

WARNING!

PLEASE READ THE FOLLOWING INFORMATION CAREFULLY:

The device described in this assembly manual 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 THIS OR ANY OTHER HIGH VOLTAGE PROJECT KIT OR DEVICE**. Seek help from an experienced and competent technician before building any unfamiliar electronics circuit.

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In the unlikely event that any parts or components included in this kit are defective from the manufacturer, said parts or components will be repaired or replaced at the discretion of the seller. Damage to parts or components included in this kit caused by misuse, or made to be unusable due to neglect, or failure to follow the recommended procedures contained in this assembly manual will not be repaired or replaced by the seller.

PLEASE READ THIS MANUAL IN IT'S ENTIRETY BEFORE BEGINNING ASSEMBLY.

INTRODUCTION

Thank you for purchasing this kit.

The amplifier¹ that you are about to build produces an audiophile-quality, high-fidelity sound that will please even the most ardent and discerning listener. To achieve the best results, please follow the recommended assembly and layout instructions contained in this manual.

It is recommended that loudspeaker systems with a minimum sensitivity of 89dB SPL, 1 watt at 1 meter, and a nominal impedance of 4 to 8 ohms are to be used with this amplifier.

A schematic diagram of one channel of the amplifier and the power supply is included as an attachment to this manual.

FEATURES & SPECIFICATIONS:

- Single-ended class A operation
- Multiple output tube selection – KT88, 6550, EL34 (KT88 included with Master kit)
- 6N1P-EV preamplifier tube (included with Master kit)
- 5U4-GB rectifier tube (included with Master kit)
- Switchable operation mode for output tubes:
 - Triode mode: 5+ watt output per channel (with KT88)
 - Ultralinear mode: 10+ watt output per channel (with KT88)
- Conservative tube biasing allows for extended tube life without comprising sound quality
- No semiconductor devices are used in the construction of this amplifier

Additional components included with the Master kit:

- Output transformers:
 - 5000 ohm primary with 6 ohm secondary load
 - 20-20,000Hz flat frequency response across band
 - 120mA, 500V rated primary, 25 watt output
- Power supply choke:
 - 10 Henry, 200mA, rated at 500V
- Power transformer:
 - 120/240V primary, 50/60Hz
 - 750V, 200mA, center-tapped secondary
 - 6.3V, 5A, center-tapped secondary
 - 5V, 3.5A, center-tapped secondary

¹ Based on a design by Mikael Abdellah, and subsequent modifications by DIYAudio.com & AudioKarma.org members.

Assembly Manual - Single Ended High Fidelity Two-Channel Vacuum Tube Amplifier

PREPARATION: Listed below are the parts included in the Basic parts kit:

Resistors	Quantity		Capacitors	
220K 1/4W Metal Film 1%	2		30uF MP Oil	1
100R 1W Metal Film 1%	2		50uF MP Oil	2
1K 1/2W Metal Film 1%	4		Erse or Solen 10uF 630V	2
1.5K 1W Metal Film 1%	2		Erse 0.22uF 630V	2
47K 3W Metal Film 1%	2		Elna Silmic II 100uF 25V	2
560R 10W Wirewound 1%	2		Elna Silmic II 220uF 100V	2
1M 1/4W Metal Film 1%	2		0.1uF 400V MP Orange	1
10R 5W Wirewound 5%	1			
Connectors, Switches, Etc.	Quantity	Notes		
IEC Power Entry EMI/Fuse	1			
IEC Power Cord	1	for 120V USA kit only		
Front Panel Power Switch	1			
Neutrik RCA Jack	2	one red, one white		
Dual Binding Post	2			
DPDT Toggle Switch	1			
9-Pin Socket	1			
8-Pin Socket	3			
2" Capacitor Clamp	2			
1.5" Capacitor Clamp	1			
Turret Board	2			
Aluminum Knob	1			
100K Alps Volume	1			
2.5A or 2A Slow Blow Fuse	1			
Hammond 155H 5H Choke	2			
Hardware	Quantity	Notes		
4-40 Locknut	16			
4-40 x 1/4" Screw	32			
6-32 Locknut	8			
6-32 x 3/8" Screw	8			
6-32 Lockwasher	3			
8-32 Lockwasher	16	w/transformers only		
4-40 x 3/4" Standoff	8			
#4 Ground Lug	1			
#6 Ground Lug	1			
Crimp Terminal RED .187"	2 (120V kit)	4 (240V kit)		
Crimp Terminal RED .250"	2			
Crimp Terminal BLU .187"	2 (120V kit)	0 (240V kit)		
Crimp Splice	0 (120V kit)	1 (240V kit)		
Adhesive Tie Wrap Mount	4			
Tie Wrap	12			
Velcro Strip	2			
1/8" Heatshrink Tubing	18	inches		
1.5mm Hex Key Wrench	1			

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PREPARATION: -continued

The Basic parts kit also includes the following wire for connection of components:

Wire	unit = ft.
20AWG, 1C, STR, 600V BLK	3
20AWG, 1C, STR, 600V WHT	2
20AWG, 1C, STR, 600V RED	1
20AWG, 1C, STR, 600V BRN	5
20AWG, 1C, STR, 600V ORG	1.5
20AWG, 1C, STR, 600V YEL	1.5
20AWG, 1C, STR, 600V BLU	1
26AWG, 1C, STR, SHIELDED	3

If you have purchased the Master kit, the following items are included:

- 1 – Pre-punched Aluminum Chassis with Walnut Side Panels
- 1 – Aluminum bottom plate w/(4) #6 x 1/2" sheet metal screw

- 1 – PT750 Power Transformer w/mounting bolts & insulators
- 1 – CK10 Filter Choke w/mounting bolts & insulators
- 2 – OT5000 Output Transformer w/mounting bolts & insulators
- 3 – 4.5" X 3.75" Powder-coated transformer end bell
- 1 – 3.75" x 3.125" Powder-coated transformer end bell

- 2 – Electro-Harmonix KT88EH Power Vacuum Tube
- 1 – Electro-Harmonix 5U4GB Rectifier Vacuum Tube
- 1 – Russian NOS 6N1P-EV Driver Vacuum Tube

RECOMMENDED TOOLS REQUIRED FOR ASSEMBLY:



Figure 1

Figure 1, from left to right, bottom row:

Nut Driver

- 1/4"/7mm
- 5/16"/8mm
- 11/32"/9mm

Fine Point Needle Nose Pliers

Small Side Cutter

Small Adjustable Wrench for tightening 9/16" nut on back of toggle switch.

Figure 1, from left to right, next row up:

Medium Flat Blade Screwdriver

#2 Phillips Screwdriver

#1 Phillips Screwdriver

Wire Strippers for 18AWG through 26AWG

Crimp Tool for push-on crimp terminals

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RECOMMENDED TOOLS REQUIRED FOR ASSEMBLY: - continued

Figure 1, to the right of the hand tools previously mentioned:

- Temperature Controlled Soldering Iron with Stand & Sponge
 - 35 – 40 watt, 800°F, + or -, 1/4" screwdriver tip
 - Weller WP35 or equivalent recommended
- Rosin Core Solder, 60/40, 21 AWG
 - 60/40 Kester 44, 21 AWG or equivalent is recommended
- Digital Multimeter, preferably Auto-Ranging, 1000V minimum, AC or DC

Figure 1, at the top from left to right:

- “BBQ/Fireplace” Lighter – makeshift “heat-gun” for heat shrink tubing
 - Works OK if you use the blue part of the flame for not too long
 - If you've never done this before, practice before attempting on the amplifier circuitry
 - If you own a heat gun, use it
- Vacuum Desoldering Pump, and/or Solder Wick
 - not absolutely necessary, but if you make a mistake, OK maybe it IS necessary, it makes it easy to remove the solder from tube socket terminals or terminal strip lugs

FYI: If you are unfamiliar with soldering techniques, it's easy once you get the hang of it, and not that hard to learn. There are plenty of resources available on the net found by searching “soldering tutorial” or “how to solder”.

SECTION 1 - CHASSIS CONSTRUCTION

The following steps outline the procedures for preparing the amplifier chassis.

NOTE: If you have purchased the Master kit, a pre-punched aluminum chassis is included and you can skip forward to SECTION 2 – PARTS INSTALLATION.

STEP 1: OVERVIEW

The construction of this amplifier is based on using Hammond Chassis Part# 1444-32CWW². This is a 17" X 10" X 3" chassis that includes decorative walnut side panels.

The Hammond Part# 1444-32 does not include the walnut side panels and is about half the cost of the CWW version. For this version of the chassis, a ventilated steel cage is available as Hammond Part #1451-30 or 1451-30BK3 for black finish. The steel cage is not compatible with the CW version.

If you choose to construct your own chassis instead, base your design on a minimum 17" X 10" aluminum or other non-magnetic metal top plate, and a chassis depth of at least 3 inches. The chassis could be for example a decorative wood frame with a "drop-in" top plate. For aluminum, the top plate should be a minimum thickness of 0.051"/1.3mm to support the weight of the transformers.

STEP 2: MARK & CUT CHASSIS

The chassis layout diagram is included as an attachment to this manual. To achieve the lowest noise and hum and for ease of component placement and connection, layout your chassis or top plate as close to the layout diagram as possible.

NOTE: The layout diagram is based on using the custom lay-down style transformers. When sourcing your own transformers and filter choke you may have to adjust the location of the power supply filter capacitors and orientation of the mounting holes shown as Detail J & K.

Figure 2A (front) and Figure 2B (back) show the Hammond 1444-32CWW marked and cut for using stand-up style transformers. This was the first test version of the amp. Note that the orientation of the mounting holes for Detail K were changed to accommodate the stand-up style transformers.

The transformers used for the first test version were:
Power transformer: Edcor XPWR010-120/240
Filter Choke: Edcor CXC125-10H-200mA
Output Transfromer: Edcor GXSE15-6-5K

² See <http://www.hammondmfg.com/dwg21CWW.htm> and <http://www.hammondmfg.com/dwg22.htm> for a detailed description of the Hammond part #'s mentioned.



Figure 2A

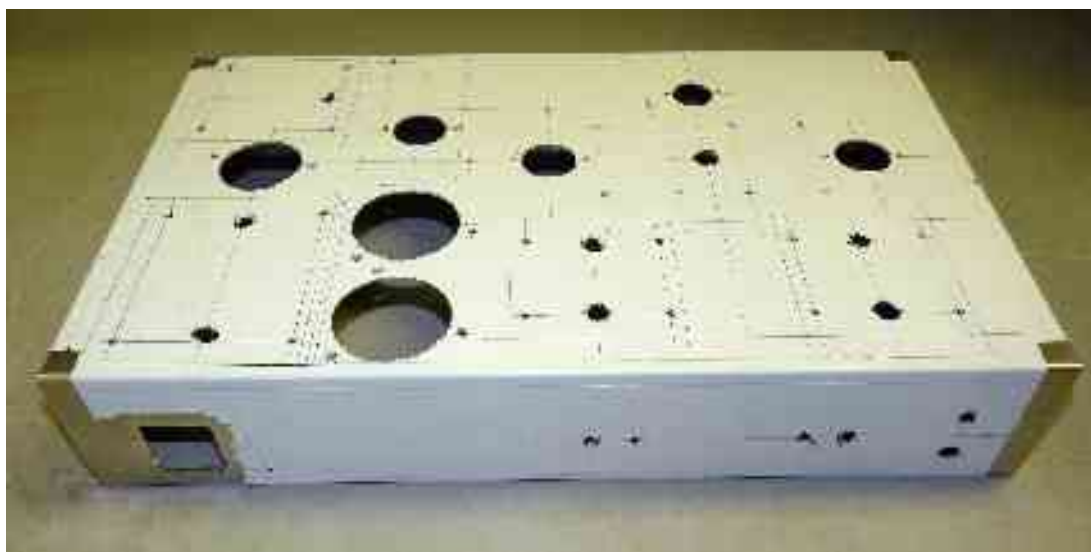


Figure 2B

It is important to keep the protective plastic sheeting in place while marking and cutting as the aluminum chassis is very easily scratched.

Mark all hole and cutout locations and perform the cuts based on the layout diagram.

After making all holes and cutouts, remove the protective film and paint the chassis or top plate if desired. Please remember that the aluminum is very easily scratched. Please use a soft folded towel, soft foam pad, or similar for your work surface.

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Figure 3A(front) & 3B(back) show the chassis with the protective film removed.

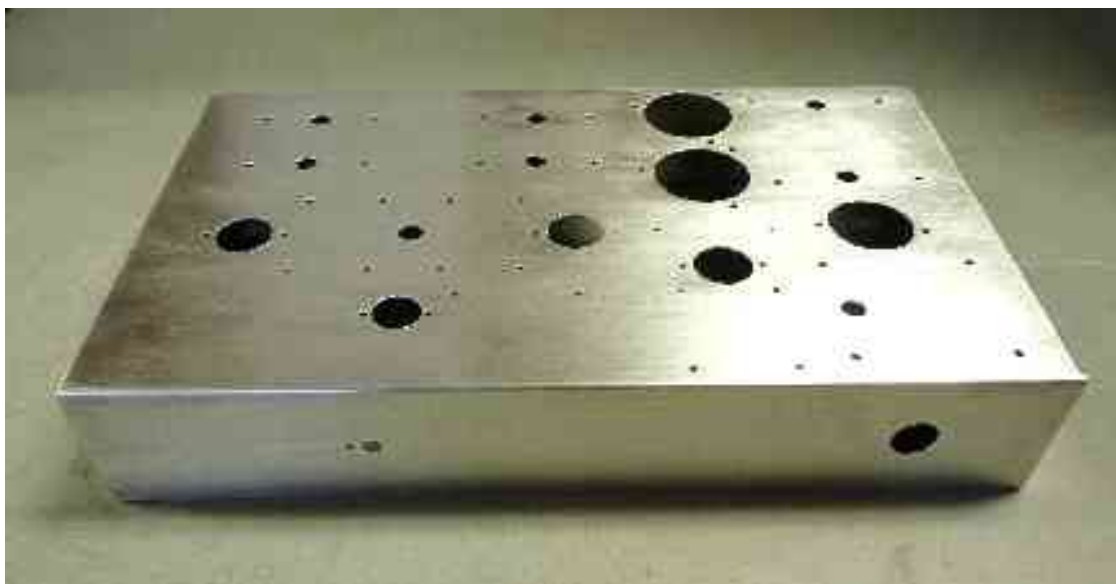


Figure 3A

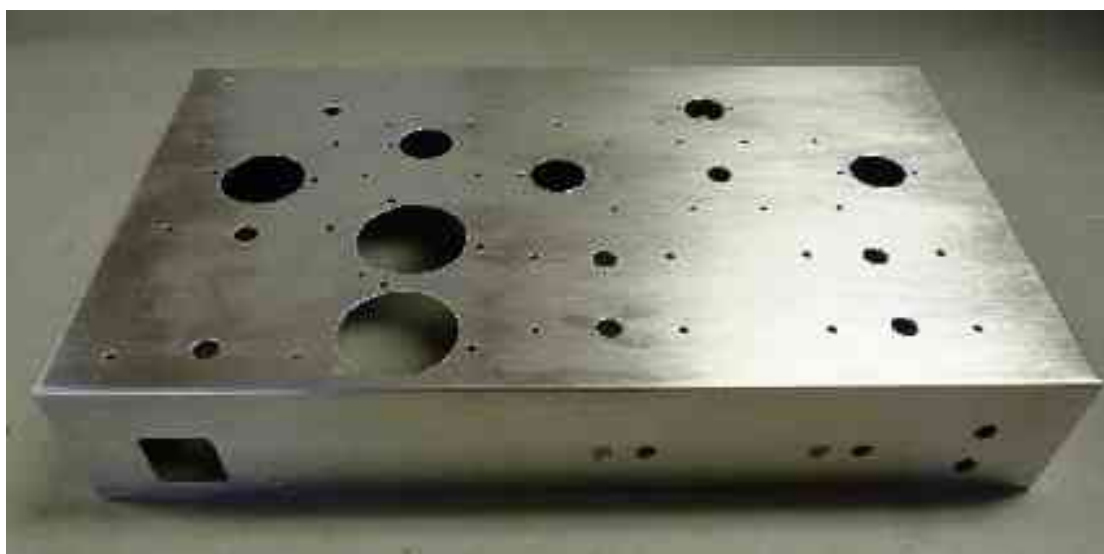


Figure 3B

SECTION2 - PARTS INSTALLATION

NOTE: The photos associated with the steps that follow all show the chassis based on the stand-up style transformers. This does not affect these steps as the transformers are not installed until one of the final steps. Photos and instructions related to both styles of transformers will be provided as required in these final steps.

1. Install the triode/UL toggle switch.
 1. Remove the chrome ring from the switch leaving the hex nut and lockwasher in place.
 2. Place the switch through the chassis aligning the keyway, and install the chrome ring flush with the top of the switch shaft.
 3. Tighten the hex nut, using a small wrench. This can be carefully done with needle nose pliers if necessary. Refer to Figure 5.
 4. Since the toggle portion of the switch extends beyond the top of the chassis, it is important to use the soft folded towel or thick soft foam work surface.



Figure 5

2. Install two terminal strips, one with ground lug, and the tube sockets. Figure 6.
 1. The terminal strips you receive will differ slightly from the photo but will have the same number of lugs.
 2. Use 4-40 x 1/2" screws and locknuts to fasten these devices.
 3. Install the 4-40 ground lug (smaller of the two ground lugs included) between the chassis and one side of the terminal strip as shown.

IMPORTANT: When tightening the nuts and bolts, it is easier to hold the screw head in place with a Phillips screwdriver and to tighten the locknut with a nut driver until you feel it “snug” and lock into place. **YOU DO NOT WANT THE PHILLIPS SCREWDRIVER TO SLIP OUT OF THE HEAD OF THE BOLT!** You **WILL** scratch the top of your chassis.



Figure 6

The 8-pin tube sockets included with the kit are Belton Micallex sockets, not ceramic as shown. They have the same pin orientation however as the sockets shown in Figure 6.

Note the orientation of the keyway for the 8-pin sockets. The power tube sockets, shown to the left and right of the toggle switch, each are facing away from the toggle switch. The 8-pin rectifier tube socket is shown above the terminal strip on the right. The keyway is also facing away from the toggle switch.

The 9-pin socket included in the kit is a bottom-mount socket instead of top-mount as shown. It has the same pin configuration.

Figure 7 shows the orientation of the 9-pin driver tube socket.



Figure 7

SECTION 2 – PARTS INSTALLATION - continued

3.