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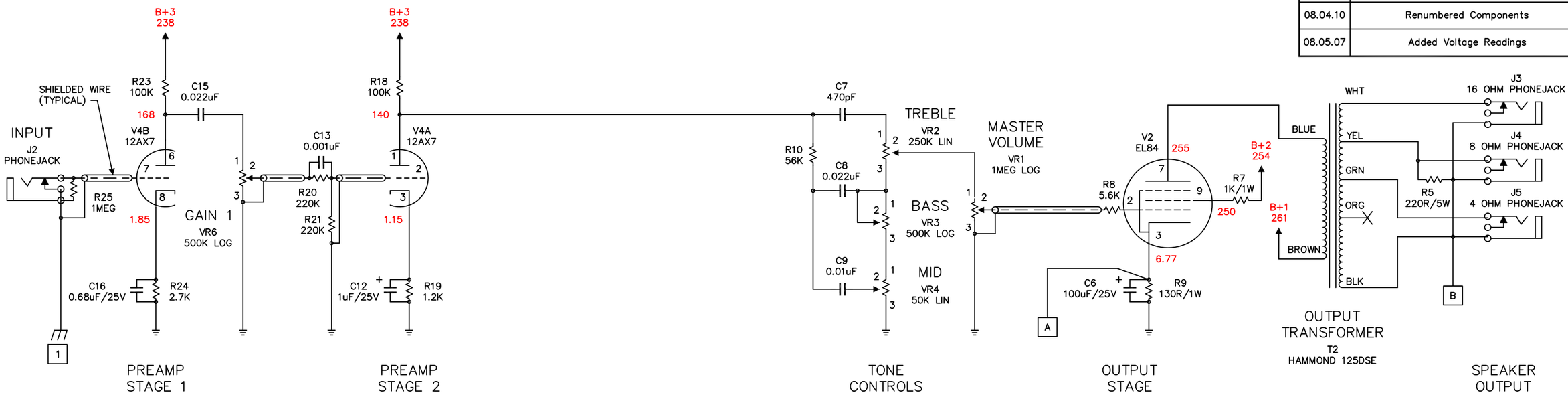
CAPACITOR, DIODE, RESISTOR, POT. AND TUBE NUMBERING NOTE:

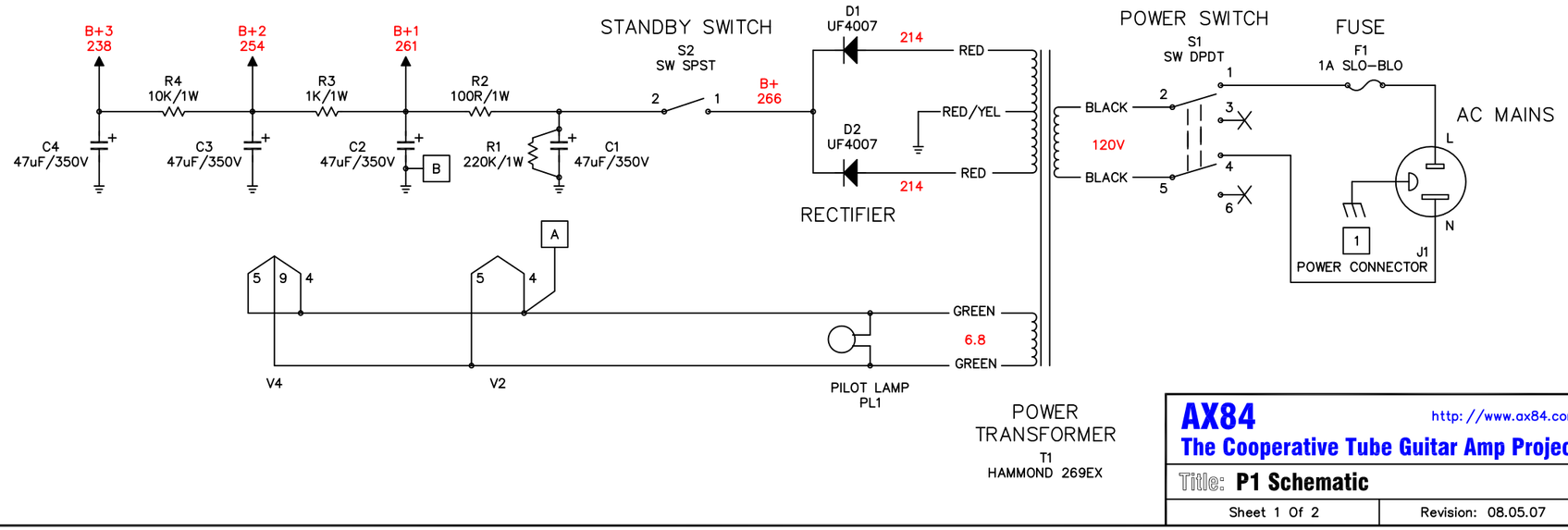
GAPS HAVE BEEN LEFT IN THE CAPACITOR, DIODE, RESISTOR, POTENTIOMETER, AND TUBE NUMBERING IN ORDER TO MAINTAIN CONSISTENCY BETWEEN THE P1, HIGH OCTANE, AND P1 EXTREME AMPS. A MISSING COMPONENT INDICATES THAT IT IS NOT USED ON THAT AMP, BUT IS USED ON ANOTHER.

RADIO NOISE NOTE:

IN THE UNLIKELY EVENT YOUR AMP STARTS PICKING UP RADIO STATIONS, YOU CAN INSTALL A GRID RESISTOR ON PIN 7 OF V4B. THE VALUE SHOULD BE BETWEEN 10K AND 68K. THE HIGHER THE VALUE, THE LESS RADIO NOISE AND THE LOWER THE VALUE, THE LESS POWER SUPPLY NOISE.

Revision	Description
06.02.23	Previous Issue
08.03.13	Renumbered Components Removed 1st Stage Grid Resistor Changed C15 To 0.68uF And R21 To 2.7K Changed R17–18 To 220K & C13 To 0.001uF Changed VR6 To 500K LOG Changed R18 To 1.2K Changed R9 To 56K Changed C8 To 0.01uF Changed VR3 To 500K LOG Changed VR4 To 50K LIN Added R5 Removed Parallel Octal Socket Changed D1 & D2 To UF4007 Changed R8 To 130R
08.04.10	Renumbered Components
08.05.07	Added Voltage Readings



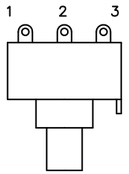


AX84 http://www.ax84.com

The Cooperative Tube Guitar Amp Project

Title: **P1 Schematic**

Sheet 1 Of 2 | Revision: 08.05.07



01 **POTENTIOMETER PINOUTS - TOP VIEW**

Revision	Description
06.02.23	Previous Issue
08.03.13	Renumbered Components Removed 1st Stage Grid Resistor Changed C15 To 0.68uF And R21 To 2.7K Changed R17–18 To 220K & C13 To 0.001uF Changed VR6 To 500K LOG Changed R18 To 1.2K Changed R9 To 56K Changed C8 To 0.01uF Changed VR3 To 500K LOG Changed VR4 To 50K LIN Added R5 Removed Parallel Octal Socket Changed D1 & D2 To UF4007 Changed R8 To 130R
08.04.10	Renumbered Components
08.05.07	Added Voltage Readings

GENERAL NOTES:

1. ALL RESISTORS 1/2W MINIMUM UNLESS OTHERWISE NOTED.

2. ALL COUPLING CAPACITORS 250V OR GREATER.

3. 47uF/350V ELECTROLYTIC POWER SUPPLY CAPACITOR VALUES/VOLTAGES ARE NOT CRITICAL. SUGGESTED VALUES: 20–50uF AT 350–500V.

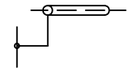
4. THE HAMMOND 269EX POWER TRANSFORMER IS USED IN THIS AMP. IT MAY BE REPLACED BY UNITS WITH THE FOLLOWING SPECIFICATIONS:

   180–0–180V @ 65mA OR MORE SECONDARY B+ TAPS
   6.3V @ 2.5A OR MORE FILAMENT TAPS

5. THE HAMMOND 125DSE OUTPUT TRANSFORMER IS USED IN THIS AMP. IT MAY BE REPLACED BY UNITS WITH THE FOLLOWING SPECIFICATIONS:

   SINGLE–ENDED OUTPUT
   4000–5000 OHM PRIMARY IMPEDENCE
   70mA OR MORE MAXIMUM D.C. BIAS
   4, 8, AND 16 OHM SECONDARY TAPS

6. SHIELDED WIRE, AS WELL AS THE SHIELD'S TIE TO GROUND, IS SHOWN IN THIS MANNER ON THE SCHEMATIC:



7. IF YOU HAVE MAINS VOLTAGES OF 200VAC OR ABOVE, YOU SHOULD USE HAMMOND'S 3XX SERIES TRANSFORMERS INSTEAD OF THE 2XX SERIES SHOWN. THE 369EX SHOULD REPLACE THE 269EX, THE 370DX REPLACES THE 270DX, AND THE 370EX RE–PLACES THE 270DX.

CONSTRUCTION NOTES:

1. THIS IS A GROUND CONNECTION TO THE CHASSIS. THE MAINS SAFETY CONNECTION SHOULD BE MADE AS CLOSE AS POSSIBLE TO THE POINT WHERE AC ENTERS THE CHASSIS. THE CIRCUIT CONNECTION SHOULD BE MADE AS CLOSE AS POSSIBLE TO THE INPUT JACK. IDEALLY, THE JACK ITSELF SHOULD BE USED AS THE CONNECTION POINT BY NOT ISOLATING IT FROM THE CHASSIS.

AX84 http://www.ax84.com
The Cooperative Tube Guitar Amp Project

Title: **P1 Detail Sheet**

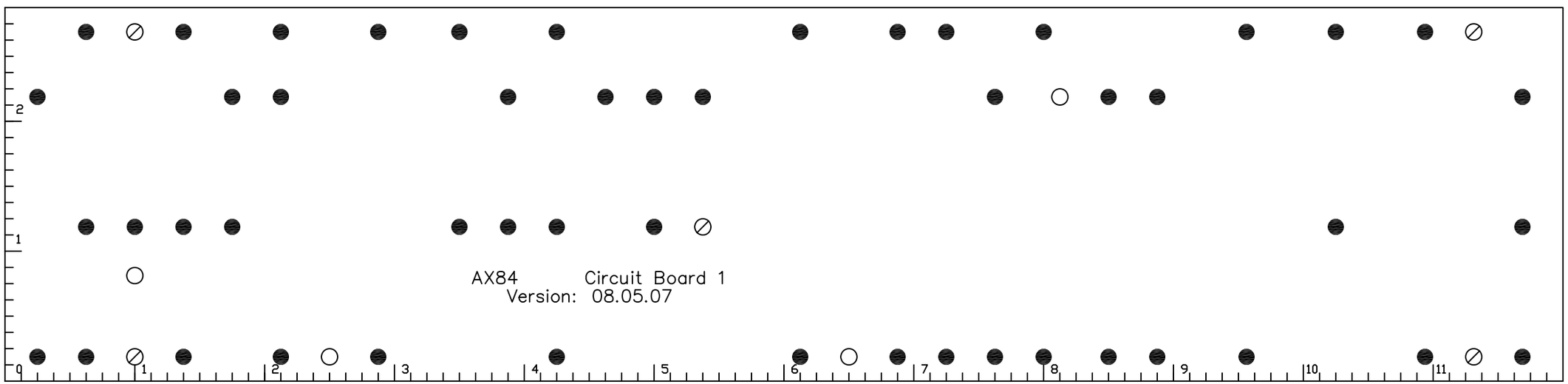
AX84 P1 Amplifier BOM

Revision: 08.05.07

NOTE: Parts for options are not included on this bill of materials.

Item	Quantity	Reference	Value
1	4	C1, C2, C3, C4	47uF/350V
2	0	C5	Not Used
3	1	C6	100uF/25V
4	1	C7	470pF
5	2	C8, C15	0.022uF
6	1	C9	0.01uF
7	0	C10, C11	Not Used
8	1	C12	1uF/25V
9	1	C13	0.001uF
10	0	C14	Not Used
11	1	C16	0.68uF/25V
12	1	R1	220K/1W
13	1	R2	100R/1W
14	2	R3, R7	1K/1W
15	1	R4	10K/1W
16	1	R5	220R/5W
17	0	R6	Not Used
18	1	R8	5.6K
19	1	R9	130R/1W
20	1	R10	56K
21	0	R11, R12, R13, R14, R15, R16, R17	Not Used
22	2	R18, R23	100K
23	1	R19	1.2K
24	2	R20, R21	220K
25	0	R22	Not Used
26	1	R24	2.7K
27	1	R25	1 Meg
28	1	F1	1A SLO-BLO
29	1	FH1	Fuse Holder
30	1	J1	Power Connector
31	4	J2, J3, J4, J5	Phonejack
32	4	JW1, JW2, JW3, JW4	Phonejack Isolation Washer (if needed)
33	1	S1	SW DPDT
34	1	S2	SW SPST
35	2	D1, D2	UF4007
36	1	PL1	Pilot Lamp Assembly And Bulb
37	1	T1	Hammond 269EX
38	1	T2	Hammond 125DSE
39	2	SK2, SK4	9 Pin Tube Sockets
40	1	V2	EL84
41	1	V4	12AX7
42	1	VR1	1Meg LOG
43	1	VR2	250K LIN
44	2	VR3, VR6	500K LOG
45	1	VR4	50K LIN

46	5	K1, K2, K3, K4, K6	Knobs
47	1	CH1	Chassis


AX84 Circuit Board 1
Version: 08.05.07
0
1
2
3
4
5
6
7
8
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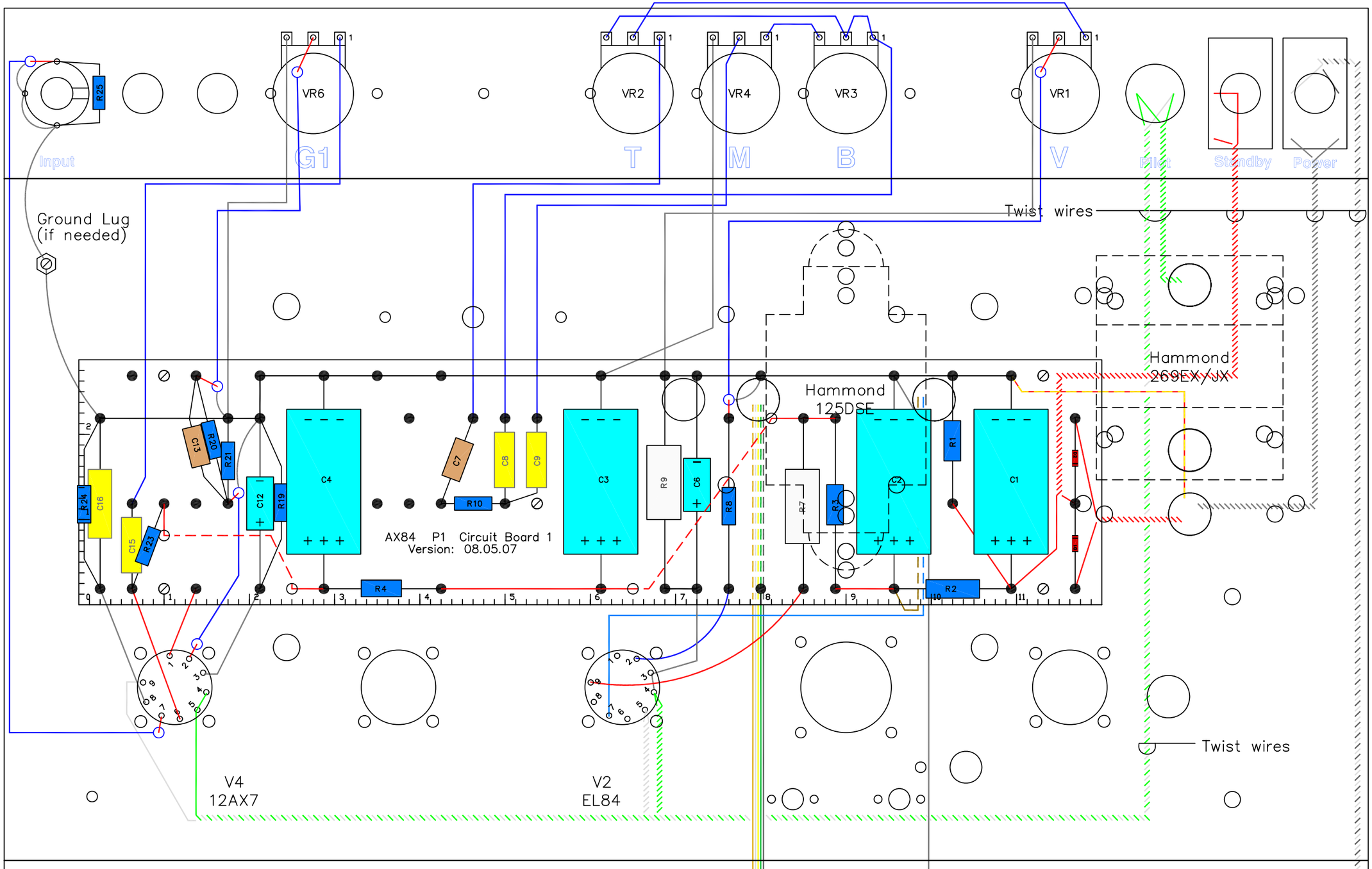
10
11
1
2

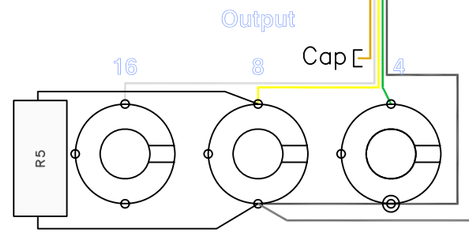


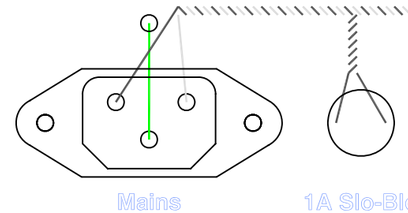
AX84 P1 Chassis Layout

Version: 08.05.07

AX84 Kit Chassis 1

Version: 08.05.07





The P1 Options Guide

08.04.10

Hours of fun and frustration with your AX84 amp.

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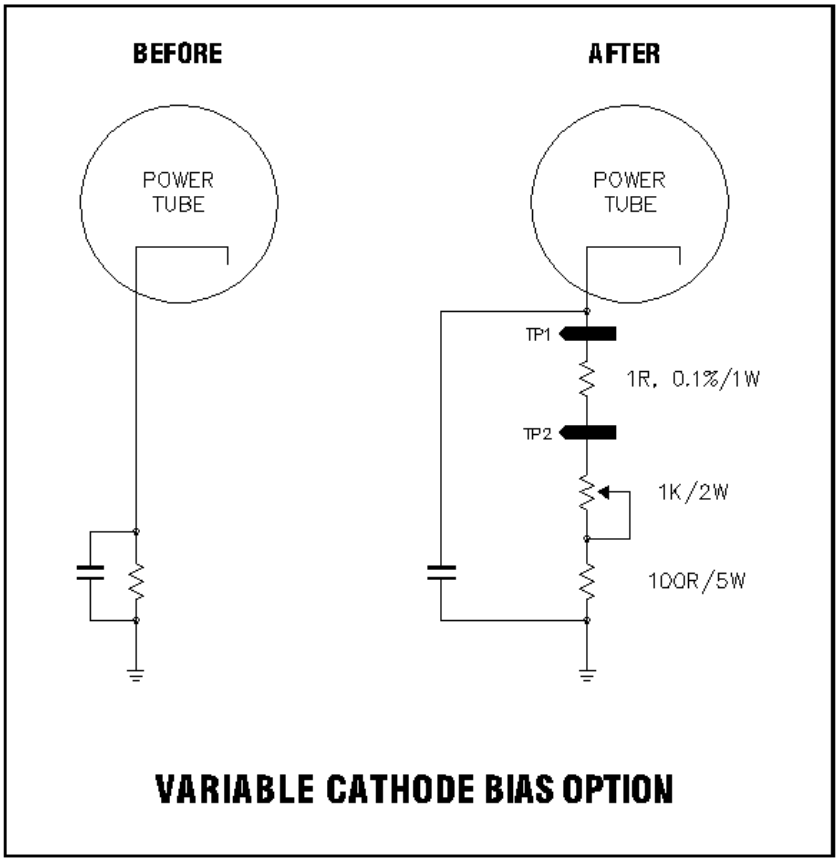
The Variable Cathode Bias Option

This is a modification that can be made to cathode biased amps like the P1, High Octane, P1 eXtreme, and the SEL. In fact, I make this mod to all of the SE amps I build. By adding one 1K Linear potentiometer, one 1R – 0.1% resistor, two multi-meter probe test points, changing the existing cathode resistor to a 100R/5W unit, and adding a little wire, you can give yourself the ability to dial in the bias setting you want for any output tube you care to use.



The 0.1% 1R resistor (you can use a 1% resistor, but the more accurate your resistor, the more accurate your reading), is placed between the two test points. You will use your multi-meter, set to mV, to measure the voltage across the 1R resistor. Since the resistor is 1R, V = mA of current that the tube is drawing.

To set the bias, first insert the positive probe in TP1 and the negative in TP2, and change the dial to mV. Pay attention to the meter. When you dial the pot one way, current (mV) increases. When you dial it the other way, current (mV) decreases. Dial the pot so that the mV reading is as low as it will go.

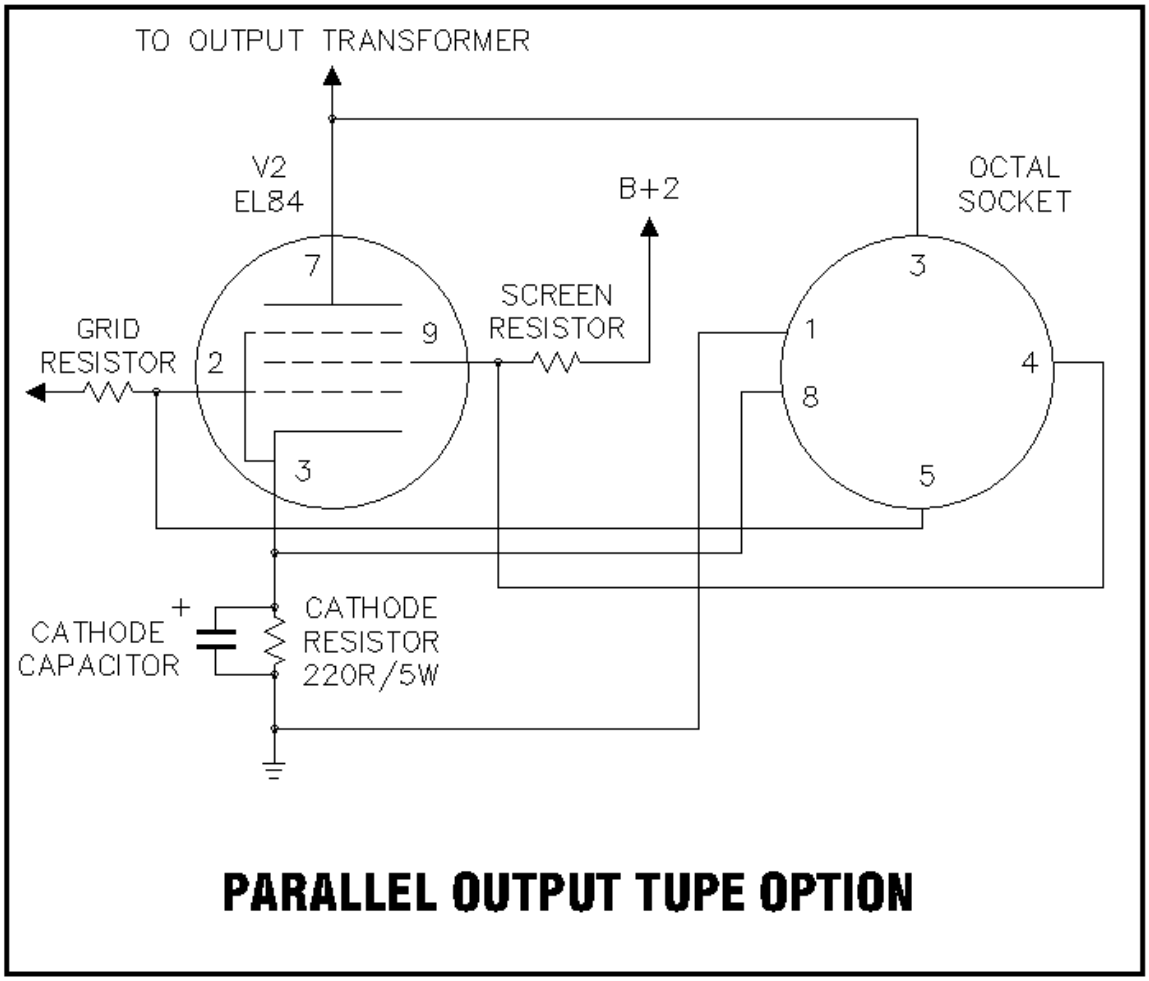
Now, take a reading of the anode (aka plate) voltage and use the following formula to determine the bias setting for the tube you are using: (PaMax * 0.9) / Va

PaMax is the maximum plate dissapation of the tube you are using and Va is the voltage at the anode that you measured. Once you have that number, you simply adjust the bias pot until you see that number on the display.

Parallel Octal Output Tube Option

This is a great option for those builders who want to add the tonal varieties available with octal output tubes to their P1 or High Octane amp.

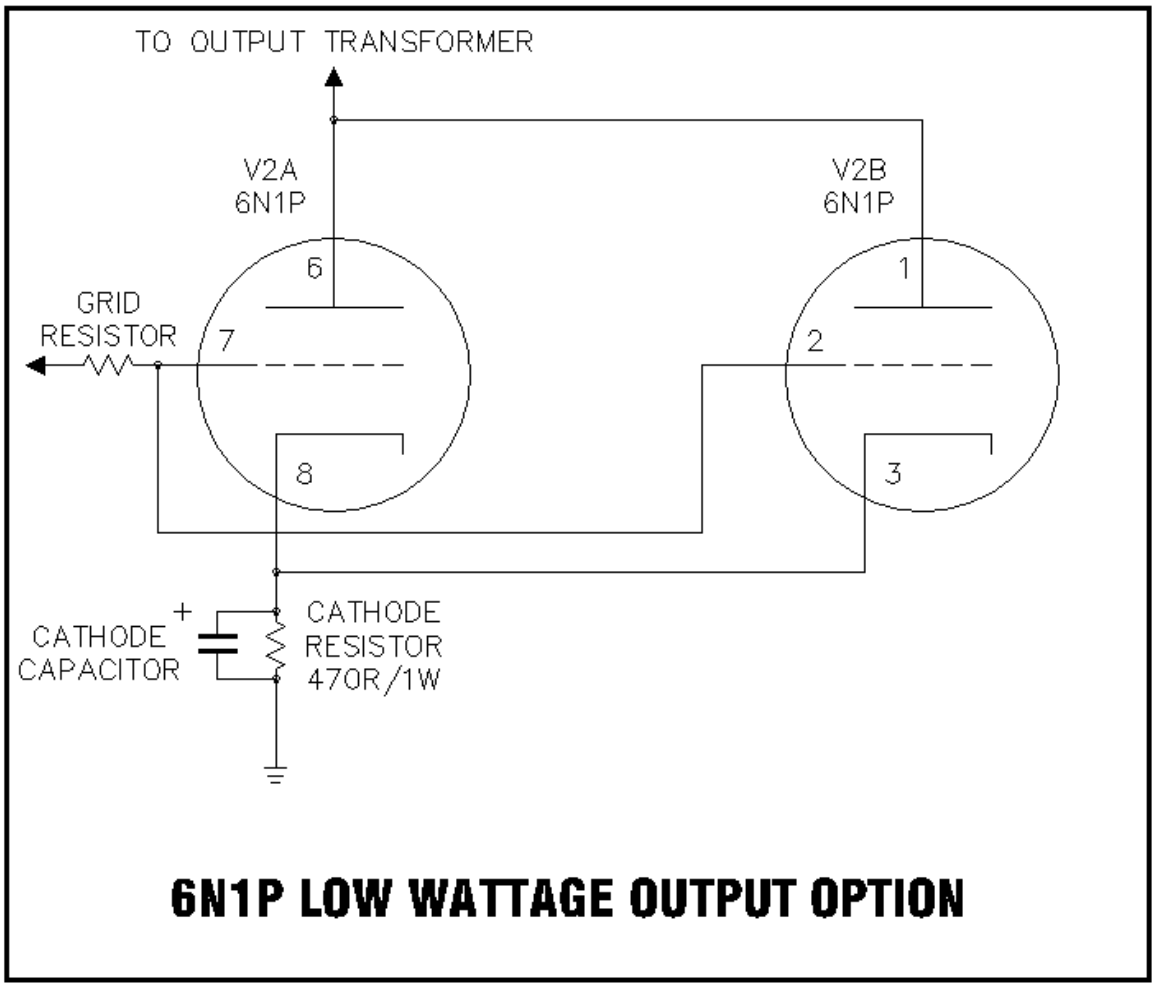
WARNING: You can only use this option in P1's and HO's. Do not attempt to use EL84's in SE amps that have a B+ plate voltage greater than 275V. Do not attempt to use both tubes at the same time with the stock Hammond 269EX. You will exceed its current rating.



Lead dress is a very important issue with this option. You will have to pay special attention to wire routing. It is **HIGHLY** recommended that you install both sockets, wire up the filaments to both sockets, but that you connect and debug the EL84 tube **FIRST**. Get the amp working like that and make sure you don't have hum, buzz, or squealing problems. If you do, get them resolved **BEFORE** you wire up the remaining connections for the octal socket. If you do that and get squeals or other problems after adding the octal connections, then you know it's one, or more, of the wires you added that is causing the problem.

Low-watt Output Option

Here is an option for those who find out, like most folks do, that a 5W amp is a lot louder than you thought it would be. Installing a 6n1P triode as an output tube lowers to power out to about 1W. For even lower output, you could just use one half instead of both as shown here.



NOTE: If you install this option, be sure and change the cathode resistor to a 470R/1W unit!

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RADIO NOISE NOTE:

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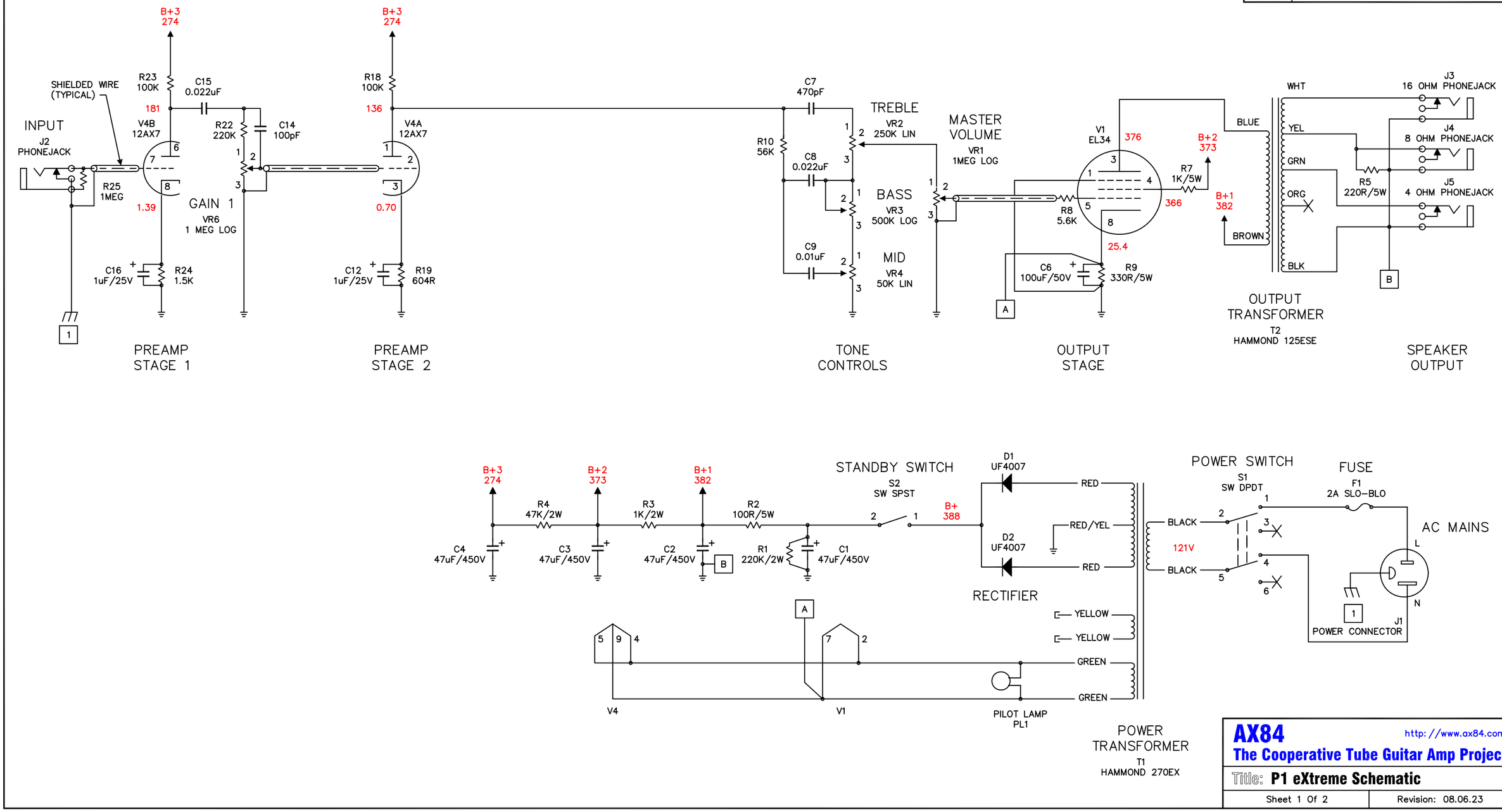
Revision	Description
08.03.13	Renumbered Components Removed 1st Stage Grid Resistor Changed Dual Rectifiers To Singles Removed Rectifier Bypass Caps Changed D1 & D2 To UF4007 Removed Standby Bypass Resistor Removed Filament Hum Resistors Added R5 Changed 270DX To 270EX
08.04.10	Renumbered Components
08.05.07	Cleaned Up Drawing
08.06.23	Issued For Construction

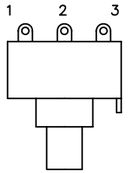


AX84 http://www.ax84.com

The Cooperative Tube Guitar Amp Project

Title: **P1 eXtreme Schematic**

Sheet 1 Of 2 | Revision: 08.06.23



01 **POTENTIOMETER PINOUTS - TOP VIEW**

Revision	Description
08.03.13	Renumbered Components Removed 1st Stage Grid Resistor Changed Dual Rectifiers To Singles Removed Rectifier Bypass Caps Changed D1 & D2 To UF4007 Removed Standby Bypass Resistor Removed Filament Hum Resistors Added R5 Changed 270DX To 270EX
08.04.10	Renumbered Components
08.05.07	Cleaned Up Drawing
08.06.23	Issued For Construction

GENERAL NOTES:

1. ALL RESISTORS 1/2W MINIMUM UNLESS OTHERWISE NOTED.

2. ALL COUPLING CAPACITORS 400V OR GREATER.

3. 47uF/450V ELECTROLYTIC POWER SUPPLY CAPACITOR VALUES/VOLTAGES ARE NOT CRITICAL. SUGGESTED VALUES: 20–50uF AT 450–500V.

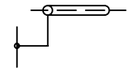
4. THE HAMMOND 270DX POWER TRANSFORMER IS USED IN THIS AMP. IT MAY BE REPLACED BY UNITS WITH THE FOLLOWING SPECIFICATIONS:

   275–0–275V @ 90mA OR MORE SECONDARY B+ TAPS
   6.3V @ 4A OR MORE FILAMENT TAPS

5. THE HAMMOND 125ESE OUTPUT TRANSFORMER IS USED IN THIS AMP. IT MAY BE REPLACED BY UNITS WITH THE FOLLOWING SPECIFICATIONS:

   SINGLE–ENDED OUTPUT
   5000 OHM PRIMARY IMPEDENCE
   90mA OR MORE MAXIMUM D.C. BIAS
   4, 8, AND 16 OHM SECONDARY TAPS

6. SHIELDED WIRE, AS WELL AS THE SHIELD'S TIE TO GROUND, IS SHOWN IN THIS MANNER ON THE SCHEMATIC:



7. IF YOU HAVE MAINS VOLTAGES OF 200VAC OR ABOVE, YOU SHOULD USE HAMMOND'S 3XX SERIES TRANSFORMERS INSTEAD OF THE 2XX SERIES SHOWN. THE 369EX SHOULD REPLACE THE 269EX, THE 370DX REPLACES THE 270DX, AND THE 370EX REPLACES THE 270EX.

CONSTRUCTION NOTES:

1 THIS IS A GROUND CONNECTION TO THE CHASSIS. THE MAINS SAFETY CONNECTION SHOULD BE MADE AS CLOSE AS POSSIBLE TO THE POINT WHERE AC ENTERS THE CHASSIS. THE CIRCUIT CONNECTION SHOULD BE MADE AS CLOSE AS POSSIBLE TO THE INPUT JACK. IDEALLY, THE JACK ITSELF SHOULD BE USED AS THE CONNECTION POINT BY NOT ISOLATING IT FROM THE CHASSIS.

AX84 http://www.ax84.com
The Cooperative Tube Guitar Amp Project

Title: **P1 eXtreme Detail Sheet**

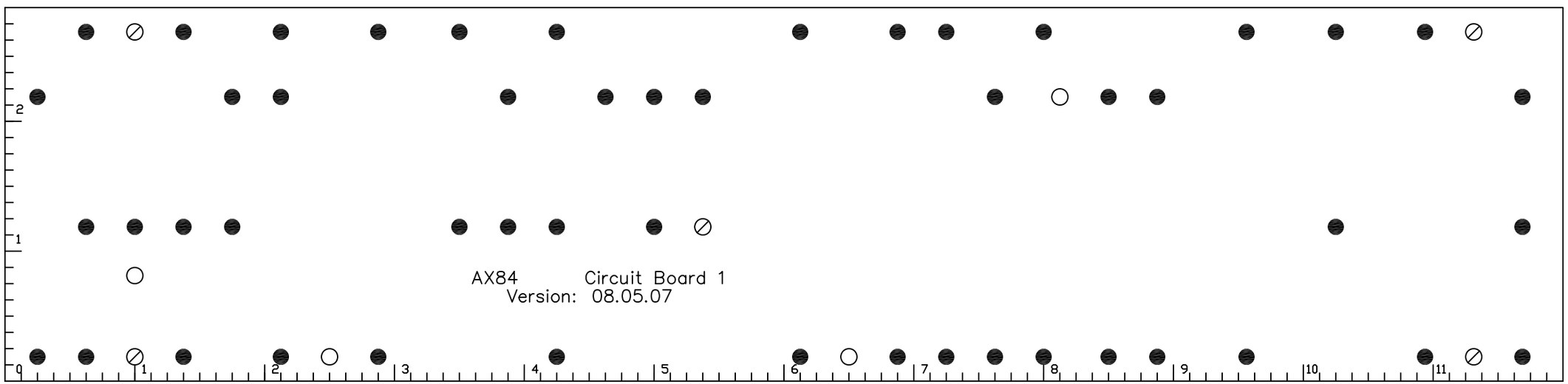
AX84 P1eX Amplifier BOM

Revision: 08.06.23

NOTE: Parts for options are not included on this bill of materials.

Item	Quantity	Reference	Value
1	4	C1, C2, C3, C4	47uF/450V
2	0	C5	Not Used
3	1	C6	100uF/50V
4	1	C7	470pF
5	2	C8, C15	0.022uF
6	1	C9	0.01uF
7	0	C10, C11	Not Used
8	2	C12, C16	1uF/25V
9	0	C13	Not Used
10	1	C14	100pF
11	1	R1	220K/2W
12	1	R2	100R/5W
13	1	R3	1K/2W
14	1	R4	47K/2W
15	1	R5	220R/5W
16	0	R6	Not Used
17	1	R7	1K/5W
18	1	R8	5.6K
19	1	R9	330R/5W
20	1	R10	56K
21	0	R11, R12, R13, R14, R15, R16, R17	Not Used
22	2	R18, R23	100K
23	1	R19	604R
24	0	R20, R21	Not Used
25	1	R22	220K
26	1	R24	1.5K
27	1	R25	1 Meg
27	1	F1	2A SLO-BLO
28	1	FH1	Fuse Holder
29	1	J1	Power Connector
30	4	J2, J3, J4, J5	Phonejack
31	4	JW1, JW2, JW3, JW4	Phonejack Isolation Washer (if needed)
32	1	S1	SW DPDT
33	1	S2	SW SPST
34	2	D1, D2	UF4007
35	1	PL1	Pilot Lamp Assembly And Bulb
36	1	T1	Hammond 270EX
37	1	T2	Hammond 125ESE
38	1	SK4	9 Pin Tube Socket
39	1	SK1	8 Pin Octal Socket
40	1	V1	EL34
41	1	V4	12AX7
42	2	VR1, VR6	1Meg LOG
43	1	VR2	250K LIN
44	1	VR3	500K LOG

45	1	VR4	50K LIN
46	5	K1, K2, K3, K4, K6	Knobs
47	1	CH1	Chassis


AX84 Circuit Board 1
Version: 08.05.07
0
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9
10
11
1
2

AX84 P1eX Chassis Layout

Version: 08.06.23

AX84 Kit Chassis 1

Version: 08.05.07

Input
Ground Lug (if needed)
VR6
G1
VR2
T
VR4
M
VR3
B
VR1
V
Pilot
Standby
Power
Twist wires
CAP
Hammond 125ESE
Hammond 270EX
AX84 P1eX Circuit Board 1
Version: 08.05.07
R25
R22
C14
C16
R24
C15
R23
R18
C12
R19
C4
C7
C8
C9
R10
C3
R9
C6
R8
R4
R3
C2
R1
C1
R2
R7
V4
12AX7
V1
EL34
Twist wires
Output
Cap
8
4
R5
Mains
2A Slo-Blo