



sinclair

SPECTRUM +2
SERVICE MANUAL

Spectrum 128K + 2 Technical Specifications

Memory:

RAM 128 Kbytes
ROM 32 Kbytes

CPU:

Z80A running at 3.54690 MHz

Screen:

256x192 Pixel resolution
24x32 Colour resolution
8 colours foreground, 8 colours background,
plus intensity and flash settings
Independently controllable border

Sound:

Three voices tone and/or noise with 16
envelope setting
One voice CPU generated
Output via TV or Audio socket

Keyboard:

58 keys full travel "Qwerty" keyboard.

Storage:

Integral Datacorder
Volatile Silicon Disc

Firmware:

48K Spectrum BASIC (compatibility mode)
128K enhanced Spectrum BASIC with full
screen editor and menu driven command
system
Calculator
Single-key program loading system

Interfaces:

UHF PAL TV port
Serial Printer port
RGB Monitor port
Keypad port
MIDI port (out only)
2 Joystick ports
Audio Out port
Expansion IO port (full Z80 bus)

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SAFETY TESTS (POWER ADAPTOR)

Please note: when any work is completed on this unit, the following safety tests must be completed to ensure continued electrical safety.

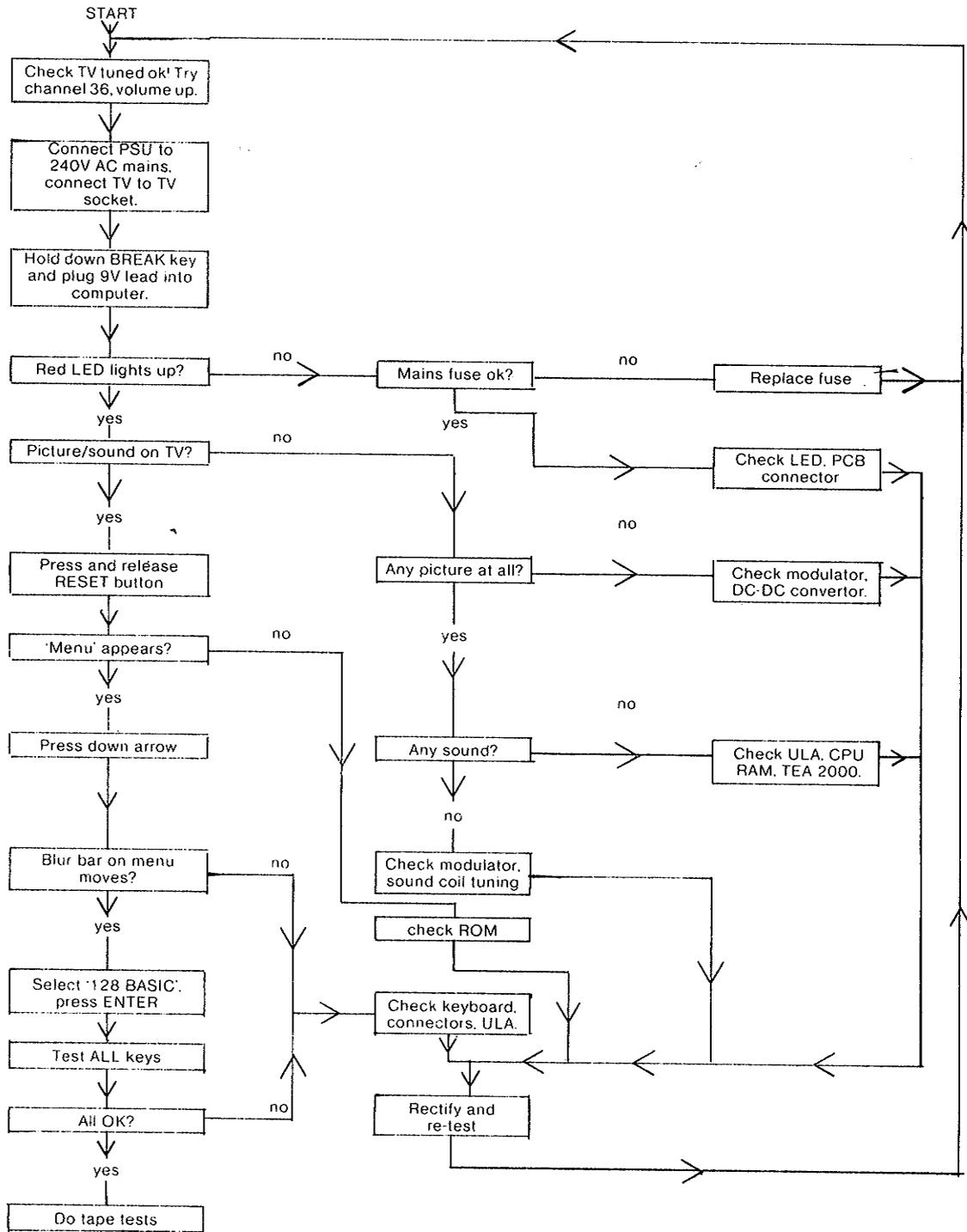
- 1. Flash test from the mains lead with live and neutral joined together to all accessible external metal points at 4kV.**
- 2. Meggertest at 400V DC from the mains lead with live and neutral joined together to all accessible metal points. The reading must not fall below 2 Mohms.**

NB. Ensure the Power Adaptor is switched on when both these tests are carried out.

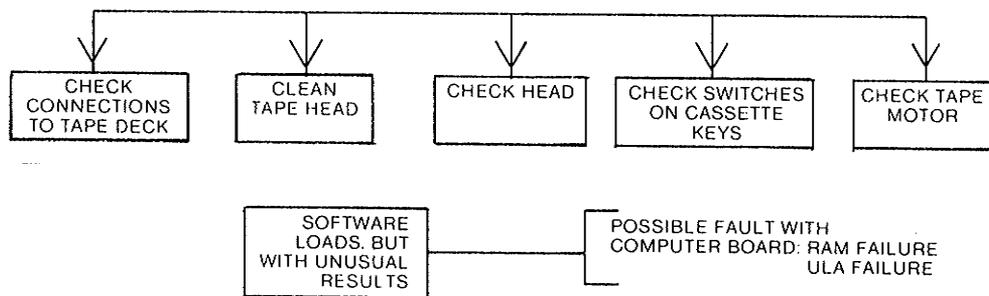
AMSTRAD CONSUMER ELECTRONICS PLC
BRENTWOOD HOUSE, 169 KINGS ROAD, BRENTWOOD, ESSEX CM14 4EF.
TELEPHONE: 0277 230222. TELEX: 995417 AMSELE G.

In keeping with our policy of continually improving our service, and the technical quality of our products, we reserve the right to change component types, manufacturers, sources of supply, or technical specification at any time.

FLOW CHART



CASSETTE AND SOFTWARE ANALYSIS



Full diagnostic tests on the C.P.U. can be carried out using the Test Pack.
Please contact Amstrad PLC for information on same.

N.B. ACTUAL 'PHYSICAL' DAMAGE TO SOFTWARE TAPE WILL PREVENT IT FROM LOADING AT ALL: IE THERE WILL BE NO 'HALF' WORKING PROGRAMS. THEY EITHER LOAD OR THEY DON'T.

Spectrum +2 Test Software

The Spectrum +2 test software comes on a rom board. This should be plugged into the Expansion I/O slot of the +2. The +2 should also have a loopback cable plugged into the KEYPAD and RS232 sockets, two joysticks plugged in, and monitor, TV and audio amp connected.

Turn the machine on. One of two things will happen.

- 1) A test card with some text will appear. Follow the instructions on the screen.
- 2) No text or testcard. In this case, note the colour of the edge of the screen. It will either be a steady colour or flashing regularly with a predominant colour. Consult the table below to find out which RAM chip has (probably) failed.

Colour	STEADY	FLASHING
BLACK	IC 17	IC 32
BLUE	IC 18	IC 31
RED	IC 19	IC 30
MAGENTA	IC 20	IC 29
GREEN	IC 21	IC 28
CYAN	IC 22	IC 27
YELLOW	IC 23	IC 26
WHITE	IC 24	IC 25

If you follow the instructions on screen from the first occurrence, then everything should be self-explanatory. The RAM test, if it finds a fault, will give two numbers. The first is the address at which the fault was found, and the second is the bank of memory which contained the address. If the address is zero, then it is probably not a RAM fault, but a paging hardware problem. Note that there is no way to fail the keyboard test - if a key won't respond then you can progress no further.

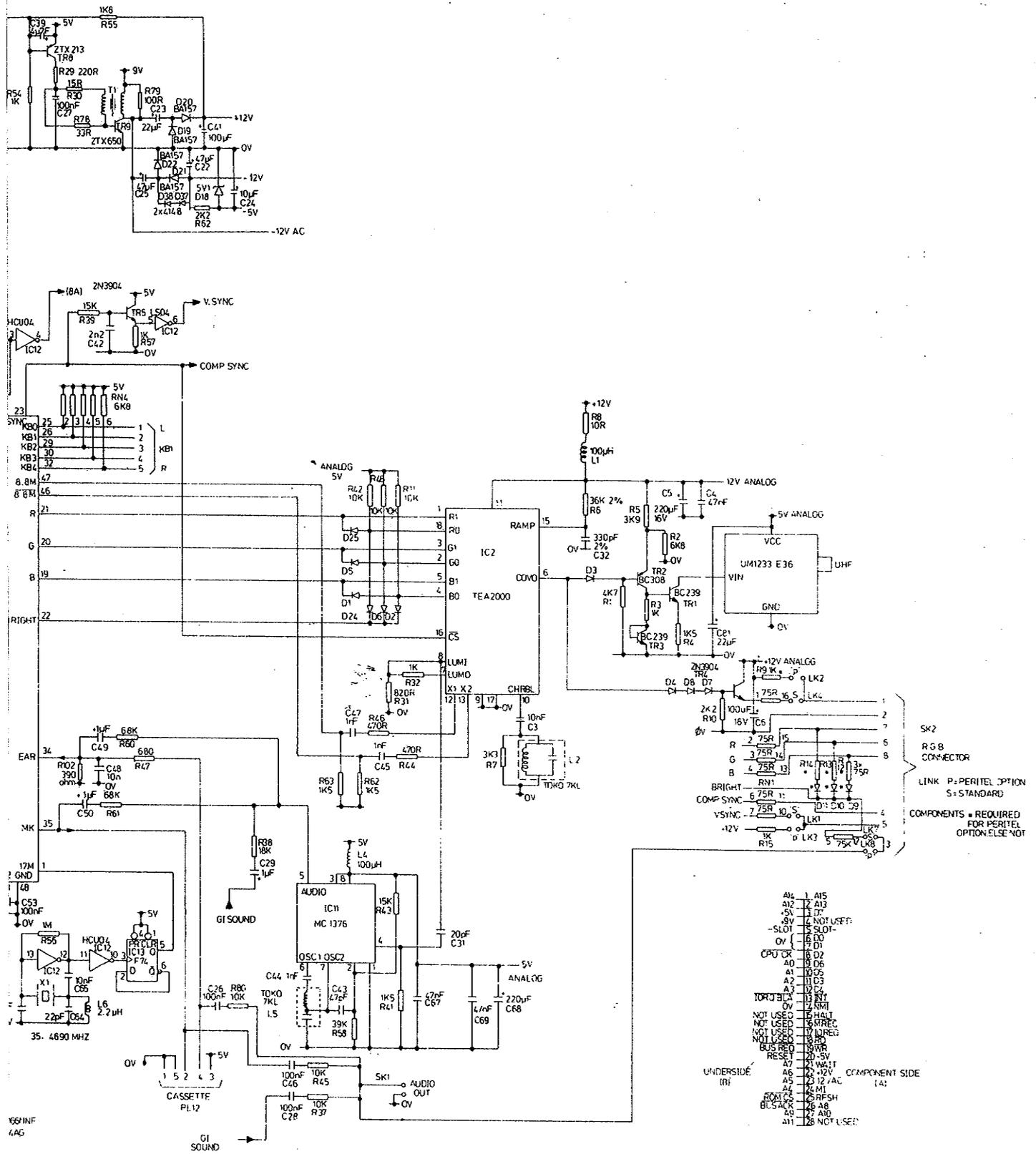
The cassette test comes in two parts. The first cassette test is similar to the ULA sound test, and is the last test in the ROM program. The tone it asks you to hear is much quieter than the other noises. The second cassette test comes on a tape and is used when the BASIC is running. Turn on the Spectrum, wait for the menu to appear and then press ENTER. Then start the test cassette. After a short while, the words PROGRAM: Loading... should appear, and shortly afterwards some instructions will appear on the screen. Follow these to test the cassette unit.

ELECTRICAL PARTS LIST

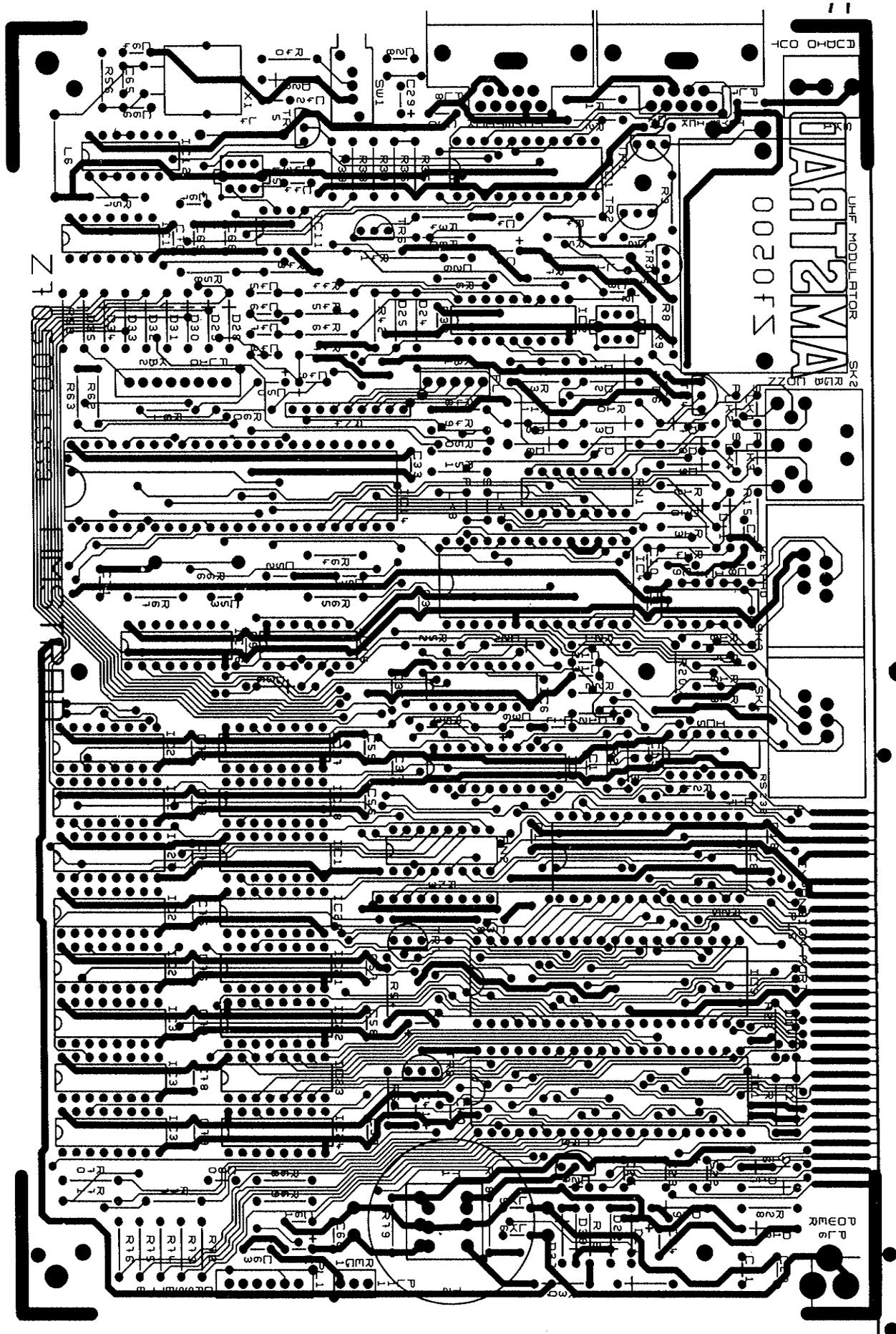
Description	Reference	Part No.
Transistors		
Tr.BC239B/C549B	TR1, 3, 6	50008
Tr.BC308B/C558B	TR2	172032
Tr.2N3904	TR4, 5, 7	172033
Tr.ZTX650	TR9	172034
Tr.ZTX213	TR8	172035
Diodes		
D.IN4148	D1-17, 23-25, 36-38	200241
D.LED LTL-3211A		172004
D.Zener 5.1V	D18	172036
D.IN4936/BA157	D19-22	172037
I.C.s		
I.C. 302	IC. LA6324	170112
I.C. 5	IC. MC1489AP	172038
I.C. 3	IC. MC1488P	172039
I.C. 16	IC. DM74LS157	172040
I.C. 7	IC. 10H8 PAL	172041
I.C. 10	IC. ZX8401/PCF1306P	172042
I.C. 4	IC. AY-3-8912A	40001
I.C. 6	IC. 74LS174	172044
I.C. 17-32	IC. KM4164B-15P	172045
I.C. 14	IC. ULA7K010E5/AMS40056	172046
I.C. 15	IC. 74LS04	172047
I.C. 2	IC. TEA 2000	172048
I.C. 11	IC. MC1376P	172049
PL 11	IC. L78S05CV	172050
I.C. 1	IC. ULA1050E/AMS40057	172051
I.C. 8	IC. 27256-25-P/AMS40054	172052
I.C. 9	IC. Z80A CPU	40080
I.C. 12	IC. M74HCU04	40008/A
I.C. 13	IC. 74F74N	172053
Capacitors		
4.7pF/25V		172069
10pF/25V		172070
22pF/25V	C31, 64	150511
25pF	C61	172071
33pF/50V	C316	150514
47pF	C43	150515
180pF/25V	C80	150492
200pF/50V	C321	172072
220pF/50V	C12-14, 17	400107
330pF/25V	C32	150518
0.001uF/25V	C7-10, 44, 45, 47, 320	24027
0.0022uF/25V	C42	21002
0.01uF/25V	C3, 48, 65	24011
0.022uF/25V	C317, 319, 323	24013
0.047uF/25V	C4, 67, 69	24015
0.1uF/25V	C20, 26, 28, 38, 46, 53, 60, 71	21019
Electrolytic Capacitors		
1uF/16V DC	C29, 36, 49, 50	20056
4.7uF/16V DC	C39	150520
10uF/25V DC	C24, 324	200528
22uF/10V DC	C81, 318	172073
22uF/16V DC	C23, 52, 62, 63	200530
47uF/16V DC	C22, 25	172074
100uF/16V DC	C6, 41, 315	20028
220uF/16V DC	C5, 68	20029
470uF/10V DC	C322	20044
Polycarbonate Capacitors		
50pF	C66	172075

Description	Circuit Reference	Part No.
Resistors 1/4 Watt Carbon Film		
10ohm	R8	10008
15ohm	R30	172076
33ohm	R78	10018
47ohm	R59	10020
56ohm	R305	10022
75ohm	R12-14	150484
100ohm	R19, 40, 79	10032
180ohm	R34, 315	10037
220ohm	R29	10040
330ohm	R35, 67	10044
470ohm	R22, 23, 44, 46, 52	10048
560ohm	R36, 313	10050
680ohm	R24, 47	10052
820ohm	R31, 324	10054
1kohm	R3, 9, 15-18, 20, 21, 32, 54, 57, 68	10061
1.2kohm	R325	10063
1.5kohm	R4, 41, 62, 63	10065
1.8kohm		
1.8kohm	R49-51, 55	10067
2.2kohm	R10, 62	10069
3.3kohm	R7, 321	10073
3.9kohm	R5	10075
4.7kohm	R1, 320	10077
5.6kohm	R314	10079
6.8kohm	R2	10081
8.2kohm	R69, 323	10083
10kohm	R11, 25-27, 37, 42, 45, 48, 80, 312	10085
12kohm	R318	10087
15kohm	R39	10089
18kohm	R38, 311	10091
33kohm	R319, 322	10097
36kohm	R6	172077
39kohm	R58	10099
47kohm		10101
68kohm	R60, 61	10105
220kohm	R53	10117
1Mohm	R56, 316	1400171
2Mohm	R310	172078
15ohm/1/2W	R66	172079
Resistor Network		
75ohm/16 Pin	RN1	172054
470ohm/16 Pin	RN2	172055
6.8kohm/9 Pin	RN4	172056
82.kohm/9 Pin	RN3	172057
Coils		
2.2uH	L6	172058
82uH	L301	172059
100uH	L1, 4	172060
TOKO 7KL/4097	L2	172061
TOKO	L5	172062
7KL/4091U		
	T1	172063
	T2	172064
Miscellaneous		
A-L	Aerial Lead	172065
I-S1	I.C. Socket 28 Pin	170120
I-S2	I.C. Socket 24 Pin	172066
I-S3	I.C. Socket 40 Pin	170121
X1	Crystal 35.4690MHz	172067
	Power Adaptor	172068

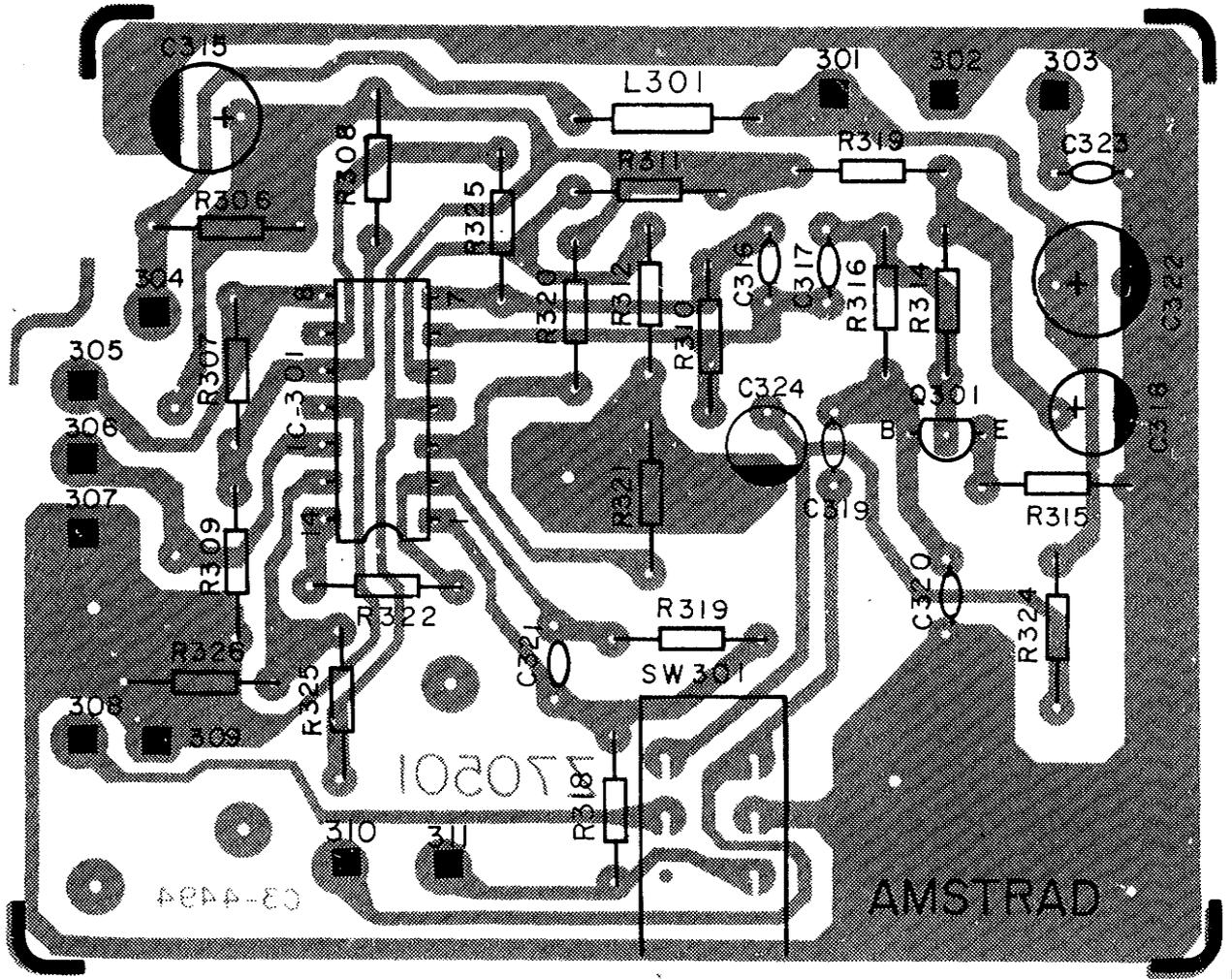
JIT DIAGRAM



DIODES D1-17, 23-25, 36-38
IN4148

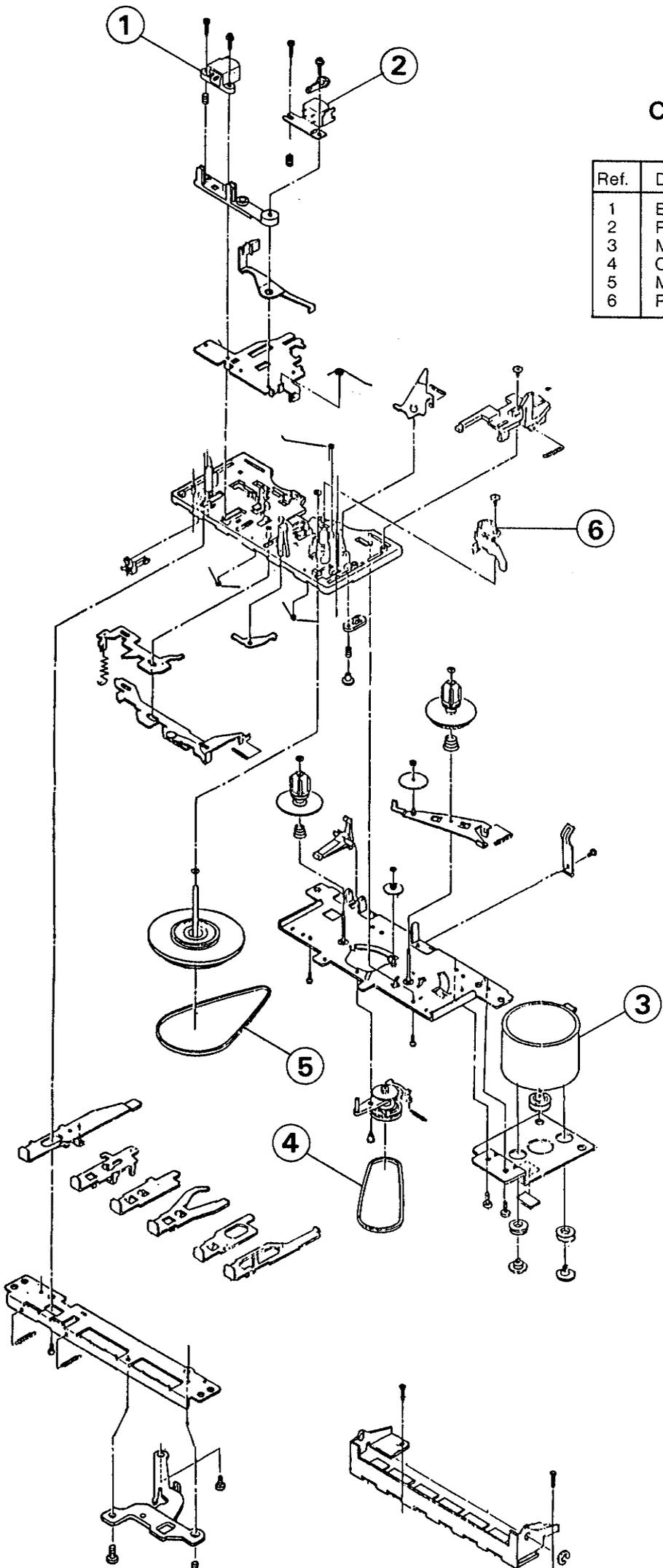


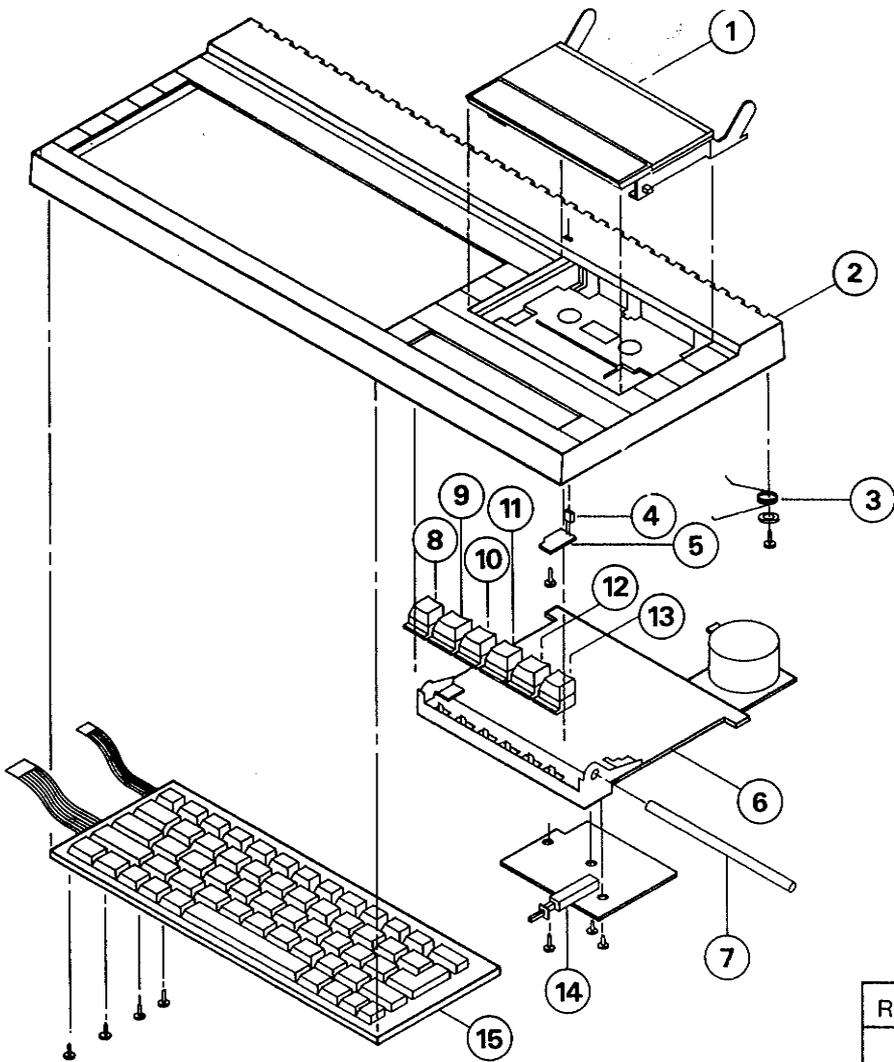
TAPE INTERFACE PCB



CASSETTE MECHANISM PARTS LIST

Ref.	Description	Part No.
1	Erase Head	170202
2	Rec/Play Head	170201
3	Motor 6V DC	172027
4	Clutch Belt	172028
5	Main Belt	172029
6	Pinch Roller	172030





CABINET PARTS LIST

Ref.	Description	Part No.
1	Cassette Door with Inlay	172001
2	Top Panel Assy.	172002
3	Spring Cassette Door	172003
4	Red LED	172004
5	PCB LED	172005
6	Cassette Mechanism Complete	172006
7	Rod Cassette Key	172007
8	Record Key	172008
9	Play Key	172009
10	Rewind Key	172010
11	F.F. Key	172011
12	Stop/Eject Key	172012
13	Pause Key	172013
14	Slide Switch Record/Play	172014
15	Key Board Assy.	172015
16	Knob Switch Reset	172016
17	Switch Reset	172017
18	Joystick Port	170023
19	Sound Out Socket 3.5mm	170022
20	Pal I Modulator	172020
21	8 Pin DIN Socket (RGB)	172021
22	BT 6 Way Sockets	172022
23	Key Pad/RS232	
23	DC Input Socket	170024
24	Heat Sink For Regulator	172024
25	Bottom Cabinet	172025
26	Rubber Feet	172026

