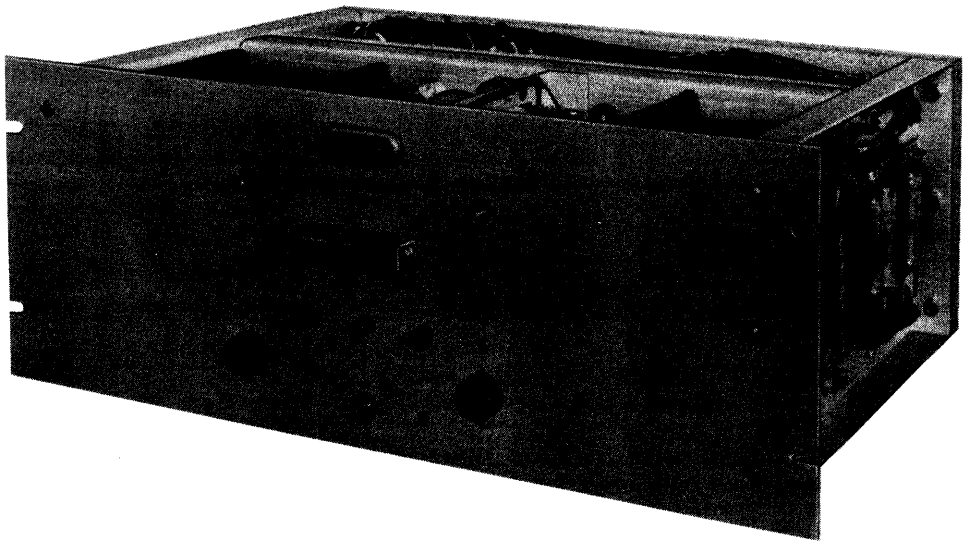

SOLARTRON Instruction Manual

COMPUTER POWER SUPPLY AS1104.2

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SECTION 1

PERFORMANCE SPECIFICATION

General

The AS1104.2 power unit combines a stabilised high tension supply and a valve heater supply. It provides the power requirements of the computing modules in Solartron Analogue Computing Systems. Three high tension lines are generated as follows:

		+300V	-200V	-308V	(nominal)
Output Voltage:		+300V	-200V	-308V	(nominal)
Output Current:		400mA*	400mA*	20mA	
Regulation $\frac{\delta V \text{ out}}{\delta I \text{ out}}$:		1.25	1.25	-	
Ripple and Noise	No load	2.5mV	2.5mV	-	peak-to-peak
	Full load	8mV	8mV	250mV	peak-to-peak
Stability $\frac{V \text{ out}}{V \text{ in}}$:		0.75V	0.5V	-	for ±7% on Mains
(AC) Output Impedance:		<2Ω	<2Ω	-	for up to 100Kc/s
Overload Protection System:		Circuit breakers			
AC Supply Requirements:		100 - 125V and 200 - 250V 50 - 60c/s VA fully loaded - 510VA			
Mechanical Specification:		Height 7in. 17.8cm Depth 10in. 25.4cm Width 19in. 48.3cm Weight 39lb. 17.5kg			

* The Arithmetic sum of the currents from the +300V and -200V lines must not exceed 600mA.

SECTION 2

INSTALLATION AND OPERATING INSTRUCTIONS

2.1 Mounting

The power supply fits into a standard 19" post office rack and has a panel height of 7 inches. The depth behind the front panel is $12\frac{1}{2}$ inches overall, and a further 3 inches are required for cables and connections. All inlets, outlets, mains voltage selection, H.T. and overload adjustment potentiometers are at the rear of the instrument. Mains fuses, cutouts, indicator lamps and monitor facilities are on the front panel.

2.2 Connections to the Supply

2.2.1 Mains Power Input

The mains power enters the unit through a six pin Plessey plug PL1. Pin assignments are as follows:

Pin Letter	A	B	C	D	E	F
Service	Supply line to LT transformer	Supply neutral to LT transformer	Chassis	Supply line HT transformer	Supply Neutral to HT transformer	Chassis

No mains switches are built into the supply which is designed for operation from a central control position.

2.2.2 Power Output

The stabilised HT supplies and the L.T. supplies are taken from the unit through four 15-way sockets SKT1, SKT2, SKT3 and SKT4. Pin assignments are as follows:

Pin Letter	Service	
	SKT1 & SKT3	SKT2 & SKT4
A) B)	6.3V at 6A biased to approx. +25V d.c. With respect to CR	) 6.3V at 6A at approx.) +25V*
C) D)	6.3V at 6A biased to approx. +25V With respect to CR	) Blank)
E) F)	9.5V at 4A biased to approx. -100V With respect to CR	) 9.5V at 4A at approx.) -100V*
H	C/R	C/R
J	Linked on all four sockets (used to convey S/G between units supplied by the AS1104.2)	
K	-308V	-308V
L	-200V	-200V
M	+300V	+300V
N) P) R)	Blank	) Blank)
S	Chassis	Chassis

* Pins A and B of SK2 are in parallel with pins C and D of SK1 and the total current from both outlets must not exceed 6A. The same restriction applies to:

Pins A and B of SK4 and pins C and D of SK3
whilst
Pins E and F of SK3 and pins E and F of SK2
Pins E and F of SK3 and pins E and F of SK4
must not exceed 4A.

SKT1 and SKT3 will each supply one full rack type TX1055.2 or TX1321 or TX1236 and 1 x AS1102.

SKT2 and SKT4 will each supply one full rack type TX1236.

2.2.3 Overload Indication

Coaxial socket SKT5 is energised when the power supply overload circuits operate, and it should be connected to the central overload trunking. The centre pin is line and,the screening is connected to common rail.

2.2.4 Monitor Socket

The Plessey socket SKT6 carries all the stabilised HT supplies and may be connected to the central overload position to provide remote monitoring of the supply lines.

2.2.5 Monitor Socket

The coaxial socket SKT7 mounted on the front panel of the instrument may be connected to each of the stabilised HT lines in turn by depressing the relevant button. This provides local voltage measurement. The centre pin is line and the screening is common rail.
Note: The push buttons are electrically interlocked to prevent any accidental shorting of two lines through the meter. If more than one button is pressed, the meter will read the most negative voltage selected. Following the pin assignments given, connect the unit into the equipment it is to supply.

2.3 Supply Voltage Setting

Set both mains voltage selector panels to the local supply voltage and set the switch SA to 110V or 220V according to the range of voltage in use. These controls are on the rear of the instrument.

2.4 Rail Voltage Setting

2.4.1 Switch on L.T. mains and allow valves time to warm up. Check that heaters are glowing in all valves except V16 and V17.

2.4.2 Switch on H.T. mains, plug in a suitable meter to the monitor socket on the front panel. Push the +300V button and adjust RV3 to give +300V reading.

2.4.3 Reverse the meter lead polarities and push the -200V button; adjust RV2 to obtain a reading of -200V.

2.4.4 Push the -308V button and check that the meter reads 308 ±4 volts.

2.4.5 Connect the meter between pin A and pin 6 on the printed circuit board of the centre tray. Adjust RV1 to give a reading of 0 ±20V.

2.5 Final Checks

Install the unit in the rack and connect all lines, switch on L.T. supply. Allow approximately one minute warm up time then switch on H.T. Check that 'H.T. on' lamp is glowing. Use remote monitoring facilities to check line voltages.

2.6 Resetting

If the unit trips following an overload, clear the fault condition from the equipment, then press the button marked L.T. then the button marked H.T. If the remote power switches have been left on, a suitable warm up period must elapse before the H.T. button is pressed.

SECTION 3

CIRCUIT DESCRIPTION

General

3.1 The circuit description which follows should be read in conjunction with the circuit diagrams at the rear of the manual. It is written in sections corresponding to the circuit functions which are illustrated in the block diagram.

Power Input

3.2 The power input to the supply is through a six pin Plessey plug PL1, the pin assignments of which are listed in paragraph 2.2.1. The supply lines then pass through the double pole switch SA to the overload cutouts CB1 and CB2. SA is set to either 110V or 220V and selects a suitable current rating for the cutouts. Both sides of the supply are then connected through the mains voltage selector panel to the primaries of the two transformers.

3.3 The primary of each transformer has two identical windings which are connected in parallel for 110V working and in series for 220V working. Five volt steps are provided from 100-120V and ten volt steps from 200-250V.

L.T. Supplies

3.4 The L.T. transformer has nine secondary windings which are allocated as follows:

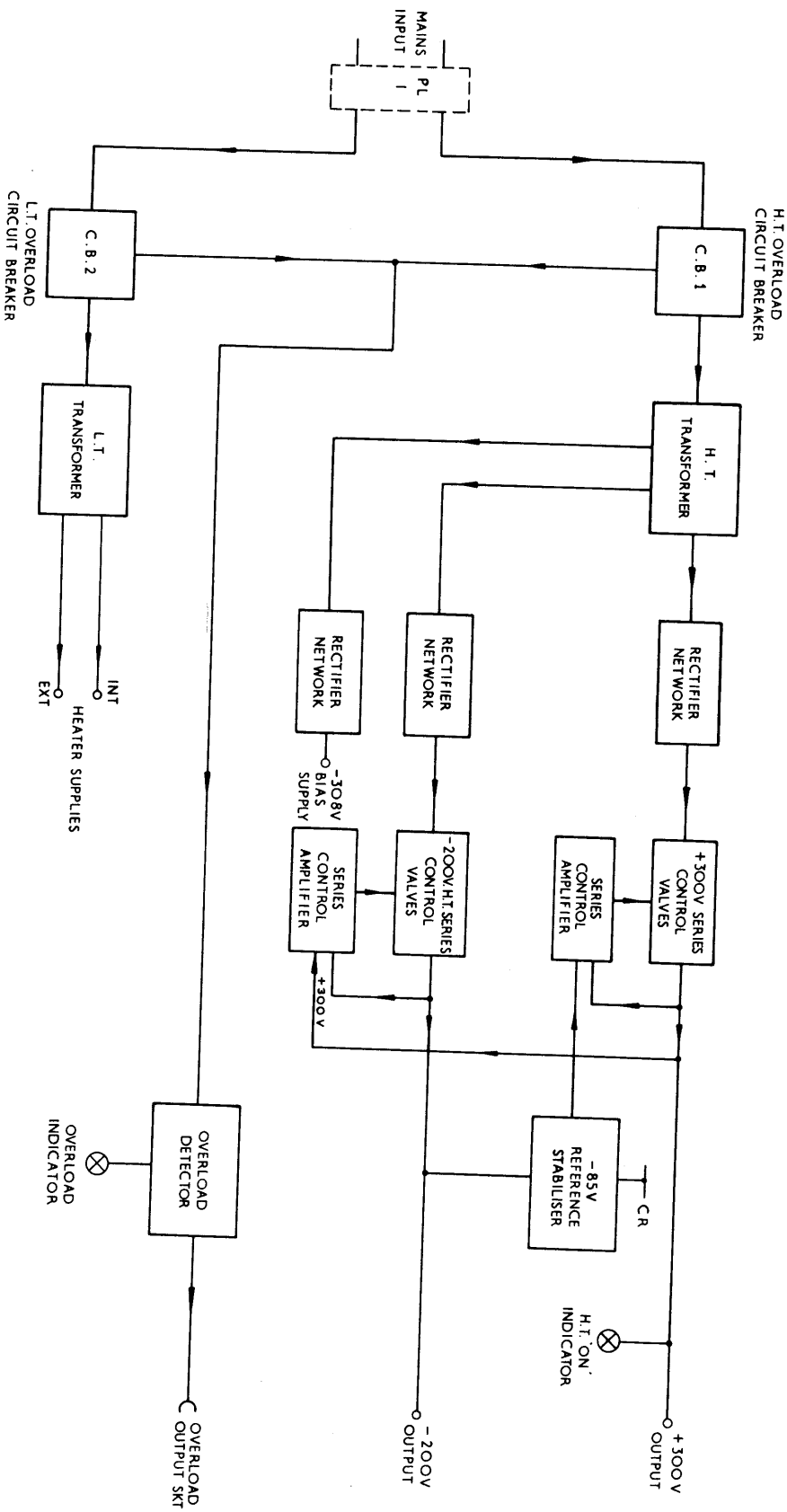


Fig. 1 - Block Schematic Diagram AS1104.2

Winding	Rating	Pin Numbers	Service
1	6.3V 5A	11, 12	Heaters of +300V series control element
2	6.3V 5A	13, 14	Heaters of Control Amplifiers and -200V series control element
3	6.3V 3A	15, 16	Heaters of Overload Amplifier
4	6.3V 6A	17, 18	SKT1 pins A and B
5	6.3V 6A	19, 20	SKT3 pins A and B
6	6.3V 6A	21, 22	SKT1 pins C and D
7	6.3V 6A	23, 24	SKT3 pins C and D
8	9.3V 4A	25, 26	SKT1 pins E and F
9	9.3V 4A	27, 28	SKT3 pins E and F

3.5 One side of windings 4, 5, 6 and 7 is connected to the junction of R1 and R2 connected between +300V and C/R and these windings operate at a d.c. potential of approximately +25V. One side of winding 8 and 9 is connected to the junction of R3 and R4; connected between -200V and C/R and these windings operate at a d.c. potential of approximately -100V.

3.6 The +300V Supply

The +300V line is obtained from the rectified output of secondary 1 on the H.T. transformer. This winding delivers 310V RMS on pins 11 and 12 and is rated at 450mA. The rectifier uses 8 silicon diodes MR3 to MR6 and MR11 to 14 connected as a bridge with two diodes in series in each arm. The rectified output is smoothed by the reservoir capacitor C5.

3.7 The series control element consists of six triode-connected pentodes V1, 3, 5, 8, 10 and 12, in parallel. The potential across these valves is varied by the control amplifier to obtain a stabilised constant voltage output. A one amp fuse in the anode circuit of these valves protects the supply against overload on this line only.

3.8 The voltage reference tube V16 is connected in series with R90 between the C/R and the -200V supply and provides an 85V reference. This is compared with the +300V supply in the feedback network consisting of R86, RV3, R87 and R88. DC signals are taken from the wiper of RV3 to the grid of the control amplifier V13B through R84. C19 connected directly from the +300V line to V13B ensures no loss of loop gain to a.c. signals.

3.9 The control amplifier consists of V13B, V14B and V14A. Signals are amplified in the pentode V13B and coupled into the cathode of V14B. The screen of V13B and the grid of V14B are referred to the same d.c. potential at the junctions of R76 and R74. The signals further amplified in V14B, are coupled to the grid of V14A, connected as a cathode follower. This provides a low impedance drive signal for the grids of the series control valves.

3.10 The -200V Supply

The -200V line is obtained from the rectified output of secondary 2 on the HT transformer. This winding delivers 230V RMS pins, 13 and 14, and is rated at 450mA. The rectifier uses 8 silicon diodes MR7, 8, 9 and 10, 15, 16, 17 and 18 connected as a bridge with two diodes in series in each arm. The rectified output is smoothed by the reservoir capacitor C6.

3.11 The series control element consists of five triode connected pentodes V2, 4, 6, 9 and 11 in parallel. The potential across these valves is varied by the control amplifier to obtain a stabilised constant voltage output. A one amp fuse in the anode circuit of these valves protects the supply against overload on this line only.

3.12 The feedback network consists of R89, RV2 and R85 in series between the +300V line and the

-200V line. DC signals are taken from the wiper of RV2 to the grid of V15B. C21 connected from -200V to the grid of V15B ensures no loss of loop gain for AC.

3.13 The control amplifier consists of V15B and V15A in cascade driving the cathode follower V13A. R78/79 and R69/70 are divide down networks which maintain the required d.c. conditions through the amplifier. C11/60 is a response shaping network to improve amplifier stability. The output from the cathode of V13A drives the series control valves.

3.14 The -308V Supply

The -308V supply is obtained from the rectified output of secondary 3 on the HT transformer. This winding delivers 140V on pins 15 and 16 and is rated at 20mA. The rectifier uses two silicon diodes MR1 and 2 connected in series as a half wave rectifier. The rectified output is smoothed in the reservoir capacitor C4a and in the smoothing network R7/C4b.

3.15 The positive of this supply is connected to the -200V line. The negative side feeds the neon V17 through resistor R10. The neon has a normal burning voltage of 108 volts which, added to -200V, gives a bias supply at -308V.

3.16 The Overload Circuits

The comprehensive overload protection can operate in several ways to give protection if either supply deviates unduly or if there is a drastic overload.

3.17 In the event of a serious overload either on the HT or LT transformer, or both, the main circuit breakers CB1/CB2 will operate. This removes power from the overloaded circuits and connects the supply line through R45 and ILP2 to the overload circuits. The signal is then coupled through C8 to the central overload trunking.

3.18 The -200V line is compared with a voltage nominally +100V in the resistor chain R13, R21. Any deviation in this line will be amplified in V7A and connected to the heater V7 through the cathode follower V7B. If the -200V line potential moves out of tolerance the voltage across the overload neon ILP2 will reach striking potential. The heater voltage of V7 will then be coupled through C8 to the central overload trunking.

3.19 Any movement of the +300V line will cause a similar action to that described in paragraph 3.18 since the -200V line must move in sympathy.

SECTION 4

MAINTENANCE AND SETTING UP PROCEDURES

1. List of Test Equipment and Power Supplies

The following instruments are required to carry out the tests detailed in part 3:

Test Equipment:
Avo Model 8
Solartron Oscilloscope CD1014.3
Test Box AS1104
Wee Megger (1000V)
Digital Voltmeter LM1010
Variac 260V
2 Way Mains Supply Sockets

2. Functional Tests

1. Check insulation between mains line and chassis is 100Mohms.
2. Set mains transformer voltage taps and Switch 'A' to 240V (the 220/110V switch to 220V).
3. Switch on heater supply, check that all valve heaters, with the exception of V16 and V17,

are glowing. Check that 6.3V ±0.3V can be obtained on SKT1 pins A and B, C and D, SKT2 pins A and B, SKT3 pins A and B, C and D, SKT4 pins A and B. With a load of 6A.

4. Check that 9.4V ±0.3V can be obtained on SKTS 1, 2, 3 and 4 on pins E and F, with a load of 4A.
5. Attach the two plugs from the test box to SKTS 1 and 4 and also the overload cable. Turn RV3 to mid-position.
6. Monitor the +300V supply on the test box with the Digital Voltmeter and set the +300 with RV3.
7. Monitor the -200V supply on the test box with a Digital Voltmeter and set the -200V rail by means of RV2.
8. Place AVO between A1 and 6 on Printed Circuit Board OOP302 and adjust RV1 to give less than 20V, either polarity.
9. Monitor the +300V line with the Digital Voltmeter and a scope referred to C.R. Fully load the supply by putting SW1 on the test box to Position 3. Ripple should be 5mV.
10. Put SW1 on test box to Position 1 and note the voltage changes by less than 0.75V.
11. Fully load the H.T. +300V line and vary mains by ±7% note change on +300V line is 0.75V.
12. Monitor the -200V line with a Digital Voltmeter and scope referred to C.R. Fully load the supply by putting SW1 on test box to Position 6. Ripple should be less than 5mV.
13. Put SW1 on test box to Position 1 and note that the loaded volts drop is 0.5V.
14. Fully load the supply by putting SW1 to Position 5 and vary mains by ±7% (±18V) and note change on -200V line is 0.5V.
15. Monitor the -300V line on test box with the Digital Voltmeter and a scope referred to C.R. Check that the line is 308V ±4V.
16. Check that the ripple on the -308V line with the -200V line fully loaded is 50mV.
17. Put a 25mA load on the 300V line (SW2, Position 2) and note that the output does not vary by more than ±1V.
18. Reduce H.T. mains, with the +300V line fully loaded, until the overload lamp lights and note that an output of 15V peak-to-peak can be obtained on the overload plug on the test box.
19. Check that +300V, -200V and -308V appear on the front panel.
20. Check that +300V, -200V and -308V appear on pins A, C, D of SKT6 respectively.
21. Check that -100V ±8V appears between C.R. and pin E, on SKT1.
22. Check that +24V +6V appears between C.R. and pin A on SKT1.
23. Check the volts as in paragraphs 19, 21 and 22 and 6.3V and 9.4V filament voltages with the Mains Selector panel link in each position and using a Variac to set the appropriate mains voltage. (Operate 110/220V switch as required).

COMPONENTS LIST

AS1104.2
(Main Unit)

RESISTORS

Cct. Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R1	270K	10	$\frac{1}{4}$	1723 52700	Dubilier	BTT
R2	22K	10	$\frac{1}{4}$	1723 42200	Dubilier	BTT
R3	47K	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT
R4	47K	10	$\frac{1}{4}$	1723 44700	Dubilier	BTT
R5	100	5	12	1743 21000	Painton	P302
R6	100	5	12	1743 21000	Painton	P302
R7	1.2K	5	6	1737 31200	Painton	P306
R8	27K	5	6	1737 42700	Painton	P306A
R9	27K	5	6	1737 42700	Painton	P306A
R10	1.2K	5	6	1737 31200	Painton	P306
R11	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R12	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
* R13						
R14	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R15	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
R16	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R17	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R18	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R19	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
* R20						
* R21						
* R22						
R23	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R24	82	10	$\frac{1}{2}$	1723 18200	Morganite	'Y'
R25	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R26	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
* R27						
R28	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R29	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
* R30						
R31	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R32	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
R33	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R34	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R35	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R36	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
* R37						
* R38						
R39	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R40	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
R41	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT

* On Printed Circuit Board OOP302

RESISTORS - continued

Cct. Ref.	Value Ohms	Tol. %	Rating Watts	Solartron Part No.	Manufacturer & Type	
R42	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R43	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R44	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
R45	470K	10	$\frac{1}{4}$	1723 54700	Dubilier	BTT
R46	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R47	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
R48	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R49	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R50	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
* R51						
* R52						
* R53						
R54	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R55	82	10	$\frac{1}{2}$	1725 18200	Morganite	'Y'
* R56						
* R57						
* R58						
* R59						
* R60						
* R61						
* R62						
R63	100K	5	$\frac{1}{2}$	1708 51000	Painton	93 HS
R64	470K	10	$\frac{1}{4}$	1723 54700	Dubilier	BTT
* R65						
* R66						
R67	470K	5	$\frac{1}{2}$	1708 54700	Painton	93 HS
R68	Not fitted					
* R69						
* R70						
* R71						
R72	100	10	$\frac{1}{4}$	1723 21000	Dubilier	BTT
R73	22K	5	9	1740 42200	Painton	301A WW
R91	100K	10	$\frac{1}{2}$	1725 51000	Erie	8 Carbon

RESISTORS VARIABLE

RV1	50K	10	$\frac{1}{2}$	1100 26120	Colvern	CLR 1206/9S
RV2	25K	10	$\frac{1}{2}$	1100 26110	Colvern	CLR 1206/9S
RV3	25K	10	$\frac{1}{2}$	1100 26110	Colvern	CLR 1206/9S

* On Printed Circuit Board OOP302

CAPACITORS

Cct. Ref.	Value µF	Tol. %	Rating Volts	Solartron Part No.	Manufacturer & Type	
C1	.1	20	500	2301 51000	TCC	CP46S
C2	.1	20	500	2301 51000	TCC	CP46S
C3	.1	20	500	2301 51000	TCC	CP46S
C4	50+50		275	2086 50040	Hunts	JFQ25AT
C5	500		500	2629 85000	Plessey	CE5466/9
C6	500		350	2623 85000	Plessey	CE5345/9
* C7 to * C11						
C12 * C13	4		500	2628 64000	Hunts	JF 701T
C14	0.001	10	500	2105 31000	Suflex	HS15/L
C15	50		350	2086 00035	Hunts	JFQ409T
C16 * C17 to * C21	50		350	2086 00035	Hunts	JFQ409T
C22	0.1	10	400	2208 51000	Wima	Tropyfol 'M'

SEMICONDUCTORS

Cct. Ref.	Description	Solartron Part No.	Manufacturer & Type	
MR1	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR2	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR3	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR4	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR5	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR6	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR7	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR8	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR9	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR10	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR11	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR12	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR13	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR14	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR15	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR16	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR17	Rectifier Silicon	3005 21080	Ferranti	ZS74
MR18	Rectifier Silicon	3005 21080	Ferranti	ZS74

MISCELLANEOUS

Cct. Ref.	Description	Solartron Part No.	Manufacturer & Type	
SKTA	Socket 15 Way	3525 15010	Electromethods	BA 15-S
SKTB	Socket 15 Way	3525 15010	Electromethods	BA 15-S
SKTC	Socket 15 Way	3525 15010	Electromethods	BA 15-S
SKTD	Socket 15 Way	3525 15010	Electromethods	BA 15-S
SKTE	Socket Coaxial (Red)	3521 01150	Belling & Lee	L603/A

* On Printed Circuit Board OOP302

MISCELLANEOUS - continued

Cct. Ref.	Description	Solartron Part No.	Manufacturer & Type	
SKTF	Socket 6 Way	3514 06020	Plessey	CZ49223
SKTG	Socket Coaxial (Red)	3521 01150	Belling & Lee	L603/A
SA	Switch 2 Pole 250V	3760 00080	Painton	501085
SB	Switch Push Button	3770 00050	Painton	501404
SC	Switch Push Button	3770 00050	Painton	501404
SD	Switch Push Button	3770 00050	Painton	501404
MSP1	Mains Selector Panel	3990 00050		
MSP2	Mains Selector Panel	3990 00050		
T1	Transformer LT	3010 10170		
T2	Transformer HT	3010 70050		
CB1	Circuit Breaker		ETA	6202/A3
CB2	Circuit Breaker		ETA	6201.2/A3
ILP1	Lamp Neon (Red) 300V	3007 20040	Arcolectric	SL166
ILP2	Lamp Neon (Clear)	3007 20050	Arcolectric	SL166
FS1	Fuse Minature 1A	3601 01300	Belling & Lee	L562
FS2	Fuse Minature 1A	3601 01300	Belling & Lee	L562
PLA	Plug 6 Way	3522 06010	Plessey	CZ48995
RLA	Relay	3006 50160	B&R Relays Ltd.	TRLS 6A/6200/25/9f/10b
Supplied with Main Unit	Socket 6 Way (Free)	3514 06010	Plessey	CZ9017
	Plug 15 Way (Free)	3513 15010	Electromethods	BA15P-H
	Plug 6 Way (Free)	3512 06030	Plessey	CZ49222
	Plug (Free)	3510 01050	Belling & Lee	L734/P/AL
	Outlet Acc. Set(Angled)	3540 00400	Plessey	2CZ108112
	Terminal S/O 5KV	3554 00110		

VALVES

Cct. Ref.	Description	Solartron Part No.	Manufacturer & Type	
V1	Pentode	3000 05240	Mullard	EL86
V2	Pentode	3000 05240	Mullard	EL86
V3	Pentode	3000 05240	Mullard	EL86
V4	Pentode	3000 05240	Mullard	EL86
V5	Pentode	3000 05240	Mullard	EL86
V6	Pentode	3000 05240	Mullard	EL86
* V7				
V8	Pentode	3000 05240	Mullard	EL86
V9	Pentode	3000 05240	Mullard	EL86
V10	Pentode	3000 05240	Mullard	EL86
V11	Pentode	3000 05240	Mullard	EL86
V12	Pentode	3000 05240	Mullard	EL86
* V13				
V14	Double Triode	3000 33040	S.T.C.	12AX7
* V15				
V16	Reference Diode	3000 11020	Mullard	85A2
V17	Reference Diode	3000 11050	S.T.C.	OB2
* V18				

* On Printed Circuit Board OOP302

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD OOP302

RESISTORS

Cct. Ref.	Value Ohms	Tol. %	Rating Watts	Manufacturer & Type	
R1 to R4	Fitted on Main Unit				
R5	Fitted on Main Unit				
R6	Fitted on Main Unit				
R7	Fitted on Main Unit				
R8	Fitted on Main Unit				
R9	Fitted on Main Unit				
R10 to R12	Fitted on Main Unit				
R13	1M	2	$\frac{1}{2}$	Painton	93 HS
R14 to R19	Fitted on Main Unit				
R20	100	10	$\frac{1}{4}$	Dubilier	BTT
R21	470K	2	$\frac{1}{2}$	Painton	93 HS
R22	220K	10	$\frac{1}{4}$	Dubilier	BTT
R23 to R26	Fitted on Main Unit				
R27	1M	2	$\frac{1}{2}$	Painton	93 HS
R28 to R29	Fitted on Main Unit				
R30	680K	10	$\frac{1}{4}$	Dubilier	BTT
R31 to R36	Fitted on Main Unit				
R37	33K	10	$\frac{1}{2}$	Erie	8
R38	10K	10	$\frac{1}{2}$	Erie	8
R39 to R50	Fitted on Main Unit				
R51	1M	10	$\frac{1}{4}$	Dubilier	BTT
R52	220K	10	$\frac{1}{4}$	Dubilier	BTT
R53	100K	10	$\frac{1}{4}$	Dubilier	BTT
R54	Fitted on Main Unit				
R55	Fitted on Main Unit				
R56	100	10	$\frac{1}{4}$	Dubilier	BTT
R57	100	10	$\frac{1}{4}$	Dubilier	BTT
R58	150K	10	$\frac{1}{4}$	Dubilier	BTT
R59	47K	10	2	Welwyn	F23
R60	820	10	$\frac{1}{4}$	Dubilier	BTT
R61	100K	10	$\frac{1}{4}$	Dubilier	BTT
R62	100K	10	$\frac{1}{4}$	Dubilier	BTT
R63	Fitted on Main Unit				
R64	Fitted on Main Unit				
R65	18K	10	2	Welwyn	F23

MISCELLANEOUS - continued

Cct. Ref.	Description	Solartron Part No.	Manufacturer & Type	
SKTF	Socket 6 Way	3514 06020	Plessey	CZ49223
SKTG	Socket Coaxial (Red)	3521 01150	Belling & Lee	L693/A
SA	Switch 2 Pole 250V	3760 00080	Painton	501085
SB	Switch Push Button	3770 00050	Painton	501404
SC	Switch Push Button	3770 00050	Painton	501404
SD	Switch Push Button	3770 00050	Painton	501404
MSP1	Mains Selector Panel	3990 00050		
MSP2	Mains Selector Panel	3990 00050		
T1	Transformer LT	3010 10170		
T2	Transformer HT	3010 70050		
CB1	Circuit Breaker		ETA	6202/A3
CB2	Circuit Breaker		ETA	6201.2/A3
ILP1	Lamp Neon (Red) 300V	3007 20040	Arcolectric	SL166
ILP2	Lamp Neon (Clear)	3007 20050	Arcolectric	SL166
FS1	Fuse Minature 1A	3601 01300	Belling & Lee	L562
FS2	Fuse Minature 1A	3601 01300	Belling & Lee	L562
PLA	Plug 6 Way	3522 06010	Plessey	CZ48995
RLA	Relay	3006 50160	B&R Relays Ltd.	TRLS 6A/6200/25/9f/10b
Supplied with Main Unit	Socket 6 Way (Free)	3514 06010	Plessey	CZ9017
	Plug 15 Way (Free)	3513 15010	Electromethods	BA15P-H
	Plug 6 Way (Free)	3512 06030	Plessey	CZ49222
	Plug (Free)	3510 01050	Belling & Lee	L734/P/AL
	Outlet Acc. Set(Angled)	3540 00400	Plessey	2CZ108112
	Terminal S/O 5KV	3554 00110		

VALVES

Cct. Ref.	Description	Solartron Part No.	Manufacturer & Type	
V1	Pentode	3000 05240	Mullard	EL86
V2	Pentode	3000 05240	Mullard	EL86
V3	Pentode	3000 05240	Mullard	EL86
V4	Pentode	3000 05240	Mullard	EL86
V5	Pentode	3000 05240	Mullard	EL86
V6	Pentode	3000 05240	Mullard	EL86
* V7				
V8	Pentode	3000 05240	Mullard	EL86
V9	Pentode	3000 05240	Mullard	EL86
V10	Pentode	3000 05240	Mullard	EL86
V11	Pentode	3000 05240	Mullard	EL86
V12	Pentode	3000 05240	Mullard	EL86
* V13				
V14	Double Triode	3000 33040	S.T.C.	12AX7
* V15				
V16	Reference Diode	3000 11020	Mullard	85A2
V17	Reference Diode	3000 11050	S.T.C.	OB2
* V18				

* On Printed Circuit Board OOP302

COMPONENTS LIST

for

PRINTED CIRCUIT BOARD OOP302

RESISTORS

Cct. Ref.	Value Ohms	Tol. %	Rating Watts	Manufacturer & Type	
R1 to R4	Fitted on Main Unit				
R5	Fitted on Main Unit				
R6	Fitted on Main Unit				
R7	Fitted on Main Unit				
R8	Fitted on Main Unit				
R9	Fitted on Main Unit				
R10 to R12	Fitted on Main Unit				
R13	1M	2	$\frac{1}{2}$	Painton	93 HS
R14 to R19	Fitted on Main Unit				
R20	100	10	$\frac{1}{4}$	Dubilier	BTT
R21	470K	2	$\frac{1}{2}$	Painton	93 HS
R22	220K	10	$\frac{1}{4}$	Dubilier	BTT
R23 to R26	Fitted on Main Unit				
R27	1M	2	$\frac{1}{2}$	Painton	93 HS
R28 to R29	Fitted on Main Unit				
R30	680K	10	$\frac{1}{4}$	Dubilier	BTT
R31 to R36	Fitted on Main Unit				
R37	33K	10	$\frac{1}{2}$	Erie	8
R38	10K	10	$\frac{1}{2}$	Erie	8
R39 to R50	Fitted on Main Unit				
R51	1M	10	$\frac{1}{4}$	Dubilier	BTT
R52	220K	10	$\frac{1}{4}$	Dubilier	BTT
R53	100K	10	$\frac{1}{4}$	Dubilier	BTT
R54	Fitted on Main Unit				
R55	Fitted on Main Unit				
R56	100	10	$\frac{1}{4}$	Dubilier	BTT
R57	100	10	$\frac{1}{4}$	Dubilier	BTT
R58	150K	10	$\frac{1}{4}$	Dubilier	BTT
R59	47K	10	2	Welwyn	F23
R60	820	10	$\frac{1}{4}$	Dubilier	BTT
R61	100K	10	$\frac{1}{4}$	Dubilier	BTT
R62	100K	10	$\frac{1}{4}$	Dubilier	BTT
R63	Fitted on Main Unit				
R64	Fitted on Main Unit				
R65	18K	10	2	Welwyn	F23

RESISTORS - continued

Cct. Ref.	Value Ohms	Tol. %	Rating Watts	Manufacturer & Type	
R66	100	10	$\frac{1}{4}$	Dubilier	BTT
R67	Fitted on Main Unit				
R68	Not Fitted				
R69	470K	2	$\frac{1}{2}$	Painton	93 HS
R70	820K	2	$\frac{1}{2}$	Painton	93 HS
R71	180K	10	$\frac{1}{2}$	Welwyn	F20
R72	Fitted on Main Unit				
R73	Fitted on Main Unit				
R74	47K	10	2	Welwyn	F23
R75	100	10	$\frac{1}{4}$	Dubilier	BTT
R76	18K	10	2	Welwyn	F23
R77	100	10	$\frac{1}{4}$	Dubilier	BTT
R78	1.5M	10	$\frac{1}{4}$	Dubilier	BTT
R79	2M	2	$\frac{1}{2}$	Painton	93 HS
R80	15K	10	2	Welwyn	F23
R81	100K	7	$\frac{1}{2}$	Welwyn	F20
R82	100	10	$\frac{1}{4}$	Dubilier	BTT
R83	100	10	$\frac{1}{4}$	Dubilier	BTT
R84	150K	10	$\frac{1}{4}$	Dubilier	BTT
R85	180K	2	$\frac{1}{2}$	Painton	93 HS
R86	330K	2	$\frac{1}{2}$	Painton	93 HS
R87	47K	2	$\frac{1}{2}$	Painton	93 HS
R88	33K	2	$\frac{1}{2}$	Painton	93 HS
R89	270K	2	$\frac{1}{2}$	Painton	93 HS
R90	12K	5	2	Welwyn	F23

CAPACITORS

Cct. Ref.	Value µF	Tol. %	Rating Volts	Manufacturer & Type	
C1 to C3	Fitted on Main Unit				
C4	Fitted on Main Unit				
C5	Fitted on Main Unit				
C6	Fitted on Main Unit				
C7	.047	20	400	Wima	Tropyfol
C8	.22	10	400	Wima	Tropyfol
C9	.22	10	400	Wima	Tropyfol
C10	2	-20 +50	350	T.C.C.	CE132.LE
C11	.0027	2	500	Suflex	HS28R
C12	Fitted on Main Unit				
C13	.1	10	400	Wima	Tropyfol
C14	Fitted on Main Unit				
C15	Fitted on Main Unit				
C16	Fitted on Main Unit				
C17	2	-20 +50	350	T.C.C.	CE132.LE
C18	.1	10	400	Wima	Tropyfol
C19	.1	10	400	Wima	Tropyfol
C20	.1	10	400	Wima	Tropyfol
C21	.1	10	400	Wima	Tropyfol

VALVES

Cct. Ref.	Description	Manufacturer & Type	
V1 to V6	Fitted on Main Unit		
V7	Valve Double Triode	STC	12AT7
V8 to V12	Fitted on Main Unit		
V13	Valve Triode Pentode	Mullard	ECF82
V14	Fitted on Main Unit		
V15	Valve Triode Pentode	Mullard	ECF82
V16	Fitted on Main Unit		
V17	Fitted on Main Unit		
V18	Neon Discharge Tube	Hivac	3L

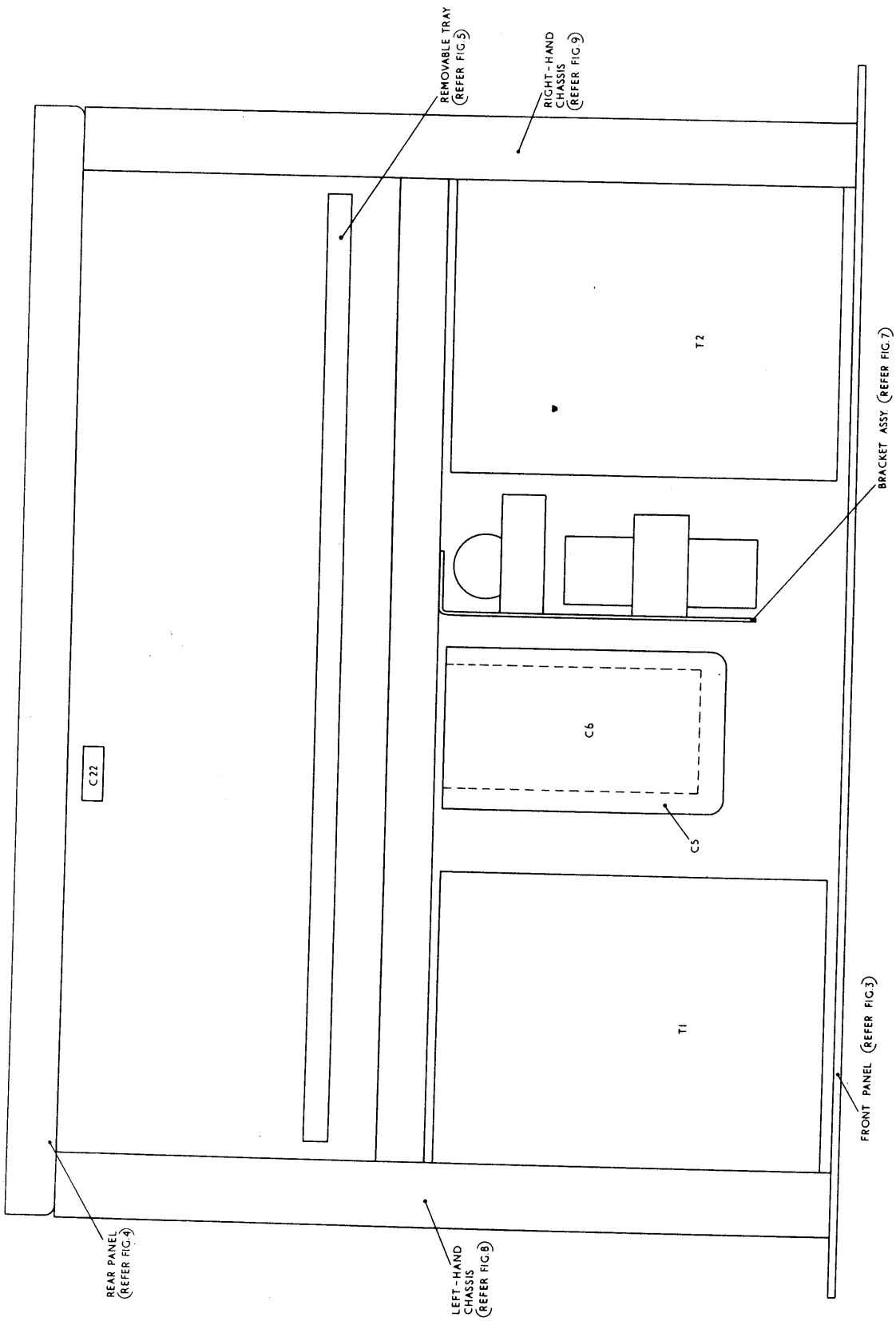


Fig. 2 - Component Location : Main Chassis - Top View

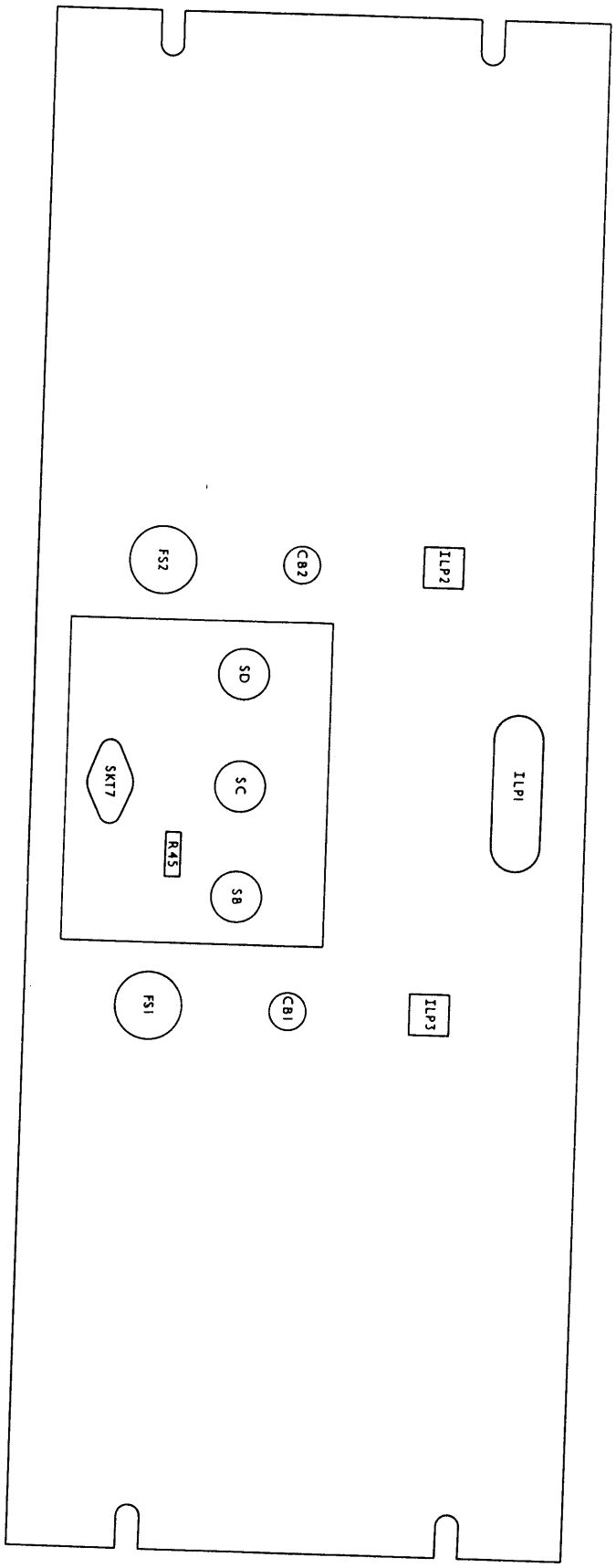


FIG. 2 COMPONENT LOCATION: FRONT PANEL - REAR VIEW

Fig. 3 - Component Location : Front Panel - Rear View

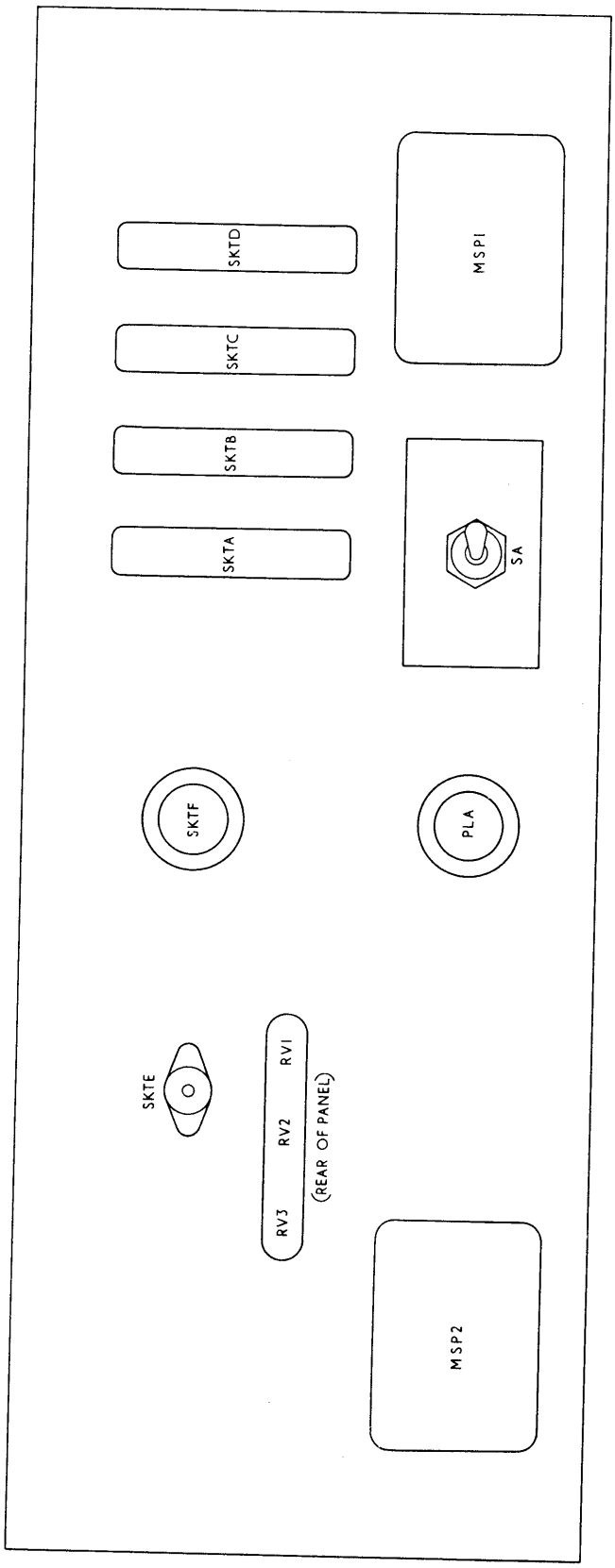


Fig. 4 - Component Location : Rear Panel - View from Rear

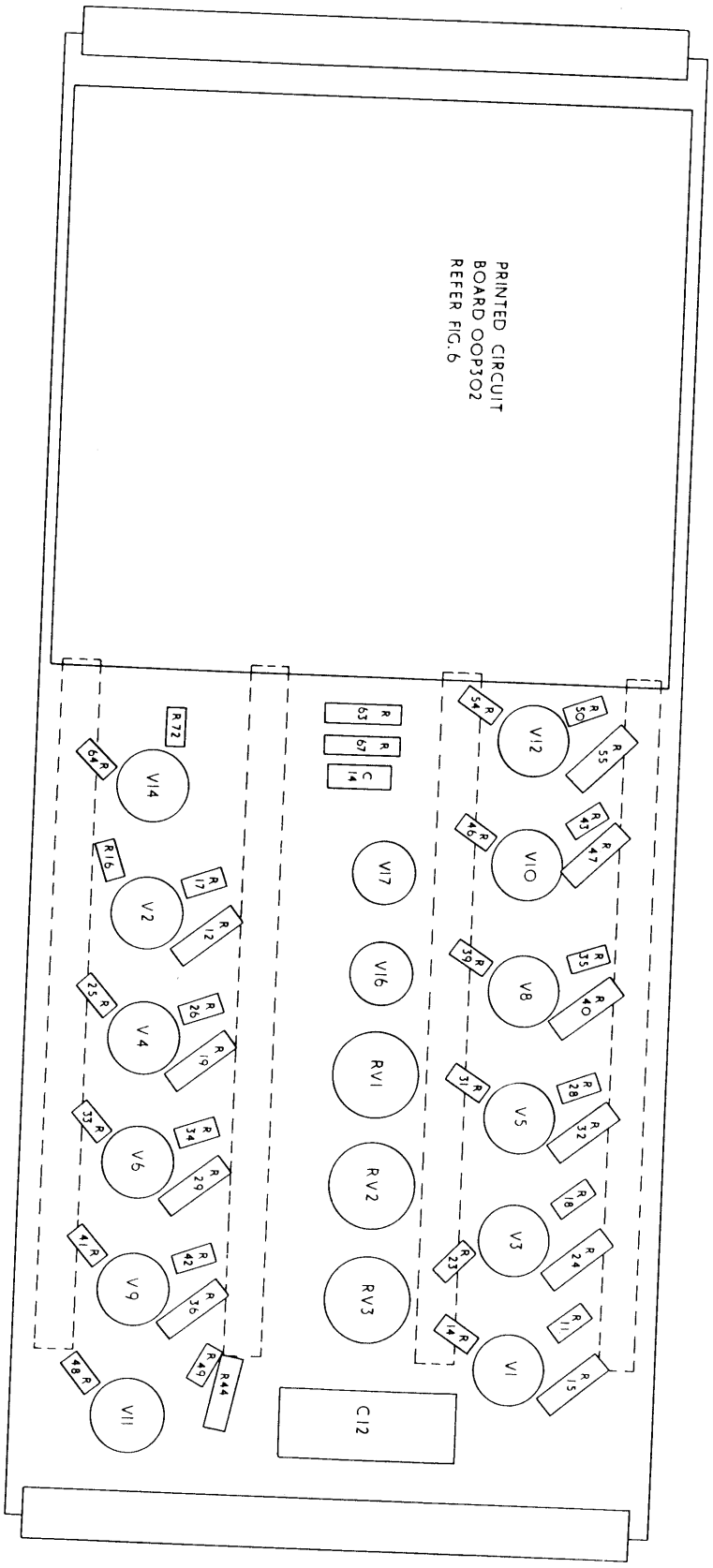


Fig. 5 - Component Location : Removable Tray

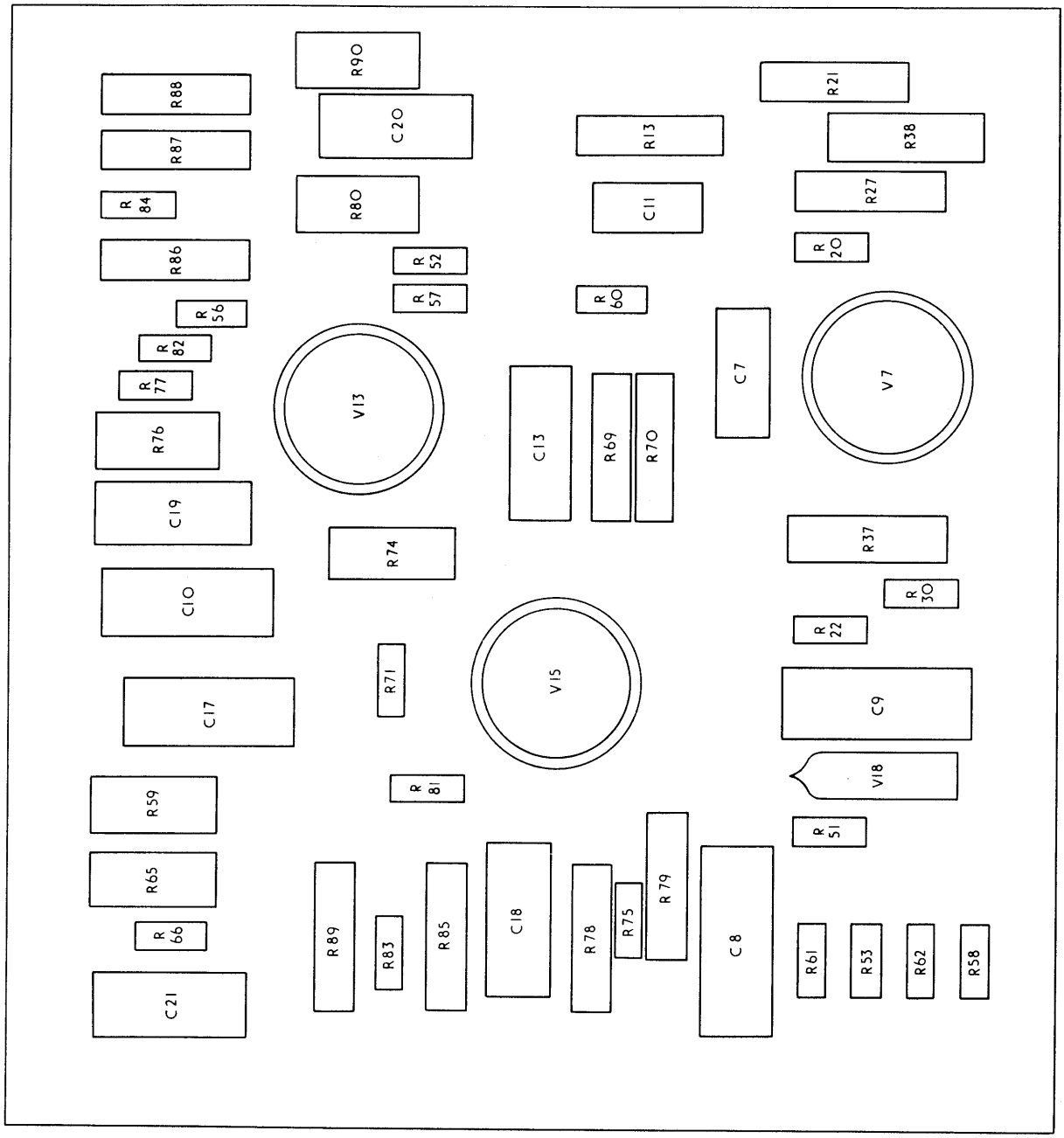


Fig. 6 - Component Location : Printed Circuit Board OOP302

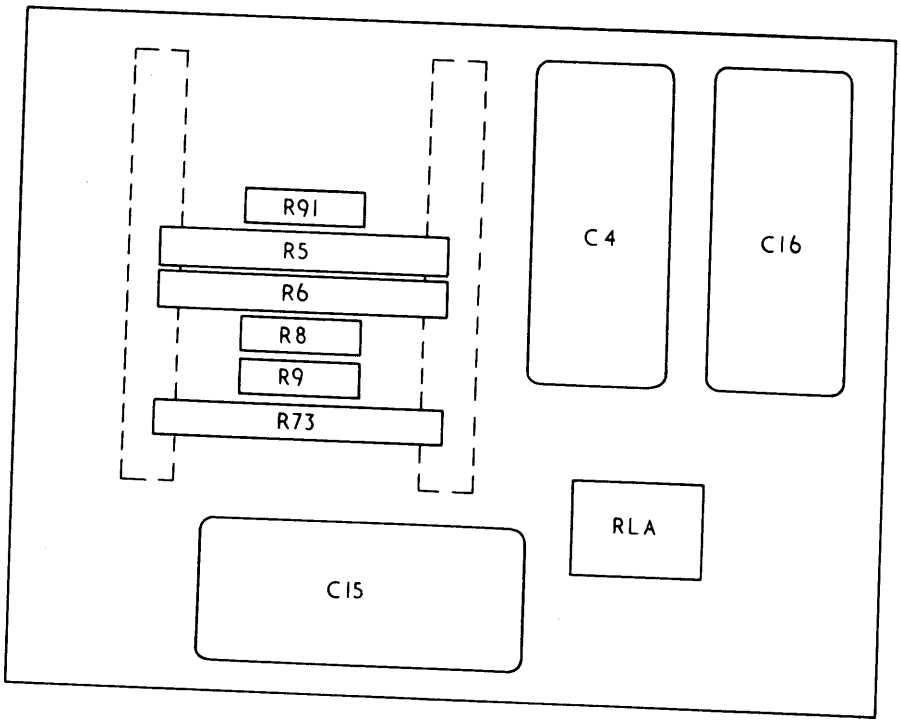


Fig. 7 - Component Location : Bracket Assembly

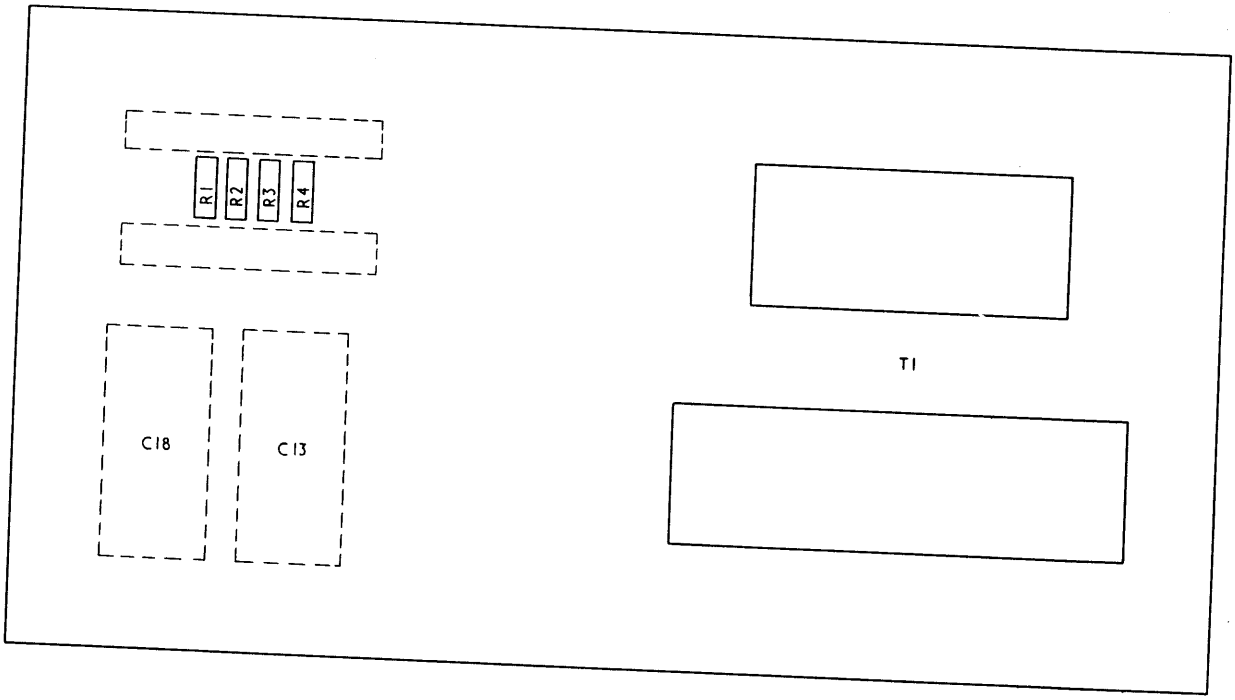


Fig. 8 - Component Location : Left-Hand Chassis

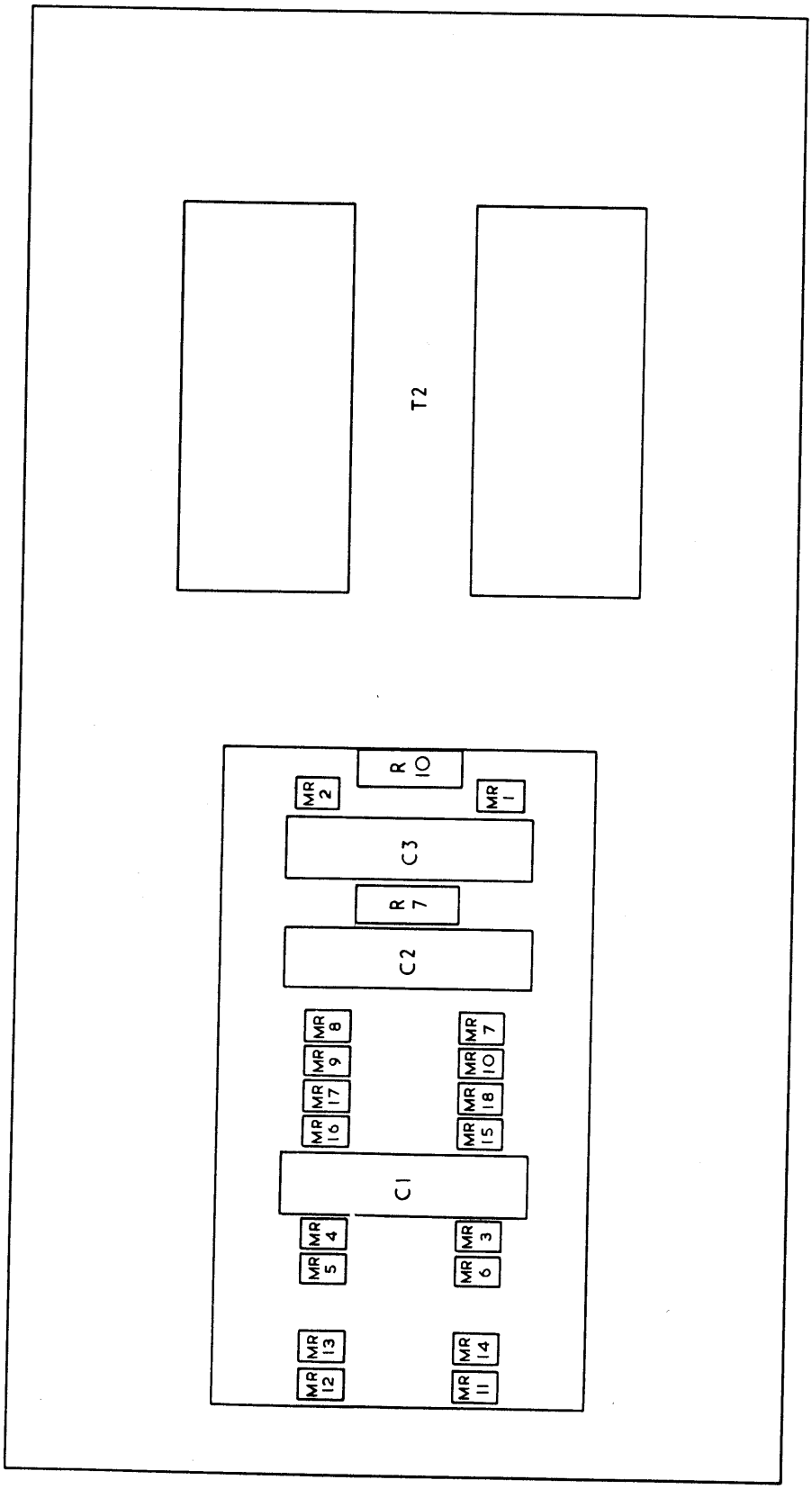


Fig. 9 - Component Location : Right-Hand Chassis

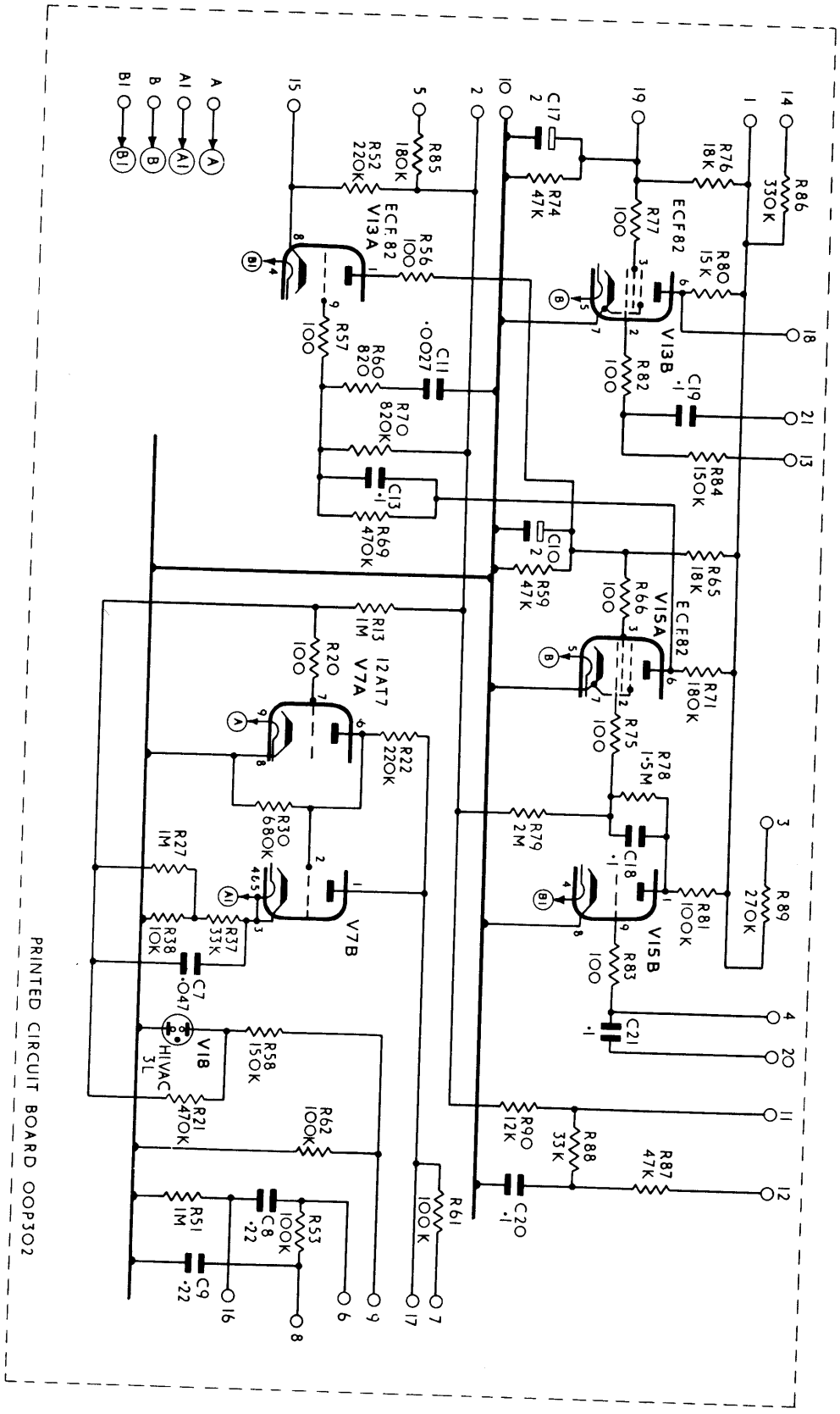
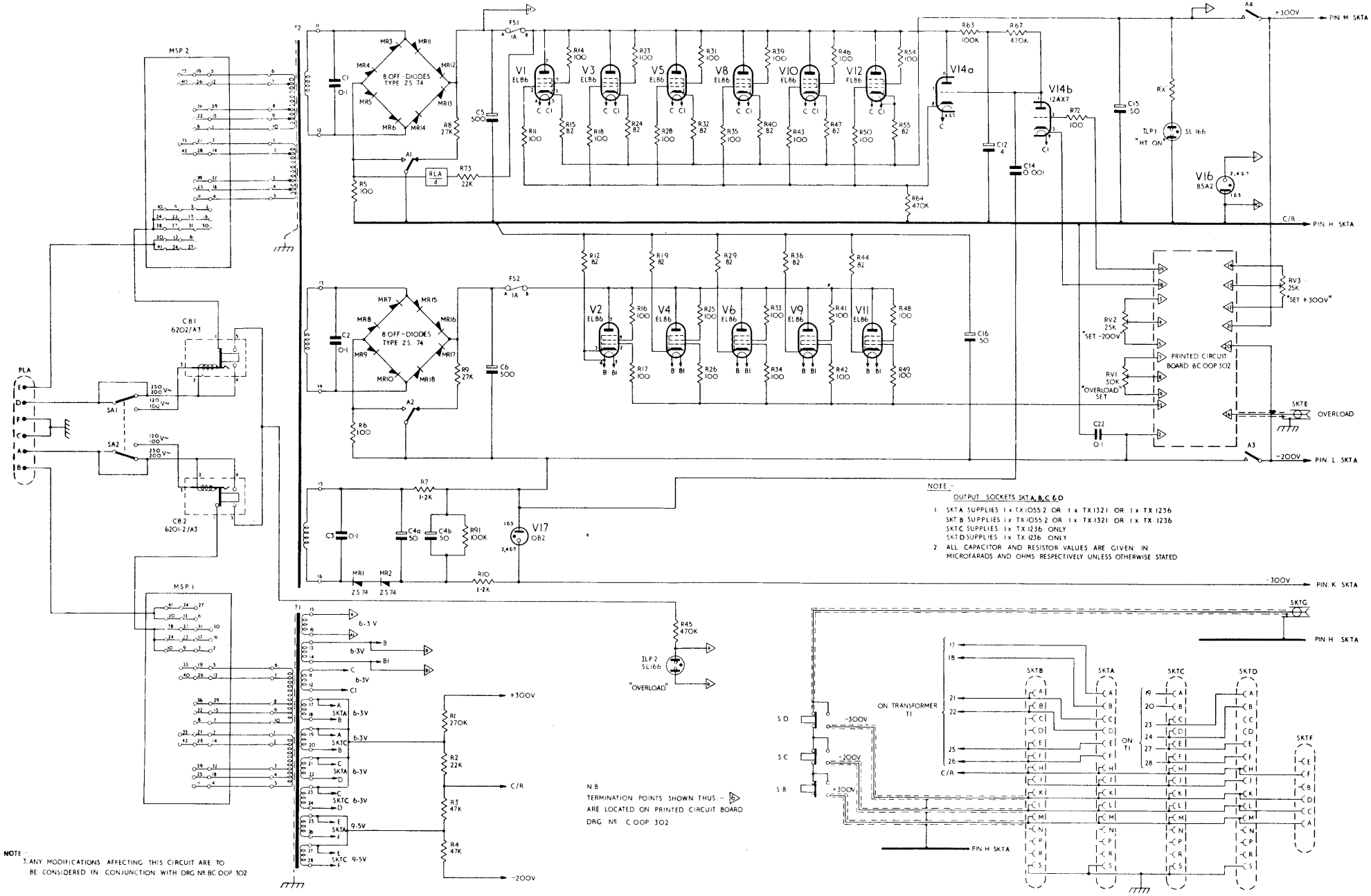


Fig. 10 - Circuit Diagram : Printed Circuit Board OOP302



NOTE -

OUTPUT SOCKETS SKT A, B, C & D

1. SKT A SUPPLIES 1 x TX1055.2 OR 1 x TX1321 OR 1 x TX1236
   SKT B SUPPLIES 1 x TX1055.2 OR 1 x TX1321 OR 1 x TX1236
   SKT C SUPPLIES 1 x TX1236 ONLY
   SKT D SUPPLIES 1 x TX1236 ONLY
2. ALL CAPACITOR AND RESISTOR VALUES ARE GIVEN IN MICROFARADS AND OHMS RESPECTIVELY UNLESS OTHERWISE STATED

NOTE -

3. ANY MODIFICATIONS AFFECTING THIS CIRCUIT ARE TO BE CONSIDERED IN CONJUNCTION WITH DRG Nº BC OOP 302

N.B

TERMINATION POINTS SHOWN THUS - ▷ ARE LOCATED ON PRINTED CIRCUIT BOARD DRG. Nº C.OOP. 302

Fig. 11 - Circuit Diagram : AS1104.2