



mojo[®] **DIY**
TONE **PACK**

TWEED CHAMP

5F1 STYLE 1 X 8 COMBO AMP

INSTRUCTION MANUAL



MOJOTONE CANYON SERIES



ROBBY BACA
OF THE CONTORTIONIST
ON STAGE WITH
THE MOJOTONE GRAND CANYON
4X12 CABINET

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TWEED CHAMP

5F1 STYLE 1X8 COMBO AMP

Mojotone's Tweed Champ 5F1 Style Amp Kit is based on the beloved 5 watt amp from the 1950s. These amps were perfect for recording and were featured on a wide array of recordings from Joe Walsh's "Rocky Mountain Way" all the way to Derek & the Dominos' "Layla." Modeled after the historic Class-A 6V6 platform, this amp delivers warm tones that are harmonically rich and have a beautiful low volume crunch.

The amp utilizes one 6V6 power tube and one 12AX7 preamp tube, giving the amp its famed lush harmonic composition. We chose our Mojotone American Vintage AV8C 15 Watt speaker to complement the 5F1 style circuit since it has a nice clean sound at its lowest volumes but introduces an articulate and unique grit as you increase the amp's volume.

Don't be fooled by the fact that this circuit features only a single volume control; 5F1s have been used by some of the greatest guitarists and on some of the greatest recordings of all time. Our Tweed Champ style amplifier is extremely tactile and responds well to dynamic playing; so no matter if you play jazz, classic rock, blues or anything in between, you will not be disappointed.

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INTRODUCTION

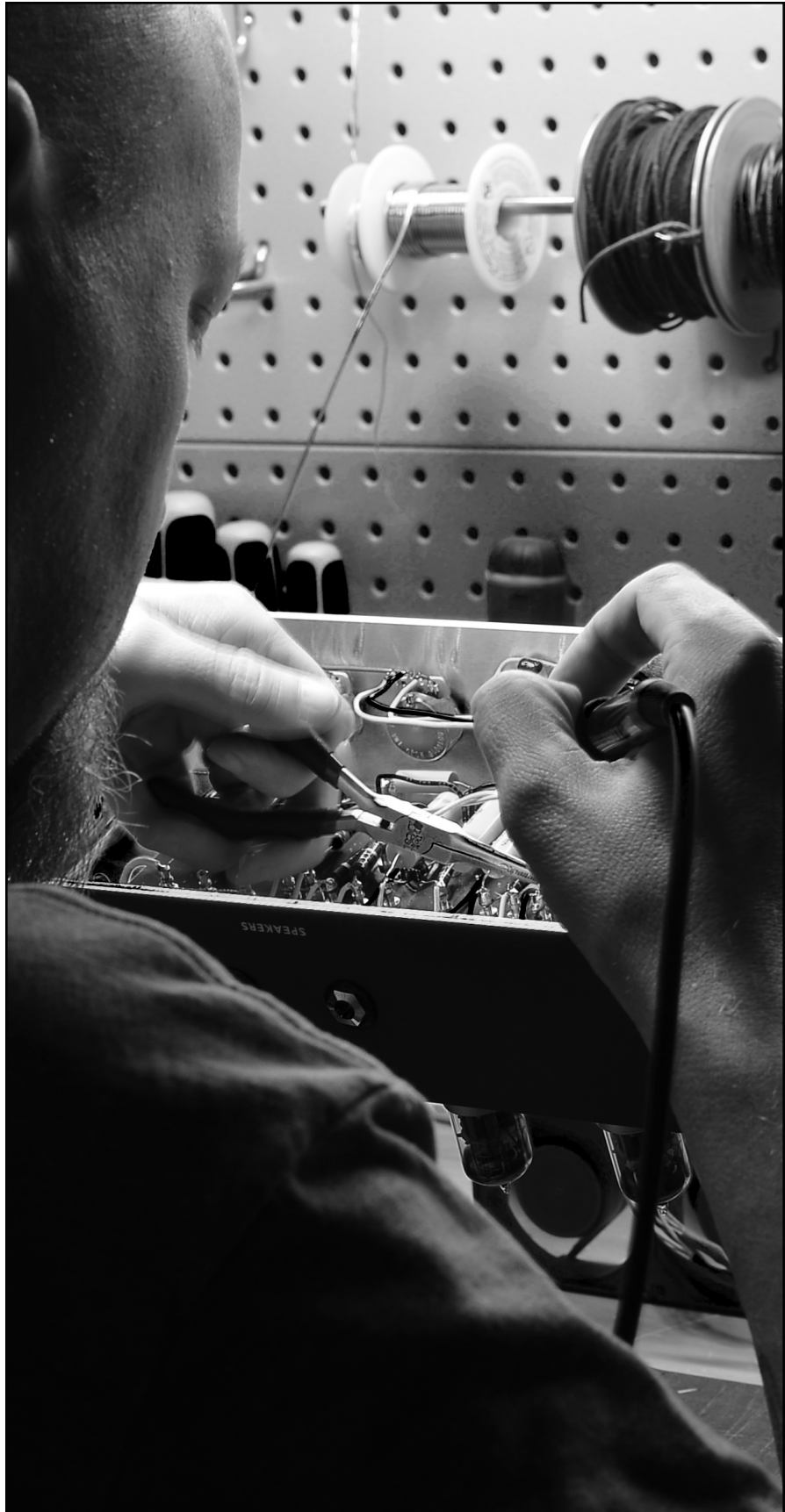
This amplifier kit wiring and assembly are based on the same construction methods that the original designers used 50+ years ago. This vintage method of assembly is a “hands-on” experience. You should take your time when assembling the kit. It’s always exciting as you get closer to finishing the build, but this is where errors will normally occur. It can become overwhelming when looking at the whole picture of building the kit, therefore try looking at the amp in small sections. Ex: The input jacks, preamp section on the board, power supply section on the board, wiring the potentiometers, wiring the preamp tube sockets, wiring the power tube sockets, transformer wiring and so on.

Remember to take your time and enjoy the build. If you get stuck on something, step away from the build for a few hours or a day, then come back to it.

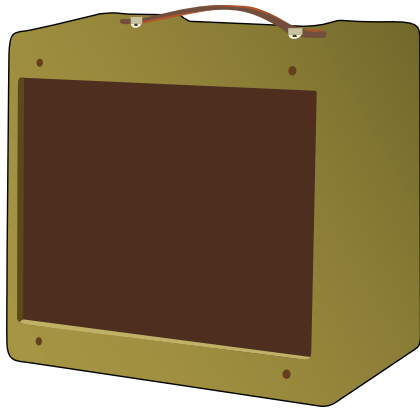
SECTION 1: SAFETY

SAFETY FIRST! Electronics can be dangerous and must be treated with respect. Any circuit that works with 120VAC power from an electrical outlet is especially dangerous and could potentially kill you. Here are some guidelines to keep you safe as you work.

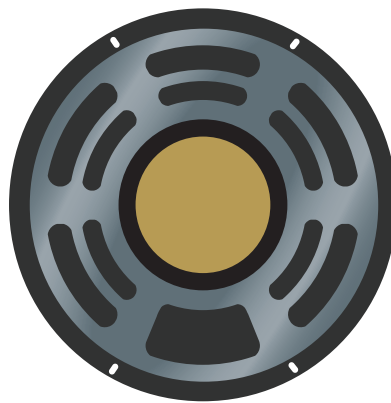
- **Never work on a circuit** while power is applied.
- **Do not connect power** to a circuit until the circuit is finished and you have carefully checked your work (twice).
- **If you smell anything burning**, immediately disconnect the power and examine your circuit to find out what went wrong.
- **Keep your work area** dry and organized.
- **Be careful around large capacitors.** They can continue to hold voltage long after they are disconnected from power. Discharge electrolytic capacitors if power has been applied to the unit.
- **Be especially careful when you solder.** A hot soldering iron can easily burn you.
- **Always work** in a well-ventilated space.
- **Have safety equipment** such as a fire extinguisher, a first-aid kit and a phone nearby.
- **Be Patient!** Rushing through any type of technical work just leads to frustration and compounds issues that can easily be avoided.



SECTION 2:
INVENTORY **optional based on order*



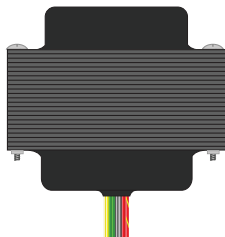
(1) solid pine cabinet*



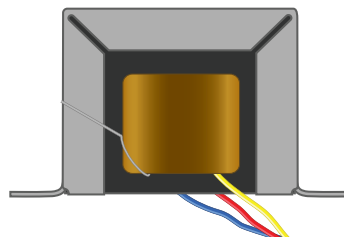
(1) Jensen C8R 8" 25watt 4Ω speaker*



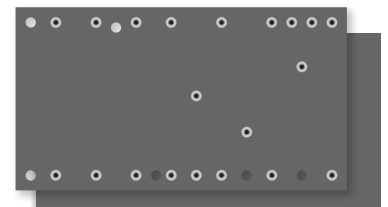
(1) chrome chassis



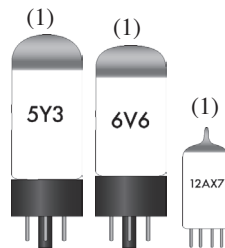
(1) Mojo 760 EX power transformer



(1) NOS 771 output transformer



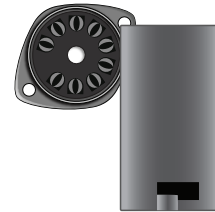
(1) eyelet board & backer board



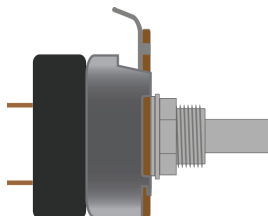
vacuum tubes*



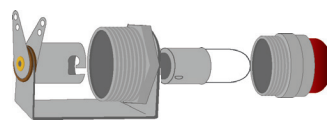
(2) octal tube socket, (2) tube clips



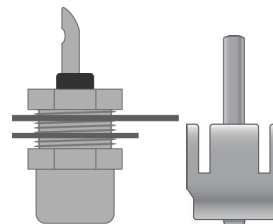
(1) 9-pin tube socket, (1) tube shield



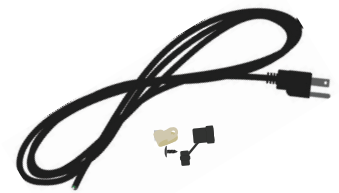
(1) 1MA potentiometer
w/ hardware



(1) indicator light assembly
w/ hardware



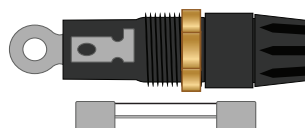
(1) RCA speaker jack set



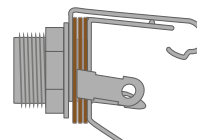
(1) 10' install power cord
w/ hardware



(1) chicken head knobs



(1) fuse holder, (1) slow blow 1 amp
fuse w/ hardware



(2) J12A 1/4" shorting jack
w/ hardware










(1) ground tab



(2) rubber grommet

RESISTORS

Carbon Composite

	(2) 1/2 watt 100Ω
	(2) 1/2 watt 1.5K
	(2) 1/2 watt 22K
	(2) 1/2 watt 68K
	(2) 1/2 watt 100K
	(1) 1/2 watt 220K
	(1) 1/2 watt 1M




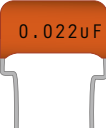
Metal Oxide

	(1) 2 watt 10K
---	----------------







Wire Wound Ceramic

	(1) 5 watt 500Ω
---	-----------------





CAPACITORS

	(1) Sprague Atom 25μf @ 50v
	(1) Mojotone Electrolytic King Cap 16μf @ 475v
	(2) Mojotone Electrolytic King Cap 8μf @ 475v
	(2) Orange Drop 0.022 μf @ 600v

HARDWARE

	keps nuts (6) 4-40, (6) 8-32, (2) 6-32, (2) 10-32
	(4) 4-40 x 1/4" screw
	(2) 8-32 x 1/4" screw
	(6) 4-40 x 3/8" screw
	(2) 6-32 x 1/2" screw
	(2) 10-32 x 1 1/2" screw

WIRES

	(2') 18 gauge stranded Black
	(2') 18 gauge stranded White
	(3') 18 gauge pre-tinned Green
	(10') 22 gauge pre-tinned Yellow

SECTION 3:

TOOLS

Certain tools are required to successfully build your amp. The following are recommended to complete your project.

NEED A TOOL? Do you see something on this list that you need? Turn to **page 20** for a full list of tools, parts and kits to add to your workbench

- ☐ 1/2" nut driver
- ☐ Set of needle nose pliers (one with teeth and one without)
- ☐ Wire cutters
- ☐ Wire strippers
- ☐ Soldering iron and solder
- ☐ Adjustable wrench
- ☐ Phillips head screw driver
- ☐ Multimeter

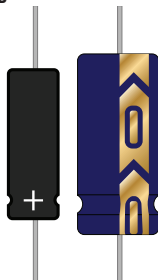
SECTION 4:

COMPONENT IDENTITY & ORIENTATION

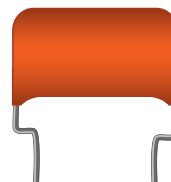
Ensure all polarized caps are in the correct orientation when installing onto the board. This is typically denoted by an arrow pointing towards the negative side, or a small indentation on the positive side.

SAFETY FIRST! A cap in the wrong orientation can explode! So follow your wiring diagram and pay close attention when orienting your polarized caps

POLARIZED



NON-POLARIZED



SECTION 5:

HOW TO READ COMPONENTS

READING RESISTOR VALUES

The resistors that are included in your Mojotone kit, all use the 4-band resistor color code for determining their values. The easiest way to read the resistors, start by having the gold strip facing towards the right. The first two colors on the left are going to be your values, for example Yellow & Violet would be 47. The third strip is going to be your multiplier. So for this example, the third strip is a yellow stripe which is 10,000. The value of the resistor is calculated as such 47 X 10,000 which equals 470,000 ohms or 470K ohms.

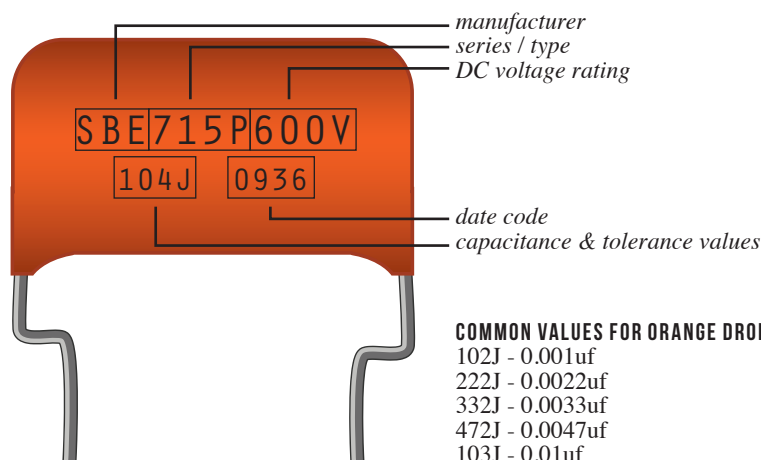


$$\begin{array}{|c|c|c|c|} \hline 4 & 7 & \times & 10,000 \\ \hline \end{array} = 470,000 \Omega \text{ or } 470K \Omega$$

COLOR	BAND 1	BAND 2	MULTIPLIER	TOLERANCE
Black	0	0	1Ω	
Brown	1	1	10Ω	± 1%
Red	2	2	100Ω	± 2%
Orange	3	3	1KΩ	
Yellow	4	4	10KΩ	
Green	5	5	100KΩ	± 0.5%
Blue	6	6	1MΩ	± 0.25%
Violet	7	7	10MΩ	± 0.10%
Grey	8	8	100MΩ	± 0.05%
White	9	9	1Ω	
Gold			0.1Ω	± 5%
Silver			0.01Ω	± 10%

READING ORANGE DROP CAPACITOR VALUES

Your Mojotone kit includes 715P Series Orange Drop capacitors. These capacitors use a numerical value and multiplier, very similar to resistors, for calculating their values. The top line printed on the capacitor is going to be the series number followed by the 3 digit voltage rating. For example, SBE 715P600V translates to SBE (manufacturer), 715P (capacitor series / type), 600V (DC voltage rating). The next line will have a 3-digit code followed by a letter. Just like the resistors, the first two digits are your values in pico farads (pf) and the third digit is the multiplier. The letter code after the 3-digits is tolerance value for the capacitor. For example, 104J is equal to 10 X 10,000 or 100,000pf which converts to 0.1uf, the 'J' indicates that cap is has a 5% tolerance in value. The 4-digit code after the value digits is going to be the date code when the capacitor was manufactured. For example, 0936 converts to the 36th week of 2009.



COMMON VALUES FOR ORANGE DROP CAPACITORS:

102J - 0.001uf
 222J - 0.0022uf
 332J - 0.0033uf
 472J - 0.0047uf
 103J - 0.01uf
 223J - 0.022uf
 473J - 0.047uf
 104J - 0.1uf

SECTION 6:

SOLDERING BASICS

Before you start slinging solder in your kit or if you have never soldered before, take a moment to read over this section about soldering.

When assembling your amp kit, whether it's putting components on the eyelet board, wiring up the tube sockets or connecting wires to the potentiometers, the first thing you want is a good solid mechanical connection. So for example if you are connecting a wire to a pin on a tube socket or on the back of a potentiometer, you do NOT want to set the wire on the pin or let it float loosely and throw a bunch of solder on there. Solder is not a great conductor, specially some of the newer lead-free solder, think of it as more of a semi-conductive glue. So what you want is a solid physical connection between the components that you are connecting together. For example, when soldering to a tube socket, you would want to create a hook with the wire or component lead, hook it through the pin, then use a pair of needle nose pliers to pinch the hook together around the pin. Now the wire has a solid connection to the pin, so even if solder were to fail, in theory you have the components connected together. After you have created the mechanical "bond", then you can add a little solder to help solidify the joint.

WORKING WITH EYELET BOARDS

When installing components onto the eyelet boards, you want the component to lay or sit down onto the board, feeding the leads into the eyelets and then bending them underneath the board. Once all the components are installed on the board and the connecting wires are attached as well, then start soldering the joints. After they have been soldered, be sure to clip the excess leads that are underneath the boards so that they do not short against other components.

PRO TIP: There is an exception to laying a component down on the eyelet board and that would be when higher wattage resistors are in the power supply OR if the amplifier is running the power tubes in a cathode biased configuration. These components are dropping voltages across them during operation, which results in excess heat, and needs to float a little above the board to dissipate the heat.

SOLDERING A CONNECTION

○ Connect the components together. Be sure you have a solid mechanical connection before you proceed.

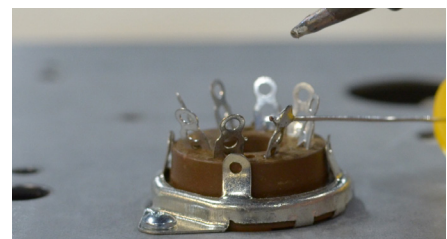
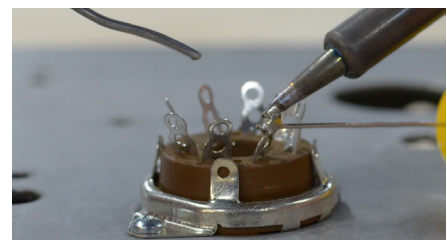
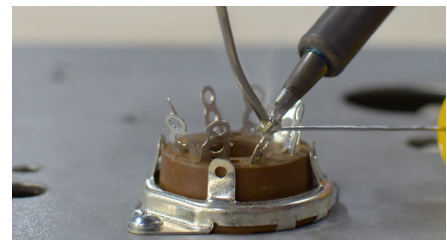
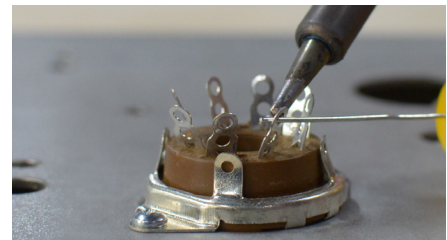
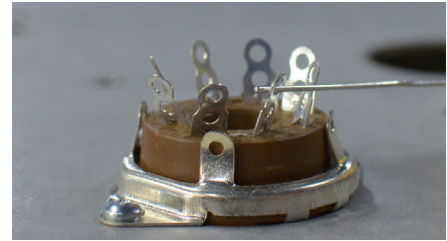
○ Make sure the tip of the iron is clean.

○ Heat the components by touching the tip of the iron to both components at the same time. It should take about 2-3 seconds for the connecting component leads to become hot enough to flow solder.

○ Slowly flow the solder into the connection. The solder should liquefy and spread over the connection. If the solder does not melt almost instantly or if it beads up and falls off, double check the temperature of your soldering iron and make sure the tip of the iron is clean.

○ Remove the solder from the connection.

○ Remove the iron from the connection and allow the joint to cool. Once it has cooled you can gently pull the component to test the connection.



SECTION 7:

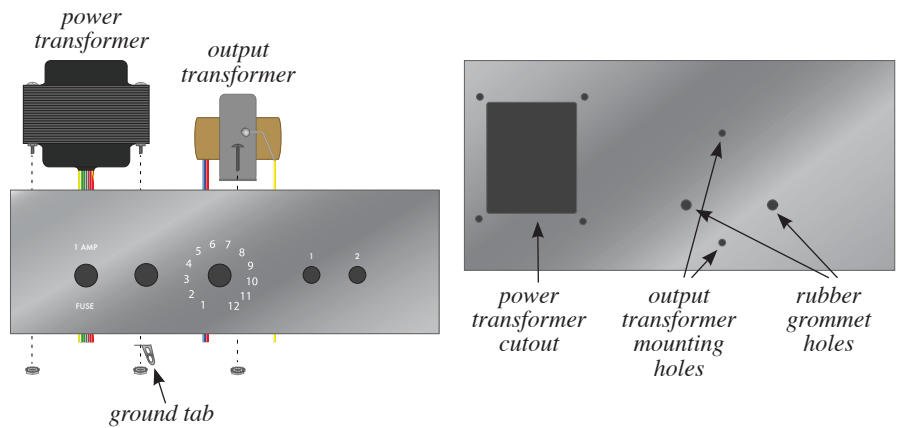
CHASSIS ASSEMBLY

TRANSFORMERS

○ **Mount the power transformer** by first removing the black rubber tips on the ends of the mounting screws. Do NOT remove the nuts on the transformer. These are used to create an air gap for dissipating heat. The transformer will be recessed through the rectangular cutout in the “belly” of the chassis. Install 8-32 keps nuts on the left two studs (ones that are closest to the side of the chassis). Install a ground tab on each of the right studs and fasten with 8-32 keps nuts.

○ **Install rubber grommets** in holes for output transformer leads.

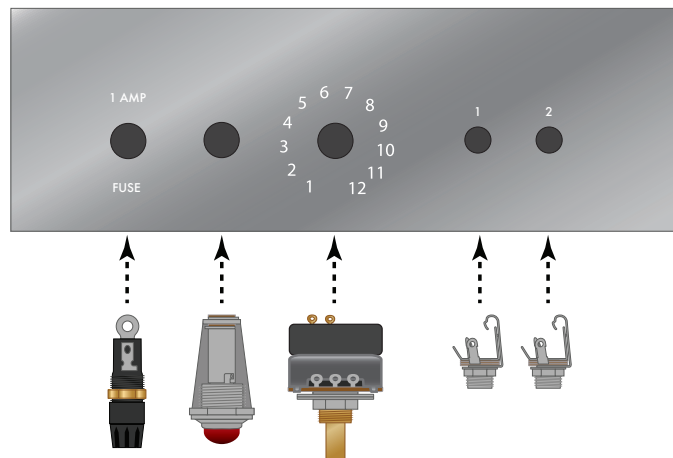
○ **Mount the output transformer** using the (2) 8-32 x 1/4” screws and corresponding keps nuts onto the outside of the chassis next to the power transformer (output transformer is not recessed). Install the transformer so that the **Red** and **Blue** wires go through the grommet closest to the power transformer and the **Yellow** wire goes through the grommet furthest from the power transformer. The screws will go through the outside of the chassis, and the nuts will be installed in the inside. Use a screwdriver and adjustable wrench to tighten.



CONTROL PANEL

○ **Mount the fuse holder** using its pre-assembled hardware and adjustable wrench. Install fuse.

○ **Mount the indicator light** using its pre-assembled hardware and adjustable wrench.



fuse holder assembly

indicator light assembly

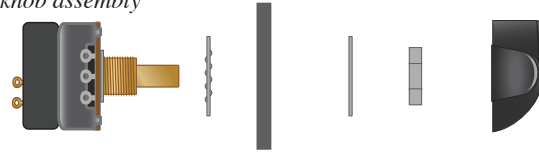
○ **Mount potentiometer** using its pre-assembled hardware and 1/2" nut driver. Make sure the potentiometer is mounted with its lugs facing up towards the open end of the chassis.

PRO TIP: When mounting the pots, make sure the toothed locking washer goes between the potentiometer and the chassis. The flat washer will go on the outside of the chassis and the nut will tighten down.

○ **Once you have the pot securely installed,** turn the shaft of the pot all the way counter-clockwise. Install the chicken head knob onto the pot shaft making sure the pointer of the knob is pointing to "1" on the chassis. Use a small flat head screwdriver to tighten the set screw in the back of the knob securely on the pot shaft.

○ **The input jacks** will be installed in a later section.

potentiometer and knob assembly

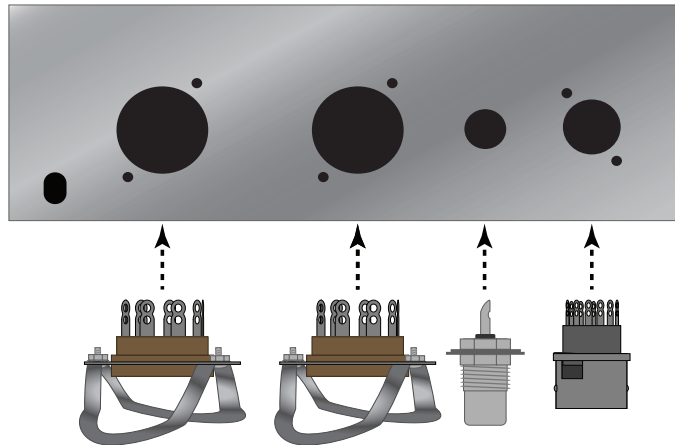


REAR PANEL

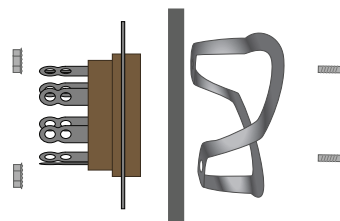
○ **Mount octal tube sockets** and tension clamp using the (6) 4-40 x 3/8" screws and keps nuts. When mounting, be sure to choose an orientation and keep this orientation uniform through both octal sockets. Install octal sockets with solder lugs facing inside the chassis.

○ **Mount speaker jack** using its pre-assembled hardware and 1/2" nut driver.

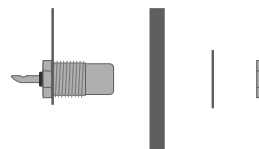
○ **Mount 9-pin tube socket** using (4) 4-40 x 1/4" screws and keps nuts and tighten down with adjustable wrench and screwdriver.



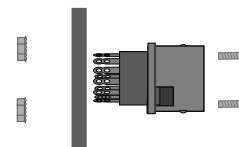
octal tube socket assembly



RCA speaker jack assembly



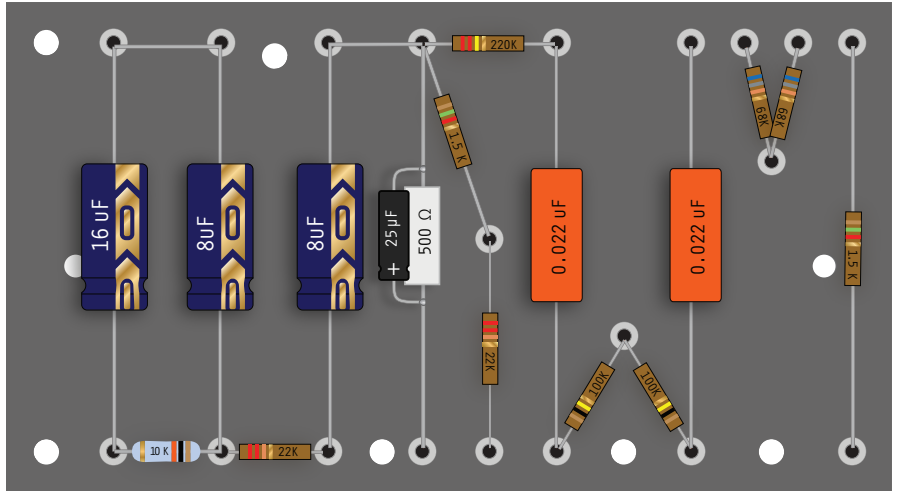
9-pin tube socket assembly



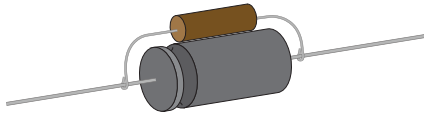
SECTION 8:

CIRCUIT BOARD ASSEMBLY

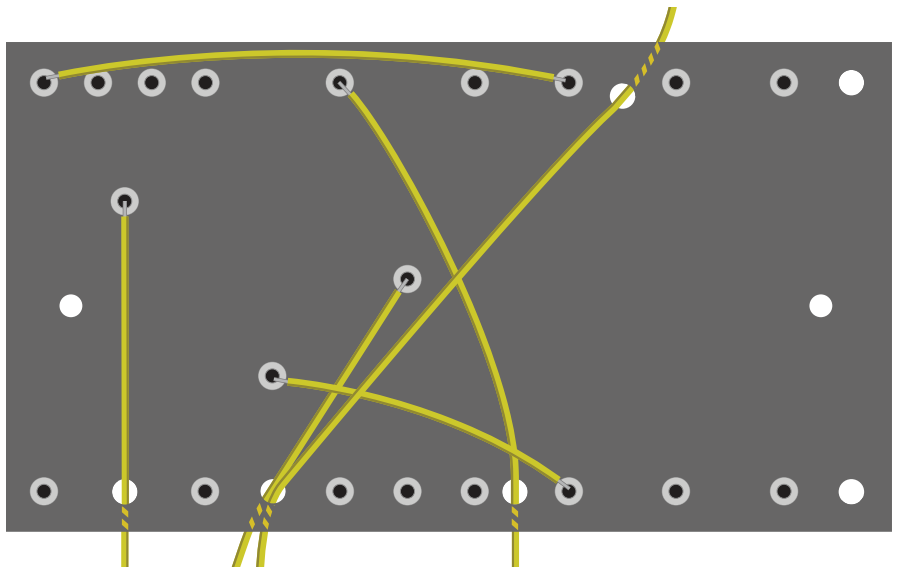
○ **Starting at one end** of the front side of the board, identify the necessary components for each eyelet connection and place leads through the eyelet holes. Once inserted, bend the leads under the bottom of the board to hold them in place.



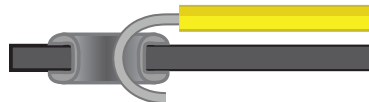
PRO TIP: When a capacitor and resistor are both running between the same eyelet holes, you can twist their leads around one another and solder to form a solid mechanical connection.



○ **Once all components are in place** on the front side of the board, flip the board over and start applying traces or jumper wires to the backside of the board. These are illustrated on your wiring diagram as striped lines connecting different eyelet holes. Use your **Yellow** cloth-covered wire and cut each piece to size. Insert leads and bend around front of eyelet board to secure them.



PRO TIP: Make a small hook with the wire so that the wire “hooks” into the eyelet.

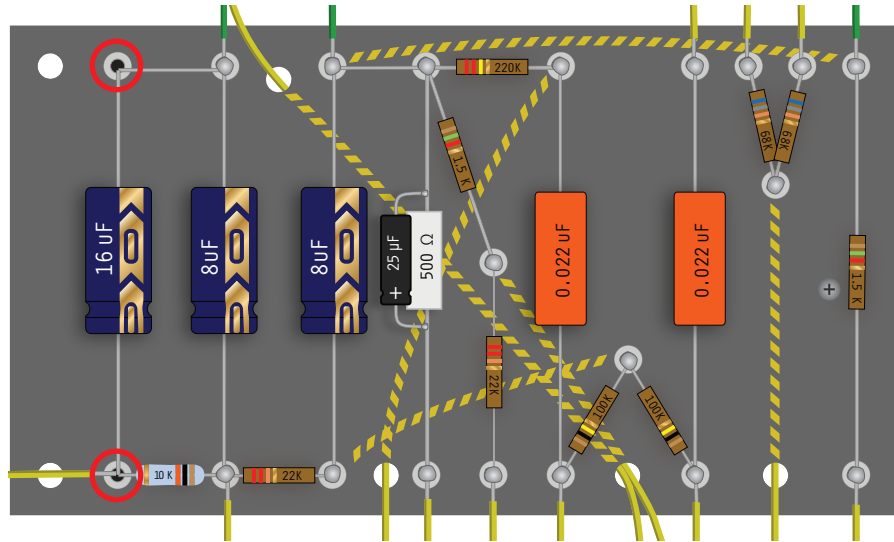


○ Once jumper wires are in place, follow wiring diagram to create leads where necessary. These will be the wires that go out from the component board to other components in the circuit. Insert these leads down through the front of the board and bend around back to secure.

PRO TIP: Use the included Wiring Diagram to approximate lead lengths

○ Once all components, jumpers, and leads are in place, start at one end of the board and begin soldering every eyelet EXCEPT the eyelets with a red circle (○). There will be additional wires connected here once the circuit board has been installed.

○ **Make Sure** you don't have any bad or "cold" solder joints by lightly pulling each wire after solder has set.



SECTION 9:

TRANSFORMER WIRING

POWER TRANSFORMER

○ Twist all matching pairs of wires coming out of the power transformer.

○ Measure length needed for each wire, allow yourself extra lead and cut to length. This will eliminate excess wire and free up space in your chassis. Apply this principle to all leads.

○ Prepare the two **Red** wires from the power transformer (HV secondary). Connect one wire to pin 4 and the other to pin 6 of the 5Y3 rectifier tube socket (the octal socket that is closest to the power transformer). These wires carry AC voltage, so either wire can go to either pin 4 or 6.

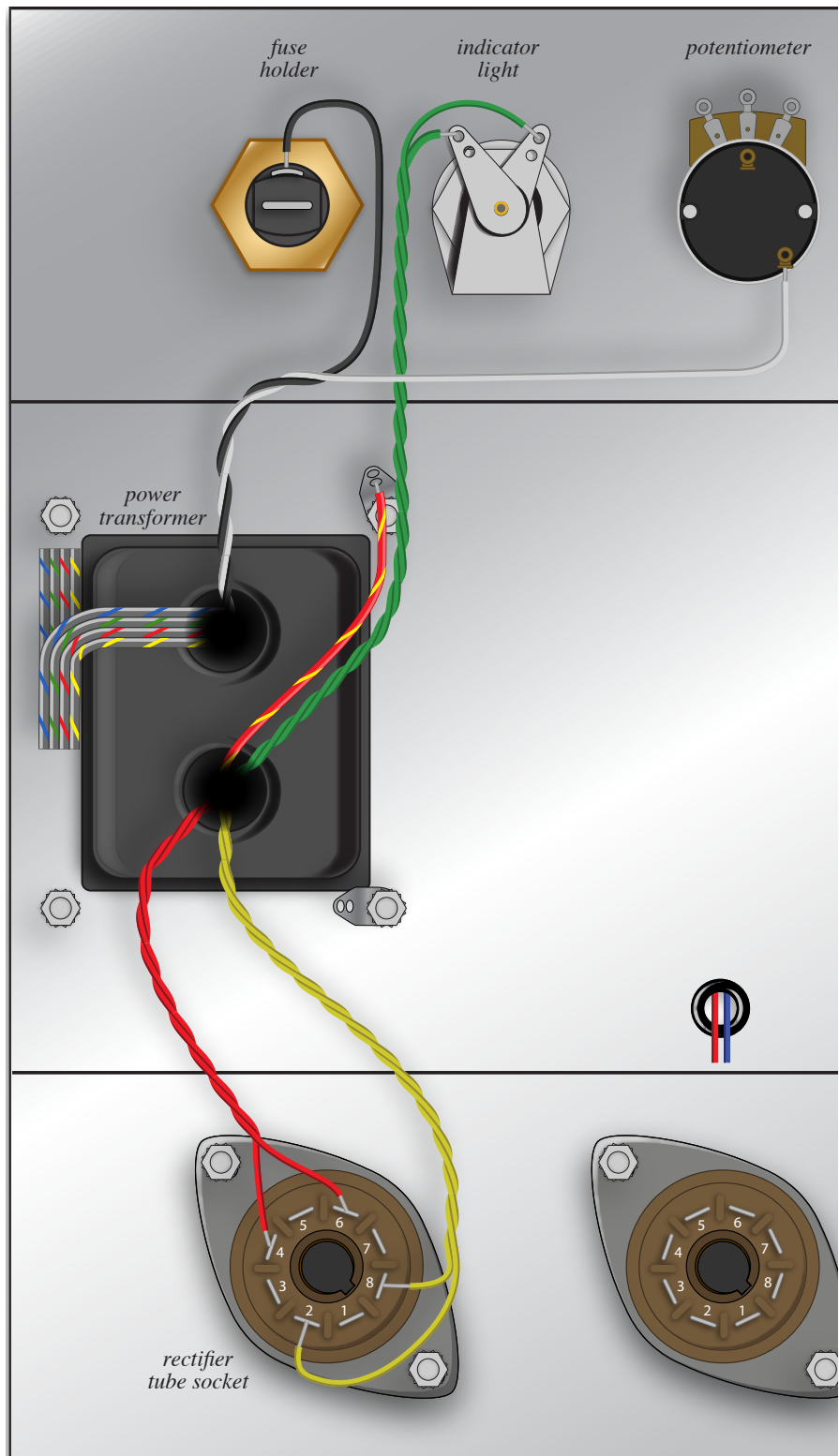
○ Prepare the two **Yellow** wires from the power transformer (5v rectifier filament). Connect these two wires to the top opening of pins 8 and 2 of the 5Y3 rectifier tube socket.

○ Prepare the 2 **Green** wires from the power transformer (6.3v tube filament). Connect them to the indicator light.

○ Prepare the **Red and Yellow** striped wire from the power transformer and connect to the ground tab.

○ Now you will need to decide to use vintage correct wiring or an updated modern wiring for the power supply. When this circuit was designed in the 1950s, typical electrical outlets were not grounded so the chassis had to be grounded by a capacitor tied to one side of incoming A/C power cord. Now that it is required that all electrical outlets in the US and most other regions to be grounded, these additional steps are unnecessary but will still function properly and safely while retaining the original wiring. Whichever wiring you choose, be sure to follow the corresponding instructions when installing the A/C power cord on page 17.

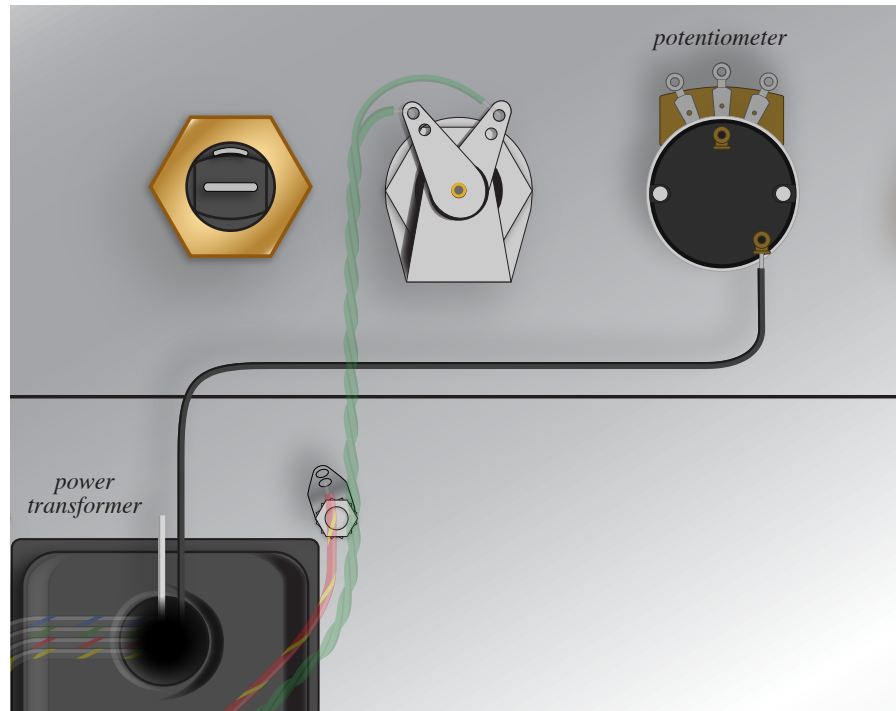
○ For **VINTAGE** wiring of the power supply, Prepare the **Black** and **White** wires coming from the power transformer. One of these will go to your fuse and one will go to the bottom lug on the back of the potentiometer. (It doesn't matter which wire goes to either component).



○ For **MODERN** wiring of the power supply, connect the **Black** wire from the power transformer to the bottom lug on the back of the potentiometer.

○ The **White** wire will be connected to the power cord once it is installed.

○ **Double check your wiring.**



OUTPUT TRANSFORMER

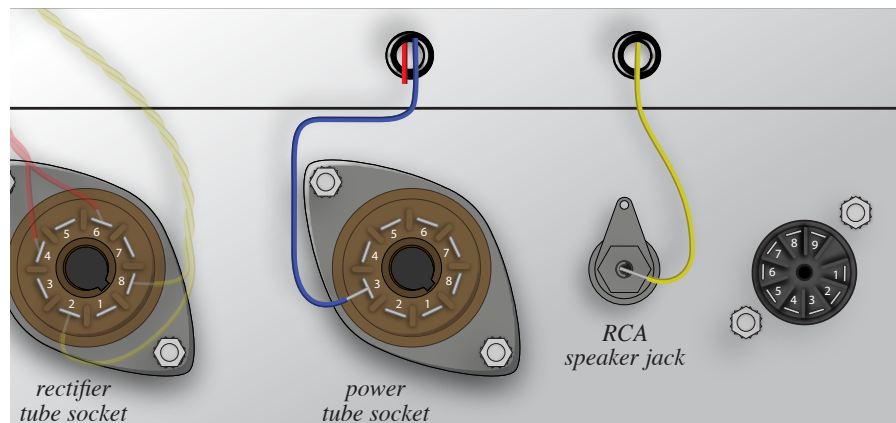
○ Primary is **Blue** and **Red**. Secondary is **Yellow**.

○ Connect the **Blue** wire from the output transformer to pin 3 of the 6V6 octal socket closest to the rectifier.

○ Connect the **Yellow** wire from the output transformer to the tip lug of the speaker jack.

○ The **Red** wire from will be soldered to the board once it has been installed.

○ **Double check your wiring** and begin soldering all connections in this section **EXCEPT** for the indicator light. There will be additional wires connected to it when wiring the tube sockets.



SECTION 10:

CIRCUIT BOARD INSTALLATION

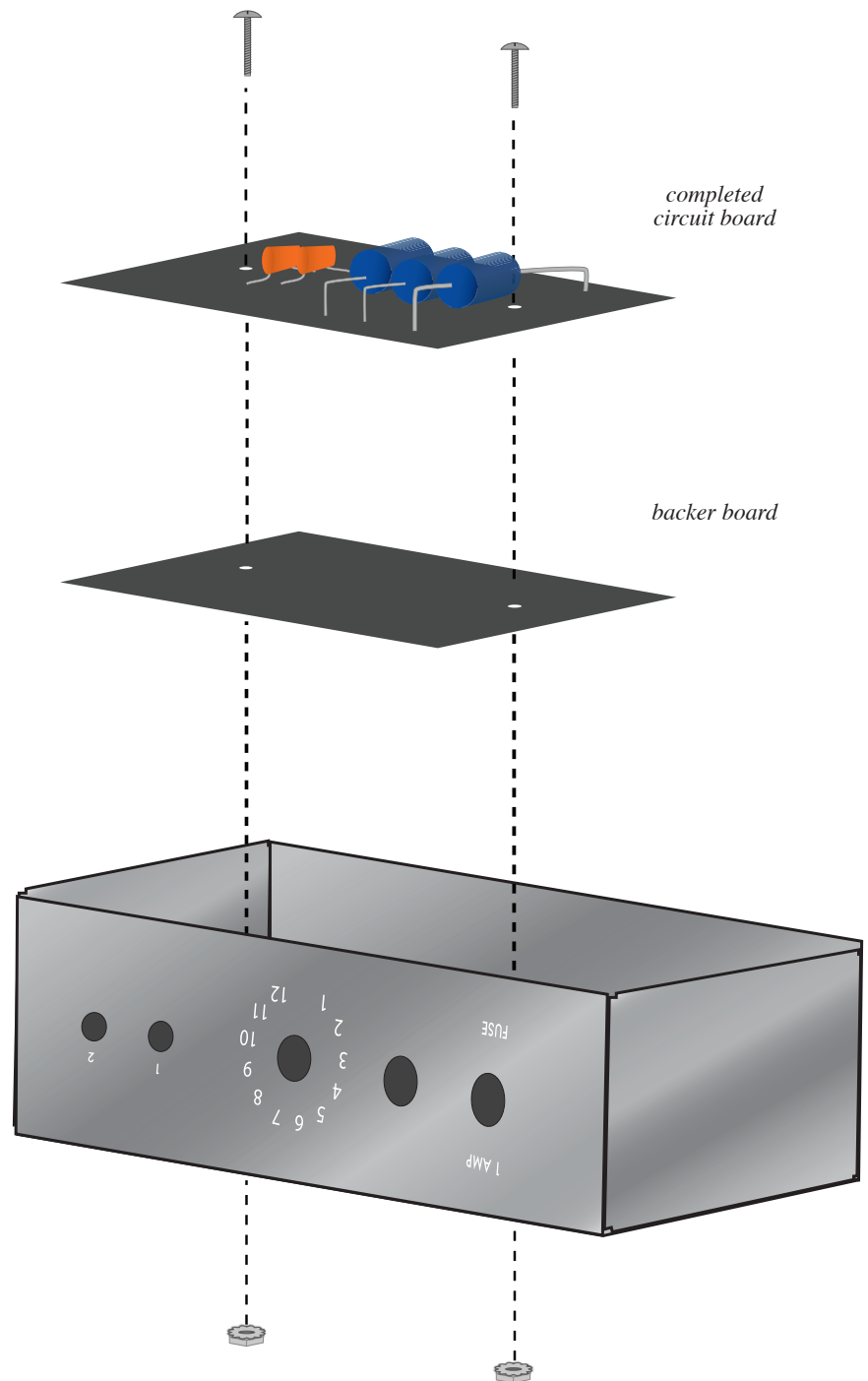
○ **Locate** the two small fiber board mounting holes drilled into the chassis.

○ **Tilt the chassis on its side** and insert the 6-32 screws from the top of the chassis through to the outside.

○ **Holding the screws in place**, insert the backboard into the chassis, and push the mounting holes down over the screws.

○ **Repeat** with main component board.

○ **Use the 6-32 keps nuts** and hand tighten screws. Once in place, fasten down the screws and nuts using a screwdriver and adjustable wrench.



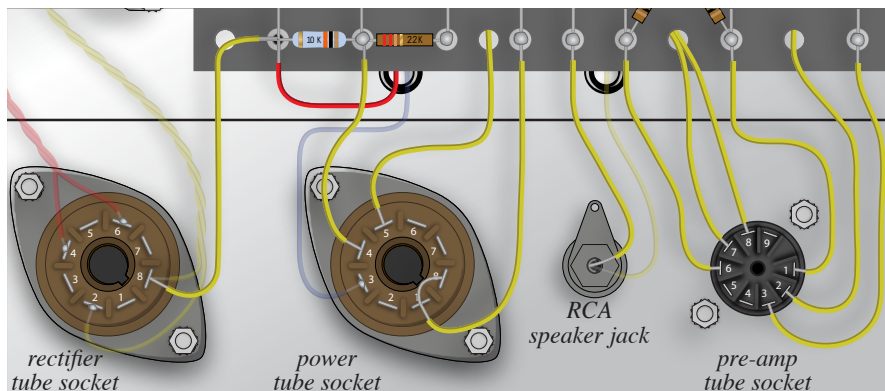
SECTION 11:

WIRING THE SOCKETS, POT, JACKS & POWER CORD

WIRING THE TUBE SOCKETS

○ Follow the wiring diagram and begin wiring the tubes sockets starting from the rectifier tube and work your way across the chassis towards the preamp tube. Note that there is a jumper between pins 1 and 8 on the 6V6 power tube.

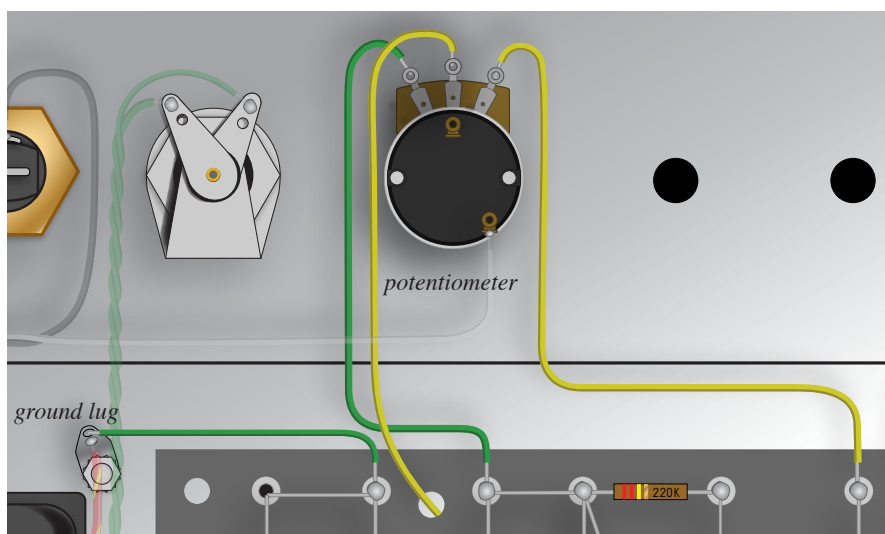
○ Prepare the **Red** wire from the output transformer and connect it to the board.



WIRING THE POTENTIOMETER

○ Follow the wiring diagram and begin wiring the “VOLUME” potentiometer.

○ Connect the correct **Green** wire to the ground lug.



INPUT JACK INSTALLATION AND WIRING

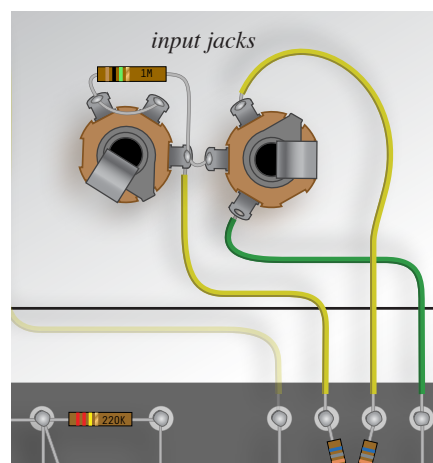
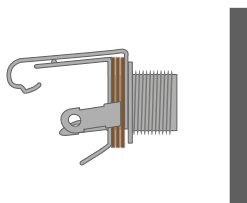
○ Install the input jacks. Follow the wiring diagram for the correct orientation.

○ Install a **1MΩ** resistor on the input jack closest to the potentiometer. Connect to the second jack with a jumper.

○ Connect the **Yellow** wires to the input jacks.

○ Connect the **Green** wire the ground lug on the input jack on the top right.

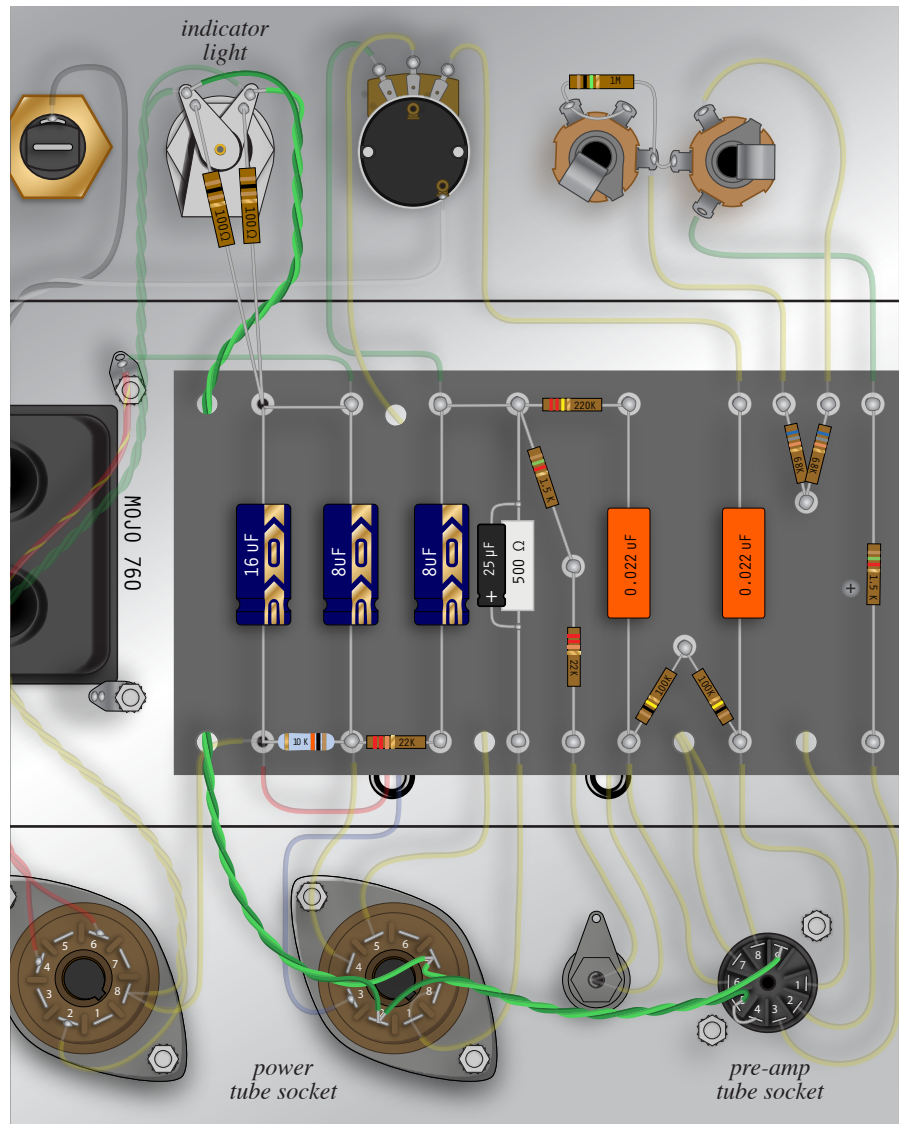
J12 input jack assembly



WIRING THE HEATER FILAMENTS

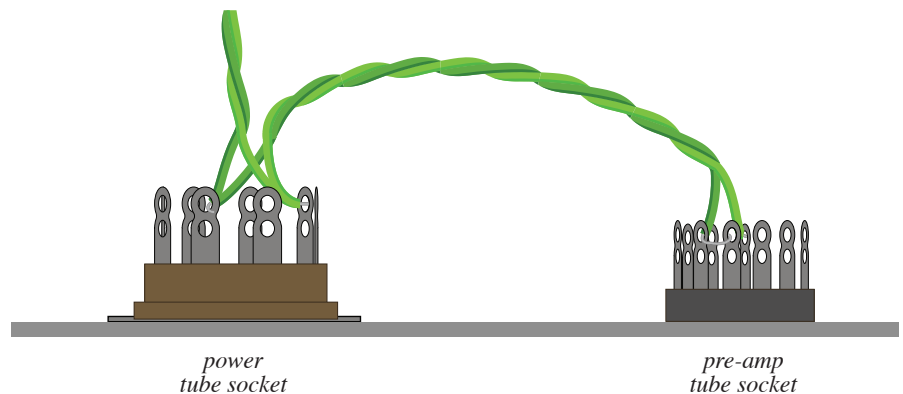
○ Connect one end of the 100Ω resistors to each lug of the indicator light. Make sure that either lead that is connected to the indicator light does NOT touch the other or the bracket that holds the assembly to the chassis. Connect the other end of both resistors to the top left eyelet on the fiberboard.

○ Connect and solder one end of a **Green** wire to each lug of the indicator light. Tightly twist together enough of the **Green** wires to reach to the 6V6 power tube socket and cut. Connect one wire to the 2 pin and one to the 7 pin of the 6V6 power tube socket.



○ Follow the **Wiring Diagram** and begin wiring the heater filaments between the tube sockets starting from the far left power tube and working your way across to the far right pre-amp tube.

PRO TIP: Since there is a jumper wire connected to the 5 pin of the pre-amp tube socket, you can achieve the jumper by stripping the wire running to the 4 pin back further and running it through to the 5 pin.



INSTALLING & WIRING THE A/C POWER CORD

○ **Strip about 5"** of the outer insulation of the power cord.

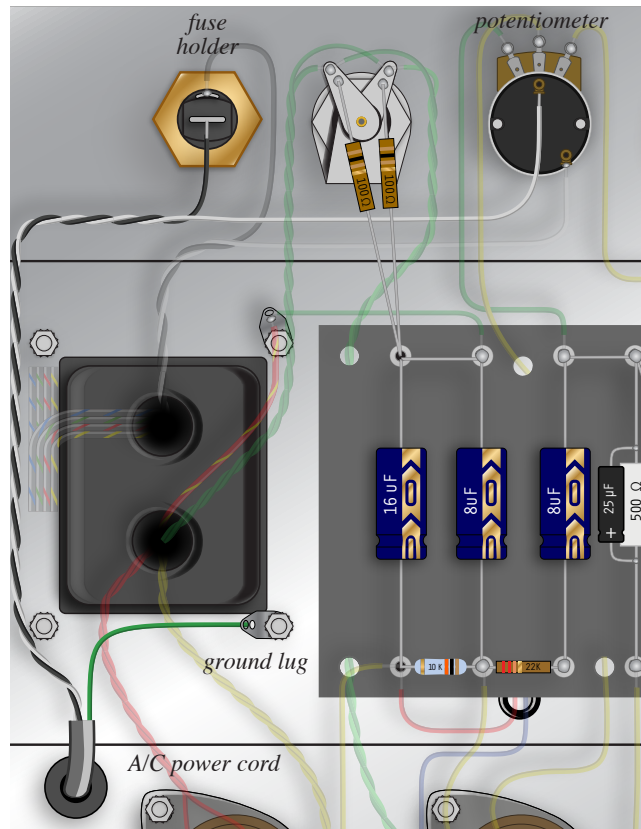
○ **Insert stripped wires** through the hole in the bottom left corner of the chassis next to the rectifier tube.

○ **Use the Black strain relief** to clamp around the power cord about 2" before the portion that was stripped. Compress the strain relief with an adjustable wrench or needle nose pliers and carefully insert it into the chassis until it locks in place.

○ **For VINTAGE wiring of the A/C power cord**, prepare the **Black** wire in the power cord and connect it to the tip terminal of the fuse holder.

○ **Prepare the White wire** in the power cord and connect it to the top lug on the back of the potentiometer.

○ **Prepare the Green wire** in the power cord and connect it to the ground lug next to the power transformer.



○ **For MODERN wiring of the A/C power cord** prepare the **Black** wire in the power cord and connect it to the tip terminal of the fuse holder.

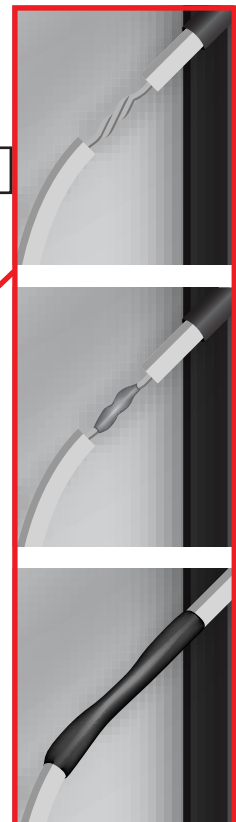
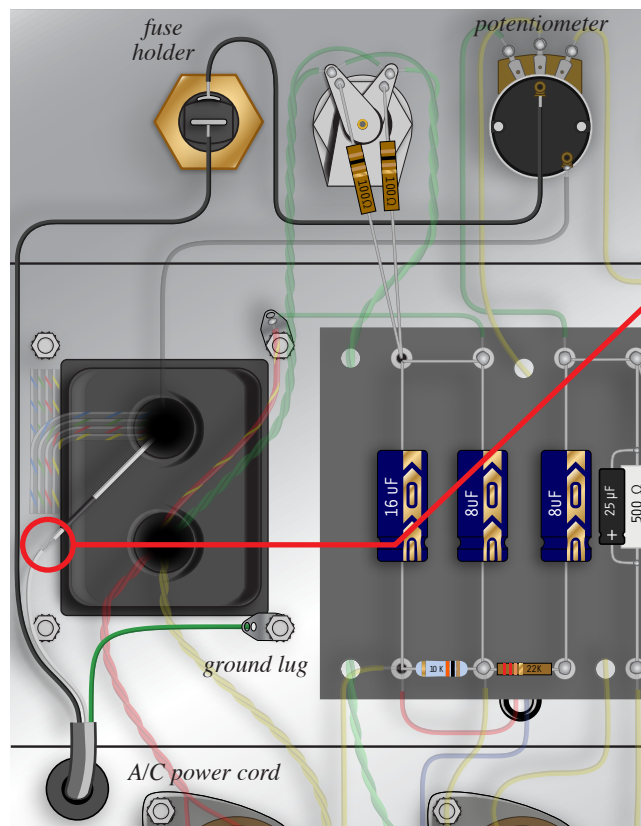
○ **Prepare a length of Black wire** and connect one end to the top lug of the fuse holder and the other end to the top lug on the back of the potentiometer.

○ **Prepare the White wire** from the power transformer and slide a 1" - 2" length of heat shrink tubing down it.

○ **Prepare the White wire** in the power cord and twist the end together with the end of the **White** wire from the power transformer to form a mechanical connection and then solder.

○ **Slide the heat shrink tubing** over the solder connection and apply heat with a small flame to shrink it over the exposed wire to insulate.

○ **Double check your wiring** and begin soldering all connections in this section.



SECTION 12:

SPEAKER WIRING & INSTALLATION

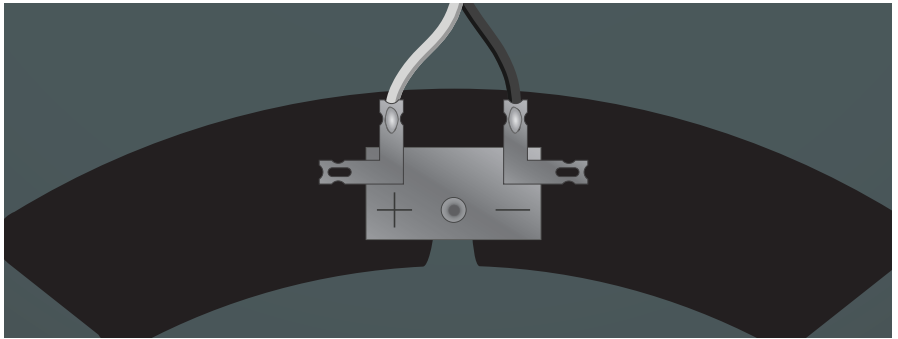
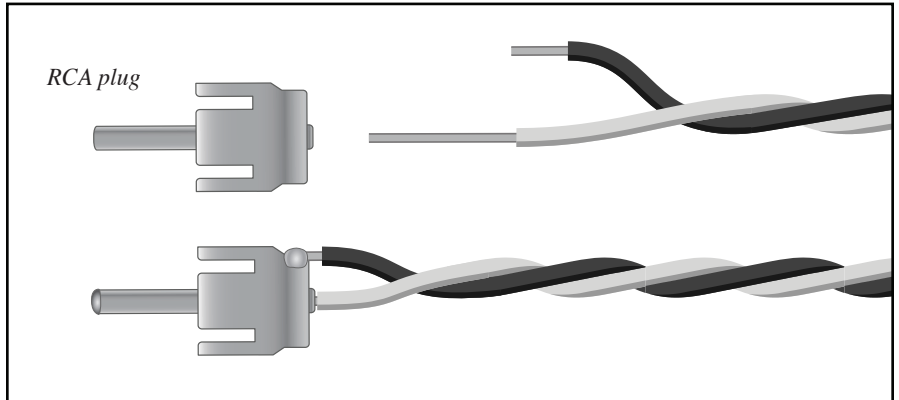
SPEAKER WIRING

○ Twist the two 15" lengths of **Black** and **White** 18 gauge stranded wire together.

○ Prepare the **Black** and **White** wires and solder them to the RCA plug, **White** to center and **Black** to shield. Trim excess wire from the tip of the plug.

○ On the other end of the wiring harness, prepare the wires and make a "hook" with a pair of needle nose pliers.

○ Insert the **White** wire "hook" into the positive (+) terminal on the back of the speaker. Use the needle nose pliers to carefully crimp the "hook" on the terminal, forming a mechanical connection. Then solder the wire to the terminal. Repeat the same process with the **Black** wire on the negative (-) terminal.



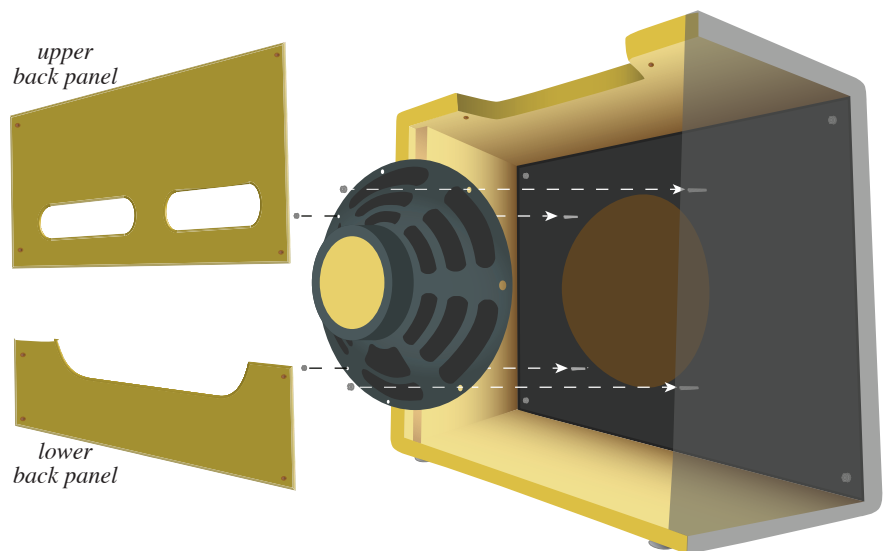
SPEAKER INSTALLATION

○ Remove the upper and lower back panel of the cabinet.

○ Remove the four keps nuts from the speaker studs on the baffle.

○ With the cabinet laying face down, line up the mounting holes on the speaker with the studs on the baffle and carefully install the speaker onto all four studs at the same time.

○ Finger tighten the mounting speaker screws starting with the top left screw, tighten with a screwdriver, then tighten the screw diagonally from it. Then tighten the remaining screws in the same way.



SECTION 13:

INITIAL CHASSIS TESTING

○ **Ensure all solder joints** and connections are good.

○ **Physically inspect every tube socket** closely, making sure there are not any extra wires touching other pins.

○ **Look and listen for loose hardware** by shaking chassis.

○ **Ensure chassis is free from debris** before plugging in. Check for pinched or burnt wire insulation.

○ **Adjust lead dress** so it is easy to see components.

○ **Power amp on** without the tubes installed.

○ **Using a multimeter** set to AC voltage, Check the power transformer secondary AC voltages (at tube socket for filaments). This will be pins 4, 5 and 9 on the preamp tubes and pins 2 and 7 on the 6V6. The voltage here should read high at around 7.5V. If the reading is 0V, shut the power off immediately and look for a short in the heater filament wiring.

○ **Turn amp off and install the tubes.** Make sure when installing the tubes that you line up the guide pin correctly. Plug the speaker into the speaker jack that is closest to the power tubes.

○ **Turn amp on** and allow it to warm up (approximately 10 seconds). Watch for any kind of arcing or smoke from any component or transformer. If you see anything, shut down the amp immediately. Disconnect the amplifier from wall socket, check voltages on the filter capacitors (DC voltage), make sure they are drained, and then recheck your wiring.

○ **Set your multimeter** to its highest DC Voltage setting. Attach the ground / common probe to the metal chassis.

○ **With one hand**, take the positive (**Red**) probe and carefully measure the voltage on pin 8 on the rectifier tube socket and compare it to the voltage on the wiring diagram. Then measure the voltages at the rest of the test points on the wiring diagram.

CAUTION: If you do not have voltages at these points, power down the amplifier, allow the capacitors to drain, DO NOT short them to ground as this can damage the capacitors or cause them to explode. Test with your multimeter to make sure the voltages are below 10V DC before working on the amp.

○ **Check the voltage** on pin 5 of the 6V6 tube. Ensure the voltage reading is near 0V +/- 50mV to avoid “red-plating” of the tubes.

PRO TIP: Red plating occurs when too much current is applied to the plate (anode) of a vacuum tube. It will overheat and glow cherry red. Turn the power off immediately if this happens.

○ **Let the amp idle** on for half an hour or so for the chassis to be warm and do the bump test. A bump test is exactly what it means. Use a non conductive tool, such as a wooden handle of hammer or plastic handle of a screw driver, to hit the edge of the chassis or pick your amp up about an inch and drop it. Don't worry it won't harm your amp. This helps you test for bad solder joints and any loose hardware as well as lets you know if there is a physical problem with one of your tubes.

SECTION 14:

CHASSIS INSTALLATION

○ **Install the 2 chassis mount screws** into mount holes on top of cab. Turning the cabinet upside down may make it easier for chassis installation.

PRO TIP: Be mindful of tweed and tolex when installing. Use painter's tape if you need to at pinch points for the cab, as it can protect from tearing or lifting up the tweed covering.

○ **Make sure** you do not pinch any wires between the chassis screws/nuts, chassis and cabinet. Do not over-tighten the chassis screws as it may deform and weaken the cabinet.

○ **Place the chassis into the cabinet**, lining up holes with mount screws.

○ **Install and hand tighten the keps nuts** for the chassis screws. Do not tighten these two screws yet. Leave them somewhat loose for chassis alignment.

○ **Hold the upper back panel in place** and slide the chassis back so it is flush against the back panel.

○ **Remove the back panel and tighten down** the two chassis mount screws.

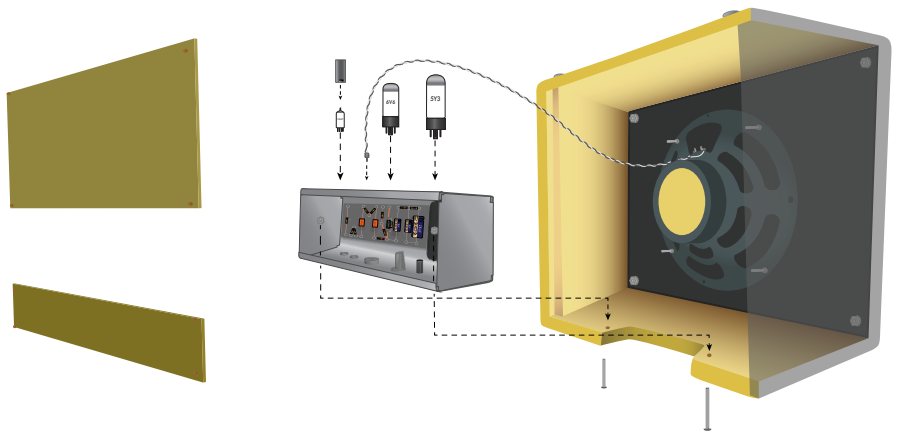
○ **Check chassis alignment** with the back panel in place, adjust as necessary.

○ **Plug speaker into speaker jack** that is closest to the power tubes.

○ **Install the cord strain relief** to the side of the cabinet using #6 screw.

○ **Install tubes and tube shields.**

○ **Install the upper and lower back panels.** Do not over-tighten the screws.



SECTION 15:

SOUND TEST

- **Turn on the amp** and let it warm up.
- **After warm-up**, ensure the tubes are not “red plating.”
- **Rotate all controls fully** and listen for noise. It is normal to have some noise at high volume levels.
- **Plug in an instrument cable** and listen for any crackle, pops, strange oscillations or feedback.
- **Leave on for a while** so the tubes and components can “burn in” - (not literally)
- **ROCK OUT!!!**

CONGRATULATIONS!! You have just built your very own Tweed Champ. There is only one on the planet that is like yours. We hope you have enjoyed this experience and gained knowledge to help you become more confident to build many more amps and spread your knowledge.

SECTION 16:

TROUBLESHOOTING

Depending on the issue you have, you will need to diagnose which part of the circuit is faulty. Try to work the problem analytically, you can make problems worse or create new ones by doing unnecessary repairs. 99% of the time it is simple, a bad solder joint, no solder on joint, capacitor in backwards, etc.. Here are a few resources we suggest.

RESOURCE WEBSITES

- **www.ampwares.com**
The best resource with the most extensive info on most vintage amps.
- **robrobinette.com**
The non-electronic tech's guide to understanding the classic 5E3 tube amplifier and how it works.
- **TDPRI.com**
Telecaster discussion page reissue - various builders are on this forum and a wealth of info for history and help.

RESOURCE LITERATURE

- **Tube Guitar Amplifier Essentials and All About Vacuum Tube Guitar Amplifiers**
by Gerald Weber
Truly must read books by Gerald Weber for any amp tech. You can purchase these at Mojotone.com.
- **The Tube Amp Book**
By Aspen Pitman.
A great resource for schematics and basic tube info. Comes with DVD that has over 800 schematics of vintage tube amp technology.
- **RCA Tube Receiving Manual**
This is one of the books that really started the guitar amp craze. In the back of the book, there are many drawings that will look familiar to you. Leo Fender used this very book to develop his first amps. These are out of print, but you can find them on Ebay and Amazon.

THE MOJO TONE WORKBENCH

WORKBENCH TESTED. AMP PRO APPROVED.

Years of experience and endless passion have driven our team at Mojotone to create the quality products that we offer. Now you can use the tools that we do in your search for perfect tone.



MOJOTONE AMPLIFIER CHASSIS STAND

Using unconventional means to work on your amplifier chassis can be a real pain, and cause unwanted frustration. We here at Mojotone decided we've had enough and created our take on the bench-top repair stand. The final outcome is the item listed above, the Mojotone Amplifier Chassis Stand. Made from 13 ply 3/4" Baltic Birch and completely adjustable, this repair stand will make you wonder how you ever got along without it.

SKU # 616A5951



MOJOTONE SYG A830L DIGITAL MULTIMETER

9V battery is included and pre-installed.

Parameters for Transistors and Continuity:

DC Voltage: 200mV/2V/20V/200V/600V

AC Voltage: 200mV/2V/20V/200V/600V

DC Current: 200uA/2mA/20mA/200mA/2A/10A

Resistance: 200/2K/20K/200K/2M/20M Ohm

SKU # 4152015



WELLER WSA350 BENCH TOP SMOKE ABSORBER

Weller WSA350 120v bench top smoke absorber removes flux fumes from your soldering workbench. Great for workspaces using more active fluxes used with lead-free solder. The fumes are absorbed by the replaceable carbon-activated filter. The stand allows the smoke absorber to be adjusted to varying angles and the fan is quiet and will not add significant noise to the workspace.

SKU # N4T0L107



TUBE AMP DOCTOR TUBE BIAS MASTER

Measures the current of 4x any standard base octal power tubes (6L6, EL34, 6550, etc).

Measures EL84 current with optional noval probe set.

SKU # 4152000



MOJOTONE PICKUP WINDING MACHINE

The most versatile, compact and heavy duty pickup winder available featuring 24DC geared motor; dual H bridge motor driver; uController controlled speed, direction and turns; free mode for manual override; 10 programmable banks; approximately 1800 RPM max speed; magnet gauss sensor; optical counter; and made in the USA.

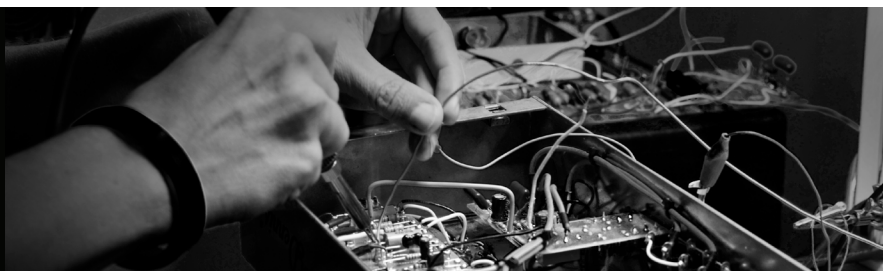
SKU # R3PUW401





READY FOR YOUR NEXT BUILD?

Mojotone has a huge variety of DIY amp kits in every skill level to help you find that vintage sound you are looking for. Here are a few that could be your next project.



GA-5 STYLE COMBO

Mojotone brings the GA-5 circuit back to life with the Mojotone GA-5 Style Kit. Featuring a classic TV Front cabinet, vintage inspired circuit now using a 6V6, 12AX7 and 5Y3 tube compliment – this unsung classic is the perfect amp kit to get you started on your amp building journey. **SKU # 61GA5951**

CLASS TYPE: SINGLE ENDED CLASS A ALL TUBE AMPLIFIER
OUTPUT: ~5W
CIRCUIT: 5F1

BIAS TYPE: CATHODE BIASED
BUILD TIME: 4 HOURS
DIFFICULTY: ●○○○○



TWEED CHAMP 5F1 STYLE COMBO

Mojotone's Tweed Champ Style Amp Kit is based on the beloved 5 watt amp from the 1950s. These amps were perfect for recording and were featured on a wide array of recordings from Joe Walsh's "Rocky Mountain Way" all the way to Derek & the Dominos' "Layla." Modeled after the historic Class-A 6V6 platform, this amp delivers warm tones that are harmonically rich and have a beautiful low volume crunch. **SKU # 61TCK910**

CLASS TYPE: SINGLE ENDED CLASS A ALL TUBE AMPLIFIER
OUTPUT: ~5W
CIRCUIT: 5F1

BIAS TYPE: CATHODE BIASED
BUILD TIME: 4 HOURS
DIFFICULTY: ●○○○○



TWEED DELUXE 5E3 STYLE COMBO

Mojotone's Tweed Deluxe Style Amp is based on the popular 5E3 circuit from the 1950s and is by far our most popular amplifier. These amps were originally designed as medium power amps that would allow a musician to plug in more than one amplified instrument at a time. At higher volumes, this amp produces saturated tones that were adopted as signature tones for the likes of Billy Gibbons, Neil Young, Don Felder, and Larry Carlton. **SKU # 61FTD819**

CLASS TYPE: CLASS A/B ALL TUBE AMPLIFIER
OUTPUT: ~15 WATTS
CIRCUIT: 5E3

BIAS TYPE: CATHODE BIASED
BUILD TIME: 5 HOURS
DIFFICULTY: ●●○○○



TWEED TWIN 5E8-A LOW POWER STYLE COMBO

Mojotone's Tweed Twin Low Power Style Amp Kit is a complete tonal powerhouse. Sporting 45 Watts of power, the amp has all the sweet, vocal qualities and rich dynamic response as the original. Known for being a plug-and-play amp, the 5E8-A circuit has been used most notably by Eric Clapton and has been said to 'cut' more than its higher powered counterpart (Tweed Twin High Power). **SKU # 61TTL031**

CLASS TYPE: A/B ALL TUBE AMPLIFIER
OUTPUT: ~45 WATTS
CIRCUIT: 5E8-A

BIAS TYPE: FIXED
BUILD TIME: 6 HOURS
DIFFICULTY: ●●●○○



TWEED BASSMAN 5F6-A STYLE COMBO

Mojotone's Tweed Bassman Style Amp is based on the late 50s 5F6-A circuit which seems to be the most commonly used of the Bassman circuits. These 40 Watt amps are known for their bold and pristine clean sounds as well as their classic unmistakable dirt. The Bassman is extremely versatile and has been used by tons of iconic guitarists from Mike McCready, of Pearl Jam fame, all the way to Stevie Ray Vaughan himself. **SKU # 61TWK942**

CLASS TYPE: A/B ALL TUBE AMPLIFIER
OUTPUT: ~40 WATTS
CIRCUIT: 5F6-A

BIAS TYPE: FIXED
BUILD TIME: 6 HOURS
DIFFICULTY: ●●●○○



BLACKFACE PRINCETON REVERB STYLE COMBO

The Blackface Princeton Reverb has been a staple in guitar tone since its inception in 1964. The Princeton Reverb was essentially all the good parts of its predecessor, the Tweed Princeton, but with a long-spring reverb and tube-driven tremolo circuit added. Over the years the Princeton Reverb has worked its way into the gear repertoire of many renowned guitarists such as Ryan Adams, Larry Carlton, Glen Campbell, and Tommy Tedesco. **SKU # G1BPR108**

CLASS A/B ALL TUBE AMPLIFIER

OUTPUT: ~12-15 WATTS

CIRCUIT: AA1164

BIAS TYPE: FIXED

BUILD TIME: 5 HOURS

DIFFICULTY: ●●●○○○



BLACKFACE DELUXE REVERB STYLE COMBO

One of our most popular amps, the Mojotone Deluxe Reverb Style Kit, is based on arguably the most widely used guitar amp of all time. Just about every iconic guitarist imaginable has played through a Deluxe Reverb at some point or another, but this amp has been specifically touted by artists such as Mike Campbell, Vince Gill, Jackson Brown, and even Elvis Costello. **SKU # G1BDR092**

CLASS TYPE: A/B ALL TUBE AMPLIFIER

OUTPUT: ~22 WATTS

CIRCUIT: AB763

BIAS TYPE: FIXED WITH AN ADJUSTABLE BIAS POTENTIOMETER

BUILD TIME: 7 HOURS

DIFFICULTY: ●●●●○○



BLACKFACE SUPER REVERB STYLE COMBO

Few amps have rivaled the commanding image and sound of the Super Reverb. Since its introduction in 1963, the Super Reverb has remained highly sought-after due to its unique tonal qualities and extreme versatility. Having a use on stages of all sizes and in any studio situation, the Mojotone Super Reverb style amp has the potential to handle literally any task at hand. **SKU # G1BSR125**

CLASS TYPE: A/B ALL TUBE AMPLIFIER

OUTPUT: ~40 WATTS

CIRCUIT: AB763

BIAS TYPE: FIXED BIAS W/ ADJUSTABLE BIAS POTENTIOMETER

BUILD TIME: 8 HOURS

DIFFICULTY: ●●●●●●



BRITISH 45 WATT STYLE COMBO & HEAD

This was the first amplifier Marshall® ever built, based off of the 5F6A circuit. Favored by blues and rock guitarists, this amp can produce a warm sustain and elegant clean tones, with a pronounced rectifier “sag.” Played by guitar greats such as Angus Young and Gary Moore. **SKU # G145C228**

CLASS TYPE: A/B ALL TUBE AMPLIFIER

OUTPUT: ~45 WATTS

CIRCUIT: M45

BIAS TYPE: FIXED BIAS W/ ADJUSTABLE POTENTIOMETER

BUILD TIME: 6 HOURS

DIFFICULTY: ●●●○○○



BRITISH 18 WATT TMB STYLE COMBO & HEAD

With our TMB mod in place, this take on a classic beast now has a normal channel with high sensitivity and low sensitivity inputs as well as a single volume and single tone control; the second channel has a single input with volume, treble, middle, and bass controls. And don't forget about the master volume! **SKU # G1TMC396**

CLASS TYPE: A/B ALL TUBE AMPLIFIER

OUTPUT: ~18 WATTS

CIRCUIT: 2204 (1974)

BIAS TYPE: CATHODE BIASED

BUILD TIME: 6 HOURS

DIFFICULTY: ●●●●○○



BRITISH NC3015 STYLE COMBO & HEAD

Inspired by some of history's most iconic British amps the Mojotone NC3015 is one of our most unique and articulate amps yet. Based on a familiar Class A EL84 platform, this amp delivers tones that salute some of the greatest guitarists of all time. Whether you're looking for the shimmering highs of George Harrison or the vintage crunch of bands like The Kinks, the NC3015 will not leave you wanting. **SKU # G1TMC396**

CLASS TYPE: A/B ALL TUBE AMPLIFIER

OUTPUT: ~15 WATTS

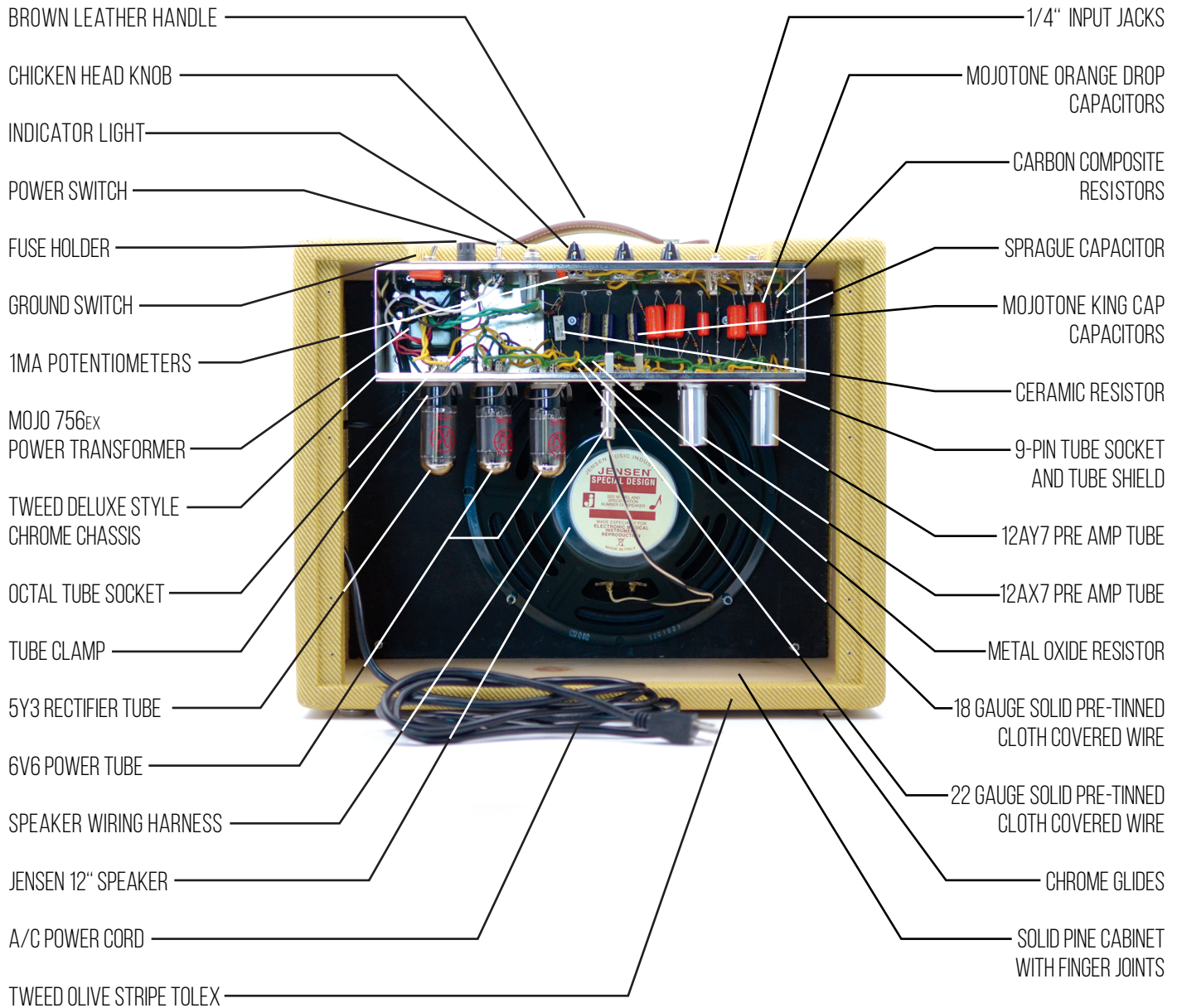
BIAS TYPE: CATHODE BIASED

BUILD TIME: 7 HOURS

DIFFICULTY: ●●●●○○



IT STARTS WITH PARTS.



BUILD. MODIFY. REPAIR.

MOJOTONE.COM

THE HEAVY HITTERS

Everyone needs at least one guitar that absolutely SLAMS! Over the years, Mojotone has developed a line of heavy-hitting pickups that never fail to melt faces and bring down houses. If you're looking to add some extra punch to one of your favorite guitars, Mojotone's lineup of high output pickups have the tones that knock 'em down while retaining articulation and musicality in every note.

CLASSIC HOT

PW HORNET

DW TOMAHAWK

44 MAGNUM

mojo GUITAR
TONE TECH.

BUILD. MODIFY. REPAIR.

MOJOTONE.COM