

Oakley Sound Systems

Compact Power Supply

PCB Issue 1

Project Builder's Guide

V1.2.0

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Introduction

This is the Project Builder's Guide for issue 1 of the Compact PSU circuit board from Oakley Sound. This document contains the circuit diagram of the completed board, a full parts list for the components needed to populate the board and some basic testing methods.

You will also need the PSU User Manual which gives details on how to use the module as well as example wiring diagrams. This can be found on the Compact PSU webpage.

For general information regarding where to get parts and suggested part numbers please see our useful Parts Guide at <http://www.oakleysound.com/parts.pdf>.

For general information on how to build our modules, including circuit board population, mounting front panel components and making up board interconnects please see our Construction Guide at <http://www.oakleysound.com/construct.pdf>.

Parts List

The components are grouped into values, the order of the component names is of no particular consequence.

A quick note on European part descriptions:

For resistors: R is shorthand for ohm. K is shorthand for kilo-ohm. M is shorthand for mega-ohm

For capacitors: $1\mu\text{F} = 1,000\text{nF} = 1,000,000\text{pF}$. Sometimes the F is not included on the circuit diagram to indicate a capacitor's value, ie. $100\text{n} = 100\text{nF}$.

To prevent loss of the small '.' as the decimal point, a convention of inserting the unit in its place is used. eg. 4R7 is a 4.7 ohm, 4K7 is a 4700 ohm resistor, 4n7 is a 4.7 nF capacitor.

Resistors

All resistors are 0.25W 1% metal film or better.

240R	R3, R5
2K2	R4, R6
4K7	R1, R2, R7

If +/-12V operation is required then you should make both R4 and R6 each a 1K5 resistor.

Wire Links

A wire link is a simple solid core wire loop inserted and soldered into the board so that it shorts out the two pads on either end of the 'device'. A resistor lead clipping is normally long enough for this purpose.

Both links are expected to be inserted.

- LK – ties pin 2 and pin 3 of the power headers together.
- R8 – ties the earth pad to pin 2 of the power header.

Capacitors

100nF, 63V multilayer axial ceramic	C4, C7, C8, C9
10uF, 35V or 50V electrolytic	C1, C2, C3, C5, C6
2200uF, 35V or 50V electrolytic	C10*, C11*

*C10 and C11 are radial types and have standard wire ended leads. Lead spacing is 7.5mm. Do not get 'push-fit' types as their pins are too large to fit into the PCB.

Discrete Semiconductors

1N4002 or 1N4004	D1, D2, D3, D4, D5, D6, D7, D8*, D9*, D10, D11
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* D8 and D9 do not need to be fitted if you are using the recommended wall-wart or single phase line lump power pack. D8 and D9 are only required if you are using twin or tapped secondaries for full wave rectification.

There are three LEDs that can be fitted to the board to indicate power status. However, these can be optionally fitted to any front panel you are using. In this case I would recommend that you fit 2-way 0.1" KK or MTA headers to the board in place of the LEDs.

5mm red LED	AC
5mm green LED	-VE
5mm orange LED	+VE

Integrated Circuits

LM317T 1A variable +ve regulator	U1*
LM337T 1A variable -ve regulator	U2*

* Ensure that both devices are TO-220 types and not any surface mounting or TO-3 packages.

Miscellaneous

1K multiturn cermet trimmer	POS, NEG
0.156" MTA 4-way header	PWR1, PWR2, PWR3, PWR4, PWR5, PWR5, PWR7
1A antisurge 20mm fuse	F1*, F2
20mm fuseholder PC mount	F1*, F2
4-way screw terminal 5mm	POWER, SWITCH
Heatsink TV35 TO220 7.2C/W	U1, U2
15mm M3 cheesehead screws	Four required – two per heatsink
M3 flat washers	Eight required – two per heatsink
M3 toothed washer	Four required – one per screw, fitted next to each nut
M3 nut	Four required – one per screw
Heatsink paste or SIL pad	For mounting of U1 and U2 to heatsinks

* If you are using the recommended wall-wart, or single phase line lump, then fuseholder F1 and it associating fuse does not need to be fitted. F1 and F2 are only required if you are using twin or tapped secondaries for full wave rectification.

Testing and Calibration

After wiring the unit according to the instructions given in the Users Manual you should apply power to the unit. Check that no device is running hot. Any sign of smoke or strange smells turn off the power immediately and recheck the all the external wiring first, and then the components on the board.

If you have the three LEDs fitted, all three should now be lit. Please note that if your LEDs are fitted remotely and connected to the board via 0.1" plugs and headers, make sure that you do not attach the red 'AC' LED while the PSU board is powered up. The 'AC' LED must be connected to the board only when the board has been off for at least a minute or so. When powered up without the AC LED in place C1 will charge up to 25V or so. If you then connect the LED this 25V will be presented across the LED for a short time and it will die. In normal operation a connected LED would restrict the voltage across C1 to around 2V and there is no fear of destroying the LED.

Assuming everything is OK so far, it is time to check the output voltages. Measure the output voltage with respect to ground. This means connect your black lead of your voltmeter to either pins 2 or 3 on one of the seven 0.156" MTA headers. Now measure the voltage at pin one of the header, the top one, it should be positive and be somewhere between +13V and +18V. Check pin 4, the bottom pin, and it should be somewhere between -13V and -18V.

You should now adjust the voltages with the trimmers (multiturn presets) on the board. Adjust POS to make pin 1 equal +15.00V. Adjust NEG to make pin 4 equal to -15.00V. It is advisable that the +VE and -VE LEDs are fitted for this adjustment, or that at least one Oakley or MOTM module is connected up to the power supply board. This is to ensure that there is some current running through the regulator chips, U1 and U2, which allows them to work properly.

The voltages will vary a little with load. That is, it will change marginally depending on how many modules you connect up to the power supply board. Feel free to re-adjust the trimmers when you add more modules to your system.

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