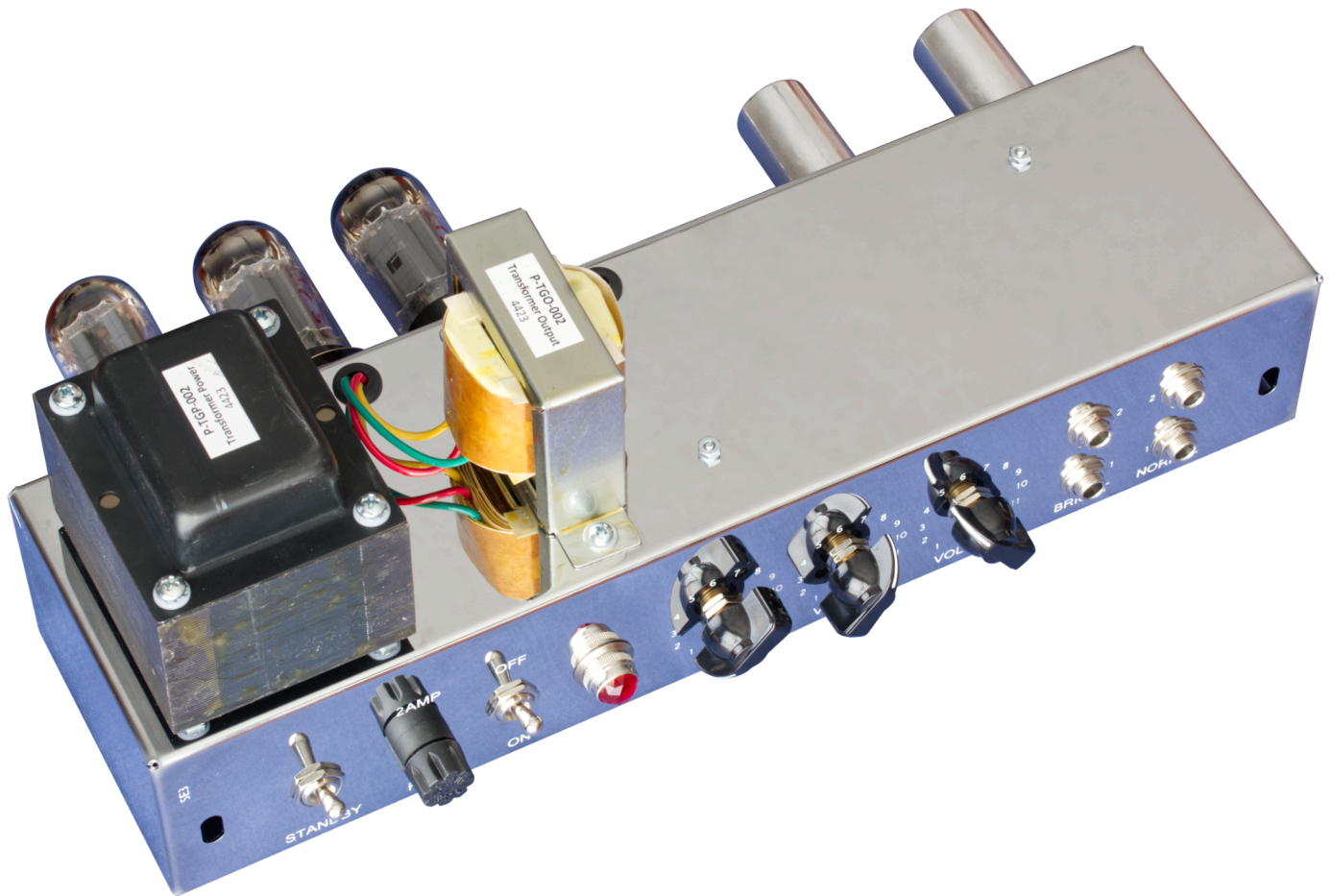


5E3 Chassis Kit

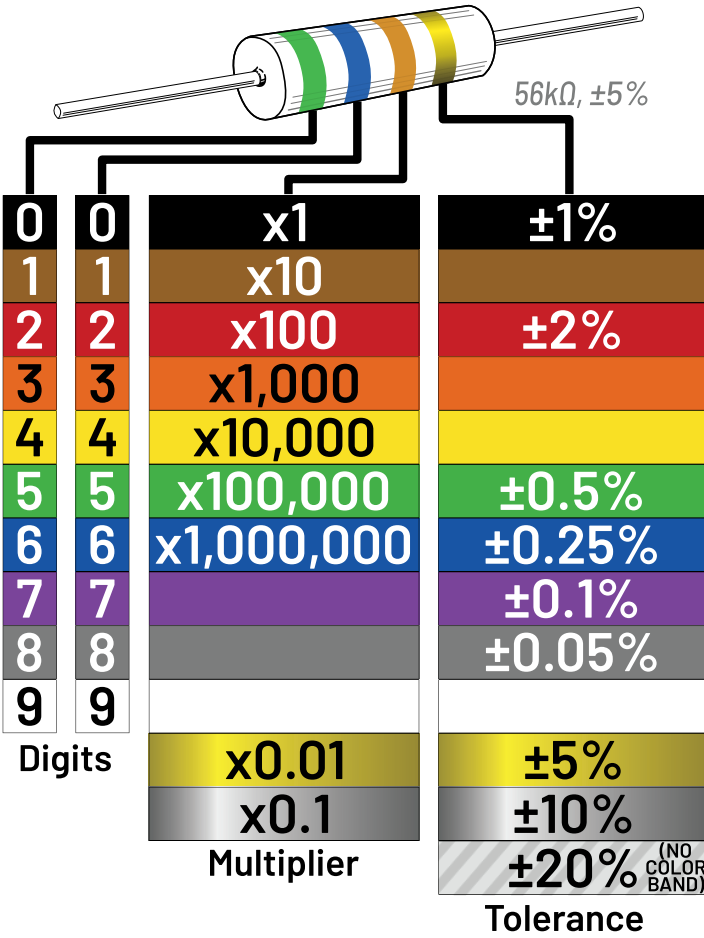


This kit provides all the chassis components to recreate one of the most iconic amps in history, known for its warm, dynamic tones and versatile design. The project offers a rewarding and educational experience for both experienced DIYers and newcomers to the world of tube amplifiers. The step-by-step guide is designed to help builders through the entire assembly process, providing everything required to successfully complete the 5E3 amp chassis.

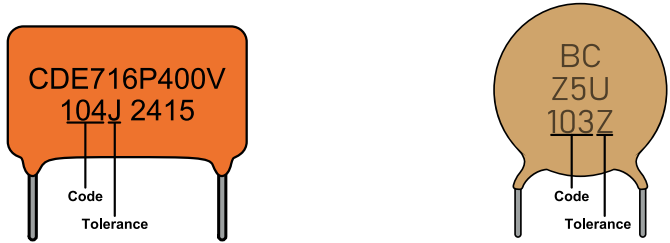
The 5E3 chassis kit is crafted to match the original specifications of the classic circuit, featuring high quality parts that best replicate the vintage units. This ensures that the finished amp not only looks authentic but also delivers the classic vintage sound. With clear instructions, detailed diagrams, and helpful tips, the building process is both engaging and enjoyable.



4-BAND RESISTOR COLOR CODE CHART



CAPACITOR CODE CHART



Picofarad pF	Nanofarad nF	Microfarad uF	Code		Picofarad pF	Nanofarad nF	Microfarad uF	Code	Tolerance
10	0.01	0.00001	100		2200	2.2	0.0022	222	E: 0.5%
12	0.012	0.000012	120		3300	3.3	0.0033	332	F: $\pm 1\%$
15	0.015	0.000015	150		4700	4.7	0.0047	472	G: $\pm 2\%$
22	0.022	0.000022	220		5600	5.6	0.0056	562	J: $\pm 5\%$
33	0.033	0.000033	330		6800	6.8	0.0068	682	K: $\pm 10\%$
47	0.047	0.000047	470		10000	10	0.01	103	M: $\pm 20\%$
56	0.056	0.000056	560		15000	15	0.015	153	P: +100%, -0%
68	0.068	0.000068	680		22000	22	0.022	223	Z: +80%, -20%
82	0.082	0.000082	820		33000	33	0.033	333	
100	0.1	0.0001	101		47000	47	0.047	473	
120	0.12	0.00012	121		56000	56	0.056	563	
150	0.15	0.00015	151		68000	68	0.068	683	
220	0.22	0.00022	221		100000	100	0.1	104	
330	0.33	0.00033	331		150000	150	0.15	154	
470	0.47	0.00047	471		220000	220	0.22	224	
560	0.56	0.00056	561		330000	330	0.33	334	
680	0.68	0.00068	681		470000	470	0.47	474	
820	0.82	0.00082	821		560000	560	0.56	564	
1000	1	0.001	102		680000	680	0.68	684	
1500	1.5	0.0015	152		1000000	1000	1	105	

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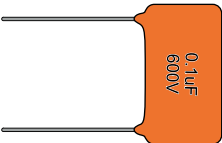
Required Tools

Adjustable Wrench
Cutters
Needlenose Pliers
Phillips Head Screwdrivers
Ruler
Solder (No Clean Type)
Soldering Iron (70W+)
Multimeter with Standard Probes & Alligator Clip Leads
Wire Stripper
Xacto Knife or Similar Cutting Tool
8Ω Speaker with Speaker Cable
Electric Guitar with Instrument Cable
Permanent Marker

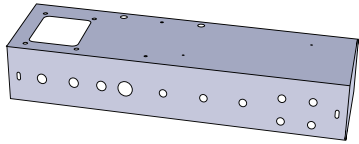
Optional Recommended Tools

Self-adjusting Wire Stripper
Strain Relief Pliers
Socket Drivers
Desoldering Braid
Desoldering Pump
Helping Hands
Non-slip Bench Mat
Speaker Cable Extension

Parts List

	R-PR02-820	Qty 1	820Ω 2W Metal Film Resistor
	R-PR02-1D5K	Qty 4	1.5kΩ 2W Metal Film Resistor
	R-PR02-22K	Qty 1	22kΩ 2W Metal Film Resistor
	R-PR02-56K	Qty 2	56kΩ 2W Metal Film Resistor
	R-PR02-68K	Qty 4	68kΩ 2W Metal Film Resistor
	R-PR02-100K	Qty 3	100kΩ 2W Metal Film Resistor
	R-PR02-220K	Qty 2	220kΩ 2W Metal Film Resistor
	R-PR02-1M	Qty 3	1MΩ 2W Metal Film Resistor
	R-PR03-5D1K	Qty 1	5.1kΩ 3W Metal Film Resistor
	R-BD8-250	Qty 1	250Ω 8W Wire Wound Resistor
	C-ET25-50-MOD	Qty 3	25uF 50V Electrolytic Capacitor
	C-ET16-475-MOD	Qty 3	16uF 475V Electrolytic Capacitor
	C-RD1-600	Qty 4	0.1 600V Film Capacitor (104J)
	C-RD022-600	Qty 1	0.022uF 600V Film Capacitor (223J)
	C-RD0047-600	Qty 1	0.0047uF 600V Film Capacitor (472J)
	C-SM500	Qty 1	500pF 500V Silver Mica Capacitor

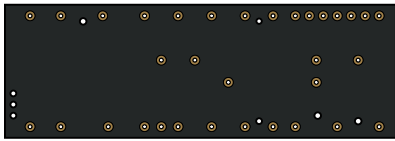
Parts List



P-HCH02-B

Qty 1

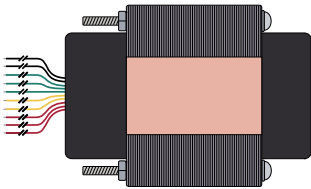
5E3 Chassis



P-HEYE-2

Qty 1

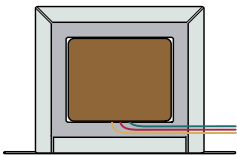
5E3 Eyelet Board with Bottom



P-TGP-002

Qty 1

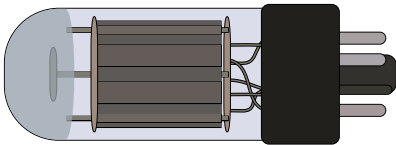
5E3 Power Transformer



P-TGO-002

Qty 1

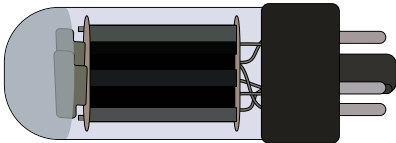
5E3 Output Transformer



T-6V6-S-JJ

Qty 2

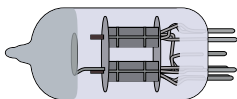
6V6S (6V6GT) Power Tube



T-5Y3-S-JJ

Qty 1

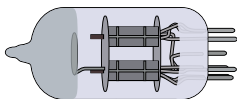
5Y3S (5Y3GT) Rectifier Tube



T-12AY7-S-JJ

Qty 1

12AY7 Preamp Tube



T-12AX7-S-JJ

Qty 1

ECC83S (12AX7) Preamp Tube



F-Z3AG-S2

Qty 1

2A 3AG Slow Blow Fuse

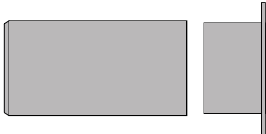
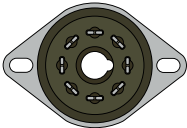
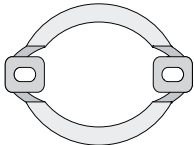
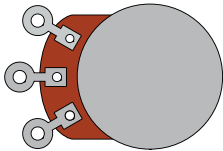
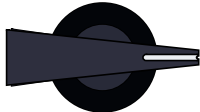
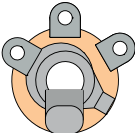
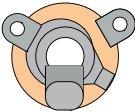
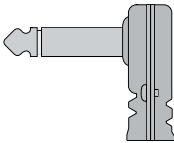
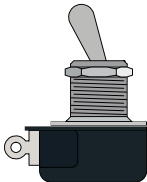
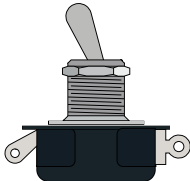


S-H210

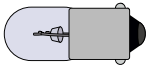
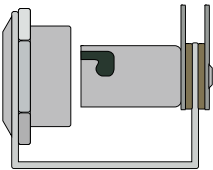
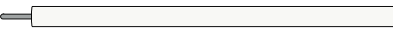
Qty 1

Fuse Holder

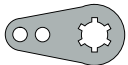
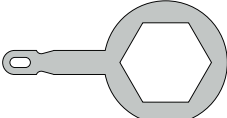
Parts List

	P-ST9-700	Qty 2	Noval Socket
	P-SS9-400	Qty 2	Noval Socket Shield & Base
	P-ST8-209MIP	Qty 3	Octal Socket
	S-H142	Qty 3	Octal Socket Tube Retainer
	R-VC1MA-M	Qty 3	A1MΩ Potentiometer
	P-K300	Qty 3	Chickenhead Knob
	W-SC-12A	Qty 5	Switched 1/4" Jack
	W-SC-11	Qty 1	1/4" Jack
	W-SC-228	Qty 1	Right Angle 1/4" Plug
	P-H495	Qty 1	SPST Toggle Switch
	P-H529	Qty 1	DPST Toggle Switch

Parts List

	P-L115	Qty 1	Red Jewel
	P-47	Qty 1	47 Bulb
	P-L124-P	Qty 1	Pilot Light Socket
	P-GROM-14-S	Qty 2	1/4" Inner Diameter Rubber Grommet
	P-H1350	Qty 1	Power Cord Strain Relief
	S-W133	Qty 1	3 Conductor Power Cord
	S-W902Y	13 ft	22AWG Yellow Wire
	S-W903G	7 ft	18AWG Green Wire
	S-W903W	2 ft	18AWG White Wire
	S-W903B	2 ft	18AWG Black Wire
	S-W3817	2 ft	20AWG Bus Wire

Parts List

	S-HS440-14	Qty 4	4-40 x 1/4" Pan Head Screw
	S-HS440-12	Qty 2	4-40 x 1/2" Pan Head Screw
	S-HS632-14	Qty 8	6-32 x 1/4" Pan Head Screw
	S-HHN440	Qty 8	4-40 Nut
	S-HHN632	Qty 8	6-32 Nut
	S-HHN832	Qty 4	8-32 Nut
	S-HW4	Qty 2	#4 Flat Washer
	S-HW6	Qty 2	#6 Flat Washer
	S-HLW4	Qty 6	#4 Lock Washer
	S-HLW6	Qty 6	#6 Lock Washer
	S-HLW8	Qty 2	#8 Lock Washer
	S-H113	Qty 2	#8 Solder Lug
	S-H132	Qty 3	3/8" Solder Lug

Notes on Wired Connections

This section covers stripping and dressing the various wires used throughout this kit.

Instructions Terminology

Throughout these instructions, you will be guided to make various wire connections. Typically, these steps will instruct you to 'connect a wire from one point to another.' Occasionally, a specific length will be specified. It's important to follow these measurements precisely.

In other steps, you will be instructed to 'trim and connect' a wire that is already installed to components, like the transformers or wires previously connected to the eyelet board or elsewhere. For these steps, first line up the wire to gauge the required length. Ensure the wire is not pulled taut, allowing for some slack.

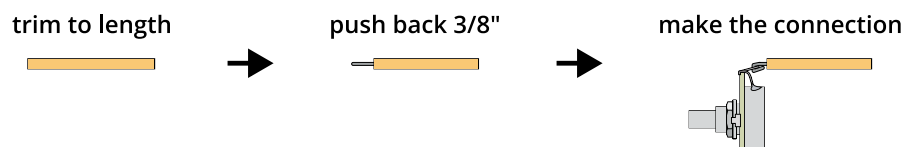
You will sometimes want to route wires away from or around other components. This keeps the build tidy and prevents wires from blocking access to solder lugs and other connections. In the drawings, the individual wires are laid out to avoid overlapping for clarity, but their basic routings are good examples to follow. It is perfectly fine if the wires in your build overlap one another as long as metal contacts don't touch.

Once you are satisfied with the length and routing, cut the wire. Prepare the wire appropriately for its type and then make the connection as instructed.

Preparing Cloth-Covered Wires

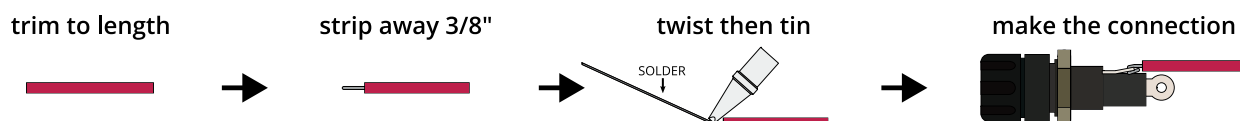
The majority of the wire used throughout this kit is cloth-covered wire. The type included is stranded wire, which allows flexibility, but it includes a top coat of solder to help it hold shape. Additionally, no tinning is required which makes building with this type of wire a breeze.

Cloth-covered wire like this is commonly referred to as "push back" wire. This is because you can simply trim the wire to length and then push back the cloth insulation rather than stripping it with wire strippers. First, make a clean cut with a sharp pair of cutters. Then carefully push the cloth cover back to expose $\sim 3/8"$ of the bare wire. Try to avoid fraying the cloth when pushing it back. As mentioned, no additional tinning is required so you can now make the connection.



Preparing PVC-Insulated Wires

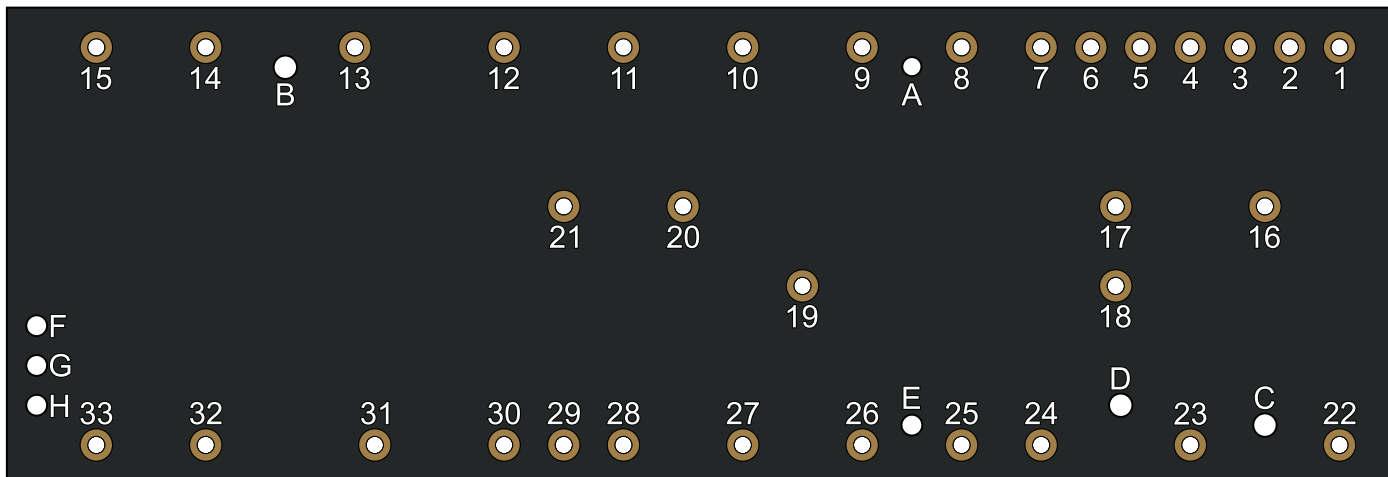
Some wires like the power cord and transformer wires are PVC-insulated. To prepare these wires you will need to strip and tin them before making the connection. Once trimmed to length, use wire strippers to remove $\sim 3/8"$ of the insulation. Twist the bare end of the wire and then tin it with a soldering iron. You can now make the connection.



Notes on Fiberboard Construction

This section covers basic fiberboard construction.

Board Layout

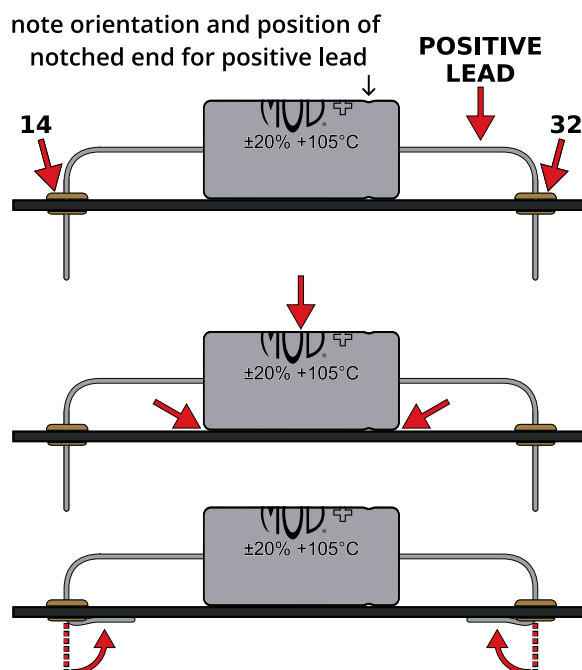


Orient the fiberboard as shown above. The eyelets will be referenced by the numbers shown on this drawing throughout the instructions. Similarly, the empty holes will be referenced by the letters shown here. These numbered and lettered holes will be used when mounting the various parts. For example, you might be instructed to connect an electrolytic capacitor from eyelet 14 to 32 with the positive lead at 32. For the empty holes, you will be instructed to pass a wire through them. These wires may connect to an eyelet through the back of the board. Alternatively, the wire may pass back through another hole to be routed to an eyelet on the top of the board or elsewhere in the amp.

Mounting and Soldering Parts

When instructed to mount a part to the board, line the part up with the two holes and then bend the leads so each lead can pass through the eyelets. Make sure that the label is facing upwards so you can clearly read the capacitance or other pertinent info for the type of part being mounted. Make sure that the body of the part sits flush to the board.

Once the part is oriented correctly and flush to the board, bend the leads on the underside of the board to secure the component to the board. Do this by pushing each lead inwards and completely flat to the board. The part should now be held tightly to the board.



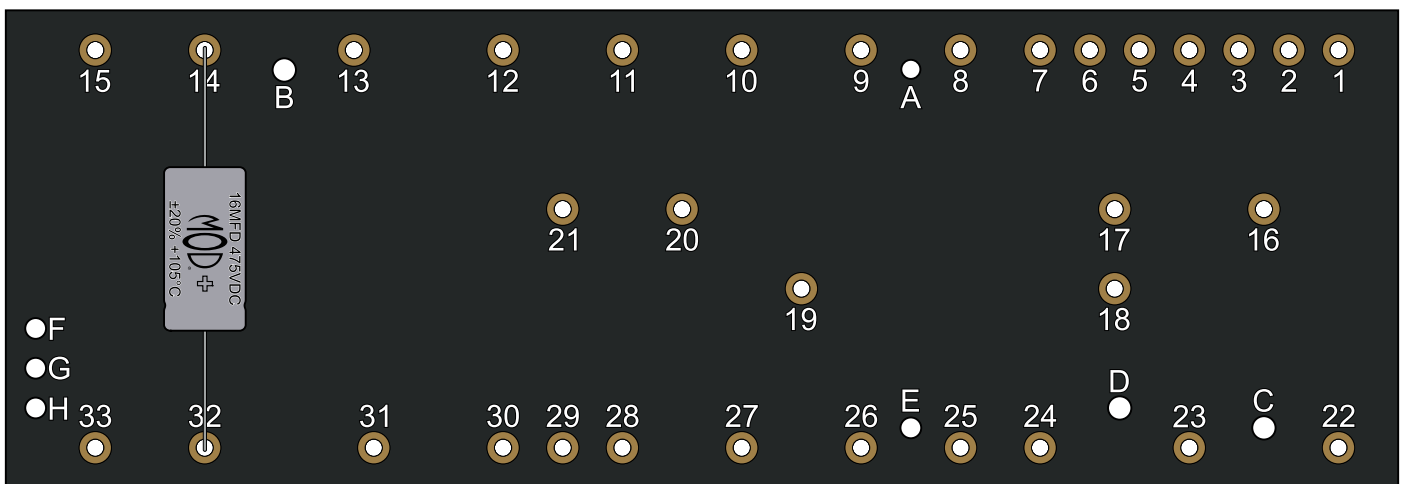
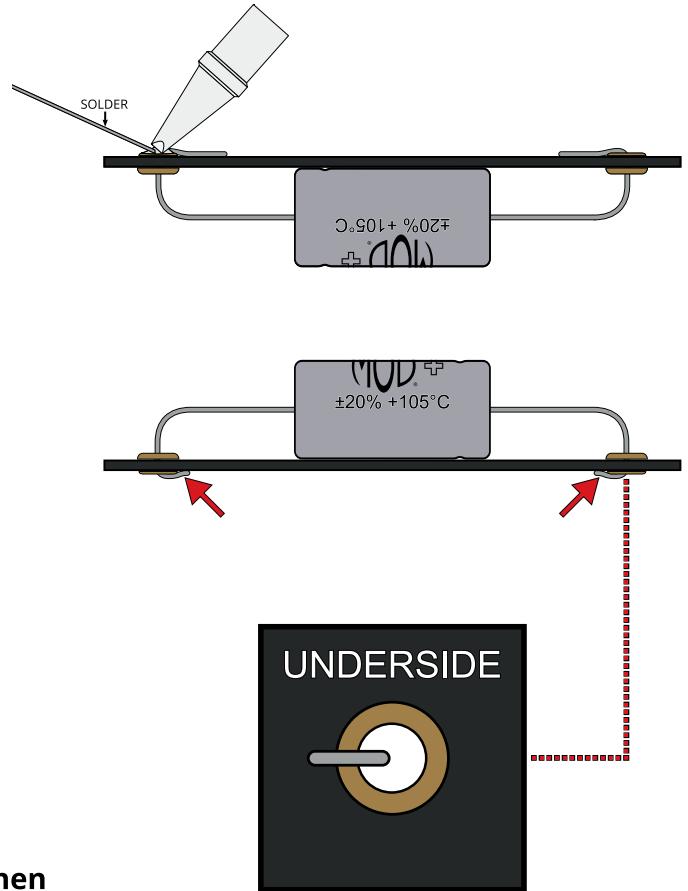
Notes on Fiberboard Construction

Mounting and Soldering Parts (cont.)

At this point you may be instructed to solder one or both of the eyelets. If so, make sure your soldering iron is fully warmed up before soldering. Position the tip of the iron so that it is touching both the metal eyelet and the lead or leads of the mounted components. Slowly feed solder onto the eyelet. The solder should flow evenly across the eyelet and completely fill the hole. You may need to move the end of the solder strand around the eyelet to ensure that the eyelet is fully filled with solder and that it is also bonding to the lead of the component. Once fully flowed, remove both the solder strand and iron from the eyelet and components.

With the component soldered to the board, use a pair of cutters to trim the excess leads on the underside of the board.

Be sure to carefully follow the various connections listed in the instructions. **Only solder an eyelet when instructed.** Some eyelets will connect multiple parts or offboard wire connections that appear later in the instructions.



5E3 Eyelet Board Construction

Please fully review the safety information on page 47 before beginning. Locate the 5E3 Eyelet Board. The following steps will cover the placement and soldering of all parts that are mounted on this board. Use the Parts List as a reference.

5E3 Eyelet Board: Part 1

A1-1: Locate the 820 Ω resistor. Its color bands are gray, red, brown, gold. Next, locate a 25 μ F 50V capacitor. Bend the leads of the resistor so each cross perpendicularly with the leads of the capacitor. Wrap the resistor's leads around the capacitor's leads and solder the wrapped areas to bond the resistor to the capacitor. Connect the negative lead to eyelet 1 and the positive lead to eyelet 22.

A1-2: Connect a 4" piece of yellow wire to eyelet 1. Solder eyelet 1 now.

A1-3: Connect a 4" piece of yellow wire to eyelet 22. Solder eyelet 22 now.

A1-4: Locate a 68K Ω resistor. Its color bands are blue, gray, orange, gold. Connect this resistor from eyelet 2 to 16.

A1-5: Connect a 3" piece of yellow wire to eyelet 2. Solder eyelet 2 now.

A1-6: Locate another 68K Ω resistor. Connect this resistor from eyelet 3 to 16.

A1-7: Connect a 2" piece of yellow wire to eyelet 3. Solder eyelet 3 now.

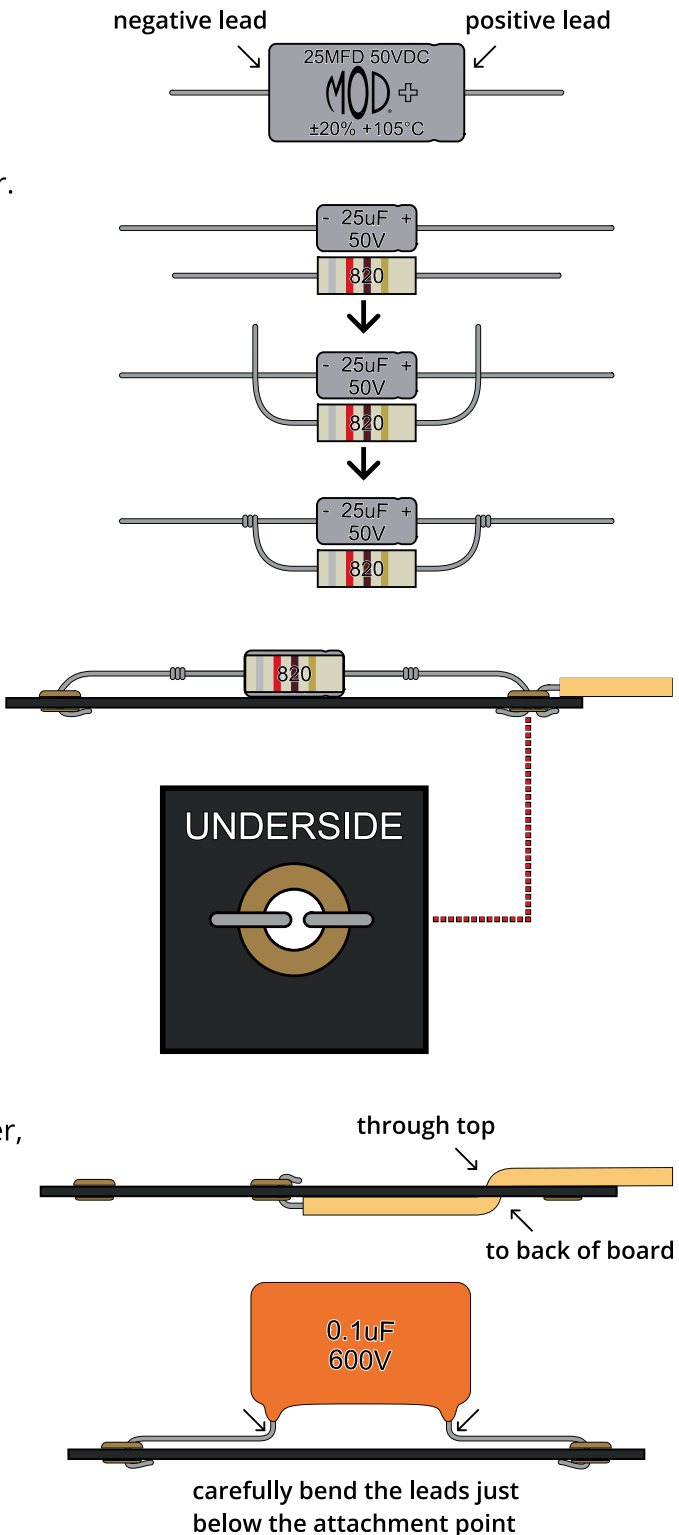
A1-8: Thread a 5" piece of yellow wire through hole C and connect it to eyelet 16 through the back of the board. Solder eyelet 16 now. With a black marker, make a dot on the unconnected end of this wire.

A1-9: Locate a 0.1 μ F 600V capacitor. Connect it from eyelet 4 to 23.

A1-10: Connect a 7" piece of yellow wire to eyelet 4. Solder eyelet 4 now.

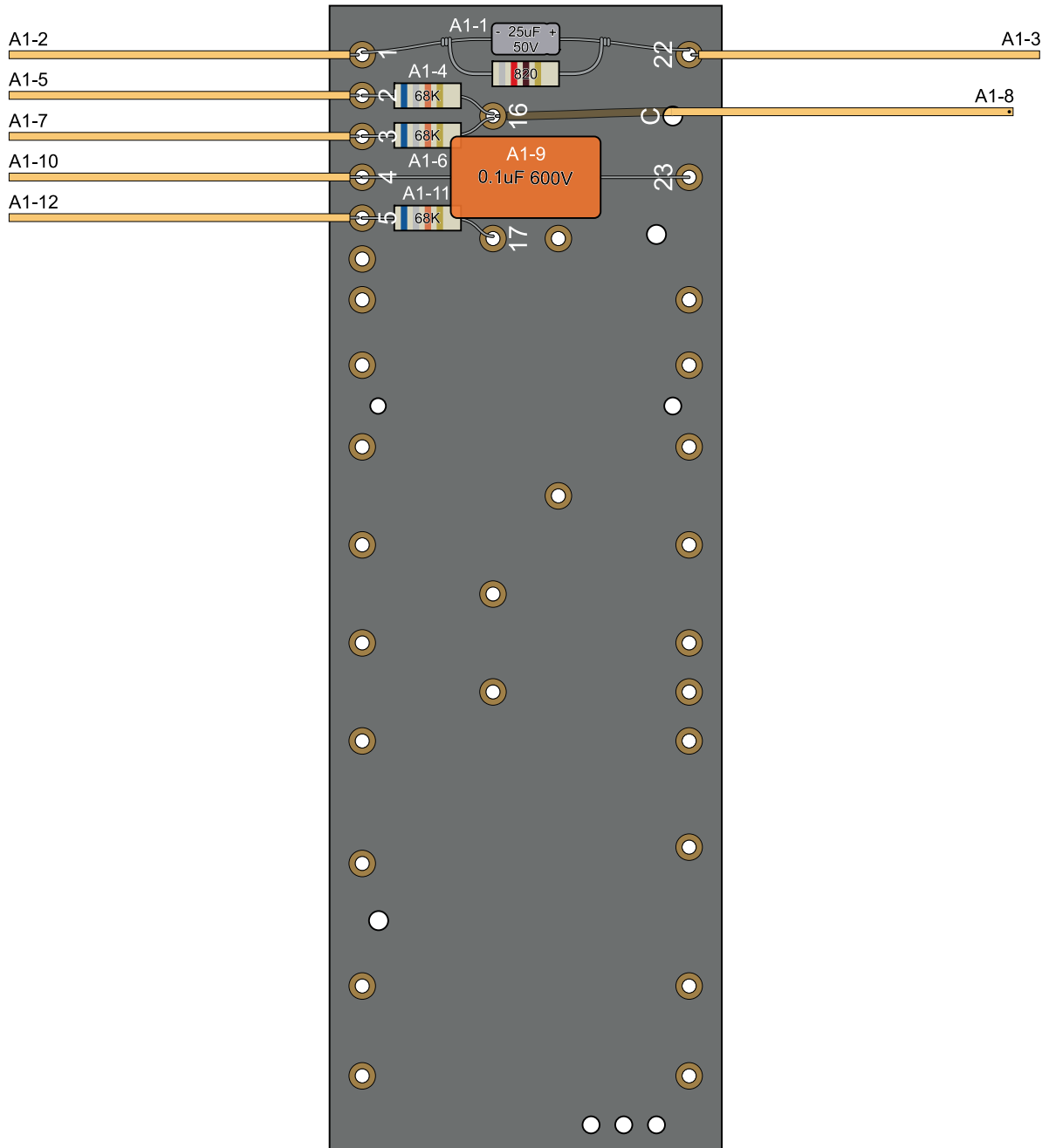
A1-11: Locate another 68K Ω resistor. Connect this resistor from eyelet 5 to 17.

A1-12: Connect a 3" piece of yellow wire to eyelet 5. Solder eyelet 5 now.



5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 1 Drawing



5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 2

A2-1: Locate another 68K Ω resistor. Connect this resistor from eyelet 6 to 17.

A2-2: Thread a 5" piece of yellow wire through hole C and connect it to eyelet 17 through the back of the board. Solder eyelet 17 now.

A2-3: Connect a 2" piece of yellow wire to eyelet 6. Solder eyelet 6 now.

A2-4: Locate a 100K Ω resistor. Its color bands are brown, black, yellow, gold. Connect this resistor from eyelet 23 to 18.

A2-5: Connect a 4" piece of yellow wire to eyelet 23. Solder eyelet 23 now.

A2-6: Locate another 100K Ω resistor. Connect this resistor from eyelet 24 to 18.

A2-7: Connect a 2.5" piece of yellow wire from the back of eyelet 18 to the back of 19. Solder eyelet 18 now.

A2-8: Locate a 0.1 μ F 600V capacitor. Connect it from eyelet 7 to 24.

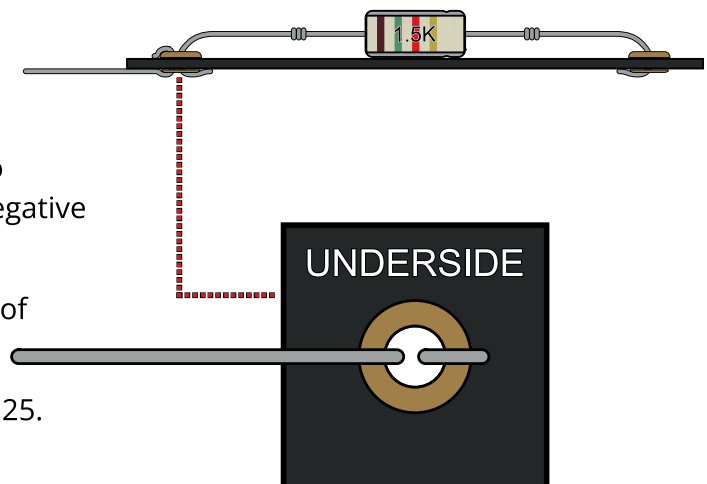
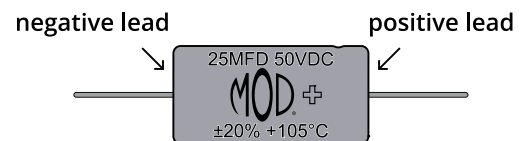
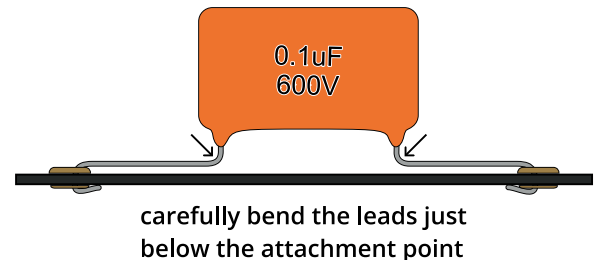
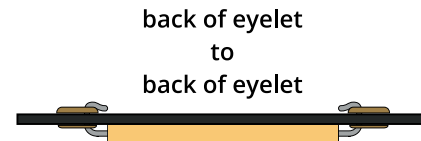
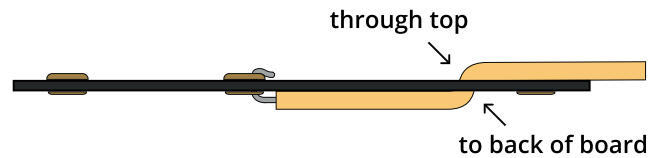
A2-9: Connect a 7" piece of yellow wire to eyelet 7. Solder eyelet 7 now.

A2-10: Connect a 4" piece of yellow wire to eyelet 24. Solder eyelet 24 now.

A2-11: Locate a 1.5K Ω resistor. Its color bands are brown, green, red, gold. Next, locate a 25 μ F 50V capacitor. Bend the leads of the resistor so each cross perpendicularly with the leads of the capacitor. Wrap the resistor's leads around the capacitor's leads and solder the wrapped areas to bond the resistor to the capacitor. Connect the negative lead to eyelet 8 and the positive lead to eyelet 25.

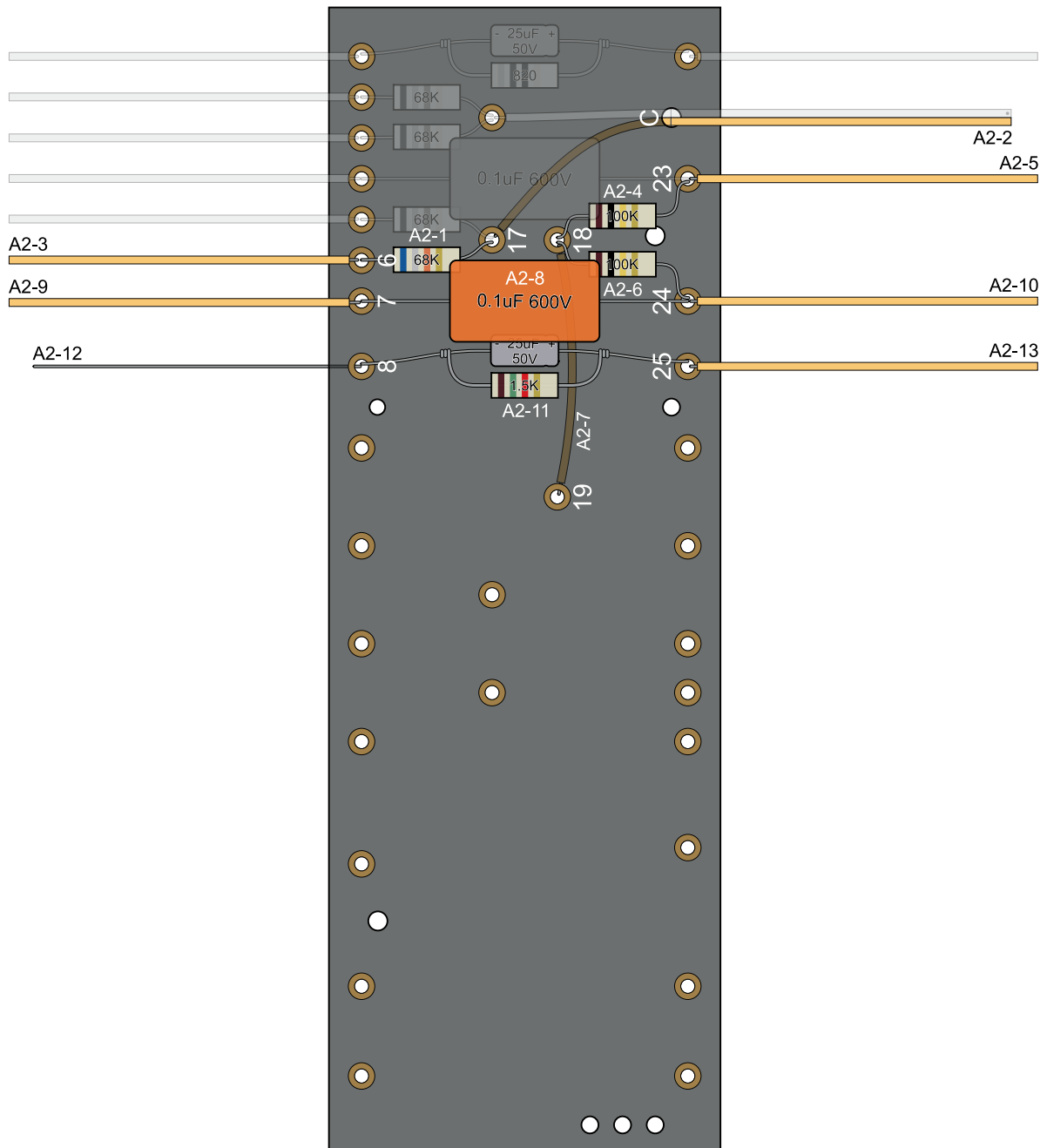
A2-12: Connect a 3" piece of bus wire to the back of eyelet 8. Solder eyelet 8 now.

A2-13: Connect a 4" piece of yellow wire to eyelet 25. Solder eyelet 25 now.



5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 2 Drawing



5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 3

A3-1: Thread a 12" piece of yellow wire from A to E with the loop passing through the back of the board. Ensure the ends exiting holes A and E are roughly equal in length.

A3-2: Locate the 0.022uF 600V capacitor. Connect it from eyelet 9 to 26.

A3-3: Connect a 4" piece of yellow wire from the back of eyelet 9 to the back of 29. Solder eyelet 9 now.

A3-4: Locate a 100KΩ resistor. Its color bands are brown, black, yellow, gold. Connect this resistor from eyelet 26 to 19.

A3-5: Connect a 4" piece of yellow wire to eyelet 26. Solder eyelet 26 now.

A3-6: Locate a 56KΩ resistor. Its color bands are green, blue, orange, gold. Connect this resistor from eyelet 27 to 19.

A3-7: Connect a 3" piece of yellow wire from the back of eyelet 19 to the back of 30. Solder eyelet 19 now.

A3-8: Locate a 0.1uF 600V capacitor. Connect it from eyelet 10 to 27.

A3-9: Locate a 220KΩ resistor. Its color bands are red, red, yellow, gold. Connect this resistor from eyelet 10 to 20.

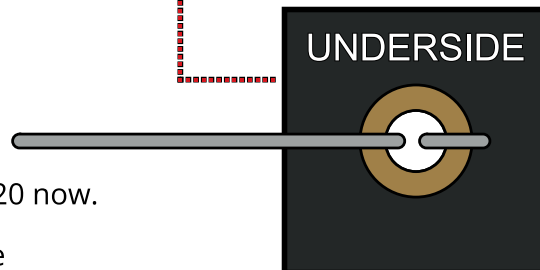
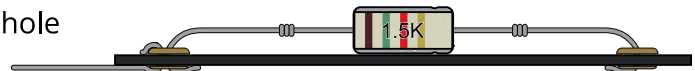
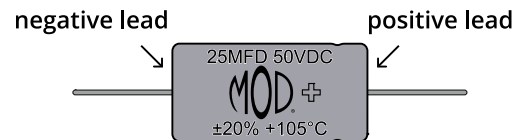
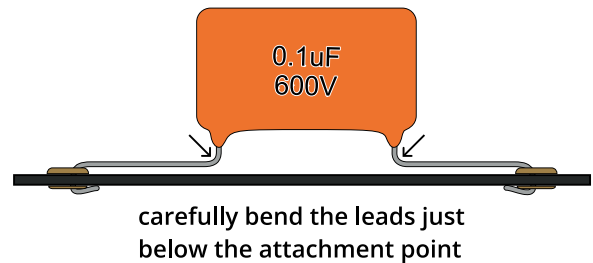
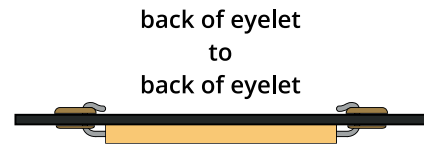
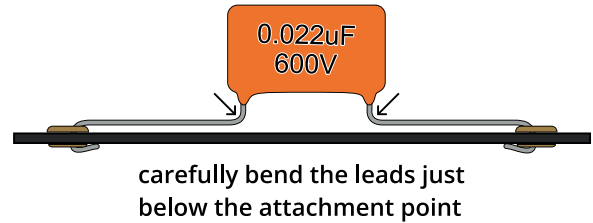
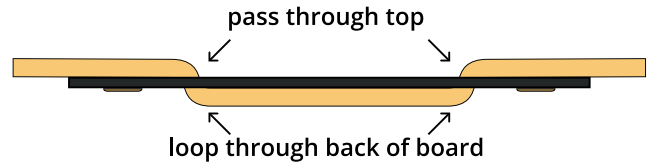
A3-10: Thread an 11" piece of yellow wire through hole G and connect it to eyelet 10 through the back of the board. Solder eyelet 10 now.

A3-11: Connect a 3" piece of yellow wire to eyelet 27. Solder eyelet 27 now.

A3-12: Locate a 220KΩ resistor. Connect this resistor from eyelet 11 to 20.

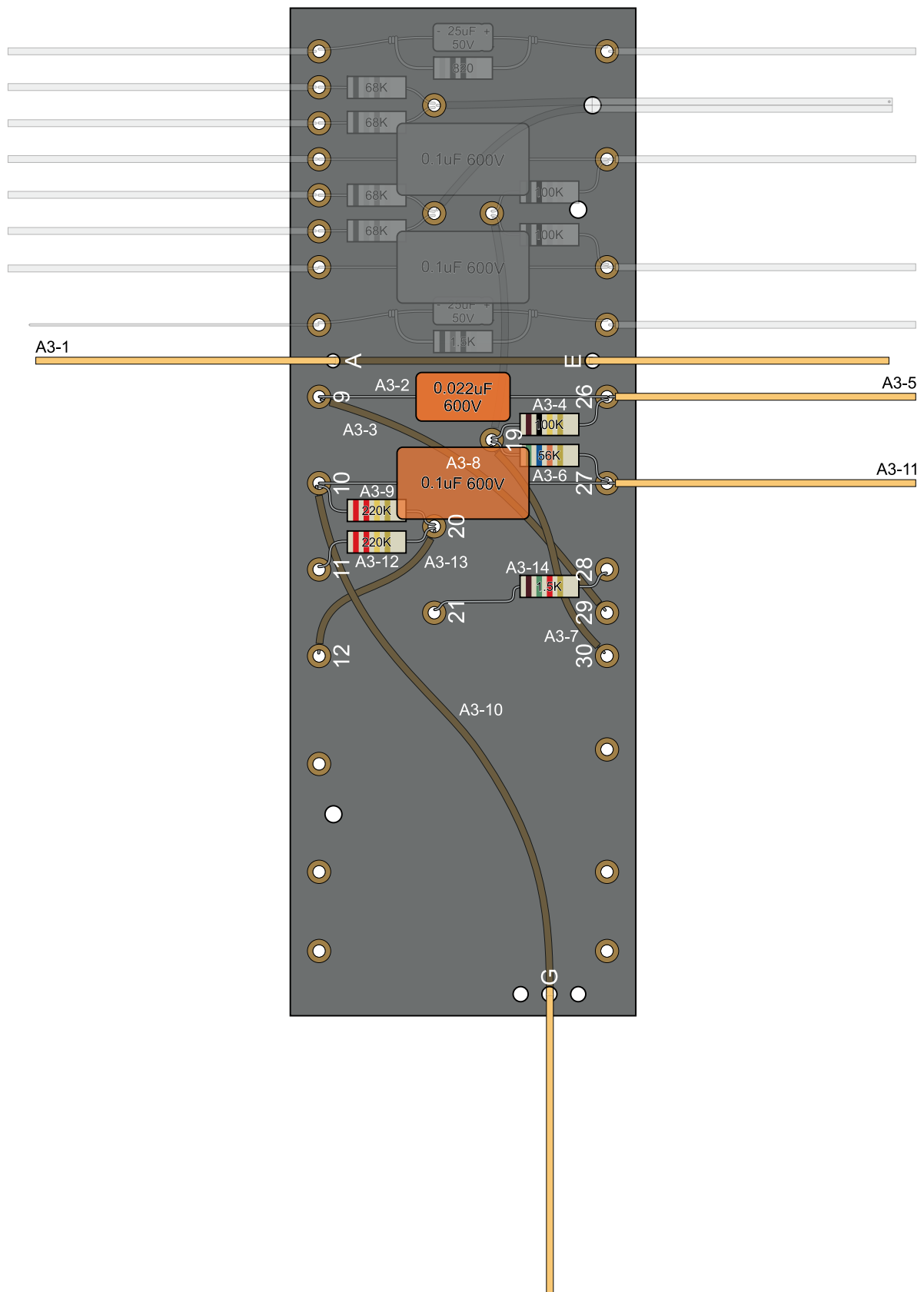
A3-13: Connect a 2" piece of yellow wire from the back of eyelet 20 to the back of 12. Solder eyelet 20 now.

A3-14: Locate a 1.5KΩ resistor. Its color bands are brown, green, red, gold. Connect this resistor from eyelet 21 to 28.



5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 3 Drawing



5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 4

A4-1: Locate a 0.1uF 600V capacitor. Connect it from eyelet 11 to 28.

A4-2: Connect a 4" piece of yellow wire to eyelet 28. Solder eyelet 28 now.

A4-3: Thread an 11" piece of yellow wire through hole F and connect it to eyelet 11 through the back of the board. Solder eyelet 11 now.

A4-4: Locate a 56KΩ resistor. Its color bands are green, blue, orange, gold. Connect this resistor from eyelet 12 to 21.

A4-5: Locate a 1MΩ resistor. Its color bands are brown, black, green, gold. Connect this resistor from eyelet 21 to 29. Solder eyelet 21 now.

A4-6: Connect a 4" piece of yellow wire to eyelet 29. Solder eyelet 29 now.

A4-7: Locate a 16uF 475V capacitor. Connect the negative lead to eyelet 12 and the positive to 30.

A4-8: Connect a 1.5" piece of bus wire from the back of eyelet 12 to the back of eyelet 13.

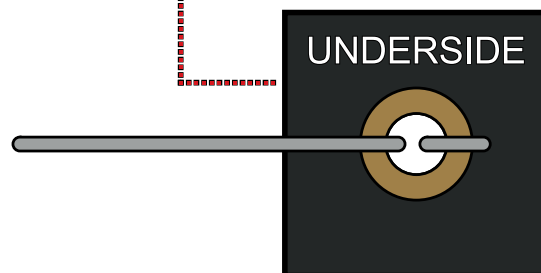
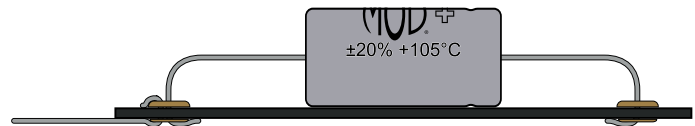
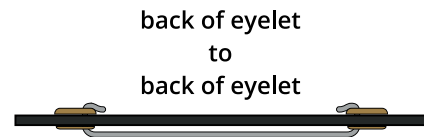
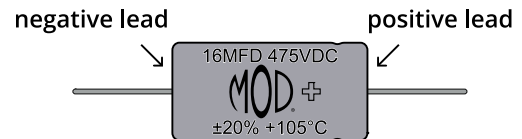
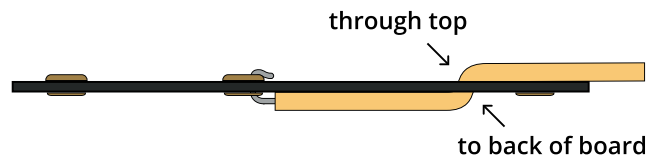
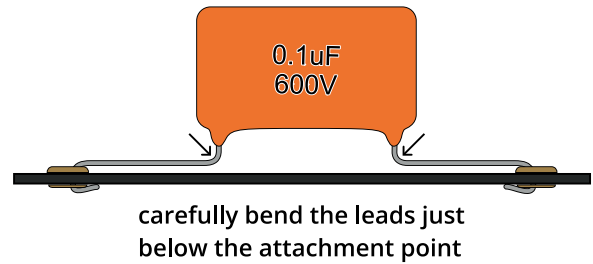
A4-9: Connect a 2" piece of bus wire to the back of eyelet 12. Solder eyelet 12 now.

A4-10: Locate a 22KΩ resistor. Its color bands are red, red, orange, gold. Connect this resistor from eyelet 30 to 31. Solder eyelet 30 now.

A4-11: Locate a 16uF 475V capacitor. Connect the negative lead to eyelet 13 and the positive to 31. Solder eyelet 13 now.

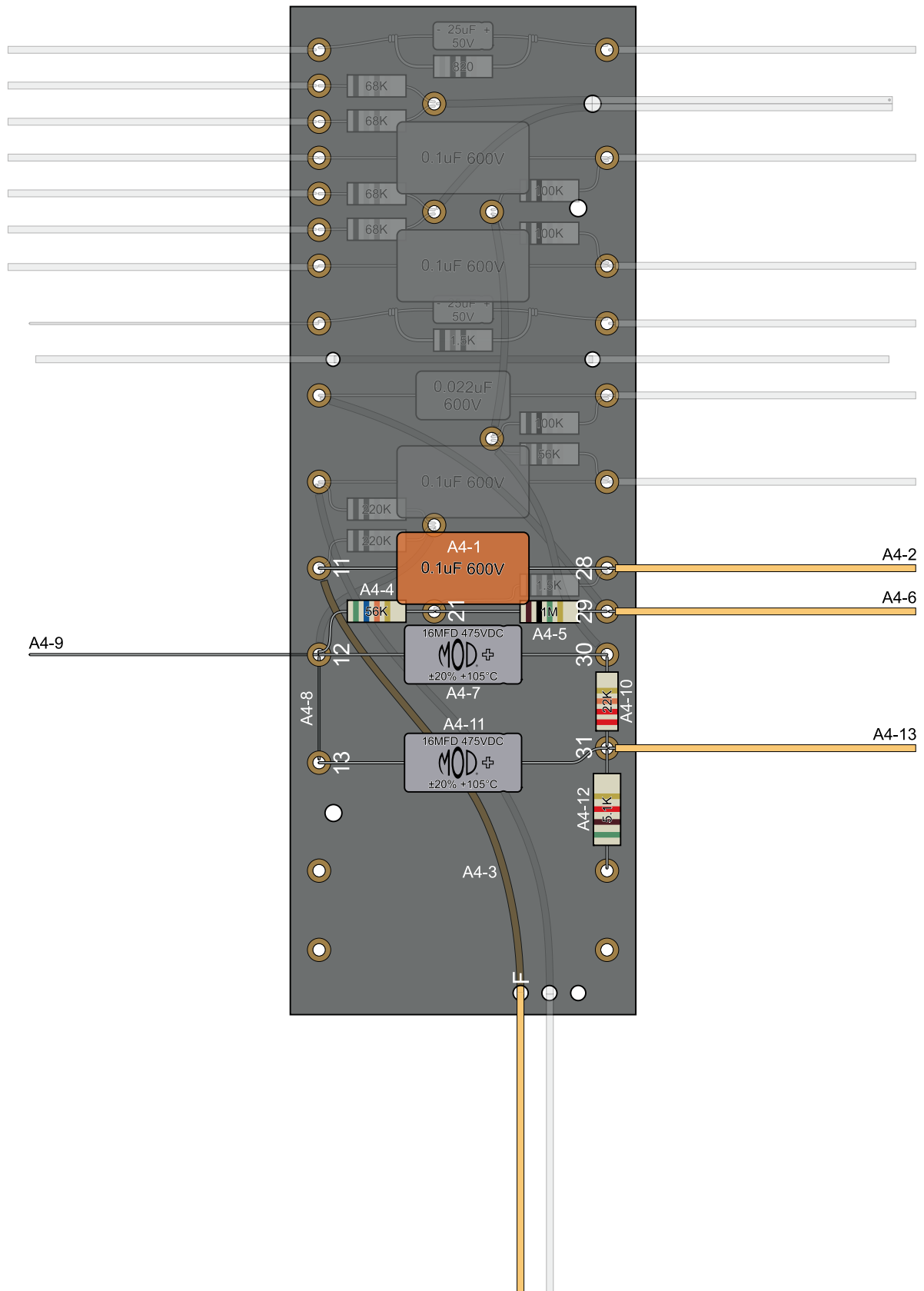
A4-12: Locate the 3W 5.1KΩ resistor. Its color bands are green, brown, red, gold. Connect this resistor from eyelet 31 to 32.

A4-13: Connect a 5" piece of yellow wire to eyelet 31. Solder eyelet 31 now.



5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 4 Drawing



5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 5

A5-1: Locate a 16uF 475V capacitor. Connect the negative lead to eyelet 14 and the positive to 32.

A5-2: Connect a 1.25" piece of bus wire from the back of eyelet 14 to the back of eyelet 15. Solder eyelet 14 now.

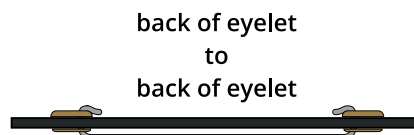
A5-3: Thread an 8" piece of yellow wire through hole H and connect it to eyelet 32 through the back of the board. Solder eyelet 32 now.

A5-4: Locate a 25uF 50V capacitor. Connect the negative lead to eyelet 15 and the positive to 33.

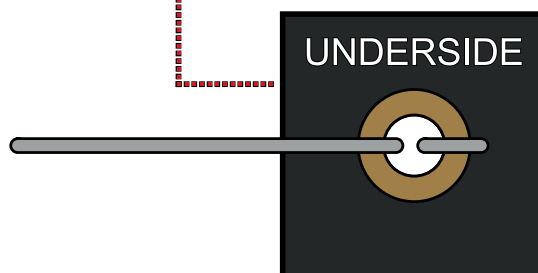
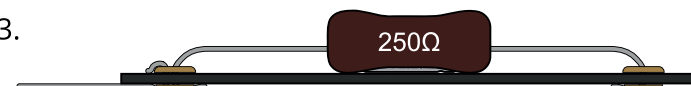
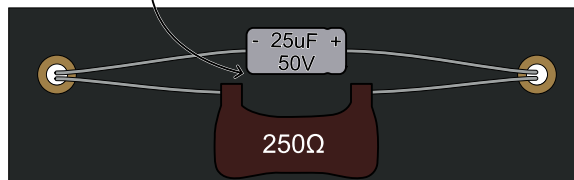
A5-5: Locate the 8W 250Ω resistor. Connect this resistor from eyelet 15 to 33. Make sure that the resistor and capacitor bodies are not touching.

A5-6: Connect a 3" piece of bus wire to the back of eyelet 15. Solder eyelet 15 now.

A5-7: Connect a 4" piece of yellow wire to eyelet 33. Solder eyelet 33 now.



space the parts for a small air gap to keep the heat from the resistor away from the capacitor

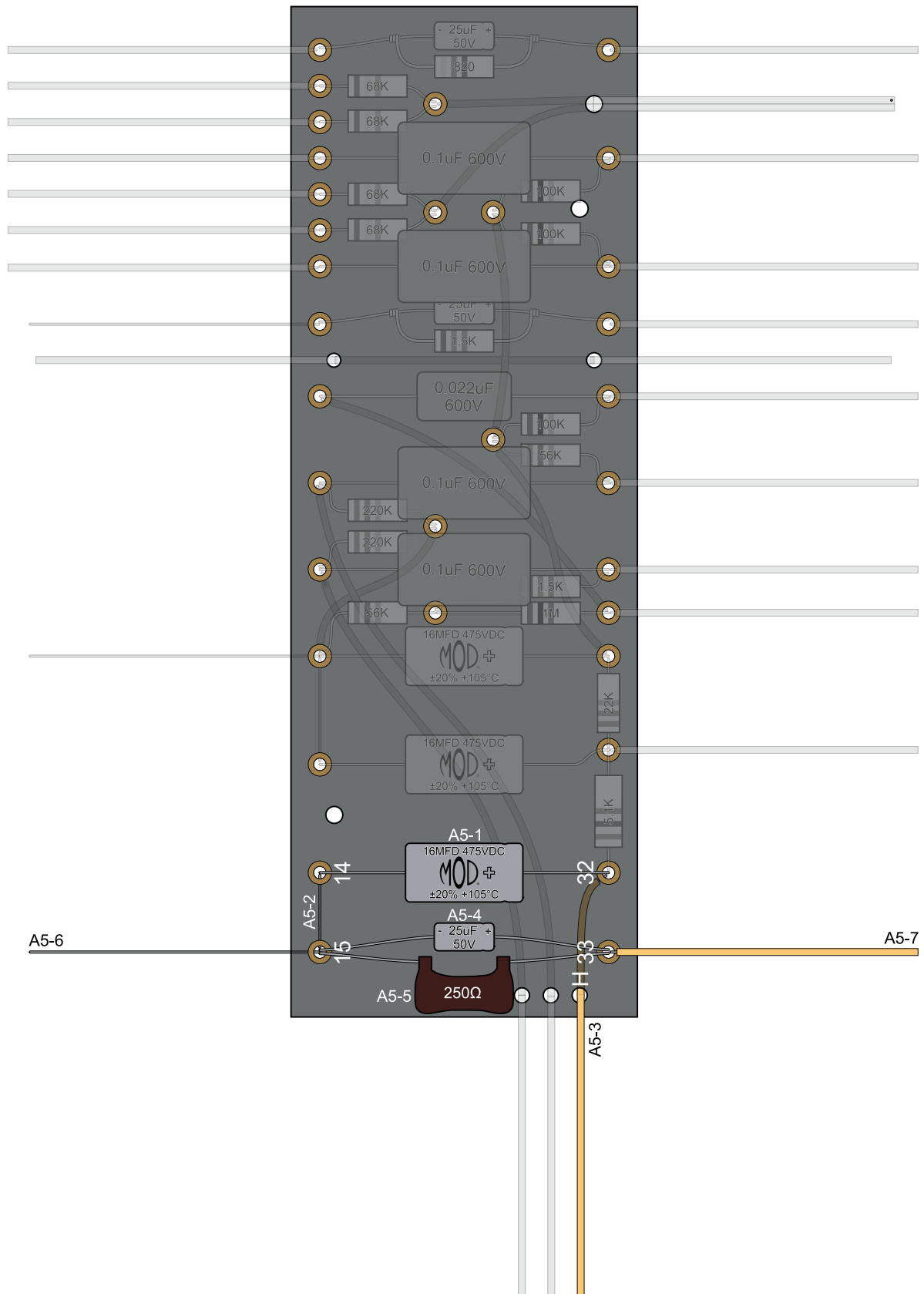


Completed Fiberboard: Inspection

The main fiberboard of the 5E3 is now completed. Please take some time to thoroughly check the connections, parts placement, and solder joints. Ensure all components are in their correct positions according to the wiring diagram, with electrolytic capacitors oriented correctly for polarity. Verify that all solder joints are smooth and shiny, and free of cold joints, which can appear dull or cracked. Note that all eyelets should be soldered at this point.

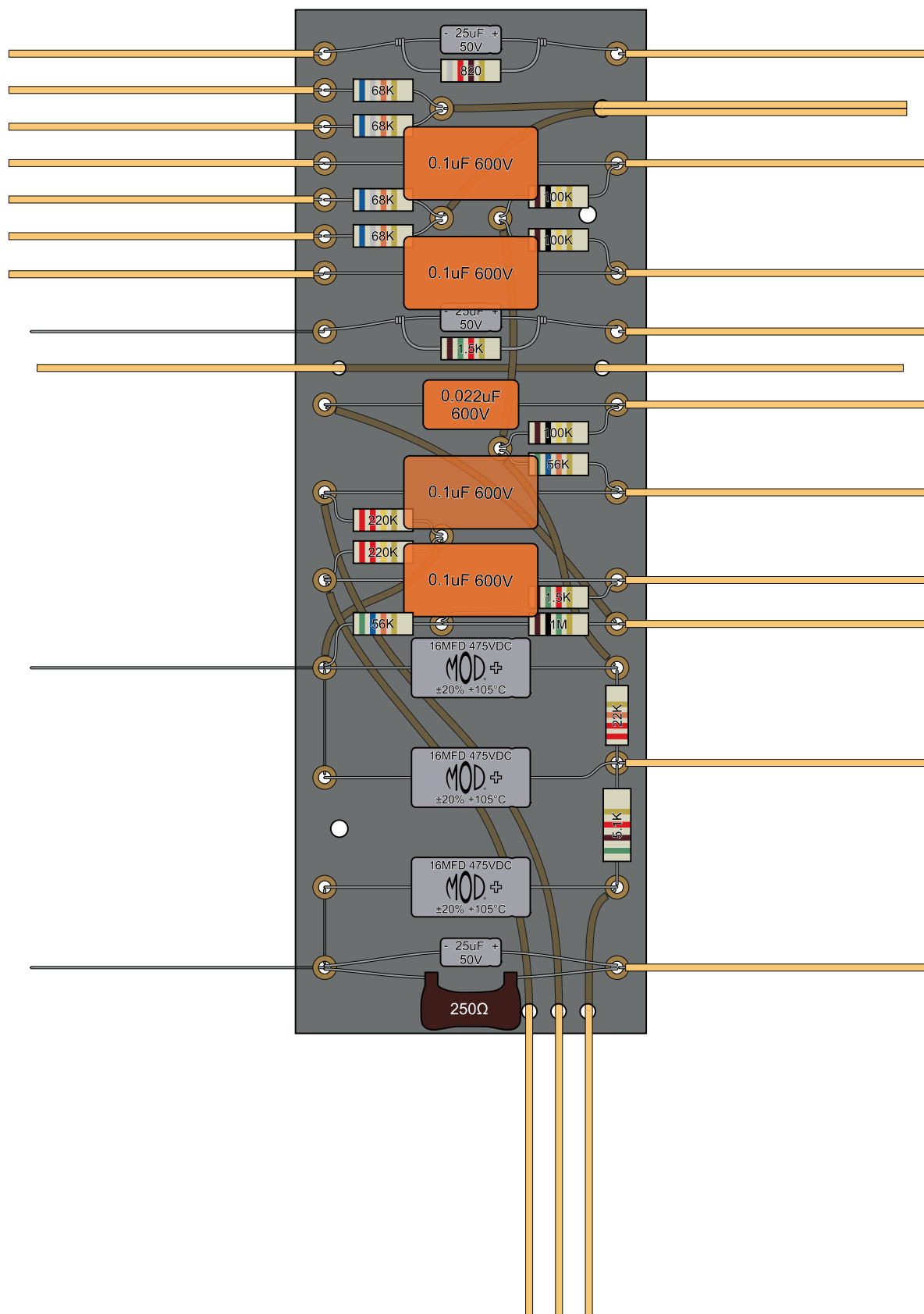
5E3 Eyelet Board Construction

5E3 Eyelet Board: Part 5 Drawing



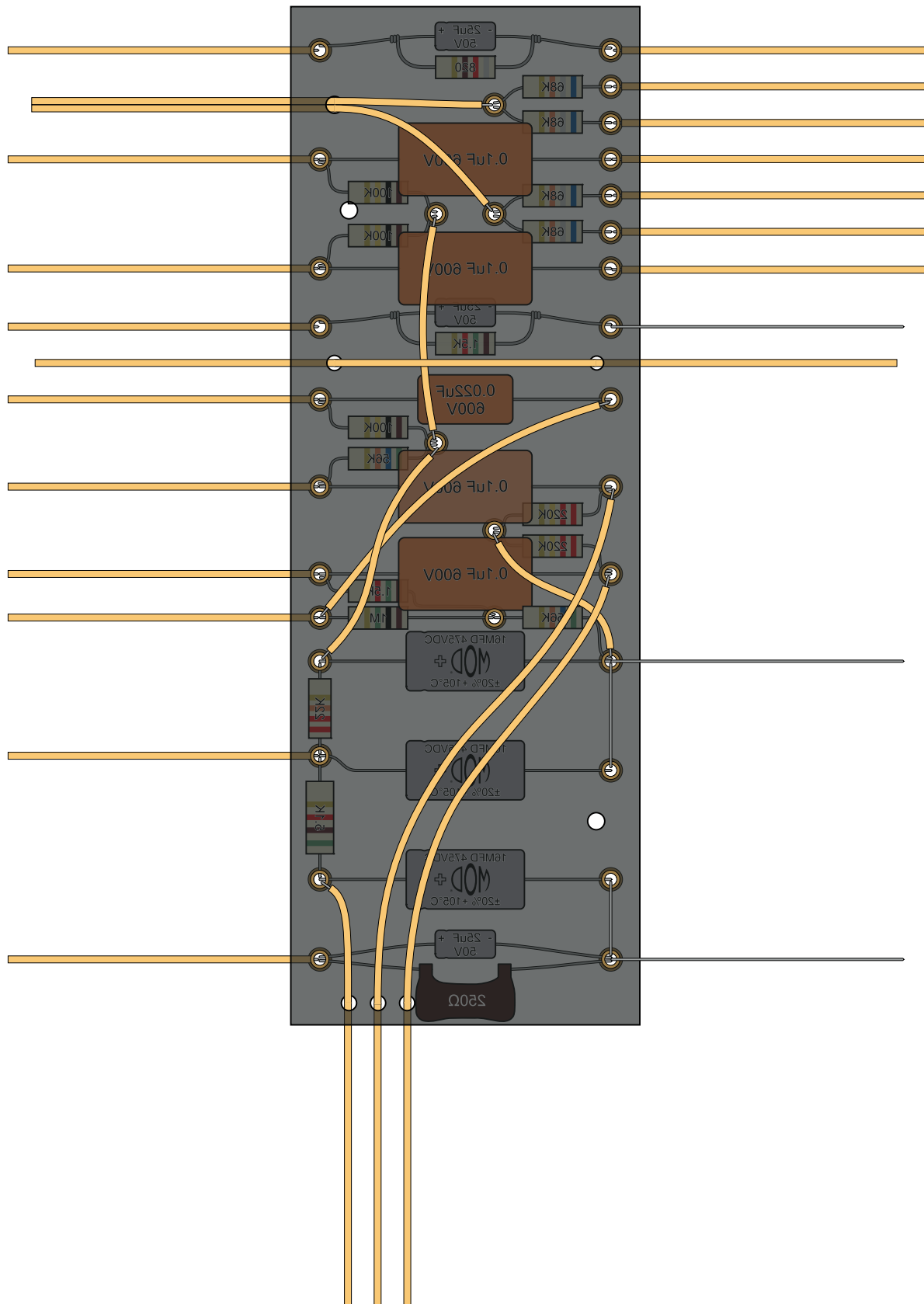
5E3 Eyelet Board Construction

Completed Fiberboard



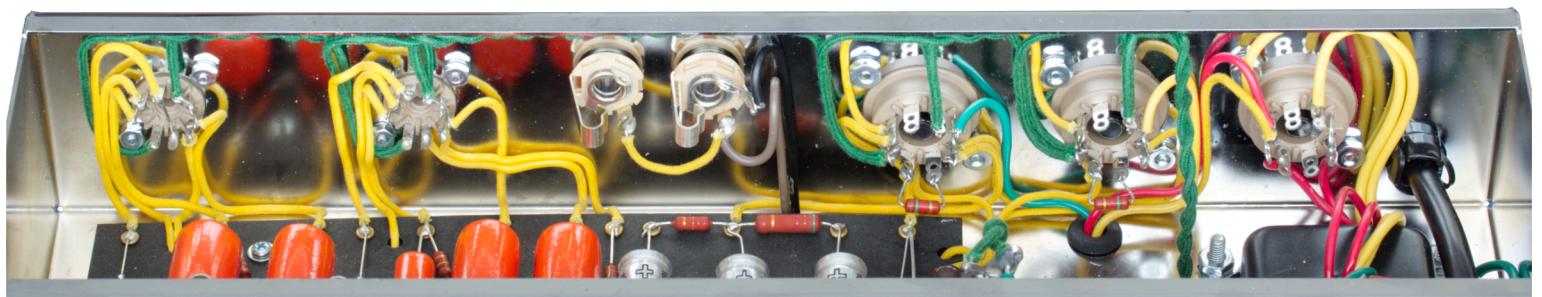
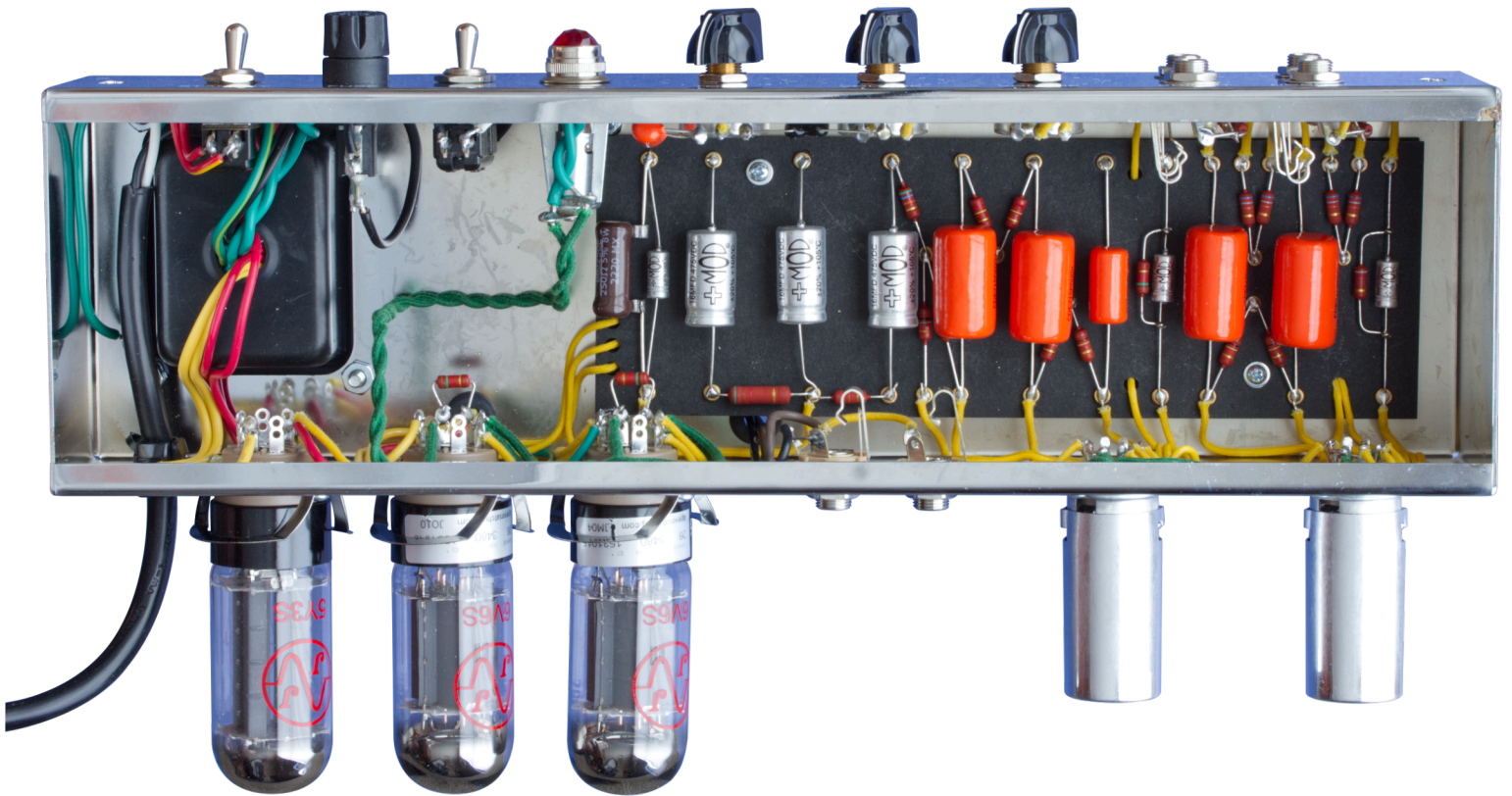
5E3 Eyelet Board Construction

Completed Fiberboard (back)



5E3 Reference Photos

Use these reference photos of the completed build to assist during construction.

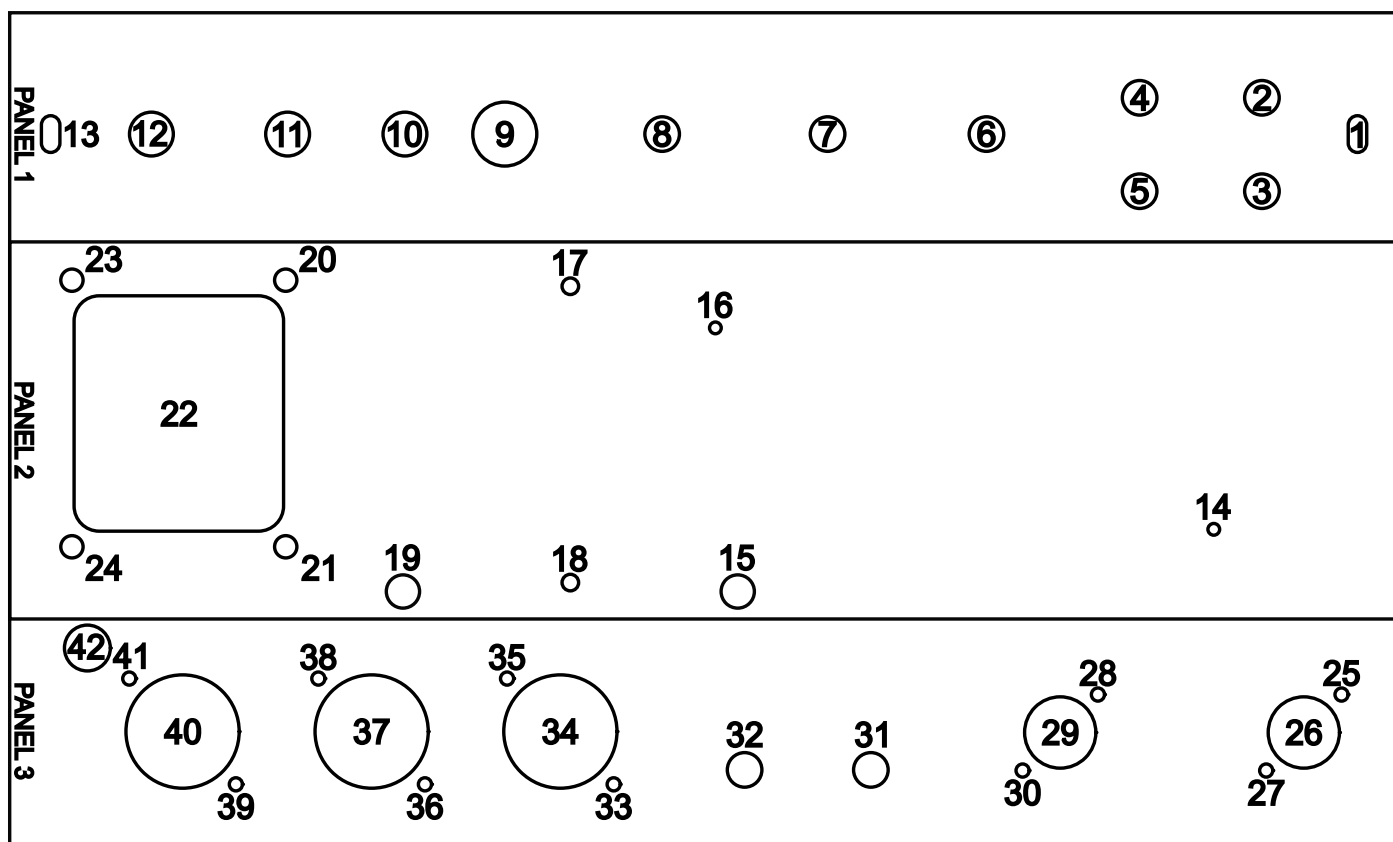


Notes on Chassis Construction

This section covers the chassis construction and diagrams used throughout these instructions

Chassis Layout

The chassis drawings show a flattened view of the chassis, looking into the open side, with the control side at the top and the tube side at the bottom. The top panel with the inputs and controls is referred to as Panel 1. The middle panel with the transformers and fiberboard is Panel 2. The bottom panel where the tube sockets mount is Panel 3. The holes referenced throughout the instructions will correspond to the numbers shown on this drawing.



Low-Profile Chassis-Mounted Components

Locate the chassis. The following steps will cover the placement and mounting of components such as potentiometers, transformers, and sockets onto the chassis. Use the Parts List as a reference.

Part 1: Transformers and Power Cord

B1-1: Locate the power transformer. Mount it in hole 22 of panel 2 with the yellow wire cluster facing panel 3. Leave the four preinstalled transformer nuts in place.

B1-2: Locate two #8 solder lugs. Slide these onto the mounting screws of the power transformer at holes 23 and 24.

B1-3: Locate two #8 lock washers. Slide these onto the mounting screws of the power transformer at holes 20 and 21.

B1-4: Locate four 8-32 nuts. Thread these onto each mounting screw of the transformer. Use a nut driver to completely tighten each down.

B1-5: Locate the 1/4" rubber grommets. Attach these to holes 15 and 19 on panel 2.

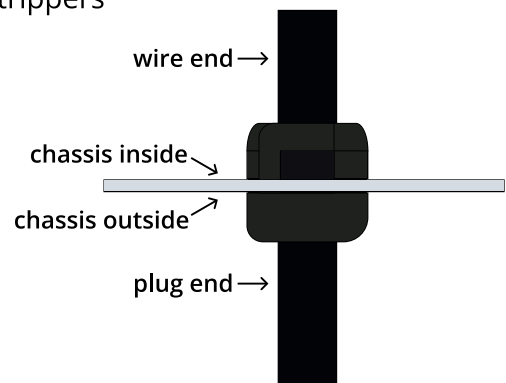
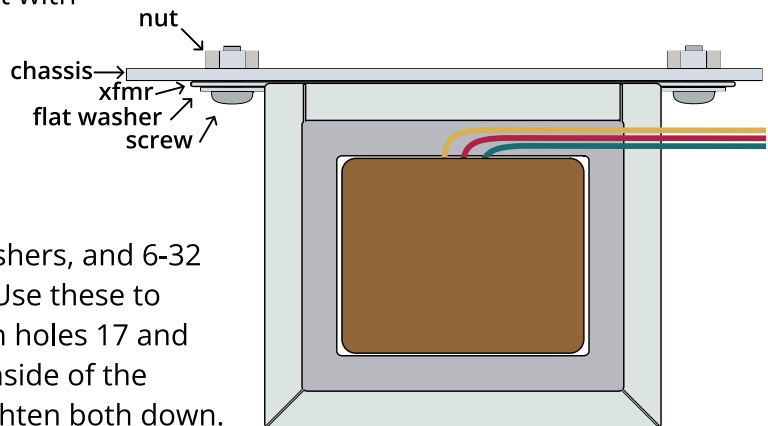
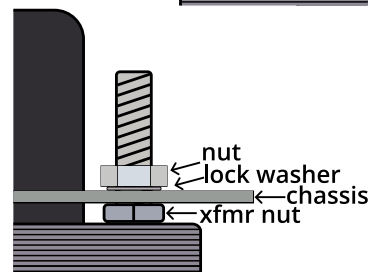
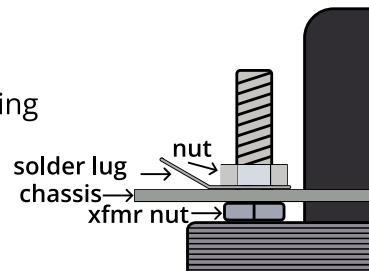
B1-6: Locate the output transformer. Mount it with the brown and black wires oriented towards hole 15. Pull the brown and black wires through the 1/4" grommet at hole 15. Pull the green, red, and yellow wires through the grommet at hole 19.

B1-7: Locate two 1/4" 6-32 screws, #6 flat washers, and 6-32 nuts. Slide the flat washers onto the screws. Use these to attach the transformer to the chassis through holes 17 and 18. Thread the nuts onto the screws on the inside of the chassis and use a nut driver to completely tighten both down.

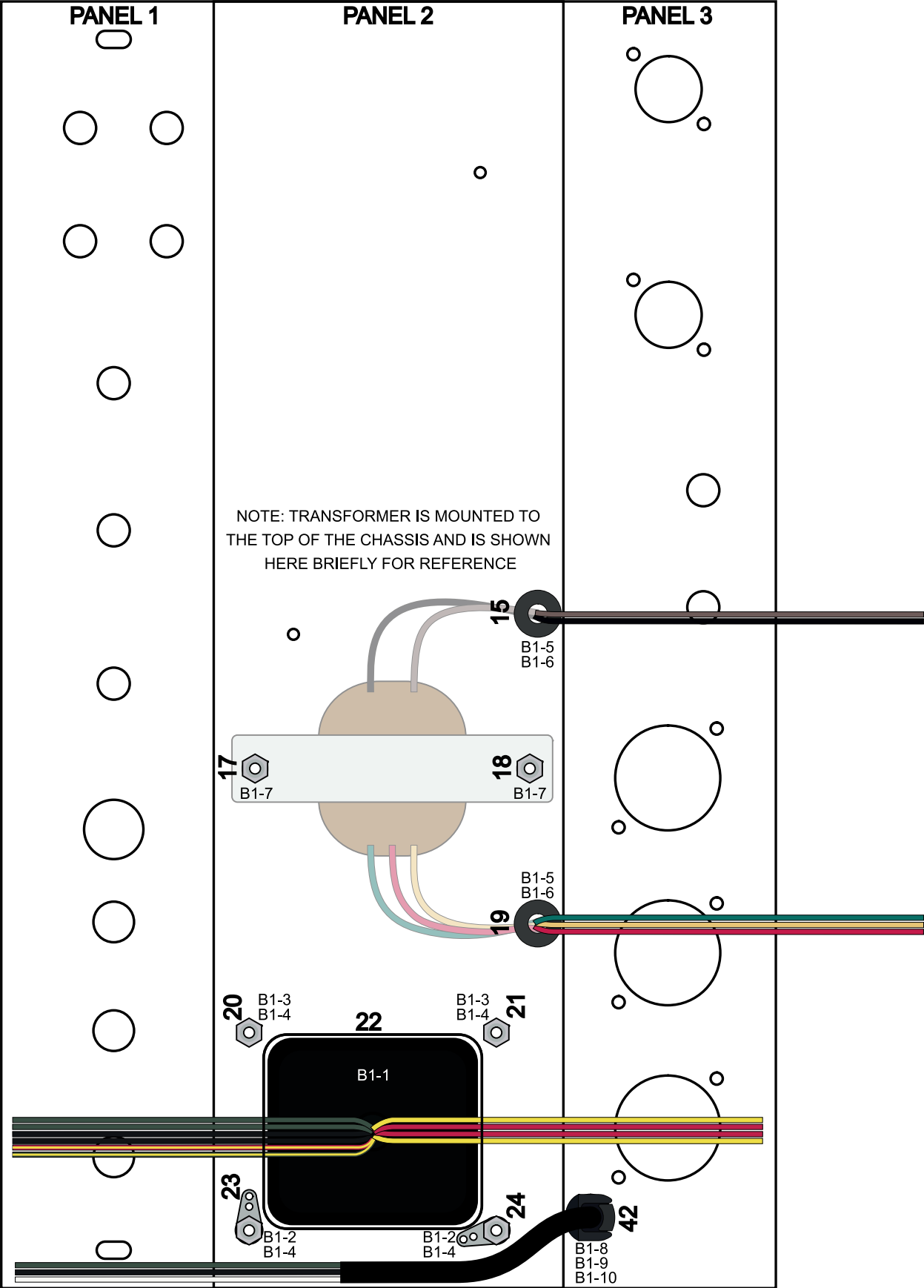
B1-8: Locate the three prong power cord. Trim back 7 inches of the black outer insulation from the bare end. Self adjusting wire strippers are the best tool for this but careful use of cutters can work.

B1-9: From the outside of the chassis, thread this cord through hole 42 on panel 3 of the chassis until roughly 3" of the black outer insulation is inside the chassis.

B1-10: Locate the strain relief. Attach it to the power cord at the outside of the chassis. Strain relief pliers are the ideal tool to compress the cord in the strain relief but careful use of standard pliers can accomplish this. Feed the strain relief into hole 42 until it snaps into place.



Low-Profile Chassis-Mounted Components



Low-Profile Chassis-Mounted Components

Part 2: Tube Sockets

B2-1: Locate the three octal sockets and tube clips. These will mount to holes 34, 37, and 40 on panel 3 of the chassis. Hole 40 is the rectifier tube socket and holes 37 and 34 are the output tube sockets. Be sure to orient the sockets as shown in the drawing.

B2-2: Locate six 1/4" 6-32 screws, 6-32 nuts, and #6 lock washers. Pass the screws through the tube clip and then the mounting bracket of the octal sockets.

B2-3: Mount these through the outside of the chassis then use the lock washers and nuts to secure the sockets to the chassis at holes 33 and 35, 36 and 38, and 39 and 41.

B2-4: Locate the two noval sockets. These will mount to holes 26 and 29 on panel 3 of the chassis. These are the preamp tube sockets. Be sure to orient the socket as shown in the drawing.

B2-5: Locate four 1/4" 4-40 screws, 4-40 nuts, and #4 lock washers. Pass the screws through the mounting bracket of the noval socket at holes 25 and 27, and 28 and 30.

B2-6: These mount through the outside of the chassis. Use the lock washers and nuts to secure the sockets to the chassis.

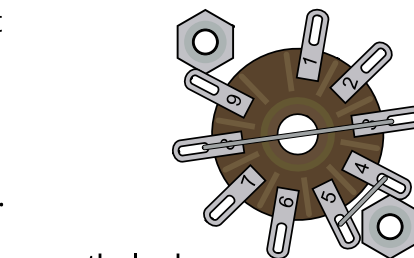
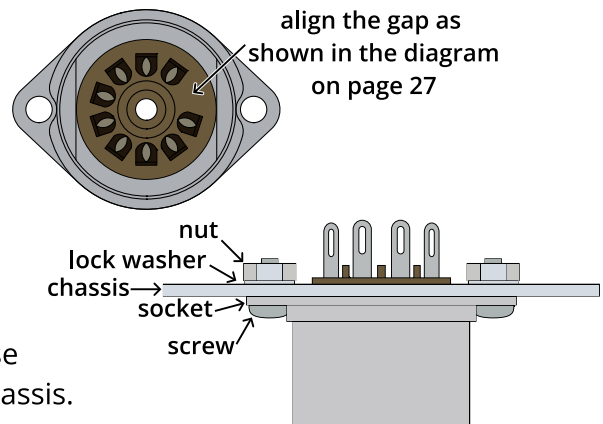
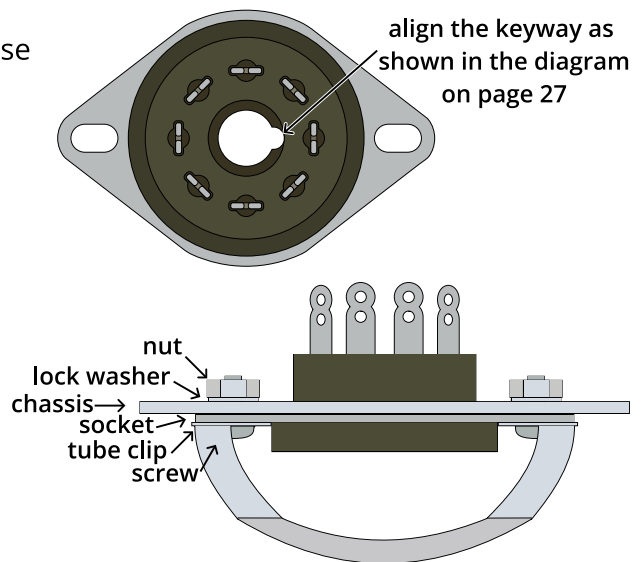
B2-7: Cut two 1/2" piece of bus wire. Use these to connect the lug 4 to 5 on each noval socket. Solder lug 5 on both noval sockets now.

B2-8: Cut a 1" piece of bus wire. Use this to connect the lug 3 to 8 on the noval socket at hole 26. Solder lug 8 now.

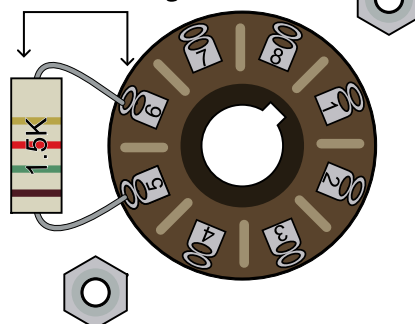
B2-9: Locate two 1.5K Ω resistors. Their color bands are brown, green, red, gold. Connect these resistors from lug 5 to 6 on the octal sockets at holes 34 and 37. Solder lug 5 on both of these octal sockets now.

B2-10: Cut a 5" piece of yellow wire. Use this to connect lug 8 of the socket at hole 34 to lug 8 of the socket at hole 37. Solder lug 8 of the socket at hole 37 now.

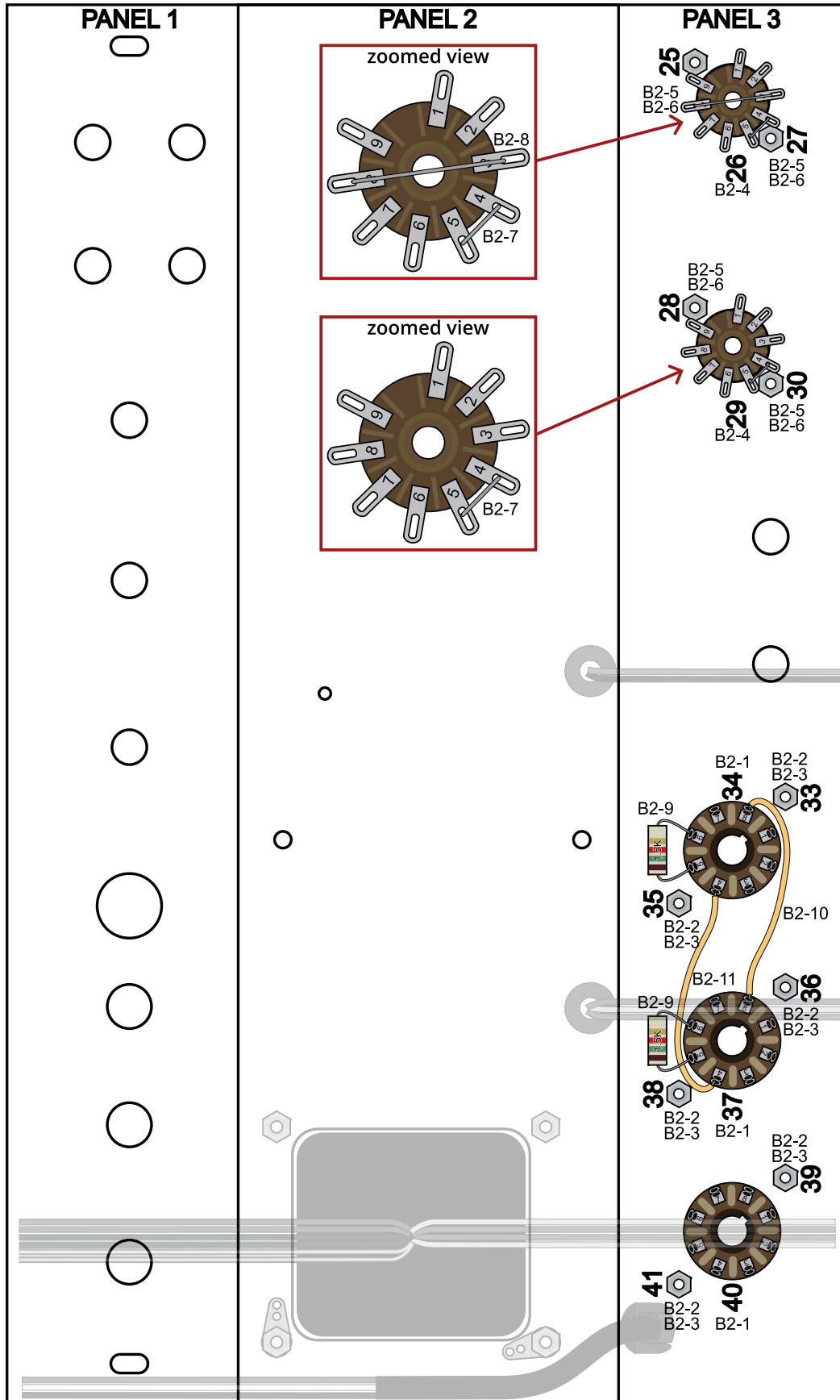
B2-11: Cut a 5" piece of yellow wire. Use this to connect lug 4 of the socket at hole 34 to lug 4 of the socket at hole 37. Solder lug 4 of the socket at hole 37 now.



space the leads so the resistor's body is not touching the solder lugs.



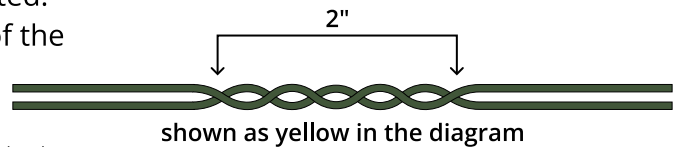
Low-Profile Chassis-Mounted Components



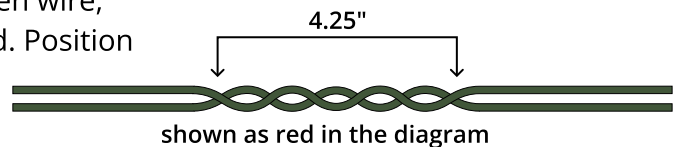
Low-Profile Chassis-Mounted Components

Part 3: Filament & Rectifier Wiring

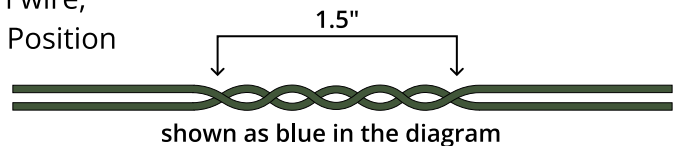
B3-1: Starting at the middle of two 8" pieces of green wire, twist a 2" segment. Leave the two ends untwisted. Position the twisted section against the outside lip of the chassis between the two noval sockets. Trim the four untwisted ends to connect pins 9 and 4 of the noval socket at hole 26 to 9 and 4 of the noval socket at hole 29. Polarity does not matter with these wires. Solder pins 9 and 4 of the noval socket at hole 26 now.



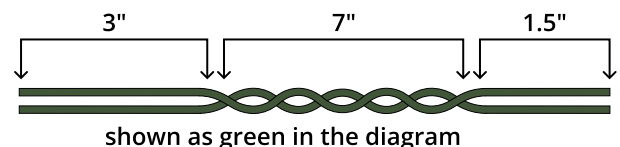
B3-2: Starting at the middle of two 10" pieces of green wire, twist a 4.25" segment. Leave the two ends untwisted. Position the twisted section against the outside lip of the chassis between the noval socket at hole 29 and the octal socket at hole 34. Trim the four untwisted ends to connect pins 9 and 4 of the noval socket at hole 29 to 7 and 2 of the octal socket at hole 34. Polarity does not matter with these wires. Solder pins 9 and 4 of the noval socket at hole 29 now.



B3-3: Starting at the middle of two 7" pieces of green wire, twist a 1.5" segment. Leave the two ends untwisted. Position the twisted section against the outside lip of the chassis between the octal socket at hole 34 and the octal socket at hole 37. Trim the four untwisted ends to connect pins 7 and 2 of the octal socket at hole 34 to 7 and 2 of the octal socket at hole 37. Polarity does not matter with these wires. Solder pins 7 and 2 of the octal socket at hole 34 now.

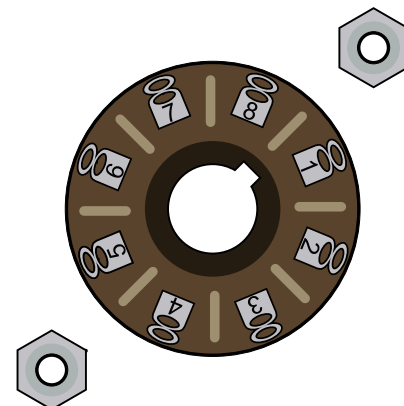


B3-4: Starting at 3" in of two 12" pieces of green wire, twist a 7" segment, leaving roughly 1.5" untwisted on the other end. Position the twisted section between the octal socket at hole 37 and hole 9 with the 3" untwisted section facing the octal socket at hole 37. Trim these 3" ends to connect to pins 7 and 2 of the octal socket at hole 37. Keep in mind that the other ends will connect to the pilot light holder later in the instructions. Solder pins 7 and 2 of the octal socket at hole 37 now.

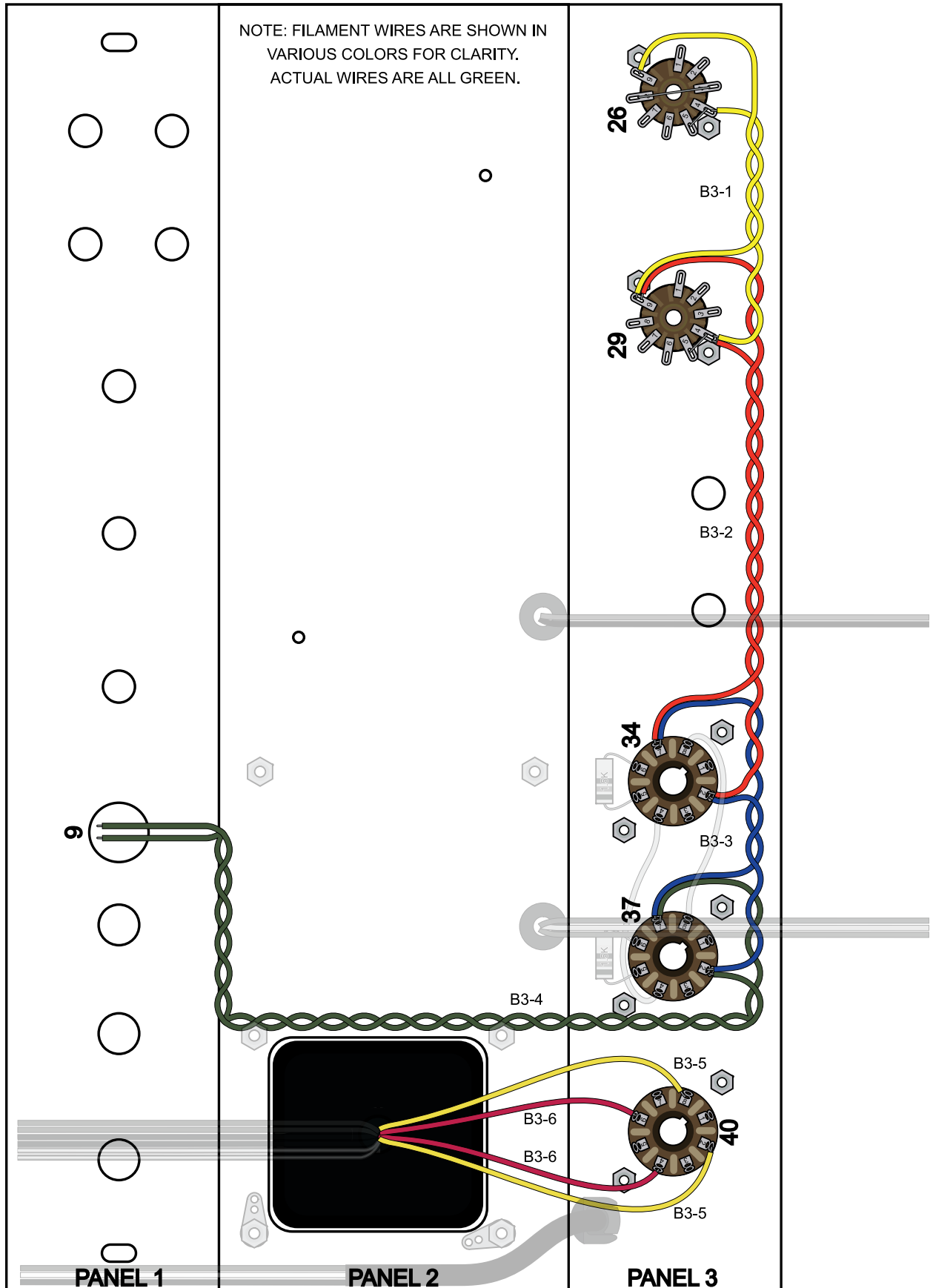


B3-5: Locate the two yellow wires on the power transformer. Trim these to connect to pins 2 and 8 of the octal socket at hole 40. Solder pin 2 now.

B3-6: Locate the two red wires on the power transformer. Trim these to connect to pins 4 and 6 of the octal socket at hole 40. Solder both pins now.



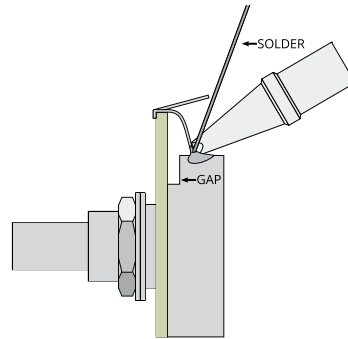
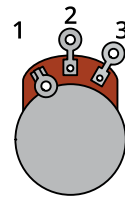
Low-Profile Chassis-Mounted Components



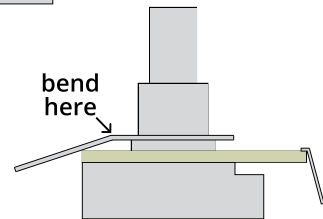
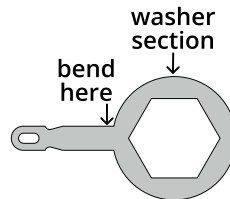
Low-Profile Chassis-Mounted Components

Part 4: Potentiometers

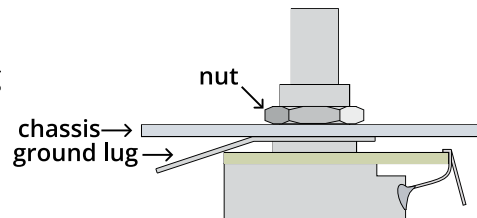
B4-1: Locate the three A1MΩ potentiometers. On **two** of the pots, bend lug 1 down until it makes contact with the metal potentiometer body. Solder lug 1 to the frame on both pots now. Be careful not to melt any solder into the gap. This connection grounds the lug to the chassis when the pot is mounted.



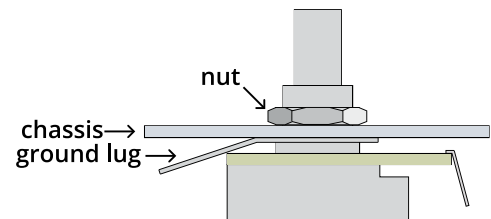
B4-2: Locate three 3/8" solder lugs. Use needlenose pliers to slightly bend the arm so that the washer section of the solder lug can sit flush on the potentiometers. Remove all of the mounting hardware from the potentiometers. Slide the solder lugs onto each of the pots' bushings. The arm should be angled away from the pots' shafts.



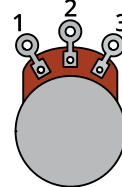
B4-3: Mount the pots with the grounded lug 1 to holes 6 and 7. Mount the pots with their lugs facing up. The 3/8" solder lugs should be pointing down. Attach the nut on the outside of the chassis. Be careful not to scratch the panel when tightening the front panel hardware.



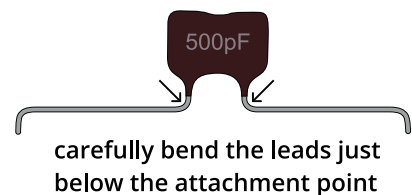
B4-4: Mount the remaining pot to hole 8. Make sure its lugs are facing up and that the 3/8" solder lug is pointed down. Attach the nut on the outside of the chassis.



B4-5: Cut a 3" piece of yellow wire. Use this to connect the lug 2 of the pot at hole 8 to lug 3 of the pot at hole 7. Solder lug 2 of the pot at hole 8 now.

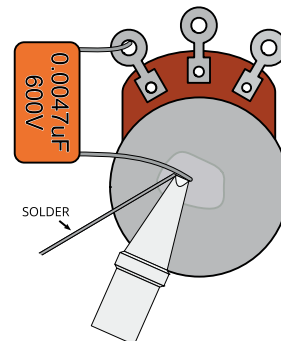


B4-6: Cut a 2.5" piece of yellow wire. Use this to connect the lug 3 of the pot at hole 7 to lug 3 of the pot at hole 6. Solder lug 3 of the pot at hole 7 now.

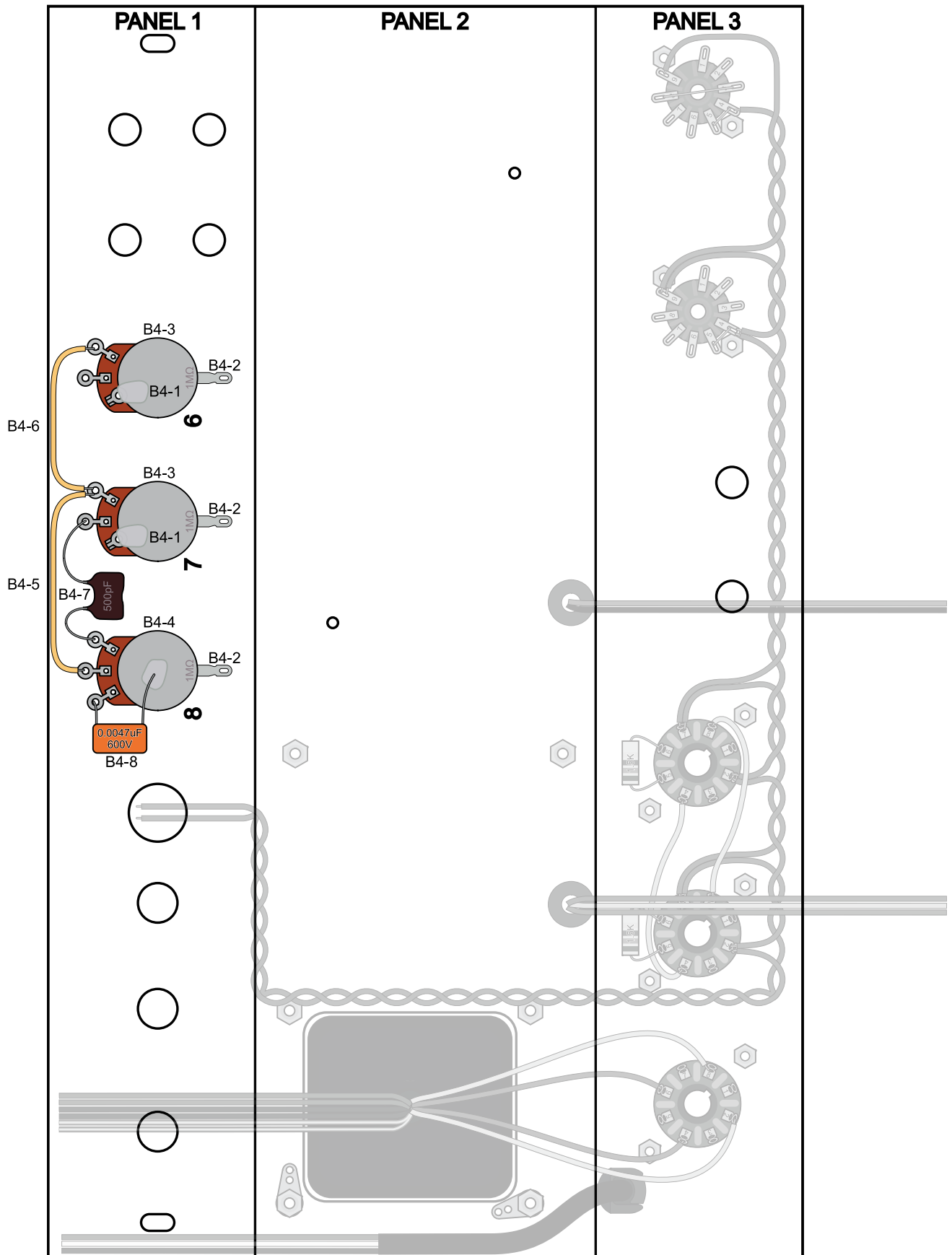


B4-7: Locate the 500pF 500V silver mica capacitor. Connect it from lug 3 of the pot at hole 8 to lug 2 of the pot at hole 7. Solder lug 3 of the pot at hole 8 now.

B4-8: Locate the 0.0047uF 600V capacitor. Connect it from lug 1 of the pot at hole 8 to the back of the pot. First solder lug 1 of the pot. Then solder the other lead to the back of the pot. Be sure to sufficiently heat both the lead and the back of the pot before attempting to apply solder. It can sometimes be helpful to lightly sand or scuff the back of the pot so the solder can bond to it more easily.



Low-Profile Chassis-Mounted Components



Low-Profile Chassis-Mounted Components

Part 5: Power Controls

B5-1: Trim the green wire of the power cord to connect to the #8 solder lug at hole 24 of the power transformer. Solder the #8 solder lug now.

B5-2: Locate the yellow-striped red wire on the power transformer. Cut 5" of wire from the end of it. Connect the 5" cut piece of wire to the #8 solder lug at hole 23.

B5-3: Locate the yellow-striped green wire on the power transformer. Trim it to connect to the #8 solder lug at hole 23. Solder this #8 solder lug now.

B5-4: Locate the SPST toggle switch. This will mount to hole 12. First remove both nuts. Thread the circular nut onto the bushing until 3/16" of the threading is exposed. Then secure the SPST toggle switch to the chassis with the hex nut. Make sure that the lugs are oriented upward.

B5-5: Locate the fuse holder. This will mount to hole 11. The holder is inserted through the outside of the chassis. Slide the rubber washer over the bushing inside the chassis and then secure the fuse holder with the nut. Make sure that the side lug is oriented upward.

B5-6: Locate the DPST toggle switch. This will mount to hole 10. First remove both nuts. Thread the circular nut onto the bushing until 3/16" of the threading is exposed. Then secure the DPST toggle switch to the chassis with the hex nut. Make sure that the slanted lugs are oriented downward.

B5-7: Locate the yellow-striped red wire at the #8 solder lug on hole 23. Trim and connect it to lug 1 of the SPST switch at hole 12. Solder lug 1 now.

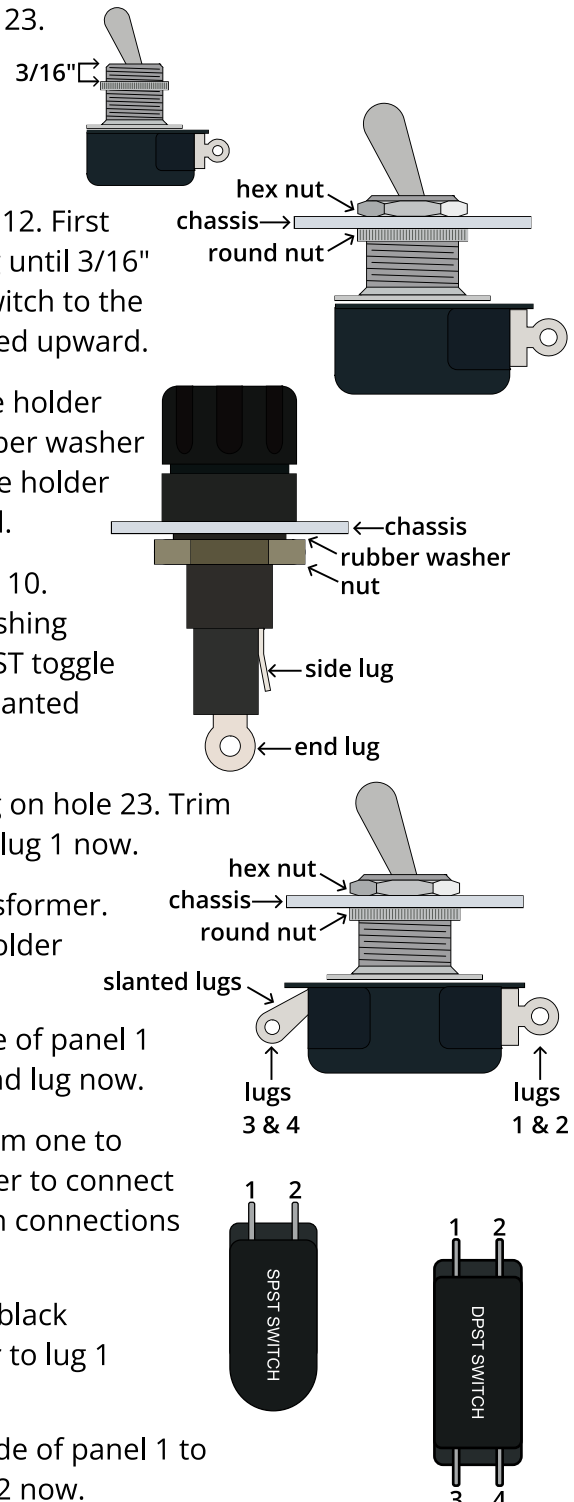
B5-8: Locate the yellow-striped red wire on the power transformer. Trim and connect it to lug 2 of the SPST switch at hole 12. Solder lug 2 now.

B5-9: Run the black wire of the power cord across the inside of panel 1 to connect it to the end lug of the fuse holder. Solder the end lug now.

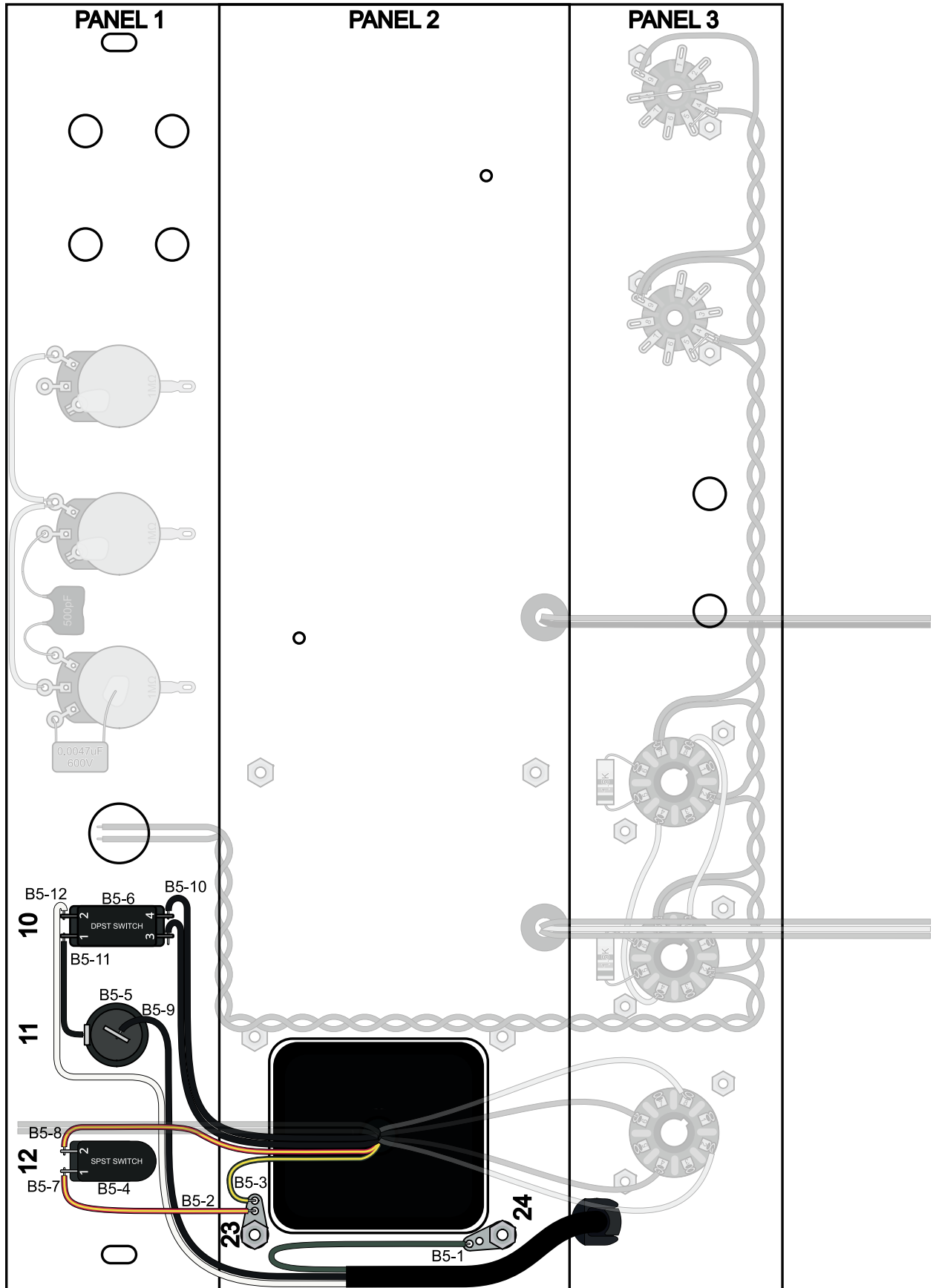
B5-10: Locate the black wires on the power transformer. Trim one to connect to lug 3 of the DPST switch at hole 10. Trim the other to connect to lug 4 of the same switch. Save the scrap wire. Solder both connections now.

B5-11: Use a 2.5" piece of the scrap wire from the trimmed black transformer wires to connect the side lug of the fuse holder to lug 1 of the DPST switch. Solder both connections now.

B5-12: Run the white wire of the power cord across the inside of panel 1 to connect it to lug 2 of the DPST switch at hole 10. Solder lug 2 now.



Low-Profile Chassis-Mounted Components



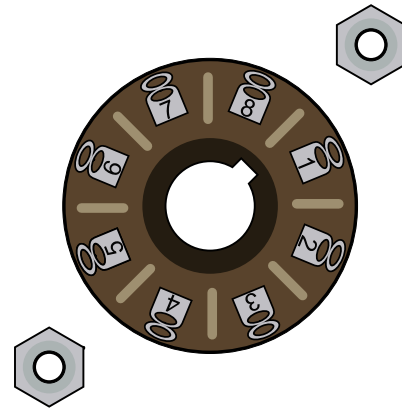
Low-Profile Chassis-Mounted Components

Part 6: Output Transformer Primary Wiring

B6-1: Locate the green wire on the output transformer. This is located at the grommet on hole 19 on panel 2 of the chassis. Trim this to connect to pin 3 of the octal socket at hole 34. Solder this connection now.

B6-2: Locate the yellow wire on the output transformer. This is located at the grommet on hole 19 on panel 2 of the chassis. Trim this to connect to pin 3 of the octal socket at hole 37. Solder this connection now.

B6-3: Locate the red wire on the output transformer. This is located at the grommet on hole 19 on panel 2 of the chassis. Trim this to connect to pin 8 of the octal socket at hole 40. Do not solder this connection yet.

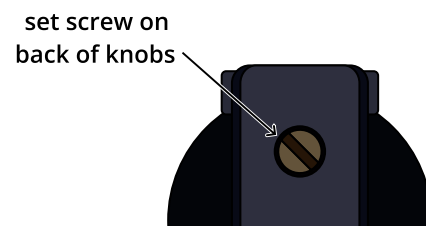
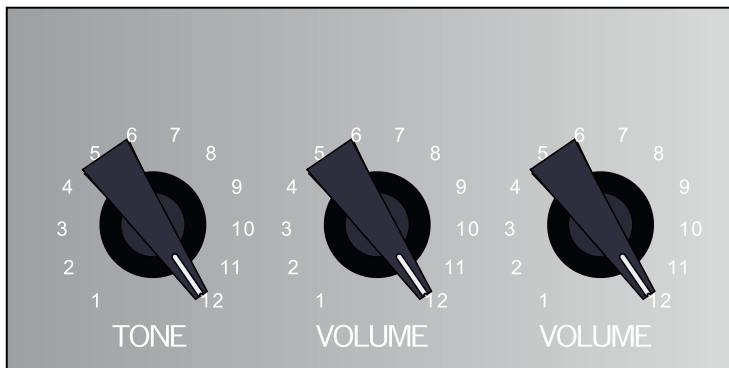


Completed Low-Profile Chassis Hardware: Inspection

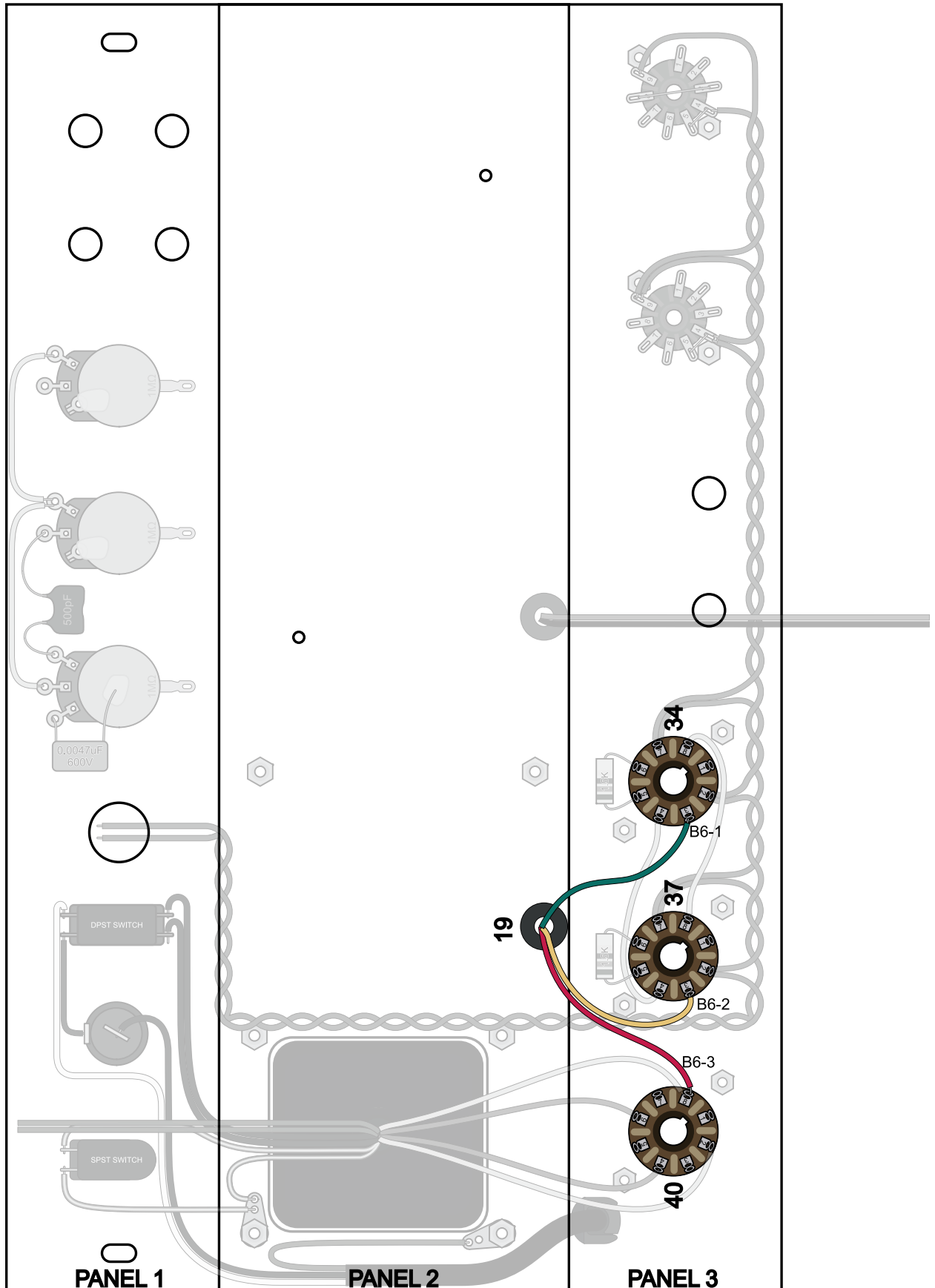
The hardware mounting and wiring of this section is now completed. Please take some time to thoroughly check the connections, parts placement, and solder joints. Ensure all components are in their correct positions according to the wiring diagram. Verify that all solder joints are smooth and shiny, and free of cold joints, which can appear dull or cracked.

Front Panel Control Knobs

Attach the knobs to the potentiometer. Turn the pot shafts fully clockwise, then align the knobs to point at 12. Tighten the set screw. Rotate the knobs to ensure that they are fully attached and are not slipping.



Low-Profile Chassis-Mounted Components

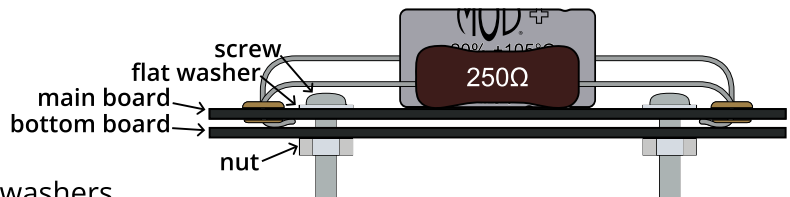


Fiberboard Mounting & Partial Wiring

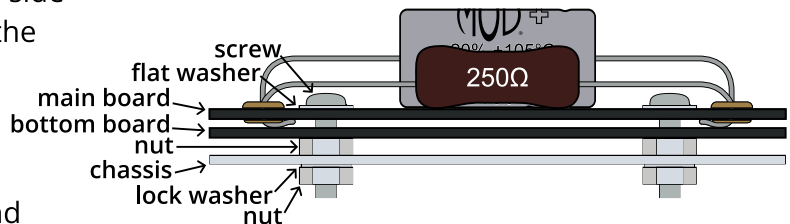
Locate the completed fiberboard. The following steps will guide you through mounting the fiberboard into the chassis and wiring its connections.

Part 1: Mounting the Fiberboard

C1-1: Locate the completed fiberboard and the bottom insulator board. Line up the bottom fiberboard with the top fiberboard. Make sure the two empty holes match the same position on both boards. Be careful not to disturb any of the loose wires on the main board.



C1-2: Locate two 1/2" 4-40 screws, 4-40 flat washers, and 4-40 nuts. Slide the flat washers onto the screws and then insert the screws through the top of the main fiberboard at holes B and D. On the bottom side of the bottom board, thread the nuts onto the screws. These only need to be finger tight.



C1-3: Carefully lower the fiberboard assembly into the chassis so that the ends of the 1/2" screws pass through holes 14 and 16 of the chassis. Make sure that none of the transformer or filament wires are beneath the boards.

C1-4: Locate two 4-40 nuts and #4 lock washers. On the outside of the chassis, slide the lock washers onto the 1/2" screws and then secure them using the nuts.

Part 2: Wired Connections

C2-1: Connect the bus wire at eyelet 8 to the 3/8" solder lug at hole 6 of the chassis. Solder the 3/8" solder lug at hole 6 now.

C2-2: Connect the bus wire at eyelet 12 to the 3/8" solder lug at hole 7 of the chassis. Solder the 3/8" solder lug at hole 7 now.

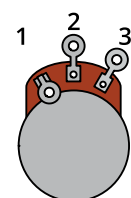
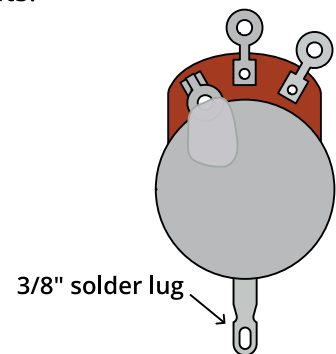
C2-3: Connect the bus wire at eyelet 15 to the 3/8" solder lug at hole 8 of the chassis. Solder the 3/8" solder lug at hole 8 now.

C2-4: Locate the yellow wire at eyelet 4 of the fiberboard. Trim and connect it to lug 2 of the potentiometer at hole 6. Solder lug 2 of the potentiometer at hole 6 now.

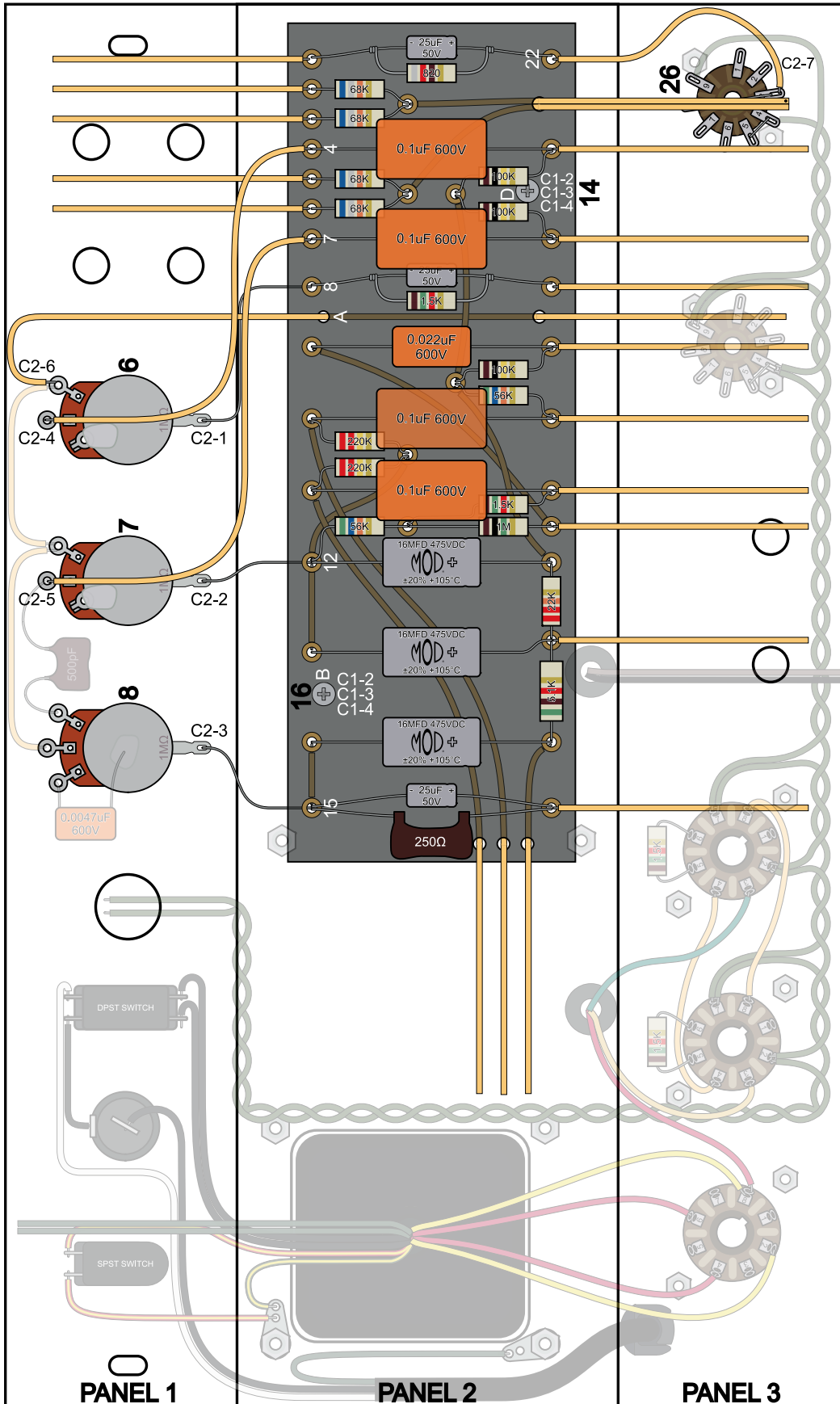
C2-5: Locate the yellow wire at eyelet 7 of the fiberboard. Trim and connect it to lug 2 of the potentiometer at hole 7. Solder lug 2 of the potentiometer at hole 7 now.

C2-6: Locate the yellow wire at hole A. Trim and connect it to lug 3 of the potentiometer at hole 6. Solder lug 3 of the potentiometer at hole 6 now.

C2-7: Locate the yellow wire at eyelet 22. Trim and connect it to lug 3 of the noval socket at hole 26. Solder lug 3 of the noval socket at hole 26 now.



Fiberboard Mounting & Partial Wiring



Fiberboard Mounting & Partial Wiring

Part 2: Wired Connections (cont.)

C2-8: Locate the yellow wire with the dot at hole C. Trim and connect it to lug 2 of the noval socket at hole 26. Solder lug 2 of the noval socket at hole 26 now.

C2-9: Locate the other yellow wire at hole C. Trim and connect it to lug 7 of the noval socket at hole 26. Solder lug 7 of the noval socket at hole 26 now.

C2-10: Locate the yellow wire at eyelet 23. Trim and connect it to lug 1 of the noval socket at hole 26. Solder lug 1 of the noval socket at hole 26 now.

C2-11: Locate the yellow wire at eyelet 24. Trim and connect it to lug 6 of the noval socket at hole 26. Solder lug 6 of the noval socket at hole 26 now.

C2-12: Locate the yellow wire at eyelet 25. Trim and connect it to lug 3 of the noval socket at hole 29. Solder lug 3 of the noval socket at hole 29 now.

C2-13: Locate the yellow wire at hole E. Trim and connect it to lug 2 of the noval socket at hole 29. Solder lug 2 of the noval socket at hole 29 now.

C2-14: Locate the yellow wire at eyelet 26. Trim and connect it to lug 1 of the noval socket at hole 29. Solder lug 1 of the noval socket at hole 29 now.

C2-15: Locate the yellow wire at eyelet 27. Trim and connect it to lug 6 of the noval socket at hole 29. Solder lug 6 of the noval socket at hole 29 now.

C2-16: Locate the yellow wire at eyelet 28. Trim and connect it to lug 8 of the noval socket at hole 29. Solder lug 8 of the noval socket at hole 29 now.

C2-17: Locate the yellow wire at eyelet 29. Trim and connect it to lug 7 of the noval socket at hole 29. Solder lug 7 of the noval socket at hole 29 now.

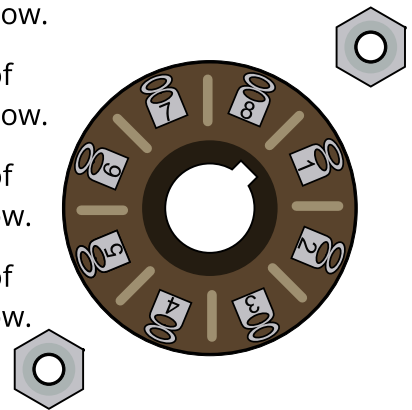
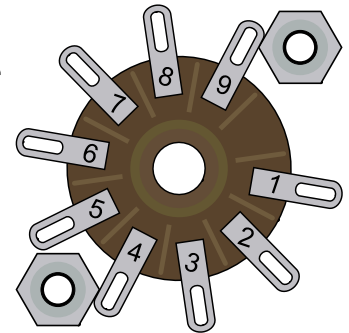
C2-18: Locate the yellow wire at eyelet 31. Trim and connect it to lug 4 of the octal socket at hole 34. Solder lug 4 of the octal socket at hole 34 now.

C2-19: Locate the yellow wire at eyelet 33. Trim and connect it to lug 8 of the octal socket at hole 34. Solder lug 8 of the octal socket at hole 34 now.

C2-20: Locate the yellow wire at hole H. Trim and connect it to lug 8 of the octal socket at hole 40. Solder lug 8 of the octal socket at hole 40 now.

C2-21: Locate the yellow wire at hole G. Trim and connect it to lug 6 of the octal socket at hole 34. Solder lug 6 of the octal socket at hole 34 now.

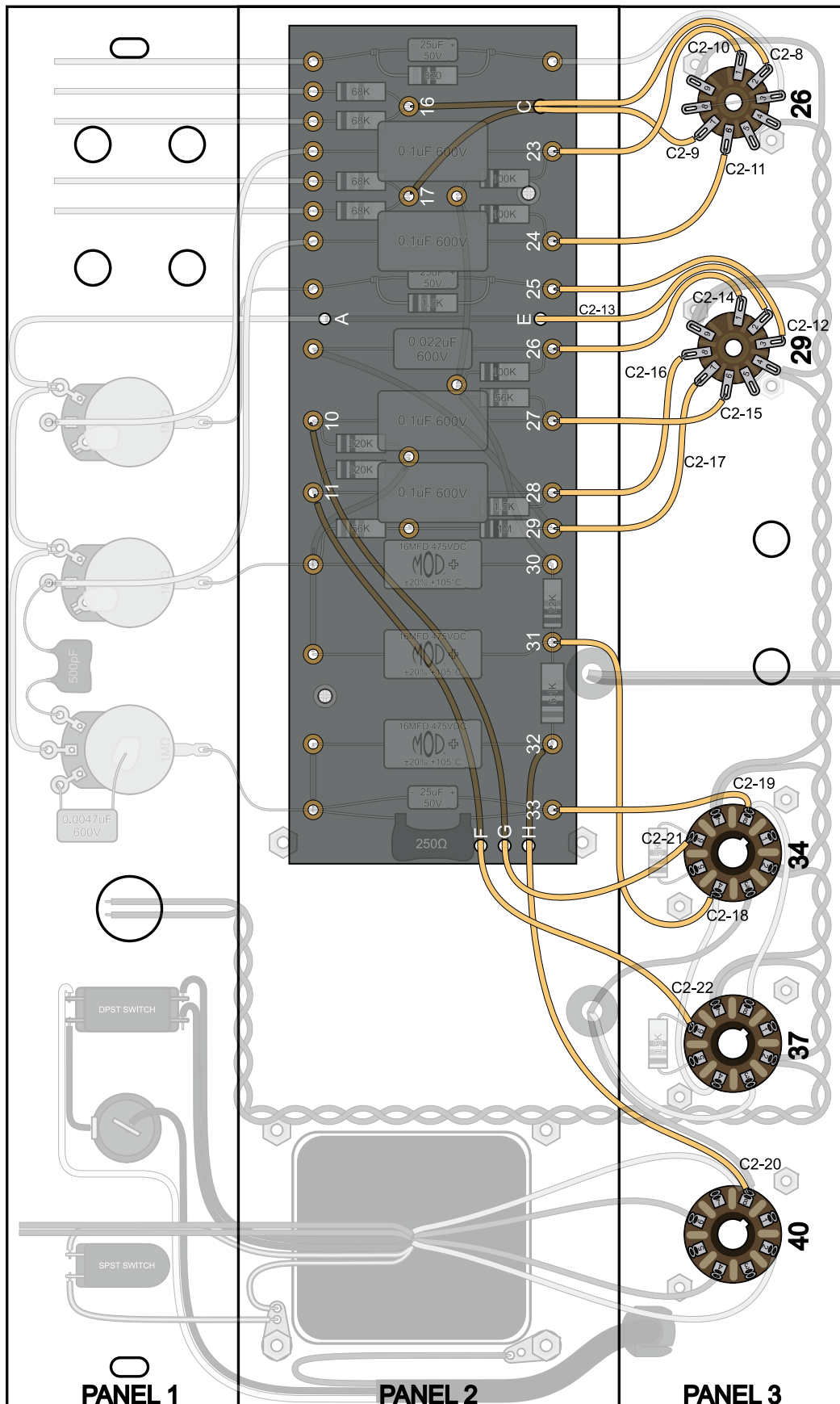
C2-22: Locate the yellow wire at hole F. Trim and connect it to lug 6 of the octal socket at hole 37. Solder lug 6 of the octal socket at hole 37 now.



Completed Fiberboard Mounting & Partial Wiring: Inspection

Ensure all components are in their correct positions according to the wiring diagram. Verify that all solder joints are smooth and shiny, and free of cold joints, which can appear dull or cracked.

Fiberboard Mounting & Partial Wiring



Final Assembly

Please double check all of the connections before proceeding. The following steps will guide you through mounting and wiring the remaining hardware.

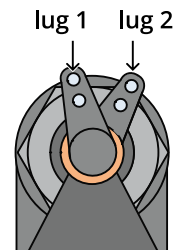
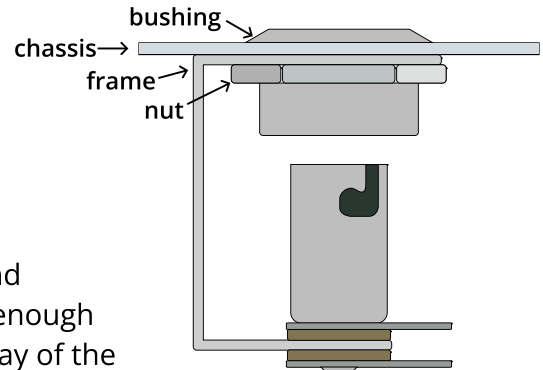
Part 1: Mounting & Wiring the Pilot Light

D1-1: Locate the pilot light socket. This will mount in hole 9. The bushing mounts to the outside of the chassis. The frame is then secured with the nut on the inside of the chassis. Make sure that the frame is oriented downward.

D1-2: Locate the two green wires on the power transformer. Tightly twist the entire length of these wires.

D1-3: Once twisted, trim these to connect one wire to lug 1 and the other to lug 2 of the pilot light holder. Be sure to provide enough slack to run them along the inside of panel 1 and out of the way of the board area.

D1-4: Locate the two twisted green wires coming from the octal socket at hole 37. Trim these to connect one to lug 1 and the other to lug 2 of the pilot light holder. Polarity does not matter. Solder both holes on both lugs now.



Part 2: Mounting & Wiring the Jacks

D2-1: Locate the five switched 1/4" jacks. Mount these to holes 2, 3, 4, 5, and 32. 2-5 are the input jacks and 32 is the main output jack. The included flat washers mount beneath the nut on the outside of the chassis. Orient all of the jacks as shown in the drawing on page 41.

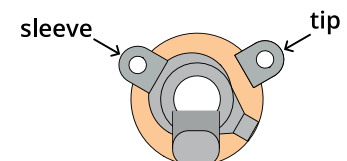
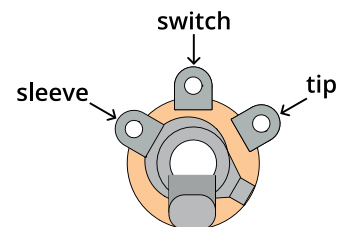
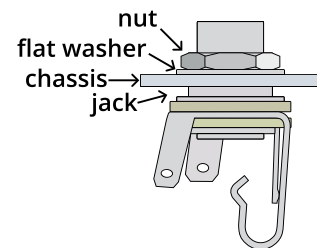
D2-2: Locate the non-switched 1/4" jack. Mount this jack to hole 31. This is the extension speaker output jack. The included flat washer mounts beneath the nut on the outside of the chassis.

D2-3: Cut three 3/4" pieces of bus wire. Use these to connect the switch lug to the sleeve lug on the jacks at holes 2, 4, and 32. Solder the sleeve lugs of the jacks at 4 and 32 now.

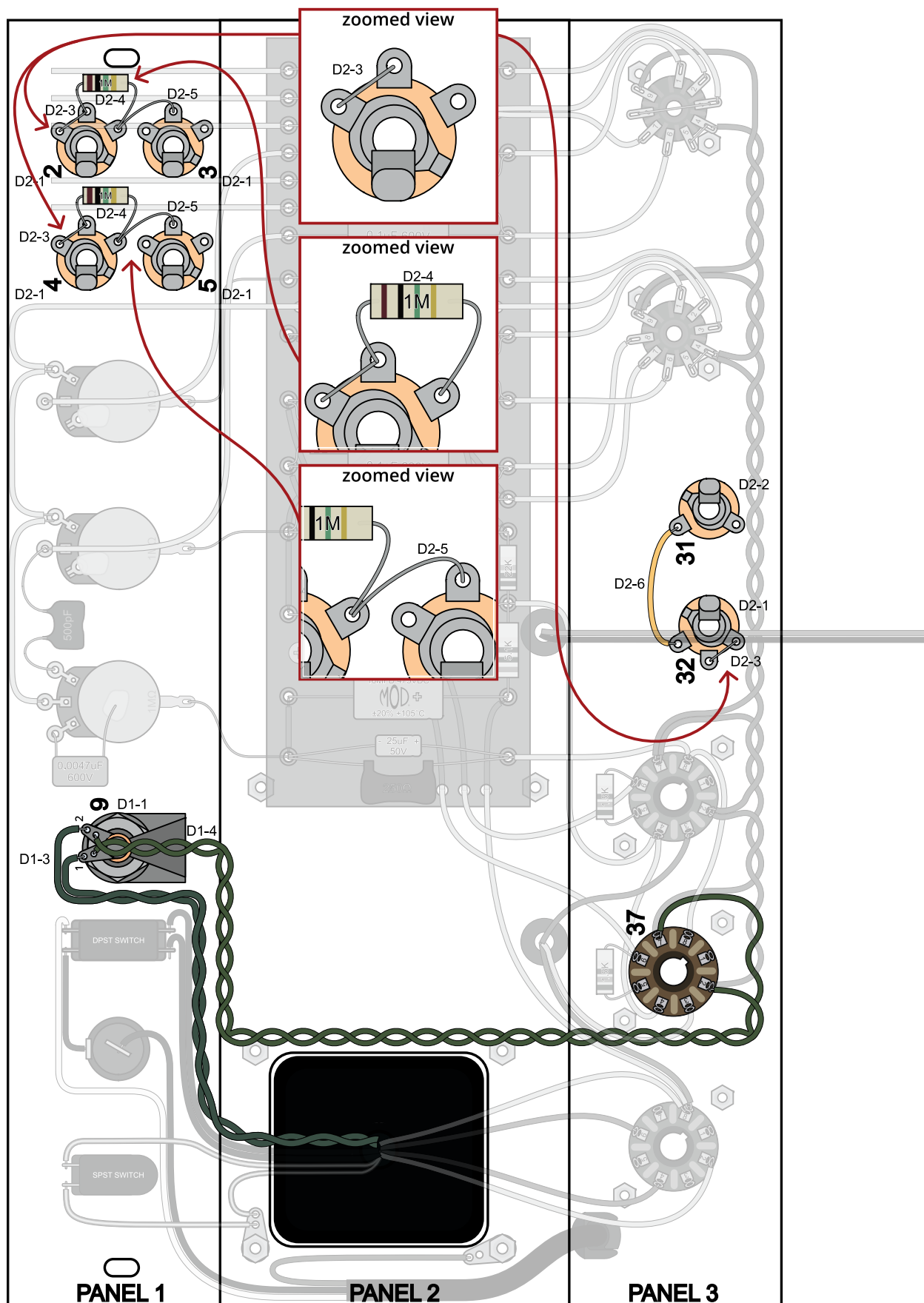
D2-4: Locate two 1M resistors. Their color bands are brown, black, green, gold. Connect each from the tip lug to the switch lug on the jacks at hole 2 and 4. Solder the switch lugs of these jacks now.

D2-5: Cut two 1.25" pieces of bus wire. Use one to connect the tip lug of the jack at hole 2 to the switch lug of the jack at hole 3. Use the other to connect the tip lug of jack at hole 4 to the switch lug of the jack at hole 5. Solder the tip lugs on the jacks at holes 2 and 4 now.

D2-6: Cut a 2" piece of yellow wire. Use this to connect the tip lug of the jack at hole 31 to the tip lug of the jack at hole 32. Solder the tip lug of the jack at hole 31 now.



Final Assembly



Final Assembly

Part 2: Wired Connections (cont.)

D2-7: Locate the black wire on the output transformer at the grommet on hole 15. Trim this to connect to the switch lug of the main output jack at hole 32. Solder the switch lug of the main output jack at hole 32 now.

D2-8: Locate the brown wire on the output transformer at the grommet on hole 15. Trim this to connect to the tip lug of the main output jack at hole 32. Solder the tip lug of the main output jack at hole 32 now.

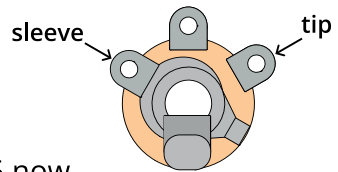
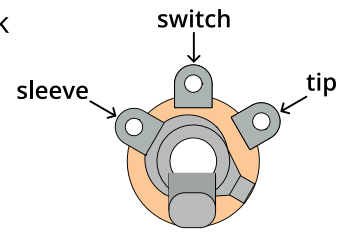
D2-9: Locate the yellow wire at eyelet 1. Trim this to connect to the sleeve lug of the jack at hole 2. Solder the sleeve lug of the jack at hole 2 now.

D2-10: Locate the yellow wire at eyelet 2. Trim this to connect to the switch lug of the jack at hole 3. Solder the switch lug of the jack at hole 3 now.

D2-11: Locate the yellow wire at eyelet 3. Trim this to connect to the tip lug of the jack at hole 3. Solder the tip lug of the jack at hole 3 now.

D2-12: Locate the yellow wire at eyelet 5. Trim this to connect to the switch lug of the jack at hole 5. Solder the switch lug of the jack at hole 5 now.

D2-13: Locate the yellow wire at eyelet 6. Trim this to connect to the tip lug of the jack at hole 5. Solder the tip lug of the jack at hole 5 now.

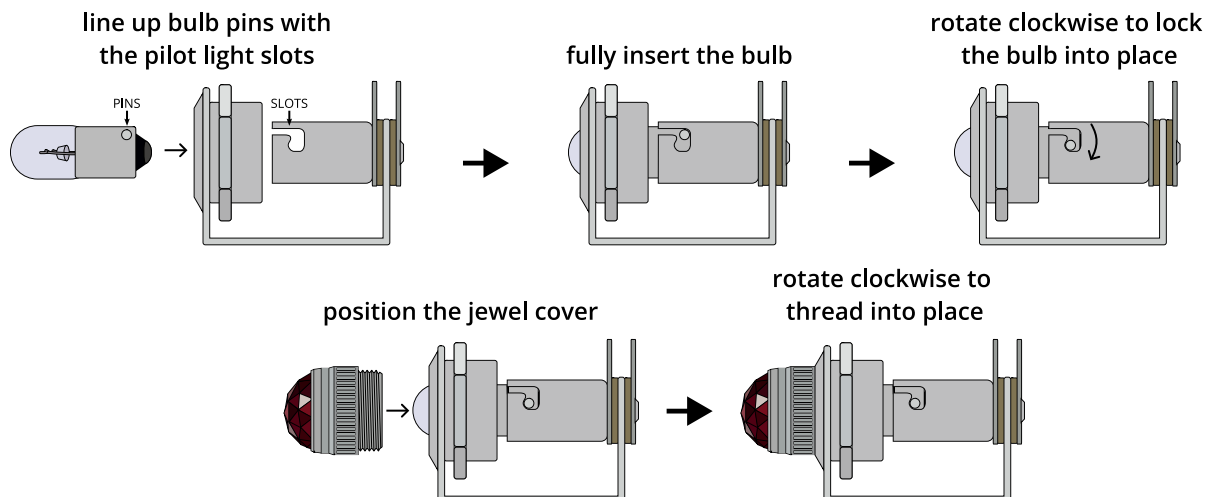


Completed Build: Inspection

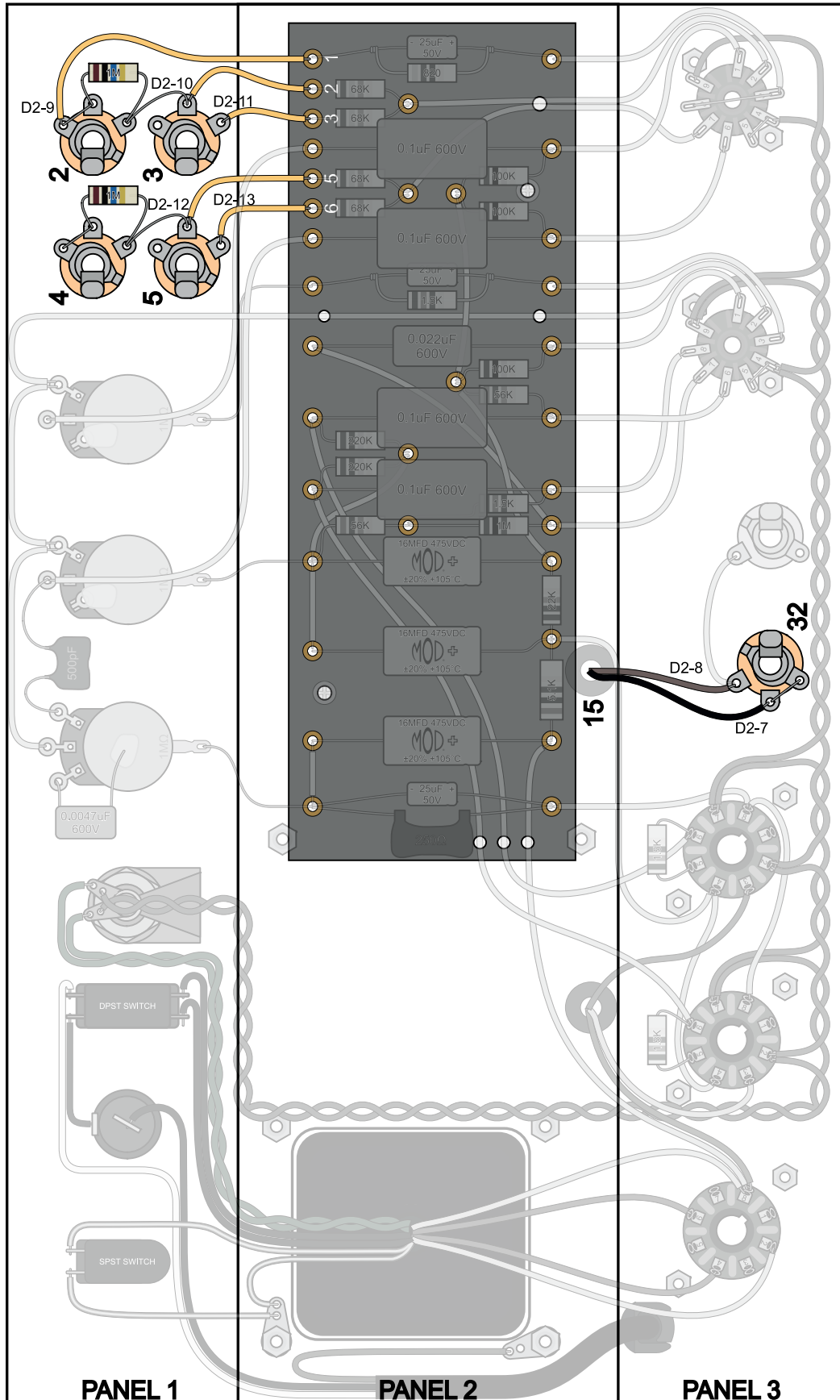
The chassis of the 5E3 is now completed. Please take some time to thoroughly check all of the connections, parts placement, and solder joints. Ensure all components are in their correct positions according to the wiring diagram, with electrolytic capacitors oriented correctly for polarity. Verify that all solder joints are smooth and shiny, and free of cold joints, which can appear dull or cracked.

Install the Pilot Light Bulb and Jewel

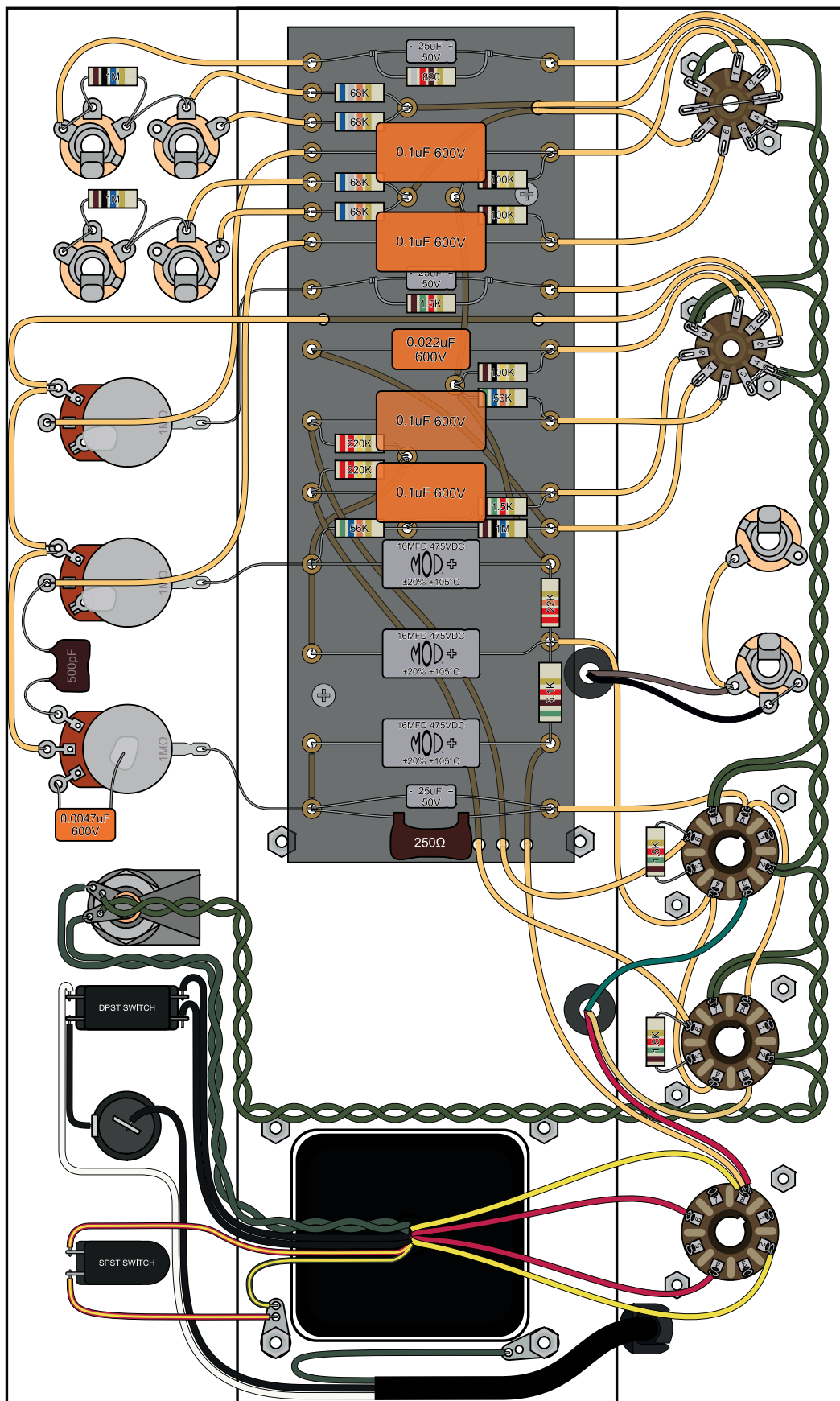
Insert the bulb into the pilot light socket ensuring it is securely in place. Position the jewel cover over the bulb and screw it on gently until it is firmly attached.



Final Assembly



Completed 5E3 Chassis



5E3 Chassis Construction Builder Notes

Use this page to record any notes on the chassis construction.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Speaker Wiring (optional)

This optional section provides instructions for wiring the stock speaker when using the stock cabinet with the amplifier. If a different speaker or cabinet will be used, this section can be skipped.

Part 1: Preparing the Speaker Wire

E1-1: Locate the black and white 18AWG wires. Push back the cloth sleeving to expose 3/8" of bare wire on each.

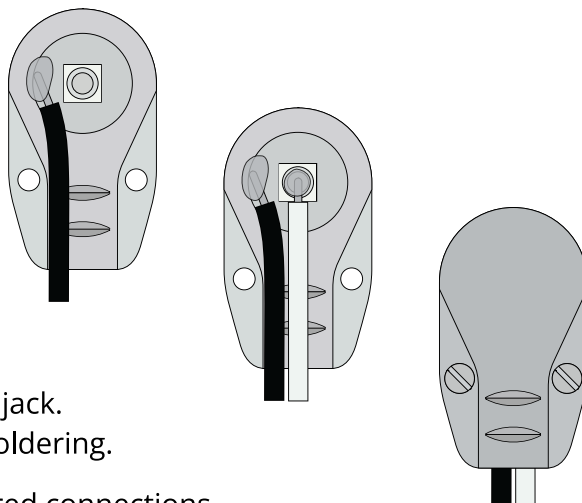
E1-2: Locate the right angle 1/4" plug. Remove the two screws to open the case. Secure the half with the plug using helping hands or a similar tool.

E1-3: Take the black wire and solder it directly to the inside of the jack's frame. Ensure that the wire is threaded through the opening before soldering.

E1-4: Solder the white wire to the center solder cup of the jack. Ensure the wire is threaded through the opening before soldering.

E1-5: Slide the sleeving back up the wire toward the soldered connections. Then, use the two screws to reattach the back cover of the jack.

E1-6: Grip the two wires at the base of the jack and twist them leaving only 1/2" of each wire untwisted.



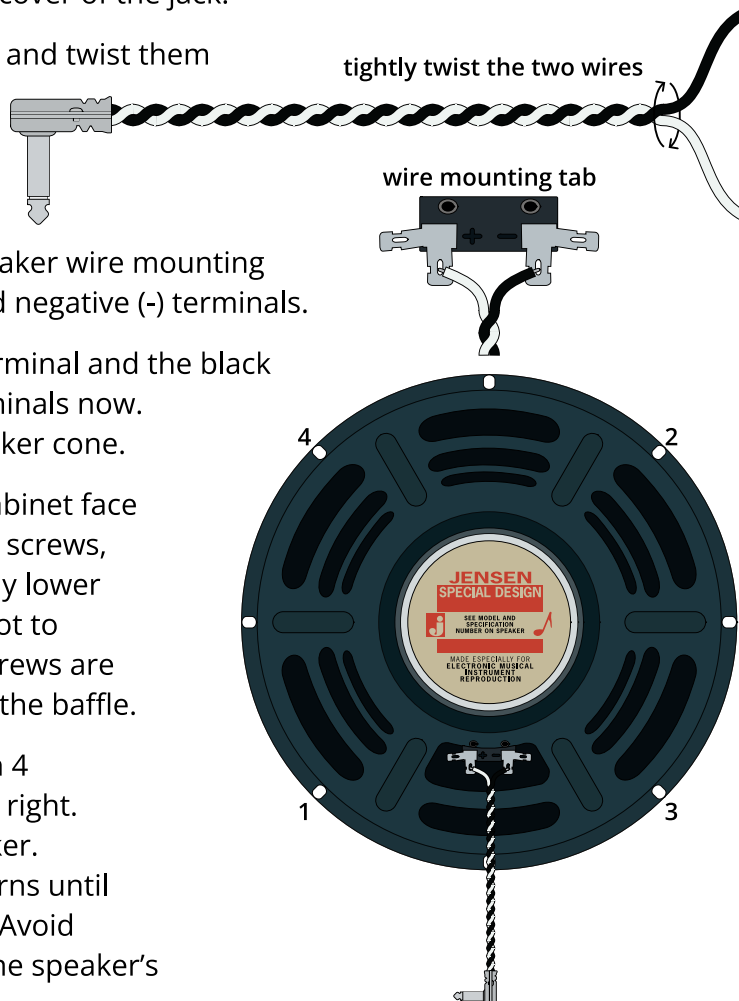
Part 2: Wiring the Speaker

E2-1: Locate the 12" 8Ω speaker used in the stock amp cabinet for the 5E3. Identify the speaker wire mounting tab. Note the orientation of the positive (+) and negative (-) terminals.

E2-2: Connect the white wire to the positive terminal and the black wire to the negative terminal. Solder both terminals now. Be careful not to drip any solder onto the speaker cone.

E2-3: Remove the back panels and place the cabinet face down. Align the speaker's holes with the baffle screws, ensuring the wire tab is at the bottom. Carefully lower the speaker onto the screws. Be very careful not to puncture the cone with the screws. Once all screws are through, lower the speaker until it's flush with the baffle.

E2-4: Attach the 6-32 Kep nuts in the 1 through 4 crisscross pattern shown on the graphic to the right. Tighten each nut until it just touches the speaker. Then go through the 1-4 sequence with half turns until the speaker is securely mounted to the baffle. Avoid over-tightening as this can negatively impact the speaker's performance.



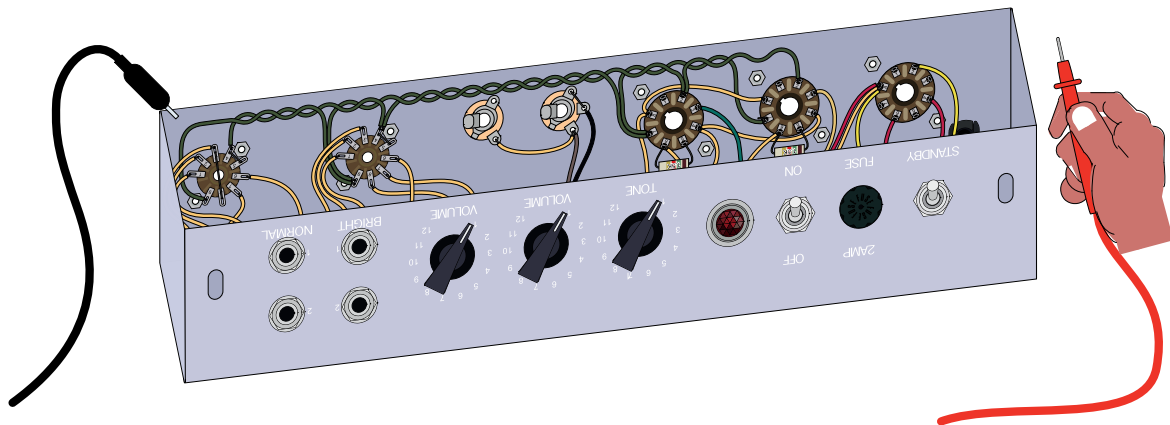
Safety

Tube amps operate at high voltages that have the potential to injure and kill. Please remember the following when working on this project.

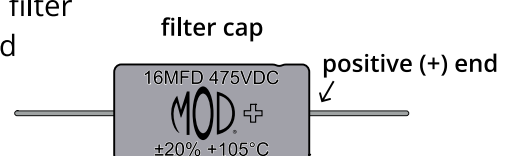
- Only work on tube amps when you are wide awake and sober.
- Do not plug the amp in until you have gone through all of the instructions, checking and rechecking each step.
- Be aware that tubes become very hot when the amp is on and can take several minutes to cool down after power is turned off.
- Work in a ventilated area when soldering.
- Always follow the one hand rule when working with an amp that is connected to power or may have voltage present. (Any amp that has been plugged in at one time, may have high voltage present)

One Hand Rule

The one hand rule is a safety precaution for working on an amp that is plugged in or could potentially have high voltages present. Use an alligator clip on the negative lead of your DMM and secure it to the chassis. With a standard 2mm probe on the positive lead, test the various points using one hand. This practice prevents a fatal shock by avoiding current passing through your heart. (Many people even put their other hand in their pocket or behind their back).



Always probe a tube amp for dangerous voltages present on the filter capacitors before working on it, even if it has been turned off and unplugged for months.



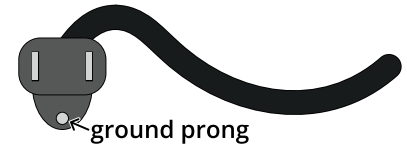
Preliminary Testing

At this stage, it's crucial to double-check and triple-check all connections, solder joints, and parts placement. It's highly recommended to review each step of the instructions to ensure all steps have been accurately completed. Incorrect wiring or misplaced components can permanently damage the amplifier. Once you are confident that the build is fully completed, you can begin preliminary testing.

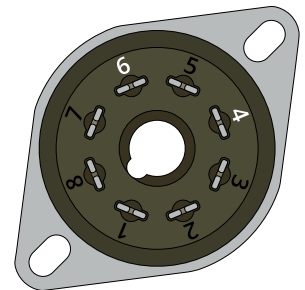
Power Transformer Verification

F1-1: If any of the test results differ from the provided information, immediately stop and unplug the amplifier. Review all connections to locate and fix the fault before proceeding further.

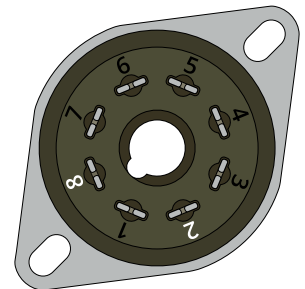
F1-2: Using the continuity test on a multimeter, check that the ground prong of the power cord has continuity with the chassis. Once verified, place the chassis in a clean work area with the open side facing down. A bench mat will help prevent slipping. The amp should be fully stable.



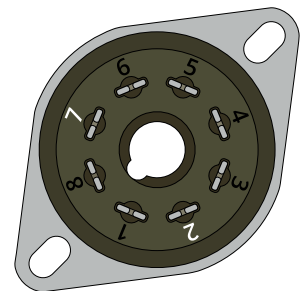
F1-3: Insert the 2A fuse into its holder. Set the multimeter to measure volts AC and attach standard 2mm pin test leads. Insert the probes into pins 4 and 6 of the rectifier's octal socket at hole 40. Make sure that the metal probes are not touching the tube clamp or one another. Flip the power switch to the off position.



F1-4: Plug the power cord into an outlet. The meter should read 0VAC but might show ~1-100mV. This is OK. Flip the power switch into the on position. The pilot light should be lit and the meter should now read ~699VAC. Flip the power switch into the off position. Unplug the amp from the outlet.



F1-5: Remove the probes from pins 4 and 6 of the rectifier's octal socket and insert them into pins 2 and 8 of the same socket. Plug the power cord into the outlet. The meter should read 0VAC. Flip the power switch into the on position. The meter should now read ~5.8VAC. Flip the power switch into the off position. Unplug the amp from the outlet.



F1-6: Remove the probes from pins 4 and 6 of the rectifier's octal socket and insert them into pins 2 and 7 of the output tube's octal socket at hole 37. Plug the power cord into the outlet. The meter should read 0VAC. Flip the power switch into the on position. The meter should now read ~6.6VAC. Flip the power switch into the off position. Unplug the amp from the outlet.

F1-7: With these tests completed, you have successfully verified proper functionality of the power transformer in your amplifier. Measuring 699VAC confirms that the AC voltage, which will be rectified into the B+, is reaching the rectifier tube. The measurement of 5.8VAC ensures that the filament voltage is properly supplied to the rectifier tube. Similarly, the 6.6VAC measurement confirms that the 6.3V filament voltage is correctly distributed. Additionally, the functionality of the 6.3V filament is further validated by the pilot light, which is powered by the same 6.3V supply as the audio tubes.

DC Voltage Testing

Remember to follow the one-hand rule when working on an amp that is plugged in or may have high voltages present. Use an alligator clip on the negative lead of your DMM and secure it to the chassis. With a standard 2mm probe on the positive lead, test the various points using one hand. This practice prevents a fatal shock by avoiding current passing through your heart.

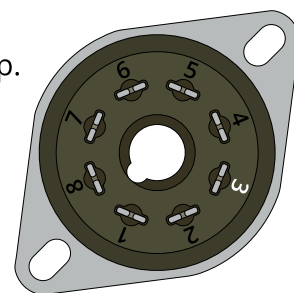
Rectifier Check

G1-1: If any of the test results differ from the provided information, immediately stop and unplug the amplifier. Review all connections to locate and fix the fault before proceeding further.

G1-2: Keep the chassis on the clean work area with the open side facing down. Switch your negative test lead to an alligator clip style lead. Secure the negative lead of the multimeter directly to the chassis. Hole 1 or 13 on panel 1 of the chassis works well for this.

G1-3: Insert the 5Y3 tube into the rectifier socket at hole 40. Make sure that the key on the tube aligns with the corresponding slot on the socket. Gently bend the clamp away from the tube and carefully insert it into place.

G1-4: Insert the positive probe of the multimeter into pin 3 of the power tube's octal socket at hole 37, ensuring the metal probe does not touch the tube clamp. Set the multimeter to measure DC volts. Plug the power cord into the outlet and then flip the power switch to the on position. Then flip the standby switch to the on position. Observe the DC voltage as it rises. It should stabilize around 490VDC. This is the plate voltage for the 6V6 output tubes. It will read high without the tube installed but will drop down to approximately 360VDC with the tubes installed.



G1-5: Flip the power switch into the off position but leave the standby on. Unplug the amp from the outlet. Leave the multimeter connected and observe the voltage. Notice how slowly it decreases; this is the charge held by the capacitors. Even though the amp is unplugged and off, dangerous voltages are still present. Be mindful of this and be sure to use the one-hand rule throughout these tests.

G1-6: Leave everything in place and allow the voltage to drop before continuing. This may take up to an hour. It should eventually settle around <5VDC.

G1-7: Carefully remove the positive probe from pin 3 of the output tube's socket. Be careful not to touch the metal retainer with the probe.

DC Voltage Test Measurements

G2-1: Flip the amplifier so the open side is facing up. Insert the 12AY7 tube into the socket at hole 26 and the 12AX7 into the socket at hole 29. The 6V6 pair goes into the octal sockets at holes 34 and 37.

G2-2: Make sure the negative lead of the multimeter is still securely connected to the metal chassis. Connect an 8 ohm speaker to the main output jack at hole 32. Always use this jack when connecting a speaker to this amp. Set the multimeter to volts DC. Plug the power cord into the outlet and turn the power then standby switches to the on position. Make sure the volume knobs are both at their lowest setting. The speaker might have a very faint 60hz hum but should otherwise be silent.

DC Voltage Testing

DC Voltage Test Measurements (cont.)

Diagram with examples voltage shown on page 51 for reference.

G2-3: Carefully measure the voltage at eyelet 33 using the positive lead of the multimeter. The meter should read approximately 21VDC.

G2-4: Carefully measure the voltage at eyelet 32 using the positive lead of the multimeter. Be prepared for the speaker to make a light popping sound when the probe makes contact with this eyelet. The meter should read approximately 370VDC.

G2-5: Carefully measure the voltage at eyelet 31 using the positive lead of the multimeter. Be prepared for the speaker to make a light popping sound when the probe makes contact with this eyelet. The meter should read approximately 325VDC.

G2-6: Carefully measure the voltage at eyelet 30 using the positive lead of the multimeter. Be prepared for the speaker to make a light popping sound when the probe makes contact with this eyelet. The meter should read approximately 240VDC.

G2-7: Carefully measure the voltage at eyelet 28 using the positive lead of the multimeter. Be prepared for the speaker to make a popping sound when the probe makes contact with this eyelet. The meter should read approximately 46VDC.

G2-8: Carefully measure the voltage at eyelet 27 using the positive lead of the multimeter. Be prepared for the speaker to make a popping sound when the probe makes contact with this eyelet. The meter should read approximately 195VDC.

G2-9: Carefully measure the voltage at eyelet 26 using the positive lead of the multimeter. Be prepared for the speaker to make a light popping sound when the probe makes contact with this eyelet. The meter should read approximately 158VDC.

G2-10: Carefully measure the voltage at eyelet 25 using the positive lead of the multimeter. The meter should read approximately 1.2-1.8VDC.

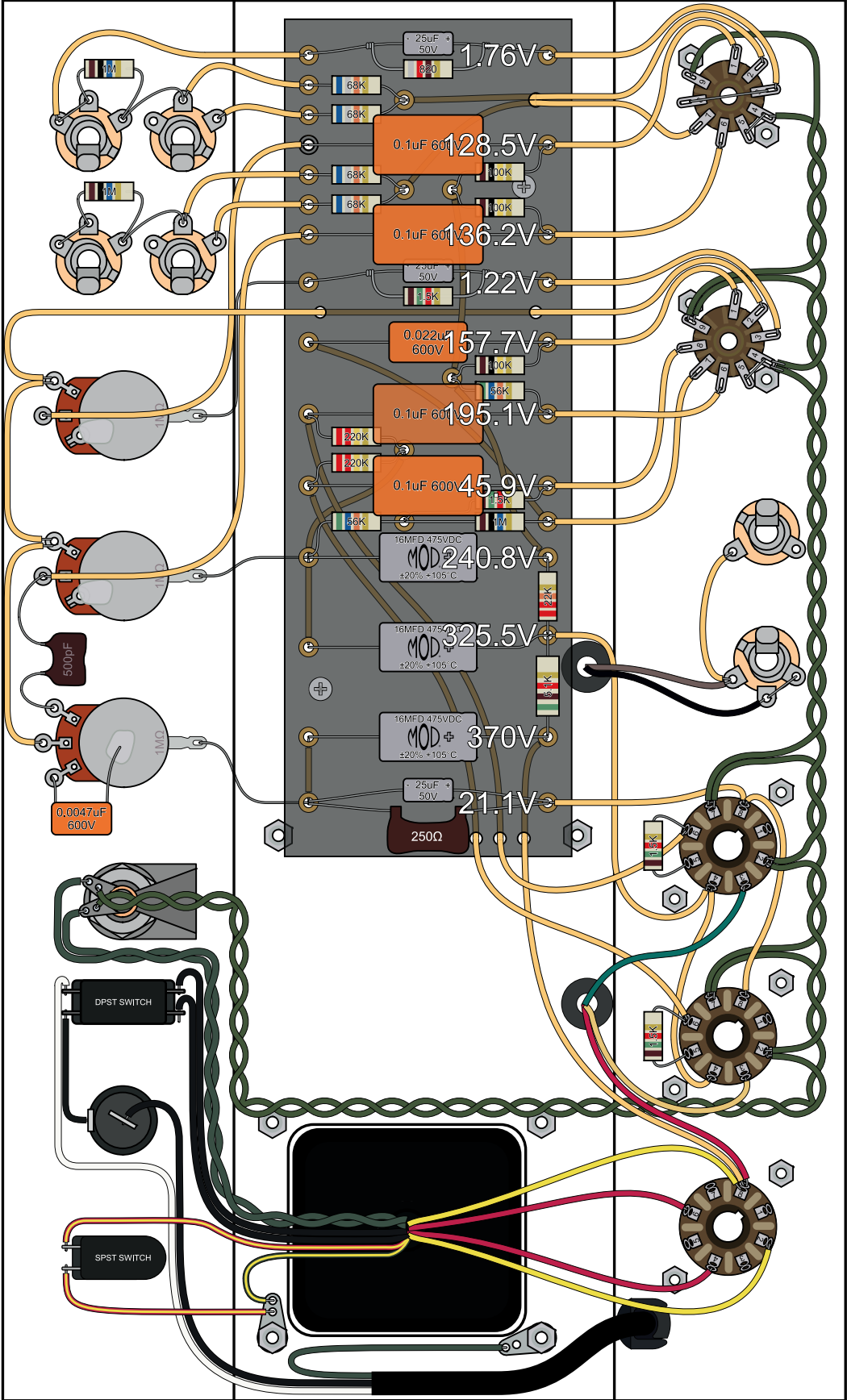
G2-11: Carefully measure the voltage at eyelet 24 using the positive lead of the multimeter. The meter should read approximately 125-140VDC.

G2-12: Carefully measure the voltage at eyelet 23 using the positive lead of the multimeter. The meter should read approximately 125-140VDC.

G2-13: Carefully measure the voltage at eyelet 22 using the positive lead of the multimeter. The meter should read approximately 1.2-1.8VDC.

G2-14: Turn the power then standby switches to the off position. Unplug the power cord.

DC Voltage Testing (example voltages)



Functionality Testing

Sound Test

H1-1: Remove the multimeter and flip the amplifier so the open side faces down. Ensure the amp is securely positioned and the speaker remains connected. Set the Tone knob between 6 and 7 and make sure that both volume controls are turned fully counter-clockwise.

H1-2: Connect a guitar to an instrument cable and plug it into the Normal 1 jack. Make sure that you have enough cable to play the guitar without pulling on the amp.

H1-3: Plug the power cord into the outlet and then turn the power switch to the on position. Then turn the standby switch to the on position. Slowly increase the volume knob closest to the jacks until the guitar can be heard clearly. This is the normal channel's volume control.

H1-4: Play around with the different levels. The amp should have fairly clean headroom at a high volume before the tube distortion kicks in. Adjust the Tone control to hear the variety of sounds it offers. Lower settings will be more muffled and bassy while higher settings will have more treble.

H1-5: Flip the standby switch to the off position. Unplug the cable from the Normal 1 jack and plug it into the Normal 2 jack. Flip the standby switch back to the on position. Play with the levels again. This should sound roughly the same as Normal 1 input but quieter. When satisfied that this input is working correctly, flip the standby switch into the off position. Turn the Normal volume fully counter-clockwise.

H1-6: Unplug the cable from the Normal 2 jack and plug it into the Bright 1 jack. Flip the standby switch to the on position. Slowly increase the middle volume knob until the guitar can be heard clearly. This is the Bright channel's volume control.

H1-7: Play around with the different levels. This channel will operate similarly to the Normal channel but with a brighter, more treble-heavy sound. The amp should have fairly clean headroom at a high volume before the tube distortion kicks in. Adjust the Tone control to hear the variety of sounds it offers. Lower settings will be more muffled and bassy while higher settings will have more treble.

H1-8: Flip the standby switch to the off position. Unplug the cable from the Bright 1 jack and plug it into the Bright 2 jack. Flip the standby switch back to the on position. Play with the levels again. This should sound roughly the same as Bright 1 input but quieter. When satisfied that this input is working correctly, flip the standby switch into the off position.

H1-9: You have now fully tested the functionality of the amplifier. Switch the power into the off position. Unplug the amp from the outlet.

H1-10: You can now install the amplifier into its cabinet. It's a good idea to remove the tubes before mounting the chassis to avoid potential damage. Allow the tubes to cool to room temperature before attempting to remove them.



Thanks for selecting a Mod® Electronics amp kit. We hope you had as much fun building this amplifier as we had designing it for you. Mod® Electronics is a small business and your support means the world to us. Learn more about what else we do at modelectronics.com. Keep rocking.

