STABILISED POWER SUPPLIERS PS2/82A-D

Introduction

The PS2/82 series of stabilised power suppliers are mounted on CH1/26A chassis and provide output voltages and currents as shown in Table 1. Each unit has foldback current limiting; the short-circuit current is about one third of the full load current.

Units PS2/82A (6 volts) and PS2/82B (12 volts) include overvoltage protection which operates at about 125 per cent of nominal output voltage.

TABLE 1

	PS2/82A	*PS2/82B*	*PS2/82C*	*PS2/82D*
Output Voltage	6	12	24	50
Load Current (amperes)	2·0	1·5	1·0	0·5
Output Impedance (d.c.)	<0·2Ω	<0·3Ω	<0·5Ω	<1·0Ω
Output Impedance (a.c.) (up to 100 kHz)	<0·6Ω	<1·0Ω	<1·5Ω	<3·0Ω
Output Ripple at Full Load (p–p)	<12 mV	<9 mV	<6 mV	<3 mV
Index Pegs	26 37	26 38	26 39	26 40

Circuit Description (Fig. 1)

The PS2/82 is effectively two paralleled power suppliers with some shared stages. The output from bridge rectifier D1 – D4 is stabilised by TR7 and TR8. Similarly the output from bridge rectifier D5 – D8 is stabilised by TR4 and TR6.

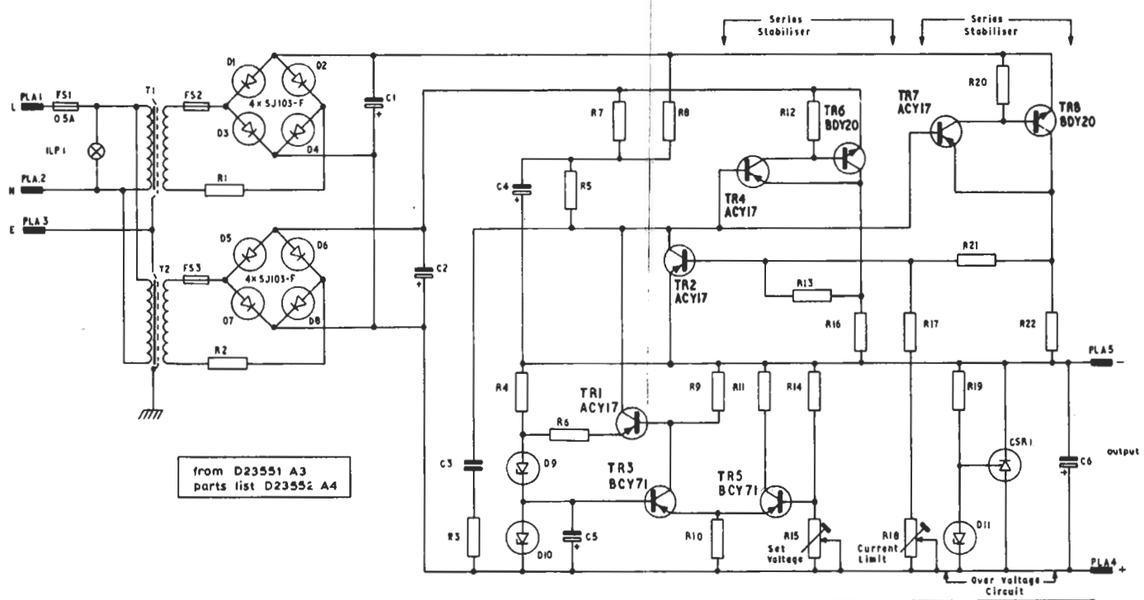
The shared stabilising amplifier consists of a long-tailed pair, TR3 and TR5, driving common emitter stage TR1. The control voltage from the stabilising amplifier is the amplified difference between the reference voltage across zener diode D10 and the proportion of the output voltage developed across R15.

The base potential of TR2 is derived from the output voltage plus a voltage developed across R16 and R22 by the output current. The required proportion of this voltage is determined by the Current Limit preset resistor, R18, in the network R13 R21 R17 R18 so that TR2 is cut-off for all currents up to the full rated output.

If the load current rises above the full rated output the potential drop across R16 R22 increases, drives the base of TR2 more negative, and thus TR2 conducts. The collector current of TR2 flows through R5 and causes a positive-going voltage change at TR2 collector and at the bases of TR4 and TR7. The collector currents of TR4 and TR7 fall and hence the collector currents of TR6 and TR8 (the output current) are also reduced.

As the output current is now controlled by TR2, the resulting fall in output voltage cannot be compensated for by the stabilising circuit. Thus, the emitter of TR2 goes more positive, increases TR2 collector current, and reinforces the reduction of output current. However, the falling load current through R16 R22 causes a positive-going voltage change at TR2 base and this opposes the increase of TR2 collector current. Therefore, a stable state is reached in which TR2 is conducting and the load current is held at a value between one third and full rated current. One third of full rated current flows when the output is short circuited.

The A and B versions incorporate a voltage limiting circuit, which comprises a thyristor CSR1 the striking voltage of which is controlled by zener diode D11. If the output voltage rises more than about 25 per cent above nominal, the thyristor CSR1 fires and virtually short-circuits the output. As the short-circuit current is controlled to one third of the nominal output current damage does not result even if action is not taken. However, the output voltage does not recover unless the mains input is disconnected and restored.



UNIT	OUTPUT	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R 20	R21	R22
PS2/82A	6V(2A)	0·5	0·5	2·2a	100	510	47	1k	1k	220	330	10	1k	200	100	470	1	220	4·7k	1k	1k	200	1
PS2/82B	12V (1·5A)	LINK	LINK	4·7a	390	750	200	1·5k	1·5k	1k	560	10	1k	200	820	1k	1·5	470	10k	2·2k	1k	200	1·5
PS2/82C	24V(1·0A)	LINK	LINK	10a	820	1·1k	270	2·2k	2·2k	3·9k	1·8k	10	1k	270	1·6k	22k	2·2	1k	22k	—	1k	270	2·2
PS2/82D	50V (0·5A)	LINK	LINK	20a	7·5k	10k	3·9k	20k	20k	27k	4·7k	10	1k	1·6k	13k	5·6k	3·9	4·7k	100k	—	1k	1·6k	3·9

UNIT	C1	C2	C3	C4	C5	C6		D9	D10	D11	CSR1		FS2	FS3		T1	T2
PS2/82A	940	940	0·22	64	250	40		LINK	MR33 C–H	MR75 C–H	CR1–05J–C		2·5A	2·5A		M370A	M370A
PS2/82B	940	940	0·22	40	250	40		MR39 C–H	MR39 C–H	BZY88–C15	CR1–05J–C		2·5A	2·5A		M385A	M385A
PS2/82C	440	440	0·1	25	80	16		MR82 C–H	MR82 C–H	—	—		1·0A	1·0A		M369A	M369A
PS2/82D	200	200	0·1	16	80	16		MR100 C–H	MR100 C–H	—	—		0·5A	0·5A		M386A	M386A

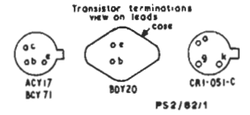


Fig. 1. Circuit of the PS2/82 Series

Maintenance Notes

Output Voltage Adjustment

Connect a suitable load and set R18, the Current Limit control, fully clockwise. Adjust R15 to set the voltage.

Current Limit Adjustment

After setting the output voltage, as above, adjust the load to take an output current ten per cent above nominal; adjust R18 so that the output voltage is ten per cent below nominal. (Note: Ignore the fall in output current while adjusting R18.)

Overvoltage Test

The voltage-limiting action can be proved by causing the stabilising circuit to increase the output voltage. This is done by placing a momentary short-circuit across R15. As the output voltage rises, D11 conducts and causes CSR1 to fire. Check that the output voltage has fallen to 1·5V ±0·5V.

Switch-off the mains input and check that the output voltage returns to normal when the supply is restored.

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