SECTION 3

STABILISED POWER-SUPPLY UNITS SPS/7A AND SPS/7B

Introduction

The Stabilised Power-Supply Units SPS/7A and 7B are designed to feed apparatus requiring a stabilised supply in the range 250-350 volts with a maximum current of 250 milliamps. Three 6·3-volt r.m.s. feeds are available, all rated at a maximum current of 5 amperes.

The only significant difference between the units SPS/7A and SPS/7B is in the construction of the mains transformers and chokes. In the SPS/7B these are of 'C' core type. The following description applies to both.

The unit is mounted on a 19 × 7-inch panel suitable for bay mounting; when so mounted, the unit projects through the bay. Power dissipation in the unit is high and adequate ventilation must be provided. Because of ventilation requirements the unit must not be operated when resting on a flat surface.

The output voltage is normally stabilised by reference to an internal stable voltage source but can be made to vary with reference to an external source of — 150 volts. The circuit arrangement is such that as the external reference voltage increases negatively the output voltage increases positively, and vice versa.

Circuit Description

A complete circuit diagram of the unit is shown in Fig. 3. When the external source is not used, the stabilised h.t. supply circuit is almost identical with that described in Section 1. It differs from that of Section 1 in that a coarse control of the output is provided in addition to the fine control. This coarse control is obtained by appropriate interconnection of the tags X, Y and Z, which varies in discrete steps the voltage fed to the grid of V2. The fine control then serves to vary the output voltage about the mean voltage of 250, 300 or 350. The limits of each range are approximately 30 volts above and below the nominal centre voltage.

When the external reference voltage is employed, the gas-filled reference-voltage valve V3 is strapped out of circuit; the cathode of V2 is thus at earth potential. The reference voltage, which, for correct operation, must have a nominal voltage of — 150 with respect to earth, is then connected to the one end of the potential divider chain feeding the grid of valve V2; the other end of this chain remains connected to h.t. positive. The resistors in this chain are so chosen that with the external reference voltage at — 150 volts, the grid of V2 is negative with respect to earth and the grid-earth potential is such that the h.t. output voltage is at substantially the same value as that obtained when the internal reference voltage is used. If the magnitude of the reference voltage increases, the bias of the grid of V2 increases negatively, and hence the h.t. output voltage rises, offsetting this effect. The circuit arrangement is such that the h.t. voltage change is approximately twice the change in the reference voltage.

Input and Output Connections

Mains input and power output connections are made by plugs and sockets at the rear of the unit. The mains input plug is of the four-pin recessed type (F. and E. EP-4-14S) the socket being located by a keyway. The power output is taken by means of a twelve-way socket, (F. and E. JP-10-CCT), the connections to which are as follows:

Tags	
1, 2	Not used.
3	H.T. + ve.
4	H.T. — ve.
5, 6	6·3 V a.c.
7, 8	6·3 V a.c.
9, 10	6·3 V a.c.
11	— 150 V external reference (when used)
12	Chassis earth.

Mechanical Construction

The unit is mounted on a 19-inch panel. Attached to this panel are side panels which serve to locate the cover in position and support a further panel parallel with the front panel, at a distance of 5 inches from it. This latter panel carries the valves and associated components. Access to the valves from the front of the unit is given by a detachable plate secured to the front panel by two catches. The fine control of the h.t. supply R20 is accessible when the plate is removed.

The cover enclosing the unit engages from the rear and is retained in position by spring leaves in the side panels. The width of the cover is reduced at the rear, to reveal the mains input and power output connectors, and the mains voltage selector. The On/Off switch, indicator lamp and mains fuses are mounted on the front panel.

Valve Data

Valve	*Type*
V1	CV378
V2	CV138
V3	CV449
V4, V5	CV345

General Data

Output Voltage Control	Reliance type TW, 50 kΩ wirewound.
Current Meter	Weston model S33 0-300 mA or Ernest Turner model 909, 0-300 mA.
Voltmeter	Weston model S33 0-500V or Ernest Turner model 909, 0-500 V

Test Specification

1. The output voltage control should vary the output over the following minimum ranges :—
   250 V range : 230-270 V
   300 V range : 260-320 V
   350 V range : 300-360 V.
2. With the chassis of the unit connected to h.t. negative, the hum level measured on a high impedance oscilloscope should not exceed 10 mV.
3. The output voltage should not vary by more than 1 V between no load and full load.
4. With an output voltage of 300, load current of 250 mA and nominal 230 V a.c. input, the output voltage should not vary by more than 1 V for changes in the a.c. input of 6 per cent.
5. Sudden changes of 6 per cent. in the input mains voltage should produce transient changes in the output of not more than 10 mV d.a.p. at any value of load current.
6. With an external reference source at − 150 V employed, and the output voltage set to 300, the output voltage should change to 290 ± 1 V when the reference voltage is changed to − 145 V.

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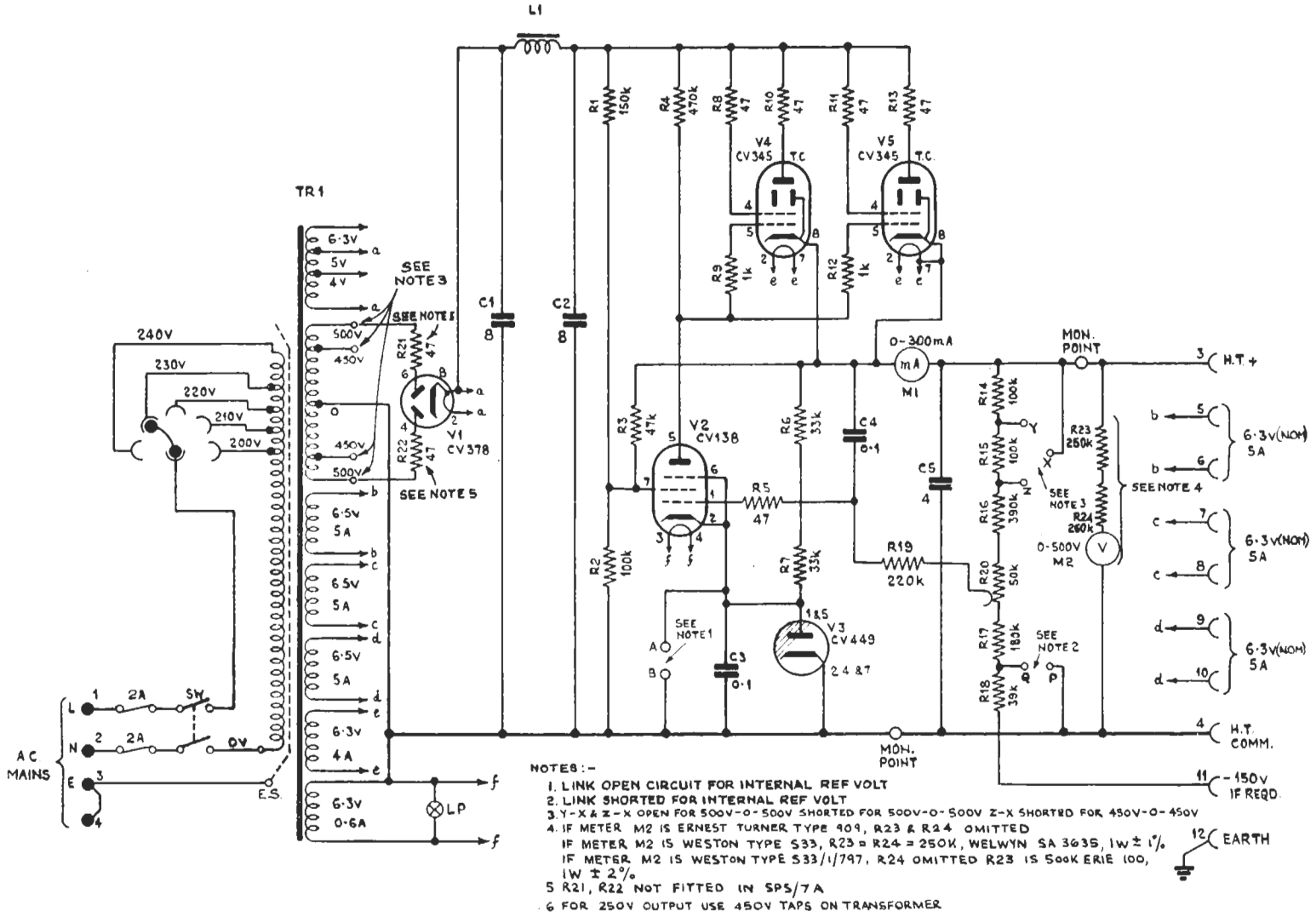

NOTES:-

1. LINK OPEN CIRCUIT FOR INTERNAL REF VOLT
2. LINK SHORTED FOR INTERNAL REF VOLT
3. Y-X & Z-X OPEN FOR 500V-0-500V SHORTED FOR 500V-0-500V Z-X SHORTED FOR 450V-0-450V
4. IF METER M2 IS ERNEST TURNER TYPE 909, R23 & R24 OMITTED
   IF METER M2 IS WESTON TYPE S33, R23 = R24 = 250K, WELWYN SA 3635, 1W ± 1%
   IF METER M2 IS WESTON TYPE S33/1/797, R24 OMITTED R23 IS 500K ERIE 100, 1W ± 2%
5. R21, R22 NOT FITTED IN SPS/7A
6. FOR 250V OUTPUT USE 450V TAPS ON TRANSFORMER

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FIG 3 V4
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