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# Audio Grade DC Power Supply, 200W, Variable Voltage

## Model XAPS-200W

### Assembly Instruction Manual

Rev 1.1

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#### **Features**

- Regulated DC power supply - optimized for audio amplifier applications
- Output voltage: Adjustable from 5V – 32V
- Output Current: 5A Sustained, 7A Peak
- Large filter caps for clean, solid, output
- Dimensions: 3.125" x 2.5" x 2.5" High (79mm x 64mm x 64mm)
- This is an beginner level electronic kit containing 18 components, and can be assembled in less than 1 hour

## **Unpacking Your Kit**

Carefully unpack and take stock of the components in your kit. The electronic components are packed in 1 bag labeled 'Bag A'. See Table 1 for a complete listing of your components.

## **Assembly Instructions**

It is very important that you read and understand all of the following instructions before you start your assembly so that you don't make any mistakes that might be difficult to recover from. The assembly should be done in the order listed in Table 1 or you may have difficulty physically accessing components for soldering.

## **What you'll need**

- Soldering iron with small or medium tip
- Damp sponge for tip cleaning
- Solder
- Solder wick or solder sucker in case of solder bridging (stranded wire could substitute)
- Small needle nose pliers.
- Small wire cutters
- Small straight screwdriver
- Magnifying glass to read the markings on the tiny components

## **General Assembly Guidelines**

- **Take your time!!** Most mistakes are made when rushing through the assembly. Taking the time to double check every step will pay off with a first-time functional device.
- In cases where it is necessary to re-form the leads on components (such as resistors and diodes), be very careful not to put stress where the lead enters the component itself. The physical attachment of the lead to the component can sometimes be very fragile and the lead may break off if too much force is applied. Reforming the leads can be done by gripping the lead with small needle-nose pliers at the base of the component while bending the lead on the other side of the pliers.
- Use as little heat and solder as necessary to affix the components to the PCB (printed circuit board). Many of the parts in this kit are temperature sensitive. Overheating may damage them.
- Always clean the soldering iron tip on the damp sponge prior to every solder joint. Re-tin whenever the tip gets a little dull. (tinning is the application of fresh solder to the tip of the iron until its shiny, wipe excess on a damp sponge).
- Inspect the solder joints. They should be shiny and smoothly connect the pad to the lead. A dull looking joint may indicate it is 'cold', meaning that either the pad or the lead weren't heated enough to allow reliable connection. This could lead to erratic operation of the device. Re-flow the joint again with the soldering iron, apply equal heat to both the pad and the lead, apply a little more solder if needed to get a good shiny connection.
- When clipping the excess leads of the through-hole parts, don't try to clip too close to the PCB. Clip just above the solder joint to avoid fracturing the solder joint, which could lead to device failure sometime in the future.
- Carefully inspect each solder joint to make sure you didn't accidentally form a 'solder bridge', or connect two adjacent pads together. Remove solder bridges by using solder wick or a solder sucker. If the bridge is small you may be able to remove it by just reheating the joint and sliding the soldering iron across the bridge. If not, see the next step.
- If you need to remove solder from a hole (or a solder bridge) and you don't have solder wick or a solder sucker, you can use stripped stranded wire in place of solder wick. Place the stranded wire across the hole and touch the soldering iron to the wire, above the hole. As the wire heats it will melt the solder in the hole, and the melted solder will tend to wick up into the stranded wire. When the wire fills up with solder, move a clean part of the wire over the hole and repeat until the hole is clear of solder.

## Circuit Board Assembly

You're ready to begin assembling your XAPS-200W circuit board. Assemble the board in the order listed in Table 1. Use the install check boxes on the right side to track your progress. The 'Install Notes' column will alert you to any special instructions (listed below) for each of the components.

**Table 1. Circuit Board Parts List (Bag A)**

Pack √	Device	Value	Marking	Qty	Reference Designators	Install Notes	Install √
	CIRCUIT BOARD (PCB)	REV 1.0	XAPS-200W	1			
	RESISTOR	1K,1%	BRN-BLK-BLK-BRN-BRN	1	R1		
	RESISTOR	4.7,1%	YEL-VIO-BLK-SLV-BRN	1	R2		
	RESISTOR	4.7K,1%	YEL-VIO-BLK-BRN-BRN	1	R3		
	DIODE	1N4005	1N4005	2	D1,D2	1	
	CAPACITOR	.1uF	104 (Small Tan Caps)	2	C3,C4		
	CAPACITOR	1uF	105	1	C5		
	CAPACITOR	.01uF, 250V	103	1	C10		
	CAPACITOR	.1uF, 250V	104	4	C1,C2,C8, C9		
	ELECTROLYTIC CAPACITOR	10uF	10uF	1	C11	2	
	SPADE TERMINALS			6	SP1,SP2, SP3,SP5, SP6,SP7		
	TRIMPOT	20K	R20K	1	VR1		
	BRIDGE RECTIFIER		GSIB 2560	1	BR1		
	VOLTAGE REG IC	LM338	LM338	1	U1	3	
	HEAT SINK			1		3	
	4-40 SCREW			1		3	
	4-40 NUT			1		3	
	ELECTROLYTIC CAPACITOR	10,000uF	10,000uF	2	C6,C7	2	

### Circuit Board Component Installation Notes:

1. Diodes are polarized devices; which means they won't work if installed the wrong way around. A solid bar on one end of the diode marks the cathode. The cathode goes in the square pad hole on the PCB.
2. The electrolytic capacitors are polarized devices, be sure to install them the right way around. The positive lead is longer than the negative lead. The positive lead goes in the square pad hole on the PCB. Note that the polarity is also marked on the outer casing of the caps.
3. Attach the voltage regulator IC (LM338) to the heat sink using the included 4-40 screw and nut; leave it a little loose for now. The VREG leads should point in the same direction as the heat sink mounting tabs. Now insert the assembly into the appropriate PCB holes. Solder the VREG leads, and tighten the nut to secure the heat sink.

## Transformer Selection

You should select a transformer with a secondary voltage of approximately equal to your desired final DC output voltage, and a current rating capable of driving your expected worst case DC load. Table 2 below gives sample part numbers for toroid power transformers made by Hammond Manufacturing for some common voltage and current ratings. These can be purchased from most parts distributors such as Mouser Electronics. The listed transformers are dual secondary, and the secondary's should be wired in parallel to obtain the listed voltage and current.

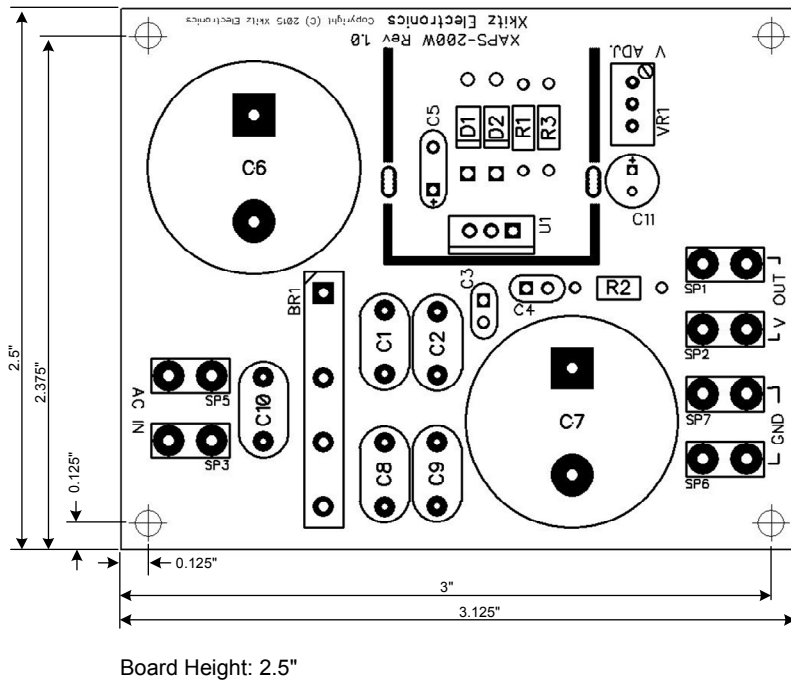
**Table 2. Sample Transformers, Part Numbers for Hammond Mfg Power Transformers**

DC Volts Out	DC Output Current		
	2.5 Amps	4 Amps	5 Amps
12V	Hammond Part No. 1182K12	Hammond Part No. 1182L12	Hammond Part No. 1182M12
18V	Hammond Part No. 1182J18	Hammond Part No. 1182L18	Hammond Part No. 1182M18
22V	Hammond Part No. 1182J22	Hammond Part No. 1182L22	Hammond Part No. 1182M22
30V	Hammond Part No. 1182K30	Hammond Part No. 1182L30	Hammond Part No. 1182M30

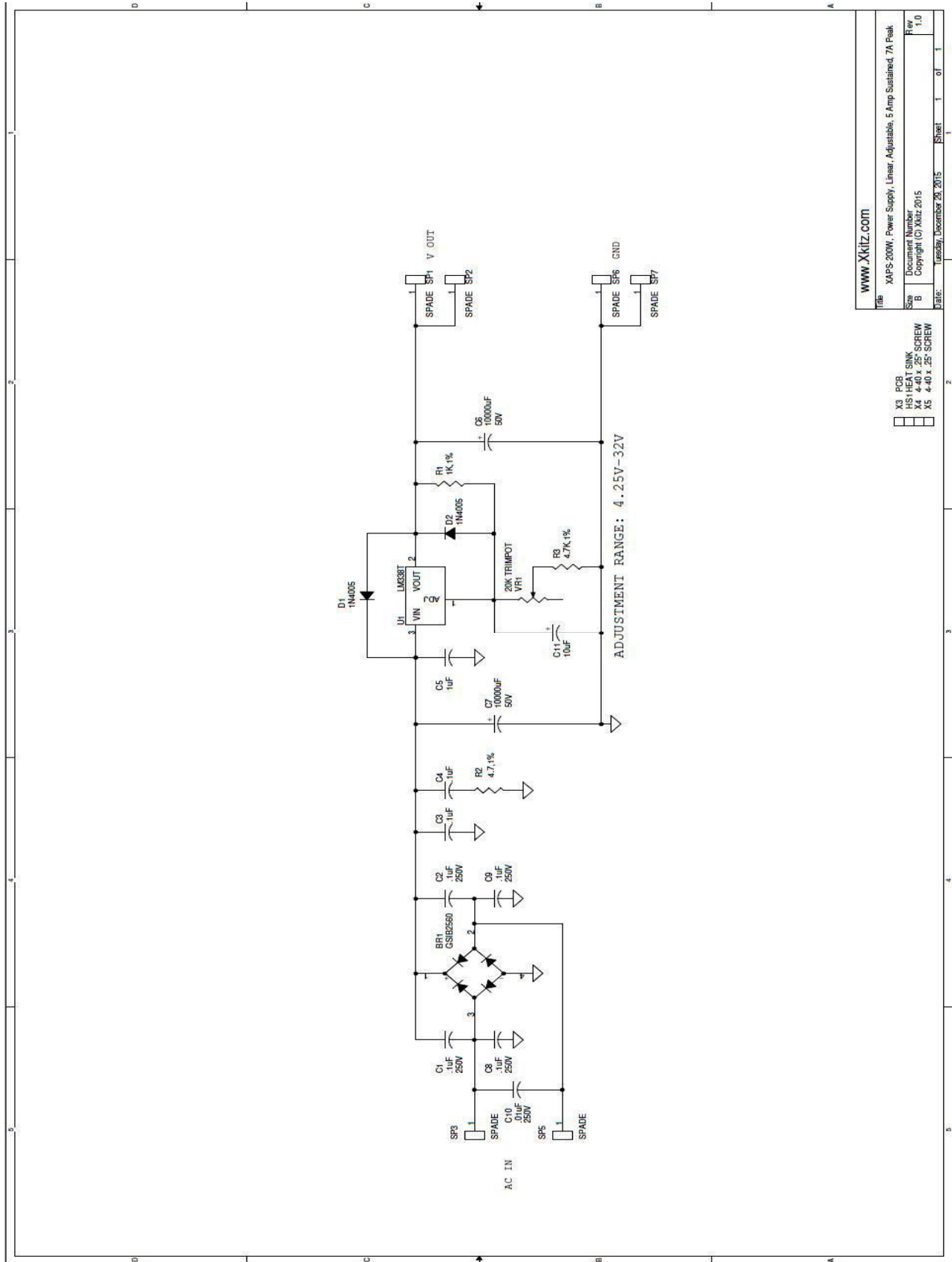
## Adjusting the Variable Voltage Output

Turn trim-pot VR1 all the way counter-clockwise to set output voltage to its lowest value. While watching the voltage output with a voltmeter, slowly turn VR1 clockwise to increase the output voltage to your required setting.

**Figure 1. PCB Parts Placement and Dimensions**



**Figure 2. XAPS-200W Schematic**



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Title	XAPS-200W, Power Supply, Linear, Adjustable, 5 Amp Sustained, 7A Peak		
Size	Document Number	Revision	Rev
B	Copyright (C) Xkitz 2015	1.0	1.0
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- X3 PCB
- HS-HEAT SINK
- 4-40 x .25 SCREW
- X5 4-40 x .25 SCREW