POWER SUPPLY MODULE
AT04878/-

WARNING

This power supply module has been designed to meet relevant safety requirements.
If it is necessary to replace any safety conscious component only the item quoted in the Parts List MUST be fitted.
Ensure that these components are securely fastened and that all insulators or covers are fitted after servicing. Check that all warning labels are in place.
If any re-wiring of the mains input supply cables is necessary the specified type MUST be used and alterations to the routeing or connections MUST NOT be made.

INTRODUCTION

Three versions of this module provide for operation from an AC supply of either 115V or 220/240V, or from a 24V nominal DC supply. In each version an unregulated 24V DC output is provided for use on the transmitter power amplifier whilst two regulators each produce an output of +18V DC.

This module also houses the monitor amplifier and loudspeaker (optional).

DETAILED DESCRIPTION

AC Supply

The AC input is applied, via [0]FS1, to the step-down transformer [0]T1. The secondary voltage is rectified in [0]D1 and smoothed by [0]C1; [0]FS2 protects the rectified voltage which is applied to the regulator board across SP6 and SP1.

Rectification provided by [1]D1 and [1]D2 is smoothed by [1]C2 to produce a voltage which lights [0]LED1 (AC ON), causes [1]TR1 to conduct inhibiting the 'DC POWER IN USE' line, provides a supply for [1]RLA via [1]D10 and is fed to [1]IC2 pin6. Contact [1]RLA1 ([1]RLA energised) connects the rectified voltage on SP6, via the on/off switch SA, to:

(i) provide an unregulated 24V output across SP3 and SP4

(ii) light [0]LED3 (DC OUT) indicating the presence of an unregulated voltage

(iii) supply an input to the 18V regulators [0]IC1 and [0]IC2

DC Supply

The DC supply is connected to SKC and applied to the regulator board across SP5 and SP2. [1]D3 provides reverse polarity protection and [0]LED2 indicates the presence of a DC input.

The input voltage is routed via contact [1]RLA1 ([1]RLA de-energised) and the on/off switch as described under 'AC Supply'. The voltage also causes [1]TR2 to conduct to provide an active 'low' on the 'DC POWER IN USE' line.

Supply Monitoring Circuits

The supply monitoring circuits which comprise [1]IC2 and its associated components provide three functions:-

(i) selects the AC supply as a priority

(ii) in the event of an AC over-voltage selects the DC supply

(iii) in the absence of an AC supply holds on the DC supply.

[1]IC2(a) monitors the DC input from SP5 whilst [1]IC2(b) monitors the AC voltage via [1]D1,D2. On the application of AC power [1]IC2(b) senses the voltage at [1]D1,D2, the output from [1]IC2(b) pin7 causes [1]TR3 and hence [1]TR4 to conduct, energising [1]RLA. If an AC over-voltage occurs it is sensed by [1]IC2(b) which causes [1]TR3 and hence [1]TR4 to cut off, de-energising [1]RLA thus disconnecting the rectified AC at SP6 and connecting the external DC input at [0]SKC (unless an over-voltage is also present on the DC input, in which case the output from [1]IC2(a) will maintain [1]TR4 in the conducting state).

With a DC but no AC input connected to the PSU the output of [1]IC2(a) holds [1]TR4 in the cut off state and [1]RLA remains de-energised, should a DC over-voltage occur under these conditions [1]IC2(a) will cause [1]RLA to energise removing the DC supply to the base station.

Regulator

The dual regulators [0]IC1 and [0]IC2 are similar in operation, each 18V output is set by a potentiometer, [1]RV2 and [1]RV1 respectively.

Monitor Amplifier and Loudspeaker

The AF monitor input from the control module is fed, via the front panel volume control [0]RV1, to amplifier [1]IC1. The AF output and LS OV lines are routed to the rear panel connector [0]SKA, enabling either the use of an internal loudspeaker by linking pins 16 and 14 or an external loudspeaker (connected across pins 6 and 16).

SPECIFICATION

AC Input

115, 220, or 240V ±10% 47-60Hz
Fuse integral with IEC connector

DC Input

24V -10% +20% +ve or -ve chassis
Fuses in line with supply lead

Power consumption

AC Supply 200VA max.
DC Supply 160W max.

DC outputs

(i) 25V (nominal) unregulated
5A maximum
Ripple less than 3V pk-pk

Used for:		
	PA module	4A max
	C/O relay	(35mA)
	External equip	200mA max

(ii) 18V ± 0,5V
1,3A maximum
Ripple less than 1mV pk-pk

Used for:		
	TX Driver	0,8A max
	RX module	0,5A max

(iii) 18V ± 0,5V
0,9A maximum
Ripple less than 1mV ptp

Used for:		
	Local control	0,5A max
	Remote control	0,3A max
	Monitor Amp	0,1A max

DC fuse on back panel

Monitor Amplifier

Sensitivity	300mV (for 1W into 15Ω)
Freq Response	300Hz to 3kHz ±1dB
Power Output	2W into 8Ω

Internal Loudspeaker

1W, 16Ω, 2,5 inch

Connectors

AC input	3 pin IEC male
Interface/DC output	25 way D plug
DC input *	3 pin AMP female
DC output **	3 pin AMP male

* Also used for +ve/-ve chassis linking
** For use as stand-alone PSU

TEST PROCEDURE

Test Equipment required

Note: Refer to Part I, Table 3.1 for suitable types.

1. DC Power Supply
2. AF Generator (with output millivoltmeter)
3. Variable DC Load
4. Digital multimeter
5. Oscilloscope.
6. Multimeter
7. Metrohm
8. AF Power Meter
20. 'Break-out' connector 25way

1. Remove the module cover and connect DC supply at 25V to SKC.

2. With front panel switch 'off' check that the green front panel DC ON indicator is not lit.
   With front panel switch 'on', check that both the red DC IN and the green DC ON indicators are lit.

3. Set RV2 to give 18,3V unloaded across SKA pins 2 and 18.
   Connect DC load, set to 1,3A, across SKA pins 2 and 18.
   Check voltage on SKA pin 2 is greater than 17,5V.

4. Set RV1 to give 18,3V unloaded across SKA pins 4 and 18.
   Connect DC load, set to 1,3A, across SKA pins 4 and 18.
   Check voltage on SKA pin 6 is greater than 17,5V.

5. Increase DC supply to 32V and check that the green DC ON indicator is lit.
   Increase supply to 40V and check that green indicator extinguishes.
   Reduce DC supply to 25V.

6. Set front panel volume control fully counter-clockwise.
   Connect AF generator set to 300mV at 1kHz across SKA pins 1 and 7.
   Connect oscilloscope and AF power meter (set to 8Ω) between SKA pins 6 and 16.
   Adjust volume control so that AF waveform is just below clipping level.
   Check AF power is greater than 2W.

7. Connect variable load, set to 1A, across the un-regulated 24V output PLD; check output is greater than 31V
   Increase current to 6A; check output is greater than 24V.

8. Set variable load to minimum.
   Remove all connectors and check for isolation between SKC earth terminal and negative terminal.
   Check for continuity between SKC earth terminal and SKA pin 21 and to PLD earth terminal.

9. AC Supply Only

   Re-fit plug into SKC linking negative to earth.

10. Remove all items of test equipment and refit the module cover.

POWER SUPPLY UNIT

AT04878/01 240V AC with Loudspeaker
AT04878/02 110V AC with Loudspeaker
AT04878/03 24V DC with Loudspeaker
AT04878/07 240V AC less Loudspeaker
AT04878/08 110V AC less Loudspeaker
AT04878/09 24V DC less Loudspeaker

⚥ Denotes safety conscious component

Cct Ref		Description	Part No	Remarks
COMMON ITEMS				
PLD		DC socket & lead assy	AT14751	
SKC		DC socket & lead assy	AT14752	
		Knob printed	BJ30904/03	1/RV1 (Volume)
RV1		5k ±20% Pot log	PL09220	Volume
SA		Switch power c/w bracket	FS50951	On/off
LED2		LED red	3513 993 47000	DC input
LS1		Loudspeaker 15Ω	FS11215	/01-03
		Spring retaining LS	BT50521	/01-03
		Cloth LS panel	BT27318	
		Button black	FR10750	1/SA
		Bush LED panel mounting	QA99007	1/LED2
		Heatsink assembly	AT14757	
		Front panel assembly	AT14816	
		Cover PSU	BT15914	
		Pillar round M3	BT27210	2/SA
		Label, unit	BT38209/01	Unit label
		Nut st hex M2,5	QA11604/B	2/mains plug - chassis (/01,02,04,05), 2/blanking plate (/03,06)
		Scr st tap pozi No6 x 9,5mm	QJ07697/X	3/heatsink - chassis, 3/regulator heatsink - chassis, 4/front panel - chassis, 4/PSU cover - chassis
		Scr st pan pozi M3 x 10mm	QJ11903/X	2/SA
			AT04878/01 240V AC	
			AT04878/02 110V AC	
			AT04878/07 240V AC	
			AT04878/08 110V AC	
		PCB Assy, regulator & h'sink	AT14901/01	
T1	⚥	Transfomer mains	AL21473	
		Plug assy	AT14814	SKC - -Ve
		Lead assy AC	AT70234/01	LEDs & vol switch - PCB
		Wire kit	AT70156	
		Lead assy	AT70180	AC on/off - mains plug
LK1		Wire link assembly	AT14923	
C1		15000 -10% +30% Cap elec	PS68022	
FS1	⚥	Fuse 2,5A, time lag, mains	FF99042	/01,07 only
FS1	⚥	Fuse 5A, mains	FF99038	/02,08 only
FS2		Fuse 10A	FF99021	
PLB/FS1	⚥	Plug mains c/w fuseholder	FP11522	
LED1		LED yellow	FV05930	AC ON
		Accessories style CEE22	FS41518	1/AC mains plug retainer
	⚥	Strap	BT27069	1/T1
	⚥	Label 'LIVE TERMINALS ENCLOSED'	BT37403/01	
	⚥	Label 'DISCONNECT POWER LEAD'	BT37404/01	
		Label, Warning	3513 903 40031	
	⚥	Cover mains transformer	BT15941	
		Fuse holder panel mounting	FH99100	1/FS2
		Shroud insulating	FH99102	1/FS2 fuseholder
	⚥	Boot insulating	FR10953	1/PLB & FS1
	⚥	Sleeve pink neoprene	FS22515	3/Mains plug connections
		Cap, protection	FC11916	1/C1 terminals
		Bush LED panel mounting	QA99007	1/LED1
		Washer st M6	QA15010/X	1/strap - transformer
		Scr st tap pozi No6 x 9,5mm	QJ07697/X	2/strap - chassis
		Scr st csk pozi M2,5 x 6mm	QJ11601/B	2/mains plug - chassis
		Scr st hex M6 x 12mm	QJ13328/X	1/strap - transformer 1/transformer - chassis
			AT04878/03,09 24V DC ONLY	
		PCB assy regulator & h'sink	AT14901/02	
LK1		Wire link assembly	AT14923	
		Lead assy DC	AT70234/02	Volume switch - PCB

Cct Ref	Description	Part No	Remarks
	Plate blanking	BT20260	For mains connector
	Hole plug black	FG02576	For FS2 fuseholder
	Hole plug black	FG02737	For LED1
	Strap	BT27069	1/Baseplate
	Scr st tap pozi No6 x 9,5mm	QJ07697/X	2/strap - baseplate
	Scr st pan pozi M2,5 x 6mm	QJ11945/B	2/plate blanking

FRONT PANEL ASSEMBLY PSU
AT14816

	Panel, front, printed	BT30973	
	Handle	BT35950	
	Label, PSU	BT38206/01	1/Handle
	Label, Philips	BT38208/01	1/Handle
	Housing, double row, 4 pos'n	FC00821/04	1/LED3
LED3	LED, green	FV05931	DC Power
	Fastener	BT17284	4/PSU-shelf
	Contact, male crimp	FC00839	3/LED wires
	Scr st tap pozi No.4 x 8mm	QJ08241/X	3/Handle-front panel

REGULATOR PCB AND HEATSINK ASSEMBLY

AT14901/01 AC
AT14901/02 DC

	PCB Assembly Regulator	AT29060	
IC1	IC Volt reg 317	FU99119	
D1	Rectifier bridge 26MB40A	9337 195 10682	/01
	Heatsink	BT45159	
	Pillar hexagon	BT04411	
	Nut st hex M3	QA11605/X	1/IC1
	Nut st hex M4	QA11607/X	1/D1 (/01 only)
	Scr st pan pozi M3 x 5mm	QJ11900/X	4/Regulator PCB - pillars
	Scr st pan pozi M3 x 8mm	QJ11902/X	4/Heatsink - pillars
	Scr st pan pozi M3 x 10mm	QJ11903/X	1/IC1
	Scr st pan pozi M4 x 20mm	QJ11921/X	1/D1 (/01 only)
	Washer st form A M3	QA15005/X	1/IC1
	Washer st form A M4	QA15007/X	1/D1 (/01 only)
	Bush insulating (TO-220)	QA99024	1/IC1
	Washer insulating (TO-220)	QA99025	1/IC1

AT29060
PCB ASSEMBLY REGULATOR

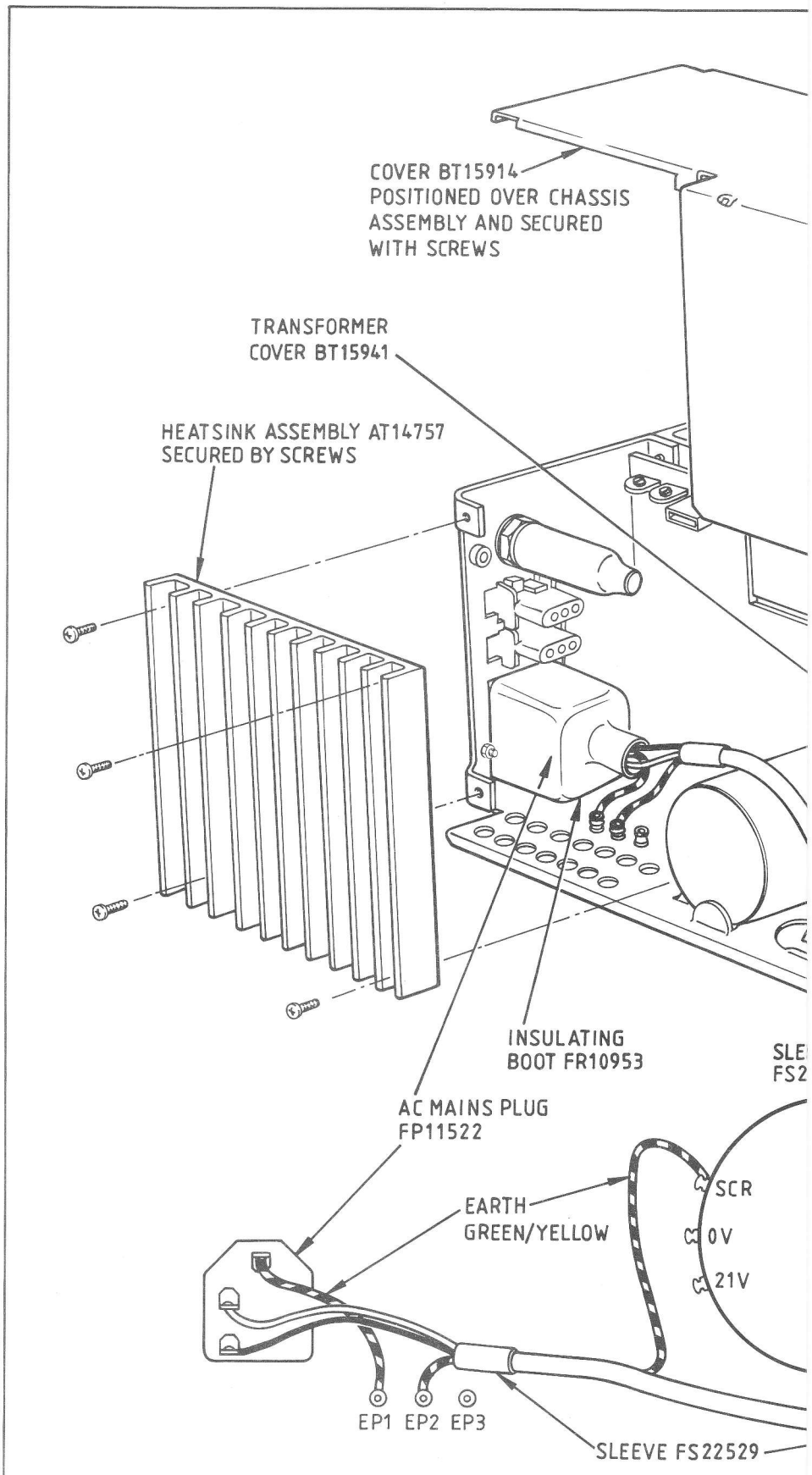
Semiconductors & IC's

IC1	IC Audio amp 2002	FU08027
IC2	IC Dual op amp 1458	FU99092
TR1,2	Transistor BC337 GP	FV05896
TR3	Transistor GP BC547	FV05889
TR4	Transistor BC337 GP	FV05896
D1,2	Diode GP BYW54	FV05892
D3	Diode MR751	FV08961
D4	Diode GP 1N4448	FV05874
D5	Diode GP BYW54	FV05892
D6-8	Diode GP 1N4448	FV05874
D9-11	Diode GP BYW54	FV05892
D12	Diode zener 13V ±5%	FV05871
D13	Diode zener 18V ±5%	FV05873
D14	Diode GP BYW54	FV05892
D15	Diode GP 1N4448	FV05874
D16	Diode GP BYW54	FV05892
D17	Diode GP 1N4448	FV05874

Resistors

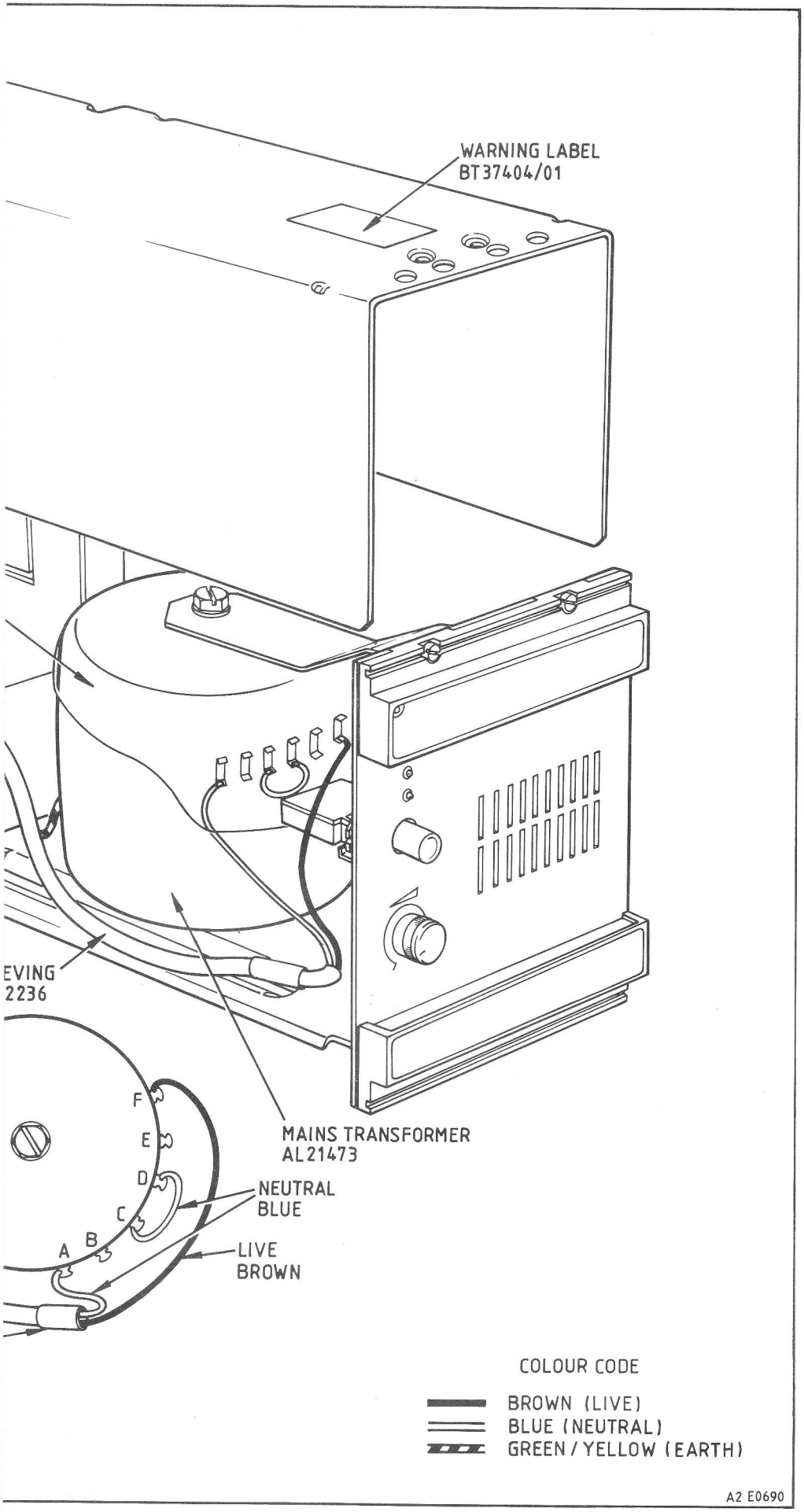
R1-3	1k8	0,5W ±2%	m oxide	PL99308
R4	2k2	0,5W ±2%	m oxide	PL99309
R5	3k16	0,25W ±2%	m film	PM99092
R6	18k	0,25W ±2%	m film	PM99312
R7	1k	0,25W ±2%	m film	PM99282
R8	4k7	0,25W ±2%	m film	PM99298
R9	2k2	0,25W ±2%	m film	PM99290
R10	1k	0,25W ±2%	m film	PM99282
R11	1	0,25W ±2%	m film	PM99210
R12	220	0,25W ±2%	m film	PM99266
R13	10	0,25W ±2%	m film	PM99234

Cct Ref	Description	Part No.	Remarks
Resistors (Cont'd)			
R14	240 0,25W ±2% m film	PM99267	
R15	2k7 0,25W ±2% m film	PM99292	
R16	240 0,25W ±2% m film	PM99267	
R17	2k7 0,25W ±2% m film	PM99292	
R18	4k7 0,25W ±2% m film	PM99298	
R19	1 0,25W ±2% m film	PM99210	
R20	180 0,25W ±2% m film	PM99264	
R21	18k 0,25W ±2% m film	PM99312	
R22	12k 0,25W ±2% m film	PM99308	
R23	18k 0,25W ±2% m film	PM99312	
R24	12k 0,25W ±2% m film	PM99308	
R25	1k 0,25W ±2% m film	PM99282	
R26	33k 0,25W ±2% m film	PM99318	
R27	18k 0,25W ±2% m film	PM99312	
R28	1k3 0,25W ±2% m film	PM99285	
R29	150k 0,25W ±2% m film	PM99334	
R30	18k 0,25W ±2% m film	PM99312	
R31	6k8 0,25W ±2% m film	PM99302	
R32	560 0,25W ±2% m film	PM99276	
R33	180 0,25W ±2% m film	PM99264	
RV1/2	1k ±20% Pot skel lin	PL01483	
Capacitors			
C1	100n ±10% 63V pes	PQ99511	
C2	100 ±20% 50V elec	PS99440	
C3	470 ±20% 35V elec	PS99433	
C4,5	100n ±10% 63V pes	PQ99511	
C6	470 ±20% 16V elec	PS99416	
C7	100n ±10% 63V pes	PQ99511	
C8,9	100 ±20% 25V elec	PS99424	
C10	22 ±20% 25V elec	PS99421	
C11	470p ±20% cer	PN99933	
C12	2µ2 ±20% 100V elec	PS99456	
C13	100n ±10% 63V pes	PQ99511	
C14	22 ±20% 25V elec	PS99421	
C15	100n ±10% 63V pes	PQ99511	
C16	47 ±20% 50V elec	PS99439	
Miscellaneous			
PLA	Plug PCB mtd straight 2 x 7	FP99290	
RLA	Relay 2 pole changeover	FR21714	
SKA	Socket 25-way D type angle	FS99082	
	Heatsink	BT37523	1/IC1
	Insulating bead	FJ00007	1/R5
	Nut st hex M3	QA11605/X	2/SKA, 1/IC1
	Scr st pan pozi M3 x 6mm	QJ11901/X	1/IC1
	Scr st pan pozi M3 x 10mm	QJ11903/X	2/SKA

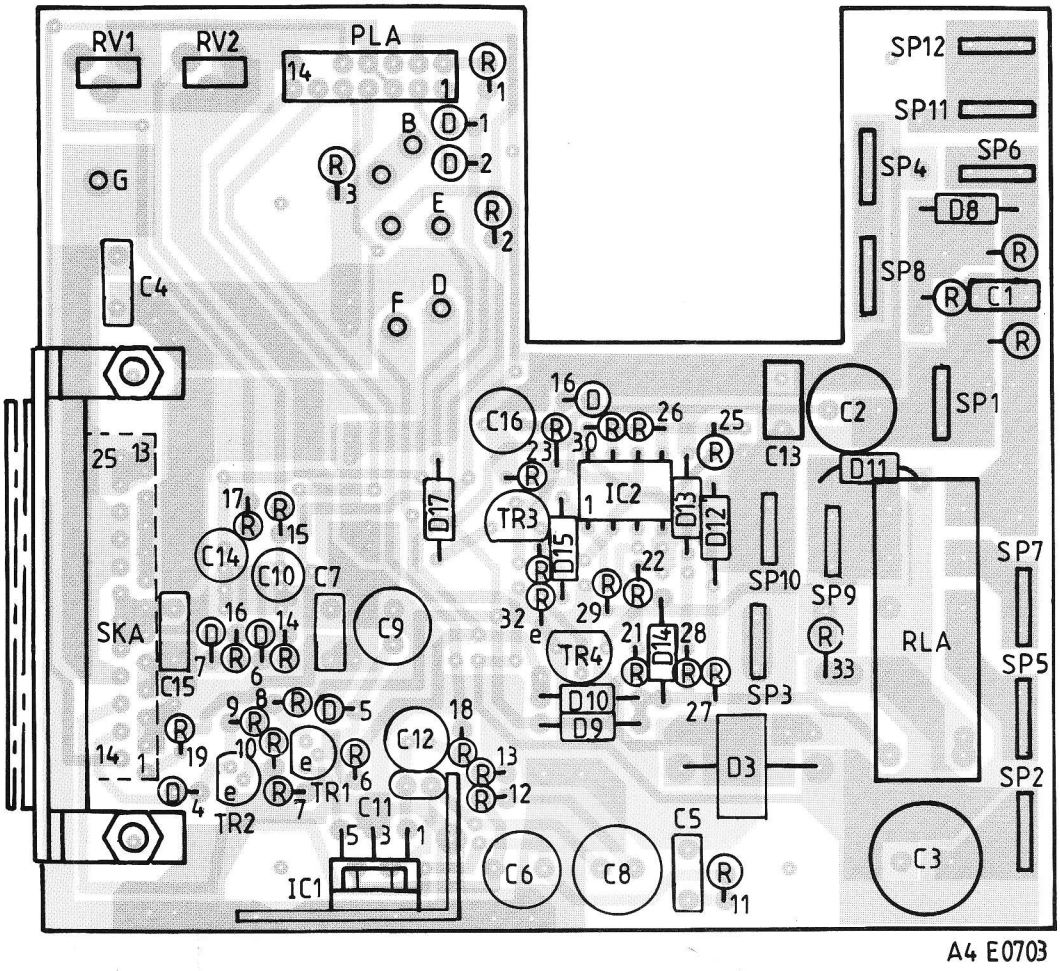


NOTE

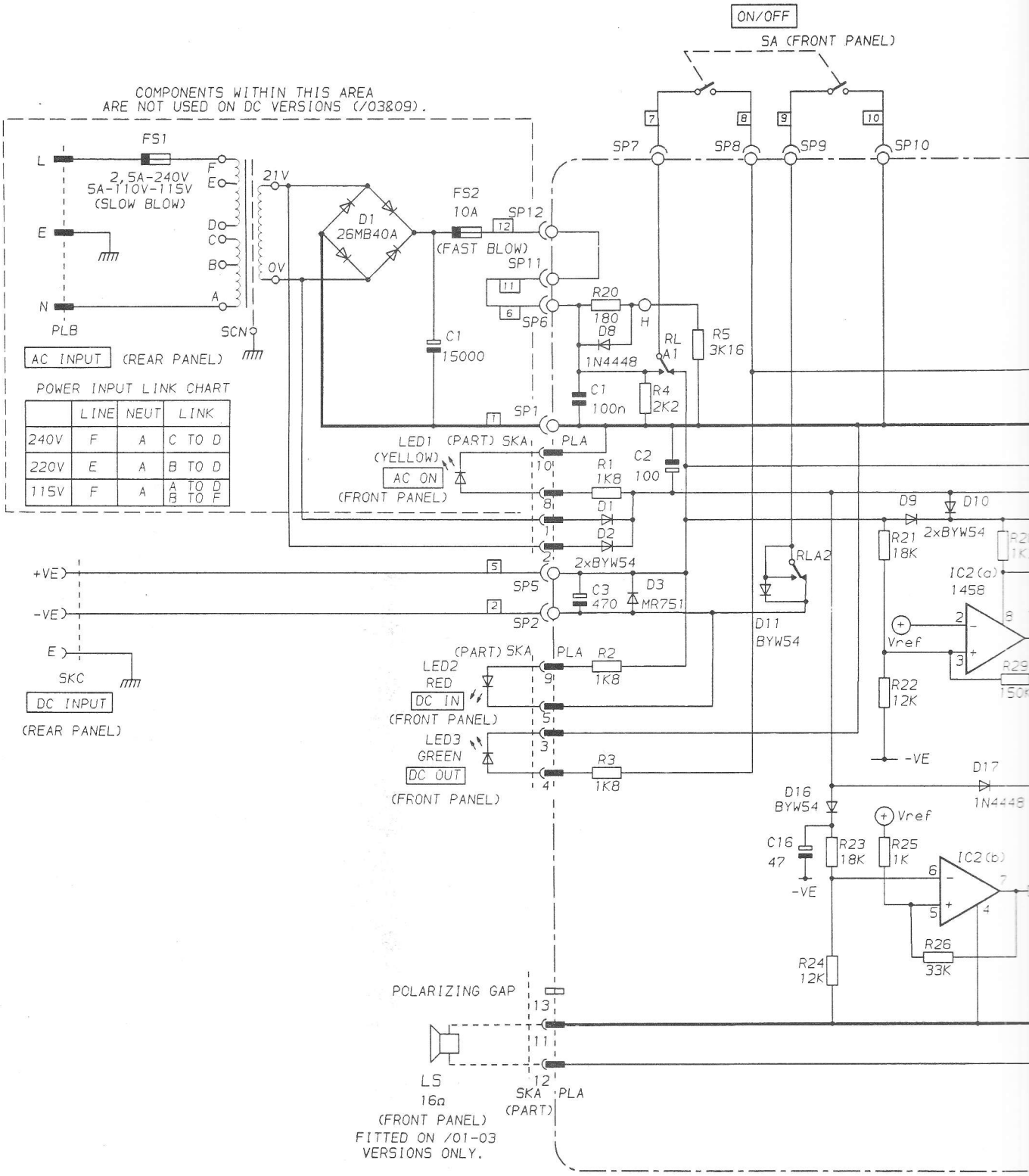
JOINTS ON AC MAINS PLUG, MAINS TRANSFORMER AND EARTH PINS TO BE WRAPPED AND SOLDERED



PSU AT04878/-
POWER WIRING DETAILS

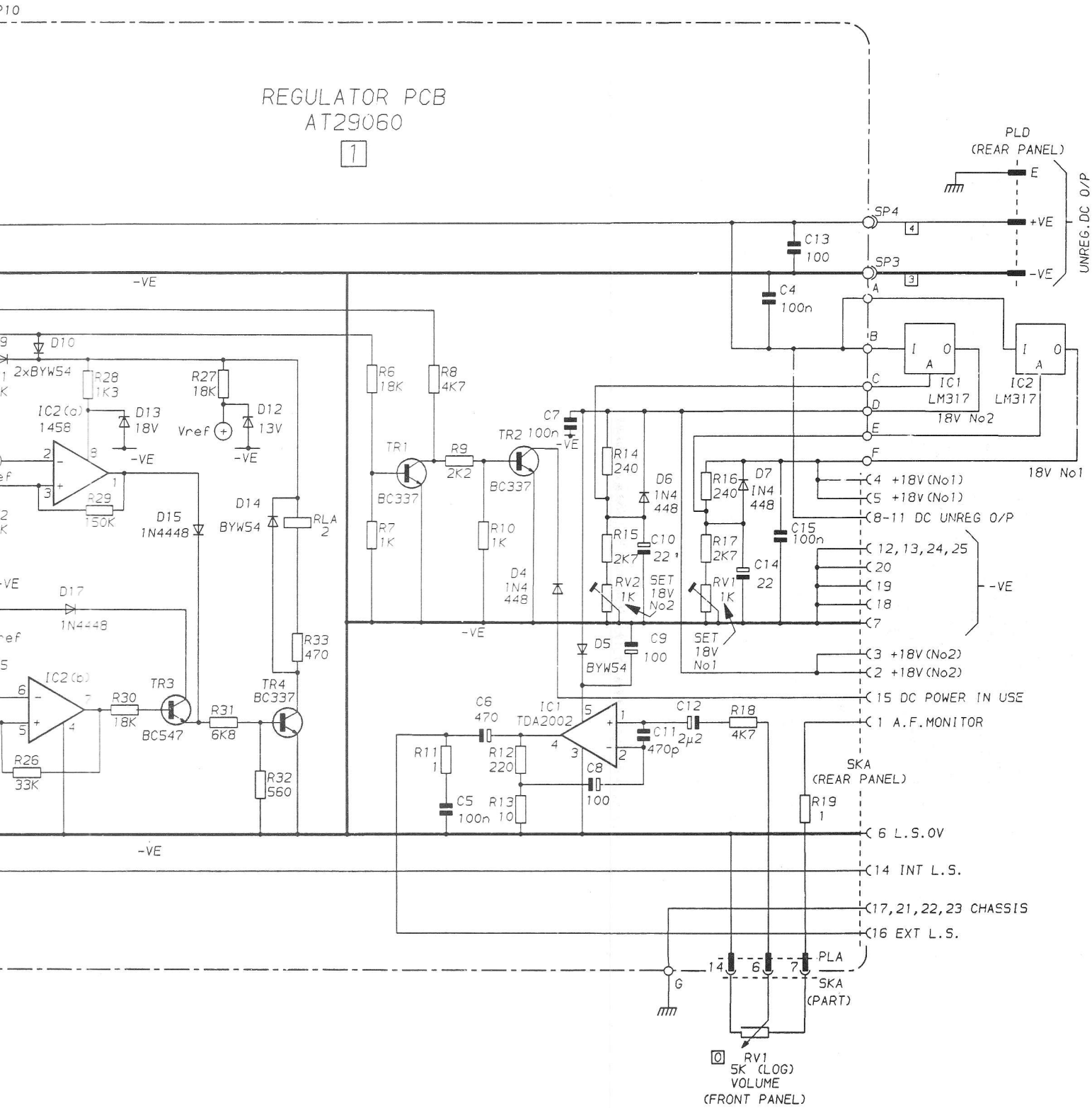


REGULATOR AT29060
LAYOUT DIAGRAM



NOTES

1. WHEN REFERENCE IS MADE TO COMPONENTS ON THE REGULATOR PCB
   PREFIX [1] SHOULD BE USED, ANY COMPONENT NOT ON THE PCB
   PREFIX [0] SHOULD BE USED.



PSU AT04878/-
CIRCUIT DIAGRAM