

## POWER SUPPLIER PS2/45

**Introduction**

The PS2/45<sup>3</sup> is a power supplier having two main stabilised outputs and a number of subsidiary outputs which are obtained from them. Protection circuits are included. A metering circuit is provided for checking the two main supplies and for indicating levels in associated equipment<sup>1,2</sup>.

The PS2/45 is built on a CH1/26C chassis with most of the components mounted on two printed boards, one of which is hinged to allow easy access. The two mains fuses are accessible from the front but the d.c. supply fuses are fitted internally.

**General Specification**

<i>Input</i>	200-250 volts, 50 Hz, 50 W
<i>Main Outputs</i>	+25 V, 600 mA -30 V, 200 mA
<i>Subsidiary Outputs</i>	+20 V, 60 mA +17 V, 120 mA +12 V $\pm 0.25$ V, 85 mA -24 V, 120 mA -10 V $\pm 0.25$ V, 60 mA
<i>Voltage Accuracy</i>	
Main supplies	preset
Subsidiary supplies	$\pm 1.0$ V
<i>Regulation</i>	
main supplies	less than 125 mV
(for mains change 200-250 V)	
main supplies	less than 125 mV
(no load to full load)	
<i>Hum</i>	not more than 100 $\mu$ V p-p
<i>L.F. Ripple and Noise</i>	not more than 500 $\mu$ V p-p
<i>Index Pegs</i>	16 and 23
<i>Weight</i>	8 $\frac{3}{4}$ lb.

**Circuit Description**

The circuit diagram is given in Fig. 1. on page 3. The main supplies are obtained from bridge rectifiers MR1 and MR2 which provide sufficient output voltage for stabilisation to be effective with mains voltages between 200 V and 250 V. The stabilisers are similar in operation and will be described with reference to the 25-volt supply.

TR6 is a series stabiliser controlled by the amplifier TR10 and the Darlington pair TR8 and TR9. TR8, TR9 and TR10 obtain their collector potentials from a subsidiary 18-volt supply connected in series with the 25-volt supply thus increasing the feedback gain available. D2 is the reference zener diode and the output voltage is set by adjustment of RV15.

R5, R6, D5 and TR7 give protection against short circuits. When the voltage across R5/R6 exceeds a certain level TR7 starts to conduct, reducing the base current to TR9 which, through TR8 and TR6, limits the short circuit current to a safe value. C6 reduces the gain of the feedback loop at high frequencies and thus prevents instability.

Following the stabilisers there are certain differences between the 25-volt and the 30-volt supplies and these are described below.

C8 increases the gain of the 25 V supply feedback loop at low frequencies, and D15 discharges any voltage spikes which may occur on accidental short circuit and prevents them from damaging TR10. A similar capacitor is not necessary in the 30-volt supply circuit owing to its lower current demand. If the 30-volt supply is short-circuited R17, D7 and D9 cause the 25-volt supply to fail also. In this case D7 conducts, cutting off TR10. Diode D8 holds off the relatively low impedance potentiometer chain from the base of TR10.

If the 25-volt supply fails, the 30-volt supply will fail also as the collector potentials of TR1, TR2 and TR3 are all dependent on the 25-volt supply.

D3 and R4 supply a small current to the base of TR6 immediately the unit is switched on as otherwise the interdependence of the two supplies would prevent the voltages building up.

The subsidiary supplies are obtained from the main supplies by means of the zener diodes D10, D11, D12, D13 and D14.

Switch SB and the associated meter allow the two main supply voltages to be checked and, via test points 1 and 2, two external voltages may also be checked. TR11 and TR12 form a two-stage complementary emitter follower used to isolate test point 3 from the meter circuit. This circuit is used for indicating a.g.c. voltages or peak video level when the PS2/45 is used with receiver type RC5M/501 or Transmitter Demodulator type DM1M/501. TR11 provides an output from its emitter via terminal 4 for operating a vision sensing circuit in the same receivers.

The potentiometer RV24 (*Set TP3*) adjusts the meter reading when switch SB is in the *TP3* position; see reference 1.

#### Maintenance

Routine maintenance is not required but the tests detailed below may be made periodically to ensure the correct working of the unit.

#### Apparatus Required

Avometer Model 8

Oscilloscope e.g., Tektronic type 515A

Variac 180-250 volts

Variable load resistor 20-75 ohms, 30 watts

Digital voltmeter e.g., Solartron LM1420

#### Voltage Checks

1. Set the 25-volt and 30-volt supplies by adjustment of RV15 and RV11. This should be done with the outputs loaded as given in the General Specification. The fitted voltmeter should then read within 1 volt of the correct values.
2. Check that the 20-volt, the 17-volt and the 24-volt supplies are within 1 volt of the nominal values.
3. Load the 12-volt supply to 90 mA and the 10-volt supply to 60 mA; the output voltages should be within 0.25 volt of the nominal values.

#### Stabilisation Checks

1. On full load the hum on the 25-volt and 30-volt rails should be less than 100  $\mu$ V p-p at mains input voltages down to 195 volts.

2. Switch off the PS2/45 and with the variac determine the mains voltage at which the supplier fails to start properly when switched on. This should be below 195 volts. If the supplier does not meet this test, R4 should be reduced slightly until it does.
3. The variation of the 25-volt and 30-volt rails should be less than 100 mV as the mains input voltage is varied between 200 V and 250 V.
4. With the mains input set to 240 V, the variation of the 25-volt and 30-volt rails as full load is switched on and off, should be less than 100 mV.

#### Overload Tests

1. Set the Avometer on to its 1 A d.c. range and connect it in series with the 30-watt resistor (set to maximum resistance) across the 25-volt supply.
2. Reduce the resistance until the stabilisation starts to fail as indicated by a sudden drop in output voltage or by greatly increased hum on the output. This point should occur at a load current between 0.75 A and 1 A. The current should not be increased beyond 1 A and as soon as the failure point is reached, the value of the series resistance should be increased to avoid blowing fuses.
3. Remove the variable resistor and connect the Avometer, still on the 1 A range, across the 25-volt output. The 25-volt supply should collapse and the indicated current should be less than 0.5 A. The 30-volt supply should drop to less than 10 volts on load.
4. Remove the Avometer; conditions should revert to normal.
5. Repeat tests 3 and 4 on the 30-volt supply. Stabilisation should start to fail at about 0.5 A and when short-circuited by the Avometer the current should not exceed 0.7 A. Under the short-circuit conditions, the 25-volt supply should drop to 15 volts or less on load.

#### References

1. Television Rebroadcast and Monitoring Receivers RC5M/501, DM1M/501
2. Designs Department Specifications Nos. 6.106 (67), 6.127(67)
3. Designs Department Specification No. 6.117(67)

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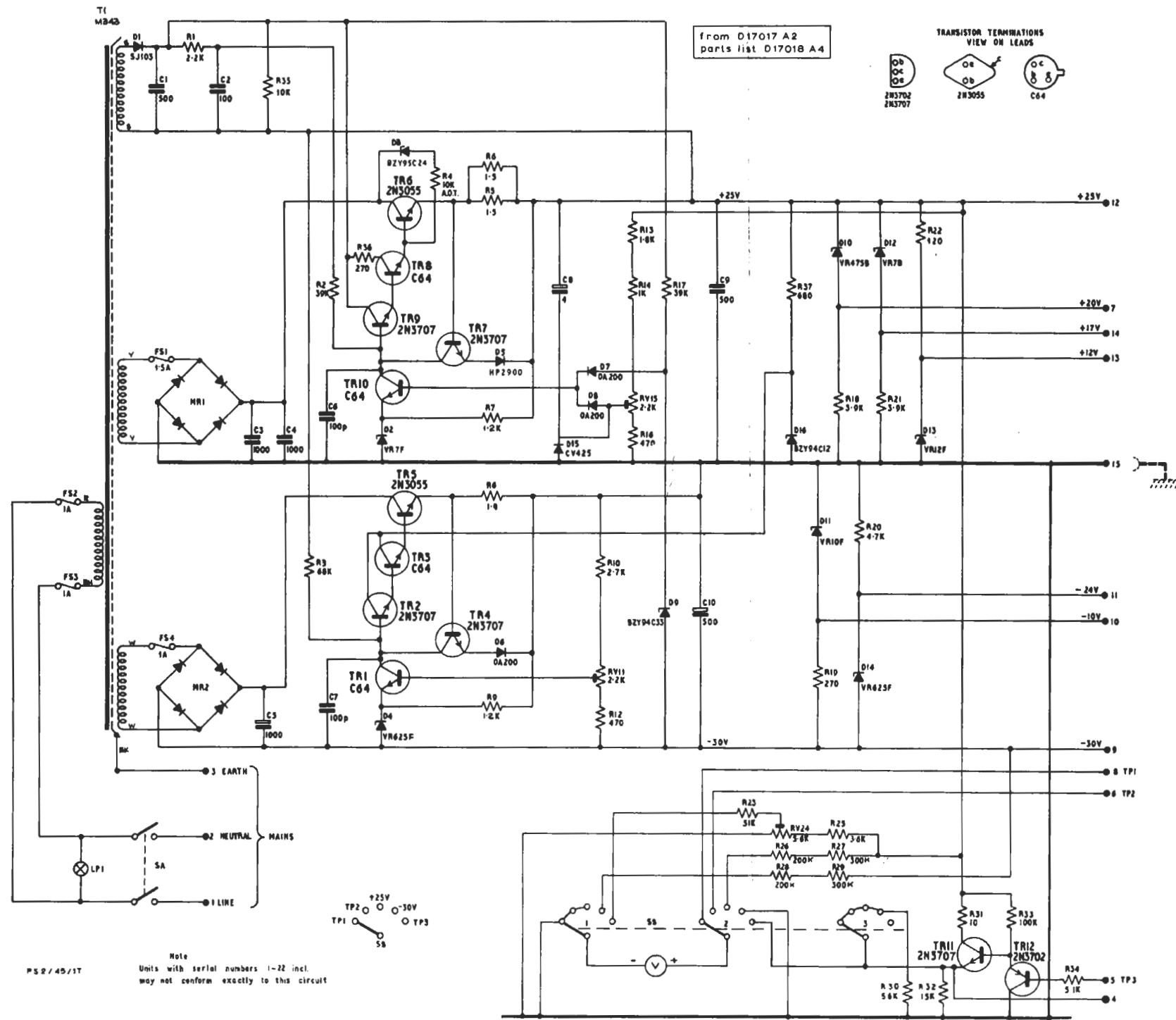


Fig. 1 Circuit of the PS2/45