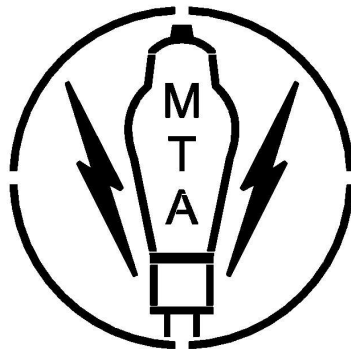


**Operating Manual  
Mellow Tone Amps  
OTL Headphone  
Power Amplifier  
v1.0**



- **Letter of Introduction**
- **Warnings**
- **Features & Specifications**
- **Operating Guide**
- **Full Frequency Sweep**
- **Power Supply Schematic**
- **Power Amp Schematic**
- **Parts List**
- **Hardware, Wire & Heat Shrink List**
- **Troubleshooting**
- **Addendum (Important! Download Current Version)**

Date\_\_\_\_\_

Purchaser\_\_\_\_\_

Product **OTL Headphone Power Amplifier**

Serial No **1.0** – \_\_\_\_\_

Thank You for choosing the **OTL Headphone Power Amp!** Please take the time to go over the Operating Manual and if building the Kit version, watch the build videos - YouTube - Mellow Tone Amps.

Should you have a question, problem or just need a kick in the pants, feel free to send us an email [mellowtoneamps@protonmail.com](mailto:mellowtoneamps@protonmail.com)

Our Prime Objective is to build a SIMPLE, but GREAT sounding Low Output Impedance OTL Headphone Power Amplifier.

But never forget the SECOND Objective – which is to have FUN!

If at some point you're getting tired and making mistakes or NOT having Fun, put down the soldering iron (turn it off) and walk away from the work bench. I guarantee you'll come back to it FRESHER and ready to do your best work!

Cheers,

James (Jim) Lambton, President  
Mellow Tone Amps Ltd.

**!!!WARNING!!!**  
**Please actually read this!**

**Tube amplifiers can have very high heat and voltages present. Which are fire, burn, and shock hazards. Use extreme CAUTION when working around them. Read and carefully follow the recommendations in this build manual.**

**If you are unsure of how to operate this amplifier safely, please contact the manufacturer at [mellowtoneamps@protonmail.com](mailto:mellowtoneamps@protonmail.com)**

**Caution!!! Capacitors can hold a LETHAL charge, ALWAYS discharge them before working on any Electronic Equipment**

**DO NOT operate the amplifier in an enclosed space. Or with a DAMAGED, CLOGGED, or INOPERATIVE Cooling Fan.**

**Never use the amplifier with a damaged power cord.**

**Do not operate the amplifier in moist or wet conditions.**

**Do not operate the amplifier if chassis is open or damaged.**

**CAUTION! High volume can cause hearing damage!!!  
Always turn the volume to zero before powering on the amplifier.**

**Do not place flammable items on or around the amplifier.**

**Do not operate the amplifier without adult supervision if small children or pets are present.**

**Never leave the amplifier ON and Unattended.**

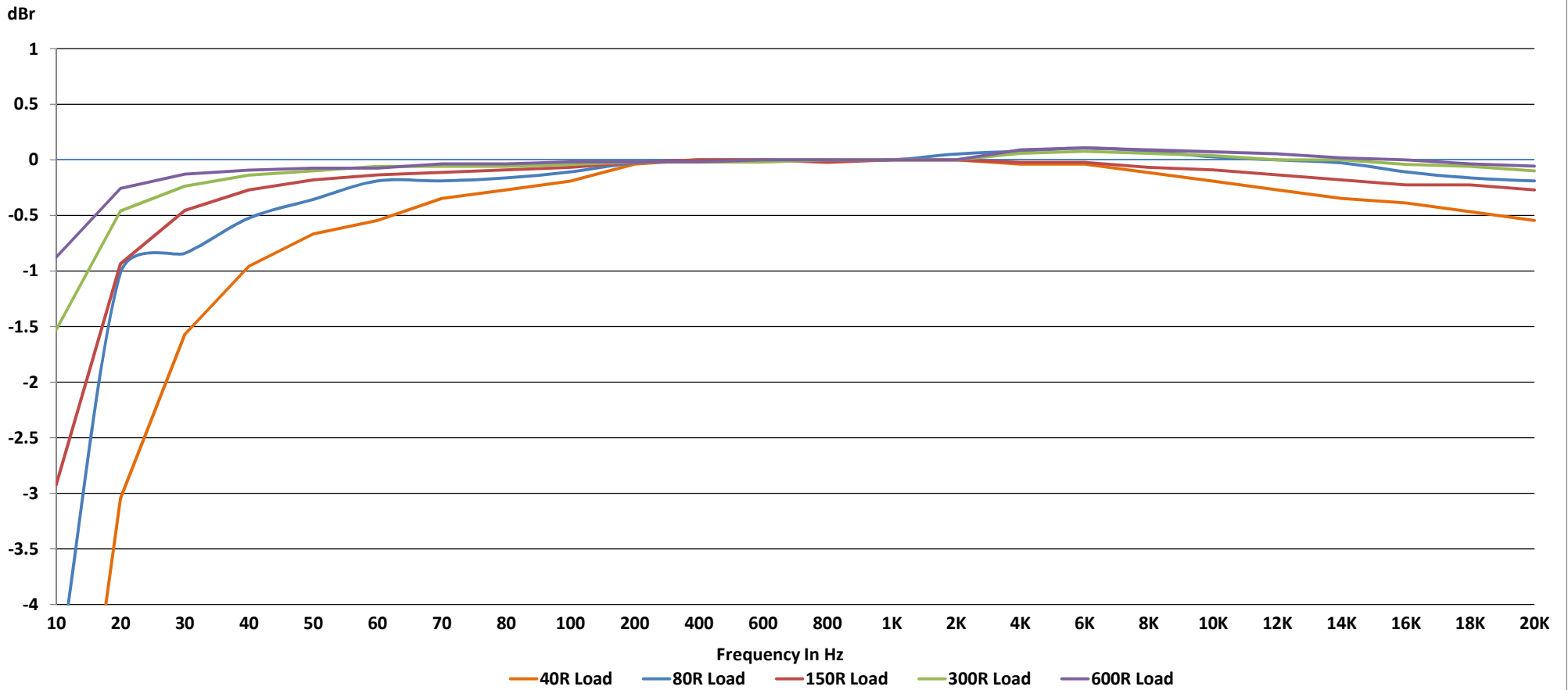
**Never use tubes that are damaged, untested, unknown, or not listed as compatible in the manual.**

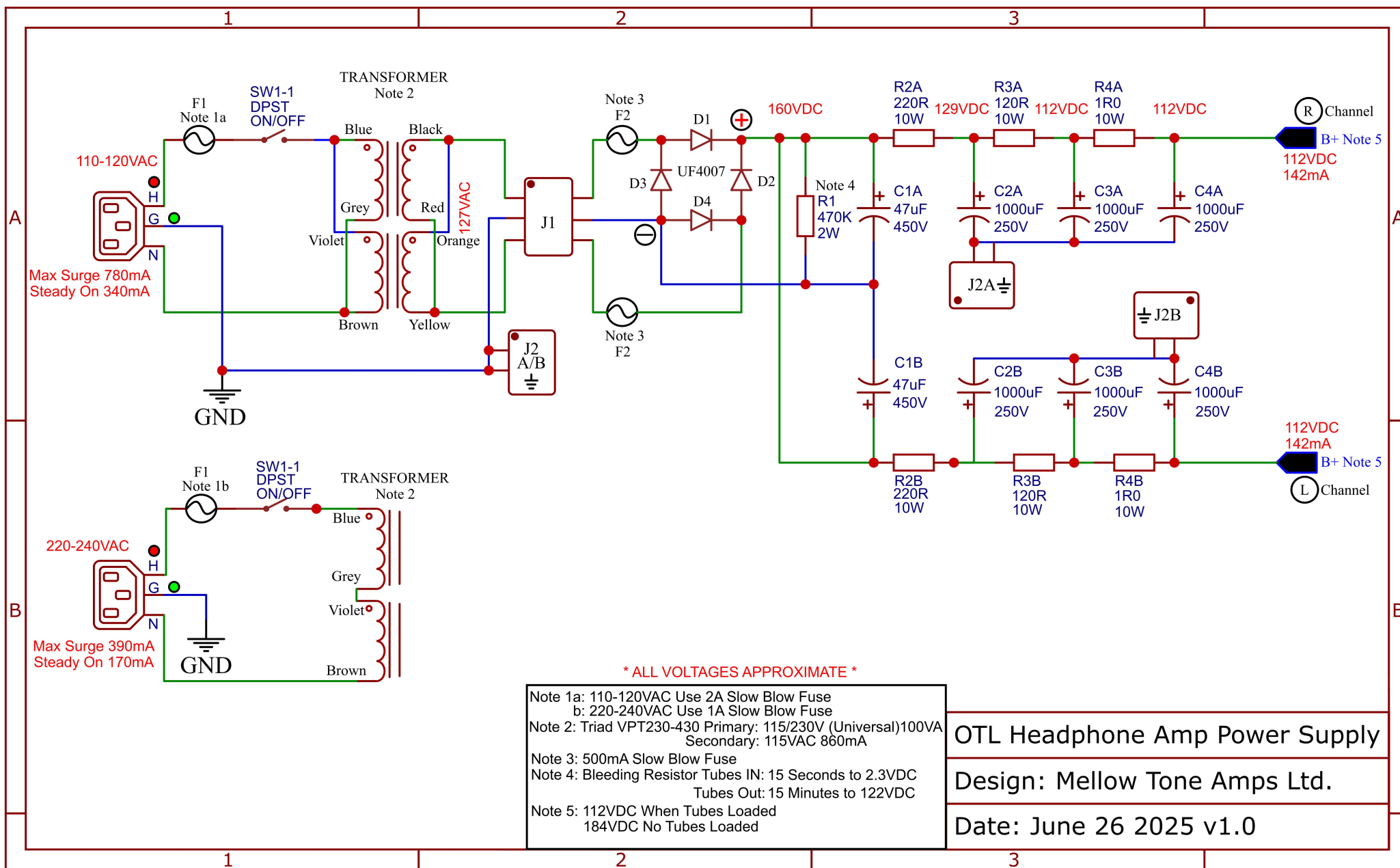
**If significant smell, sparks, heat, or flames are present.  
Unplug immediately.**

Features & Specifications		V1.0	July 22/25	
<ul style="list-style-type: none"> <li>• Universal Power Transformer (110Vac – 240Vac)</li> <li>• Capacitor Filtered Quasi Dual Mono Power Supply</li> <li>• Fuse Protection On Transformer Primary &amp; Secondary</li> <li>• External 6Vdc 8A SMPS Filament Supply Required</li> <li>• Single Pair of RCA Input Jacks</li> <li>• Quality 1/4" / 6.35mm Stereo Headphone Output Jack</li> <li>• Active Cooling With Optimized Airflow &amp; Ultra Quiet Noctua Cooling Fan</li> <li>• Large Variety Of Compatible V1/V2 Power Tubes</li> <li>• Headphone Impedance From 80 Ohm to 600 Ohm</li> <li>• Extremely Low Noise Floor</li> <li>• High Output Power</li> <li>• Easy To Solder Dual Sided PCB With 2oz Copper Traces</li> <li>• "Sandwich" Construction For High Rigidity</li> <li>• Ultra Short Signal Paths</li> <li>• Pure Power Amplifier, No Gain Is Applied</li> </ul>				
<b>Compatible Tubes</b>		6AS7 / 6080 / 6N13S		
<b>Tubes Used In Testing</b>		Svetlana 6N13S		
<b>Signal To Noise Ratio</b>		61 dB @ 1Khz		
<b>Input Impedance</b>		47 Kohm	<b>Output Impedance</b>	
			70 Ohm	
<b>Power Consumption</b>				
<b>Amplifier = 40 W</b>			<b>SMPS = 30 W</b>	
<b>Input Sensitivity @ 1Khz Into 150 Ohm Load</b>				
<b>Input Voltage</b>			<b>Output Power</b>	
24.2 Vrms			0.54 Wrms	
<b>Input Signal Required For Normal Listening Level</b>				
80 Ohm 96dB Efficient Headphones			0.16 Vrms	
150 Ohm 104dB Efficient Headphones			0.065 Vrms	
<b>THD (Total Harmonic Distortion) @ 1Khz Into 150 Ohm Load</b>				
2nd Harmonic			0.091% / -61.3 dBr	
Noise Floor			0.013% / -77.5 dBr	
<b>Frequency Response</b>				
Load Impedance	Full (20Hz-20Khz)	Low (20Hz)	Mid (1Khz)	High (20Khz)
40 Ohm	+0.00 / -3.04 dB	-3.04 dB	0.00 dB	-0.55 dB
80 Ohm	+0.11 / -1.67 dB	-1.67 dB	0.00 dB	-0.19 dB
150 Ohm	+0.00 / -0.93 dB	-0.93 dB	0.00 dB	-0.27 dB
300 Ohm	+0.08 / -0.46 dB	-0.46 dB	0.00 dB	-0.10 dB
600 Ohm	+0.11 / -0.26 dB	-0.26 dB	0.00 dB	-0.05 dB

Operating Guide	V1.0	July 22/25
<b>First Steps</b>	<ol style="list-style-type: none"> <li>1. Break in tube sockets with dummy tube if you have one.</li> <li>2. Carefully install tubes in sockets,</li> <li>3. Plug in power cord &amp; 6V 8A DC Switchmode Power Supply.</li> <li>4. Plug in RCA inputs and 1/4" / 6.35mm headphones.</li> <li>5. Turn on power switch.</li> <li>6. Let the amplifier warm up for 1 minute.</li> <li>7. Set Volume to Zero, turn on the rest of your system.</li> <li>8. Watch for sparks, smoke, fire, and great sound (only partly joking).</li> <li>9. Check for noise with volume of preceding preamp or DAC set to zero</li> <li>10. If all good, it's time to listen.</li> </ol>	
<b>Sound Shaping</b>	<p>Tube rolling in V1 &amp; V2 gives you the option to significantly change the sonics of your OTL Headphone Power Amplifier. The 6AS7 tube type was made all over the world and so there are a huge variety available to choose from.</p> <p>And as we all know, <b>“The Tubes Are The Amplifiers!”</b></p>	
<b>Pro Tips</b>	<ul style="list-style-type: none"> <li>• Locating your Audio Equipment away from electronic noise will reduce your total noise floor.</li> <li>• This is an extremely sensitive power amplifier, ensure you are using a low noise preamp or DAC to drive it.</li> <li>• Don't drop your tubes, it will annoy them (They will get all bent out of shape). And if you're really unlucky, they will break.</li> <li>• Don't use junk, untested, or incompatible tubes. (See First Steps #8 for possible results).</li> <li>• Use quality RCA patch cords, not coat hangers. (Quality cables do not require a dump truck full of cash, just don't buy the cheapest).</li> <li>• Ensure the area over, under, around, and behind the amplifier stay clean &amp; clear to allow for good airflow.</li> <li>• If you have a pet that sheds, inspect and clean the cooling fan regularly.</li> </ul>	
<b>Cleaning</b>	<ol style="list-style-type: none"> <li>1. Switch off and unplug power cord and SMPS.</li> <li>2. Carefully remove tubes. (Place them somewhere safe).</li> <li>3. Use only 99% Isopropyl alcohol and a clean micro fibre cloth.</li> <li>4. Apply alcohol <u>sparingly</u> to micro fibre cloth and wipe down any surfaces that need to be cleaned, while avoiding the edges of the top and bottom plates. And avoid cleaning the label on the bottom.</li> <li>5. To clean dust, carefully vacuum vent holes and fan blades. If dust is persistent then use compressed air or blower followed by a vacuum.</li> </ol>	
<b>Replacing Primary Fuse</b>	<ol style="list-style-type: none"> <li>1. Switch off and unplug power cord and SMPS.</li> <li>2. Use mini slot screw driver, remove fuse holder from IEC power inlet.</li> <li>3. Spare fuse may be in the holder, if not refer to bottom label for correct fuse.</li> <li>4. Replace and re-install fuse holder in IEC power inlet.</li> </ol>	

### OTL Headphone Power Amplifier v1.0 Full Frequency Sweep





\* ALL VOLTAGES APPROXIMATE \*

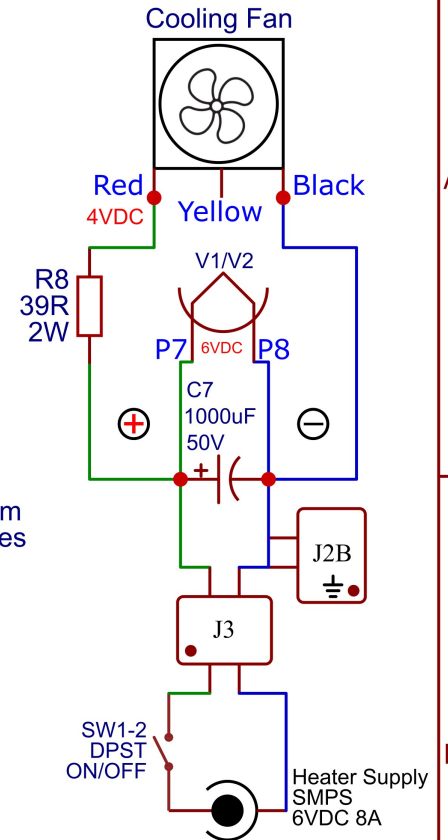
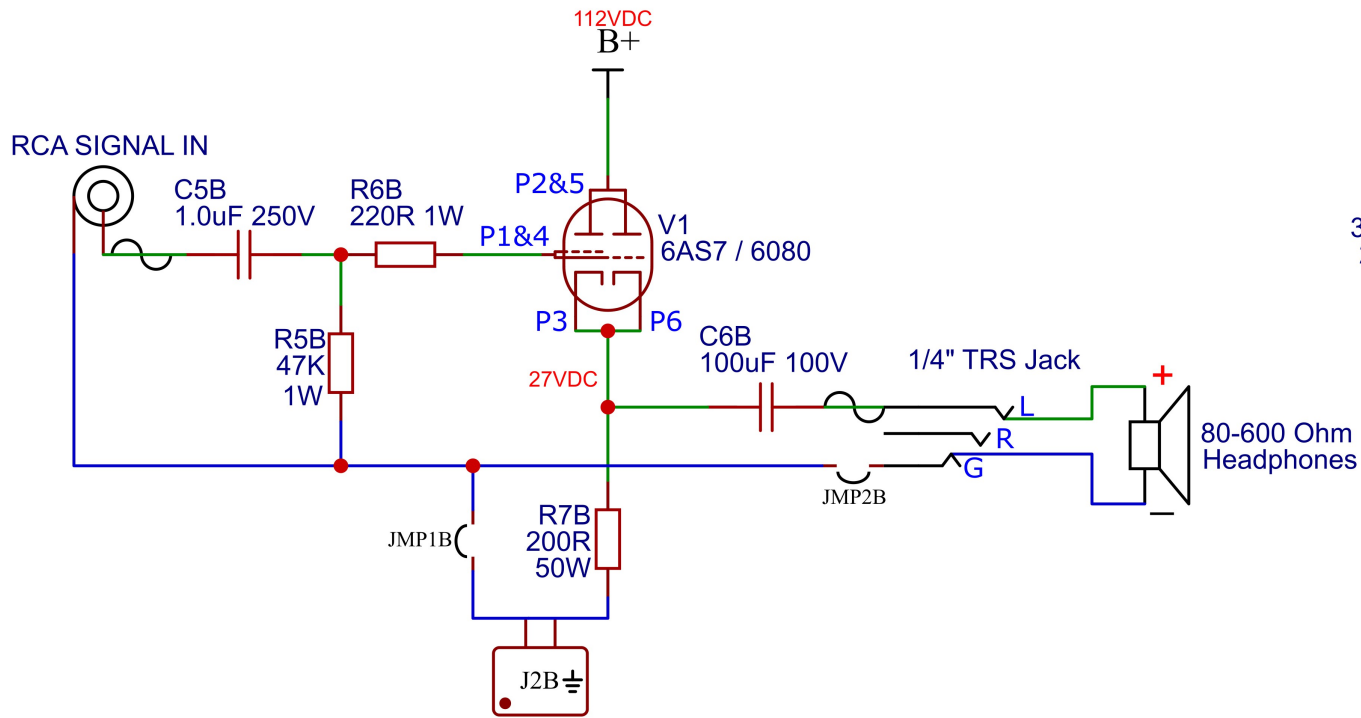
Note 1a: 110-120VAC Use 2A Slow Blow Fuse  
 b: 220-240VAC Use 1A Slow Blow Fuse  
 Note 2: Triad VPT230-430 Primary: 115/230V (Universal)100VA  
 Secondary: 115VAC 860mA  
 Note 3: 500mA Slow Blow Fuse  
 Note 4: Bleeding Resistor Tubes IN: 15 Seconds to 2.3VDC  
 Tubes Out: 15 Minutes to 122VDC  
 Note 5: 112VDC When Tubes Loaded  
 184VDC No Tubes Loaded

OTL Headphone Amp Power Supply

Design: Mellow Tone Amps Ltd.

Date: June 26 2025 v1.0

## One (Left) Channel Shown



\* All Voltages Approximate \*

OTL Headphone Power Amp

Design: Mellow Tone Amps Ltd.

Date: June 26 2025 v1.0

Right Channel Marked With A Suffix On PCB  
 Left Channel Marked With B Suffix On PCB  
 Example: R2A = R2 Right Channel  
 Example: C2B = C2 Left Channel

	<b>Qty</b>	<b>Power Supply</b>	<b>Description</b>	<b>Product Number / Value</b>	<b>Plan No.</b>
	1	Triad Torodial	pri: 115v/230v sec: 0-115v 860mA	VPT230-430	
	1	Transformer Cover	black (box + lid)		
	1	IEC Inlet	c/w fuse		
	1	Switch	DPST (on-off x 2)	1221s	SW1
	1	Fan	Noctua 5vdc (operating at ~4vdc)	NF-A4X20	
	1	Resistor	metal film 1%	39r 2w	R8
	1	PCB	circuit board	v1.0 April 2025	
	1+1	Fuse (1 spare incl)	Slow Blow x 20mm (120Vac/230Vac)	2A/1A	F1
	2	Fuse	Slow Blow x 20mm	500mA	F2
	4+1	Diode	1A 1000V	UF4007	D1-D4
	2	Capacitor	radial	47uF 450v	C1
	6	Capacitor	snap in (d30 x h40mm)	1000uF 250v	C2-4
	1	Capacitor	radial	1000uf 50v	C7
	1	Resistor	metal film 1%	470k 2w	R1
	2	Resistor	RX21 5%	220r 10w	R2
	2	Resistor	RX21 5%	120r 10w	R3
	2	Resistor	RX21 5%	1r0 10w	R4
	<b>Qty</b>	<b>Amplifier</b>	<b>Description</b>	<b>Product Number / Value</b>	<b>Plan No.</b>
	2	socket	ceramic - pcb type	8 pin octal	
	2	RCA female jacks	high quality isolated ground	red=right IN white=Left IN	
	1	1/4" Jack	long shaft	stereo	TRS Jack
	1	DC female jack	metal housing (grounded)		
	2	Capacitor	MPET, Vishay MKT 1813	1.0uF 250v	C5
	2	Capacitor	MKTA-E, Bevenbi	100uF 100v	C6
	2	Resistor	metal film 1%	47k 1w	R5
	2	Resistor	metal film 1%	220r 1w	R6
	2	Resistor	RX24 type alum encased wire wound	200r 50w	R7
	2	Bracket (RX24)	aluminium (1.0 x 1.5 x 2.0")		
	1	PCB	Top Plate		
	1	PCB	Bottom Plate		
	1	PCB	Front Plate		
	1	PCB	Back Plate		
	2	PCB	Side Plates		
	2	Bracket (Capacitor)	3D Printed ASA Black	C6 Holder	
	4	Corner Blocks	3D Printed ASA Black		
	2	RCA Spacers	3D Printed ASA Black		
	4	Feet	3D Printed ASA Black		
	2	Tool-RCA Jack Holder	3D Printed ASA Black	2x Flat RCA	
	1	Transformer Mount	3D Printed ASA Black		

Qty	Hardware	Product Number / Position	Notes
4	O-ring nitrile 5x14x24mm		
3+1	brass standoff - male/female	12mm	
8	brass standoff - female/female	53mm	
2	pcb fuse holders		including covers
1	terminal block - blue 3p x 5.08mm	J1	
3	terminal block - blue 2p x 5.08mm	J2A,B J3	
1	fan pin connector - 3p x 2.54	fan	
2	aligator clips - medium (35mm)		check for red & black
1+1	female spade - med (3/16")		no clear plastic sleeves
4+1	m3 ring terminal		
2	machine screw m3 x 5mm flat hd	thin flat head type	fuse holder
2	machine screw m3 x 8mm flat hd	black	IEC
4	machine screw m3 x 8mm flat hd	stainless	capacitor holder
20+2	machine screw m3 x 8mm truss hd		
8+1	machine screw m3 x 10mm truss hd		feet & aluminium bracket
24+2	machine screw m3 x 16mm HEX truss hd		
4	machine screw m4 x 10mm flat hd	black	cover lid
4	machine screw m4 x 12mm truss hd		cover to top
16+2	square nut m3		
8+1	flange nut x m3		
2+1	nylock nut m3		
4+1	lock washer m3	inside teeth	
2+2	zip ties 2.75mm x 8"		
1	3M scrubber 2 x 2"		
Qty	Wire & Shrink	Product Number / Position	Notes
4"	hookup wire – bare buss	22awg solid	
2"	hookup wire – bare buss	16awg solid	
16"	hookup wire – yellow	18awg stranded (run straight)	
10"	hookup wire - black	18awg solid	
24"	hookup wire – yellow/green	18awg stranded	
9"	hookup wire - red	18awg stranded	
6"	heat shrink - red	2.4mm	
3"	heat shrink - black	3.2mm	
3"	heat shrink - white	3.2mm	
8"	heat shrink - red	3.2mm	
4"	heat shrink - yellow	3.2mm	
1.25"	heat shrink - black	7.9mm	
2.5"	heat shrink - black	10.0mm (flat)	

<b>Troubleshooting</b>		<b>!!!CAUTION HIGH VOLTAGE PRESENT!!!</b>	<b>V1.0</b>	<b>July 22/25</b>
<b>Issue:</b>	<b>Resolution:</b>			
<b>Amp Does Not Turn On</b>	<ul style="list-style-type: none"> <li>• Check power cord is undamaged and connected at both ends.</li> <li>• Check filament SMPS is plugged in at both ends and blue light is on.</li> <li>• If still not turning on and power light on rear of amplifier is unlit while SMPS light is on then you may need to replace the main fuse. Disconnect power cord, SMPS, and remove the fuse from the back, test and replace. (2A Slow Blow For 110-120 Vac, 1A Slow Blow For 220-240 Vac) Note: Fuses can wear out over time!</li> <li>• If issue unresolved, internal 500mA fuses may need to be replaced and the amp should be brought to a professional for servicing to identify the reason the fuses blew.</li> </ul>			
<b>No Sound</b>	<ul style="list-style-type: none"> <li>• Check the amplifier is powered on.</li> <li>• Check RCA cables are connected to input RCA jacks and source.</li> <li>• Ensure 1/4" / 6.35mm headphone plug is properly connected at both ends and that the cable is undamaged.</li> <li>• Ensure tubes are lamping (glow from filaments). If no glow, check if SMPS is correct voltage and current rating (6V 8A) and use a multimeter to check for correct DC voltage present at DC jack.</li> <li>• Re-seat the tubes, clean the pins if signs of oxidization are present.</li> <li>• Replace tubes with known good ones.</li> <li>• If unresolved, bring amp in for servicing.</li> </ul>			
<b>Noise</b>	<ul style="list-style-type: none"> <li>• Make sure your IEC ground is undamaged.</li> <li>• Test other components in system individually to narrow down the source of the noise.</li> <li>• Wireless sources such as Phones, Bluetooth, and WIFI may introduce electronic noise if placed close to the amplifier. Power off these devices or move them further away to see if the noise is reduced.</li> <li>• Ensure all audio cables and RCA jacks are clean and not oxidized. Clean with electrical contact cleaner if necessary.</li> <li>• Ensure tube pins and socket receivers are clean and making good electrical contact.</li> <li>• Replace tubes one at a time with known good tubes and try to identify which tube is noisy.</li> <li>• If unresolved, bring amp in for servicing.</li> </ul>			
<b>Distorted Sound</b>	<ul style="list-style-type: none"> <li>• Ensure compatible tubes are being used.</li> <li>• Ensure compatible headphones are being used.</li> <li>• Ensure music source is capable of providing adequate input signal voltage.</li> <li>• Ensure headphones and cables are undamaged.</li> </ul>			
<b>Smoke, Smell, Fire</b>	<ul style="list-style-type: none"> <li>• Unplug the amplifier and bring in for servicing.</li> </ul>			
<b>Music Sounds Bad</b>	<ul style="list-style-type: none"> <li>• Get better music.</li> </ul>			

**Changes to the Build, Schematic, Parts, or Important Information Supplemental to the Build Manual and YouTube Build Series are located here.**

**Note: Always download the  
latest Addendum sheet  
available at [mellowtoneamps.ca](http://mellowtoneamps.ca)  
under the download section for  
your amplifier.**