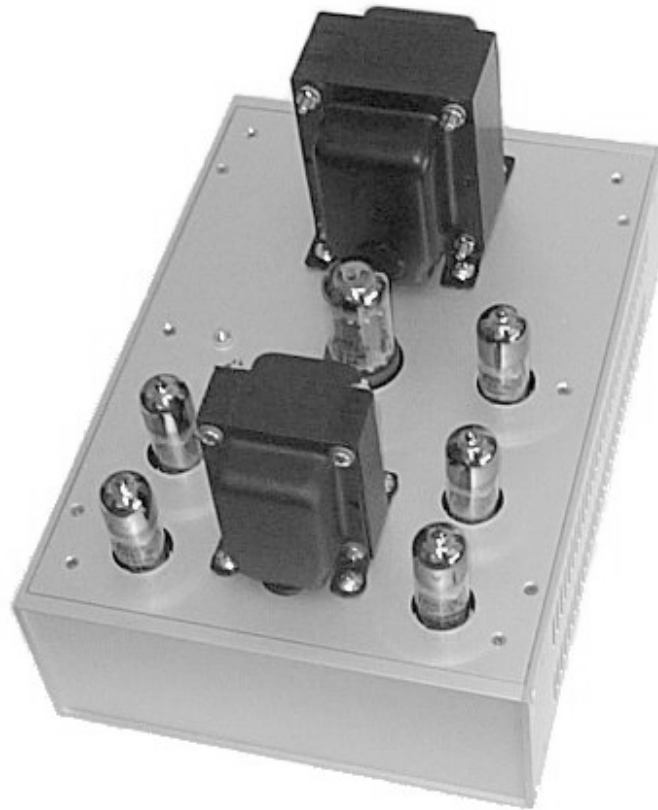
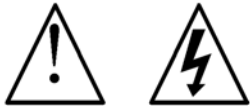




Cymbal

8 Watt Monoblock Amplifier





Warnings

This product uses dangerous and potentially lethal voltages. Extreme care must be taken while assembling this amplifier and should only be attempted by a skilled technician. The instructions in this manual are a suggested guide only and no liability is assumed by Hagerman Technology LLC.

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1 Before You Begin

Description

Congratulations! You have just purchased one of the highest performance-per-dollar audiophile products available. The Cymbal monoblock amplifier is intended to bring high-end audio and construction quality into the hands of do-it-yourselfers. It is part of a line of vacuum tube products based on a common chassis and circuit board architecture. The design is optimized for both ease of assembly and sonic excellence.

Circuit topology is the classic push/pull output driven by a fully balanced differential input/driver stage. Both stages operate in class-A and use no negative feedback. Designed around the ultra-linear 6H30 supertube, this unique amplifier is optimized for sonics rather than raw power. Its exceptionally low output impedance retains powerful and clean bass without sacrificing a SET-like midrange. The monoblocks are built in mirror-image pairs (left channel shown on cover). A second input offers capacitive coupling and can be designed to set a specific high-pass turnover frequency for systems operating with a subwoofer.

The half-kit consists of these instructions, blank circuit boards, and 1:1 drill guides. You must purchase the remaining components from DigiKey, Antique Electronic Supply; New Sensor, and Lansing Instruments. You may also substitute parts from your own stock.

Features

- All vacuum-tube signal path
- Pure class-A amplifier stages
- No feedback
- Fully balanced differential input stage with ground lift
- Vacuum tube B+ rectification with choke regulation

Tools

This is a kit product and construction should only be attempted by skilled electronic technicians. Chassis metalworking is also required. You will need an array of shop tools and a good soldering iron. If you are at all unsure of this, send it back!

2 Parts to Buy

Kit

If you purchased factory assembled Cymbals, skip to Chapter 5. The kit does not need to be built as specified, part substitutions or upgrades can be made at your discretion. It is recommended you read this entire manual before starting.

Modifications

Here are a few simple modifications and upgrades possible to customize your unit.

- ❑ Upgrade signal capacitors to “auricap” brand: Change C8 to AES #CAUD1-450. Change C7 and C15 to AES #CAUD47-450.
- ❑ Upgrade to gold plated RCA jack: Change J1 to AES #S-H267W.
- ❑ Change chassis anodize color from clear to black: Use Lansing #B2H12-V01B.
- ❑ Bolt both chassis together side-by-side for a 19” rackmount fit using four #KCOUP bolts from Lansing.
- ❑ For testing, it is handy to buy a #8.2W-10-ND power resistor from DigiKey..

You can also run this amplifier with a balanced input connector (DigiKey #SC1009). Connect pin 1 to ground, pin 2 to positive, and pin 3 to negative input (lifted ground). Set LIFT switch to open or do not install.

Parts List

Parts should be ordered directly from www.digikey.com, www.tubesandmore.com (AES), www.sovtek.com (New Sensor), and www.lansing-enclosures.com. The parts lists on the following pages are for one amplifier, quantities must be doubled for a pair.

Component	Qty	DigiKey	References
100uF 350V	4	493-1442-ND	C3, C4, C9, C14
220uF 16V	1	493-1284-ND	C10
100nF 50V	2	EF1104-ND	C6L, C6R
1uF 400V	4	PF4105-ND	C12, C13, C22, C23
470nF 400V	2	PF4474-ND	C7, C15
100nF 400V	1	PF4104-ND	C8
10nF 2kV	3	P11423CT-ND	C1, C2, C5
1N4148	2	1N4148FS-ND	D1, D2
LED R/G	1	160-1715-ND	D3
Power Cord	1	Q120-ND	
Grommet	10*	RP456-ND	
Feet	4	SJ5523-0-ND	
Standoff #4 x 1	10*	4806K-ND	
Nylon Spacer	10*	1457AK-ND	
Fuse	2	F2419-ND	
Dome, LED	1	L30032-ND	
Grounding Post	1	J587-ND	
RCA Jack	1	CP-1435-ND	J1
AC Input	1	CCM1647-ND	
Fuse Holder	1	WK0011-ND	F1
Terminal	30*	1285K-ND	
Crimp	30*	A27804-ND	
Switch	1	EG1903-ND	S1
Heat Sink	4	HS372-ND	
2N3904	2	2N3904FS-ND	Q3, Q4
2N3906	2	2N3906FS-ND	Q1, Q2
Pot, 100k	1	3386P-104-ND	R28
1.0 1/2W	5*	1.0H-ND	R23, R35
22 1/2W	10	22H-ND	R11, R13, R17, R19, R26, R27, R38, R41, R43, R44
220 1/2W	15*	220H-ND	R5, R12, R15, R16, R18, R20, R36, R37, R39, R40, R42
2.2k 1/2W	5	2.2KH-ND	R7, R8, R29, R31
10k 1/2W	5*	10KH-ND	R2, R6
22k 1/2W	5*	22KH-ND	R21, R33
47k 1/2W	5*	47KH-ND	R22, R25, R30, R34
1.3k 2W	2	P1.3KW-2BK-ND	R9, R46
220k 2W	1	P220KW-2BK-ND	R4
220 3W	2	P220W-3BK-ND	R24, R32
330 3W	2	P330W-3BK-ND	R1, R3
4.7k 5W	2	ALSR5F-4.7K-ND	R10, R45

Component	Qty	AES	References
Wire	2	S-WS16	
Binding Post	1	S-H263	J3
Socket, 8-pin	1	P-ST8-193G	V1
Socket, 9-pin	5	P-ST9-214G	V2, V3, V4, V5, V6
Tranny, Power	1	P-T370FX	T1
Tranny, Output	1	P-T1615	T2
Choke	1	P-T158Q	L1
5AR4	1	5AR4	
Screw #10	2*	P-H245	
Nut #10	2*	S-HHN1032	
Washer #10	2*	S-HLW10	
Screw #4	3*	S-HS440-14	
Nut #4	2*	S-HHN440	
Lug	1*	S-H112	

Component	Qty	New Sensor	References
6H30	5	6H30pi	

Component	Qty	Lansing	References
Chassis	1	B2H12-V01A	

* Minimum purchased quantity.

3 Assembly

Chassis

The instructions below refer specifically to the Lansing Instruments' enclosure. Follow these step-by-step instructions to machine the chassis pieces. If you plan to use upgraded RCA jacks or other controls, some mounting holes will not be the same as those specified on the drill guides; they need to be lowered to prevent interference with the circuit board.

The monoblocks are built in mirror-image pairs. The top cover drill guide is drawn for the left channel. Flip over to use for right side. The LED dome and output binding posts are on the left for the left channel (front view), and vice-versa. Ground jack goes on RCA jack input side.

- ❑ Use a scissor to notch out the four alignment holes in the printed drill guide.
- ❑ Place the drill guide on top of a blank top cover; align so the mounting holes are centered in the crosshairs. Use a metal punch (sharp nail) to mark the center of each hole.
- ❑ Cut out the rear panel drill guides using a straight edge and razor blade. Mark hole centers and outline of ac input cutout.
- ❑ Carefully drill holes on top cover, front and rear panels. Large holes are best done using punches, but a step-drill also works fine. A file may be needed to get a clean rectangular cutout on the rear panel.
- ❑ Wash with dishsoap to remove fingerprints and grime.

Circuit Board

Assemble in the following order, solder and clip leads before continuing. Not every spot on the circuit board is populated. Many parts are marked either "L" or "R" to indicate channel. Only those parts needed per channel are used, refer to schematic.

- ❑ Solder sockets onto the *backside* of circuit board. Insure rotation of octal socket is correct (see dimple). Only one driver tube V2 is used.
- ❑ Add six standoffs to bottom of circuit board using #4 nuts.
- ❑ Add four grommets.
- ❑ Install quick release terminals (for transformer wiring).
- ❑ Install all resistors and potentiometer.
- ❑ Install diodes and transistors.
- ❑ Install all capacitors.

- ❑ Install fuse holder.
- ❑ Install RCA jacks and ground lift switch.
- ❑ Install inductor using #6 screws and short nylon spacers.
- ❑ Install heat sink shields near RCA connectors and transformer wiring. These are used only for shielding purposes.
- ❑ Install LED onto *backside* of circuit board. Keep leads as long as possible (about one inch). Tab on side labeled “*”.
- ❑ Optionally soak and brush assembly in 99% isopropyl alcohol to remove solder flux residue. Blow dry.



Completed circuit board (left channel).

Integration

If built properly, everything should fit together like a glove. The chassis anodization acts as an electrical insulator. Make sure to scrape down to bare metal under the chassis screws to insure complete Earthing of all panels.

- ❑ Install rubber grommets to top cover.
- ❑ Install LED window to top cover.
- ❑ Mount transformers to top cover using the #10 hardware with ac primary and output secondary wires towards outside.
- ❑ Mount circuit board assembly to top cover, routing transformer wires through grommets.
- ❑ Cut length of transformer wires to 5 inches above circuit board. Save the scraps!
- ❑ Add crimp terminals to all of the power transformer wires.
- ❑ Plug in the transformer wires to the terminals on the circuit board. Use the silkscreened chart for proper voltage selection.
- ❑ Add crimp terminals to both ends of scrap wires colored brown, blue, and brown/yellow.
- ❑ Add crimp terminals to one end of scrap wires colored green and green/yellow.
- ❑ Solder both open ends of the green and green/yellow wires to the eyelet lug.
- ❑ Install the ground jack to rear panel with above eyelet lug secured under the nut.
- ❑ Install ac input connector.
- ❑ Connect the brown/yellow wire from the L terminal to a switch terminal. Connect the brown wire to the other switch terminal. Connect the blue wire to the N terminal, and the green/yellow wire to the E terminal.
- ❑ Connect L (brown), N (blue), and E (green) wires from rear panel to terminals on circuit board.
- ❑ Secure rear panel to assembly using a #4 screws on the RCA jack.
- ❑ Add chassis side panels.
- ❑ Solder output transformer primary wires into the color labeled holes. Solder the secondary wires into the “G”, “S”, “O”, and “H” holes per impedance chart.
- ❑ Solder approximately 16 inches of output speaker wire to the “G” and “H” holes. Lightly twist and solder to the rear panel binding posts. Insure the “G” wire connects to the black post.
- ❑ Install front panel.
- ❑ Add fuse.
- ❑ Install vacuum tubes
- ❑ Add feet to bottom cover. Do not install until after testing.



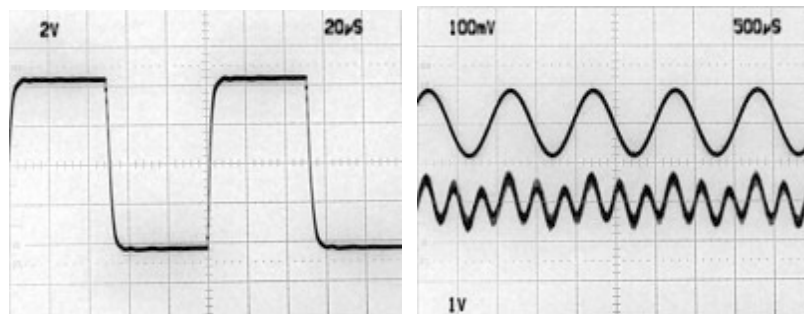
Completed assembly (left channel).

4 Testing & Installation

Testing

Double-check all of your work before applying power. Wear safety glasses, turn on the power and check for smoke. The LED should be red, and then switch to green after about 20 seconds. This indicates both heater and high voltage circuits are working.

- ❑ Measure power supply and plate voltages using a DVM. Voltages are marked on circuit board and schematic. Due to tube variations, these voltages will range as much as +/-10V.
- ❑ Connect a DVM across the test points labeled “M+” and “M-“. Adjust BALANCE pot until a zero reading is achieved.
- ❑ Apply a large 8 ohm resistor across the outputs.
- ❑ Connect a 1kHz sinewave signal and observe output on oscilloscope.
- ❑ Turn off, remove power cord and install bottom cover. Your Cymbal is now ready for use.



Square wave performance at 10kHz and 1kHz residual distortion.

Connections

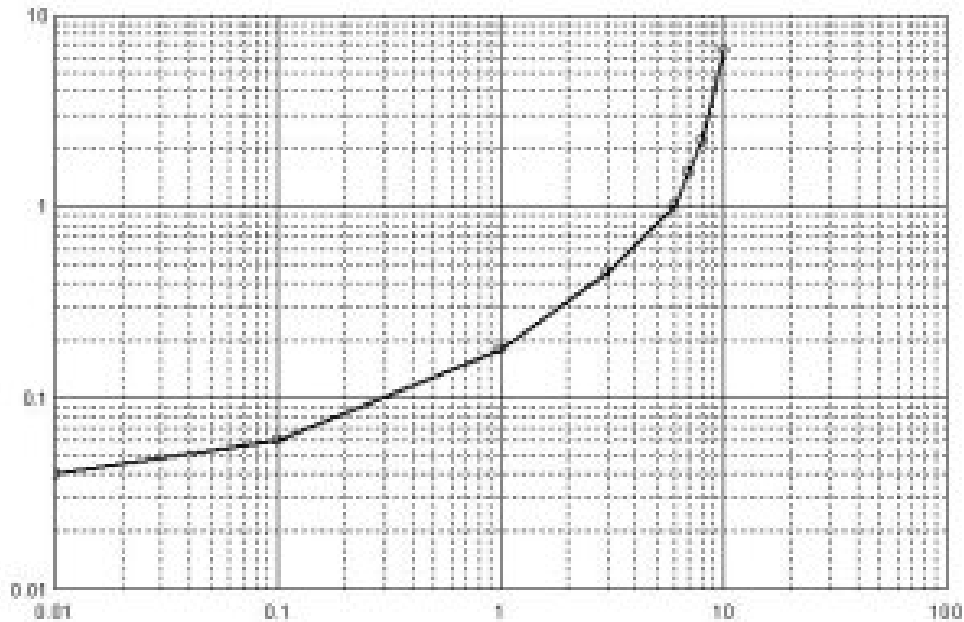
The Cymbal connects to your audio system just like any other power amplifier. In some installations where the amplifiers are remoted from the signal source, you can use the ground lift switch S1 to disconnect signal ground from amplifier ground. The differential input stage has a common mode range of about +/-1Vdc, which helps to eliminate possible ground loop induced hum. Use the quietest setting.

There are two input RCA jacks. The upper one is direct, lower is capacitively coupled.

5 Specifications

The following specifications are subject to change without notice.

Item	Specification
Power	8W into 8 ohms (see graph)
Gain	15dB (1.5Vrms for full output)
Input Impedance	47k ohm
Bandwidth (-3dB)	10Hz to 95kHz
Distortion	0.18% @ 1kHz @ 1W
SNR	95dB A-weighted
Damping Factor	5
Size (PCB)	7.25 x 11.65 inches
Size (Chassis)	8 x 12 x 3 inches
Input Voltage	100V, 110V, 120V, 200V, 220V, 240V
Tube Compliment	6H30 x 5, 5AR4 x 1



Distortion vs. output power @ 1kHz

6 Warranty & Service

Warranty

Hagerman Technology LLC warrants this product free of defects in materials and workmanship for 10 years (90 days for tubes). If you discover a defect, Hagerman Technology LLC will, at its option, repair or replace the product at no charge to you provided you return it during the warranty period, transportation charges prepaid to Hagerman Technology LLC. This warranty does not apply if the product has been damaged by negligence, accident, abuse or misuse or misapplication, has been damaged because it has been improperly connected to other equipment or has been modified without the express written permission of Hagerman Technology LLC. This warranty is limited to the replacement or repair of this product and not to damage to equipment of other manufacturers.

Any applicable implied warranties, including warranty of merchantability, are limited in duration to a period of the express warranty as provided herein beginning with the original date of purchase and no warranties, whether express or implied shall apply to the product thereafter.

Under no circumstances shall Hagerman Technology LLC be liable for any loss, direct, indirect, incidental, special, or consequential damage arising out of or in connection with the use of this product.

Service

Refer to Chapter 4 for troubleshooting information. If the problem persists, contact Hagerman Technology for service at www.hagtech.com.

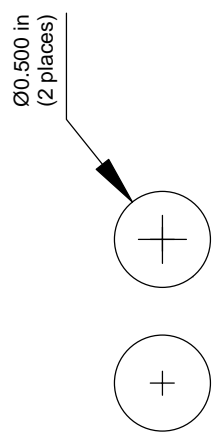
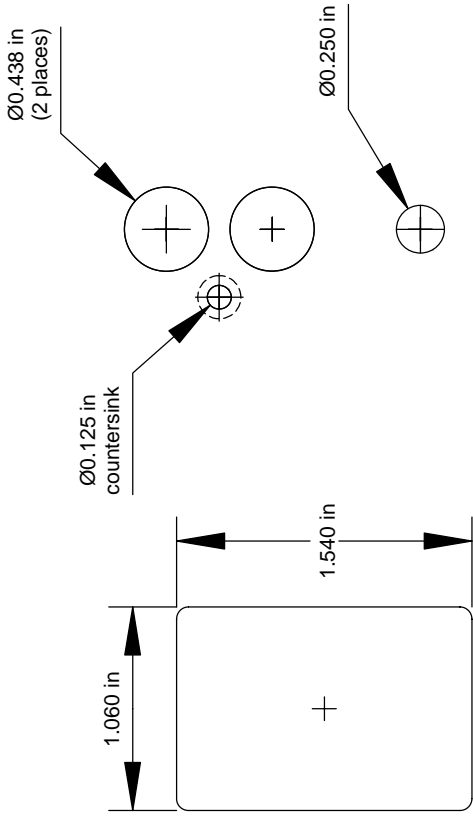
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Honolulu, HI 96825 USA

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808-394-6076 (fax)

DRILL GUIDE

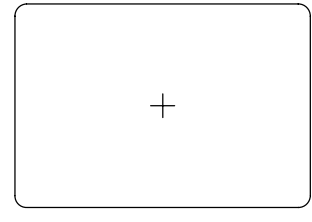
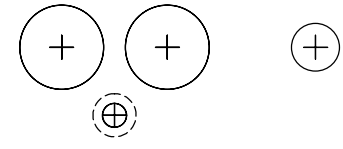
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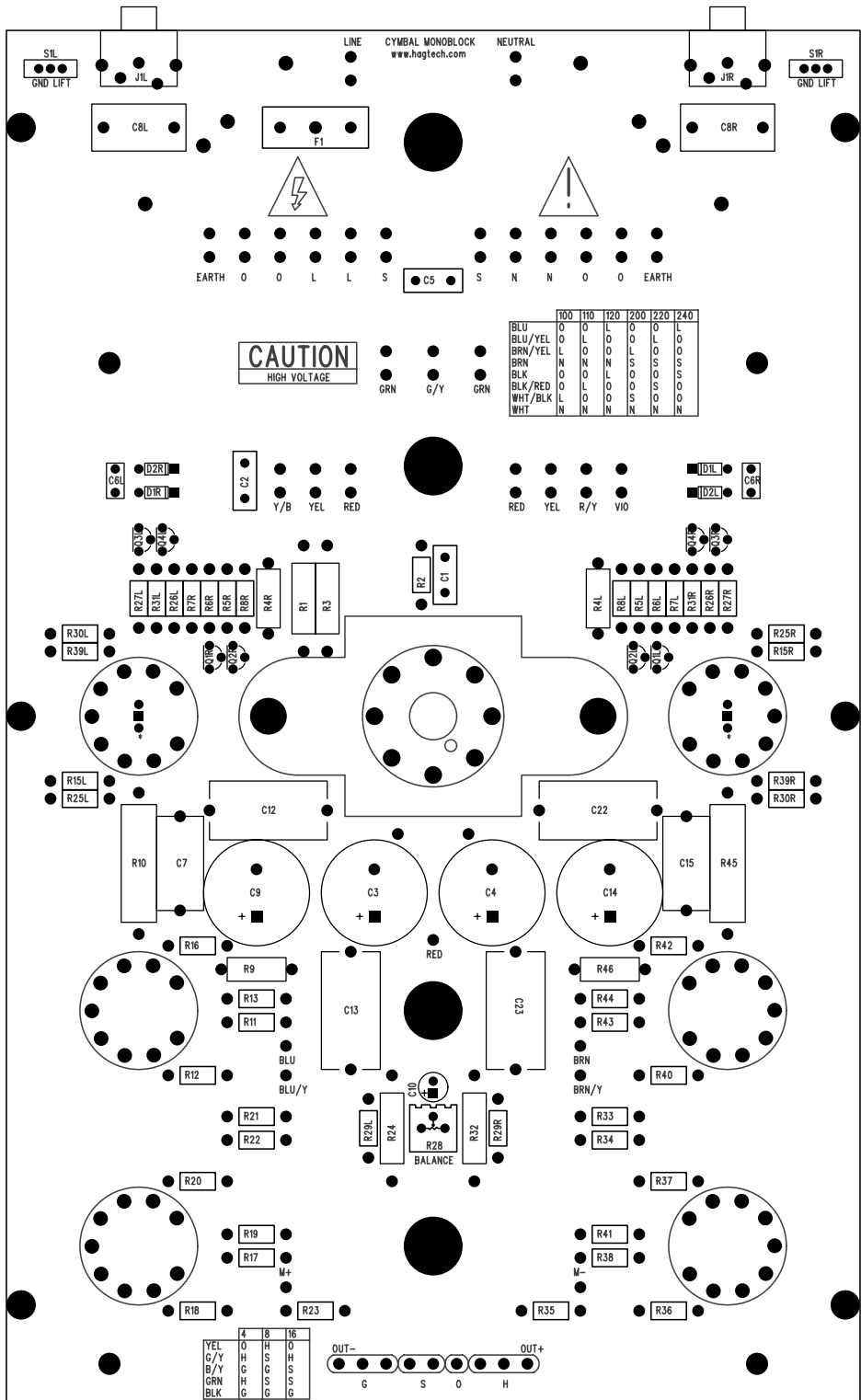


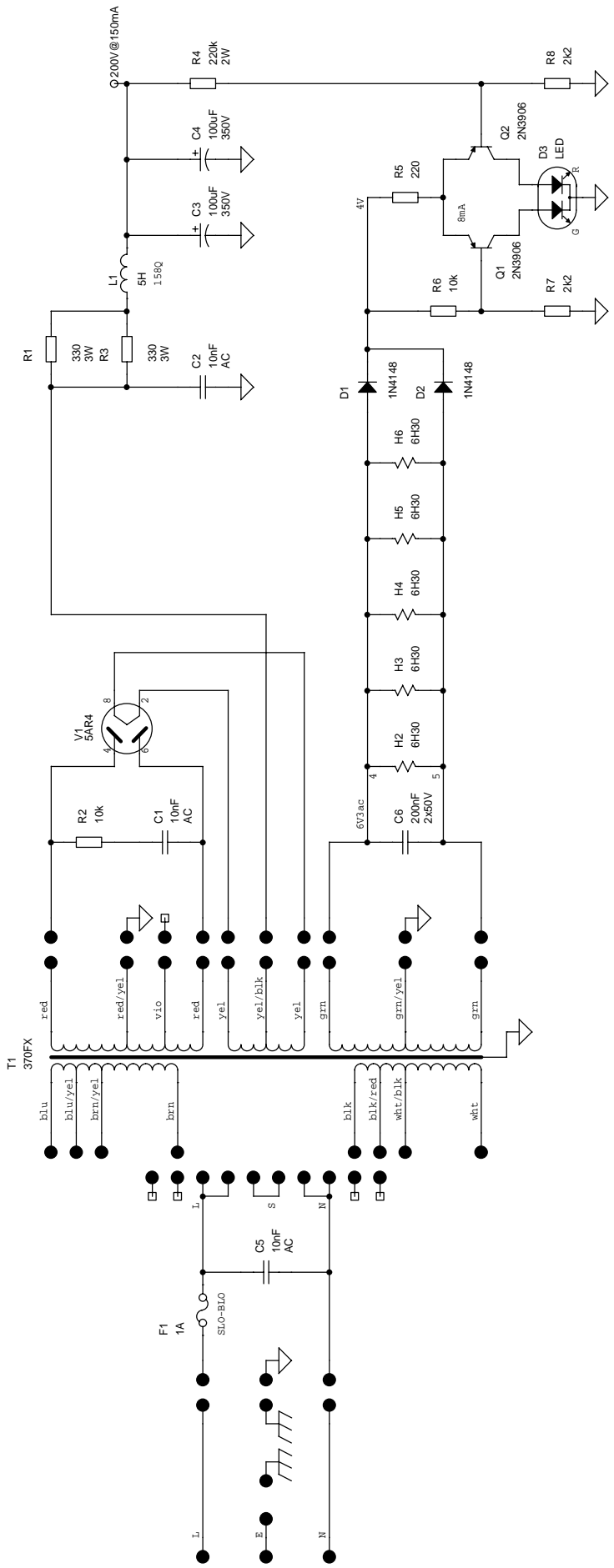
(right)

DRILL GUIDE



(left)





	100V	110V	120V	200V	220V	240V
Blu	NC	NC	L	NC	NC	L
Blu/Yel	NC	L	NC	NC	L	NC
Brn/Yel	L	NC	NC	L	NC	NC
Brn	N	N	S	S	S	S
Blk	NC	NC	L	NC	NC	S
Blk/Red	NC	L	NC	NC	S	NC
Blk/Blk	L	NC	NC	S	NC	NC
Wht	N	N	N	N	N	N

NOTES:
 1. ALL RESISTORS 1/2W UNLESS SPECIFIED.

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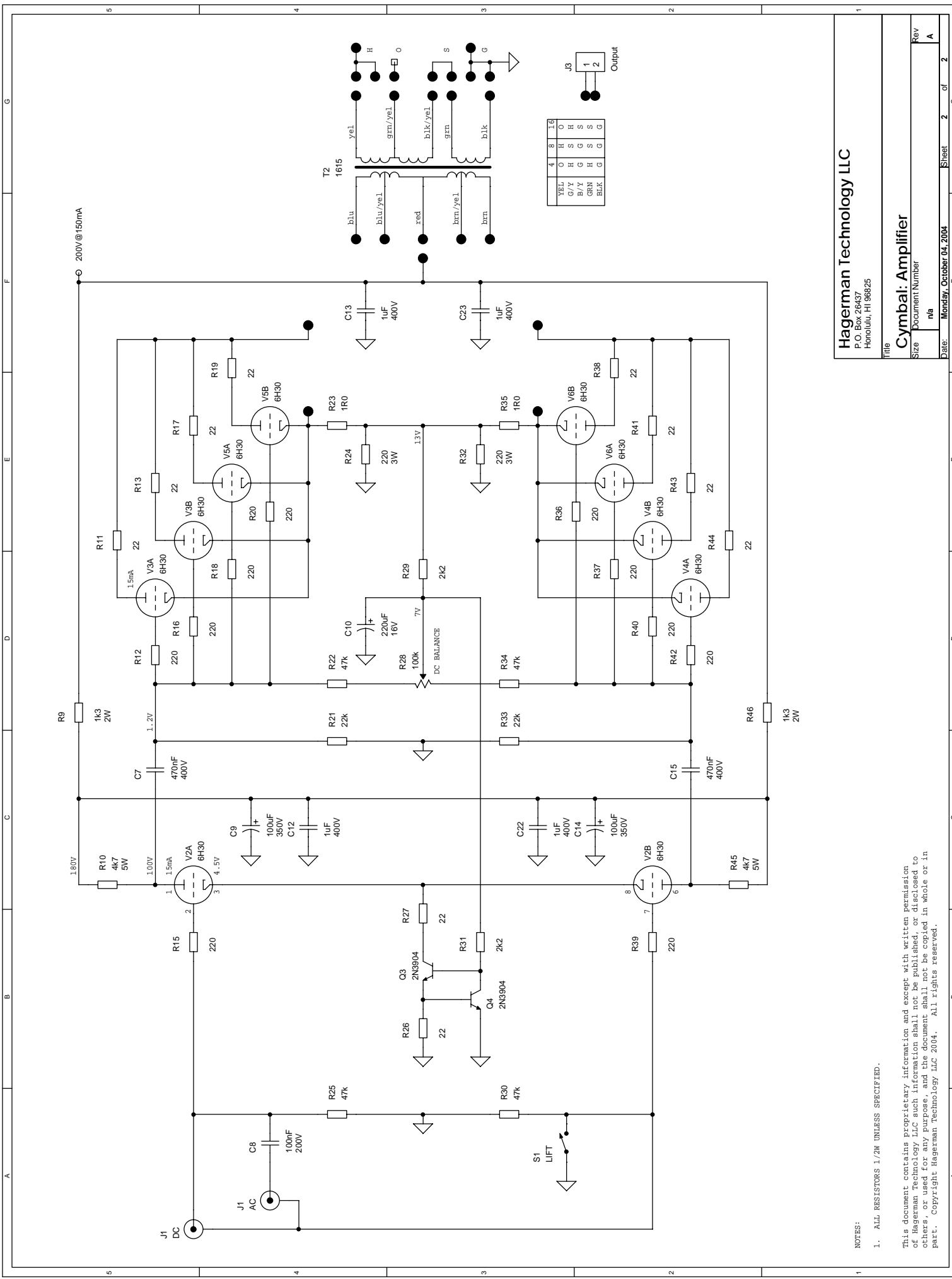
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Title: _____
 Size: _____
 Document Number: n/a
 Date: Thursday, September 02, 2004

Cymbal: Power Supply

Rev: A

Sheet 1 of 2



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Title

Cymbal Amplifier
 Document Number
 n/a

Date: **Monday, October 04, 2004** Sheet 2 of 2

- NOTES:
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4	3	1	6
YEL	O	H	O
G/Y	H	S	H
B/Y	G	G	S
GRN	H	S	S
BLK	G	G	G

