’66 D-REVERB 22W
COMBO AMP KIT
ORIGINAL AB763 CIRCUIT

ASSEMBLY INSTRUCTIONS

StewMac® ICON KITS

Contents

’66 D-REVERB 22W

COMBO AMP KIT ORIGINAL AB763 CIRCUIT

For many players, this is the #1 desert island amp!

Be excited!

Your new StewMac ’66 D-Reverb will be a blast to play through and even more fun to build.

Perfect for recording as well as performing, the D-Reverb produces stinging clarity that absolutely refuses to get lost in the mix.

This amp is an ICON

One of the most popular designs ever, this amp lives in the happy middle between bright clarity and rich distortion. It excels in the studio and on the stage. While capable of crystal clear tones at good volume, you can push this one into beautifully saturated, play-sensitive distortion.

It’s all here: clarity, distortion, and rectifier tube sag.

StewMac® ICON KITS

StewMac ICON KITS bring classics that are no longer made, or are simply unaffordable, within reach. And the best part is you get to build them with your own hands.

We give painstaking attention to parts selection, authentic materials, and instantly recognizable details—everything that makes the originals so sought after.

Build it with StewMac

These immersive instructions walk you through every step of creating your ’66 D-Reverb. And you’ll learn a lot, gaining a deep knowledge of your amp’s inner workings.

Follow our steps closely for safety, too: we’ve carefully laid out a path that even newcomers can follow in handling electrical components.

Building an amp can seem daunting, but nobody makes it easier than StewMac. Watch for helpful tips along the way, too—we’re here to help!

Let's get building!

Here's how to build this amp!

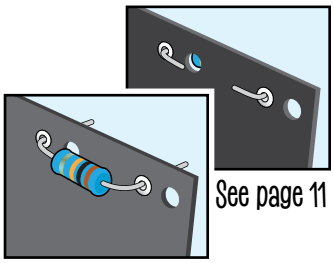
Quick look:

Sort your components by type, using the **parts list**.

Get the **cabinet** ready, starting at **Step 1** on page 8.

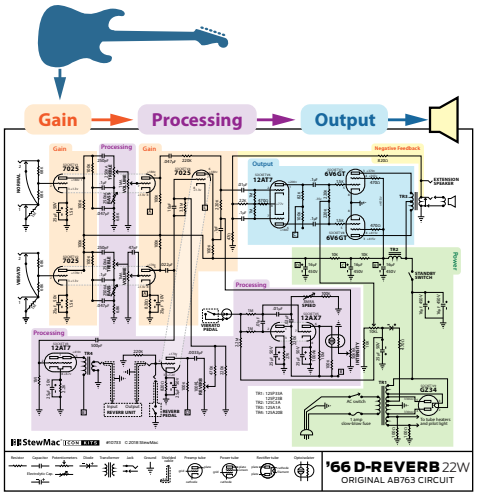
You'll prep the metal **chassis** and the **eyelet board** too.

Wiring goes like this:



See page 11

1. First, you'll **wrap** the leads, connecting them without solder.
2. Then **double-check** all the connections. Don't rush!
3. When everything checks out, it's time to **solder**. The numbered steps tell you when.



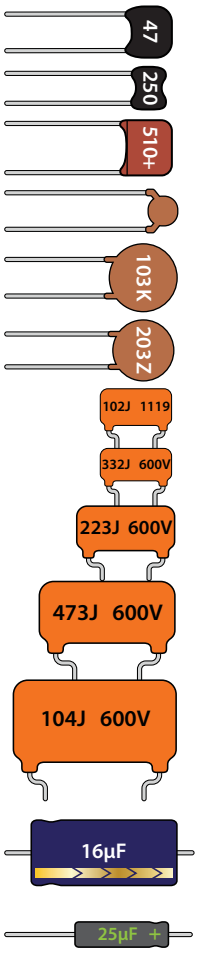
Learn more:
You don't need to read the **schematic**, but it's fun!
See how your guitar's signal gets processed into sound on **page 59**.

Parts list

Resistors

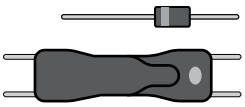
- ☐ (1) 47Ω .5W carbon composite
- ☐ (2) 100Ω .5W carbon composite
- ☐ (1) 470Ω .5W carbon composite
- ☐ (3) 820Ω .5W carbon composite
- ☐ (4) 1.5K .5W carbon composite
- ☐ (1) 2.2K .5W carbon composite
- ☐ (1) 2.7K .5W carbon composite
- ☐ (2) 6.8K .5W carbon composite
- ☐ (1) 10K .5W carbon composite
- ☐ (1) 22K .5W carbon composite
- ☐ (4) 68K .5W carbon composite
- ☐ (1) 82K .5W carbon composite
- ☐ (12)100K .5W carbon composite
- ☐ (7) 220K .5W carbon composite
- ☐ (1) 470K .5W carbon composite
- ☐ (7) 1M .5W carbon composite
- ☐ (1) 2.2M .5W carbon composite
- ☐ (1) 3.3M .5W carbon composite
- ☐ (3) 470Ω 1W carbon film
- ☐ (1) 10M 1W carbon film
- ☐ (2) 10K 2W metal oxide

Capacitors



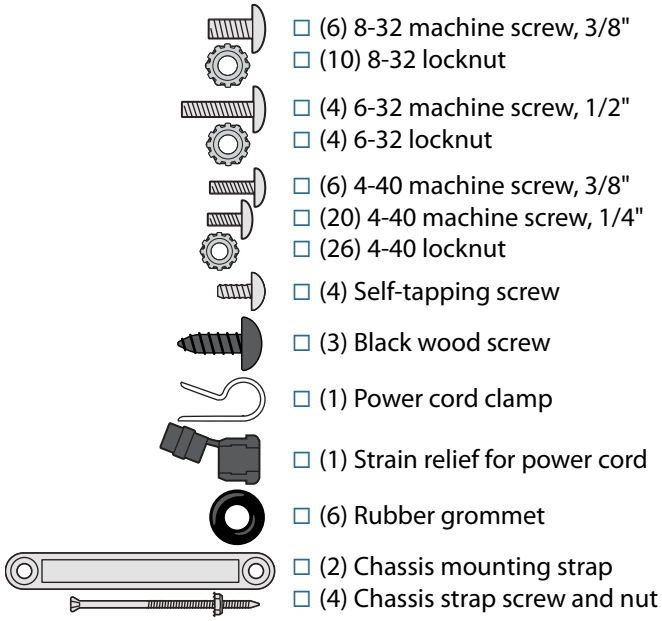
- ☐ (1) 47pF 500V silver mica
- ☐ (2) 250pF 500V silver mica
- ☐ (1) 500pF 500V silver mica
- ☐ (1) 10pF 500V ceramic disk
- ☐ (2) .01µF 500V ceramic disk
- ☐ (1) .02µF 500V ceramic disk
- ☐ (1) .001µF 600V Orange Drop
- ☐ (1) .0033µF 600V Orange Drop
- ☐ (1) .022µF 600V Orange Drop
- ☐ (4) .047µF 600V Orange Drop
- ☐ (6) .1µF 600V Orange Drop
- ☐ (5) 16µF 500V electrolytic
- ☐ (8) 25µF 50V sprague atom

Diode, optoisolator

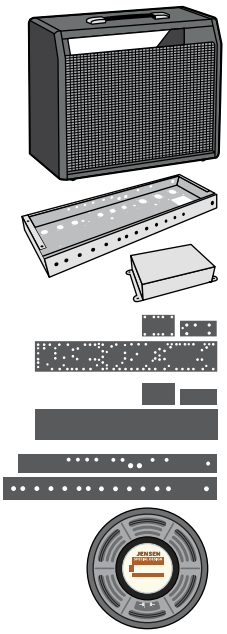


- ☐ (1) 1N4007 1000V rectifier diode
- ☐ (1) Optoisolator

Hardware



- ☐ (6) 8-32 machine screw, 3/8"
- ☐ (10) 8-32 locknut
- ☐ (4) 6-32 machine screw, 1/2"
- ☐ (4) 6-32 locknut
- ☐ (6) 4-40 machine screw, 3/8"
- ☐ (20) 4-40 machine screw, 1/4"
- ☐ (26) 4-40 locknut
- ☐ (4) Self-tapping screw
- ☐ (3) Black wood screw
- ☐ (1) Power cord clamp
- ☐ (1) Strain relief for power cord
- ☐ (6) Rubber grommet
- ☐ (2) Chassis mounting strap
- ☐ (4) Chassis strap screw and nut

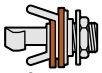


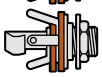
- ☐ (1) Cabinet
- ☐ (1) Chassis
- ☐ (1) Capacitor pan
- ☐ (3) Eyelet boards
- ☐ (3) Insulator boards
- ☐ (1) Faceplate/backplate set
- ☐ (1) 12″ speaker

Parts list

Tubes, lamps, fuses, and sockets

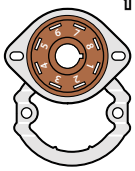

☐ (4) RCA-style jack


☐ (1) Two-lug jack

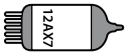

☐ (5) Three-lug jack


☐ (6) Nine-pin tube socket

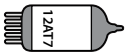

☐ (6) Shield for nine-pin tube socket


☐ (3) Eight-pin tube socket

☐ (3) Tension clip for eight-pin socket



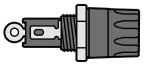
☐ (4) 12AX7 preamp tube (also called ECC83S)



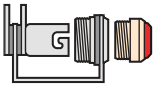
☐ (2) 12AT7 preamp tube (also called ECC81)

☐ (2) 6V6S power tube

☐ (1) 5AR4 rectifier tube (also called GZ34)

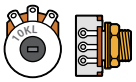

☐ (1) Fuse socket


☐ (1) Fuse (1 amp, slow blow)

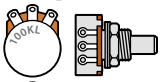

☐ (1) Pilot lamp socket with lens


☐ (1) Pilot lamp bulb (#47)

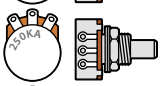
Control pots and more



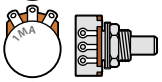
☐ (1) 10KL bias pot



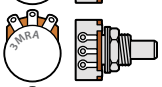
☐ (1) 100KL control pot



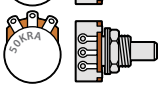
☐ (4) 250KA control pot



☐ (2) 1MA control pot

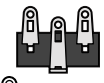


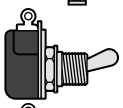
☐ (1) 3MRA control pot

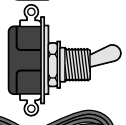


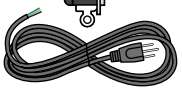
☐ (1) 50KRA control pot

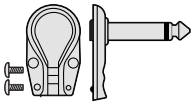

☐ (9) Knob


☐ (2) Three-lug grounding strip


☐ (2) Power switch (2 lugs)


☐ (1) Ground switch (3 lugs)


☐ (1) Power cord


☐ (1) Speaker plug

Wire


☐ (1) Heater wires (pre-tinned)


☐ (1) Speaker wires (multi-strand)


☐ (1) Yellow push-back wire

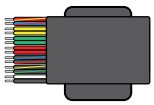

☐ (1) Green push-back wire

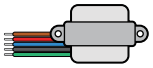

Vintage-style **push-back wire** lets you push the insulation back instead of trimming it.
BUT: Trimming it still works better!

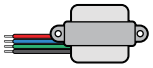
Heat-shrink tubing

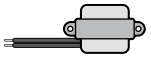

☐ (2) 1/8" diameter

Transformers

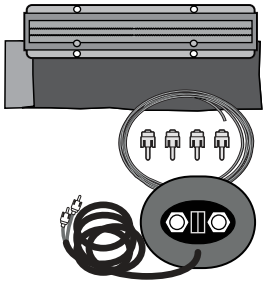

☐ (1) Power transformer


☐ (1) Output transformer


☐ (1) Reverb driver


☐ (1) Filter choke

Reverb


☐ (1) Reverb tank

☐ (1) Reverb tank bag

☐ (1) Reverb wiring kit

☐ (1) Footswitch

Tools and supplies

Required

Phillips screwdrivers, #1 and #2
Item #3000 Guitar Tech Screwdriver Set

Needle nose pliers
Item #1610 Long Nose Pliers

Wire cutter
Item #1607 Wire Cutter

Wire stripper
Item #1606 Wire Stripper

Soldering iron (preferably 40W)
Item #0501 Solomon SL-30 Soldering Station

Solder (at least one Pocket-Pak)
Item #0505 Kester Pocket-Pak Solder

Solder sucker
Item #0503 Solomon Solder Sucker

Drill with a 5/32", 5/64", and 1/4" bit
For mounting eyelet board and filter cap

Ruler
Item #4905 StewMac Shop Rule

Digital multimeter
Item #3618 Fieldpiece Pocket Multimeter

Snuffer stick (bleed resistor)
Item #1552 Snuffer Stick

Pencil

Wooden chopsticks

Glue
Wood glue, white glue, or contact cement for gluing a paper label inside the cabinet

Butane lighter or matches
For heating heat-shrink tubing

Helpful

Round nose bending pliers
Item #1609 Round Nose Bending Pliers

Solder wick
Item #0504 Solder Wick, 5-foot roll

Soldering aids
Item #0521 StewMac Soldering Aids

Soldering stand
Item #0506 Solomon Soldering Stand

Solder Monster, or helping hand tool
Item #0531 StewMac Solder Monster

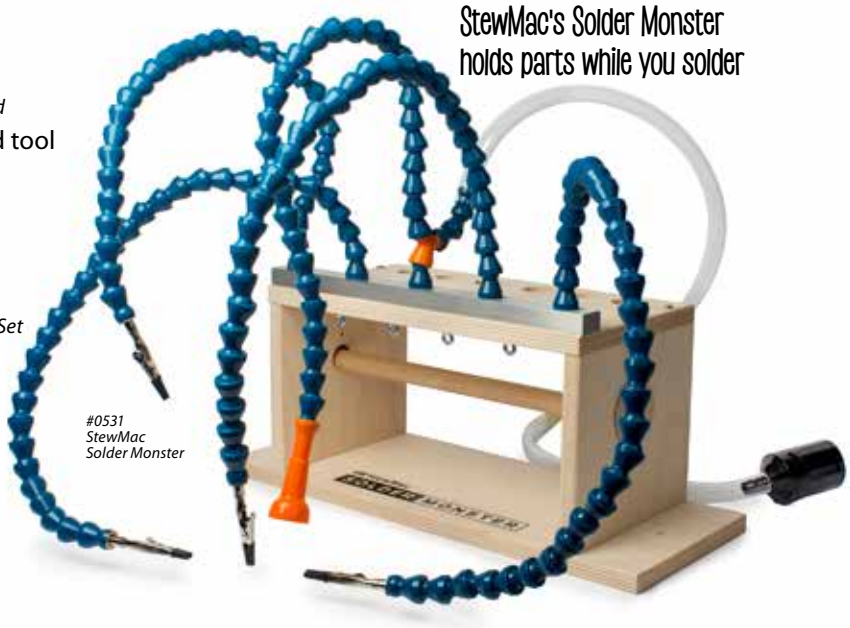
Chassis stand
Item #10750 Chassis Stand

Printed circuit board vise

Scratch awl or center punch
Item #3000 Guitar Tech Screwdriver Set

Tray for loose parts

Bias meter for accurate biasing
Item #1580 VHT Tube Tester + Amp Bias Meter



Amp voltages are seriously dangerous!

High voltage, even when unplugged

When you turn on an amp, the capacitors are designed to take on a charge and hold it. That stored voltage is enough to injure you seriously, or even kill you.

These components aren't a threat until the first time you plug the amp in. The stored electricity can be safely discharged to ground with a snuffer stick. See how to use it below.

Once your amp has been turned on, don't touch the wiring with your bare hands—even after turning it off. If you need to press on a contact, use a chopstick or Sharpie marker, which are both non-conductive. Don't use a pencil, because graphite is conductive.

It's important that you understand the dangers so you're working safely. Here's how to do it right.

Wear rubber-soled shoes

Rubber soles increase the insulation between yourself and the ground.

Take off your ring

A metal ring on your finger can bridge a hot connection to ground.

Professionals who work on amps take these safety habits very seriously

Wear safety glasses

Rosin-core solder sometimes bubbles up, and it can spew molten specks into the air. You don't want molten solder in your eyes.

It's better not to work alone

Electrical shocks can incapacitate you, and having someone available to call 911 can be a lifesaver.

Take breaks and stop when you're tired

Fatigue leads to mistakes, and no one can afford mistakes when working with electricity.

Stay suspicious

Whether it's the first time you've been inside a live amplifier or the 100th time, don't become complacent. If you discharge the caps and walk away for a few minutes, check again for residual voltage when you return. Capacitors can self-charge through a phenomenon known as dielectric memory.

Check before powering on

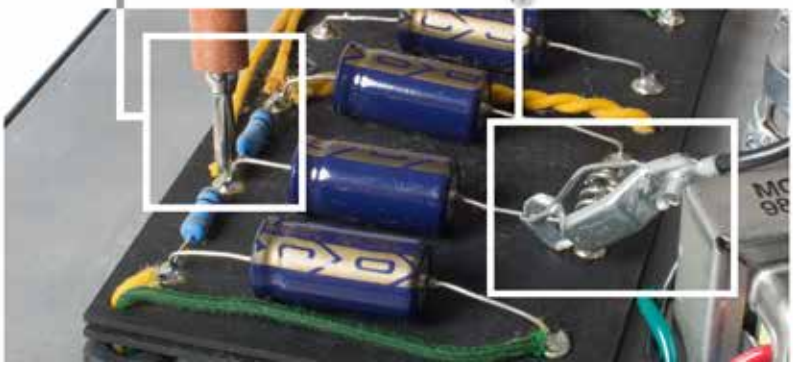
It's easy to forget that you a left a stray tool or wire in the chassis. It's also easy to forget to re-attach the speaker wire, and that can fry an output transformer in seconds. Constant vigilance is your friend when working on amps.

Always unplug it

Unplug the amp whenever you don't specifically need it plugged in. Some points are always hot when the amp's plugged in, even if the power switch is off. These points include the lugs on the fuse socket, power switch, and standby switch.

How to use a snuffer stick

To discharge a capacitor, clip the snuffer stick lead to ground—preferably a mounting bolt on the power transformer. Hold the tip of the stick to the cap's positive lead and use your multimeter to watch the voltage drain to less than 18V.



How to read resistor values

A resistor's value—the amount of resistance it creates—is rated in ohms (Ω). Larger ohm values mean more resistance. For example, a 100Ω resistor creates ten times as much resistance as a 10Ω resistor.

The resistors used in amplifiers are too small to have value numbers printed on them. Instead, a system of colored bands tells their values. The key to reading these bands is provided below. However, an easier way to decode these bands is to download one of the many smartphone apps for this purpose.

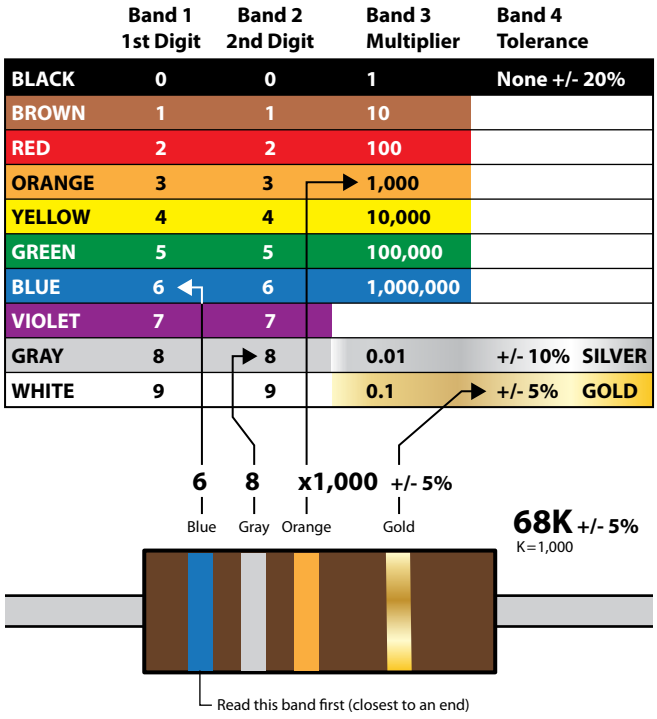
One band will be the nearest to an end of the resistor. That band tells the first value. Combine it with the value of band 2 to get a two-digit number (68 in our example below). Multiply that number by band 3 (68 x 1,000 = 68,000). Thousands are represented by the letter K, so this resistor is 68K (kilo-ohms, or KΩ).

If there is a fourth band, it will be either silver or gold. This indicates the tolerance allowed during manufacturing. The resistors used in this kit have a +/- 5% tolerance, represented by a gold band 4.

A magnifying glass helps a lot. The bands on a 470Ω resistor are yellow/violet/brown, and the bands on a 47K resistor are yellow/violet/orange. They're easily confused!

Can't read the colors?

You can always use a multimeter to test a resistor's value. Set your meter to ohms and connect the test leads on each side of the resistor.



Capacitor values

Capacitor values are typically printed on the component. The key values with caps are their capacitance and voltage.

Think of a capacitor as a container that can hold electricity. Capacitance, measured in farads, refers to how much electricity this container can hold—its capacity. One farad (1F) would be much too large for use in an amplifier. Caps for amps are rated in millionths of a farad, called microfarads (µF), or trillionths of a farad: picofarads (pF). The voltage spec for a cap refers to how much DC voltage it can handle at any given time.

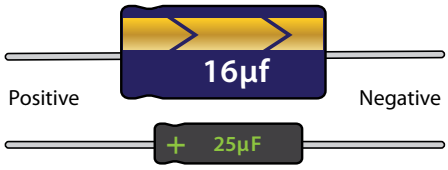
A unique property of capacitors is that they don't allow DC current to flow past them, only AC current. This is important in parts of an amplifier circuit, such as the path between a preamp stage and a power amp stage. Here, a "coupling capacitor" will block DC voltage, allowing only the AC guitar signal to pass.

Filter caps

Capacitors also filter out 60Hz hum, or "ripple," after the AC current from the wall is converted to DC. These capacitors are called filter caps, because they filter out the ripple from a power supply. The filter caps in this amp are the 16µF electrolytic capacitors.

Electrolytic caps

Electrolytic capacitors contain electrolyte: a liquid or gel that gives them a large storage capacity. Electrolytic caps are typically polarized.



Polarized caps

Some capacitors have polarity and some don't. It's extremely important to install polarized caps correctly in a circuit. The positive lead of an electrolytic cap will be indicated by an indented ring around one edge of the capacitor. The negative lead will often be indicated by a band of arrows pointing to the negative lead.

Installing capacitors with the polarity backwards will make the circuit malfunction and quickly destroy the capacitor—even causing it to explode.

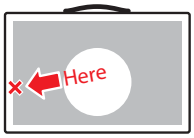
Start by prepping the cabinet

Remove the cabinet's two back panels to prepare for installing the speaker.

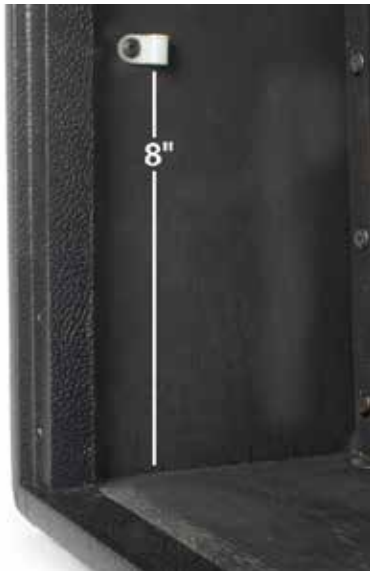
☐ STEP 1

Mount the power cord clamp

Drill a 5/64" pilot hole to mount the power cord clamp. Locate the clamp inside the left wall of the cabinet, 1" from the back panel ledge, 8" from the bottom.



Back



Don't drill through the cabinet! Use a piece of masking tape on your drill bit to mark the depth, or use a StewMac Depth-stop Drill Bit (item #1712).

Use the black wood screw to mount the power cord clamp. You'll secure the power cord with this clamp later, after the testing.

☐ STEP 2

Solder the speaker plug

On the black and white speaker leads, push the insulation back 3/8". Solder the white positive lead to the tip lug (center of the plug).

Trim the black lead and solder it to the sleeve lug. The solder joints need to be neat so they won't short against the metal case. See "Tips for great soldering" on page 11.

Reassemble the plug and do a continuity test with your multimeter to make sure there's no connection between the plug's tip and its metal case (see page 53).

☐ STEP 3

Solder the speaker leads

Twist the speaker leads together to keep them neat.

Push the insulation back 3/8" and insert the white lead into the speaker's positive terminal and the black lead through the negative terminal.

Before soldering these leads, place a business card or other protection under the terminals to prevent solder dripping onto the speaker cone. Solder the two leads to the speaker terminals.

☐ STEP 4

Install the speaker

Remove the nuts from the four speaker-mounting screws. Carefully slide the speaker onto the mounting screws until it's flush with the front panel.

Install the four speaker-mounting nuts so they're lightly touching the speaker frame.

Do not tighten the nuts in a circular pattern around the speaker, because this can warp the speaker frame.

Instead tighten one nut with a quarter turn so it's just snug, then do the same to the opposite side. Then snug the third nut and fourth. Repeat this criss-cross pattern of quarter-turns until all four nuts have had one full turn. This will give proper tension to compress the speaker gasket. Overtightening can warp the frame, damage the cone, and cause unwanted distortion.

☐ STEP 5

Install faceplate + backplate

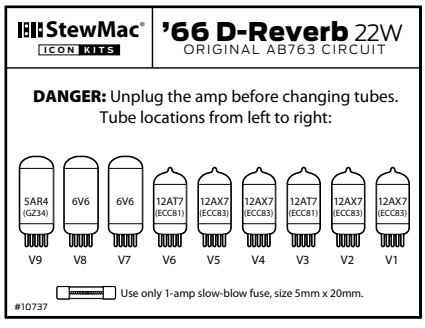
Secure the faceplate by putting the normal channel volume and bass control pots in their holes and sliding the faceplate over them. Install washers and nuts on the pots to hold the plate in place.

Use the 1MA pot for volume and a 250KA pot for bass. Install them with their lugs facing up for soldering. See the wiring diagram on Page 12.

Install the backplate the same way, using the two-lug extension speaker jack and the three-lug ground switch.

This switch is just for looks, because ground switches are not needed in modern amps with three-wire grounding power cords. But having it there keeps the vintage 1960s look.

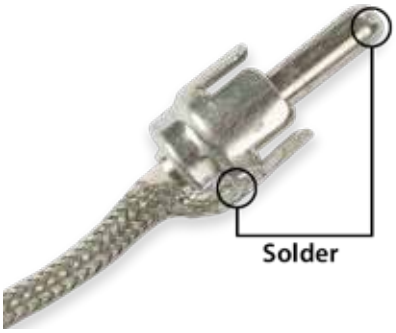
Mount the ground switch so it toggles left/right rather than up/down.



☐ STEP 6

Glue the tube placement chart

Cut out the tube replacement chart on page 63. Put a thin coat of glue or contact cement on the back and glue it to the inside wall of the cabinet.



☐ STEP 7

Reverb wiring kit

The shielded wire is in two 3-foot lengths. At the ends of each piece, pull 3/4" of the wire mesh shielding away to one side and strip away 3/8" of the internal cloth shielding. Insert the exposed wire into an RCA plug so that it reaches the tip of the center post.

Solder this lead in place at the tip of the plug. Don't leave solder on the outside of the plug tip, which would keep it from fitting into the jack. See "Tips for great soldering" on page 11.

After the plug tip cools and the inside solder joint is set, solder the braided wire shielding onto the outside of the plug. Solder the four RCA plugs this way, on each end of the two cables.

These two cables will connect the reverb tank.

Test for continuity between the tips of the plugs on each cable, then test for continuity between the shields of the plugs in the same way.

Also test to make sure you don't have continuity between the tip and the shield of each plug, which would indicate a short in the cable. If your multimeter finds unwanted continuity, the likely culprit is the inside (tip) wire shorting to the outer shield. If that happens, de-solder the tip connection and redo that solder joint.

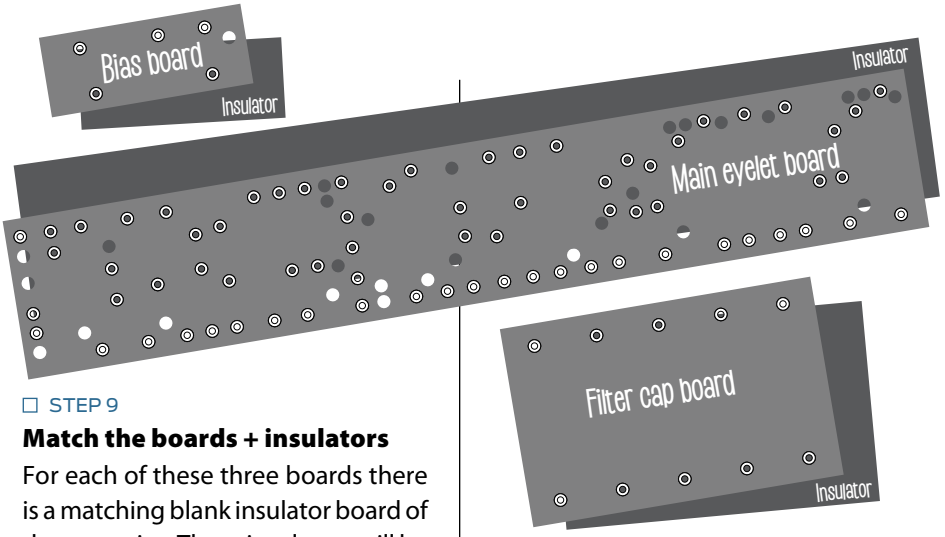
Prepping the eyelet boards

This circuit is built on three eyelet boards: the large main eyelet board, the middle-sized filter cap board, and the small bias board. Gather those three boards now.

☐ STEP 8

Number the eyelets and holes

In these instructions, we'll refer to the eyelets and holes on the main eyelet board by number. On the bias board and filter cap board, we'll use letters. Orient the boards as shown below and use a pencil to add the numbers and letters.

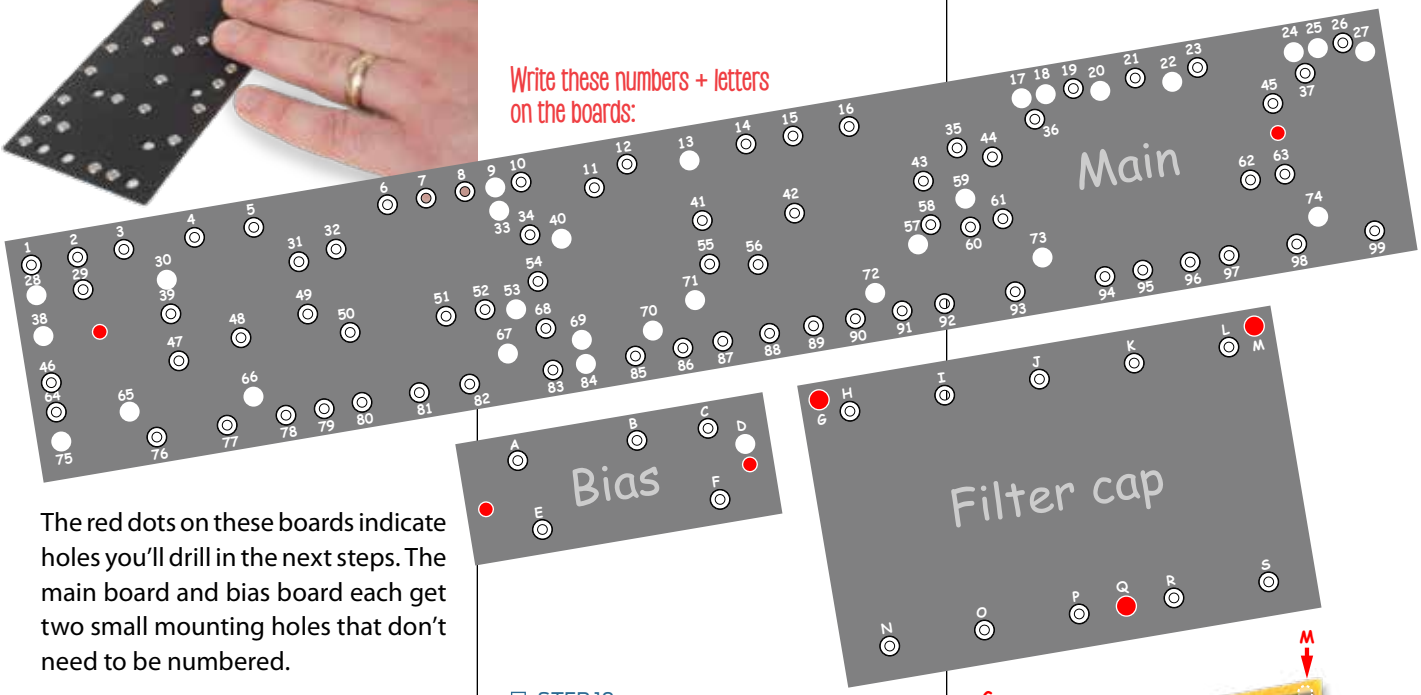


☐ STEP 9

Match the boards + insulators

For each of these three boards there is a matching blank insulator board of the same size. These insulators will be mounted behind the eyelet boards to keep the electrical connections from touching the metal chassis.

Align the three insulator boards behind their eyelet boards. Tape the pairs of boards together, to keep them aligned for the next step.



The red dots on these boards indicate holes you'll drill in the next steps. The main board and bias board each get two small mounting holes that don't need to be numbered.

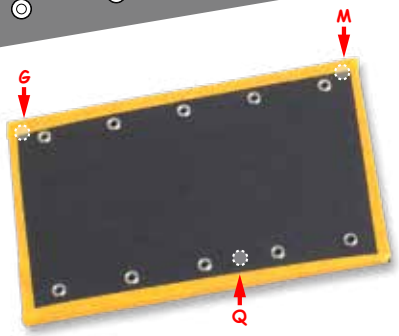
The filter cap board will get three holes drilled for wires to pass through (holes G, M, and Q). Even though those holes aren't there yet, mark the letters as shown while labeling the rest of the holes.

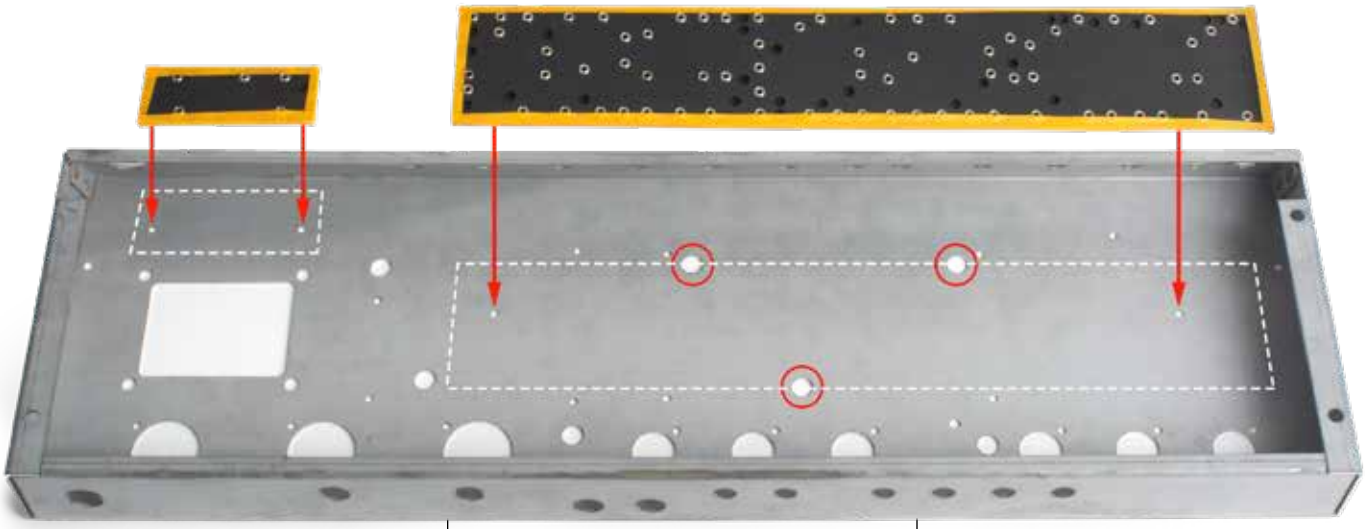
☐ STEP 10

Drill the filter cap boards

Drill 1/4" holes in the two upper corners of the taped-together filter cap board and insulator (holes G and M). Drill a third 1/4" hole centered between eyelets P and R (hole Q).

Separate the boards and set the insulator board aside.





☐ STEP 11

Drill the bias boards

The small bias board mounts near the front left corner inside the chassis as indicated by the dotted line in the photo above. Center the taped bias board and insulator over the two mounting holes. Holding the boards in place inside the chassis, use a sharp pencil from the outside to mark the location of the two mounting holes onto the boards. Drill two 3/16" mounting holes, then separate the boards and set the insulator aside.

☐ STEP 12

Drill the main boards

The main eyelet board needs to be centered between the grommet holes circled in red above.

The right end of the board is 1/2" from the side of the chassis. Position the taped main board and insulator as indicated by the dotted lines.

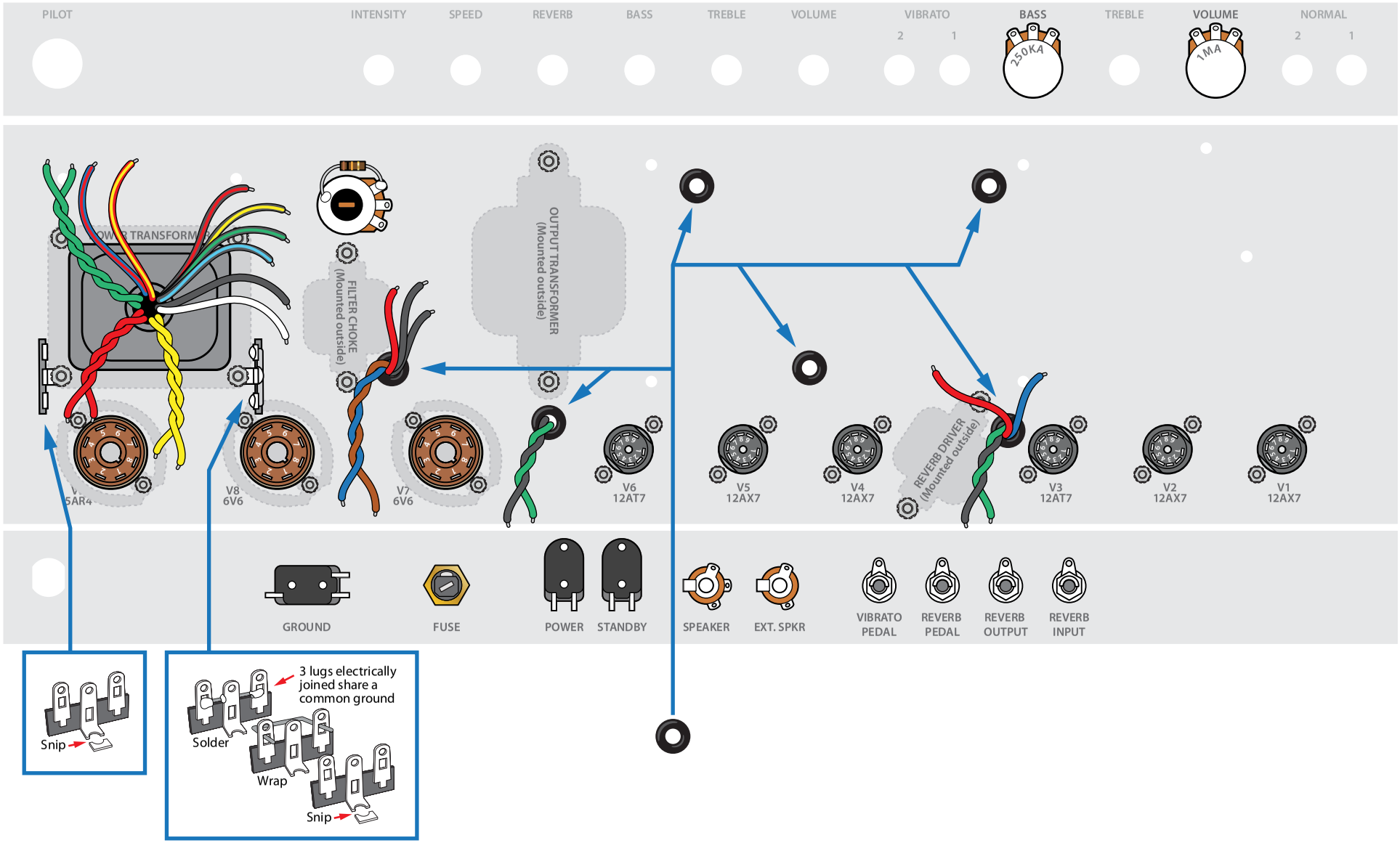
Mark the mounting holes as you did with the bias boards. Drill two 3/16" mounting holes through these boards and set the insulator aside.

Tips for great soldering!

- Don't think of solder as glue. Good mechanical connections make good electrical connections. Solder's job is to finalize an already good joint, not to hold the parts on the board. So wrap the leads tightly for good electrical contact before soldering.
- Melt a small amount of solder onto the tip of the iron ("tinning" the iron). Hold the tip against the joint for a few seconds, until the connection reaches soldering temperature.

Also tin component leads like multi-strand wires to help the solder flow.

- Keep your soldering tip clean by wiping it often on a damp sponge. Keep it tinned by occasionally melting a little solder onto it.
- Feed solder to the connection not to the iron. Keep the iron on the connection for a second longer to allow time for all of the flux to cook out of the joint.
- Don't ever blow on the hot solder or touch anything until the joint is completely cool. A good solder joint is shiny—a sign that it was left to cool undisturbed.
- Trim away the excess wires after the joint has cooled.
- Plan ahead so each joint is only soldered once. Resoldered joints are messy and more likely to fail.
- Position the parts so their specs face out so you can read them later. Many builders also align resistor bands to read in the same direction.
- How much insulation to strip? With plastic insulation, strip 3/8" from the wire ends. Push-back wire works best when you strip away about 1/4" of the cloth wrap.



Installing the chassis-mounted components

☐ STEP 13

Install six rubber grommets

Squeeze these into the six holes as shown. These provide strain relief for the wires that will pass through the metal chassis.

☐ STEP 14

Wire the power transformer

The power transformer has fourteen leads including three matching pairs: red/red, green/green, and yellow/yellow. Twist these same-color pairs together.

The power transformer also has a single red/yellow striped lead and a single blue/red striped lead. Move these aside—they'll be connected later.

This transformer is adaptable to different voltages around the world. To wire it for your location, twist the black lead together with one of the remaining five leads, depending on the electrical system where you live:

100V: black/blue striped
120V: white
220V: black/yellow striped
230V: black/green striped
240V: black/red striped

For North America (120V), twist the white wire together with the black wire; the remaining four wires will not be used. Since they carry voltage, they must be safely terminated. We'll do this in Step 38. Uncover the mounting bolts and install the transformer on the outside of the chassis, with four 8-32 locknuts inside.

☐ STEP 15

Mount the two 3-lug grounding strips

With a wire cutter, snip the mounting holes on both grounding strips. Cut a 1" piece of green wire and remove the insulation. Wrap and solder the wire on one of the grounding strips as shown, electrically connecting all three lugs. Mount the two grounding strips under the locknuts: the one with the connected lugs goes on the inside/rear corner.

☐ STEP 16

Mount the output transformer

The output transformer has red, blue, brown, black, and green leads. Twist the brown and blue leads together and the green and black leads together.

Thread the green and black leads through one rubber grommet as shown. Thread the red, brown and blue leads through the grommet to the left as shown.

Use two 8-32 machine screws and locknuts to mount the transformer to the outside of the chassis.

☐ STEP 17

Mount the reverb driver

The reverb driver has red, blue, green, and black leads. Thread all four leads through the one grommet and twist the green and black leads as shown.

Use two 8-32 machine screws and locknuts to mount the reverb driver to the outside of the chassis.

☐ STEP 18

Mount the filter choke

The filter choke has two black leads. Thread them through the grommeted hole with the red, blue, and brown output transformer leads.

Use two 8-32 machine screws and locknuts to mount the filter choke outside of the chassis.

☐ STEP 19

Install the speaker output jack

Add the three-lug speaker output jack next to the two-lug extension speaker jack, which you've already installed.

These jacks are electrically grounded through contact with the metal chassis, so tighten them well for a good ground.

☐ STEP 20

Install the three large tube sockets with tension clips

Orient these eight-pin tube sockets so that pin 1 is closest to the rear panel of the chassis.

Use two 4-40 x 3/8" machine screws and locknuts to mount these sockets on the outside of the chassis. Include a tension clip on the bottom of each socket to provide support for the three tubes when they're installed later.

☐ STEP 21

Install the six small tube sockets

Use two 4-40 x 1/4" machine screws and locknuts to mount the six remaining tube sockets. Position these sockets so pin 3 is closest to the rear panel of the chassis.

☐ STEP 22

Install the bias pot + one resistor

Mount the 10KL bias pot in the floor of the chassis as shown. Wrap one lead of a 10K resistor through the left lug of the bias pot and solder it into place. Solder the other lead of this resistor to the housing of the bias pot. It doesn't matter which direction this resistor is installed, because resistors aren't polarized.

☐ STEP 23

Install the fuse socket

Mount the fuse socket so its side lug faces the open side of the chassis. This orientation makes it easier to solder later.

☐ STEP 24

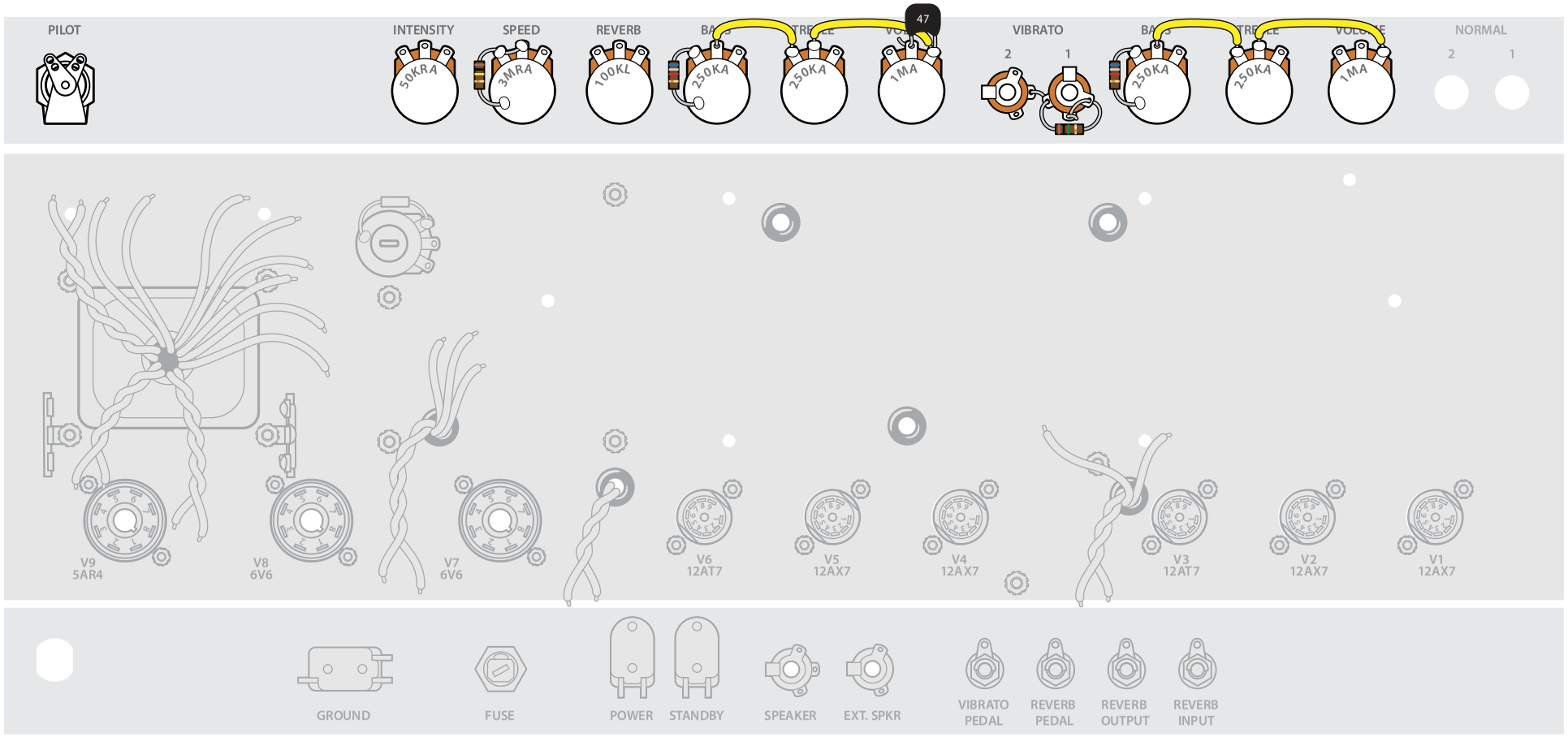
Install the power switch + the standby switch

Mount the power switch and the standby switch with their lugs facing up for easy soldering later.

☐ STEP 25

Install the four RCA jacks

Mount the RCA jacks to the chassis with the large washers on the outside. Once installed, bend the grounding tabs slightly away from the inside of the chassis.



☐ STEP 26

Install the pilot lamp socket

Mount the socket by screwing the lens from the outside into the socket assembly. Position the socket so the arm supporting the lamp faces the side wall of the chassis and the tabs face up for soldering.

Some amp builders add a drop of glue to the mounting threads to keep vibrations from high-volume playing from loosening the socket.

☐ STEP 27

Install the remaining control pots

Mount the control pots so their three lugs are facing the chassis opening . When we refer to these lugs as left or right, it's assuming you're looking at the pot from the same point of view as the wiring diagram . Mount them as follows:

Vibrato Channel Intensity: 50KRA pot
Vibrato Channel Speed: 3MRA pot
Vibrato Channel Reverb: 100KL pot
Vibrato Channel Bass: 250KA pot
Vibrato Channel Treble: 250KA pot
Vibrato Channel Volume: 1MA pot
Normal Channel Treble: 250KA pot

☐ STEP 28

Install two resistors

Run one lead of a 100K resistor up through the bottom of the left lug of the speed pot and wrap it down through the middle lug of the same pot. Solder the resistor lead to both lugs.

Solder the other lead of this resistor to the back of the speed pot.

Wrap one lead of a 6.8K resistor through the left lug of the vibrato channel bass pot and solder the lead to this lug.

Solder the 6.8K resistor's other lead to the back of the vibrato channel bass pot.

☐ STEP 29

Install one capacitor + one resistor

Run one lead of the 47pF capacitor through the middle lug of the vibrato channel volume pot. Run the other lead of this cap through the right lug of the vibrato channel volume pot. Wrap these leads around these lugs but do not solder them yet.

Wrap one lead of a 6.8K resistor through the left lug of the normal channel bass pot and solder the lead to this lug.

Solder the 6.8K resistor's other lead to the back of the normal channel bass pot.

☐ STEP 30

Install two jumpers

Cut two 2" yellow jumpers.

Wrap one end of the first jumper through the middle lug of the vibrato channel bass pot and wrap the other end of this jumper through the left lug of the vibrato channel treble pot. Solder this lead in to the left lug of the treble pot but not the middle lug of the bass pot.

Wrap one end of the other jumper through the middle lug of the vibrato channel treble pot and the other end of the same jumper through the right lug of the vibrato channel volume pot. Solder this lead into both lugs.

☐ STEP 31

Install two more jumpers

Cut two more 2" yellow jumpers.

Wrap one end of the first jumper through the middle lug of the normal channel bass pot and wrap the other end of this jumper through the left lug of the normal channel treble pot. Solder this lead into the left lug of the treble pot but not the middle lug of the bass pot.

Wrap one end of the other jumper through the middle lug of the normal channel treble pot and the other end of the same jumper through the right lug of the normal channel volume pot. Solder this lead into both lugs.

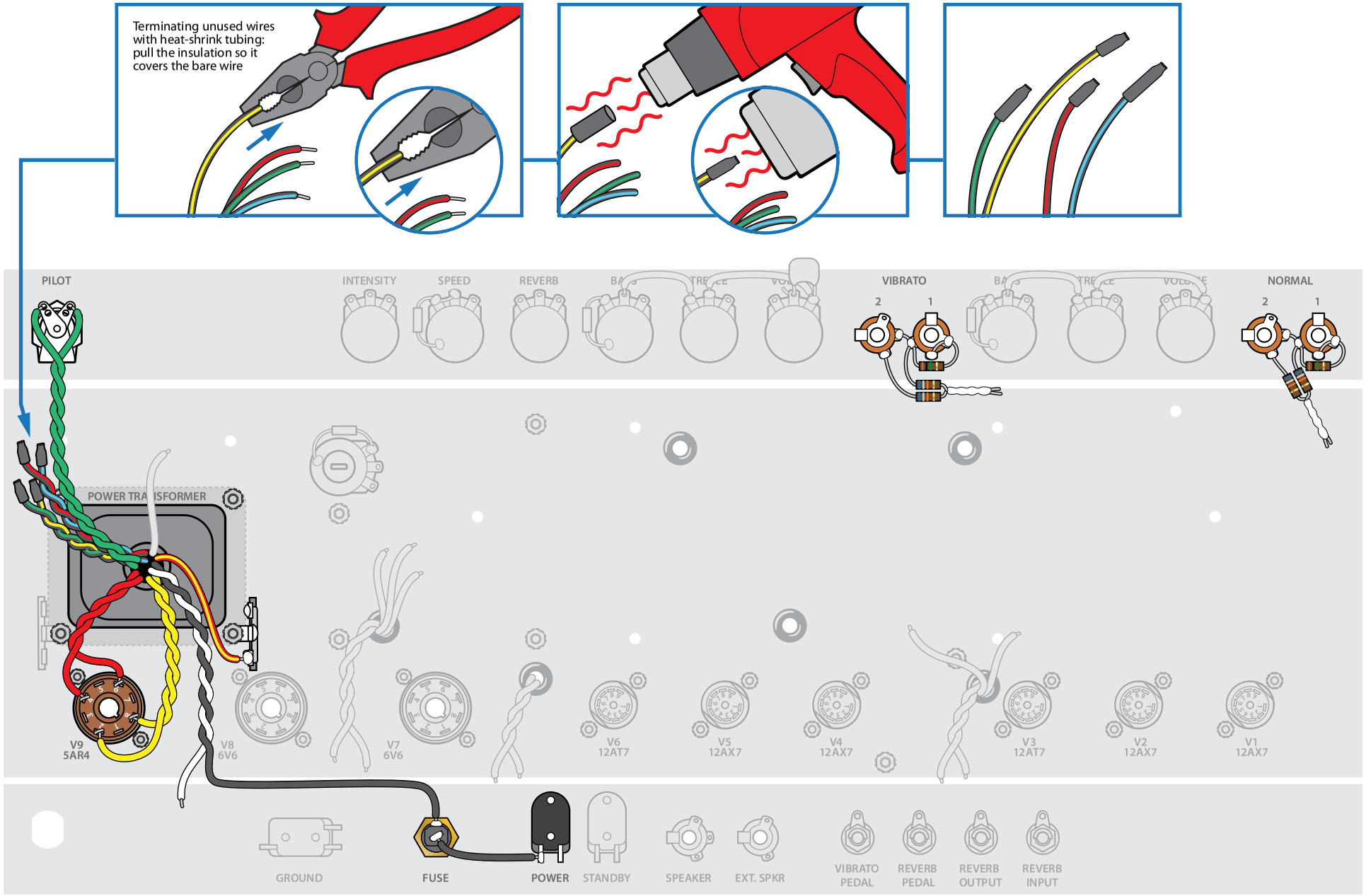
☐ STEP 32

Install vibrato channel jacks + 1M resistor

Add vibrato channel instrument jacks 1 and 2. Position them so the center lug of jack 2 is close to the left lug of jack 1 as pictured.

Wrap one lead of a 1M resistor through the right lug of jack 1 and wrap it onto the center lug of the same jack. Make sure the lead or the body of the resistor won't be in the way when an instrument cable is plugged in.

Run this resistor's other lead through the left lug of jack 1 and onto the center lug of jack 2. Don't solder these connections yet.



☐ STEP 33

Install two 68K resistors on the vibrato channel jacks

Twist the leads of two 68K resistors together, creating one connection. Wrap the other lead from one resistor onto the right lug of vibrato jack 2 as shown.

Wrap the remaining resistor lead onto the left lug of vibrato jack 1, adding it to the connection made in the previous step.

Solder all these connections, and also solder the twisted 68K resistor leads.

☐ STEP 34

Install normal channel jacks + 1M resistor

Add normal channel instrument jacks 1 and 2. Position them so the center lug of jack 2 is close to the left lug of jack 1 as pictured.

Wrap one lead of a 1M resistor through the right lug of jack 1 and wrap it onto the center lug of the same jack. Make sure the lead or the body of the resistor won't be in the way when an instrument cable is plugged in.

Run this resistor's other lead through the left lug of jack 1 and onto the center lug of jack 2. Don't solder these connections yet.

☐ STEP 35

Install two 68K resistors on the normal channel jacks

Twist the leads of two 68K resistors together, creating one connection. Wrap the other lead from one resistor onto the right lug of jack 2 as shown.

Wrap the remaining resistor lead onto the left lug of jack 1, adding it to the connection made in the previous step.

Solder all these connections, and also solder the twisted 68K resistor leads.

☐ STEP 36

Power transformer white lead + black lead

Run the black wire from the power transformer to the side lug of the fuse socket. Trim it to length and solder it.

Using the excess from the trimmed black lead, create a short jumper from the left lug of the power switch (closest to the fuse socket) to the center/back fuse socket lug. Solder both ends of this jumper. Leave the white lead as is for now; it will be connected in a later step.

☐ STEP 37

Power transformer green leads

Run the two green wires from the power transformer to the lugs on the pilot lamp socket (either wire can go to either lug). Trim these wires to length and wrap them onto the lugs. Don't solder these connections yet.

☐ STEP 38

Terminate unused power transformer leads

The four unused leads from the power transformer carry hundreds of volts, so they **must** be safely terminated and insulated before being tucked away.

Trim these leads to 4". Do **not** trim the insulation on the unused leads. With one hand hold the leads where they come out of the transformer and with the other hand pull the insulation of each lead until it stretches about a 1/4" past the wire inside. This creates further insulation over the internal conductor of each lead. These conductors **must** be properly insulated to stop them from contacting each other or the chassis.

Once the insulation is stretched out, apply 1" of heat-shrink tubing to the end of each lead. This will seal the end of each lead, preventing a shock hazard. Once the heat-shrink cools, twist these leads back up and tuck them in between the left side of the power transformer and the chassis wall.

☐ STEP 39

Power transformer red/yellow lead

Trim the power transformer's red/yellow lead to an appropriate length and solder it to the grounding strip as shown.

☐ STEP 40

Power transformer red leads

Trim the power transformer's red leads to an appropriate length and wrap one lead onto pin 4 of socket V9. The pins on the 8-pin sockets have upper and lower eyelets for multiple connections.

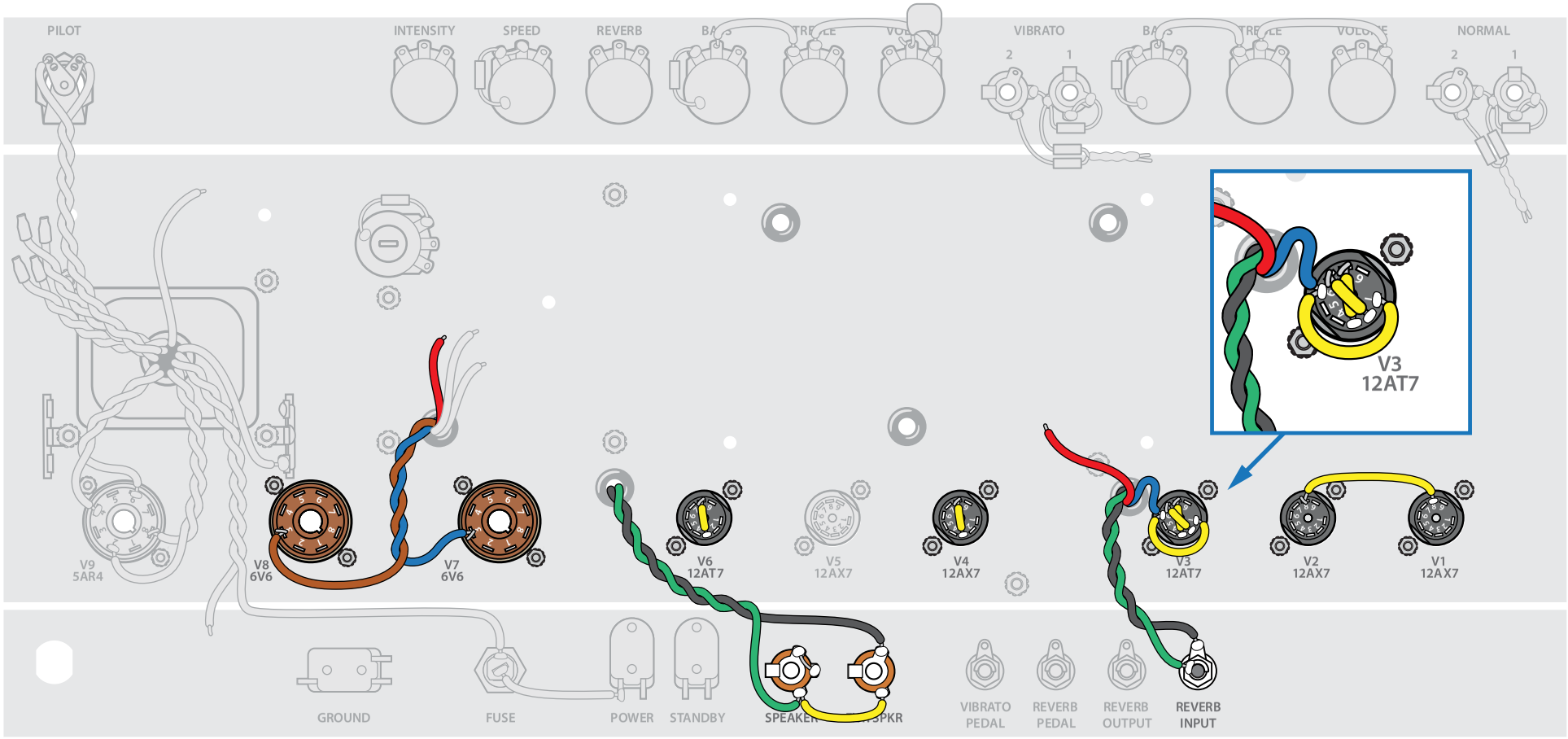
Wrap the other red lead onto pin 6 of the same socket. Don't solder these red leads yet.

☐ STEP 41

Power transformer yellow leads

Trim the power transformer's yellow leads to an appropriate length. Wrap one of these leads onto pin 2 of socket V9.

Wrap the other yellow lead onto pin 8 of the same socket. Don't solder these yellow leads yet.



☐ STEP 42

Output transformer blue + brown leads

Trim the blue wire from the output transformer to an appropriate length and wrap it onto pin 3 of socket V7. Don't solder this connection yet.

Trim the brown wire from the output transformer to an appropriate length and wrap it onto pin 3 of socket V8. Don't solder this connection yet.

Leave the red output transformer lead free for now; you'll connect it later, when the eyelet board is installed.

☐ STEP 43

Add two jumpers

Prepare a 1-1/2" yellow jumper. Solder one end to the right lug of the extension jack. Don't solder the other end—we'll do that in the next step.

Cut a 3/4" yellow jumper and remove the insulation. Add this short wire between the speaker jack's left lug and center lug. Solder both ends.

☐ STEP 44

Output transformer green + black leads

Trim these two wires to reach the speaker jack and extension speaker jack.

Solder the green lead to the right lug of the speaker jack along with the yellow jumper from the previous step.

Solder the black lead to the left lug of the extension speaker jack.

☐ STEP 45

Connect the reverb driver leads

Trim the green lead to reach the middle lug of the reverb input jack, tin it and solder it to the lug.

Trim the black lead to reach the ground tab on the reverb input jack. Tin it and solder it to this tab.

Trim the blue lead to reach pin 6 of socket V3. Tin it and wrap it onto the pin, but don't solder it yet.

Leave the red lead free for now; you will install it to the eyelet board later on.

☐ STEP 46

Add three yellow jumpers

Cut two 1" yellow jumpers. Wrap one of them between pin 2 and pin 7 of socket V3. Solder the connection to pin 2.

Wrap the second short jumper between pin 3 and pin 8 of socket V3. Solder the connection to pin 3.

Cut a 2-1/2" yellow jumper and connect it between pins 1 and 6 on socket V3. Route this jumper in a semicircle around the back of the socket. Solder this jumper at pin 1 and also at pin 6 where it joins the blue wire from the reverb driver.

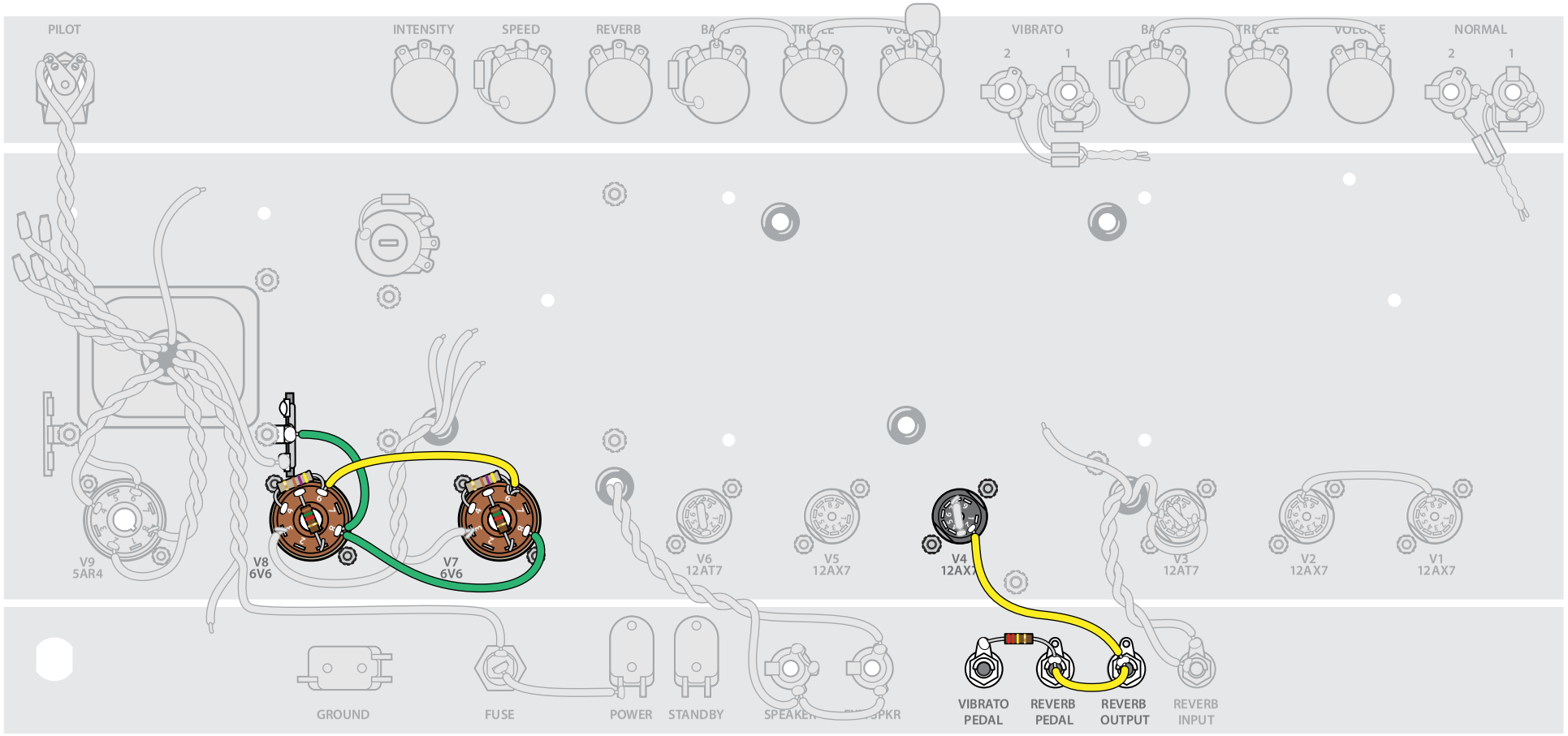
☐ STEP 47

Add three more yellow jumpers

Cut one 2-1/2" yellow jumper. Wrap one end of this jumper in pin 8 of socket V1. Wrap the other end of this jumper in pin 8 of socket V2. Solder the connection at pin 8 of V1.

Cut two 1" yellow jumpers. Wrap one of them between pin 3 and pin 8 of socket V4. Solder the connection at pin 3.

Wrap the second short jumper between pin 3 and pin 8 of socket V6. Solder the connection at pin 3.



☐ STEP 48

Add two jumpers + one resistor

Cut one 1-1/4" yellow jumper. Wrap one end through the middle lug of the reverb output RCA jack and wrap the other end through the middle lug of the reverb pedal RCA jack. Solder this jumper to the reverb output RCA jack.

Add a 220K resistor between the middle lug of the reverb pedal RCA jack and the ground lug of the vibrato pedal RCA jack. Solder both leads in place.

Cut a 3-1/2" yellow jumper. Wrap one end through the middle lug of the reverb output RCA jack and wrap the other end through pin 2 of socket V4. Solder this jumper at both ends.

☐ STEP 49

Add four resistors

Add one 1.5K resistor between pin 1 and pin 5 of socket V7. Solder both leads in to place.

Add one 1.5K resistor between pin 1 and pin 5 of socket V8. Solder both leads in to place.

Add one 470Ω 1W resistor between pin 4 and pin 6 of socket V7. Stand this resistor up off the socket about half an inch. Solder the lead wrapped in pin 4.

Add one 470Ω 1W resistor between pin 4 and pin 6 of socket V8. Stand this resistor up off the socket about half an inch. Solder the lead wrapped in pin 4.

☐ STEP 50

Add three jumpers

Cut one 3-1/2" yellow jumper. Solder one end to pin 6 of socket V8. Wrap one end onto pin 6 of socket V7, but do not solder it yet.

Cut one 3-1/2" green jumper. Solder one end to pin 8 of socket V7. Wrap the other end onto pin 8 of socket V8, but do not solder it yet.

Cut one 3" green jumper. Wrap one end in pin 8 of socket V8. Wrap the other end through one of the lugs of the three-lug grounding strip closest to socket V8. Solder both ends of this jumper.

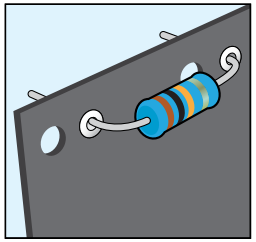
Stop and inspect your work

This is a good time to step away from the project for a few minutes. Take a break before reviewing your work for errors.

When you're ready to go at it again, very carefully walk through every connection you've made so far. When everything checks out, you're ready to move on to the eyelet board.

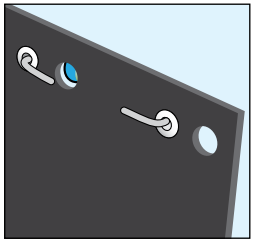
Be suspicious
There's a mistake, and you're gonna find it!

How to install parts on an eyelet board in three steps



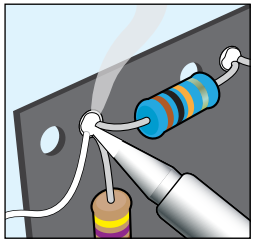
Wrap

Don't solder the components as they go onto the eyelet board. Instead wrap all the parts onto the board, bending their leads tightly so the parts stay in place without solder.



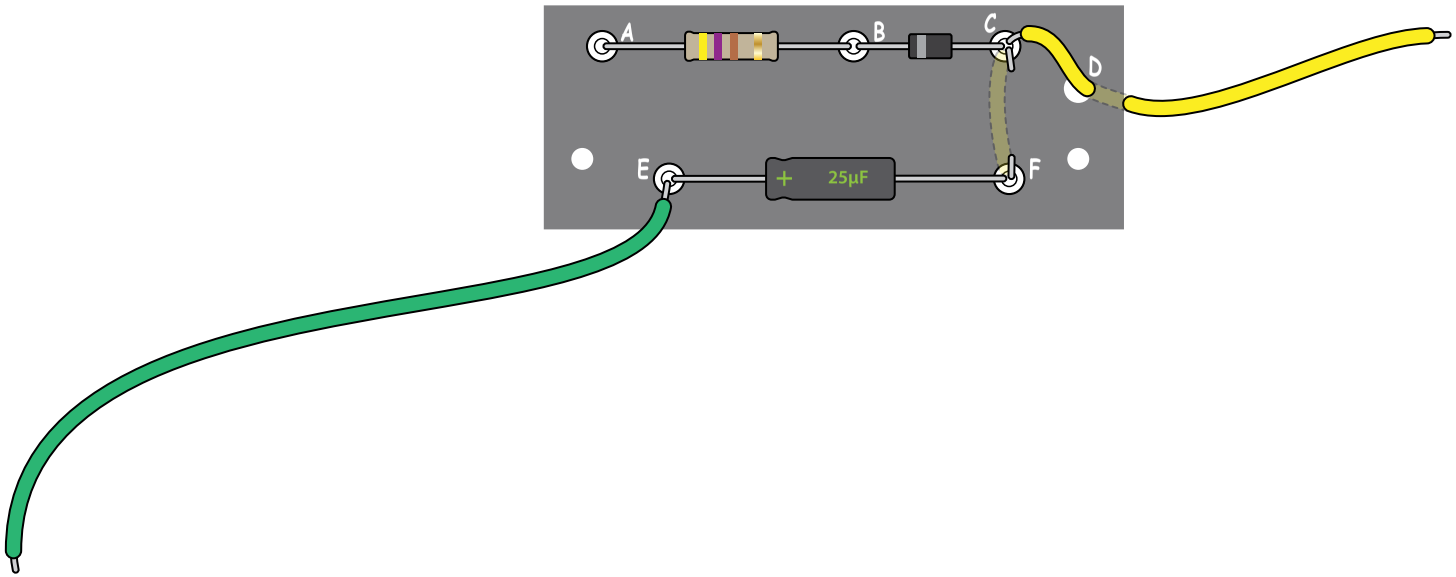
Inspect

When all the parts are in place, stop and inspect. Go back over every step. Careful inspection is the best way to make sure your amp works the first time you turn it on.



Solder

Solder each connection point only once. Reheating to add another part makes a messy, faulty solder joint. Use the soldering tips on page 11 to get professional results.



Wrapping parts onto the bias board

The bias board is the smallest of the three eyelet boards. Position it as shown above, with hole D to the upper right, and the pair of mounting holes toward the bottom.

☐ STEP 51

Add one resistor

Add a 470Ω 1W resistor between eyelets A and B.

Don't solder these connections. You'll solder the connections on both eyelet boards later, after all their parts are wrapped in place and double-checked.

☐ STEP 52

Add a capacitor and a diode

Add a 25µF electrolytic capacitor between eyelets E and F. **Note the polarity of the capacitor.** Connect the cap's negative lead to eyelet F.

Add the rectifier diode between eyelets B and C. Note the polarity. The positive lead of the diode is indicated by a stripe at that end. The end with no stripe is negative. Connect the negative lead to eyelet C.

☐ STEP 53

Add two jumpers

Cut a 1-1/8" yellow jumper. Flip the bias board over and add this jumper between eyelets C and F on the back of the board.

Cut a 4" yellow jumper. Wrap one end through eyelet C and run the rest down through hole D. Pull it tight to keep it in place.

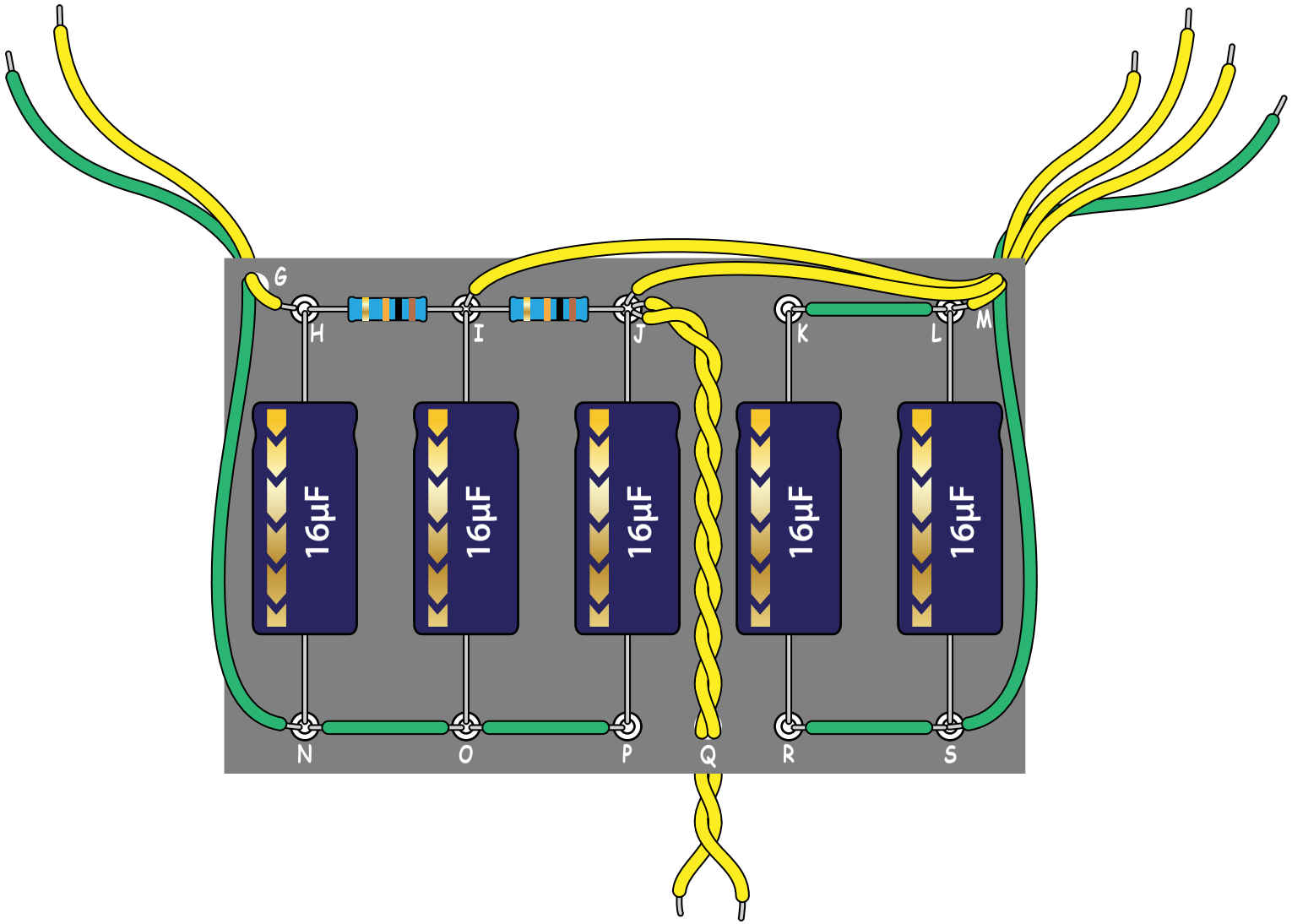
☐ STEP 54

Add one jumper

Cut one 7" green jumper and wrap one end through eyelet E.

Set the bias board aside

Store the bias board somewhere that it won't be disturbed. You're ready to turn your attention to the filter cap eyelet board.



Wrapping parts onto the filter cap board

The filter cap board is the medium-sized of the three eyelet boards. Position it as shown above, with the through holes in the top two corners.

☐ STEP 55

Add five capacitors

Add a 16µF electrolytic capacitor between eyelets H and N. Note the polarity of the capacitor. Connect the cap's negative lead to eyelet N.

Add another 16µF electrolytic capacitor between eyelets I and O. Note the polarity of the capacitor. Connect the cap's negative lead to eyelet O.

Add a third 16µF electrolytic capacitor between eyelets J and P. Note the polarity of the capacitor. Connect the cap's negative lead to eyelet P.

Add a fourth 16µF electrolytic capacitor between eyelets K and R. Note the polarity of the capacitor. Connect the cap's negative lead to eyelet R.

Add a fifth 16µF electrolytic capacitor between eyelets L and S. Note the polarity of the capacitor. Connect the cap's negative lead to eyelet S.

☐ STEP 56

Add four jumpers

Cut four 1-1/2" green jumpers.

Wrap the first between eyelets N and O.

Wrap the second between eyelets O and P.

Wrap the third between eyelets R and S.

Wrap the fourth between eyelets K and L.

☐ STEP 57

Add two resistors

Add a 10K 2W resistor between eyelets H and I.

Add another 10K 2W resistor between eyelets I and J.

☐ STEP 58

Add four jumpers

Cut two 6" green jumpers.

Wrap one end of one through eyelet S. Pull the other end through hole M and pull it tight to keep it in place.

Wrap one end of the other jumper through eyelet N. Pull the other end through hole G and pull it tight to keep it in place.

Cut two 6" yellow jumpers and twist them together tight.

Wrap one end of each jumper through eyelet J. Then run the twisted leads through hole Q and pull them tight to keep them in place.

☐ STEP 59

Add four jumpers

Cut a 6" yellow jumper and wrap one end through eyelet L. Pull the other end through hole M and pull it tight to keep it in place.

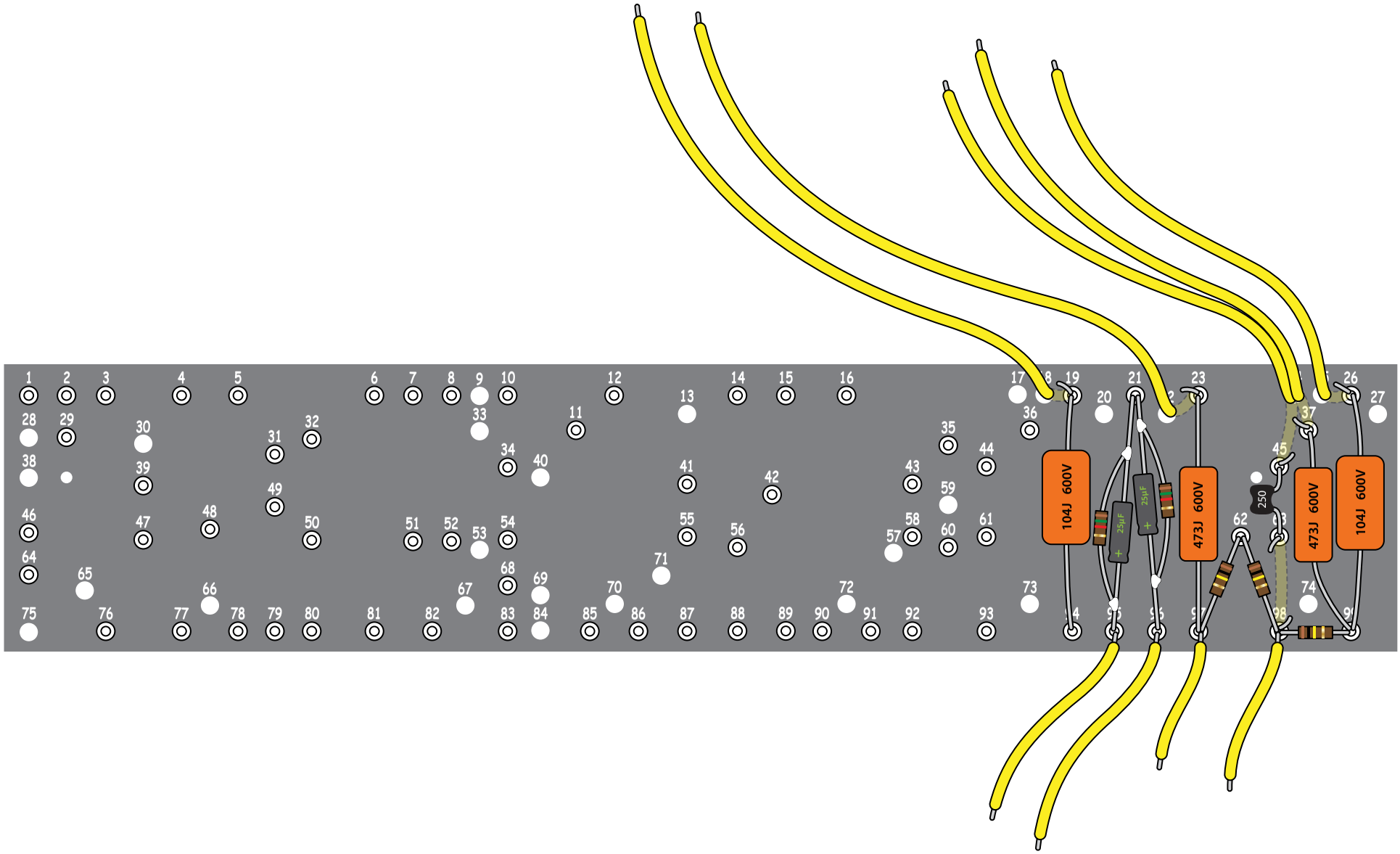
Cut a 7" yellow jumper and wrap one end through eyelet J. Pull the other end through hole M and pull it tight to keep it in place.

Cut an 8" yellow jumper and wrap one end through eyelet I. Pull the other end through hole M and pull it tight to keep it in place.

Cut a 3" yellow jumper and wrap one end through eyelet H. Pull the other end through hole G and pull it tight to keep it in place.

Set the filter cap board aside

Store the filter cap board somewhere that it won't be disturbed. You're ready to turn your attention to the main eyelet board.



Wrapping parts onto the main eyelet board

The main eyelet board is the largest of the three eyelet boards. Position it as shown above, with hole 27 in the top right and hole 75 in the bottom left.

☐ STEP 60

Install a .1µF cap + one jumper

Wrap a .1µF Orange Drop cap between eyelets 26 and 99. This capacitor does not have polarity and can be installed facing either direction.

Cut a 7-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 26. Run the other end of this jumper up through hole 25 and pull it tight so it stays in place.

☐ STEP 61

Install a .047µF cap + one jumper

Add a .047µF Orange Drop capacitor between eyelets 37 and 99. This cap is not polarized and can be installed facing either direction.

Cut a 7" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 37. Run the other end of this jumper up through hole 24 and pull it tight so it stays in place.

☐ STEP 62

Install a 100K resistor + one jumper

Add a 100K resistor between eyelets 98 and 99.

Cut a 1-1/4" yellow jumper, flip the board over, and add the jumper behind the board between eyelets 63 and 98.

☐ STEP 63

Install a 250pF cap + one jumper

Add a 250pF silver mica cap between eyelets 45 and 63.

Cut a 6-3/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 45. Run the other end of this jumper up through hole 24 and pull it tight so it stays in place.

☐ STEP 64

Install two 100K resistors

Add a 100K resistor between eyelets 62 and 98.

Add another 100K resistor between eyelets 62 and 97.

☐ STEP 65

Install a .047µF cap

Add a .047µF Orange Drop cap between eyelets 23 and 97.

☐ STEP 66

Add two jumpers

Cut a 2" jumper and add it to eyelet 97.

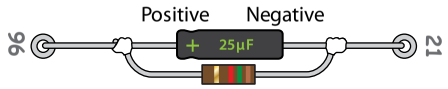
Cut a 2-3/4" jumper and add it to eyelet 98.

Cut a 10-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 23. Run the other end of this jumper up through hole 22 and pull it tight so it stays in place.

☐ STEP 67

Install a 25µF cap + a 1.5K resistor, soldered together

Wrap the leads from the 1.5K resistor around the leads on the 25µF 50V capacitor and solder them together. Note the polarity of the capacitor.

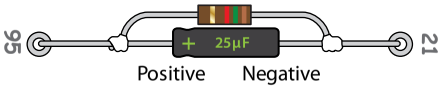


Install this resistor/capacitor assembly between eyelets 21 and 96, making sure the capacitor's negative lead goes to eyelet 21.

☐ STEP 68

Install another 25µF cap + a 1.5K resistor, soldered together

Wrap the leads from the 1.5K resistor around the leads on the 25µF 50V capacitor and solder them together. Note the polarity of the capacitor.



Install this resistor/capacitor assembly between eyelets 21 and 95, making sure the capacitor's negative lead goes to eyelet 21.

☐ STEP 69

Add two jumpers

Cut a 3-1/2" yellow jumper and wrap one end through eyelet 96.

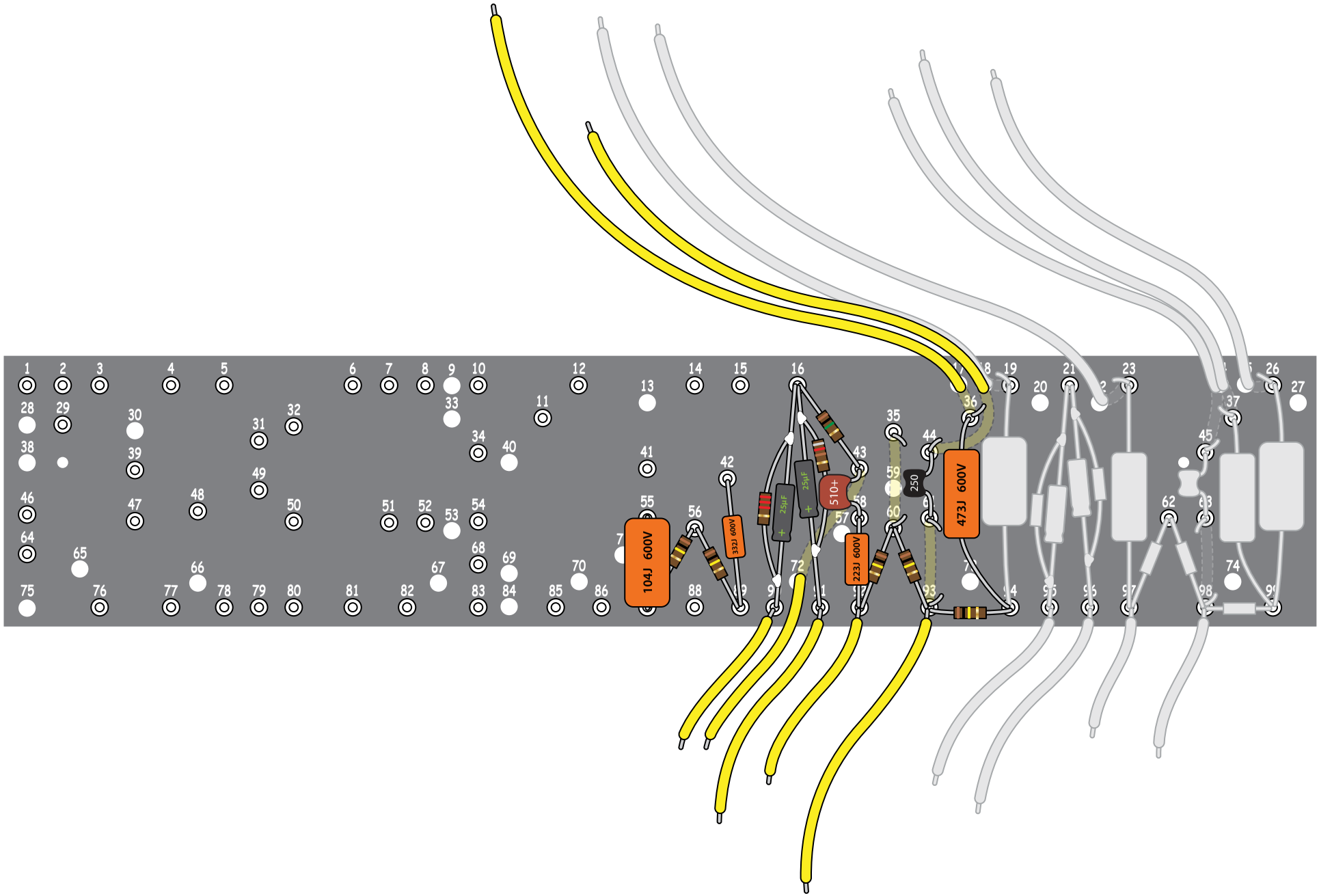
Cut one 3-1/4" yellow jumper and wrap one end through eyelet 95.

☐ STEP 70

Add a .1µF cap + one jumper

Add a .1µF Orange Drop cap between eyelets 19 and 94.

Cut a 10-3/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 19. Run the other end of this jumper up through hole 18 and pull it tight so it stays in place.



☐ STEP 71

Install a .047µF cap + one jumper

Add a .047µF Orange Drop capacitor between eyelets 36 and 94.

Cut an 11-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 36. Run the other end of this jumper up through hole 17 and pull it tight so it stays in place.

☐ STEP 72

Install a 100K resistor + one jumper

Add a 100K resistor between eyelets 93 and 94.

Cut a 1-1/4" yellow jumper, flip the board over and add the jumper behind the board between eyelets 61 and 93.

☐ STEP 73

Install a 250pF cap + one jumper

Add a 250pF cap between eyelets 44 and 61.

Cut a 9-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 44. Run the other end of this jumper up through hole 18 and pull it tight so it stays in place.

☐ STEP 74

Install two 100K resistors

Add a 100K resistor between eyelets 60 and 93.

Add another 100K resistor between eyelets 60 and 92.

☐ STEP 75

Install one jumper

Cut a 1-1/2" yellow jumper, flip the board over and add the jumper behind the board between eyelets 35 and 60.

☐ STEP 76

Install two 100K resistors

Add a .022µF Orange Drop cap between eyelets 92 and 58.

Add a 5" yellow jumper to eyelet 93.

Add a 3-1/2" yellow jumper to eyelet 92.

☐ STEP 77

Install a 500pF cap + 1M resistor

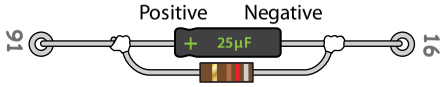
Add a 500pF silver mica cap between eyelets 43 and 58.

Add a 1M resistor between eyelets 16 and 43.

☐ STEP 78

Install a 25µF cap + an 820Ω resistor, soldered together

Wrap the leads from the 820Ω resistor around the leads on the 25µF 50V capacitor and solder them together. Note the polarity of the capacitor.

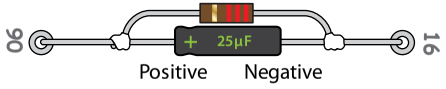


Install this resistor/capacitor assembly between eyelets 16 and 91, making sure the capacitor's negative lead goes to eyelet 16.

☐ STEP 79

Install another 25µF cap + a 2.2K resistor, soldered together

Wrap the leads from the 2.2K resistor around the leads on the 25µF 50V capacitor and solder them together. Note the polarity of the capacitor.



Install this resistor/capacitor assembly between eyelets 16 and 90, making sure the capacitor's negative lead goes to eyelet 16.

☐ STEP 80

Add three jumpers

Cut a 4-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 43. Run the other end of this jumper up through hole 72 and pull it tight so it stays in place.

Add a 4" yellow jumper to eyelet 91.

Add a 2-3/4" yellow jumper to eyelet 90.

☐ STEP 81

Add .0033µF cap + one resistor

Add a .0033µF Orange Drop capacitor between eyelets 42 and 89.

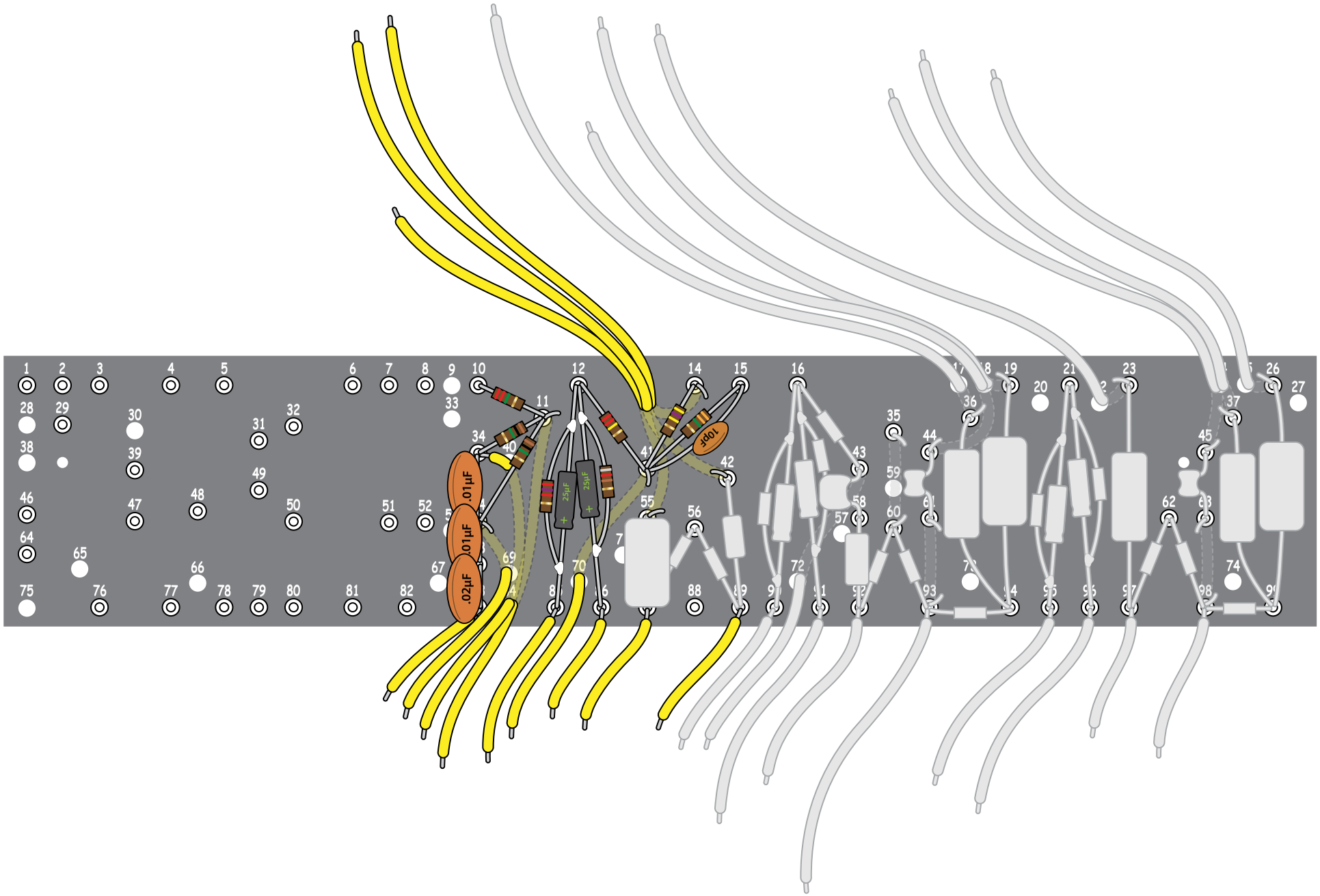
Add a 100K resistor between eyelets 56 and 89.

☐ STEP 82

Add one resistor + one capacitor

Add a 100K resistor between eyelets 56 and 87.

Add a .1µF Orange Drop capacitor between eyelets 55 and 87.



☐ STEP 83

Add two jumpers

Cut a 9" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 42. Run the other end of this jumper up through hole 13 and pull it tight so it stays in place.

Add a 2-1/2" yellow jumper to eyelet 89.

☐ STEP 84

Add two jumpers

Cut a 6-1/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 55. Run the other end of this jumper up through hole 13 and pull it tight so it stays in place.

Add a 2-1/4" yellow jumper to eyelet 87.

☐ STEP 85

Add 10pF cap + one resistor

Add a 10pF capacitor and a 3.3M resistor between eyelets 15 and 41.

☐ STEP 86

Add two resistors

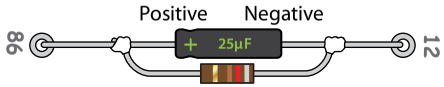
Add a 470K resistor between eyelets 14 and 41.

Add a 220K resistor between eyelets 12 and 41.

☐ STEP 87

Install a 25µF cap + an 820Ω resistor, soldered together

Wrap the leads from the 820Ω resistor around the leads on the 25µF 50V capacitor and solder them together. Note the polarity of the capacitor.

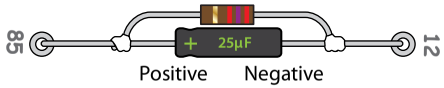


Install this assembly between eyelets 12 and 86, making sure the capacitor's negative lead goes to eyelet 12.

☐ STEP 88

Install another 25µF cap + a 2.7K resistor, soldered together

Wrap the leads from the 2.7K resistor around the leads on the 25µF 50V capacitor and solder them together. Note the polarity of the capacitor.



Install this assembly between eyelets 12 and 85, making sure the capacitor's negative lead goes to eyelet 12.

☐ STEP 89

Add four jumpers

Cut a 3-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 41. Run the other end of this jumper up through hole 70 and pull it tight so it stays in place.

Cut a 9-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 14. Run the other end of this jumper up through hole 13 and pull it tight so it stays in place.

Add a 1-3/4" yellow jumper to eyelet 86.

Add a 3" yellow jumper to eyelet 85.

☐ STEP 90

Add three resistors

Add a 1M resistor between eyelets 11 and 54.

Add a 1M resistor between eyelets 11 and 34.

Add a 2.2M resistor between eyelets 10 and 11.

☐ STEP 91

Add three capacitors

Add a .01µF ceramic disk cap between eyelets 34 and 54.

Add a .01µF ceramic disk cap between eyelets 54 and 68.

Add a .02µF ceramic disk cap between eyelets 68 and 83.

☐ STEP 92

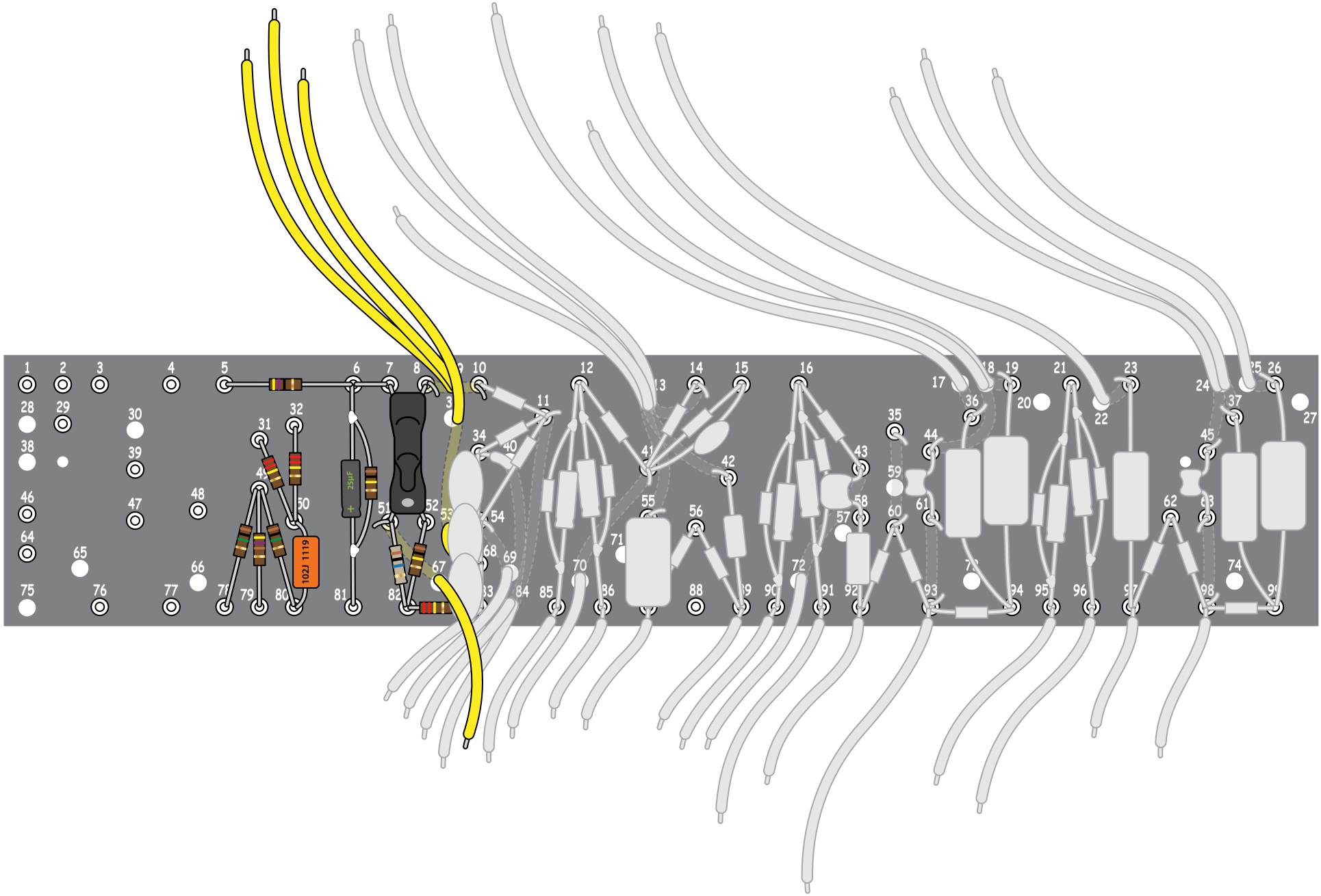
Add four jumpers

Cut a 6-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 11. Run the other end of this jumper up through hole 84 and pull it tight so it stays in place.

Cut a 4-1/2" yellow jumper. Wrap one end through eyelet 34 and run the other end down through hole 40. Flip the board over, pull this jumper back up through hole 84 and pull it tight to keep it in place.

Cut a 3" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 54. Run the other end of this jumper up through hole 69 and pull it tight so it stays in place.

Add a 2-1/2" yellow jumper to eyelet 83.



☐ STEP 93

Add two jumpers

Cut a 10" yellow jumper. Wrap one end through eyelet 68 and run the other end down through hole 53. Flip the board over, pull this jumper back up through hole 33 and pull it tight to keep it in place.

Cut an 9-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 10. Run the other end of this jumper up through hole 9 and pull it tight so it stays in place.

☐ STEP 94

Add three resistors

Add a 220K resistor between eyelets 82 and 83.

Add a 100K resistor between eyelets 52 and 82.

Add a 10M resistor between eyelets 51 and 82.

☐ STEP 95

Install the optocoupler

Orient the optocoupler as shown in the wiring diagram, with the side with the dot between eyelets 51 and 52. Wrap one lead of the dot side of the optocoupler through eyelet 51 and the other lead from that side through eyelet 52. Wrap the other end's leads through eyelets 7 and 8.

This little device is what controls the vibrato for the amp. The end with the dot has an LED and the other end is a light-dependent resistor. The speed control determines the frequency at which the LED flashes, and the intensity control determines how much of the guitar signal is affected by the light-dependent resistor.

☐ STEP 96

Add three jumpers

Cut a 10" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 8. Run the other end of this jumper up through hole 9 and pull it tight so it stays in place.

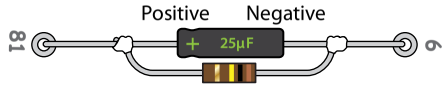
Cut a 3-1/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 51. Run the other end of this jumper up through hole 67 and pull it tight so it stays in place.

Add a 1/2" bare wire between eyelets 6 and 7.

☐ STEP 97

Install another 25µF cap + a 100K resistor, soldered together

Wrap the leads from the 100K resistor around the leads on the 25µF 50V capacitor and solder them together. Note the polarity of the capacitor.



Install this assembly between eyelets 6 and 81, making sure the capacitor's negative lead goes to eyelet 6.

☐ STEP 98

Add three resistors

Add a 47Ω resistor between eyelets 5 and 6.

Add a 220K resistor between eyelets 32 and 50.

Add a 220K resistor between eyelets 31 and 50.

☐ STEP 99

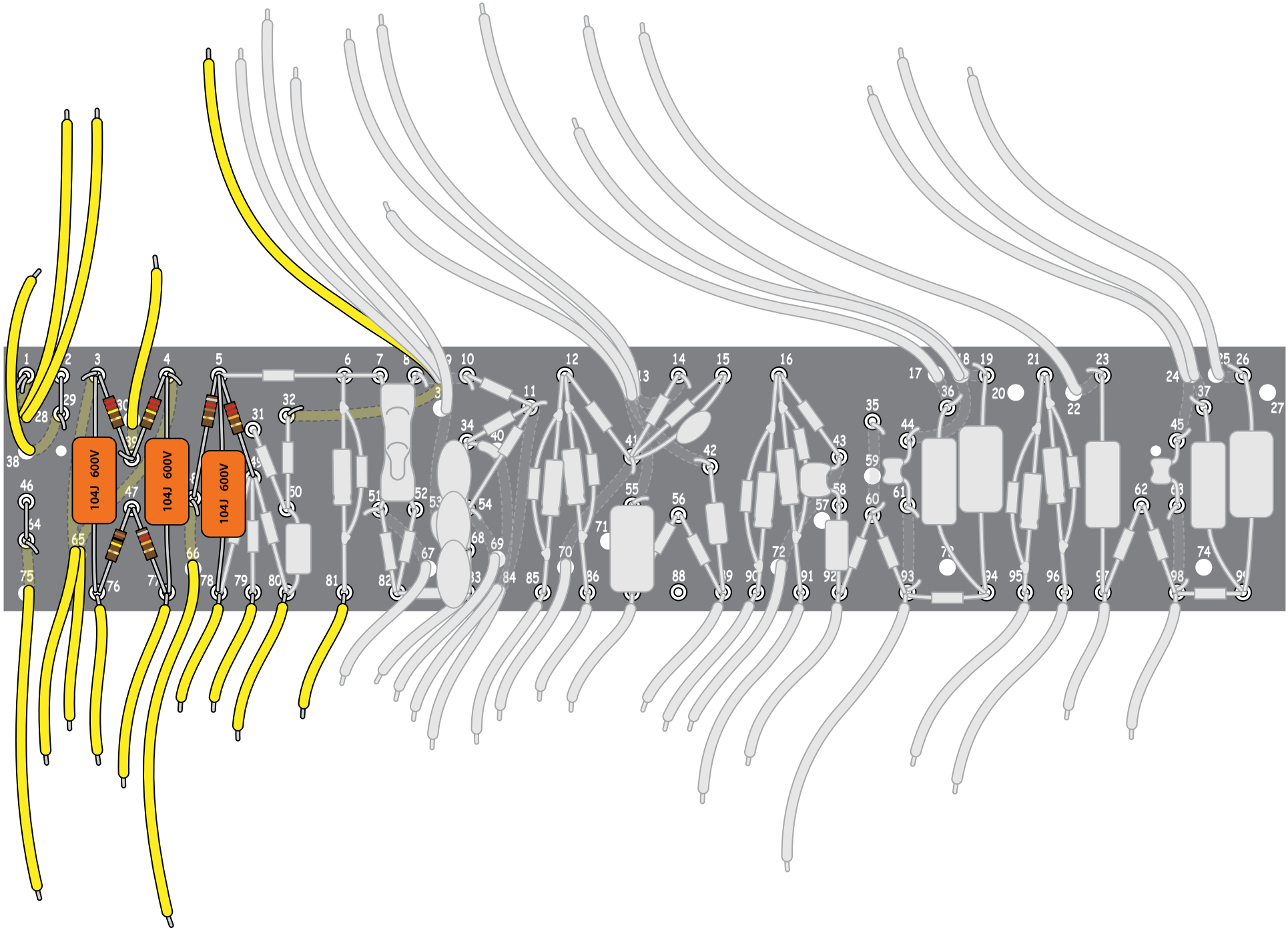
Install three resistors + one capacitor

Add a 1M resistor between eyelets 49 and 80.

Add a 470Ω resistor between eyelets 49 and 79.

Add another 1M resistor between eyelets 49 and 78.

Add a .001µF Orange Drop cap between eyelets 50 and 80.



☐ STEP 100

Add two resistors + one capacitor

Add a 22K resistor between eyelet 5 and 49.

Add an 820Ω resistor between eyelets 5 and 48.

Add a .1µF Orange Drop cap between eyelets 5 and 78.

☐ STEP 101

Add three jumpers

Add a 2-1/4" yellow jumper to eyelet 81.

Add a 3" yellow jumper to eyelet 80.

Cut an 11" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 32. Run the other end of this jumper up through hole 9 and pull it tight so it stays in place.

☐ STEP 102

Add three more jumpers

Add a 2" yellow jumper to eyelet 79.

Add a 2" yellow jumper to eyelet 78.

Cut an 8-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 48. Run the other end of this jumper up through hole 66 and pull it tight so it stays in place.

☐ STEP 103

Add four resistors

Add an 82K resistor between eyelets 47 and 77.

Add a 100K resistor between eyelets 47 and 76.

Add a 220K resistor between eyelets 3 and 39.

Add a 220K resistor between eyelets 4 and 39.

☐ STEP 104

Add two .1µF caps

Add a .1µF Orange Drop cap between eyelets 4 and 77.

Add another .1µF Orange Drop cap between eyelets 3 and 76.

☐ STEP 105

Add four jumpers

Add a 4" yellow jumper to eyelet 77.

Add a 3-1/4" yellow jumper to eyelet 76.

Cut a 6-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 4. Run the other end of this jumper up through hole 65 and pull it tight so it stays in place.

Cut a 7" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 3. Run the other end of this jumper up through hole 65 and pull it tight so it stays in place.

☐ STEP 106

Add three jumpers

Cut a 3-3/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 39. Run the other end of this jumper up through hole 30 and pull it tight so it stays in place.

Add a 3/4" bare wire between eyelets 2 and 29.

Add another 3/4" bare wire between eyelets 46 and 64.

☐ STEP 107

Add four more jumpers

Cut a 7-1/2" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 64. Run the other end of this jumper up through hole 75 and pull it tight so it stays in place.

Cut a 4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 29. Run the other end of this jumper up through hole 38 and pull it tight so it stays in place.

Cut a 7-3/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 1. Run the other end of this jumper up through hole 28 and pull it tight so it stays in place.

Cut another 7-3/4" yellow jumper. Turn the board over and also wrap this jumper through the bottom of eyelet 1. Run the other end of this jumper up through hole 28 and pull it tight so it stays in place.

Your mind is not playing tricks on you here; you really need two jumpers of the same length coming from eyelet 1 through hole 28.

☐ STEP 108

Two flying jumpers

Flying jumpers are wires that travel over the board, jumping from one eyelet to another. These are very common in classic point-to-point circuits.

The first flying jumper is the one you've installed coming from hole 22. It needs to run to the left, along the top edge of the eyelet board until it gets to hole 13. There it will be twisted in line with the behind-the-board lead from eyelet 55, coming through hole 13.

☐ STEP 109

Twisting flying jumpers

Carefully twist these two flying jumpers together toward the left side of the board while making sure not to disturb their wrapped connections on the eyelets. You want the leads to be up and away from components. Stop twisting them together once you are above eyelets 31 and 32. They will be connecting to these eyelets.

☐ STEP 110

Installing flying jumpers

Use a multimeter to find the flying jumper with continuity to eyelet 23. Wrap the free end of that jumper to eyelet 31.

The other flying jumper should have continuity to eyelet 55. Wrap the free end of this jumper to eyelet 32.

☐ STEP 111

Add three behind-the-board jumpers

Cut a 2-3/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 35. Wrap the other end of this jumper through the bottom of eyelet 62.

Cut a 3-1/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 35. Wrap the other end of this jumper through the bottom of eyelet 56.

Cut a 2-1/4" yellow jumper. Turn the board over and wrap this jumper through the bottom of eyelet 15. Wrap the other end of this jumper through the bottom of eyelet 58.

☐ STEP 112

Add four jumpers

Cut a 6" yellow jumper and an 8-1/4" yellow jumper. Mark the ends of the 6" wire with a black marker. Pass both wires down through hole 27 and back up through hole 74.

Cut two 11" yellow jumpers and mark the ends of one with a black marker. Pass both wires down through hole 20 and back up through hole 73.

☐ STEP 113

Add four ground jumpers

Cut four 3" green jumpers.

Add the first to eyelet 21.

Add the second to eyelet 16.

Add the third to eyelet 12.

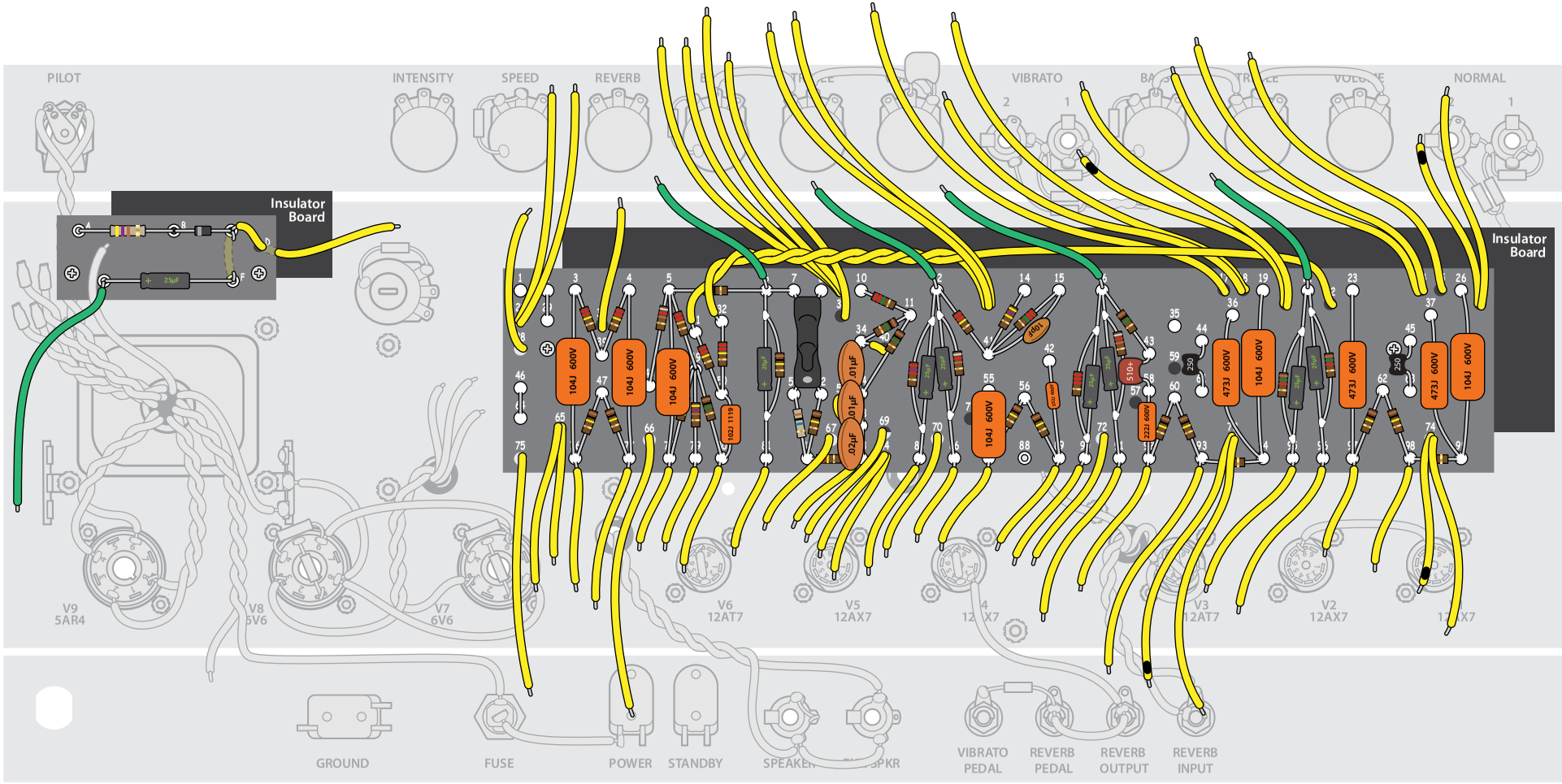
Add the fourth to eyelet 6.

Stop and review

Now all the components and wires are on the eyelet board. Stop and take a break so you'll have fresh eyes to review your work before soldering.

Make sure you've followed each step correctly. It would be surprising to find no mistakes at this point, and it's much less work to find and fix them now rather than after soldering!

As you're checking your work, make sure all your connections are tight. Don't count on solder to "glue" your joints—make them mechanically tight before solder is ever applied.



☐ STEP 114

Solder the components on the eyelet boards

Now that the components and jumpers are on the boards and double-checked for correct placement, its time to set the connections with solder. Review "Tips for great soldering" on page 11.

After all the joints are soldered, clip the excess leads on the front and back of the boards. Trimming the excess is important to avoid a short in your circuit.

Check all your solder joints to see that they're shiny and to make sure that you haven't missed one.

☐ STEP 115

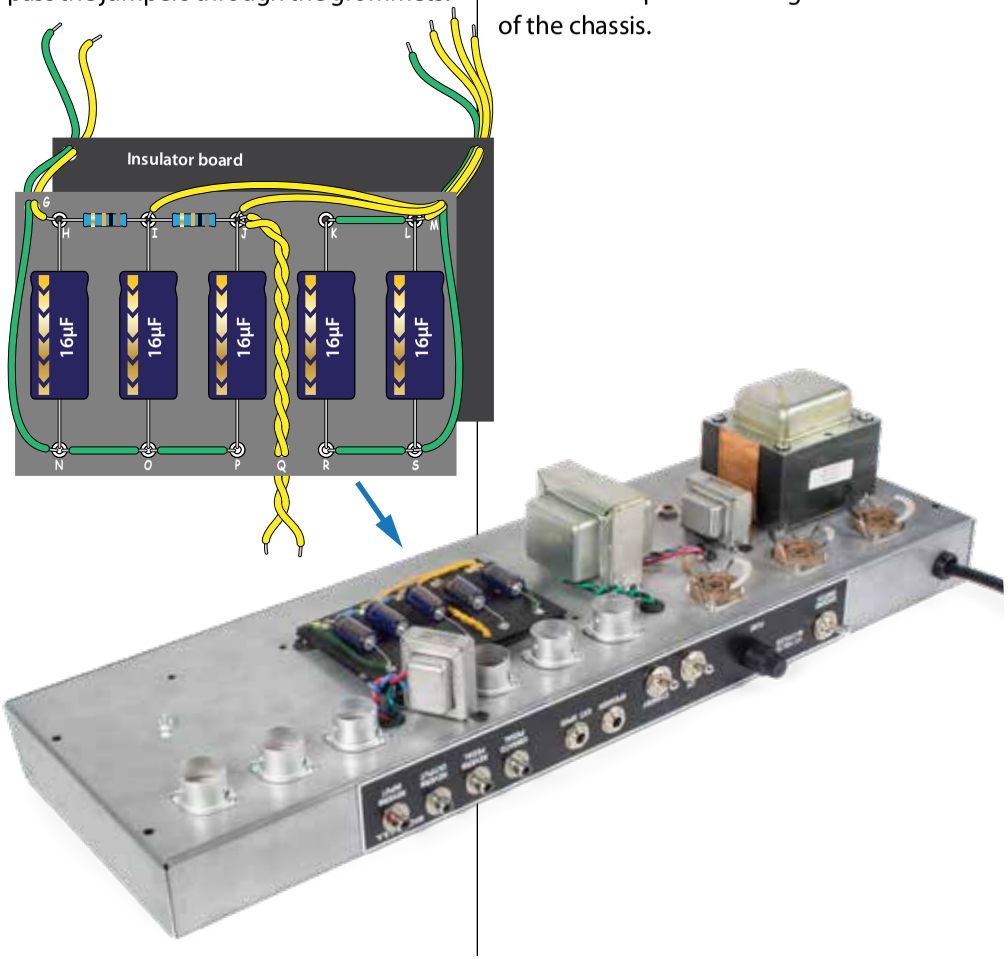
Install all three eyelet boards, backed by their insulator boards

Before installing the main eyelet board and insulator board in the chassis, make sure you have enough length on the unsoldered jumpers coming through holes 27 and 74, and holes 20 and 73, to reach their components. The best way to do this is to lay the eyelet board on the floor of the chassis where it will be mounted and adjust these jumpers until they reach their components.

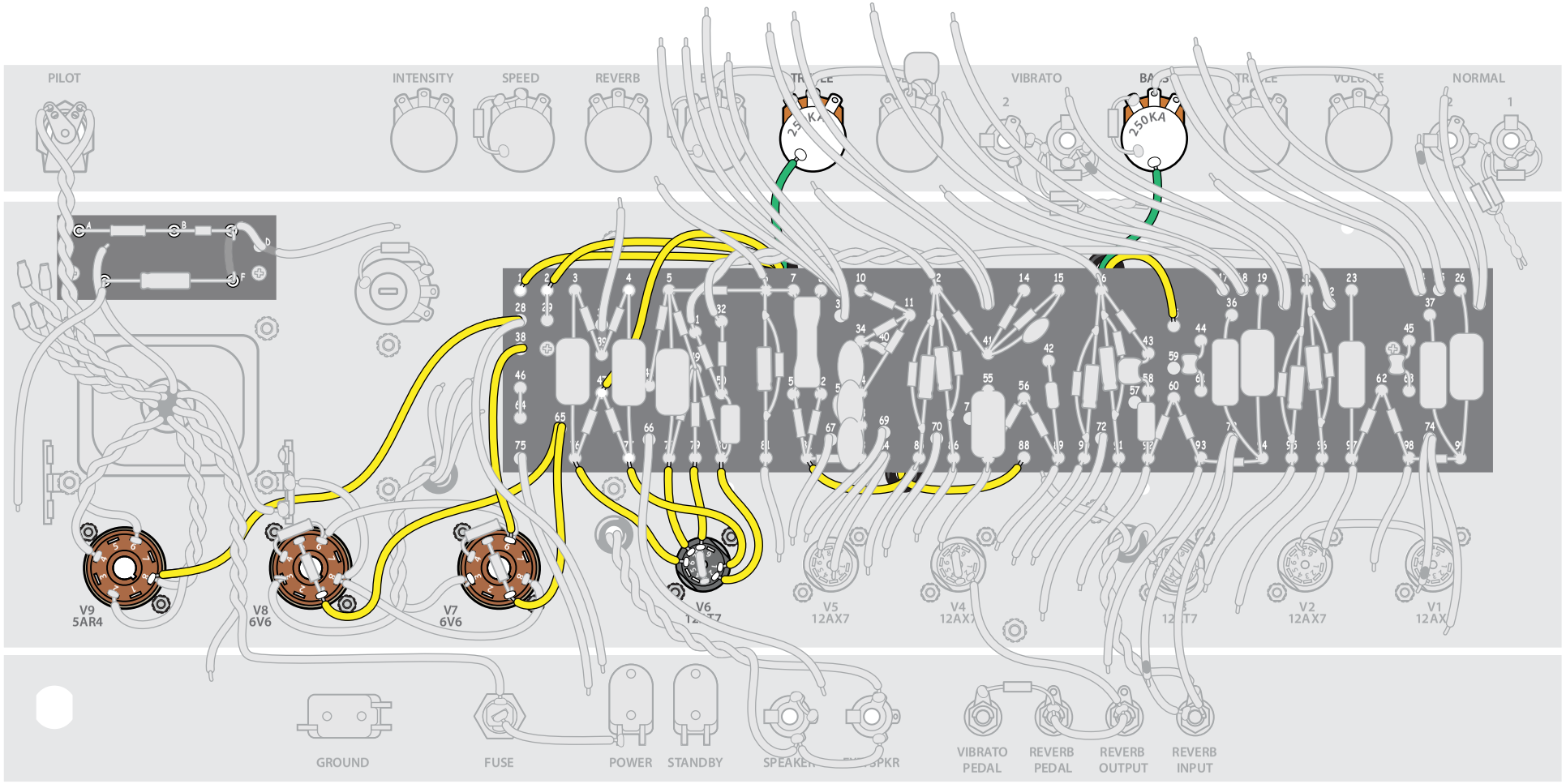
To install the main eyelet board, first lay the main insulation board on the bottom of the chassis, aligning it with the mounting holes. Run a 6-32 x 1/2" machine screw through the eyelet board, the insulation board and through the chassis. Secure it with a locknut on the outside of the chassis. Do the same with the second bolt.

Install the bias board in the same manner: insulation board down first, eyelet board on top, mounted with two sets of 6-32 hardware.

To install the filter cap eyelet board, flip the chassis over. Run the jumpers through the eyelet board and through the insulation board and then align the filter cap board with the grommets and pass the jumpers through the grommets.



This filter cap eyelet board will not be mounted with screws but rather held on by the jumper wires. Once you have the boards flush with the back side of the chassis, bend the jumpers over inside the chassis to keep the board tight to the back of the chassis.



☐ STEP 116

Solder the filter cap board jumpers

Pull the two jumpers coming through the grommeted hole between tube socket V4 and tube socket V5 until they are tight.

Solder one of these jumpers to eyelet 82.

Solder the other jumper to eyelet 88.

☐ STEP 117

Solder the filter cap board jumpers, cont.

Pull the two jumpers coming through the grommeted hole behind the normal channel bass pot until they are tight.

Solder the yellow jumper to eyelet 35.

Solder the green jumper to the back of the normal channel bass pot.

☐ STEP 118

Solder the filter cap board jumpers, cont.

Pull the four jumpers coming through the grommeted hole behind the vibrato channel treble pot until they are tight.

Solder the green jumper to the back of the vibrato channel treble pot.

Solder the jumper with continuity to eyelet L to eyelet 1.

Solder the jumper with continuity to eyelet J to eyelet 2.

Solder the jumper with continuity to eyelet I to eyelet 47. You will have to run this jumper underneath the .1µF Orange Drop cap installed between eyelets 4 and 77.

☐ STEP 119

Solder tube socket V9

Wrap one of the 7-3/4" yellow jumpers from hole 28 to pin 8 on tube socket V9 along with the yellow power transformer lead.

Solder all connections to this socket (five wires) and trim the excess wire ends.

☐ STEP 120

Solder tube socket V8

Test the two jumpers coming from hole 65 to identify the one with continuity to eyelet 3. Wrap this jumper to pin 1 of tube socket V8.

Solder all connections to this socket (five wires, four resistor leads) and trim excess wire ends.

☐ STEP 121

Solder tube socket V7

Test the remaining jumper coming from hole 65 to make sure it has continuity to eyelet 4. Wrap this jumper to pin 1 of tube socket V7.

Wrap the yellow jumper from hole 38 to pin 6 of tube socket V7 along with the resistor lead in place.

Solder all connections to this socket (five wires, four resistor leads) and trim excess wire ends.

☐ STEP 122

Solder tube socket V6

Wrap the jumper from eyelet 76 to pin 6 of the V6 tube socket.

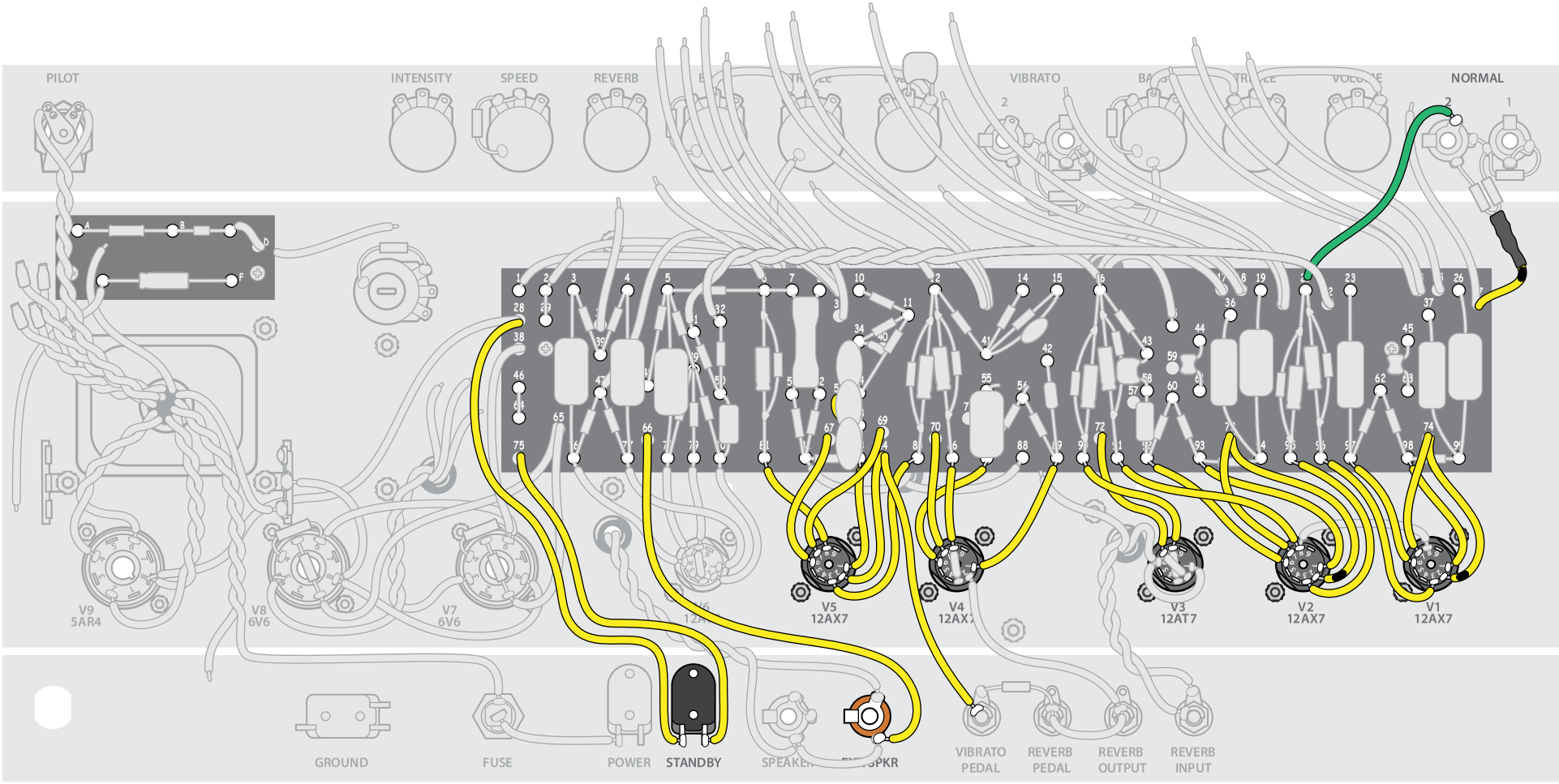
Wrap the jumper from eyelet 77 to pin 1 of the V6 tube socket.

Wrap the jumper from eyelet 78 to pin 7 of the V6 tube socket.

Wrap the jumper from eyelet 79 to pin 8 of the V6 tube socket along with the jumper already in place.

Wrap the jumper from eyelet 80 to pin 2 of the V6 tube socket.

Solder the connections to this socket (six wires) and trim the excess wire ends.



☐ STEP 123

Solder tube socket V5

Wrap the jumper from hole 67 to pin 6 of the V5 tube socket.

Wrap the jumper from eyelet 83 to pin 1 of the V5 tube socket.

Make sure the jumper coming from hole 69 has continuity to eyelet 54. Wrap this jumper to pin 7 of the V5 tube socket.

Wrap the jumper from eyelet 81 to pin 8 of the V5 tube socket.

Test the two jumpers coming from hole 84 to identify the one with continuity to eyelet 34. Wrap this jumper to pin 2 of tube socket V5.

Wrap the jumper from eyelet 85 to pin 3 of tube socket V5.

Solder the connections to this socket (six wires) and trim the excess wire ends.

☐ STEP 124

Solder tube socket V4

Wrap the jumper from eyelet 87 to pin 6 of the V4 tube socket.

Wrap the jumper from eyelet 89 to pin 1 of the V4 tube socket.

Wrap the jumper from hole 70 to pin 7 of the V4 tube socket.

Wrap the jumper from eyelet 86 to pin 8 of the V4 tube socket with the jumper already in place.

Solder the connections to this socket (six wires) and trim the excess wire ends.

☐ STEP 125

Solder tube socket V3

Wrap the jumper from hole 72 to pin 7 of the V3 tube socket with the jumper already in place.

Wrap the jumper from eyelet 90 to pin 8 of the V3 tube socket with the jumper already in place.

Solder the connections to this socket (six wires) and trim the excess wire ends.

☐ STEP 126

Solder tube socket V2

Wrap the jumper from eyelet 92 to pin 6 of the V2 tube socket.

Wrap the jumper from eyelet 93 to pin 1 of the V2 tube socket.

Wrap the unmarked jumper from hole 73 to pin 7 of the V2 tube socket.

Wrap the marked jumper from hole 73 to pin 2 of the V2 tube socket.

Wrap the jumper from eyelet 91 to pin 8 of the V2 tube socket with the jumper already in place.

Wrap the jumper from eyelet 95 to pin 3 of the V2 tube socket.

Solder the connections to this socket (six wires) and trim the excess wire ends.

☐ STEP 127

Solder tube socket V1

Wrap the jumper from eyelet 97 to pin 6 of the V1 tube socket.

Wrap the jumper from eyelet 98 to pin 1 of the V1 tube socket.

Wrap the unmarked jumper from hole 74 to pin 7 of the V1 tube socket.

Wrap the marked jumper from hole 74 to pin 2 of the V1 tube socket.

Wrap the jumper from eyelet 96 to pin 3 of the V1 tube socket.

Solder the connections to this socket (six wires) and trim the excess wire ends.

☐ STEP 128

Solder four jumpers to components on the back panel

The last unsoldered jumper coming from hole 84 should have continuity to eyelet 11. Solder this jumper to the middle lug of the vibrato pedal RCA jack.

Solder the jumper from hole 66 to the right lug (tip connection) of the extension speaker jack along with the jumper in place.

Solder the other jumper from hole 28 to the left lug of the standby switch.

Solder the jumper from hole 75 to the right lug of the standby switch.

☐ STEP 129

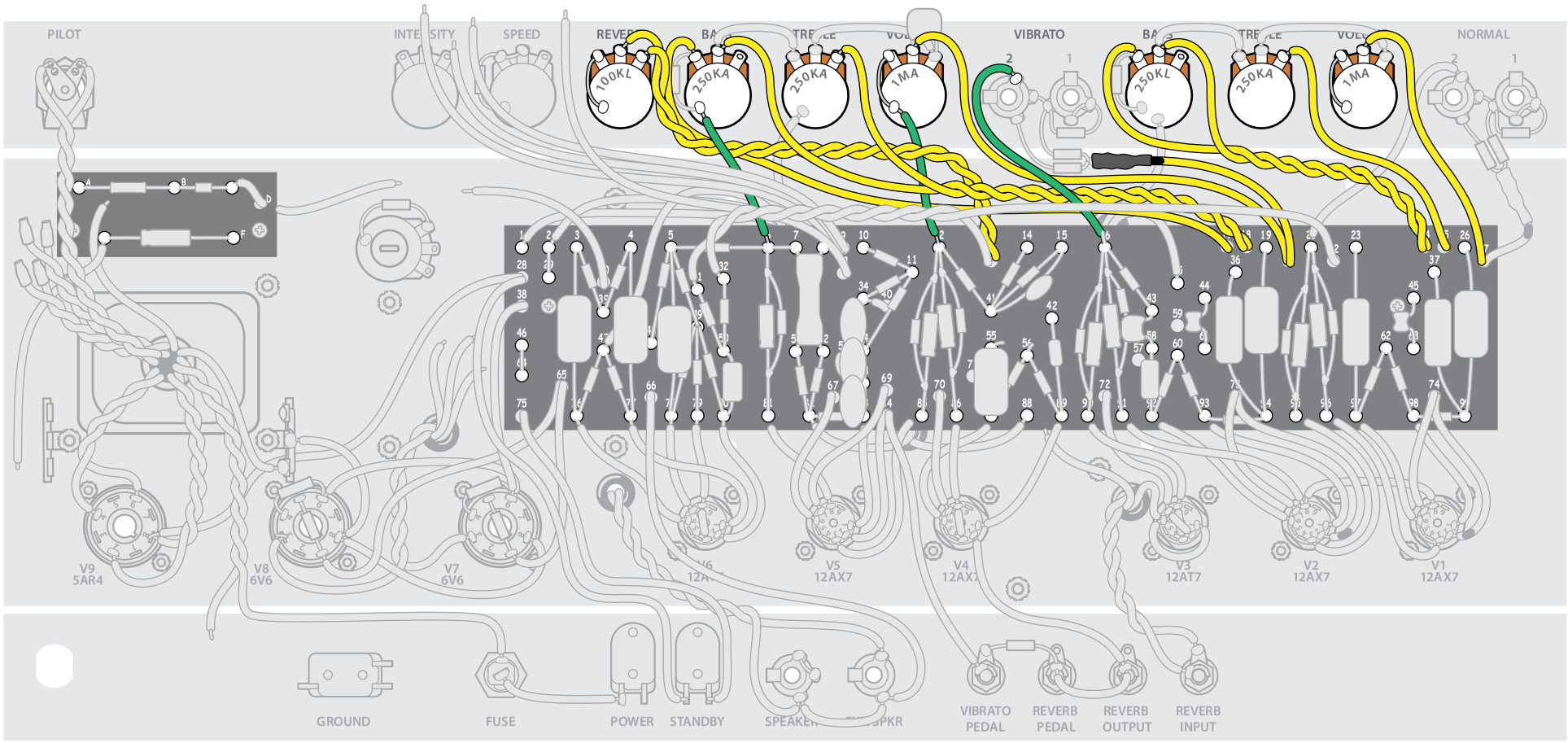
Solder the normal channel input jacks

Slide 1" of 1/8" heat-shrink tubing over the marked jumper coming from through hole 27. Solder this jumper to the twisted pair of 68k resistor leads coming from the normal channel input jacks and apply heat to the heat-shrink tubing to seal it to the solder joint.

Solder the green jumper from eyelet 21 to the left lug (shield connection) of the input 2 jack.

Solder any unsoldered resistor leads into place on the input jacks now.

Trim the excess wires.



☐ STEP 130

Solder normal channel volume pot

Solder the unmarked jumper coming through hole 27 to the middle lug of the volume pot.

Cut a 1" green jumper and remove the insulation. Bend this jumper in a "J" shape and run it from the left lug of the volume pot to the back of the volume pot. Solder it in both places.

☐ STEP 131

Solder normal channel treble pot

Find the jumper coming through hole 25 that has continuity to eyelet 45. Solder this jumper to the right lug of the normal channel treble pot.

Solder the jumpers in the center and left lugs of the treble pot if you have not done so.

☐ STEP 132

Solder normal channel bass pot

Twist together the two jumpers coming from hole 24.

Find the jumper coming through hole 24 that has continuity to eyelet 26. Solder this jumper to the middle lug of the normal channel bass pot along with the jumper already in place.

Find the jumper coming through hole 24 that has continuity to eyelet 37. Solder this jumper to the left lug of the normal channel bass pot along with the resistor lead already in place.

☐ STEP 133

Solder vibrato channel input jacks

Slide 1" of 1/8" heat-shrink tubing over the marked jumper coming from through hole 20. Solder this jumper to the twisted pair of 68K resistor leads coming from the vibrato channel input jacks and apply heat to the heat-shrink tubing to seal it to the solder joint.

Solder the green jumper from eyelet 16 to the left lug (shield connection) of the input 2 jack.

Solder any unsoldered resistor leads into place on the input jacks now.

Trim the excess wires.

☐ STEP 134

Solder vibrato channel volume pot

Solder the unmarked jumper coming through hole 20 to the middle lug of the vibrato channel volume pot along with the capacitor lead already in place.

Cut a 1" green jumper and remove the insulation. Bend this jumper in a "J" shape and run it from the left lug of the volume pot to the back of the vibrato channel volume pot. Solder it in both places.

Also solder the green jumper from eyelet 12 to the back of the vibrato channel volume pot.

☐ STEP 135

Solder vibrato channel treble pot

Find the jumper coming through hole 18 that has continuity to eyelet 44. Solder this jumper to the right lug of the vibrato channel treble pot.

Solder the jumpers in the center and left lugs of the vibrato channel treble pot if you have not done so.

☐ STEP 136

Solder vibrato channel bass pot

Find the jumper coming through hole 18 that has continuity to eyelet 19. Solder this jumper to the middle lug of the vibrato channel bass pot along with the jumper already in place.

Find the jumper coming through hole 17 that has continuity to eyelet 36. Solder this jumper to the left lug of the vibrato channel bass pot along with the resistor lead already in place.

Also solder the green jumper from eyelet 6 to the back of the vibrato channel bass pot.

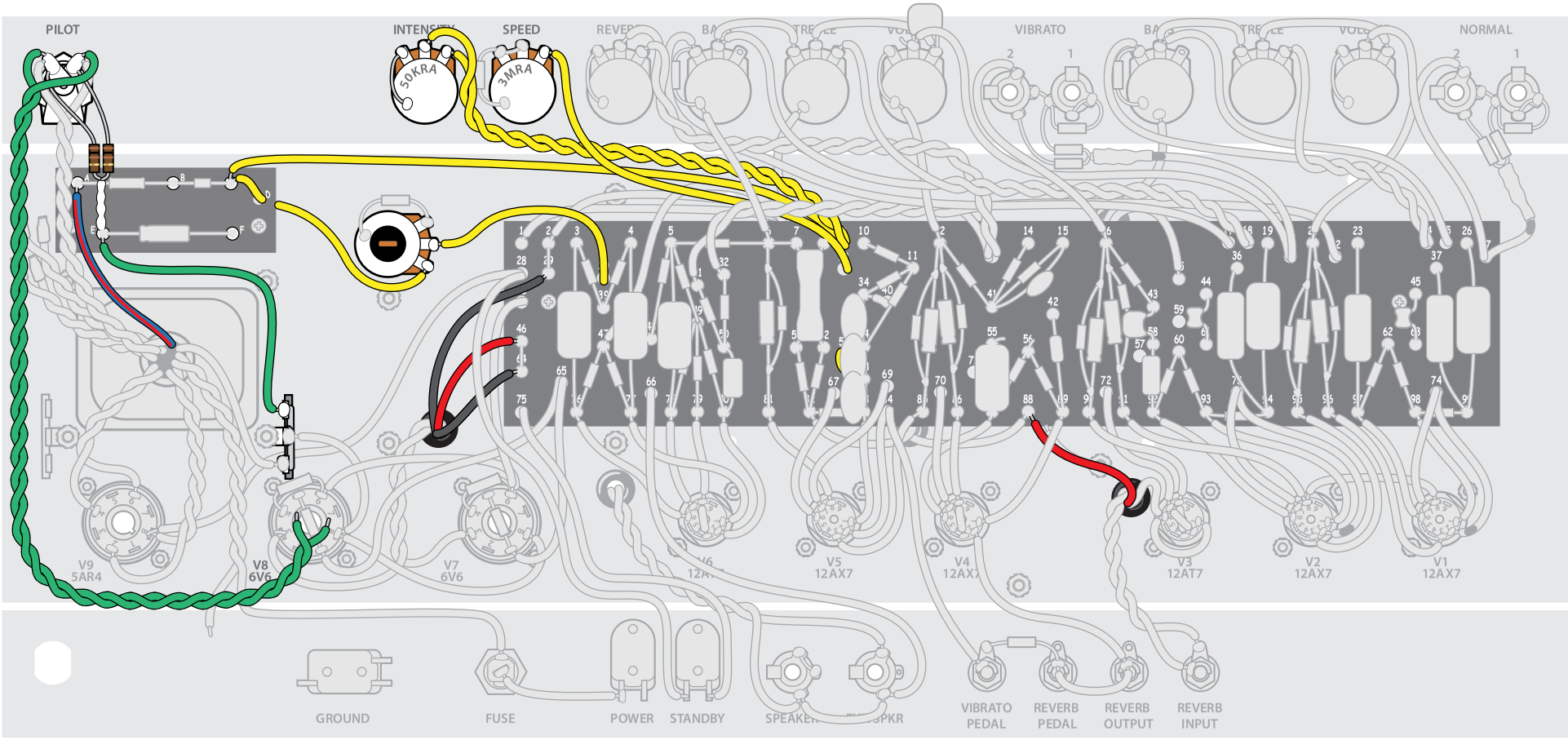
☐ STEP 137

Solder the reverb pot

Find the jumper coming through hole 13 that has continuity to eyelet 42. Solder this jumper to the right lug of the reverb pot.

Find the jumper coming through hole 13 that has continuity to eyelet 14. Solder this jumper to the middle lug of the reverb pot.

Cut a 1" green jumper and remove the insulation. Bend this jumper in a "J" shape and run it from the left lug of the reverb pot to the back of the reverb pot. Solder it in both places.



☐ STEP 138

Solder the speed pot

Find the jumper coming through hole 33 that has continuity to eyelet 68. Solder this jumper to the right lug of the speed pot.

☐ STEP 139

Solder the intensity pot

One of the wires coming through hole 9 will have continuity to eyelet 32 and one of them will have continuity to eyelet 8. Find these two wires and twist them together.

Find the jumper coming through hole 9 that has continuity to eyelet 32. Solder this jumper to the right lug of the intensity pot.

Find the jumper coming through hole 9 that has continuity to eyelet 8. Solder this jumper to the middle lug of the intensity pot.

Cut a 1" green jumper and remove the insulation. Bend this jumper in a "J" shape and run it from the left lug of the intensity pot to the back of the intensity pot. Solder it in both places.

☐ STEP 140

Solder two transformer leads

Find the red lead from the output transformer coming through the grommeted hole between the 6V6 tubes. Trim it to an appropriate length and solder it to eyelet 46.

Find the red lead from the reverb driver coming through the grommeted hole between tube socket V3 and tube socket V4. Trim it to an appropriate length and solder it to eyelet 88.

☐ STEP 141

Solder bias board jumpers

Solder the green jumper from eyelet E of the bias board to the nearby three-lug grounding strip.

Solder the red/blue lead from the power transformer to eyelet A of the bias board.

Find the jumper coming through hole 9 that has continuity to eyelet 10. Solder this jumper to eyelet C of the bias board.

☐ STEP 142

Solder bias pot jumpers

Solder the jumper from hole D to the right lug of the bias pot.

Solder the jumper from hole 30 to the middle lug of the bias pot.

☐ STEP 143

Add two resistors

Twist the leads of two 100Ω resistors together and apply solder to keep them joined. Wrap the two resistors' other leads onto the pilot lamp lugs along with the green power transformer leads. Do not solder these yet.

Solder the twisted leads to eyelet E on the bias board.

☐ STEP 144

Solder two filter choke leads

Find the two black leads coming through the grommeted hole between tube sockets V7 and V8.

Solder one of these leads to eyelet 29.

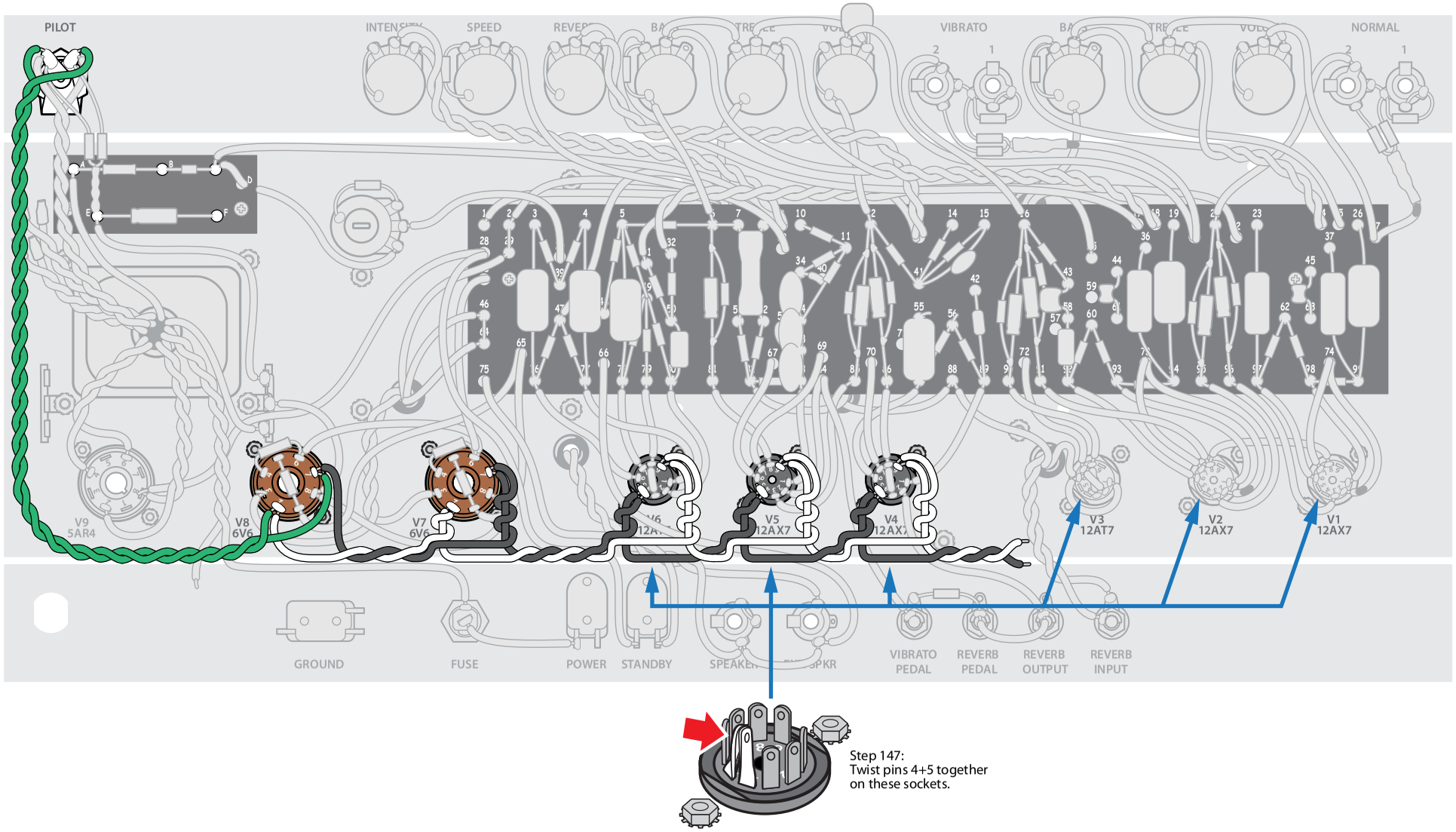
Solder the other lead to eyelet 64.

☐ STEP 145

Install two green jumpers

Cut two 15-1/2" green jumpers and twist them together, leaving one inch of untwisted wire on each side. Wrap the two wires from one side of this twisted pair through the two lugs of the pilot lamp assembly. Solder these leads into place with the two 100Ω resistors and the green power transformer leads.

Route these twisted jumpers around the edge of the chassis to reach socket V8, but leave room for the chassis mounting screws to make it through their holes. These are the two holes very close to the left wall of the inside of the chassis.



Install the heater wires

Review these steps very carefully before you start installing the heater wires that power the heating filaments in the tubes.

The twisted green wires from the power transformer carry AC voltage to the heating filaments in the tubes. It's important to twist these wires tightly together. This isn't for looks; twisting the wires has a hum-cancelling function that reduces noise in the amp.

☐ STEP 146

Connect to tube socket V8

Cut two 6" heater wires, one white and one black. Twist them together very tightly, leaving about 1" of the ends untwisted. Join the white jumper to either of the green jumpers by twisting the ends together. Join the black jumper to the other green jumper.

Solder the pair with the white wire to pin 2 of socket V8.

Solder the pair with the black wire to pin 7 of socket V8. Bend these wires up and away from the socket.

At 1" above the socket, bend the black-and-white pair at a 90° angle toward socket V7.

☐ STEP 147

Connect to tube socket V7

Cut two 6" heater wires, one white and one black. Twist them tightly together.

Twist the end of the white wire to the white jumper coming from V8. Twist the black wire with the black jumper coming from V8.

Solder the white pair onto pin 2 of V7. Solder the black pair onto pin 7. Bend the wires up away from the socket, and on toward socket V6.

Make sure that the like-colored jumper wires are going to the same-numbered pins, or you will have a phase issue from the pulsing voltage. For example, if the white wire is soldered to socket V8 pin 2 and the black wire is soldered in to socket V8 pin 7, make sure you connect the white wire to socket V7 pin 2 and the black wire to socket V7 pin 7.

☐ STEP 148

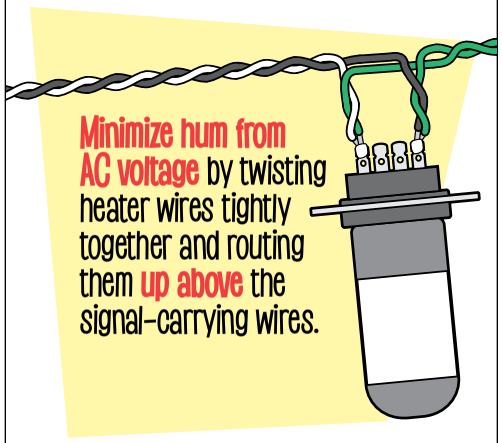
Connect to tube socket V6

On sockets V6 through V1 you will need to join pins 4 and 5 together. On these six sockets, gently twist pins 4 and pin 5 toward each other so their eyelets line up. Be very careful while doing this, as these pins are delicate.

Cut two 4" heater wires, one white and one black. Twist them tightly together.

Twist the end of the white wire together with the white jumper coming from socket V7. Twist the black wire with the black jumper coming from socket V7.

Solder the white pair to socket V6 pin 9 and solder the black pair to combined pins 4+5 on socket V6. Bend the wires up away from the socket, and on toward socket V5.



☐ STEP 149

Connect to tube socket V5

Cut two 4" heater wires, one white and one black. Twist them tightly together.

Twist the like-colored wires of this new pair in with the like-colored wires of the twisted pair coming from socket V6.

Solder the pair of twisted white wires to socket V5 pin 9 and solder the twisted black wires to socket V5 pin 4+5. Bend the wires up away from the socket, and on toward socket V4.

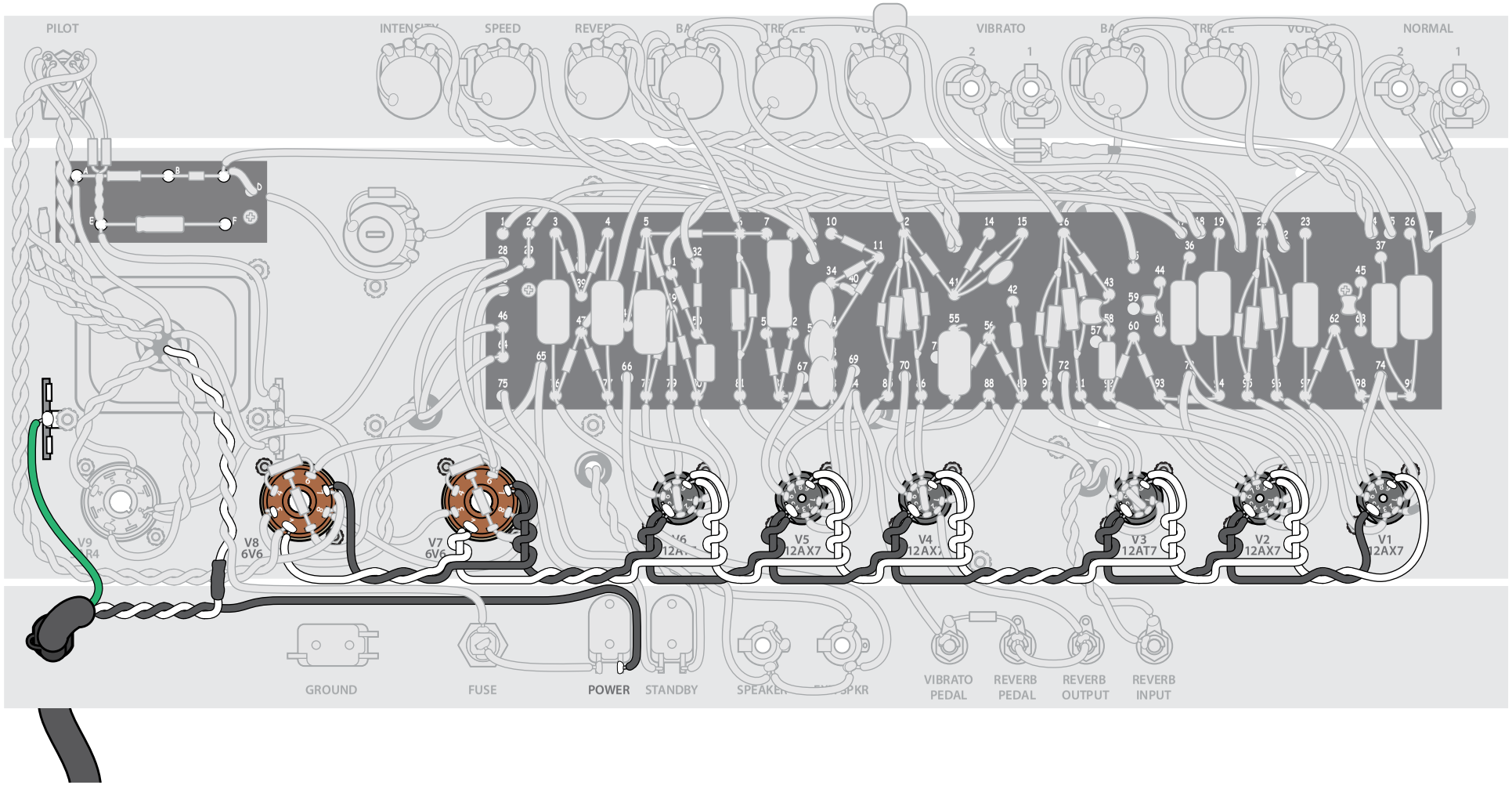
☐ STEP 150

Connect to tube socket V4

Cut two 5" heater wires, one white and one black. Twist them tightly together.

Twist the like-colored wires of this new pair in with the like-colored wires of the twisted pair coming from socket V5.

Solder the pair of twisted white wires to socket V4 pin 9 and solder the twisted black wires to socket V4 pin 4+5. Bend the wires up away from the socket, and on toward socket V3.



☐ STEP 151

Connect to tube socket V3

Cut two 4" heater wires, one white and one black. Twist them tightly together.

Twist the like-colored wires of this new pair in with the like-colored wires of the twisted pair coming from socket V4.

Solder the pair of twisted white wires to socket V3 pin 9 and solder the twisted black wires to socket V3 pin 4+5. Bend the wires up away from the socket, and on toward socket V2.

☐ STEP 152

Connect to tube socket V2

Cut two 4" heater wires, one white and one black. Twist them tightly together.

Twist the like-colored wires of this new pair in with the like-colored wires of the twisted pair coming from socket V3.

Solder the pair of twisted white wires to socket V2 pin 9 and solder the twisted black wires to socket V2 pin 4+5.

☐ STEP 153

Connect to tube socket V1

Run the black-and-white twisted pair up 1" from the tube socket, directly over to socket V1, and back down socket V1. Solder the white wire to socket V1 pin 9 and solder the black wire to socket V1 pin 4+5.

Carefully inspect each solder joint from this heater wire installation, and once the solder joints have cooled push your heater wires away from the tube sockets as far as you can.

☐ STEP 154

Add the power cord + strain relief

Pull the power cord leads through the hole in the chassis. Strip the power cord's outer insulation back until the black-and-white leads can reach from the access hole to the power switch.

Secure the power cord in the hole using the black strain relief. The strain relief is a tight fit. Use pliers to squeeze it onto the power cord outside the chassis, and keep squeezing to fit it into the mount hole.

Cut the green lead from the power cord to reach the three-lug grounding strip just inside the chassis underneath the hole for the power cord. Tin this green lead and wrap it through the middle lug of the three-lug grounding strip.

☐ STEP 155

Connect the power cord leads

Run the black-and-white power cord wires along the back wall of the chassis.

Cut the black lead to 8-1/2" and the white lead to 4", then twist them together. For 120V operation, locate the remaining white lead from the power transformer. This white lead will be connected directly to the white power cord lead. Cut it to approximately 3" and slide a 1" piece of heat-shrink over the power transformer lead. Solder these two white leads together. Cover the solder joint with heat-shrink, and apply heat.

Solder the power cord's black wire to the right/open lug of the power switch.

Solder the power cord's green ground wire onto the nearby grounding strip.

Take a break and review your work

Now that you've soldered the components and wires, it's time to take a break. Rest your eyes and review your work later, carefully looking again for any errors before moving on.

Installing parts and preparing for testing

☐ STEP 156

Install the fuse

Insert the 1-amp fuse into the fuse socket and make sure the socket cap is secure. Never use a fuse rated above 1 amp in this amplifier.

☐ STEP 157

Install the capacitor pan

Use the self-tapping screws to mount the capacitor pan on the chassis, covering the filter cap board.

☐ STEP 158

Install the pilot lamp

Insert the pilot lamp bulb into its socket from the front of the chassis and twist until it locks back in place. Screw the red jewel lens over the socket.

☐ STEP 159

Install the control knobs

Turn the shaft of each pot to "zero" and install the knob so that the indicator line points to number 1.

☐ STEP 160

Set the chassis on a chassis stand or on blocks for testing

Set your chassis up for final testing. Chassis stands are extremely useful for this. If you do not have a chassis stand a couple of blocks of wood can work just fine.

DON'T INSTALL THE TUBES YET!
DON'T PLUG THE AMP IN YET!

The next page is going to keep you out of trouble!

Any **multimeter** will work fine for the two types of tests we're about to do: checking **continuity** and reading **voltages**. The instructions that came with your meter will be helpful.

Continuity testing is simply making sure current flows between two points successfully. Touch the meter's red lead to one end of the section being tested, and the black lead to the other end. If the continuity is good, your meter will beep or register this on the display.

Voltage testing is where you need to be careful. Some steps require the amp to be plugged in and turned on. This becomes dangerous if you're not cautious. Respect the voltages and follow the directions, and these tests are safe and easy.

☐ STEP 161

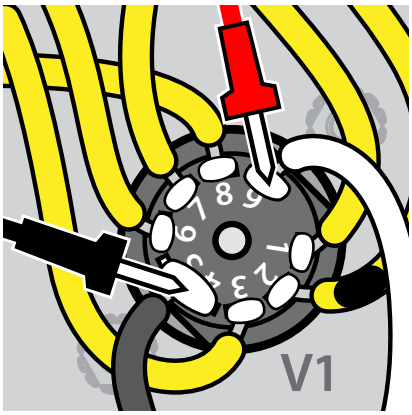
Perform a safe power-up

At this point, there should be no tubes installed, and the speaker should be disconnected.

Before plugging the amp in, turn the power switch to ON. Switching the amp on before the first power-up protects you from shock if a mistake in your wiring has created a short to the chassis. If this short exists, an indication would be that the pilot light will not turn on, since the AC current is going directly to ground.

Plug the power cord in. The pilot lamp should light.

For a few minutes, watch for smoke or unusual smells. If anything seems unusual, disconnect the power immediately and carefully review all your connections.

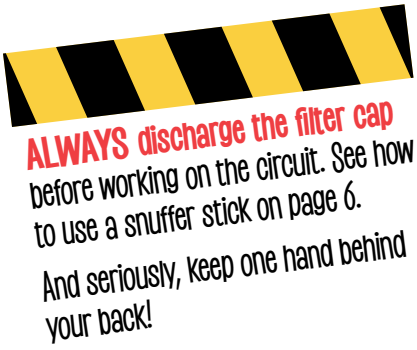


☐ STEP 162

Test the standard AC voltage

Set your multimeter to 20V AC. Check the heater voltage across pin 9 and pins 4+5 on the V1 12AX7 socket. This should read between 5-7V AC. If this reading is drastically different, disconnect power and check your connections.

If the amp seems normal, unplug the power cord and turn the power switch OFF.



☐ STEP 163

Test the dangerous DC voltage

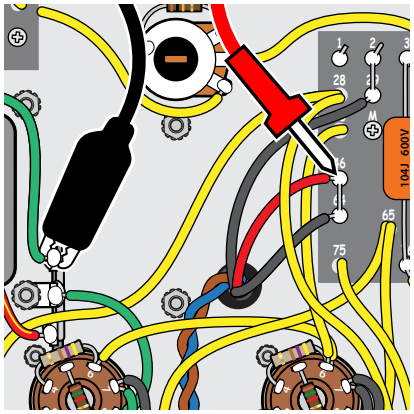
The dangerously high DC voltage that passes through the rectifier tube and the filter caps is referred to as "B+". The next step is to test this B+ voltage.

With the amp still unplugged and turned off, install the 5AR4 rectifier tube while spreading the tension clip.

Plug the power cord back in and turn the power switch to ON. The pilot lamp should light, along with the filament inside the 5AR4 rectifier tube.

Again, spend a few minutes watching for smoke or smells before flipping the standby switch to ON.

For safety, use only one hand to probe the amp during DC tests. Keep your other hand behind your back when probing a component, so you can't be a path between B+ voltage and ground—a mistake that would send a dangerous charge through your heart.



Set your multimeter to 600V DC and connect the negative lead to ground. Once the negative lead is secured to ground, flip the standby switch to ON. Measure the DC voltage at eyelet 46 for your B+ voltage. This should be roughly 490V DC.

Turn the power and standby switches to OFF and unplug the amp.

☐ STEP 164

Test the preamp tubes

With the amp unplugged use the snuffer stick to discharge the capacitors, then install the six preamp tubes.

After these tubes are installed, plug the amp back in and flip the power switch ON. The pilot lamp should light up. Let the amp warm up for a few minutes and then flip the standby switch to ON. Again, if you get smoke or smells, unplug immediately.

Connect your multimeter's negative lead to ground.

Set the multimeter to 5V DC and check eyelet 96, which should read around 1.3V.

Set the multimeter to 200V DC and check eyelet 98. It should read around 200V.

Set the multimeter to 100V DC and test pin 5 of the V7 and V8 sockets. These readings should be nearly identical.

Use a small flathead screwdriver to turn the center of the bias pot all the way counter-clockwise. This will set the bias for the lowest negative DC voltage. Doing this provides a safe voltage for the power tubes while you set the initial bias.

If all of these voltages come within approximately 10% of their expected values, turn the power switch OFF. Always turn the power switch off before turning the standby switch off. This will drain the filter capacitors as the amp cools down. After a moment, flip the standby switch OFF as well.

If the reading at eyelet 98 shows no voltage or low voltage, follow this test: unplug the amp, drain the filter caps with the snuffer stick, set your meter to read continuity, and make sure you have properly installed the back-of-board jumper from eyelet 35 to eyelet 62.

☐ STEP 165

Test the 6V6 power tubes

With the amp unplugged, install the 6V6 power tubes, turning them so their indexing keys fit correctly in the socket. Turn all of the front panel controls completely counter-clockwise, so the indicator line is pointing to "1".

Plug the speaker in and perform these next tests with the speaker turned away from you. If the amp starts to oscillate and squeal, this will help protect your ears.

Plug the amp in and flip the power switch ON. Give the tubes 30 seconds to warm up and then flip the standby switch to ON as well.

After a few moments you should hear a low hum. If the hum becomes very loud, disconnect the power immediately and review your connections.

Set your multimeter to read 500V DC and test for voltage on pin 3 of both socket V7 and socket V8. This is the plate voltage reading, and it will be around 415V. **Write this number** in Box 2 of the calculation in Step 169. It'll be needed if you use a bias meter to set your bias.

Set your multimeter to read 50V DC and test for voltage at eyelet 39. Adjust the bias pot until this voltage reads -35V.

If all of these voltages come within approximately 10% of their expected values, turn the power switch OFF. After a few moments turn the standby switch OFF as well, and unplug the amp.

Tube bias affects your sound

"Bias" refers to the current of electrons flowing from the cathode to the plate inside your power tubes when the tubes are idle. The bias setting determines this flow and is increased or decreased by the screwdriver-adjustable bias pot.

Adjusting the bias affects your sound: a higher setting gives you punchier cleans and grittier distortion, but your tubes will wear out faster. With a low setting, your tubes last longer but the sound is more sterile. A good bias setting falls between these extremes.

☐ STEP 166

Old method of setting the bias: doing it by ear

If you have a bias meter, skip this step and go on to Step 167.

The old-school way of adjusting the bias is by ear: after setting the bias voltage to a recommended starting point, you make tiny adjustments to the bias pot while listening for the sound you want. This inexact method can shorten the life of your power tubes.

You roughed-in the bias setting in the previous step by setting the bias voltage at -35V.

Danger: set your guitar aside before you adjust the bias pot. Do not touch any amp circuitry while holding your guitar. Doing so would create an electrocution hazard!

Use a screwdriver to make a tiny adjustment to the bias pot. Turn clockwise to increase the current and counter-clockwise to decrease it. Then set the screwdriver aside and play to hear to the result.

Watch out for red-plating

You especially want to avoid too much current turning the gray plates to glowing red. If your tubes start red-plating, shut the amp down and let it cool before setting the bias to a lower level.

☐ STEP 167

Improved method of setting the bias: using a bias meter

The more accurate way to set the bias is by using a bias meter, such as the VHT Bias Tester (StewMac #1580).

This method starts with a simple calculation to find your bias setting, then you adjust the bias pot until your bias meter displays that reading.

The calculation uses two numbers, the tube's maximum plate dissipation and its plate voltage.

Plate dissipation. Every power tube has a specified plate dissipation—the maximum wattage the tube can handle. For the 6V6 power tubes in this amp, that maximum is 14 watts. Exceeding the 14-watt limit will damage the tube, and operating at the full 14 watts will shorten its life. Our goal is to operate the tube at 60% of the 14-watt limit, or 8.4 watts. We've entered this number for you in Box 1 of the calculation.

Plate voltage. You already have the plate voltage for these tubes: it's the number you found in Step 165 and wrote in Box 2 below.

Divide Box 1 by Box 2. The result is your recommended bias setting for use in the next step. Our example calculation gives a bias recommendation of .020 Amps. Since bias is typically measured in milliamps, this measurement is written as 20mA.

With the amp unplugged allow the power tubes to cool. Once the power tubes have cooled, remove them from their sockets.

Plug the tubes into the bias probe sockets, which are like tube sockets. Plug the probe sockets with tubes into the power tube sockets.

Plug the amp back in and flip the power switch ON. Give the tubes 30-60 seconds to warm up, then flip the standby switch ON.

Watch the bias meter as the power tubes heat up. Both needles should rise at an equal rate and settle at the same time.

Adjust your bias pot until the bias meter displays the reading you calculated (20mA in our example). Let the amp idle for a few minutes to make sure that the bias doesn't drift.

When you see a constant readout of your bias setting, turn the power switch OFF.

After a few moments flip the standby switch OFF and unplug the amp from the wall.

Once the tubes are cool, remove them and the bias probes from the amp and plug the tubes back in to the amp's tube sockets without the probes attached.

Calculate your bias current setting

BOX 1 60% of max. plate dissapation		BOX 2 Your plate voltage from Step 165		Your bias current setting
8.4	÷		=	
Example:				
8.4	÷	415	=	0.020 (20mA)

Final assembly

☐ STEP 168

Test the reverb and tremolo

Connect the two shielded cables you assembled in Step 7 to the reverb in and out jacks on the back of the chassis. Connect the chassis out cable to the reverb tank's in jack. Connect the chassis's in cable to the out jack on the reverb tank. Also connect the footswitch cables to the reverb and vibrato jacks.

Plug the amp back in and flip the power switch ON. Allow the tubes to warm up for 30 seconds, then flip the standby switch ON.

Plug your guitar into the normal channel and play at low volume. If the amp behaves as it should, test the tone controls and keep increasing the volume. The 66D should start to break up nicely as you increase the volume.

Now test the vibrato channel effects. If the reverb isn't working, try switching the cables in the reverb in and out jacks. If that doesn't remedy the issue, check your reverb cables again for a short.

If there are any strange oscillations, squeals, or the amp seems at all unstable, use a wooden chopstick to begin probing for loose connections:

- ❑ from the input jacks to the eyelet board
- ❑ from the tube sockets to the eyelet board
- ❑ from the tube sockets to the front panel controls.

It usually takes just a minor wiring adjustment, perhaps resoldering a loose joint, to correct this sort of distortion.

☐ STEP 169

Install the chassis

Discharge the capacitors so you can safely handle the amplifier. Remove all the cables from their jacks.

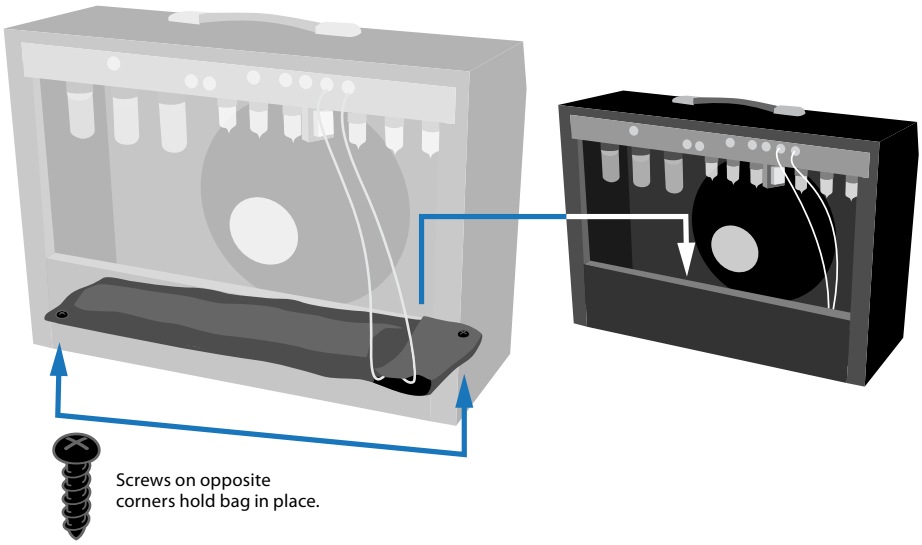
Slide the chassis in from the back until its front edge rests on the speaker baffle. Align the chassis straps with the holes in the top of the cabinet. Insert the mounting screws through the straps and down through the chassis. Tighten the locknuts.

Install the preamp tube shields. Fasten the power cord to the cable clamp on the side of the cabinet and install the back panels.

Slide the reverb tank into its bag and lay it on the floor of the cabinet. The RCA connections inside the bag should be facing front, toward the speaker baffle.

Using two black wood screws, drill through the bag on two corners and into the bottom of the cabinet. Be careful not to drill into the reverb tank or the cords! This will keep the bag from moving around inside the cabinet.

Plug in the speaker, footswitch, and reverb tank.



Enjoy your amp!

For many players, this is a "desert island" amp: the one to choose if you could only have one amplifier.

It has very little hum for a vintage circuit, the reverb is cavernous, and the distortion is just right. Also, the tremolo doesn't make the unwanted ticking noise you find with some vintage tremolos. (Speaking of tremolo, Leo mistakenly named this effect "vibrato," but let's forgive him for that.).

Why is this amp so sweet, and how do you dial it in? The AB763 tone stack has a distinct mid scoop: the bass and treble controls boost their ranges while leaving the mids unaffected. With bass and treble set to minimum, the tone stack bleeds off about 25dB from the signal. For this reason, try setting the bass and treble at about 6. If you're using single-coils, maybe bump the bass up a bit more, and give humbuckers a little more treble.

The normal channel doesn't have reverb and tremolo. This unaffected channel is helpful if you have a reverb pedal on your board and don't want to send your signal through a reverb tank. However, most players seem to prefer the vibrato channel.

With the bass and treble at about 6, try the reverb control between 4 and 5.

You can vary the tremolo speed and intensity settings quite a lot depending on the song, but the tremolo can become overwhelming when the intensity goes past 6.

I usually play with the volume control on my guitar at 10, and the 66D sits right on the edge of distortion with the volume around 5.5-6. Increasing the volume past that point doesn't make the amp louder, but the tubes start to saturate and the tone goes into full-on gorgeous, harmonic distortion.

There's no right or wrong way to play this amp, and it's almost impossible to pull a sour tone from it!

StewMac

Tube life

The life span of the power tubes is affected by how hard you drive the amp. If you are overdriving the amp for hours every day, expect the power tubes to have a shorter life span.

We encourage you to experiment with different tube brands and find the brand that is most favorable to your ears and your wallet.

MAKE IT MOD IT FIX IT StewMac®

For questions and support, StewMac is here to help!

For more than fifty years, StewMac has supplied instrument builders and repair shops. Our customer service team really knows how to help if you run into questions.

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Thanks for choosing this StewMac ICON KIT, and welcome to the world of amp building!

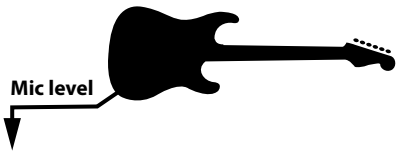
Learning more: secrets revealed in the schematic

You don't need to read a schematic to build this kit. But it's fun to see how the circuit works, and to see the different subcircuits that interact to shape your sound.

Working with the tiny signal from the guitar, the amp creates the power needed to drive the speaker. The signal is affected by the **gain**, **processing**, **output** and **power** stages as it passes through the circuit.

We've color-coded these stages on our schematic, to show how the parts work together. Symbols for components are in the key at the bottom of the frame.

On the **wiring diagram** we build step-by-step in these pages, the parts are easier to recognize. But studying these color-coded stages will help you understand where each component fits into the creation of your sound.

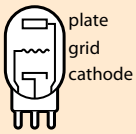


Gain

Line level →

The gain circuit increases the signal strength to **line level** (about 1 volt), by passing it through preamp tubes.

Inside the tube, electrons flow from a heated **cathode** to be received by the anode **plate**. Between these is a grid receiving the tiny voltage from the guitar. The guitar's varying musical signal controls the flow of electrons to the plate.



V1 handles the first gain stages of the normal channel, and V2 handles the first gain stages of the vibrato channel. The vibrato channel has an extra gain stage in the second half of V4 to make up for signal lost through the reverb and vibrato circuits.

Processing

Line level →

The processing stage shapes the **tone**. The AB763 is notorious for its mid-scooping tone stack.

Both the normal channel and the vibrato channel have processing controls through their respective treble and bass controls, and the vibrato channel has additional processing through the reverb and vibrato circuits.

V3 handles the reverb send and the first half of V4 handles the reverb recovery. V5 handles the vibrato circuit.

Both channels are then sent to the phase inverter which uses all of V6. The phase inverter then sends the signal to the output section.

Output

Speaker level →

The output stage increases the line level signal to **speaker level**, which is typically 8 volts or greater.

Two 6V6 tubes drive the output transformer. They receive the split signal, 180 degrees out of phase, amplify those signals, and send them to the output transformer to be recombined into one signal. This transformer adjusts the impedance to 8 ohms to drive the amp's **8Ω** speaker.

This amp has an adjustable fixed bias, which means you need to check the bias and possibly make adjustments when you change power tubes.

Negative feedback

The negative feedback loop flattens and extends the amp's frequency response, reducing distortion generated in the output stage. This makes the amp's sound cleaner and more hi-fi.

Some players disable this loop completely or add a potentiometer in place of the resistor to create a "grit control." We don't recommend this, because it places stress on the output transformer.

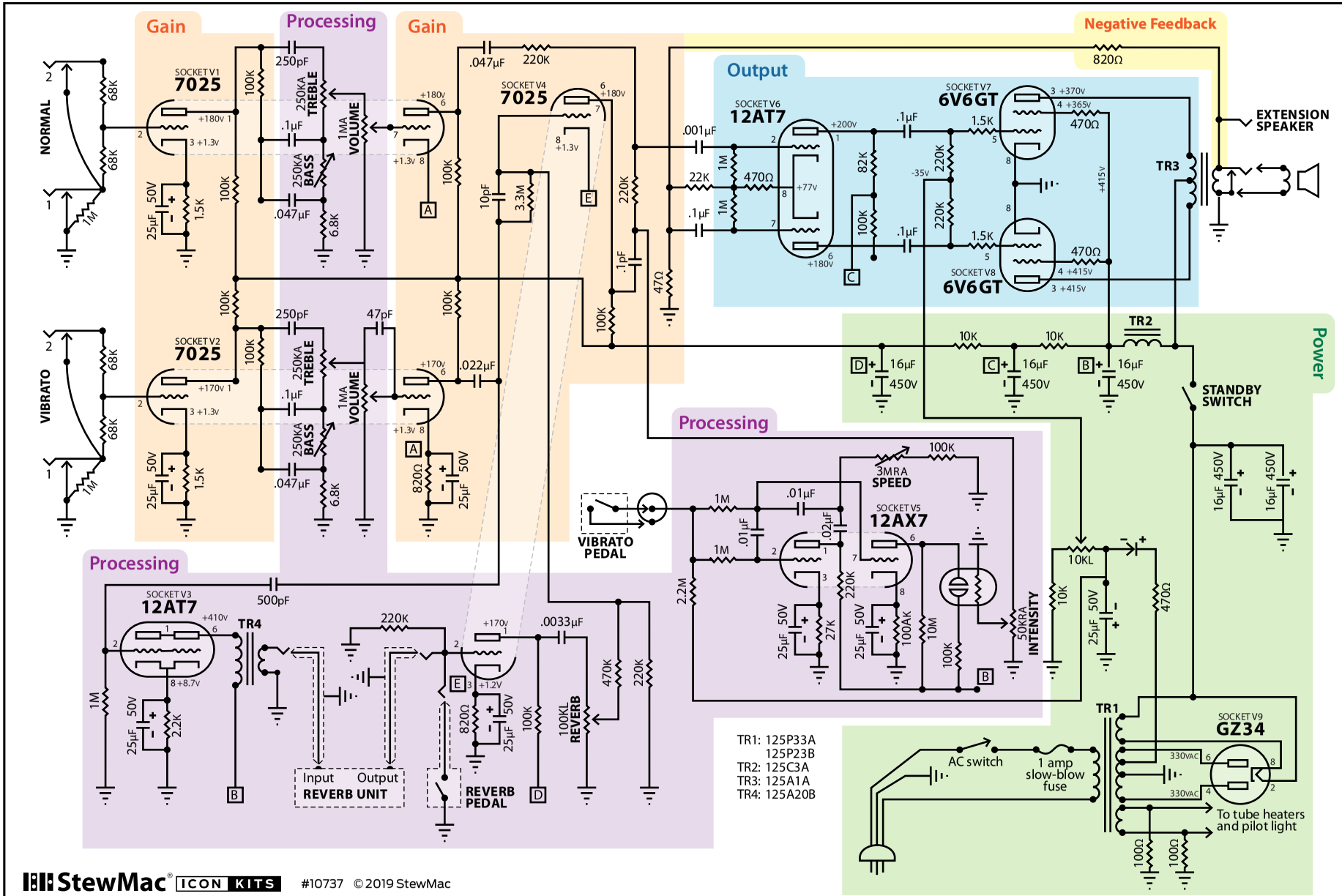
Power

The power supply stage provides power to the other circuit stages, as well as the tube heaters and pilot light.

This circuit receives the **AC power** from your wall and passes it through the power transformer to create higher voltage. The electricity then goes to the rectifier, which converts it to a pulsing **DC current**.

This then passes through the filter choke and the filter cap board. The filter cap board contains five capacitors that filter out the pulsing to create a smooth current. As each cap smooths a bit more, the current is also passing through resistors that lower the voltage.

As the signal from the guitar becomes more amplified, the ripple of DC current becomes less evident and the fully filtered current is sent to the most sensitive part of the amplifier, the first pre-amp tube in the gain stage.



StewMac® ICON KITS #10737

Resistor Capacitor Potentiometers Diode Transformer Jack Ground Shielded cable Preamp tube Power tube Rectifier tube Optoisolator

Electrolytic Cap.

'66 D-REVERB 22W

ORIGINAL AB763 CIRCUIT

It's your amp. Your tone. You built it!

StewMac **ICON KITS** teach you the world of amp building, then turn you loose with amazing hand-built tone machines!

'57 MINI TWEED 5W AMP KIT

One-knob titan of tone.

A timeless studio darling whose tiny size hides tremendous punch and versatility.

The 5F1 circuit was meant to be a student amp but wasn't kid stuff for long; rock's finest guitarists hijacked it for some of the greatest songs ever recorded. Listen to Eric Clapton ("Layla") or Joe Walsh ("Rocky Mountain Way") while you build this amp!

Our simplest kit; the quickest way to get into amp building.

#10730 5 WATTS / 8" SPEAKER / ORIGINAL 5F1 CIRCUIT

DIFFICULTY
HOURS: **6**

'59 TWEED 15W AMP KIT

Dirty little devil that shaped guitar history.

With mysteriously fat saturated tone, this little monster makes it easy to achieve seismic distortion.

This amp's 5E3 circuit is an enigma: Why do the controls on the channel you're NOT using make your tone so great? The answer: Who cares? This is one of the greatest tone monsters ever created! Listen to Neil Young's *Rust Never Sleeps* while building this kit.

Our most popular amp kit and a great learning experience.

#10731 15 WATTS / 12" SPEAKER / ORIGINAL 5E3 CIRCUIT

DIFFICULTY
HOURS: **8**

'65 P-REVERB 15W AMP KIT

Sparkling bright, perfect for the surf.

Plug your single-coils straight in for that signature clean American tone, or go surfing with onboard effects.

The smallest member of the black-panel family to offer reverb and tremolo, this amp made its name as a jangly pop dream machine. Aficionados treasure its early low-end breakup powered by a pair of 6V6 tubes.

Listen to "Surfin' USA" and the great sounds of Ryan Adams.

#10734 15 WATTS / 10" SPEAKER / ORIGINAL AA1164 CIRCUIT

DIFFICULTY
HOURS: **12**

Beginner-tested. Pro quality.

StewMac **ICON KITS** are fun to build, with friendly instructions to guide you and loads of info to add to your knowledge.

'66 D-REVERB 22W AMP KIT

Famously clean, with enough guts to gig.

Perfect for recording as well as performing, the D-Reverb produces stinging clarity that absolutely refuses to get lost in the mix.

One of the most popular designs ever, this amp lives in the happy middle between bright clarity and rich distortion. It excels in the studio and on the stage. While capable of crystal clear tones at good volume, you can push this one into beautifully saturated, play-sensitive distortion.

It's all here: clarity, distortion, and rectifier tube sag.

#10737 22 WATTS / 12" SPEAKER / ORIGINAL AB763 CIRCUIT

DIFFICULTY

HOURS: **16**

'62 BRIT-PLEX 45W AMP KIT

The original British showstopper.

This amp started a revolution. It's been rocking the world for over 50 years, and we still can't get enough.

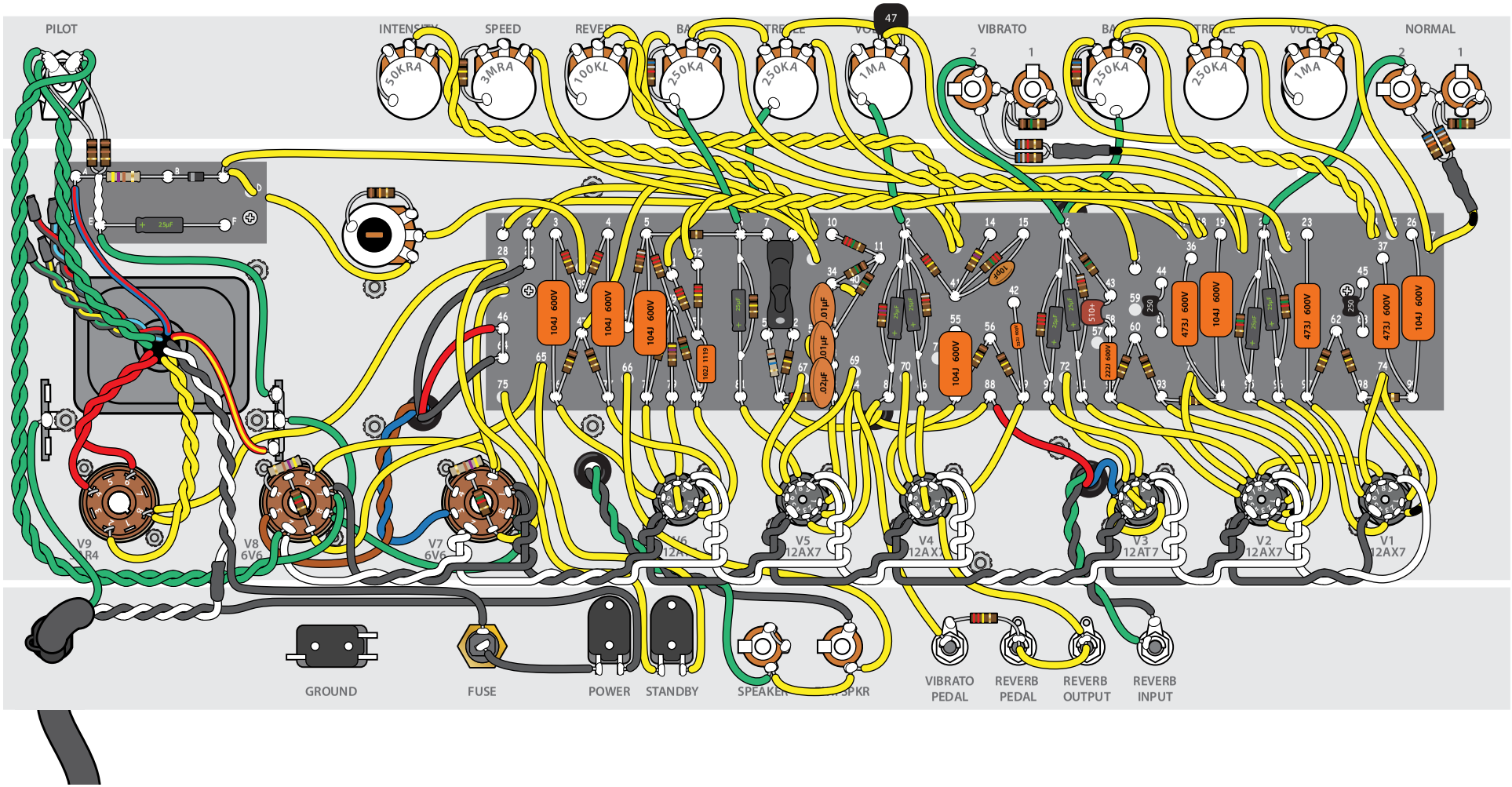
Favored by blues and rock players for exceptional sustain and rich creamy tone, the '62 Brit-Plex is chock-full of harmonic gain, yet it still stays articulate and even a little crispy. Put this head on a classic 4x12 cab and watch out!

While building, listen to Gary Moore's "Still Got The Blues."

#10736 45 WATTS / ORIGINAL BRITISH CIRCUIT

DIFFICULTY

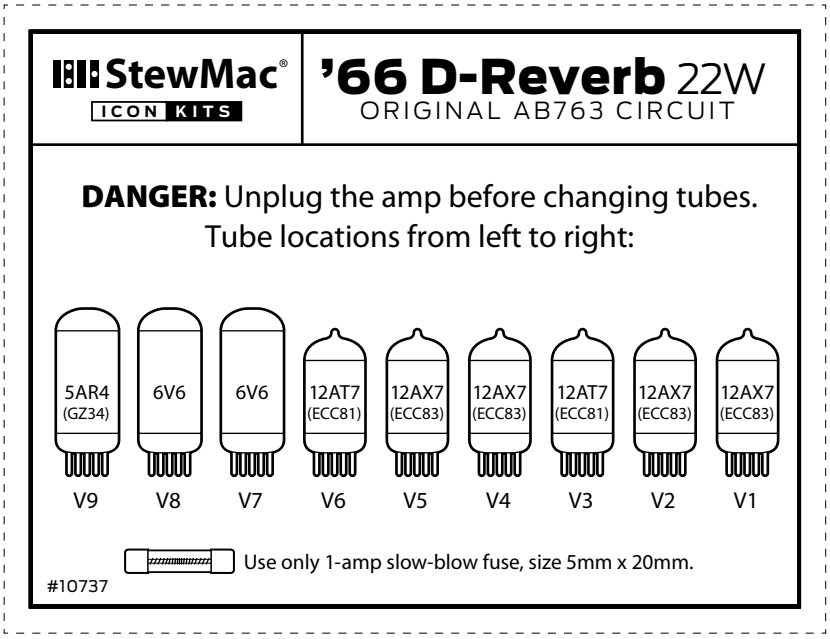
HOURS: **12**



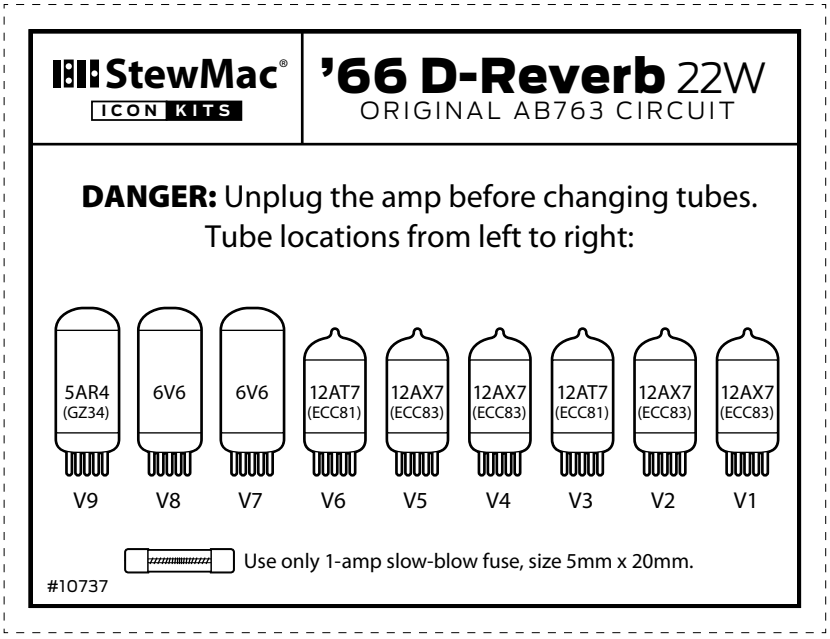
’66 D-Reverb 22W

ORIGINAL AB763 CIRCUIT

StewMac® ICON KITS



Cut this label on the dotted line with a razor knife and metal straightedge.
Fasten it inside the cabinet using thinned wood glue or contact cement.
The duplicate copy below is included as a backup.



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#10737 Updated February, 2021