HAGERMAN
TECHNOLOGY

Cornet2

Phonostage Kit Manual

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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Disclaimer

The information contained in this document is subject to change without notice. Hagerman Technology LLC shall not be liable for errors contained herein or for consequential damages in connection with the furnishing, performance, or use of this material. See Chapter 6 for warranty information.

1 Before You Begin

Description

Congratulations! You have just purchased one of the highest performance-per-dollar audiophile products available. The Cornet2 phonostage 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.

The circuit topology features common cathode class-A gain stages with no feedback, passive equalization, and cathode follower output buffers with constant current sink loading. Vacuum tube rectification for high voltage provides a gentle turn-on without the need for muting circuits. The moderate gain accommodates all moving magnet and high output moving coil cartridges.

The Cornet2 half-kit consists of these instructions, a blank circuit board, and a 1:1 drill guide. You must purchase the remaining components from a few other sources. Electronics are available from DigiKey and Antique Electronic Supply; the chassis from Lansing Instruments. You may also substitute parts from your own stock.

Features

- All vacuum-tube signal path
- Pure class-A amplifier stages
- No feedback
- Cathode follower low impedance outputs
- Vacuum tube B+ rectification

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 a factory assembled Cornet2, 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 C203 to AES #CAUD1-450. Change C200, C206, and C208 to AES #CAU1-450.
- Upgrade to gold plated RCA jacks: Buy RCJ-35 from **www.allelectronics.com**. Even better, use AES #S-H267W (white) and #S-H267R (red).
- Change chassis anodize color from clear to black: Use Lansing #B2H12-V01B.

Parts List

Parts should be ordered directly from **www.digikey.com** and **www.tubesandmore.com** (AES), and **www.lansing-enclosures.com**. See lists on following pages.

Component	Qty	DigiKey	References
47uF 450V	5	493-1461-ND	C103, C201, C207
10,000uF 10V	3	493-1275-ND	C106, C209, C210
470uF 10V	2	493-1269-ND	C205
0.1uF 50V	2	EF1104-ND	C102, C211
1uF 400V	6	PF4105-ND	C200, C206, C208
0.1uF 400V	2	PF4104-ND	C203
47nF 630V	2	495-1331-ND	C202
1nF 630V	2	495-4164-ND	C204
0.01uF 2kV	2	490-4217-ND	C100, C101
LED R/G	1	754-1235-ND	D100
1N5821	4	1N5821DICT-ND	D101, D102, D103, D104
Grommet	10*	RP456-ND	
Power Cord	1	Q120-ND	
Heat Sink	8	HS372-ND	
Feet	4	SJ5523-0-ND	
Standoff #4x1”	10*	4806K-ND	
Fuse	2	F2419-ND	F100
Dome, LED	1	L30032-ND	
Grounding Post	1	J587-ND	
RCA-2	2	CP-1435-ND	J200, J201
AC Input	1	CCM1647-ND	
Fuse Holder	1	WK0011-ND	
Terminal	30	1285K-ND	
Crimp	30	A27804-ND	
Switch, Mono	1	360-1791-ND	S200
2N3906	2	2N3906FS-ND	Q100, Q101
2SC3942	2	TIP50-ND	Q200
220 1W	20	220W-1-ND	R101, R102, R103, R201, R208, R212, R214, R216, R217, R219
680 1W	5	680W-1-ND	R104
910 1W	10	910W-1-ND	R203, R210, R215, R218
1.8k 1W	5	1.8KW-1-ND	R220, R221
3.3k 1W	5	3.3KW-1-ND	R213
6.8k 1W	5	6.8KW-1-ND	R100, R106, R108, R205
10k 1W	5	10KW-1-ND	R105, R204, R211
47k 1W	5	47KW-1-ND	R200
150k 1W	10	150KW-1-ND	R202, R207, R209
330k 1W	5	330KW-1-ND	R107, R206, R222
1.8 5W	1	1.8W-5-ND	R223

* Minimum purchased quantity.

Component	Qty	AES	References
Socket, 8-pin	1	P-ST8-193G	
Socket, 9-pin	3	P-ST9-214G	
Transformer	1	P-T370BX	T100
12AX7	2	12AX7	V200, V201
12AU7	1	12AU7	V202
5Y3GT	1	5Y3GT	V100
Screw #10	1*	P-H245	
Nut #10	1*	S-HHN1032	
Washer #10	1*	S-HLW10	
Screw #4	3*	S-HS440-14	
Nut #4	2*	S-HHN440	
Lug	1*	S-H112	

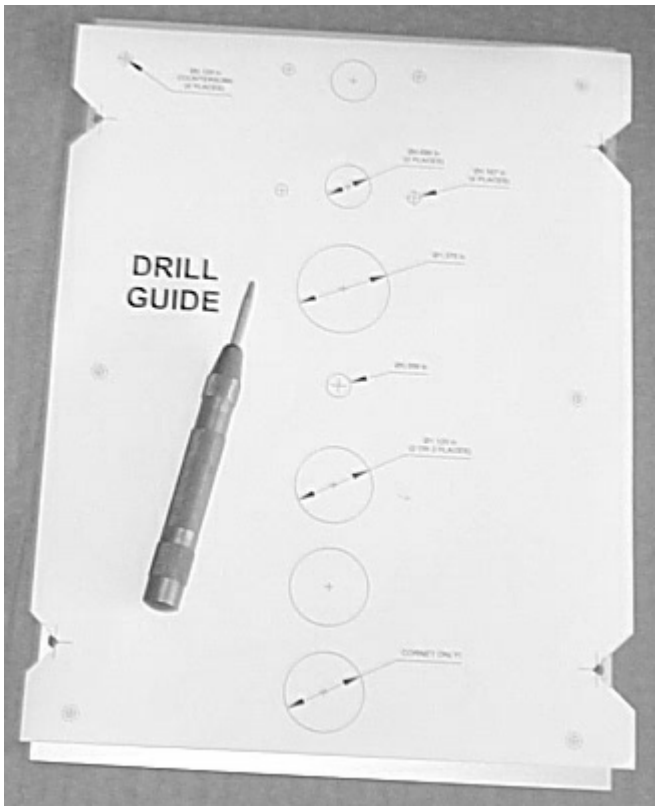
Component	Qty	Lansing	References
Chassis	1	B2H12-V01A	

3 Assembly

Chassis

The instructions below refer specifically to the Lansing Instruments' enclosure. Nevertheless, you can still use a low-cost classic "Hammond" style chassis. Follow these step-by-step instructions to machine the chassis pieces. If you plan to use upgraded RCA jacks, their 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.

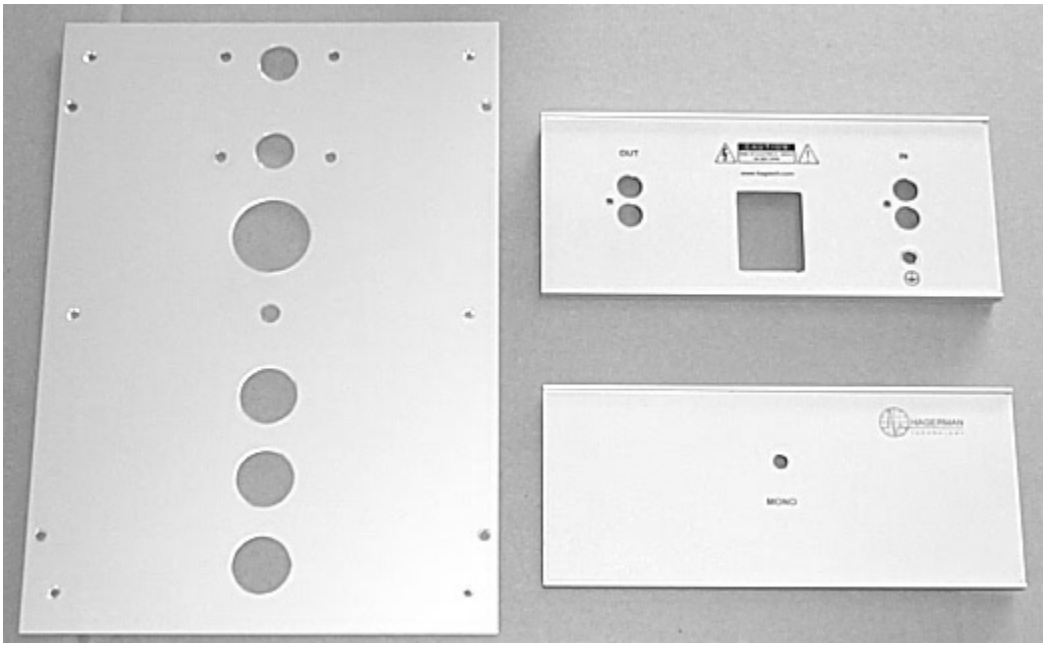
- Use a scissor to notch out the four alignment holes in the printed drill guide.
- Place the drill guide on top of a blank top cover; align so the mounting holes are centered in the crosshairs. Use a metal punch (sharp nail) to mark the center of each hole.



Drill guide placed on top cover.

- Cut out the front and rear panel drill guides using a straight edge and razor blade.

- 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 the top cover with dishsoap to remove fingerprints and grime.



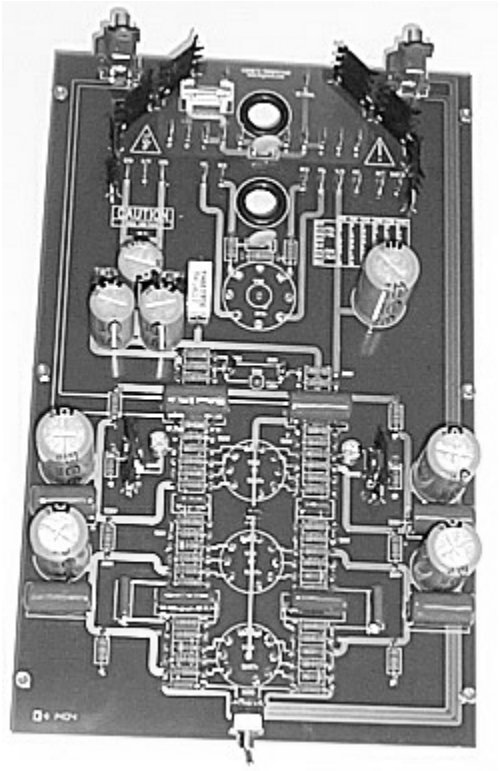
Finished chassis pieces.

Circuit Board

Assemble in the following order, solder and clip leads before continuing.

- Solder sockets onto the *backside* of circuit board. Insure rotation of octal socket is correct (see dimple).
- Add six standoffs to bottom of circuit board using #4 nuts.
- Add two grommets.
- Install quick release terminals (for transformer wiring).
- Install all resistors.
- Install diodes.
- Install the 2N3906 transistors.
- Install all capacitors.
- Install fuse holder.
- Install RCA jacks.
- Install mono switch (optional).
- Mount the 2SC3942 transistors to heat sinks using #4 hardware. Install.
- Install heat sink shields near RCA connectors and transformer wiring.

- Install LED onto *backside* of circuit board. Keep leads as long as possible (about one inch). Tab on side labeled "LED*".
- Soak and brush assembly in 99% isopropyl alcohol to remove solder flux residue. Blow dry.



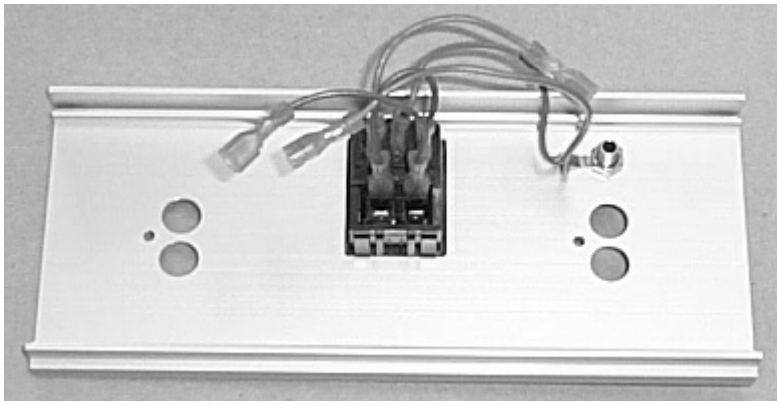
Completed circuit board.

Integration

If built properly, everything should fit together like a glove.

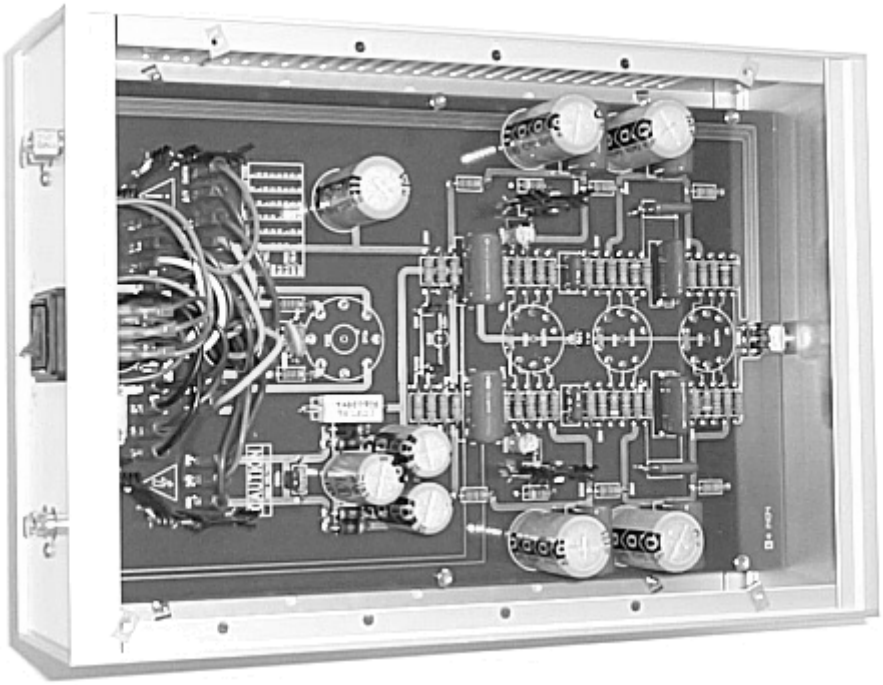
- Install rubber grommets to top cover.
- Install LED window to top cover.
- Mount transformer to top cover using the #10 hardware with primary wires towards outside.
- Mount circuit board assembly to top cover, routing transformer wires through grommets.
- Cut length of transformer wires to 5 inches above circuit board. Save the scraps!
- Add crimp terminals to all of the 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.



Rear panel showing wiring.

- Connect L (brown), N (blue), and E (green) wires from rear panel to terminals on circuit board.
- Secure rear panel to assembly using #4 screws on the RCA jacks.
- Add chassis side panels.
- Install front panel.
- Add fuse.
- Install vacuum tubes
- Add feet to bottom cover. Do not install until after testing.



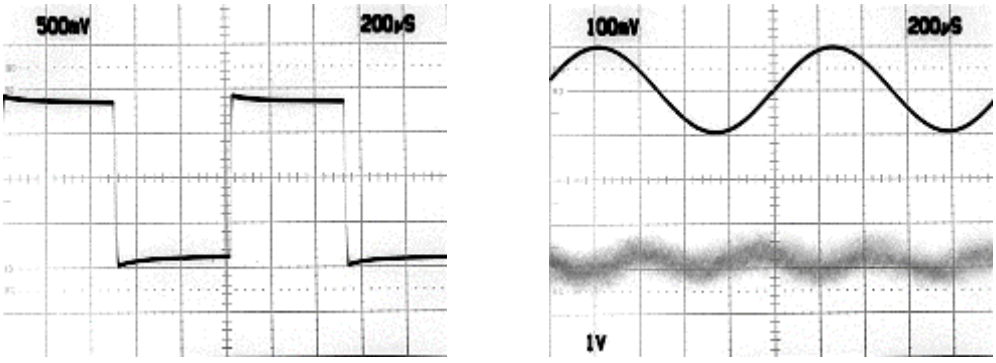
Completed assembly.

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 1kHz squarewave signal through an inverse RIAA Filter and into the Cornet2. Observe output on oscilloscope.
- Turn off, remove power cord and install bottom cover.



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

Connections

Use your Cornet2 just like any other standalone phonostage. The turntable ground wire connects to the ground lug on the rear panel. Connect the turntable output wires to the input RCA jacks. Connect the outputs to a linestage or integrated amplifier.

- Listen. Roll tubes. Enjoy.

5 Specifications

The following specifications are subject to change without notice.

Item	Specification
Gain	44dB
Input Impedance	47k ohm
Output Impedance	1k ohm
Bandwidth	15Hz to 30kHz (minimum)
RIAA Accuracy	+/-1dB from 25Hz to 25kHz
Distortion	0.02% @1kHz
SNR	72dB A-weighted
Overload	250mV @1kHz
Size (PCB)	7.25 x 11.65 inches
Size (Chassis)	8 x 12 x 3 inches
Input Power	35W
Input Voltage	100V, 110V, 120V, 200V, 220V, 240V
Tube Compliment	12AX7 (ECC83) x 2, 12AU7 (ECC82) x 1, 5Y3GT x 1

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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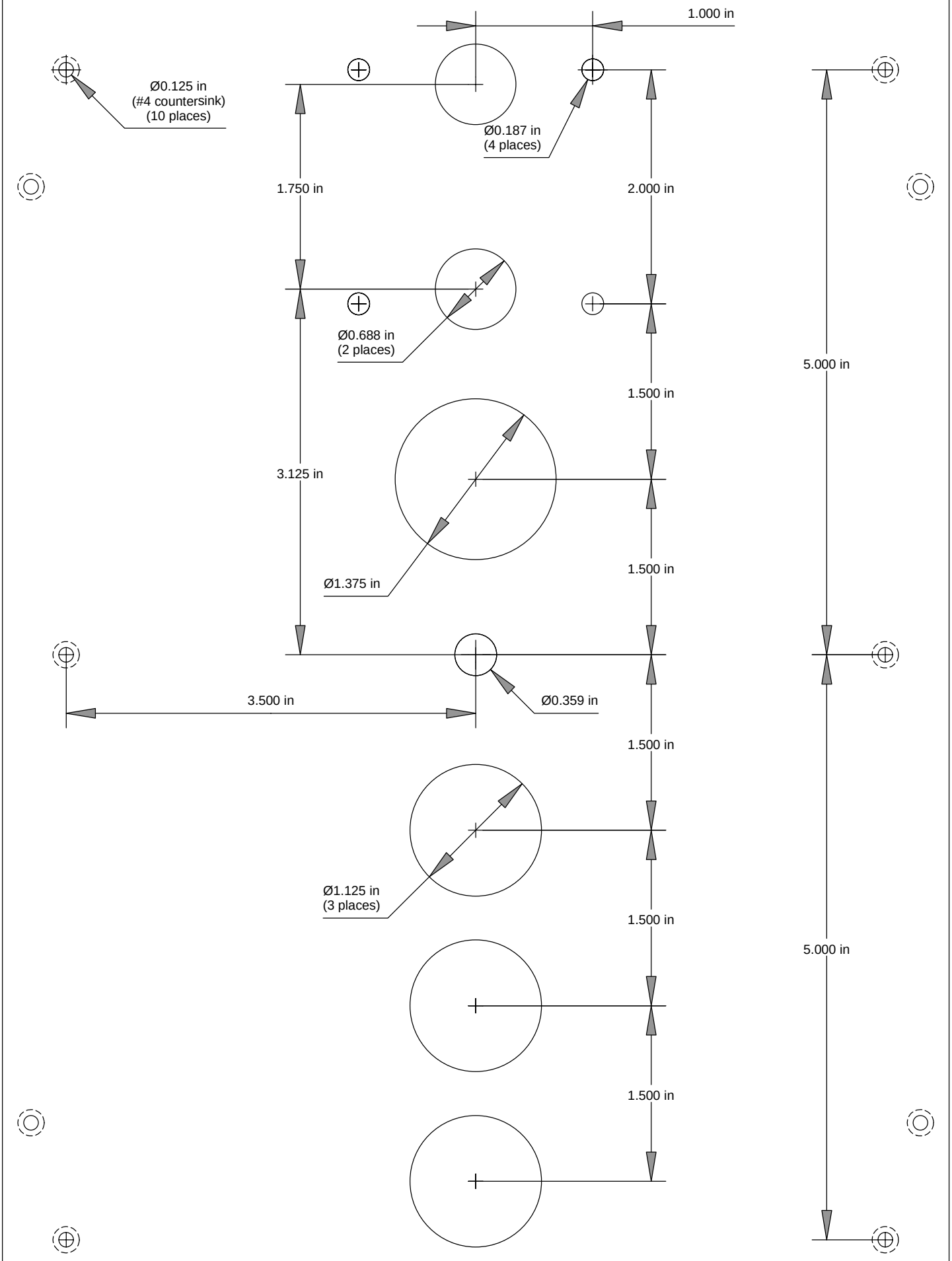
808-383-2704 (voice)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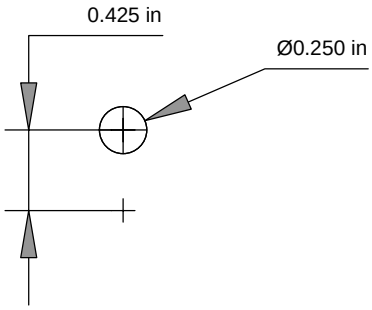
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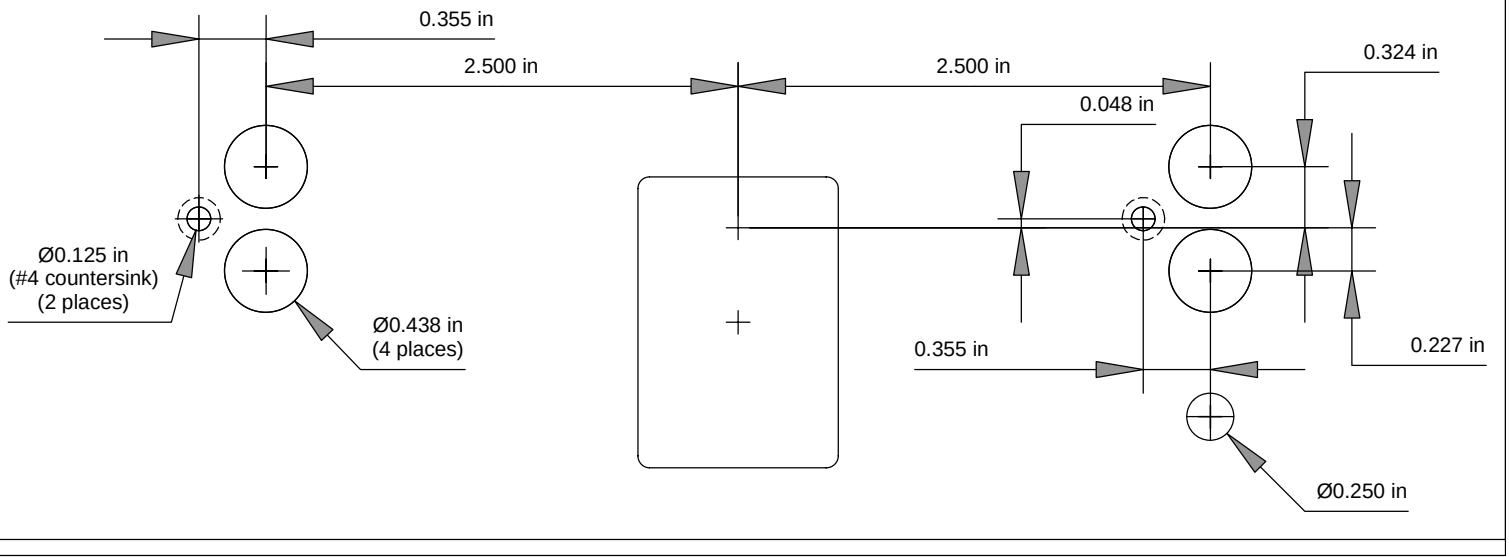
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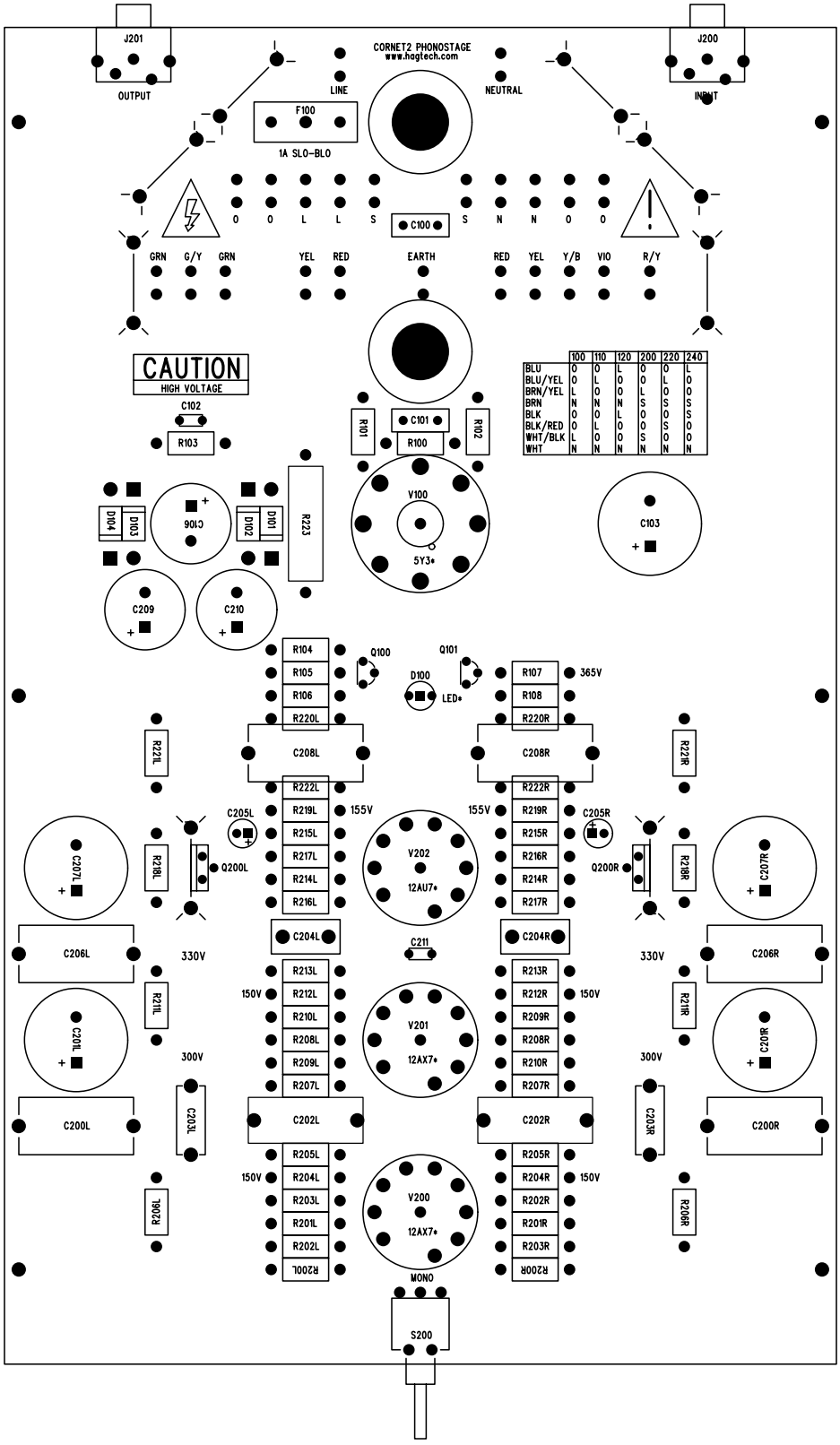
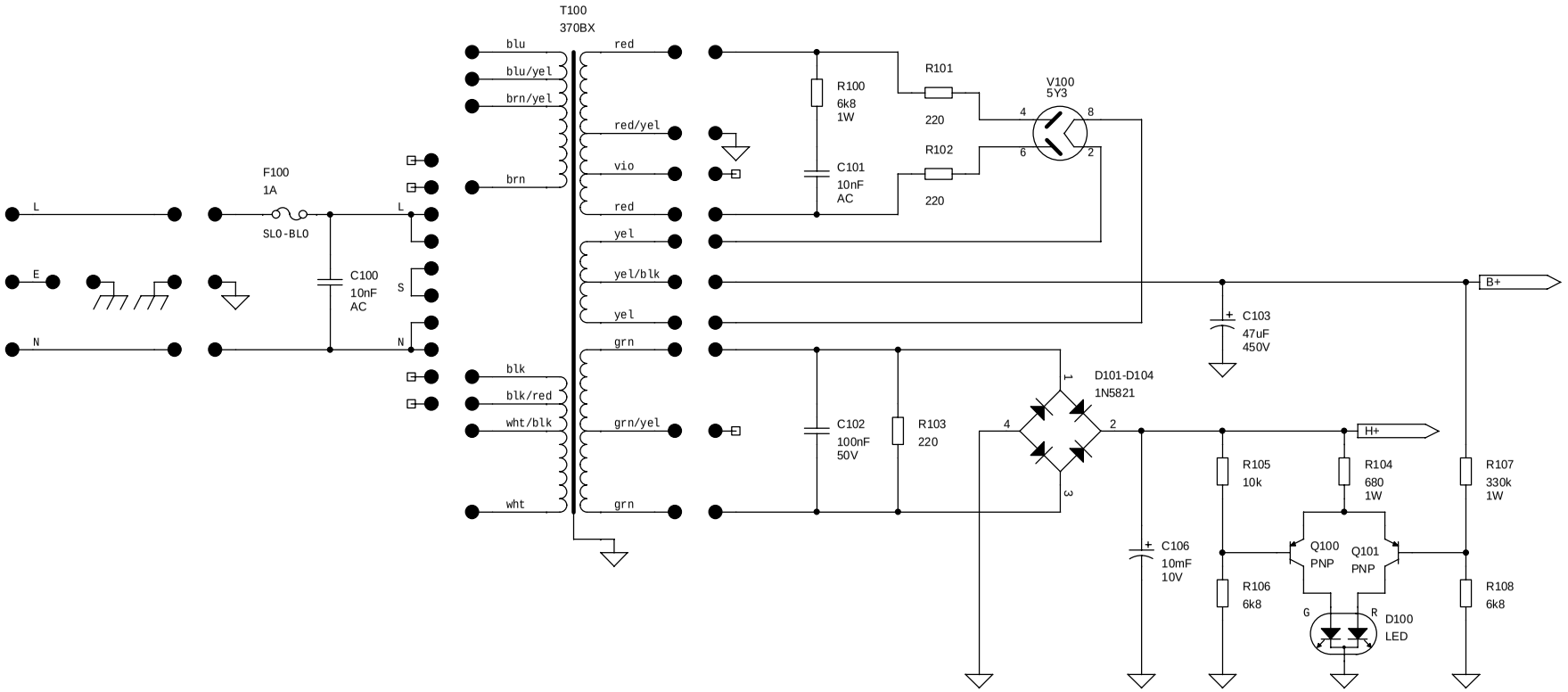


	100	110	120	200	220	240
BLU	O	O	L	O	O	L
BLU/YEL	O	L	O	O	L	O
BRN/YEL	L	O	O	L	O	O
BRN	N	N	N	S	S	S
BLK	O	O	L	O	S	O
BLK/RED	O	L	O	O	S	O
WHT/BLK	L	O	O	S	O	O
WHT	N	N	N	N	N	N



	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	N	S	S	S
Blk	NC	NC	L	NC	NC	S
Blk/Red	NC	L	NC	NC	S	NC
Wht/Blk	L	NC	NC	S	NC	NC
Wht	N	N	N	N	N	N

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Title
Constructor: Powersupply

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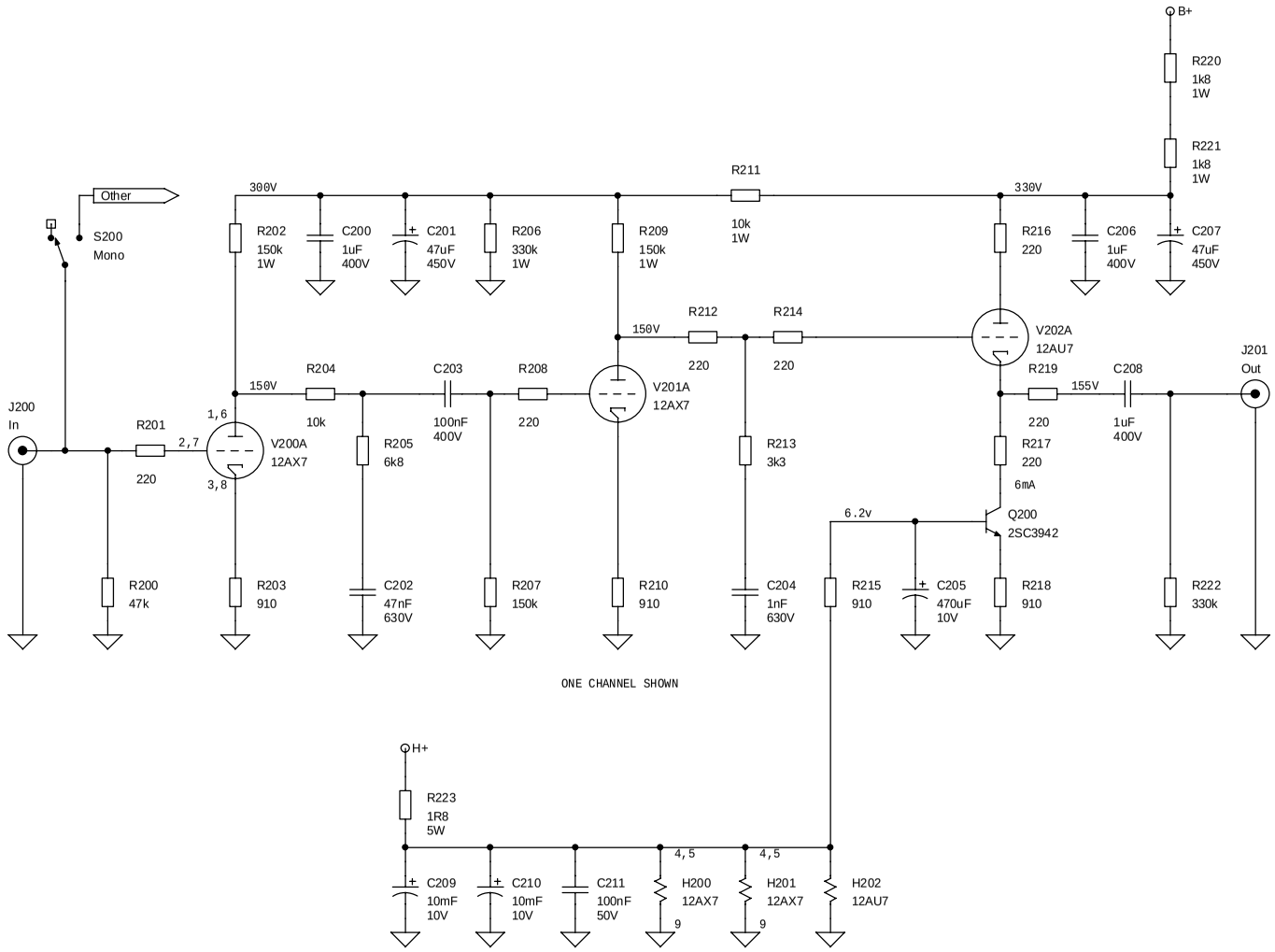

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Title
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