

QUAD OUTPUT POWER SUPPLY

Having given you the feature on power supply design, we now present a practical example to build: Paul Brow's design for a high-quality laboratory/workshop unit

Anyone interested in electronics — from the dabbling amateur to the full-time professional — knows the importance of good test and service equipment. One of the most used devices is a power supply. Every circuit you design, develop, build or use needs power.

This project uses the same design principles which are discussed and explained in Mike Bedford's article earlier in this month's ETI. However, it's not just a basic single-rail power supply with 0V and a positive DC voltage, but a five-rail supply with 0V and four different DC voltages: $\pm 5V$ and $\pm 12V$. So, just about every voltage you'll ever require for your circuits is catered for.

Same families of components are used in this project as in Mike Bedford's design feature; 78 and 79-type regulators, toroidal transformers and sealed bridge rectifiers, as readers will see from the circuit in Fig. 1, and construction is extremely simple.

Specification of the power supply is pretty good, too. It provides a continuous current of 1A on all power rails except the $\pm 5V$ rail, which is 2A (not, incidentally, a 78-series regulator circuit). Outputs are all fully fused, and the regulators give short circuit and thermal protection, so whatever you do with the supply, you can't damage it. Output rails all have LED monitoring to show individual rail operation.

Construction

PCB has been designed in such a way that all components except the mains switch are board-mounted, making construction both modular and

easy. Method here assumes readers use the case, heatsinks and components specified.

Construction sequence is important for component alignment: from PCB to panels. First, insert printed circuit board pins, wire links, resistors, diodes, capacitors C5 to C12, fuse holders and voltage dependent resistor VDR1. Fit heatsink 2 loosely to the back panel by its two central fixings. Fit heatsink 1 with an M3 16mm CSK screw to the back panel along with the transistor socket SK11 on the inside. Adjust for best fit and tighten. Now, adjust heatsink 2 for good alignment and tighten. Fit the 5V regulator, a T03-type, insulating the pins (a mica washer isn't necessary). Fit the other regulators to the back panel, ensuring that the $-5V$ and $-12V$ regs are insulated with mica and plastic bushes; leaving all slightly loose for adjustment when fitting PCB.

Next, fit the case brackets to the PCB using 14mm M3 threaded spacers. Use metal spacers for safety earthing. Fit the back panel to the brackets while carefully inserting the nine regulator leads into the PCB, but do not solder yet!

Fit output sockets to the PCB following the suggested colour sequence on the PCB overlay (but don't solder yet). Fit the front panel to align the sockets then, at last, solder every thing in place.

Attach 3 and 4 heatsinks to the bridge rectifiers and solder rectifiers in to the PCB. Now solder the T03 socket SK11, rectifiers, capacitors C1 to C4, LEDs (leave long leads) in to the PCB. Next, fit transformers by soldering them in to the PCB and securing with self tapping screws. Securing in this way is important simply because they're heavy — any severe knock

PROJECT

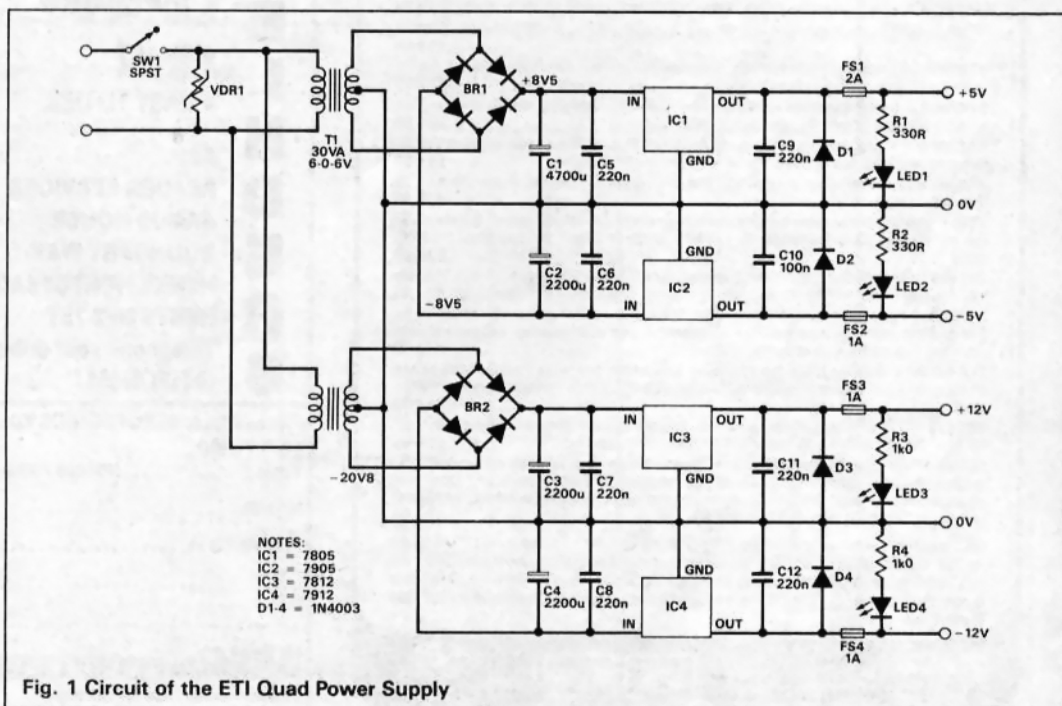


Fig. 1 Circuit of the ETI Quad Power Supply

could otherwise result in the transformer rattling around in the case! Finally, fit mains switch and cable. The cable enters the case side, so drill and file the case to suit a grommet and secure cable with a cable tie. Bend LED leads so LEDs fit into the panel clips, insert fuses and away you go. The result is a single module, easy to build, easy to service, ideal for colleges, schools or home workshops.

BUYLINES

All components are easily obtained, though the author is able to supply any for all parts. Case panels and back panel heatsinks can also be supplied pre-drilled and punched, or you may send your own panels for punching (but panels must be from the case specified).

PARTS LIST

RESISTORS (all 1/4W)

R1,R2 330R
R3,R4 1k

CAPACITORS

C1 4700 μ , 16V radial
C2,C3,C4 2200 μ , 25V radial
C5-C9,C11,C12 100n or 220n, 5mm pitch polyester
C10 100n, 10mm pitch polyester

SEMICONDUCTORS

LED1-4 Red LED
D1-4 1N4003
BR1 6A 200V rectifier (Rapid DB602)
BR2 3A 400V rectifier (Rapid BR34)
IC1 323K
IC2 905
IC3 7812

MISCELLANEOUS

F1 2A quick blow 20mm fuse
F2-4 1A quick blow 20mm fuse
Fuseholder (4 off) PCB 20mm
Led panel clip (4 off) 8mm mounting hole
Case Retex RE3 (Rapid 30-0910)
T1 6V 30VA encapsulated transformer
T2 12V 30VA encapsulated transformer
VDR1 275V transient suppression type
SK1,2 Red 4mm double height PCB socket
SK5,6 Blue 4mm double height PCB
SK3,4,8,9 Black 4mm double height PCB socket
SK7 White 4mm double height PCB socket
SK10 Yellow 4mm double height PCB socket
SK11 T03 transistor socket
TO220 washer kits Mica or silicone type
Heatsink 1,2 2.8°C/W Marston 07WN type
Heatsink 3,4 21°C/W Redpoint TV4 type
Spacers (4 off) M3 threaded 14mm long
Mains switch Push button/latching
Grommet, PCB, 1mm PCB pins, various M3 screws, nuts, washers (4BA for T03 socket).

HOW IT WORKS

Nothing much to say here, except that readers should consult Mike Bedford's feature on power supply design. He explains all the main principles better than we could here.

Essentially, the power supply is not just one supply, instead comprising two separate circuits doing similar jobs. One circuit is a $\pm 5V$ supply, while the other does the same for $\pm 12V$.

Each supply features its own transformer, bridge rectifier, smoothing capacitor, positive and negative voltage regulators, fused outputs and indicating LEDs.

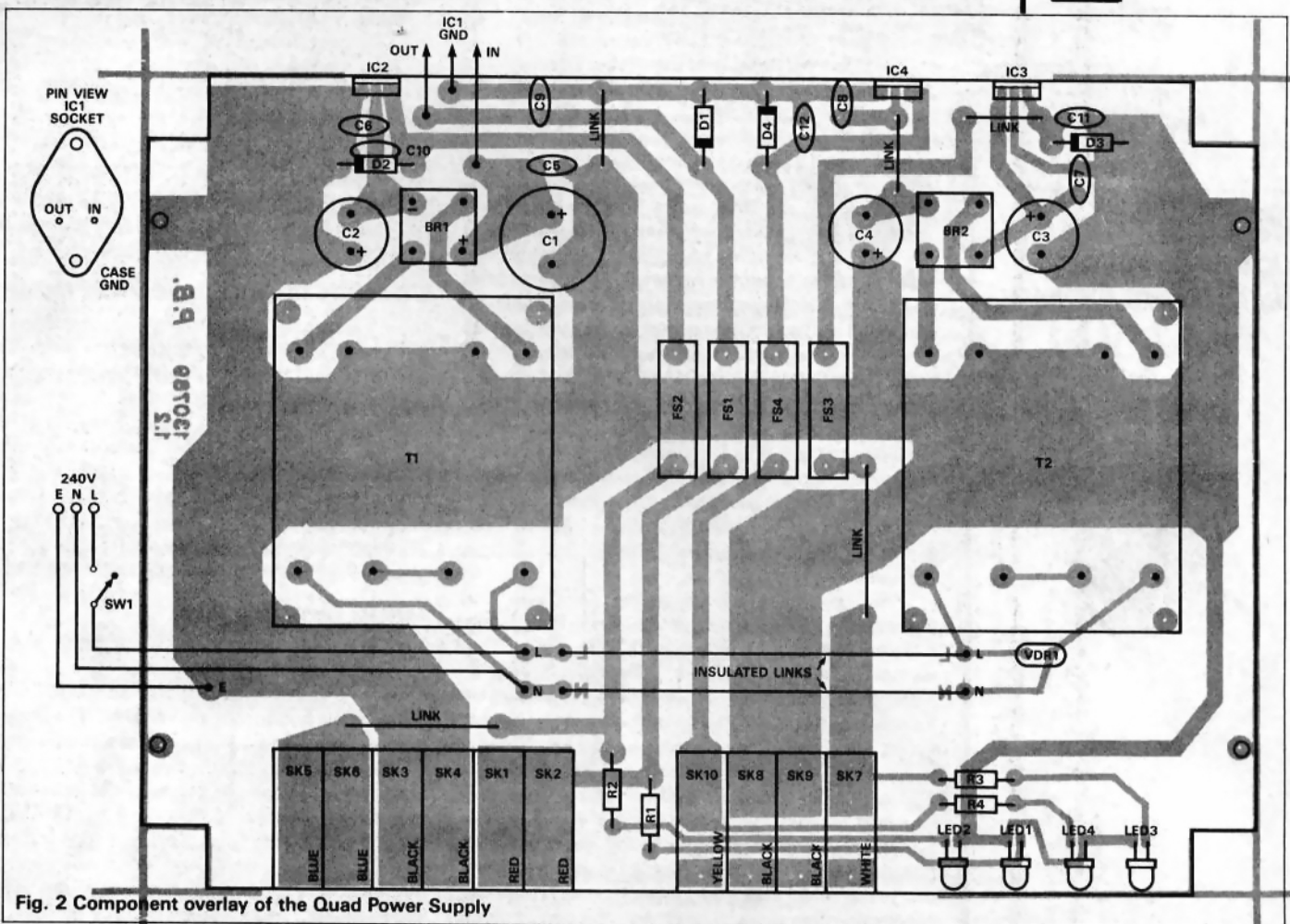
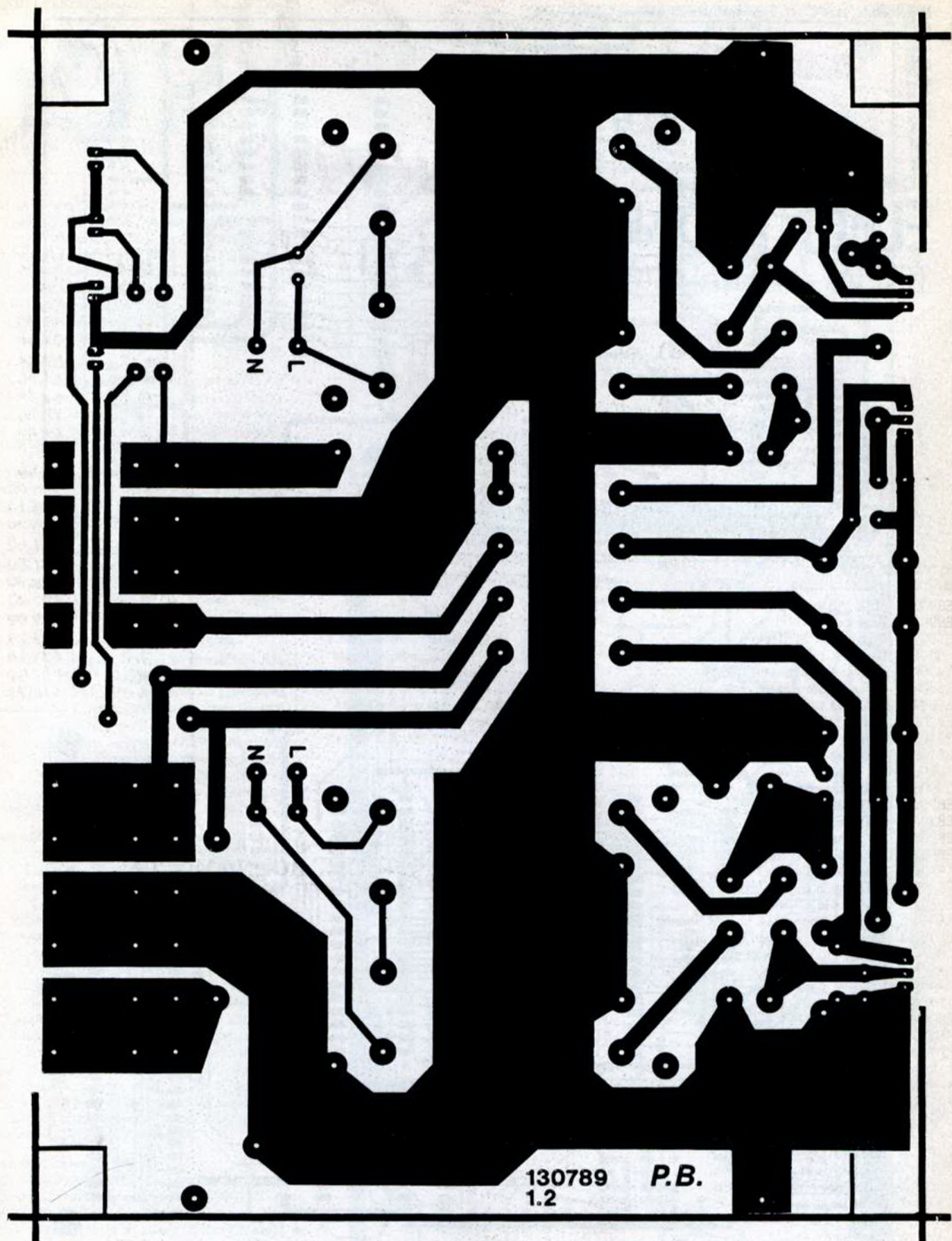


Fig. 2 Component overlay of the Quad Power Supply



130789 P.B.
1.2

Quad Power Supply foil