UNIBOARDS

SIMPLE TRANSISTOR DESIGNS

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3

9V POWER SUPPLY

CONSTRUCTION starts here

WITH one exception, all projects described in this series have been designed to operate from a 9 volt rail. In certain instances, however, it would be considerably more convenient to power the project from the domestic mains supply.

The 9 Volt Power Supply was designed with economy in mind. It was to be built as cheaply as possible, and as such it should eventually pay for itself in terms of the cost of dry batteries. Although the circuit is rather basic (and is not transistorised) the unit has proven quite adequate to operate the projects in this series.

CIRCUIT DESCRIPTION

The circuit diagram is shown in Fig. 1. Transformer T1 is a valve heater transformer with a mains primary and a 6·3V a.c. 300mA secondary. Mains voltage is applied to the primary and stepped down to 6·3V. This low a.c. voltage is presented to D1—D4.

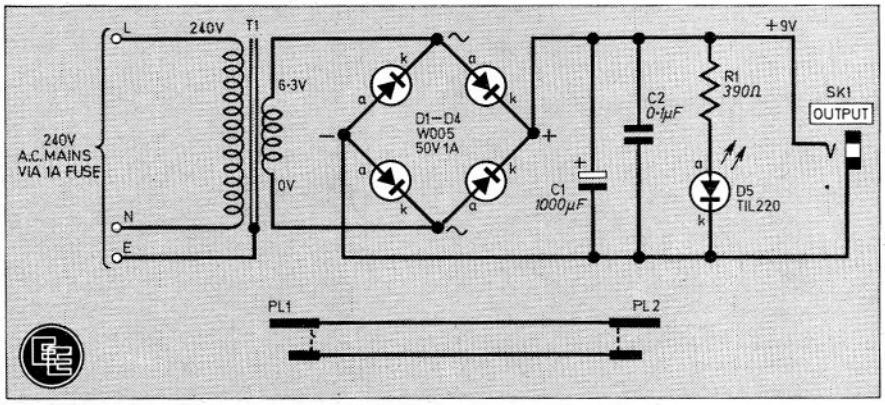
The diagram illustrates four separate rectifiers but in fact a single encapsulated unit, containing four rectifiers, called a "bridge rectifier", is used.

The bridge rectifier converts the a.c. into a pulsating d.c. voltage. Capacitor C1, being a very large value electrolytic capacitor, smoothes out the pulses to give a nominal d.c. voltage of about 9V with a reasonably low ripple content sufficient for our purposes here.

Finally, a light-emitting diode, D5, together with its associated current-limiting resistor R1, forms a "power on" indicator. A further bonus is that if for some reason, the output of the p.s.u. is shorted, the l.e.d. will extinguish, so indicating a fault present.

A 3·5mm jack socket SK1 is used as the outlet for the 9V supply. The tip of the plug inserted in SK1 is connected to +9 volts.

Fig. 1. Circuit diagram for the 9V Power Supply. The output connecting lead is terminated with jack plugs PL1 and PL2. The jack tips carry the positive (+9V) supply.



The prototype unit was housed comfortably in a readily-available PB1 type plastic box, measuring 115 x 75 x 35mm. It is recommended however that the heater transformer is acquired first, and then a plastic box of appropriate dimensions chosen to house it.

The circuit is built on 0·1 inch matrix stripboard measuring 10 strips x 24 holes as shown in Fig. 2. There are no problems with this aspect of construction, but it is extremely important that both the p.c.b. mounting electrolytic capacitor and the bridge rectifier are correctly orientated.

The completed board is mounted on the inside face of the end opposite main cable exit by means of 6BA spacers, nuts and bolts.

The interwiring is as shown. A cable retaining clamp should be fitted to the main cable to prevent it from pulling out. Also, note how the earth input of the mains cable is connected by means of a solder tag to the transformer mounting frame, using one of the mounting bolts.

The l.e.d. can be positioned and secured using the special-purpose plastic clip normally provided. Finally, a 1 amp fuse must be fitted in the mains plug.

VENTILATION

It was found that the transformer itself did tend to get rather warm during normal operation. To counter this a series of ventilation holes have been drilled in the case. If necessary, a piece of aluminium mesh, or perforated zinc, should be glued behind the holes to prevent any objects poking through the holes and possibly touching mains wiring inside.

Jack sockets have been used in the individual projects to facilitate the connection of the 9 Volt Power Supply. A common audio lead, terminated with a 3·5mm jack plug each end, is all that is required to make the connection.

Note that the audio lead must be connected up before the p.s.u. is switched on: if the p.s.u. is switched on first and then plugged into the project, it is possible that the jack plug can temporarily short out the power supply, perhaps having a detrimental effect.

Next Month: Touch Switch

The finished power supply showing the small ventilating holes and the 9V output jack socket.

COMPONENTS

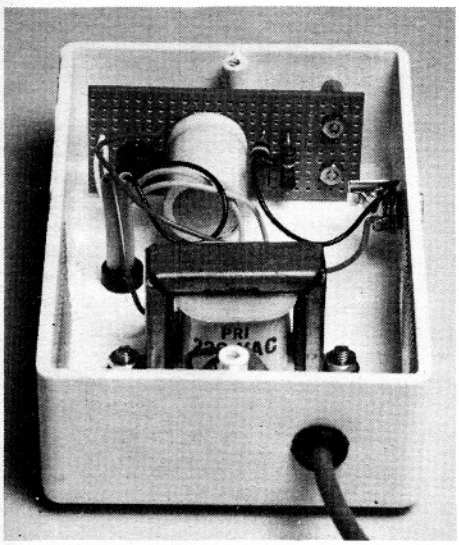
Resistors
R1 390Ω ½W carbon ±5%

Capacitors
C1 1000μF 25V radial elect.
C2 0·1μF polyester type C280

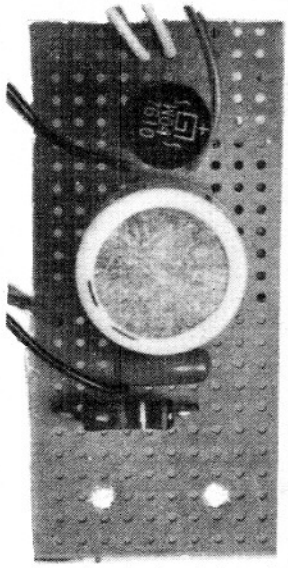
Semiconductors
D1—D4 50V 1A diode bridge type W005 or similar
D5 TIL220 l.e.d. or similar

Miscellaneous
T1 mains primary/6·3V 300mA secondary
SK1 3·5mm jack socket
PL1,2 3·5mm jack plug (2 off)
Stripboard: 0·1 inch matrix size 10 strips × 24 holes; mounting bush for D5; case type PB1, see text; cable retaining clip/grommet; p.v.c. insulated connecting wire; 3-core mains cable; 6BA fixings, nuts bolts, washers, stand-off spacers, solder tag;

Approx. cost Guidance only
£3.25



Laycut of components inside the case. The circuit board is mounted on the side of the case using 6BA spacers.



Completed circuit board.

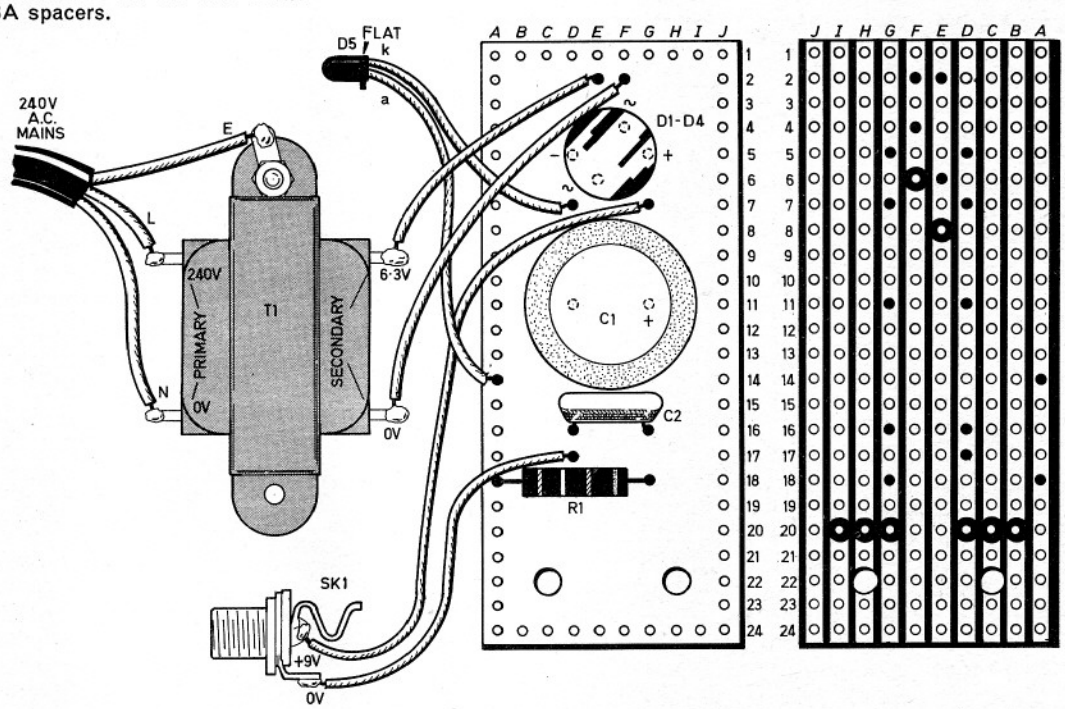


Fig. 2. Layout of components on the topside of the stripboard, breaks to be made on the copper strips on the underside and interwiring details to the mains transformer, light emitting diode (D5) and output jack socket (SK1).