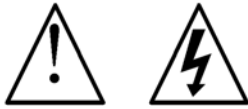




Chime

DAC 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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1 Before You Begin

Description

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

Built around the HagDac daughter card, the Chime motherboard provides all power and I/O connections, a USB to S/PDIF converter, and an all vacuum tube output gain stage. Included are an input select switch, phase switch, and volume control, allowing the Chime to run in a standalone system without the need for a linestage. The tube gain stage features no feedback; high linearity and current sink loaded output cathode followers. The circuits were inspired by the highly acclaimed Cornet phonostage. Dc heaters and tube rectification with exceptional filtering insure quiet hum-free operation. Playback is optimized for Redbook CD only (44.1k).

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

Features

- All vacuum tube output stage
- No feedback
- USB input
- Volume and phase controls

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 Chime, 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

You can customize your Chime with various upgrades and modifications. For example, you do not need to build with the input select switch, phase switch, or volume control. The following list offers a few other suggestions.

- ❑ Upgrade signal capacitors to “auricap” brand: Change output capacitors C409 to AES #CAU1-450. Go further by doing it for power supply bypass capacitors C411 and C407.
- ❑ Upgrade J401 and J405 to gold plated RCA jacks: Buy #RCJ-35 from www.allelectronics.com. Even better, use AES #S-H267W (white) and #S-H267R (red).
- ❑ Customize knob color: Change knobs to AES #P-K300R (red) or P-K300W (white) or P-K300BU (blue) or P-K300Y (yellow) or P-K300C (cream).
- ❑ Change chassis anodize color from clear to black: Use Lansing #B2H12-V01B.
- ❑ If you want to use the “slow rolloff” mode on HagDac, do not install R417.

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, C400, C406
10,000uF 10V	3	493-1275-ND	C106, C410, C411
4700uF, 25V	4	493-1308-ND	C400, C401, C402, C403
470uF 10V	4	493-1269-ND	C404, C405, C408
47uF, 10V	1	493-1265-ND	C508
22pF 50V	1	478-3162-ND	C501
47pF 50V	1	478-3195-ND	C502
1uF 50V	12	478-2479-ND	C102, C414, C415, C416, C417, C412, C500, C503, C504, C505, C506, C507
1uF 400V	6	PF4105-ND	C407, C409, C411
0.01uF 2kV	2	P11423CT-ND	C100, C101
LED R/G	3	160-1715-ND	D100, D404, D405
MBR1100	4	MBR1100-ND	D400, D401, D402, D403
1N5821	4	1N5821DICT-ND	D101, D102, D103, D104
Grommet	10*	RP456-ND	
Power Cord	1	Q120-ND	
Heat Sink	6	HS372-ND	
Feet	4	SJ5523-0-ND	
Standoff #4x1"	10*	4806K-ND	
Fuse	5*	F2419-ND	
Dome, LED	3	L30032-ND	
Grounding Post	1	J587-ND	
SIP-4	1	A26416-ND	J402
SIP-20	1	A26428-ND	J403
RCA-2	2	CP-1435-ND	J401, J405
USB Jack	1	151-1081-ND	J500
AC Input	1	CCM1647-ND	
Fuse Holder	1	WK0011-ND	F100
Terminal	40*	1285K-ND	
Crimp	40*	A27804-ND	
Switch, Select	1	GH7106-ND	S400
Switch, Phase	1	360-1791-ND	S401
Crystal, 12MHz	1	X1037-ND	Y500
2N3906	6	2N3906FS-ND	Q100, Q101, Q400, Q401, Q402, Q403
2SC3942	2	2SC3942-ND	Q402
LM7808	1	NJM78M08FA	U400
LM7908	1	NJM79M08FA	U401
Pot, Volume	1	P2T3503-ND	R426
Transformer	1	237-1048-ND	T400

Transformer	1	470-1007-ND	T500
22 1/4W	5*	22QBK-ND	R501, R502
220 1/4W	5*	220QBK-ND	R505, R506
1.5k 1/4W	5*	1.5kQBK-ND	R500, R504
1M 1/4W	5*	1.0MQBK-ND	R503
1.0 1W	2	1.0W-1-ND	R405, R406
10 1W	2	10W-1-ND	R409, R410
75 1W	4	75W-1-ND	R413, R414, R415, R417
220 1W	13	220W-1-ND	R101, R102, R103, R427, R430, R433, R434, R432
680 1W	3	680W-1-ND	R104, R440, R443
910 1W	10	910W-1-ND	R403, R404, R411, R412, R428, R431, R436
3.9k 1W	6	3.9KW-1-ND	R424, R425, R438
6.8k 1W	4	6.8KW-1-ND	R100, R106, R108, R442
10k 1W	2	10KW-1-ND	R105, R441
150k 1W	2	150KW-1-ND	R429
330k 1W	7	330KW-1-ND	R107, R437, R439, R435
3.0 5W	1	3.0W-5-ND	R423
USB Cable	1	AE9932-ND	
Ferrite Bead	2	M8702	L400, L402

* Minimum purchased quantity.

Component	Qty	AES	References
Knob	2	P-K300	
Socket, 8-pin	1	P-ST8-193G	
Socket, 9-pin	2	P-ST9-214G	
Transformer	1	P-T370BX	
12AX7	1	12AX7	
12AU7	1	12AU7	
5Y3GT	1	5Y3GT	
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	

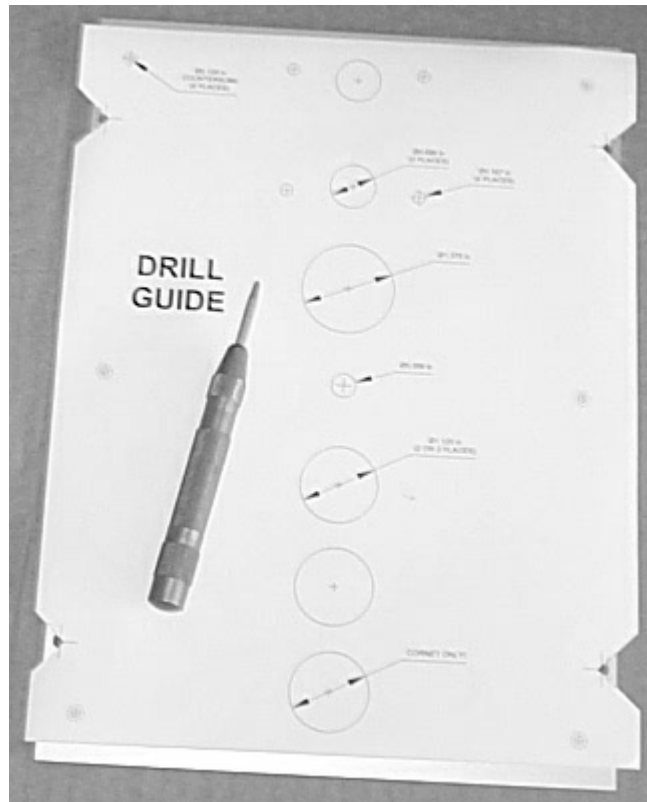
Component	Qty	Lansing	References
Chassis	1	B2H12-V01A	

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 (3" height). 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 may need to be lowered to prevent interference with the circuit board.

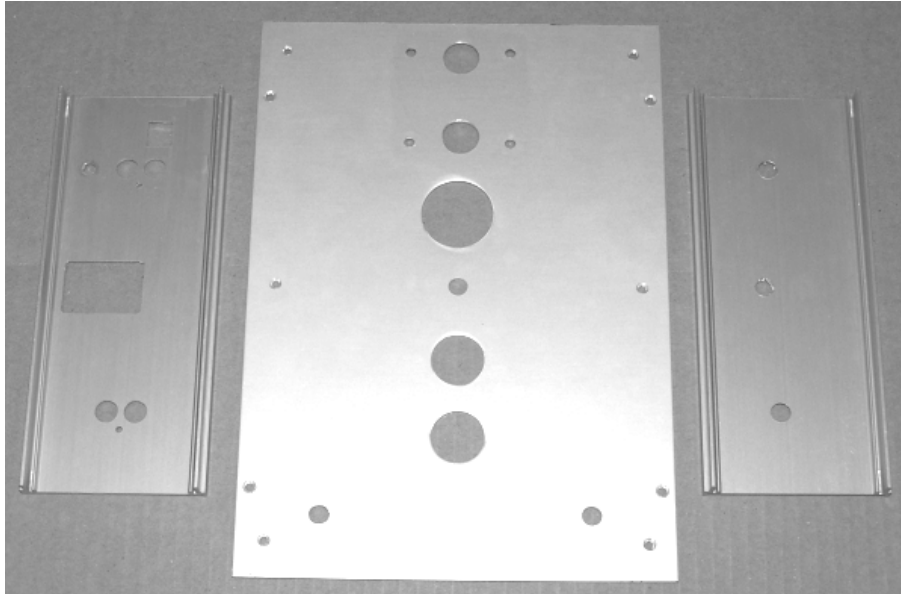
- ❑ Use a scissor to notch out the four alignment holes in the printed drill guide.
- ❑ Place the drill guide on top of a blank top cover; align so the mounting holes are centered in the crosshairs. Use a metal punch (sharp nail) to mark the center of each hole.



Drill guide placed on top cover.

- ❑ Cut out the front and rear panel 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.
- ❑ Apply masking tape to the exposed aluminum on the panels around the decals and spray paint lightly with a clear acrylic lacquer for a smudge-free finish.
- ❑ Wash the top cover with dishsoap to remove fingerprints and grime.



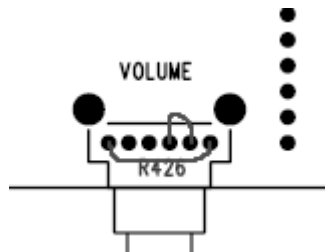
Finished chassis pieces.

Circuit Board

Assemble in the following order; solder and clip leads before continuing. The surface mount USB chip U500 has been pre-installed for your convenience.

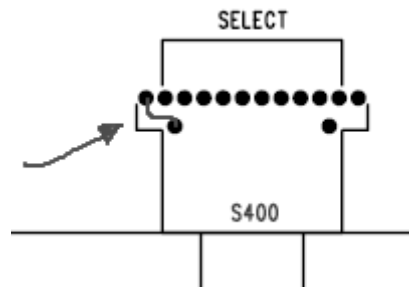
- ❑ Solder sockets onto the *backside* of circuit board. Insure rotation of octal socket is correct (see dimple). Bend leads on octal socket flat, to prevent shorting to low voltage transformer.
- ❑ Solder J402 and J403 onto *backside* of circuit board.
- ❑ Install C100 and C101 onto *backside* of circuit board.
- ❑ 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 and TO-92 (small) transistors. For Q400 and Q402, add a small ferrite bead core around the base lead prior to installation (center leg). These beads become inductors L400 and L402.

- ❑ Install Y500 crystal. Use a spare wire lead to solder the crystal case to the ground hole right next to R503.
- ❑ Install all capacitors, starting with the small ones.
- ❑ Install T500. You may need to clip leads to prevent interference with C505.
- ❑ Install fuse holder.
- ❑ Install RCA jacks.
- ❑ Install USB socket.
- ❑ Install volume control. If you choose not to include control, bypass with jumpers as shown.



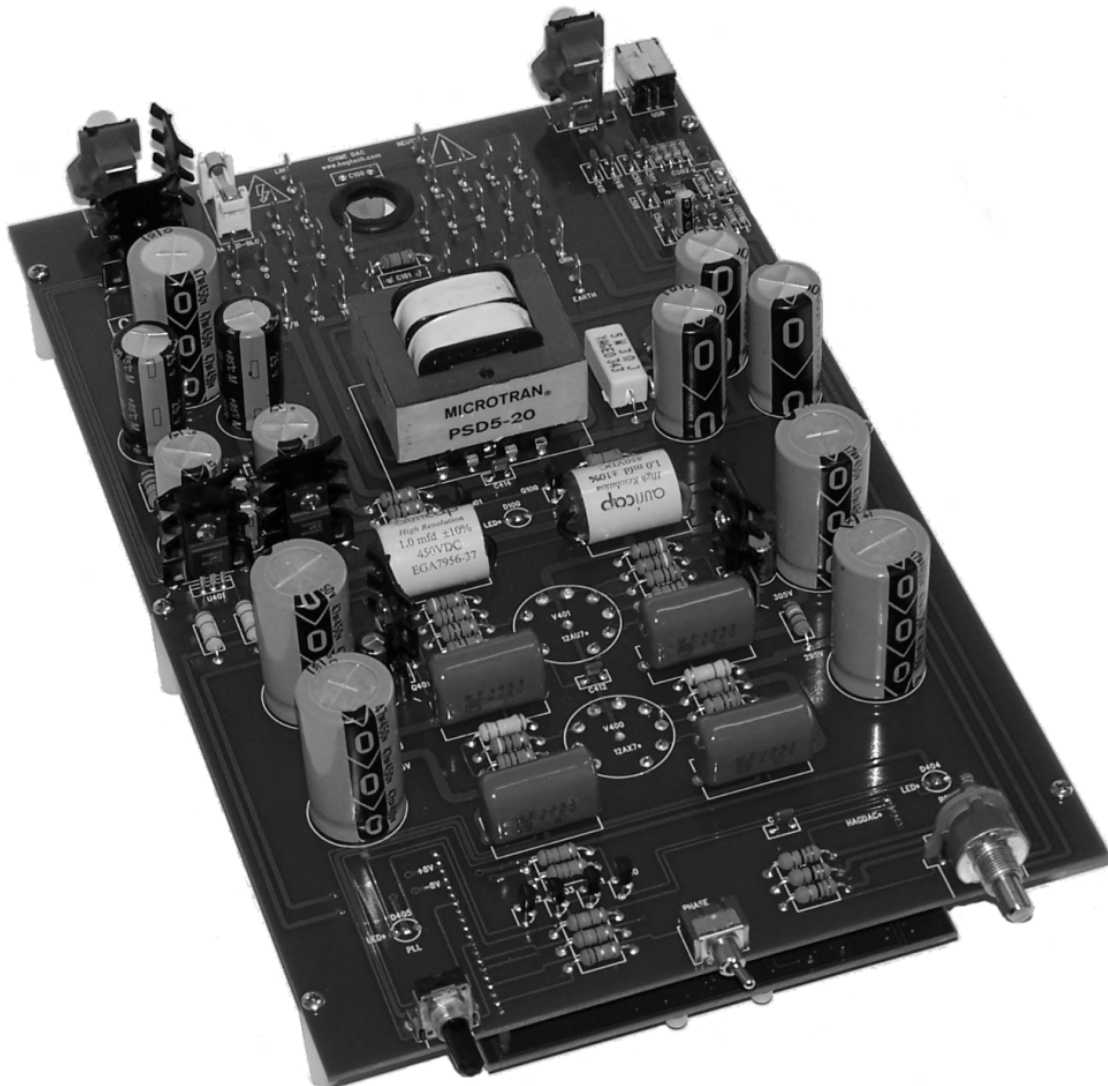
Bypassed volume control (if removed).

- ❑ Install phase switch.
- ❑ Install select switch. Set rotation so flat on shaft points to 7:30 o'clock. Insert miniature limit pins to locations at 12:00 and 3:00 o'clock. Add retaining sticker.
- ❑ Add short jumper wire to select switch as shown.



Jumper added to select switch.

- ❑ Install T400.
- ❑ Mount U400 and U401 to heat sinks using #4 screws and nuts. Install.
- ❑ Mount Q402s to heat sinks using #4 screws and nuts. Bend center lead to fit. Install.
- ❑ Install heat sink shields near RCA connectors and transformer wiring.
- ❑ Install LEDs onto *backside* of circuit board. Keep leads as long as possible (about one inch). Tab towards side labeled "LED*".
- ❑ Soak and brush assembly in 99% isopropyl alcohol to remove solder flux residue. Blow dry.
- ❑ Plug HagDac onto connectors.



Completed circuit board.

Integration

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

- ❑ Install rubber grommets to top cover.
- ❑ Install LED windows 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!

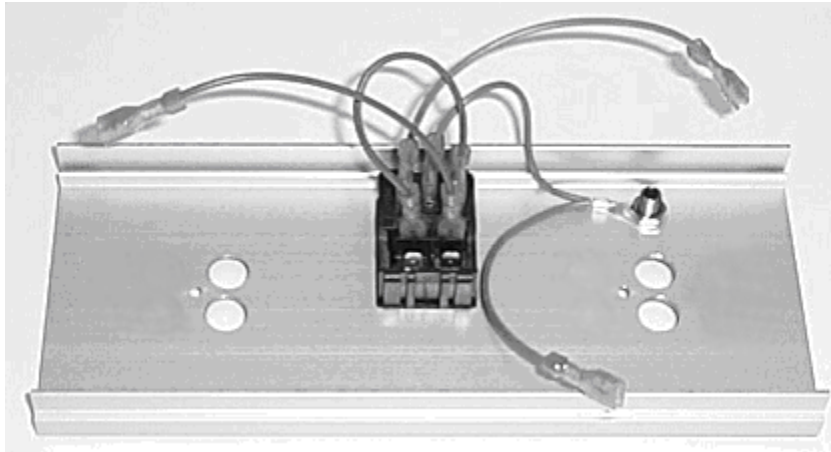
- ❑ Add crimp terminals to all of the transformer wires.
- ❑ Add crimp terminals to both ends of scrap wires colored red, yellow, red/yellow, and yellow/black. They are needed to supply power to T400.
- ❑ Plug in the transformer secondary wires to their respective terminals labeled on the circuit board.
- ❑ Plug in the transformer primary wires to the terminals on the circuit board. Use the following chart for proper voltage selection.

Wire	100V	110V	120V	200V	220V	240V
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	O	S
BLK/RED	O	L	O	O	S	O
WHT/BLK	L	O	O	S	O	O
WHT	N	N	N	N	N	N

- ❑ Install the red and yellow jumper wires between the T400 terminals and L+, N+ and S+ terminals. Use the following chart for proper voltage selection.

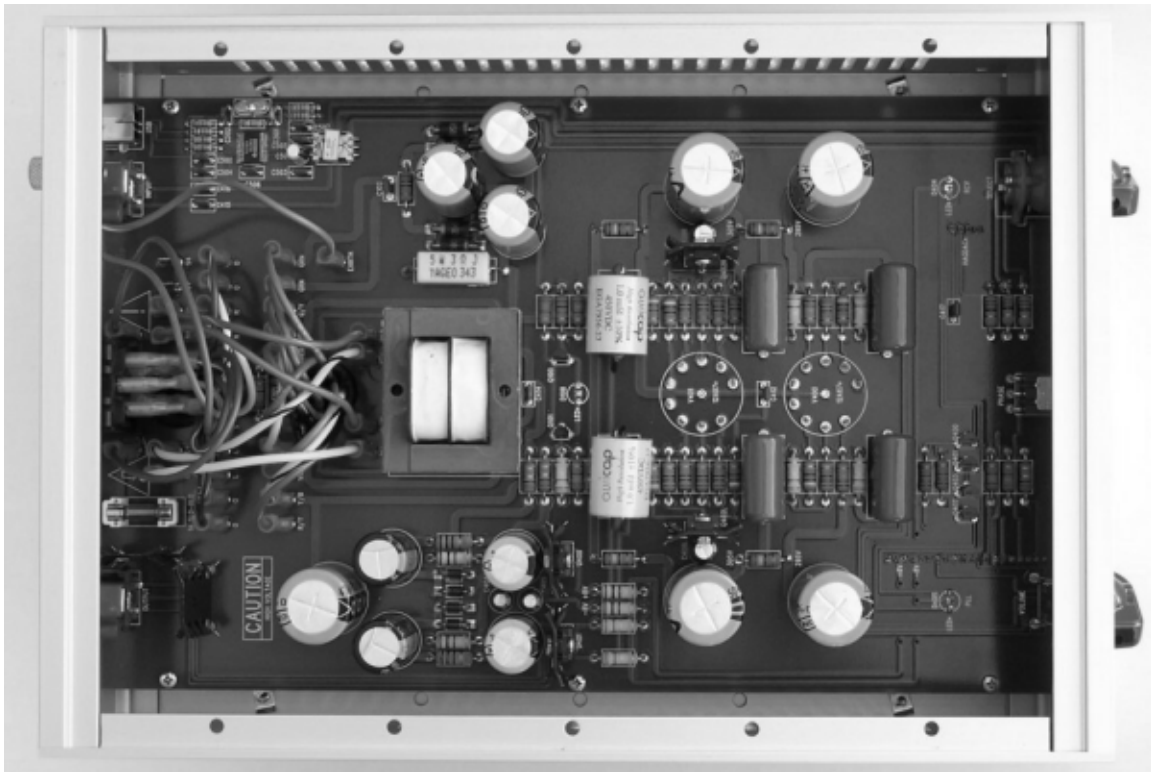
Wire	100V	110V	120V	200V	220V	240V
YEL	L+	L+	L+	L+	L+	L+
RED/YEL	N+	N+	N+	S+	S+	S+
YEL/BLK	L+	L+	L+	S+	S+	S+
RED	N+	N+	N+	N+	N+	N+

- ❑ 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.
- ❑ Install front panel. Secure in place with switch and potentiometer nuts.
- ❑ Add chassis side panels. If anodized, scrape away to expose bare metal where mounting screws attach. This is to maintain an electrical ground for all chassis pieces.
- ❑ Add fuse.
- ❑ Turn select switch to center position. Apply knob pointing straight up.
- ❑ Set volume control with detent flat at center position. Add knob pointing straight up.
- ❑ Install vacuum tubes
- ❑ Add feet to bottom cover. Do not install until after testing.



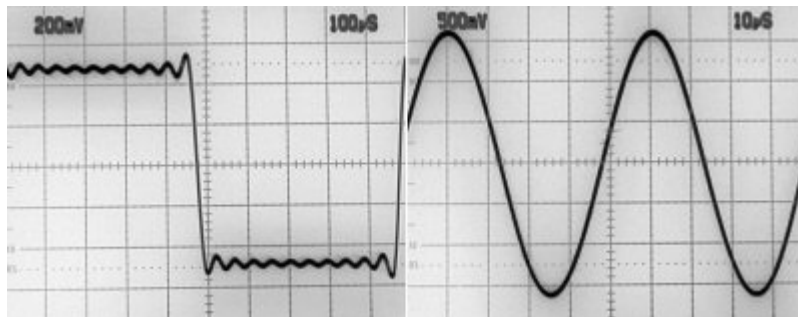
Completed assembly.

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 LEDs should be red. The center LED switches to green after about 20 seconds. This indicates both heater and high voltage circuits are working. The other LEDs indicate operational status of the HagDac. The left one shows S/PDIF receiver ok, the right one PLL reclocker ok. Neither will turn green unless a valid CD input is present.

- ❑ Measure power supply and plate voltages using a DVM. Voltages are marked on circuit board and schematic. Due to tube variations, plate voltages will range as much as +/-10V.
- ❑ Connect an S/PDIF digital audio input. Press “play”. All three LEDs should be green.
- ❑ Turn off, remove power cord and install bottom cover.



1kHz square wave and 20kHz sinewave.

Connections

The Chime connects to your audio system just like any other DAC. If you installed the volume control, the linestage can be eliminated, connecting the Chime straight to the power amplifiers.

Note: The left and right outputs are swapped on this revision circuit board.

- ❑ Listen. Roll tubes. Enjoy.

5 Specifications

The following specifications are subject to change without notice.

Item	Specification
Input Impedance (S/PDIF)	75 ohm
Input Data Rates	44.1k
Inputs	S/PDIF x 2, USB
Bandwidth (analog)	10Hz to 100kHz
Gain (analog)	30dB
Distortion (analog)	0.03% @1kHz @1Vrms
Output Impedance	1k ohm
Output Voltage	1.2Vrms full scale
SNR	92dB A-weighted
Size (PCB)	7.25 x 11.65 inches
Size (Chassis)	8 x 12 x 3 inches
Weight	9.5 lbs.
Input Power	30W
Input Voltage	100V, 110V, 120V, 200V, 220V, 240V
Tube Compliment	12AX7 (ECC83), 12AU7 (ECC82), 5Y3GT (or GZ34)

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.

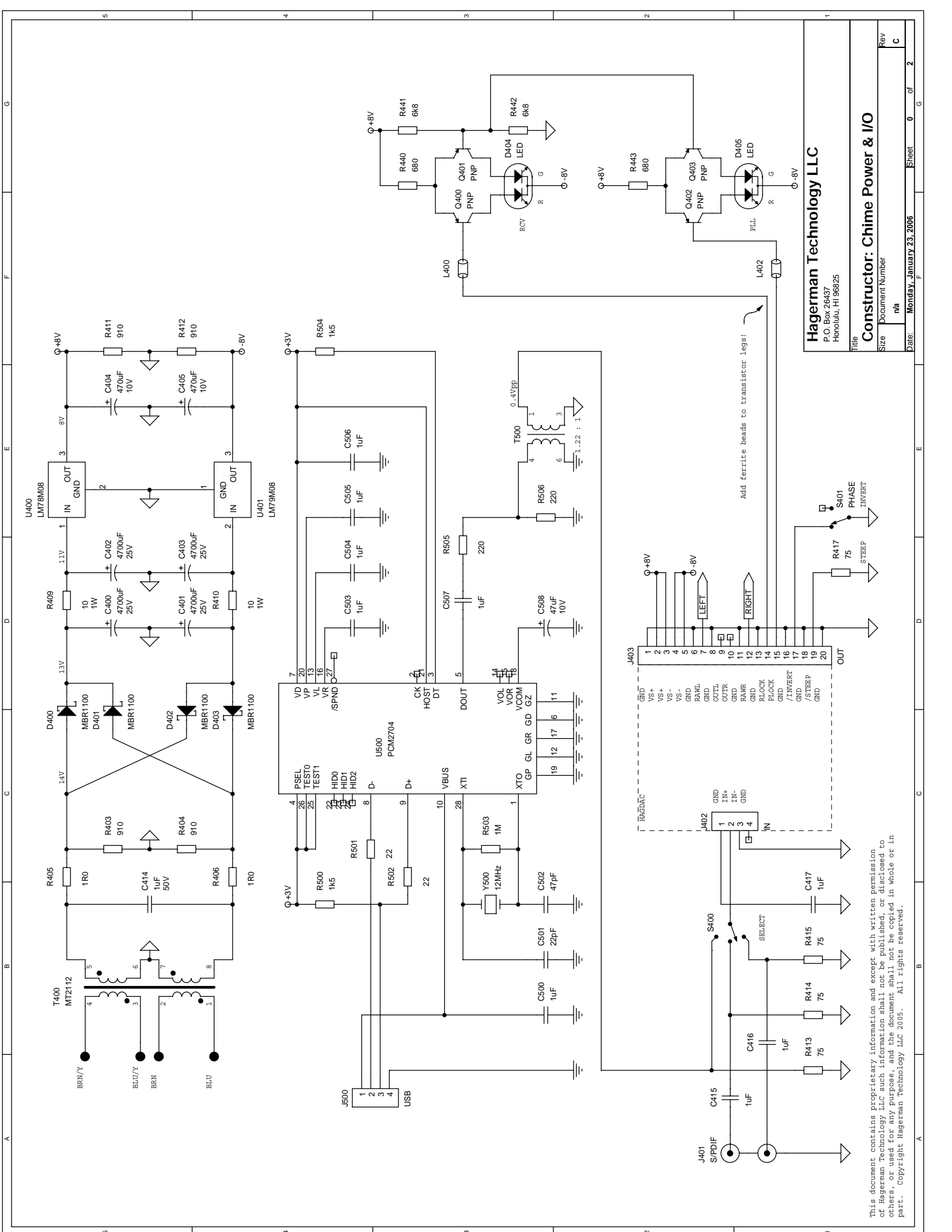
Under no circumstances shall Hagerman Technology LLC be liable for any loss, direct, indirect, incidental, special, or consequential damage arising out of or in connection with the use of this product.

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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