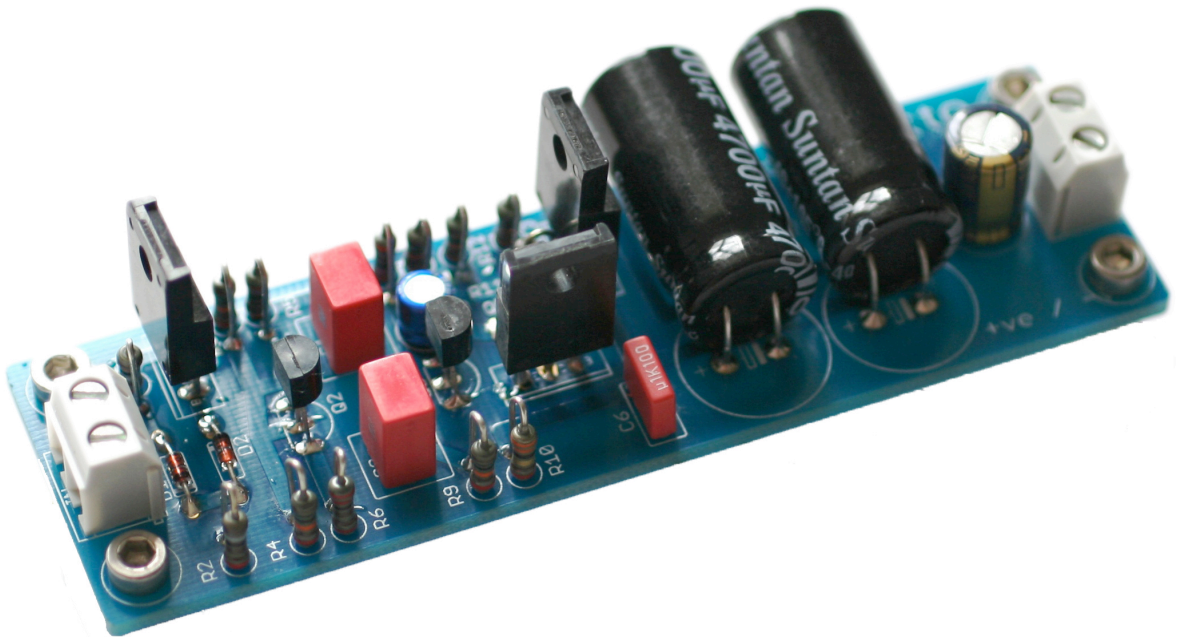


The **Rock Grotto**

JLH Ripple Eater

Not-for-profit DIY Audio Group Buy to benefit Cancer Research UK

Mini Manual v1.0



JLH Ripple Eater

Terms and Conditions of Sale / Warning and Disclaimer

This project schematic is used with the agreement of Wimborne Publishing Limited. All trademarks remain the property of their respective owners. This PCB was developed at the **Rock Grotto** audio forum and support is readily available from the nice folk over there! Many thanks to these organizations for their support for this project

To order your boards, please refer to Section IV.

By ordering this board, you agree to the following terms and conditions:

This device was originally designed by the late John Linsley Hood MIEE, and published in April 1994. The design has been modified to increase performance using modern components and design tweaks. The PCB layout is a new, double-sided design. This design has been validated by a test build on hand-etched PCBs, and also additional builds using final version PCBs and published BOM. One of these builds supplied the photos included in this document.

This project does not in itself use line/mains voltages. However, nearly all DIY electronics projects expose the builder to line/mains voltages at one time or another. These voltages can kill – even at miniscule current. If you are not competent / confident with working with these voltages, please seek advice from either a qualified electrician, or an audio DIYer who is competent and experienced in this area. Always work safe and work smart!

The original schematic has been updated and a new PCB layout devised. This PCB is offered **without any warranty, guarantee provided or liability taken by us**. JLH himself stated that he could not guarantee it would improve audio, but that his test instruments proved it did a useful job in cleaning up power supplies. This is a low-voltage, low current design. Users report improvements when used with the SC Headphone Amp and DAC. This is a 500mA or less current, and +-15VDC application. This board is designed using thicker than standard traces, but it has not been proven to work above 650mA. If you try to misuse it, and set fire to yourself, your pet, your house etc, it's your own fault. Likewise, if you like to solder in the nude and drop your iron into your lap, it's your own fault. If you blow up your headphone amp, DAC, hi-fi etc when using this PCB, it is not our fault.

With all that said, this build manual will allow you to complete the build with minimal fuss. This project is suitable for beginners, and all you need do is read this manual carefully and apply, as always, a modicum of common sense. Post any questions on the build thread at **Rock Grotto**.

But, most importantly, have Fun!

Part II – Bill Of Materials

MRS25 0.6W resistors have been used to good effect - small size, decent power rating.

POSITIVE VERSION

R1 = 1R 0.5W

R2 = 1K8

R3, 4, 8, 9 = 100K

R5, 7 = 2K7

R6 = 2K2

R10 = 33R

R11 = 1K

R12 = 120K

R13 = 10K

C1, 2 = 2U2 Film (Wima MKS)

C3 = 10uF Electrolytic

C4a, 4b = 2200uF 10V Suntan CD286 from Jaycar RE6306 – or:

C4a, 4b = 4700uF 10V Suntan CD286 from Jaycar RE6308 – for higher current, non-CL applications only.

C5 = 100uF 25V Electrolytic – recommended Panasonic FC

C6 = Optional 100nF (0.1uF) Film (Wima) – fit only if you are NOT using low ESR capacitors.

D1, 2 = 1N4148

Q2, 3 = BC550C

Q5 = BC639

Semiconductor A (Q1) (Current Limiter) = 2SA1930

Semiconductors B, C (Q4, 6) = 2SC5171

NOTE: Panasonic FC 2200uF 10V EEUF1A222 Farnell 969-1979 works well out of the packet, but has not been subject to listening tests at this point.

NEGATIVE VERSION

R1 = 1R 0.5W
R2 = 1K8
R3, 4, 8, 9 = 100K
R5, 7 = 2K7
R6 = 2K2
R10 = 33R
R11 = 1K
R12 = 120K
R13 = 10K

C1, 2 = 2U2 Film (Wima MKS)
C3 = 10uF Electrolytic REVERSE THE POLARITY
C4a, 4b = 2200uF 10V Suntan CD286 from Jaycar RE6306 REVERSE THE POLARITY – or:
C4a, 4b = 4700uF 10V Suntan CD286 from Jaycar RE6308 REVERSE THE POLARITY - for
higher current, non-CL applications only.
C5 = 100uF 25V Electrolytic – recommended Panasonic FC REVERSE THE POLARITY
C6 = Optional 100nF (0.1uF) Film (Wima) – fit only if you are NOT using low ESR capacitors.

D1, 2 = 1N4148 REVERSE THE POLARITY

Q2, 3 = BC560C
Q5 = BC640

Semiconductor A (Q1) (Current Limiter) = 2SC5171
Semiconductors B, C (Q4, 6) = 2SA1930

NOTE: Panasonic FC 2200uF 10V EEUF1A222 Farnell 969-1979 works well out of the packet, but has not been subject to listening tests at this point.

NOTES:

Watch out for pin-outs on the small transistors. Some manufacturers like to swap these about randomly! If in doubt, check your datasheet and the schematic / board image. You may also use the hFE mode on your DMM if it has that facility. This will correctly determine the Emitter, Collector and Base of your device.

As you can see, the NEGATIVE version of populating this board swaps the 2SA1930 and 2SC5171 semiconductors around (i.e. replaces a PNP device for NPN and vice versa), but they go in the PCB the SAME way shown on the silkscreen.

The NEGATIVE version also replaces the Q1, Q2 BC550C with BC560C devices, and the Q3 BC639 with a BC640. Also fitted the SAME way as the silkscreen. Watch your pinouts, though!

HOWEVER, the electrolytic capacitors, C3, C4, C5, and C6 must be fitted REVERSED on the NEGATIVE version. Film caps don't mind which way they are installed, but an electrolytic cap is polarised (directional) and if fitted the wrong way, will go off with a big pop! **Additionally**, the diodes, D1 and D2 must be fitted REVERSED to the silkscreen. Did I say you need to **REVERSE**

the polarity of the electrolytic caps and diodes in the negative version????

Fit -ve power in to left input connector and keep GND on the right (as per the POS version). From Alex's diagram (AK Modifications to original circuit – page 8), and in summary:

Current Limit = $0.65V \times R12$

To bypass the Current Limiter, remove the 2SA1930 (POS) or the 2SC5171 (NEG) limiter, D1 and D2, R1 and R2 and link from +ve or -ve in directly to R3.

Only do this if the PSRR is PRECEDED by an LM78xx/79xx or LM317/337 with built in current limiting, or your PSRR will draw a load of current on start up and go pop!

The Current Limiter (CL) version sometimes hunts around the required voltage while the C4a and C4b capacitors are forming. This is a very low frequency, gentle cycle. It's something we are looking at, because it doesn't always manifest itself with every load. If you are using a preceding limiter (78XX/317 etc), then don't fit the current limiting components at all – just the link as described in the paragraph above. This hunting is apparent when using Suntan 4700uF capacitors, and was evident with the 2200uF parts – both with the larger "Suntan" motif on the body. Therefore, the recommendation is to use 2200uF C4a/b, and only use 4700uF for higher current, non CL versions. However, feel free to experiment between the two. You might like the 4700uF better in your particular application! Panasonic FC 2200uF 10V EEUFC1A222 Farnell 969-1979 showed no hunting (likewise the small motif Suntan caps) out of the packet, but has not been subject to listening tests at this point.

BC550C and 560C will enable operation up to +- 40V. But check CAP RATINGS!!!

C3 and C5 voltage ratings are selected to suit voltage rails. So for 15V rails, use 25V caps, for 40V rails use 63V caps. Might get away with 50V, but I haven't tried this yet. A 55V version is out there, but as I mention, I haven't tried this yet. I intend to, for use on my Pearl phono raw power supplies.

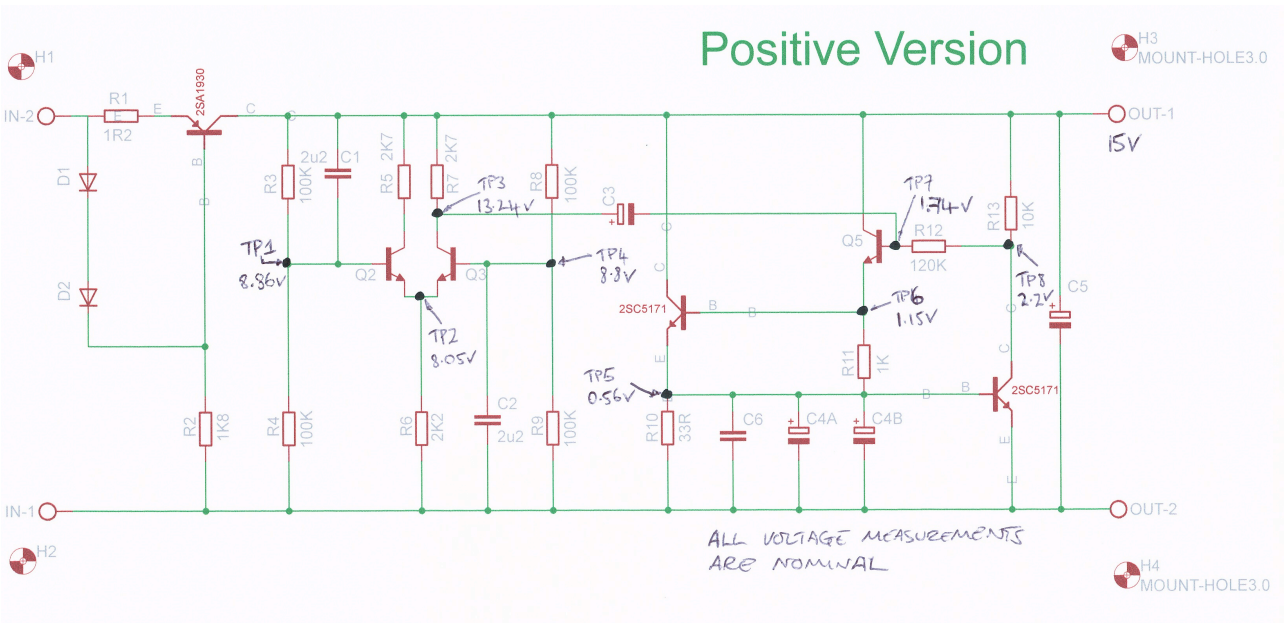
JC

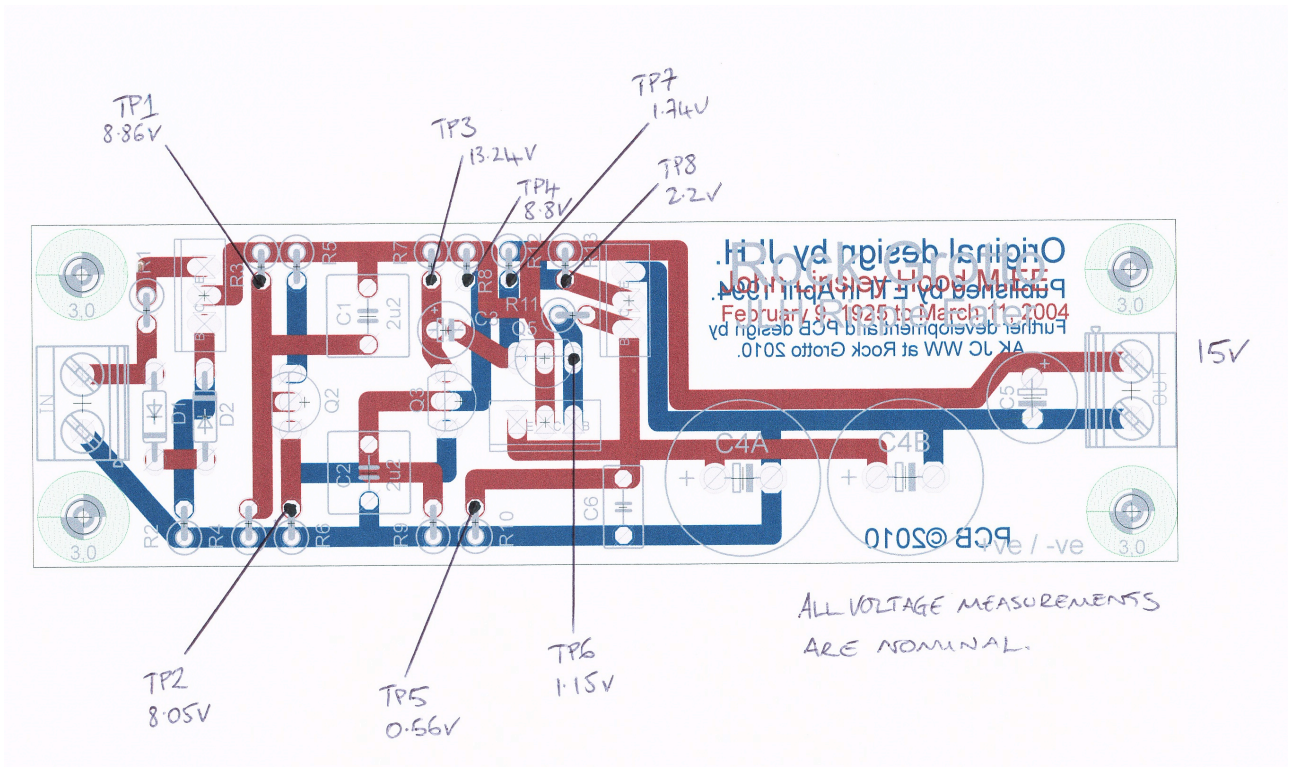
Testing

Make sure you are wearing eye protection.

You should consider a Dim Bulb Tester (Google it up!!) powering up after building or modifying a circuit. The resistance of the bulb filament reduces the amount of current that passes through your equipment. If your gear doesn't work, don't replace the bulb with a higher wattage. Stop, unplug and find the fault. I start off with a 40W bulb, but there is no harm in starting off at a lower wattage. A short circuit or other fault will manifest itself in a couple of ways: Either the equipment will not work and the bulb stays OFF – meaning that little current is being drawn, or the bulb will stay lit, indicating a heavy current draw (possibly a short circuit). It is normal for the bulb to flash on switch on as the capacitors in the circuit draw current while they charge.

Hook up the Ripple Eater to your DC power supply. Most builders will be using the Ripple Eater with the Jaycar Headphone Amp kit (KC5417) and the associated PSU board (KC5418). The board in the photos has been modified according to instructions given at Rock Grotto, so might differ from yours. Refer to the Test Points (TP) on the schematic and board image below, and verify that you have similar readings on your digital multimeter. The readings, which are historical ones from the last generation layout, are based on a 15V DC input voltage. These voltage measurements do not have to be exact; many factors will change their values. However, gross differences should be investigated. Is the input voltage correct? Are all components correctly placed and undamaged? Are all solder joints good (shiny)?





Part IV – Ordering Information

These boards cost £3 each. Postage is at cost and a charge of £0.15 for packaging will be included in the final postage details. To order, simply select your postage charges from the table below and add this to the board total. Please use PayPal to send this total in GBP to JC-at-CAPT-dot-CO-dot-UK. **If you use the setting for Personal Payment for money owed, there should be no PayPal fees added.** I will refund payments where fees are added, as they are crippling!! Please make sure you include your forum nickname, real name and your preferred mailing address in the Message box if it is different from your normal PayPal delivery address. As soon as I receive your payment, I will prepare your package, cut out and use the address on the payment receipt (that's why I'd like it there and not in another email please!!), and return the other portion as your receipt, plus a copy of the schematic and a board diagram, both showing the test points. Your package will be posted at the earliest opportunity. Once all obligations have been met, donations calculated and made, final accounts will be posted.

All postage is First Class in the UK, and Airmail Small Packet for Europe and ROW. There is not real benefit for the extra expense of "International Signed For" as tracking is only available for the UK portion of the service, and the compensation cover of £41 is the same as the normal Airmail service. Delivery will take around 3 days for European orders and around 5 days for ROW.

Board Number	2	4	6	8	10	12
UK	£0.81	£0.81	£1.11	£1.11	£1.11	£1.11
EUROPE (Including Russia and Turkey)	£1.46	£1.46	£1.57	£1.72	£1.85	£2.13
Rest of World	£1.97	£1.97	£2.25	£2.53	£2.80	£3.55

For orders larger than 12 boards, please email **JC-at-CAPT-dot-CO-dot-UK** for a quote.