WARNING! - Please Read this Information Carefully:

The project described in these pages utilizes **POTENTIALLY FATAL HIGH VOLTAGES.** If you are in any way unfamiliar with high voltage circuits or are uncomfortable working around high voltages, **PLEASE DO NOT RISK YOUR LIFE BY BUILDING THEM.** Seek help from a competent technician before building any unfamiliar electronics circuit. While efforts are made to ensure accuracy of these circuits, no guarantee is provided, of any kind!

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NOTICE! - This document represents a project that is in the PRELIMINARY, or BETA TEST phase.

This project is intended for **experienced builders only** at this phase. It may contain errors on the documents, or in the design itself. Once this project has been successfully prototyped and tested this notice will be removed and it will be released for construction. Should you find an error on the documents, please notify the Project Coordinator so that the documents may be corrected.

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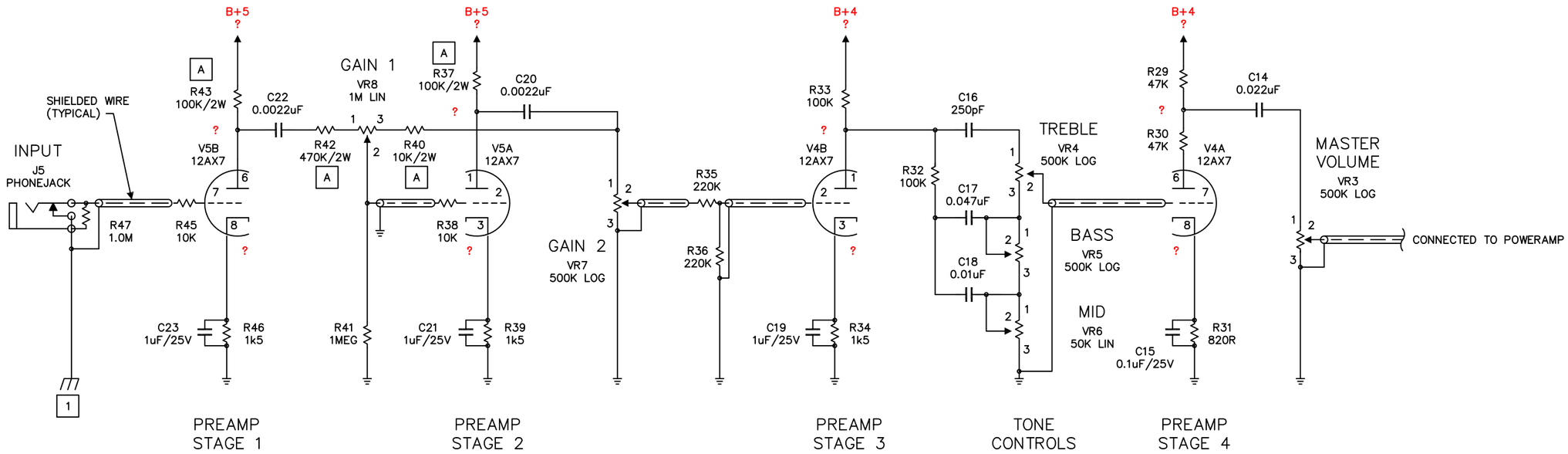
Revision	Description
09.09.12	Initial Design
09.09.14	Changed VR8 From LOG to LIN
10.02.02	Changed Chassis – Board Layout, & BOM
10.02.09	Changed R2 From 5W To 2W Resistor

[A] MEASURES MUST BE TAKEN AT THESE LOCATIONS TO REDUCE NOISE AND HISS. THE USE OF "LOW NOISE" TYPE RESISTORS IS RECOMMENDED. YOU CAN ALSO SUB +/<1W RESISTORS, OR USE 2 RESISTORS OF TWICE THE VALUE IN PARALLEL.



AX84 http://www.ax84.com

The Cooperative Tube Guitar Amp Project

Title: **L2L Club Schematic**

Sheet 1 Of 3 | Revision: 10.02.09

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OUTPUT STAGE

CONNECTED TO PREAMP
C13 0.022uF
R28 100K
V3A 12AX7
V3B 12AX7
R23 1.0M
R24 470R
R25 1.0M
R26 22K
C11 0.1uF/100V
R27 15K
C9 0.022uF
C10 0.022uF
R21 82K
R22 100K
R19 100K
R20 100K
B+3
V–
TP1
TP2
TP3
R17 1R/1W
R18 1R/1W
V1 6V6
V2 6V6
R13 5k6
R14 5k6
R15 1K/5W
R16 1K/5W
B+2
B+1

PRESENCE
VR2 5K LIN
C12 0.47uF/100V
B

OUTPUT TRANSFORMER
T2
HAMMOND 1650FA, OR EQUIVALENT
7.6K, 25W
BRN
BRN/YEL
RED
BLU/YEL
BLU
WHT
YEL
GRN
BLK

SPEAKER OUTPUT
R12 220R/10W
J2 16 OHM PHONEJACK
J3 8 OHM PHONEJACK
J4 4 OHM PHONEJACK

BIAS CALCULATIONS:
USE THE FOLLOWING FORMULA TO CALCULATE WHAT THE mA READING ACROSS R16 AND R17 SHOULD BE:

0.7 * PaMAX / Va

WHERE PaMAX IS THE MAXIMUM PLATE DISSAPATION FOR THE TUBE USED AND Va IS THE PLATE VOLTAGE.

NOTE: R27 VALUE
16R HOOKUP = 22K
8R HOOKUP = 15K
4R HOOKUP = 10K

NOTE: WHEN USING THIS ROTARY SWITCH, R27 SHOULD BE 15K.

B BYPASS CAPACITOR VALUE FOR C12 MAY BE ANYTHING BETWEEN 0.1uF AND 1uF AND IS A GOOD PLACE FOR EXPERIMENTATION.

V–
BIAS
VR1 50K LIN
R10 68K
R8 100K/1W
D3 SCHOTTKY 1000V/6A
R9 15K/1W
C7 10uF/160V
C8 10uF/160V
R11 39K

RECTIFIER
D1 SCHOTTKY 1000V/6A
D2 SCHOTTKY 1000V/6A
311VAC
387VDC

FUSE
F1 2A SLO–BLO
POWER SWITCH
S1 SW DPDT
AC MAINS
MAINS 123VAC
J1 POWER CONNECTOR
PILOT LAMP PL1
RED
RED/YEL
YEL
GREEN
BLACK

Rf1 100R
Rf2 100R
Rf3 0.1R/5W
Rf4 0.1R/5W

B+1 387VDC
B+2 385VDC
B+3 344VDC
B+4 332VDC
B+5 328VDC
R1 130R/5W
R2 3K/2W
R3 1k5/1W
R4 1k5/1W
R5 180K/1W
R6 47K/1W
C1 100uF/450V
C2A 40uF/500V
C2B 20uF/500V
C2C 20uF/500V
C2D 20uF/500V
C6 10uF/160V

V1 V2 V3 V4 V5

POWER TRANSFORMER
T1
HAMMOND 270EX, OR EQUIVALENT
275–0–275 @ 144mA
5V @ 3A
6.3V @ 4A

AX84 http://www.ax84.com
The Cooperative Tube Guitar Amp Project
Title: **L2L Club Schematic**
Sheet 2 Of 3 | Revision: 10.02.09

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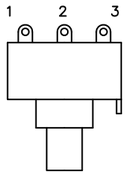
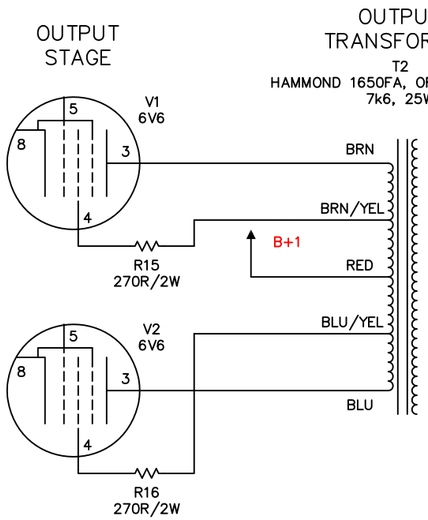


01 **POTENTIOMETER PINOUTS - TOP VIEW**



02 **ULTRALINEAR OUTPUT TRANSFORMER HOOKUP**

GENERAL NOTES:

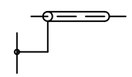
1. ALL RESISTORS 1/2W MINIMUM UNLESS OTHERWISE NOTED.
2. ALL COUPLING CAPACITORS 400V OR GREATER.
3. THE HAMMOND 270EX POWER TRANSFORMER IS USED IN THIS AMP. IT MAY BE REPLACED BY UNITS WITH THE FOLLOWING SPECIFICATIONS:

   275–0–275V @ 125mA OR MORE SECONDARY B+ TAPS
   6.3V @ 4A OR MORE FILAMENT TAPS

4. THE HAMMOND 1650F OUTPUT TRANSFORMER IS USED IN THIS AMP. IT MAY BE REPLACED BY UNITS WITH THE FOLLOWING SPECIFICATIONS:

   PUSH–PULL OUTPUT
   7k6 OHM PRIMARY IMPEDENCE
   128mA OR MORE MAXIMUM D.C. BIAS
   4, 8, AND 16 OHM SECONDARY TAPS

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



6. 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 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: **L2L Club Detail Sheet**

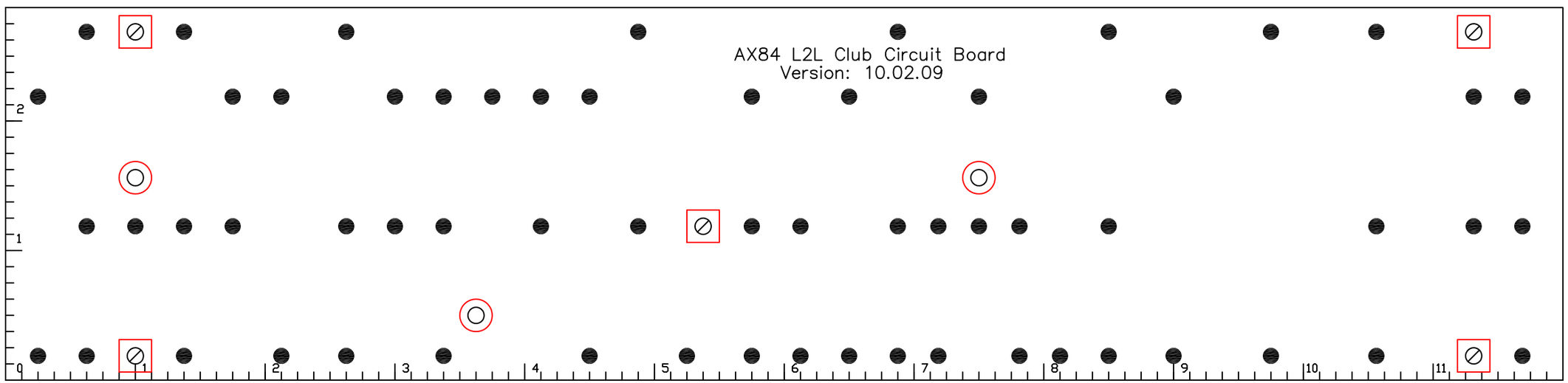
Sheet 3 Of 3 | Revision: 10.02.09

AX84 L2L Club Amplifier BOM

Revision: 10.02.09

Item	Quantity	Reference	Value
1	1	C1	100uF/450V
2	1	C2	40/20/20/20 Multi-section Capacitor
3	3	C6, C7, C8	10uF/160V
4	4	C9, C10, C13, C14	0.022uF/400V
5	2	C11, C12	0.1uF/100V
6	1	C15	0.1uF/25V
7	1	C16	250pF/500V
8	1	C17	0.047uF/400V
9	1	C18	0.01uF/400V
10	3	C19, C21, C23	1uF/25V
11	2	C20, C22	0.0022uF/400V
12	1	R1	130R/5W
13	2	Rf1, Rf2	100R
14	2	Rf3, Rf4	0.1R/5W
15	1	R2	3K/2W
16	2	R3, R4	1k5/1W
17	1	R5	180K/1W
18	1	R6	47K/1W
19	1	R8	100K/1W
20	1	R9	15K/1W
21	1	R10	68K
22	1	R11	39K
23	1	R12	220R/5W
24	2	R13, R14	5k6
25	2	R15, R16	1K/5W
26	2	R17, R18	1R/1W
27	6	R19, R20, R22, R28, R32, R33	100K
28	1	R21	82K
29	4	R23, R25, R41, R47	1.0M
30	1	R24	470R
31	1	R26	22K
32	1	R27	15K
33	2	R29, R30	47K
34	1	R31	820R
35	3	R34, R39, R46	1k5
36	2	R35, R36	220K
37	2	R37, R43	100K/2W
38	2	R38, R45	10K
39	1	R40	10K/2W
40	1	R42	470K/2W
41	1	F1	1A SLO-BLO
42	1	FH1	Fuse Holder
43	1	J1	Power Connector
44	1	PC1	Power Cord
45	4	J2, J3, J4, J5	Phonejack

46	6	JW1, JW2, JW3, JW4, JW5, JW6	Phonejack Isolation Washer (if needed)
47	1	S1	SW DPDT
48	3	D1, D2, D3	Schottky 1000V/6A Diodes
48	1	PL1	Pilot Lamp Assembly And Bulb
49	1	T1	Hammond 270EX
50	1	T2	Hammond 1650FA
51	3	SK3, SK4, SK5	9 Pin Tube Sockets
52	2	SK1, SK2	8 Pin Octal Socket
53	2	V2, V3	6V6GT
54	3	V3, V4, V5	12AX7
55	1	VR1	50K LIN (bias)
56	1	VR2	5K LIN
57	4	VR3, VR4, VR5, VR7	500K LOG
58	1	VR6	50K LOG
59	1	VR8	1.0M LIN
60	1	CClmp	Clamp For Multi-section Cap C2
61	7	K1, K2, K3, K4, K5, K6, K7	Front Panel Knobs
62	1	CH1	Chassis
63	2	TP1, TP2	Red Tip Jack
64	1	TP3	Black Tip Jack
65	2		3-lug Terminal Strip


AX84 L2L Club Circuit Board
Version: 10.02.09
0
1
2
3
4
5
6
7
8
9
10
11
1
2

AX84 L2L Club Chassis Layout

Version: 10.02.09

AX84 Kit Chassis 3

Version: 09.09.14

AX84 L2L Club Circuit Board
Version: 10.02.09

Hammond 1650FA

Hammond 270EX

KEEP WIRES CLEAR OF MOUNTING BOLT HOLES

KEEP WIRES CLEAR OF MOUNTING BOLT HOLES

KEEP WIRES CLEAR OF MOUNTING BOLT HOLES

KEEP WIRES CLEAR OF MOUNTING BOLT HOLES

CAP

Input

G1

G2

T

M

B

P

V

Pilot

Power

VR8

VR7

VR4

VR6

VR5

VR2

VR3

VR1

R47

R3

R4

R2

C2

C12

R46

C23

R42

R40

R41

C21

R39

R34

C19

R36

R35

C16

C17

C18

R32

C14

R31

C15

R28

R26

R27

C11

R20

R19

C6

R6

R1

C1

C7

C8

R11

R9

R8

C22

R43

R37

C20

R33

R29

R30

C13

R23

R24

R25

R14

C10

R22

R21

C9

R5

R38

R45

V5
12AX7

V4
12AX7

V3
12AX7

V2
6V6

V1
6V6

R16

R15

R10

Rf3

Rf4

Rf1

Rf2

R12

Output

16 Ohm

8 Ohm

4 Ohm

R18

R17

TP2

TP3

TP1

Mains

1A Slo-Blo