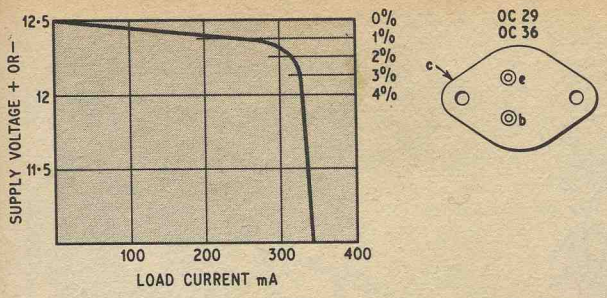

Fig. 3.2. Performance curve of stabilised power supply

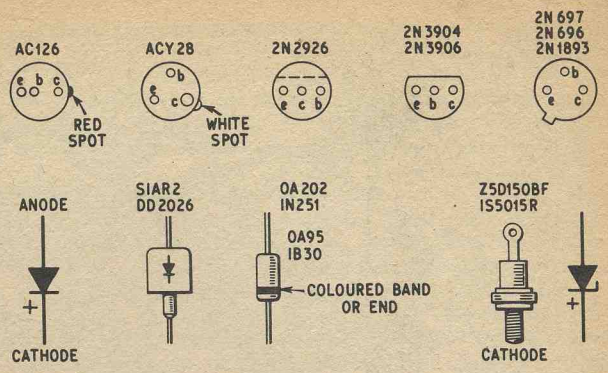

Fig. 3.3. Transistor and diode key

followed by two shunt regulators arranged in series to give positive and negative outputs relative to a zero voltage earthed centre-tap. Diodes D1–D4 provide full-wave rectification of the 40V r.m.s. nominal transformer output. Capacitors C1 and C2 are wired in series, with their common connection taken to the transformer centre-tap, and this doubles the capacitor voltage rating without the need for bleeder resistors. R1 and R2 achieve some measure of preliminary ripple smoothing while dropping the unregulated d.c. voltage to a safe value for C3 and C4.

COMPONENTS . . .

UNIT "A" POWER PACK

Resistors

R1, R2 7Ω 0·7A power resistors 5% (2 off)
R3 400Ω 5W wirewound 5%
R4 300Ω 5W wirewound 5%
R5, R6 1kΩ 2W carbon 10% (2 off)
R7 60Ω 0·7A power resistor 5% (two 30Ω in series, see text)
R8, R9 100Ω 1W carbon 10% (2 off)

Potentiometers

VR1, VR2 500Ω 3W panel mounting, wirewound (2 off)

Capacitors

C1–C4 1,000μF elect. 50V d.c. 900mA rippled (4 off)

Transformer

T1 Rectifier transformer. Standard mains primary. Secondary, 20V–0–20V 0·7A (Radiospares)

Diodes

D1–D4 SIAR2 (Westinghouse) *or* DD2026 (Lucas) (4 off)
D5, D6 Z5D150BF (STC) *or* IS5015R (Texas) (see text) (2 off)

Transistors

TR1, TR2 ACY28 (STC) *or* AC126 (Mullard) (2 off)
TR3, TR4 OC29 *or* OC36 (Mullard) (2 off)

Miscellaneous

Four capacitor clips to fit C1–C4
S.R.B.P. panel 4in × 12in × $\frac{1}{16}$in or $\frac{1}{8}$in
4 B.A. and 6 B.A. assorted screws, nuts, washers, and solder tags
Insulated sleeving
20 s.w.g. tinned copper wire
16 s.w.g. sheet aluminium 2 off 4in × 4in, and 2 off $1\frac{1}{2}$in × $1\frac{3}{4}$in

SHUNT REGULATORS

To understand the action of the twin shunt regulators, temporarily assume that the −12·5V output terminal is at zero voltage. The centre-tap and the positive outputs will then be positive in relation to the negative output. TR3 and TR4 collector-emitter voltages are both clamped at 12·5V, and the unregulated d.c. voltage is dropped across R7. Therefore, the voltage appearing at the junction of R7 and TR3 emitter is +25V relative to the assumed zero rail, with the centre-tap output at +12·5V. As all three output terminals are floating, it is a simple matter to connect the centre-tap output to an external earth and classify it as the zero voltage rail, with the other terminals forming positive and negative regulated outputs.

VR1 setting will determine the voltage across TR3, and VR2 the voltage across TR4. The range of adjustment of VR1 and VR2 is sufficient to allow for regulator diode (D5 and D6) tolerances on nominal voltage of ±15 per cent, and will therefore permit the use of manufacturers' rejects or "bargain" price regulator diodes. 10W diodes are specified for D5 and D6 in the Fig. 3.1 circuit, to achieve a low dynamic resistance, and reduce the short-term thermal changes which are inevitable when smaller regulator diodes are run at high temperatures.

Fig. 3.2 will give an idea of the capabilities of the regulated power supply, and maximum current limits. If an optional press-button switch is wired across one half of R7 (Fig. 3.1) output current can almost be doubled for short periods, and special purposes. The prolonged use of this extra current facility will, however, result in mains transformer overheating.

POWER PACK CONSTRUCTION

Low cost semiconductors were used throughout the prototype power pack. The diodes D1–D4 should have a p.i.v. rating of not less than 100V, and a maximum current rating of 1A or more. It is advisable to check all diodes with an ohmmeter, for high reverse resistance and correct polarity. The D5 and D6