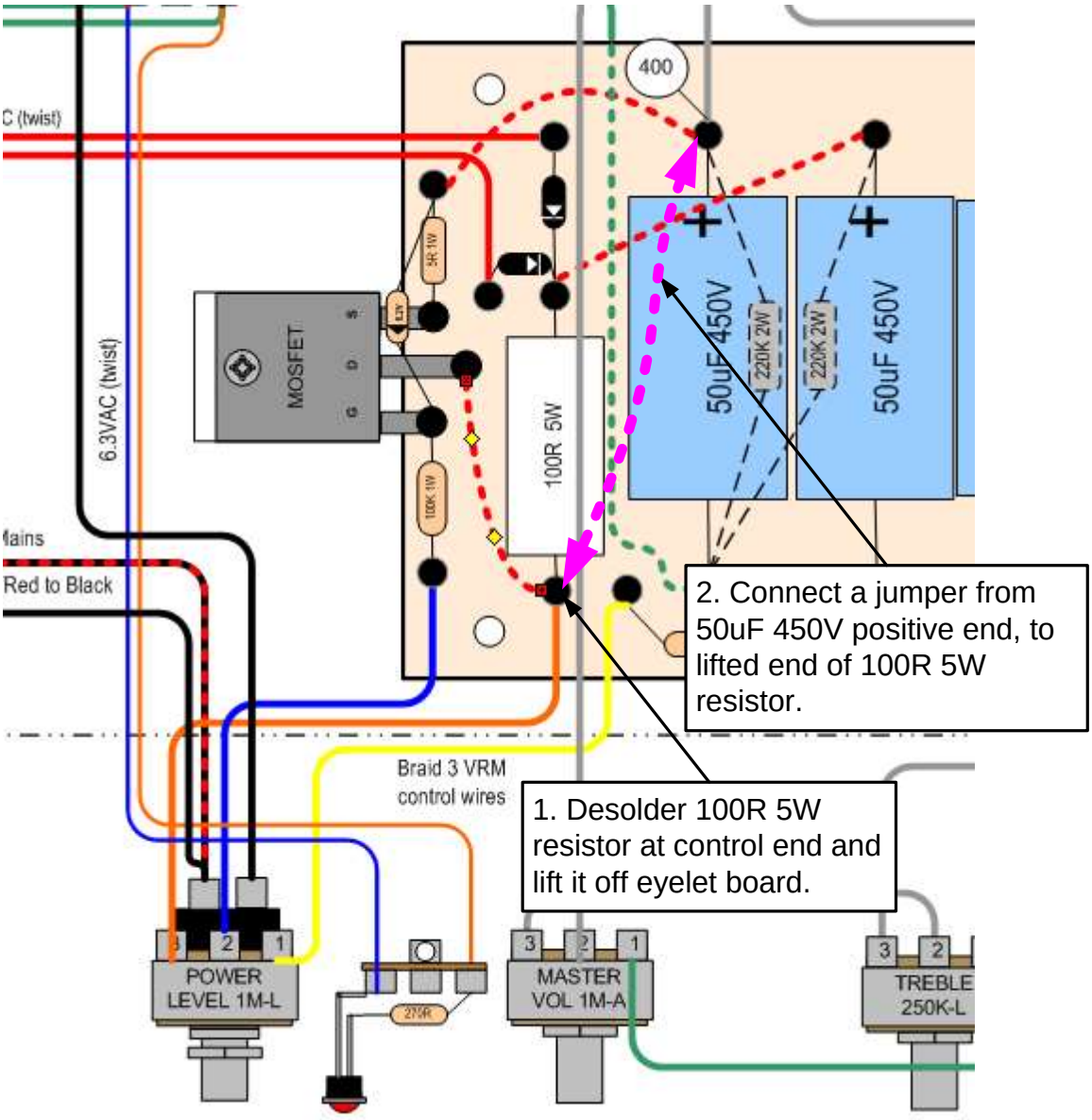
If you cant diagnose the problem, and you are blowing fuses, you can bypass the VRM ndsee if that isolate the issue.

VRM Bypass Procedure

1. Desolder 100R 5W resistor at control end and lift it off eyelet board.
2. Connect a jumper from 50uF 450V positive end, to lifted end of 100R 5W resistor.

Testing a VRM Installation

1. Get a 9V battery.
2. Remove all tubes and disconnect the Power cord.
3. Using a jumper, Connect the +ve terminal of the 9V Battery to the VRM HV IN and the –ve terminal to the chassis ground.
4. Turn the VRM control and measure and observe the DC voltage at HV OUT.
5. It should vary from about 6V and down as the control is turned from maximum.
6. Note: It may take a moment for the voltage to drop, so be patient.

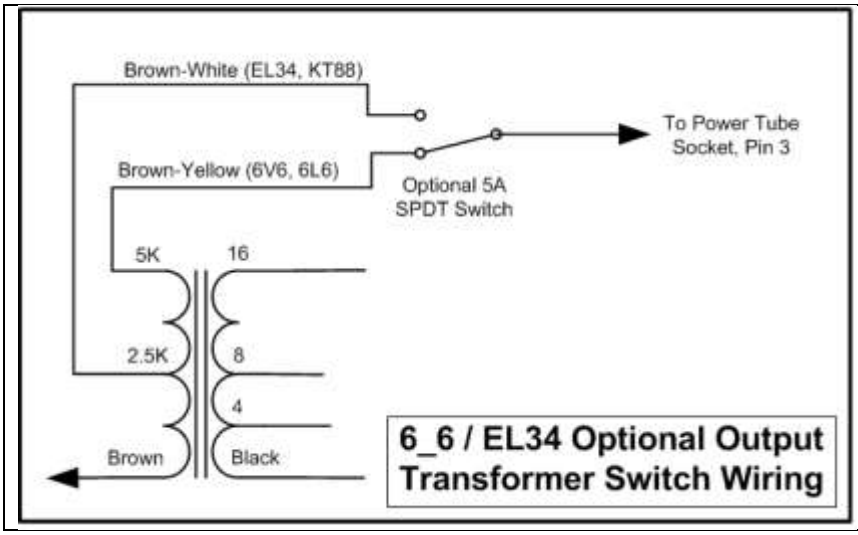


Tone Tweaking

Below are some modifications you might choose to implement in order to change the tone and response of your Trinity Tramp. We will add them as people discover them.

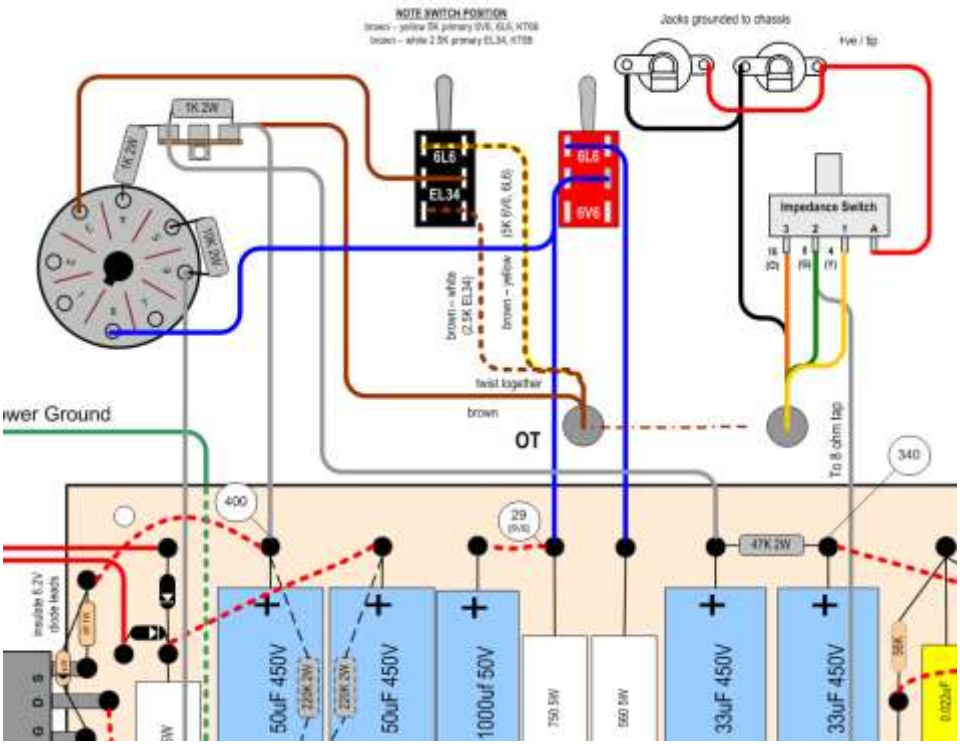
- Use KT66 - Replace the stock 560 ohm resistor with a 1K resistor and it is in parallel with the existing 750 ohms. This will do the job nicely for a KT66, KT88 or EL34
- Use an EL34 – set to 6L6 setting and re-wire / re-set the Impedance switch so the 2.5K impedance tap is in effect for the EL34

EL34 Optional Switched Output Transformer Wiring



Note: Make sure that you insulate the solder lugs/connections at the switch in order to prevent any arcing between lug and switch metal body.

Use shrink tubing on the joint or paint on some "liquid electrical tape".



These are some simple modifications you can do to your amp, let your ears be your guide:

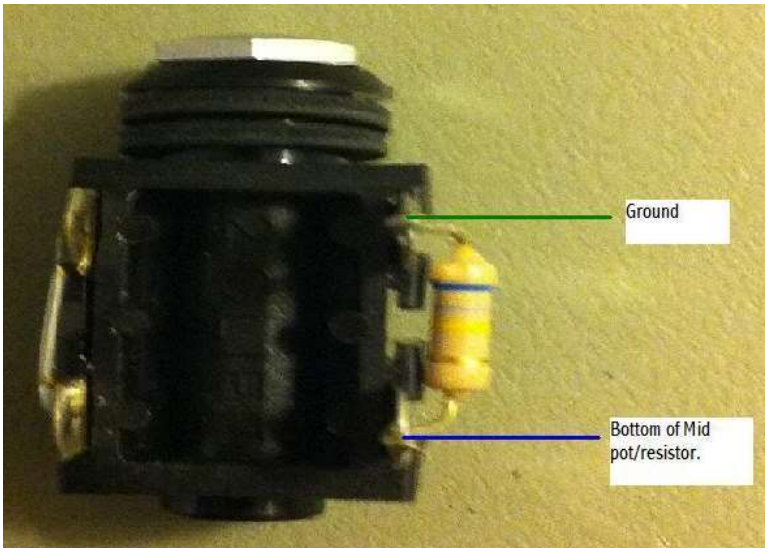
- Change coupling caps; changing to smaller values reduces bass, changing to larger values adds more bass. Reducing the value of coupling caps can help eliminate "flabby" bass syndrome.
- Change cathode bypass caps. Adding a cathode bypass cap to a stage that doesn't have one will let the stage have 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/squeal. 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.
- Replace all plate resistors with metal film types. This can help reduce hiss..

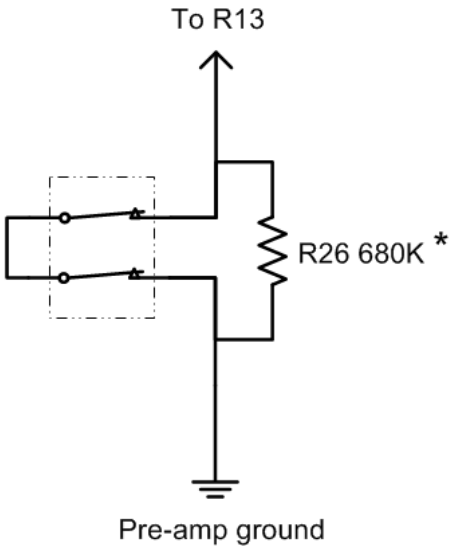
PAB – Pre-Amp Boost Footswitch

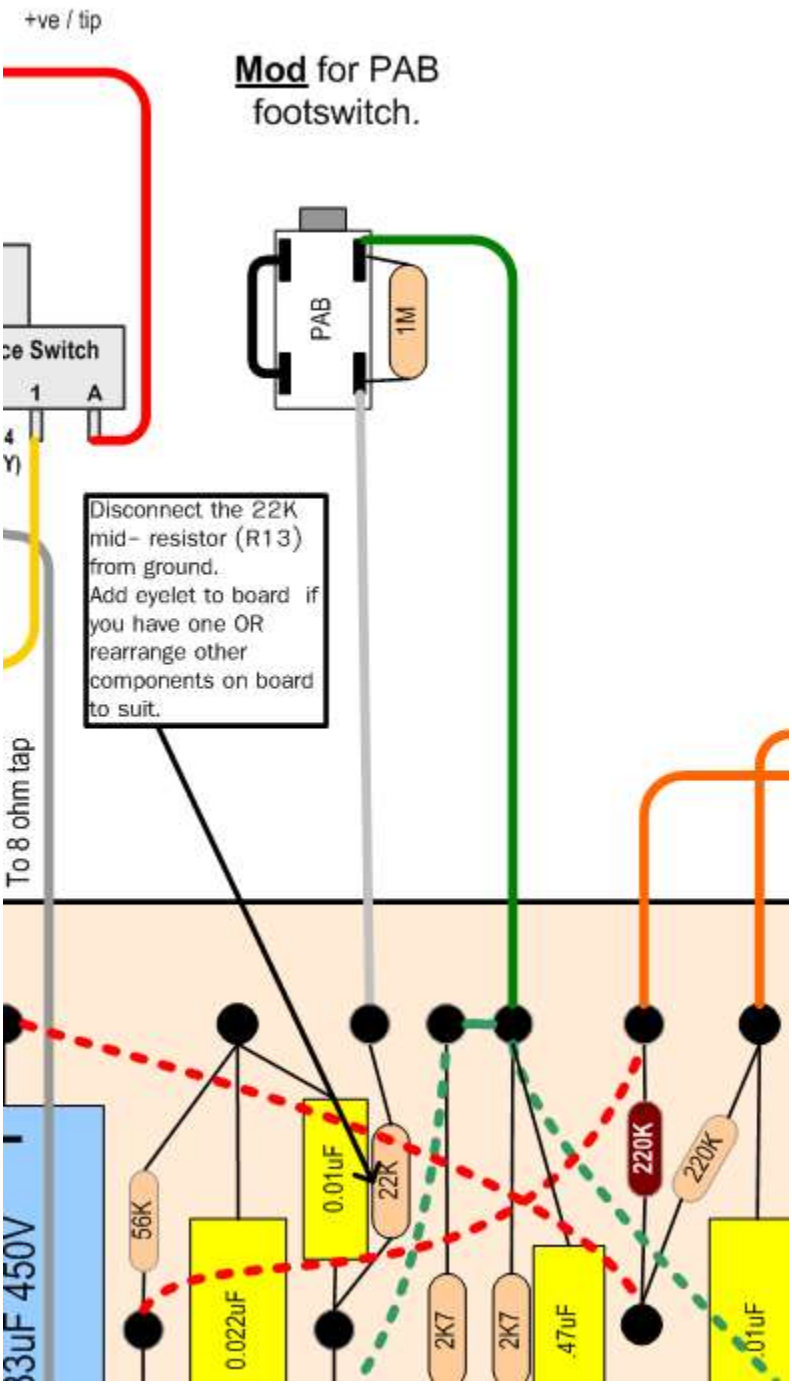
This mod “eliminates or minimizes” the effect of the Tone Stack but adds boost because tone stacks suck up some gain. It is easy to implement and can be done with a Cliff Jack or with a toggle switch too. You will need to drill a hole and mount a Cliff Jack or other insulated jack or toggle switch of some sort. You could combine it with a third –party pull switch on the 1M-A Master Volume or 250K-B Treble as well.

With no cable plugged in or toggle switch off, no boost, amp is stock. Plug in a cable and you can toggle between boost and stock. For maximum boost, don’t use a limiting resistor, for less boost try a limiting resistor of 680K resistor. Experiment with 68K to 5M here. The higher the value, the more boost. Infinite (open circuit) is maximum. You might find the amp squeals at high boost values when on max power and volume. Drop the resistance to 68K-100K.

Disconnect the 22K mid resistor R13from ground. Run a wire form R13 to the jack or toggle switch. If desired, use a fixed resistor on the other side of the jack/switch, and then run that to ground.


Ground
Bottom of Mid pot/resistor.


To R13
R26 680K *
Pre-amp ground


+ve / tip
Mod for PAB
footswitch.
PAB
1M
ce Switch
1
A
Disconnect the 22K
mid- resistor (R13)
from ground.
Add eyelet to board if
you have one OR
rearrange other
components on board
to suit.
To 8 ohm tap
3uF 450V
56K
0.022uF
0.01uF
22K
2K7
2K7
.47uF
220K
220K
.01uF

Tube Substitutions

The 12AX7 family of dual-triode preamp tubes consists of the 12AX7, 5751, 12AT7, 12AY7, 12AV7 & 12AU7. These are all pin compatible with one another, the only differences being the gain factor of each tube. A common substitution is to replace a 12AX7 with a 5751 or a 12AT7 to tame a preamp that tends to overdrive too easily, allowing you to get a better 'clean' sound out of your amp.

Tube	Gain	Acceptable Substitutes					
12AX7	100		5751	12AT7	12AY7		
5751	70	12AX7		12AT7	12AY7		
12AT7	60		5751		12AY7		
12AY7	45		5751	12AT7		12AV7	
12AV7	41				12AY7		12AU7
12AU7	19						

The above is not carved in stone and any of these tubes can be substituted for any other. You can always replace a higher-gain tube with a lower-gain tube, using your ears to tell you whether this was good idea or not. As example, the Fender Pro Junior amp came stock with two 12AX7 tubes - one for the preamp and one for the inverter. If you re-tube it with a 12AU7 in the preamp stage and a 12AT7 for the inverter the 12AU7 in the preamp will provide a nice clean sound, and the 12AT7 inverter helps prevent overdriving the power amp.

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 103J is a 10,000 pF with +/-5% tolerance

Typical Capacitor Markings			
Code	**pf**	**nf**	**uF**
510	51	0.051	0.0000510
181	180	0.18	0.00018
501	500	0.5	0.0005
472	4700	4.7	0.0047
103	10000	10	0.01
123	12000	12	0.012
203	20000	20	0.02
223	22000	22	0.022
104	100000	100	0.1
474	470000	470	0.47
684	680000	680	0.68

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%
M +/	20%
N +/	0.05%
P +100%	0%
Z +80%	20%

FAQ

NOTE: B+ stands 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.

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

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

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 22 gauge, twisted tightly for tube heater wiring;

Use 22 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 eyelet board?

A: Use the provided solid 22 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/black wire. The core goes to the hot. At the other end, the shield does NOT get connected to the tag strip at V1.

Q: Do you need use both of the fiber shoulder washers when mounting the input jacks?

A: Yes, we recommend you do do as well as when installing the output jacks

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 can go the transformer mount but there is a separate hole to mount the grounding points.

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, but I would 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 gives you me 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.

Schematic**: trinityamps.com Forum Index -> Resources ->** Tramp Docs

Photos **: trinityamps.com Forum Index -> Resources ->** Tramp Photos

TIP: Flatten or remove the locating tabs on the pots so that they tighten properly on the chassis.

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.

Tramp Bill of Materials (BOM)

DESCRIPTION	QTY	CHECK
TRAMP KIT WITH TRANSFORMER SET, CHASSIS, PANEL, TUBES		
TRAMP RESISTORS	1	
METAL OXIDE RESISTORS RSS 3W 5.1 5%TR	1	
WIREWOUND RESISTORS - THROUGH HOLE 100 OHMS 5% TOL	1	
CARBON FILM RESISTORS - THROUGH HOLE 270 OHMS 5% 1/2W	1	
WIREWOUND RESISTORS - THROUGH HOLE 560 OHMS 5% TOL	1	
WIREWOUND RESISTORS - THROUGH HOLE 750 OHMS 5% TOL	1	
METAL OXIDE RESISTORS 1.0K OHMS 5% TOL	2	
CARBON FILM RESISTORS- THROUGH HOLE 2.7K OHMS 5%	3	
CARBON FILM RESISTORS- THROUGH HOLE 10K OHMS 0.05	1	
METAL OXIDE RESISTORS 10K OHMS 5% TOL	1	
CARBON FILM RESISTORS- THROUGH HOLE 22K OHMS 5%	3	
METAL OXIDE RESISTORS 47K OHMS 5% TOL	1	
CARBON FILM RESISTORS - THROUGH HOLE 56K OHMS 5%	1	
CARBON FILM RESISTORS- THROUGH HOLE 100K OHMS 0.05	1	
CARBON COMPOSITION RESISTORS 220K OHM 5%	1	
CARBON FILM RESISTORS- THROUGH HOLE 220K OHMS 0.05	3	
METAL OXIDE RESISTORS 220K OHMS 5% TOL	2	
CARBON FILM RESISTORS- THROUGH HOLE 330K OHMS 5%	1	
CARBON FILM RESISTORS- THROUGH HOLE 1M OHMS 5%	1	
TRAMP CAPACITORS	1	
CAPACITOR - 500V SILVER MICA ± 5% CAPACITANCE: 500 PF	1	
CAPACITOR - MALLORY 630V 150S AXIAL LEAD CAPACITANCE: .01 UF	2	
CAPACITOR - MALLORY 630V 150S AXIAL LEAD CAPACITANCE: .022 UF	1	
CAPACITOR - MALLORY 630V 150S AXIAL LEAD CAPACITANCE: .047 UF	1	
CAPACITOR - MALLORY 630V 150S AXIAL LEAD CAPACITANCE: .1 UF	1	
.47 UF AT 100V TUBULAR AXIAL FILM CAP	1	
ALUMINUM ELECTROLYTIC CAPACITORS - AXIAL LEADED 1UF 50VOLTS 20%	1	
CAPACITOR - 450V AXIAL LEAD ELECTROLYTIC CAPACITANCE: 33 UF	2	
CAPACITOR - 450V AXIAL LEAD ELECTROLYTIC CAPACITANCE: 47 UF	2	
1000 UF AT 50 VOLTS AXIAL E-CAP	1	
TRAMP POTENTIOMETERS	1	
POTENTIOMETER - ALPHA LINEAR 3/8" BUSHING RESISTANCE: 250 KOHM	1	
POTENTIOMETERS POTENTIOMETERS 500K OHMS PLAIN SOLDER LUGS	2	
POTENTIOMETER - ALPHA 1M AUDIO WITH SWITCH	1	
POTENTIOMETER - ALPHA AUDIO 3/8" BUSHING RESISTANCE: 1 MOHM	1	
ROTARY SWITCHES LORLIN 2POL 6POS SLDR 6.35X17.5MM FLT SHFT	1	
KNOB - CHICKEN HEAD SET SCREW COLOR: BLACK	5	

KNOB - LARGE INDICATOR LINE SET SCREW BLACK	1	
TRAMP SEMI-CONDUCTORS	1	
MOSFET IRFPE50PBF N-CH 800V HEXFET	1	
SIL-PAD TSP 900 SERIES BERGQUIST SIL-PAD 400 SERIES	1	
STANDARD LEDS - THROUGH HOLE RED 625NM DIFFUSED 30MCD	1	
LED MOUNTING HARDWARE LED MOUNTING HARDWARE LED CLIP AND RING 5MM NYLON BLACK	1	
RECTIFIERS 1000V 1A RECTIFIER GLASS PASSIVATED	2	
ZENER DIODES 1N4735A 6.2V 1W ZENER 5%	1	
TRAMP CHASSIS HARDWARE	1	
SCREW TYPE FUSE HOLDER 10A 250VAC CSA	1	
FUSE - SLOW-BLOW 250V 3AG 0.25" X 1.25" 1 AMPS	1	
TERMINAL STRIP - 3 LUG 2ND LUG COMMON HORIZONTAL	5	
IEC RECEPTACLE - FOR POWER CORD	1	
GROMMETS & BUSHINGS GROMMETS & BUSHINGS SB 500-6 BLK	4	
SWITCH - CARLING MINI TOGGLE DPDT 2 POSITION	1	
TRAMP SOCKET	1	
SOCKET - BELTON 9 PIN MINIATURE TOP MOUNT	1	
TUBE SHIELD - FOR 9-PIN MINIATURE ALUMINUM MULTIPLE COLORS COLOR: ALUMINUM	1	
SOCKET - BELTON MICALEX 8 PIN OCTAL MIP	1	
TUBE CLIP - BELTON FOR OCTAL SOLD INDIVIDUALLY	1	
TRAMP JACKS	1	
JACK - CLIFF 1/4" MONO SOLDER LUG	1	
JACK - SWITCHCRAFT ¼" MONO 2-CONDUCTOR OPEN CIRCUIT	2	
TRAMP FASTENERS	1	
MACHINE SCREW PHILLIPS PAN HEAD 4-40X5/16 L	11	
HEX NUT EXT TOOTH LOCKWASHER 4-40	5	
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	3	
INTERNAL TOOTH LOCK WASHER #6 CHROME	4	
STANDOFFS & SPACERS .375 STD SPACER	4	
TERMINALS TERMINALS LUG LOCKING MATTE TINNED#6	1	
MACHINE SCREW PHILLIPS PAN HEAD 8-32X3/8 L	9	
HEX NUT EXT TOOTH LOCKWASHER 8-32	9	
TERMINALS TERMINALS LUG LOCKING MATTE TINNED#8	1	
MACHINE SCREW PHILLIPS TRUSS HEAD 10-32X1-1/4 L	2	
HEX NUT EXT TOOTH LOCKWASHER 10-32	2	
SAE FLAT WASHER #10	2	
TRAMP WIRE	1	

22 GUAGE SOLID CORE WIRE (VARIOUS COLOURS)	10	
22 GAUGE TWISTED PAIR RED/BLACK	3	
BELDEN RG174/U COAXIAL CABLE	1	
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	5	
TRAMP VACUUM TUBE SET	1	
VACUUM TUBE - 6V6 JJ ELECTRONICS	1	
12AX7/ECC83 - JJ ELECTRONICS PIN TYPE: REGULAR	1	
CORD - POWER 18 AWG 3 CONDUCTOR DETACHABLE BLACK IEC LENGTH: 8 FEET	1	
TRAMP EYELET BOARD	1	
CHASSIS TRAMP ALUM PRINTED	1	
PANEL TRAMP MIRROR FINISH	1	
TRANSFORMER SINGLE ENDED OT 3.5/4K	1	
TRANSFORMER TRAMP PT	1	

***Note - Some 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 substitute any part without notification. Substitutions are guaranteed not to affect the integrity or operation of your amplifier kit.

Trinity Amps Schematics and Layouts