POWER SUPPLIERS PS2/74A-D

General Description

The PS2/74 is a single-output power supplier unit available in four versions:

PS2/74A	6 volts at 4 amps
PS2/74B	12 volts at 3 amps
PS2/74C	24 volts at 2 amps
PS2/74D	50 volts at 1 amp

Each version has a current-limiting system of the foldback type which makes the short-circuit current about one-third of full load. The A and B versions have over-voltage protection on their output and this operates at about 25 per cent above the nominal output voltage.

Each unit is constructed on a standard CH1/26B chassis designed for accommodation in a PN3/23 mounting. The input mains supply to the unit is fed via a Painton 15-way in-line connector on the rear of the chassis. The input pins on the connector are

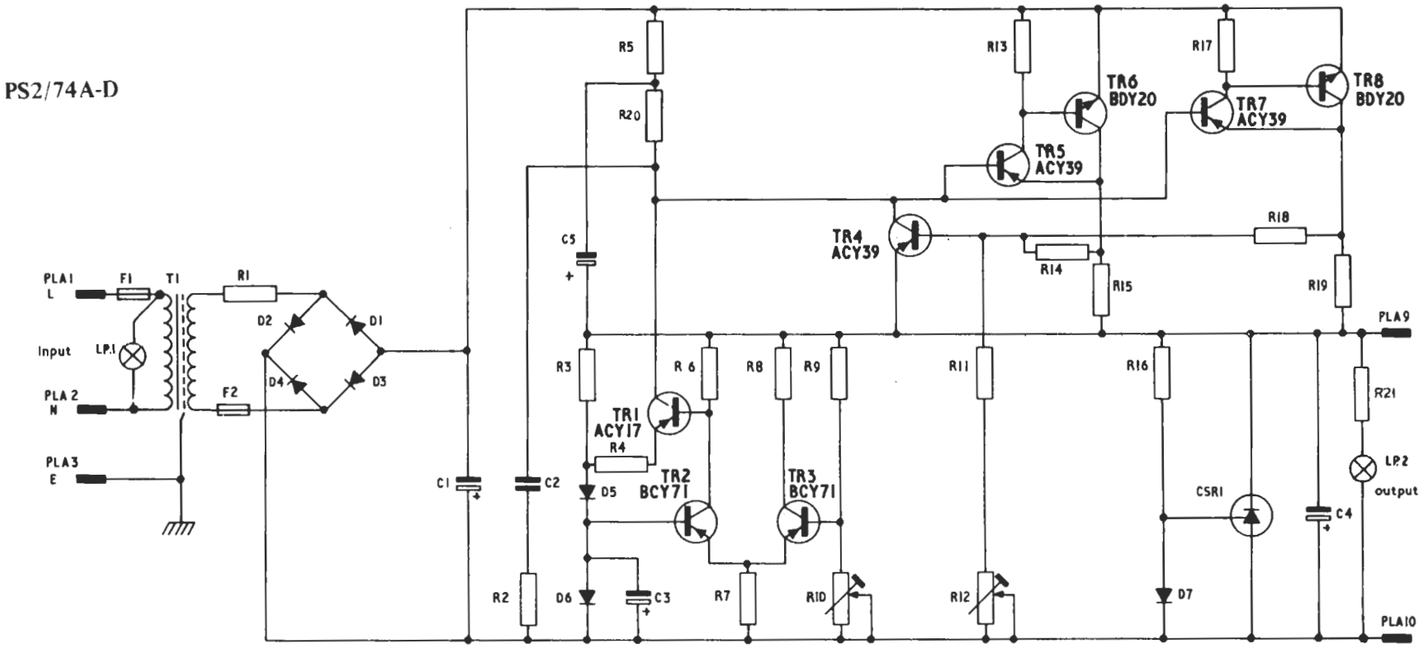
PLA 1	Line
PLA 2	Neutral
PLA 3	Earth

The output is also wired via the connector and is isolated from earth allowing either positive or negative to be earthed. The output pins are

PLA 9	Negative
PLA 10	Positive

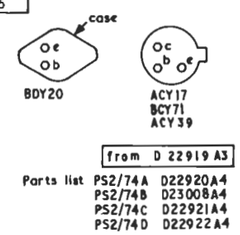
The d.c. output impedance, and the a.c. output impedance up to 100 kHz, both measured in ohms, are less than the following:

	A	*B*	*C*	*D*
A.C. output impedance	0.1	0.15	0.25	0.5
D.C. output impedance	0.3	0.5	0.7	1.5



UNIT	VOLTAGE	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	C5
PS2/74A	6V	1/4	2·2	100	47	510	220	330	10	100	470	220	2·2k	1k	200	1/2	1k	1k	200	1/2	510	68
PS2/74B	12V	1/4	2·2	390	200	750	1k	560	10	820	1k	470	5·6k	1k	200	1/2	2·2k	1k	200	1/2	750	47
PS2/74C	24V	1/2	10	820	270	1·1k	3·9k	1·8k	10	1·6k	2·2k	1k	10k	1k	270	1		1k	270	1	1·1K	22
PS2/74D	50V	1/2	20	7·5k	3·9k	10K	27k	4·7k	10	13k	5·6k	4·7k	100k	1k	1·6K	2·2		1k	1·6K	2·2	10K	15

Transistor terminations view on leads



UNIT	VOLTAGE	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6	D7	T1	F.1	F.2.	CSR1	R21
PS2/74A	6V	8000	0·22	220	40	BYX42/300R	BYX42/300R	BYX42/300R	BYX42/300R	LINK	MR33	MR75	M379	1A	7A	BTY79/100R	STRAP
PS2/74B	12V	5600	0·22	220	47					MR39	MR39	BZY94-C15	M380	1A	5A		"
PS2/74C	24V	3550	0·1	100	16					MR82	MR82		M378	1A	3A		"
PS2/74D	50V	2240	0·1	100	16					MR100	MR100		M377	1A	1·5A		680

from D 22919 A3

Parts list PS2/74A D22920A4
PS2/74B D23008A4
PS2/74C D22921A4
PS2/74D D22922A4

PS2 /74/1

Fig. 1. Circuit of the PS2/74A-D

Circuit Description (Fig. 1)

The mains input is taken to transformer T1, whose secondary feeds a full-wave rectifier bridge, D1 to D4. R1 is included to limit the surge current into reservoir capacitor C1 when the unit is plugged in or the mains are switched on.

Current is fed via R5 and R20 to TR5 and TR7, which form part of the output pairs. Capacitor C5 at the junction of R5 and R20 is used to reduce the ripple to a reasonable level before it is fed to two series regulators. Feedback in the regulator loop then reduces the ripple in the output to a low level.

The output load current is shared between the two series regulators TR6 and TR8. These regulators are not of the conventional type, and together with TR5 and TR7 they form two complementary emitter-followers due to 100 per cent feedback. Resistors R15 and R19 help to promote current sharing and minimise the effect of differences in the output pairs; these resistors also form part of the current-limiting circuit described later.

TR2 and TR3 form a differential amplifier pair, used to ensure a stable temperature characteristic. A reference potential, determined by zener diode D6, is applied to one side of the pair, at TR2 base. A portion of the output is fed back to TR3 base and this is compared with the reference potential. TR1 amplifies the difference voltage produced by TR2 and TR3, and when TR1 collector current changes, so does the voltage dropped across R5 and R20. This change tends to cancel any change in the output caused for example by load current variations.

TR4 is a current-limiting transistor, normally biased off by the potential divider R14, R18, R11 and R12. When the output current increases, the voltage across R15 and R19 increases too, and this voltage eventually overcomes the back-bias across TR4 and, at a point depending on the current limit setting fixed by R12, turns TR4 on.

The over-voltage protection system provided in the A and B versions of the PS2/74 uses a controlled silicon rectifier CSR1 across the output. CSR1 is turned on when the output voltage exceeds that of zener diode D7; the voltage drop across R16 due to current flowing in D7 causes CSR1 to fire at about 30 per cent above the nominal output voltage. CSR1 continues to conduct until the mains voltage to the unit is removed for a few seconds.

Test Procedure

Apparatus Required

Two Avometers Model 8
Oscilloscope
Variable resistor 10 ohms capable of passing 4 amps for A and B versions
Variable resistor 100 ohms capable of passing 2 amps for C and D versions

General Performance Tests

1. Turn R12 fully clockwise.
2. Connect a 240-volt 50-Hz mains supply to the unit.
3. Connect the appropriate variable resistor across the output, in series with an Avometer Model 8 on its 10-amp d.c. range. Adjust the variable resistor to give the rated current for the supplier under test. This is 4, 3, 2 or 1 amps for the A, B, C or D version.
4. Adjust R10 to give the nominal output voltage and re-adjust the variable resistor if necessary to maintain the rated current output.
5. Now check the following:

	A	*B*	*C*	*D*
Voltage drop (mV) from no-load to full-load to be less than	400	450	500	500
Output ripple (mV) on full-load to be less than	12	9	6	3
Short-circuit current (amps) to be within ±30 per cent of	1.3	1.0	0.7	0.3

Current Limit Setting

1. Arrange for the load current to be about 110 per cent of full load.
2. Adjust R12 until the output voltage drops a few hundred millivolts.

Over-voltage Check: PS2/74A and PS2/74B Only

1. Remove the variable resistor load.
2. Increase the output voltage by adjusting R10. At about 30 per cent over the nominal output voltage, CSR1 should fire, causing the output voltage to drop to about 1 volt.
3. Turn R10 fully anticlockwise, and remove the mains supply from the unit.
4. After a few seconds, restore the mains supply, re-connect the variable resistor and re-adjust R10 to give the nominal output voltage.

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