Service
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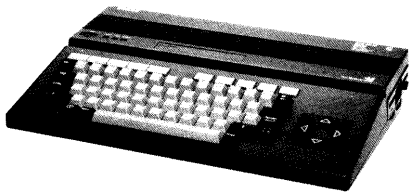

42 935 A12

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

Service Manual

(GB) SPECIFICATION

Microprocessor	:	Z80A
Memory	:	48k ROM 16k disk ROM 128k video RAM 128k user RAM
Video processor	:	V9938
MSX controller	:	S-3527
Floppy-disk drive	:	3.5",1 MB
Interfaces	:	RF output (UHF channel E36) Monitor output SCART Cassette recorder 2 joysticks Printer 2 cartridge slots
Keyboard	:	QWERTY/00/16
Power supply voltage	:	220 V ± 10%, 50Hz

(NL) SPECIFICATIE

Microprocessor	:	Z80A
Geheugen	:	48k ROM 16k disk ROM 128k video RAM 128K gebruikers RAM
Video processor	:	V9938
MSX controller	:	S-3527
Floppy-disk drive	:	3.5",1 MB
Interfaces	:	RF uitgang (UHF kanaal E36) Monitor uitgang SCART Cassette recorder 2 handbedieningen Printer 2 cartridge sleuven
Toetsenbord	:	QWERTY/00/16
Voedingsspanning	:	220 V ± 10%, 50Hz

(F) CARACTERISTIQUES TECHNIQUES

Microprocesseur	:	Z80A
Mémoire	:	48k ROM 16k ROM à disque 128k RAM vidéo 128k RAM utilisateur
Processeur vidéo	:	V9938
Contrôle MSX	:	S-3527
Lecteur de disquette	:	3.5",1 MB
Interfaces	:	Sortie RF (Canal UHF E36) Sortie monitor SCART Magnétophne cassette 2 poignées Imprimante 2 "slots" cartouche
Clavier	:	QWERTY/00/16
Tension d'alimentation	:	220 V ± 10%, 50Hz

(D) TECHNISCHE DATEN

Microprozessor	:	Z80A
Speicher	:	48k ROM 16k Disk-ROM 128k Video-RAM 128k Gebrauchers-RAM
Videoprozessor	:	V9938
MSX-Steureinheit	:	S-3527
Floppy Disk-Laufwerk	:	3.5",1 MB
Schnittstellen	:	RF Ausgang (UHF Kanal E36) Monitorausgang SCART Cassettenrecorder 2 Handbedienungen Drucker 2 Kassettenschlitze
Tastatur	:	QWERTY/00/16
Versorgungsspannung	:	220 V ± 10%, 50Hz

(I) DATA TECHICI

Microprocessore	:	Z80A
Memoria	:	48k ROM 16k ROM A disco 128k RAM video 128k RAM utilizzatori
Processore video	:	V9938
MSX di controllo	:	S-3527
Lettore di dischetto	:	3.5",1 MB
Interfaccie	:	Uscita RF (Canale UHF E36) Uscita monitore SCART Registratore a cassetta 2 leve manuali Stampa 2 connettore per cartuccia
Tastiera	:	QWERTY/00/16
Tensione di aliment.	:	220 V ± 10%, 50Hz

Documentation Technique Service Dokumentation Documentazione di Servizio Huolte-Ohje Manual de Servicio Manual de Serviçio

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(GB)

CAUTION

1. The exchange of cartridges should take place with the set turned off.

2. ESD

All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential.

ADJUSTMENTS

VDP Clock frequency

- Connect a frequency counter to 8-U15 via a 10:1 probe.
- Adjust TC2 for a frequency of 3,554,685 ± 200 Hz on 8-U15.

FDC

1. Read-pulse width

- Connect an oscilloscope to 29-U8 via a 10:1 probe.
- Switch the computer on.
- Connect 22-U8 to ground.
- Adjust the pulse width on 29-U8 for 400 ± 100 ns with the aid of VR1, see figure 1.
- Interrupt the connection between 22-U8 and ground.

2. VCO frequency

- Connect a frequency counter to 16-U8 via a 10:1 probe.
- Switch the computer on.
- Connect 22-U8 to ground.
- Adjust the frequency on 16-U8 for 255 ± 5 kHz with the aid of VR2.
- Interrupt the connection between 22-U8 and ground.

RTC clock frequency

- Connect a frequency counter to 17-U13 via a 10:1 probe.
- Adjust TC1 for a frequency of 32.768 kHz on 17-U3.

Encoder unit

- Connect a frequency counter to 17-U1 via a 10:1 probe.
- Adjust TC1 for a frequency of 4,433,619 ± 20 Hz on 17-U1.

Floppy Disk Drive

1. Required measuring equipment

- Dual trace oscilloscope, for example PM3211.
- Alignment disk, code nummer 4822 395 30274.
- FDD test cartridge, code nummer 4822 397 30171.

2. Use of the FDD test cartridge

- Switch the computer off and insert the FDD cartridge.
- Switch the computer on again.
- Type: "CALL FDDTEST" and press the <RETURN> key.
- Select the disk drive test.
- The functions in the disk drive test are used for adjusting the disk drive.

3. Radial alignment

A) - Connect channel A of the oscilloscope via a 10:1 probe with test point TP1 (for a survey of the test points, see figure 2).
   - Connect channel B via a 10:1 probe with test point TP2.
   - Connect the mass terminal of the probe with TP3.
   - Oscilloscope alignments:
     - Trigger externally with the index signal (on connector J1, pin 1).
     - Sensitivity time basis: 20 ms/div.
     - Sensitivity channel A and channel B: 5mV/div.
     - Invert channel B.
     - Add channel A and channel B.

B) - Place the alignment disk in the drive and read track 40, side 0 (with <F3>).
   - Check that the cat's eye pattern (see figure 3) is visible on track 40.
   - If the correct cat's eye pattern is not visible, stop the reading action (with <ESC>).
   - Loosen the screws A (see figure 4) of the stepping motor a quarter turn.
   - Read track 40, side 0 continuously (with <F3>).
   - Rotate the stepping motor until all lobes of the cat's eye pattern have the same amplitude.
   - Tighten the screws A of the stepping motor again and check the cat's eye pattern once more. Repeat the alignment, if necessary.
   - Stop the reading action with <ESC>.
   - Read track 00, side 0 (with <F3>) and increase the track number with the <CURSOR UP> key to track 40.
     Check the cat's eye pattern again.
   - Stop the reading action (with <ESC>).
   - Read track 79, side 0 (with <F3>) and lower the track number to track 40 with the <CURSOR DOWN>key.
     Check the cat's eye pattern again.

4. Alignment track 00 sensor

Method 1

- First check the radial alignment.
- Carry out point A of the radial alignment, however with the sensitivity of the time base at 5 µs/div. and trigger on channel A.
- Insert the alignment disk into the drive and read track 00, side 0 (with <F3>).
- Check whether a 62.5 kHz signal (a '1F' data pattern) is present on track 00.
- If the signal is not present, loosen the screw of the track 00 sensor a quarter turn and adjust the track 00 sensor until the 62.5 kHz signal will be visible.
- Tighten the screw of the track 00 sensor again.
- Check if the 62.5 kHz signal is only present on track 00 and not on track 01.

Method 2

- First check the radial alignment.
- Connect the input of the oscilloscope with test point TP5 and ground.
- Insert a disk into the drive and read track 00, side 0 (with <F3>).
- Increase the track number to track 02 (with the <CURSOR UP>key) and measure the voltages across the track 00 sensor. These voltages should be:
  - 3.5V on track 00
  - 1.5V on track 01
  - 0.5V on track 02
- If the measured values do not correspond with the values given above, decrease the track number by 1 to track 01.
- Loosen the screw of the track 00 sensor a quarter turn.
- Adjust the track 00 sensor until the voltage across the sensor is 1.5V at track 01.
- Tighten the screw of the track 00 sensor again.
- Check the voltages across the sensor at track 00, track 01 and track 02.

5. Azimuth inspection

- Carry out point A of the radial alignment, however with the sensitivity of the time base at 0.5 ms/div.
- Place the alignment disk into the drive and read track 40, side 0 (with <F3>).
- Check the azimuth burst wave pattern (see figure 5).
- A tolerance of ±30' is allowed. Greater deviations may cause compatibility problems. The head unit cannot be adjusted further.

6. Index burst alignment

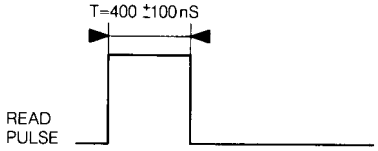
- Connect channel A of the oscilloscope via a 10:1 probe with test point TP1.
- Connect channel B via a 10:1 probe with the index signal (on connector J1, pin 1).
- Connect the mass terminal of the probe, connected to channel A, with TP3.
- Oscilloscope alignments:
  - Trigger on channel B.
  - Sensitivity time base: 0.1 ms/div.
  - Sensitivity channel A: 2 mV/div.
  - Sensitivity channel B: 0.2V/div.
- Loosen the screw of the index sensor a quarter turn.
- Insert the alignment disk into the floppy drive and read track 40, side 0 (with <F3>).
- Adjust the index sensor so, that the period time T becomes 400 ± 200 µs (see fig. 6).
- Tighten the screw of the index sensor again and check the alignment once more.

7. Side 1

- Check alignments 3 to 6 for side 1.

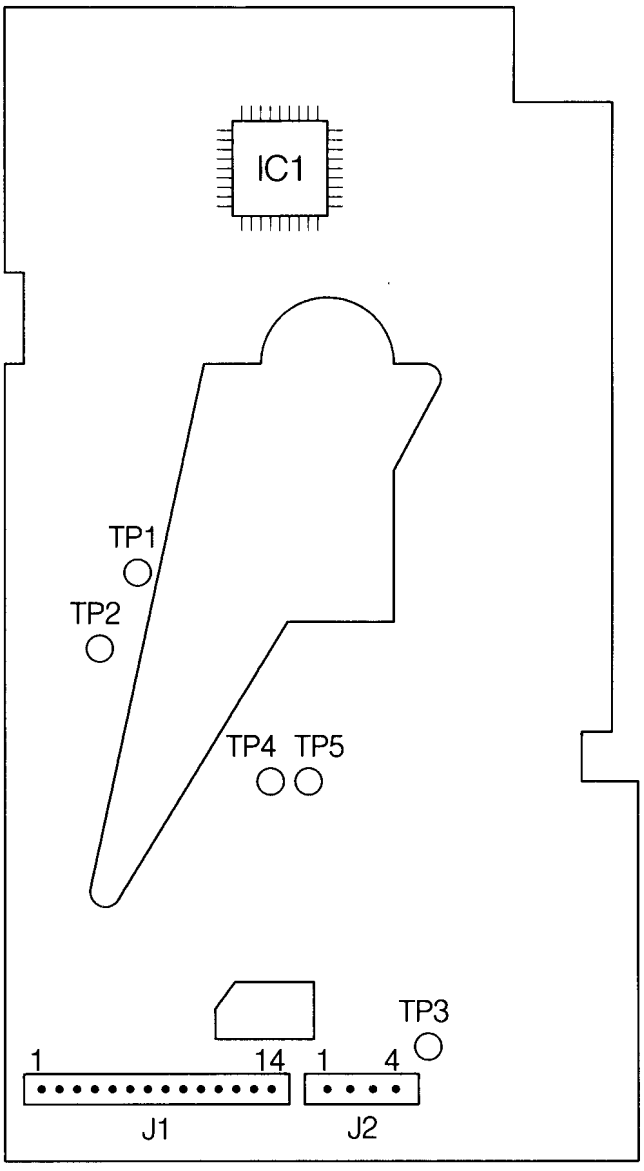
8. Speed of spindle motor

- Connect an oscilloscope via a 10:1 probe to connector J1, pin 1 (index) and connect the mass terminal of the probe with TP3.
- Adjust the period time of the index pulse for 200 ± 0.5 ms by means of a screwdriver in alignment point A (see figure 7) of the spindle motor.



MDA.00969
T 26/746

Fig. 1



MDA.00886
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Fig. 2

FDD PARTS LIST

1	4822 535 92418	Spindle motor
2	4822 404 60409	Holder assy
3	4822 432 10645	Front
4	4822 358 20269	Belt
6	4822 212 22884	Complete PCB
7	4822 404 60411	Bracket
8	4822 362 10265	Stator stepper motor
9	4822 362 20234	Rotor stepper motor

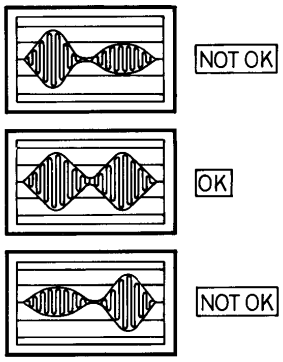


Fig. 3 39 578 A12

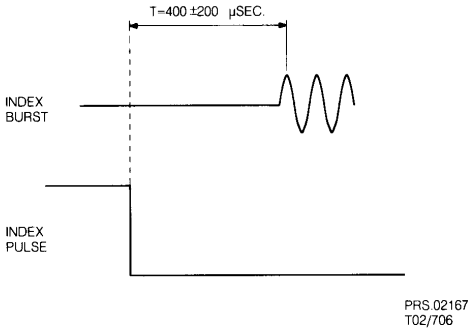


Fig. 6

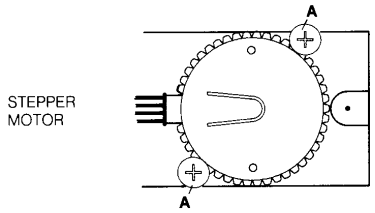


Fig. 4

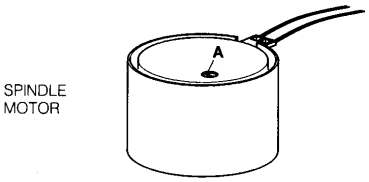


Fig. 7 MDA. 00885

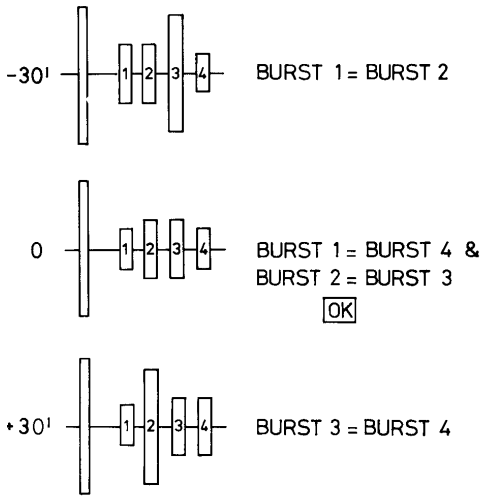
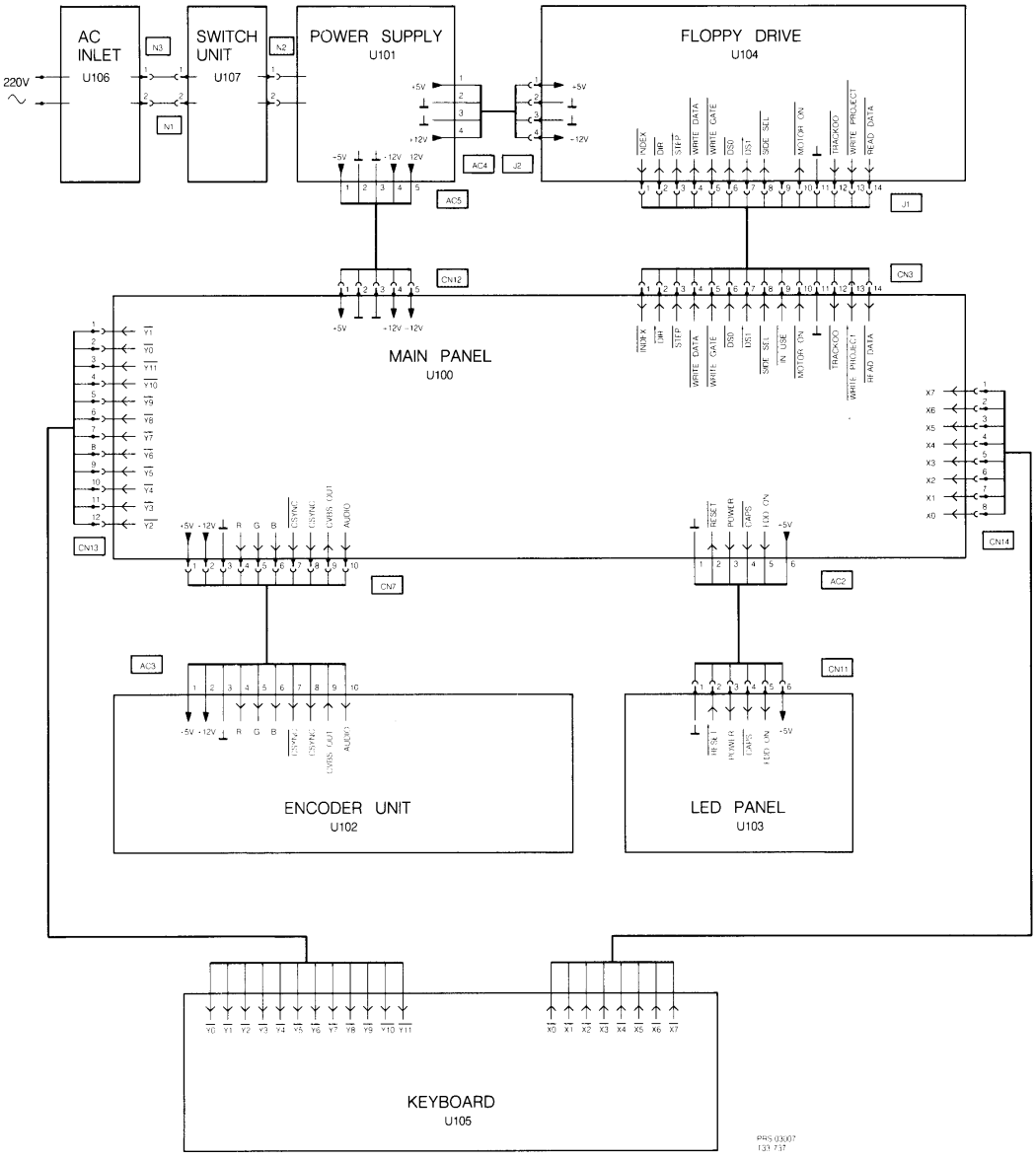
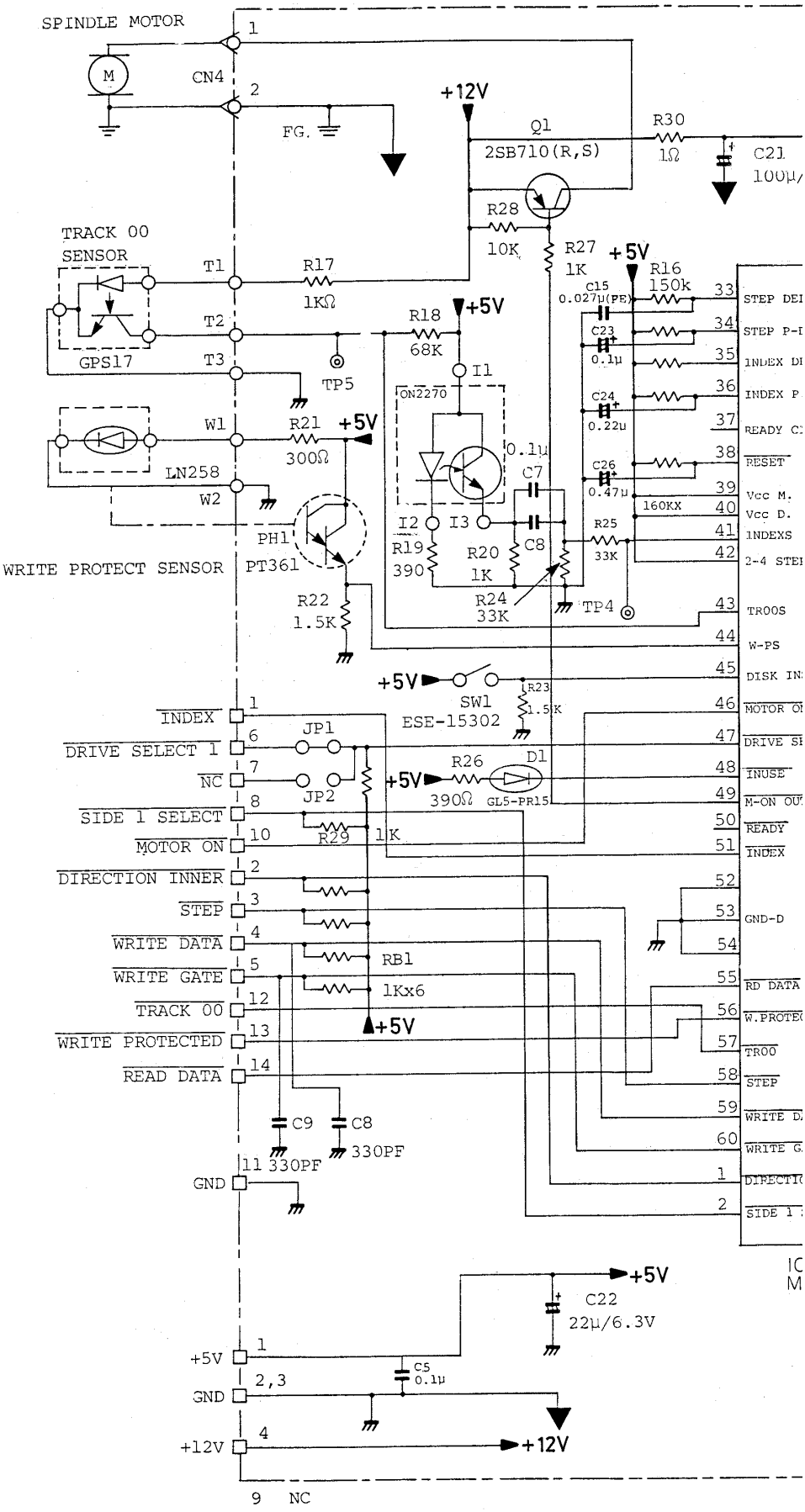


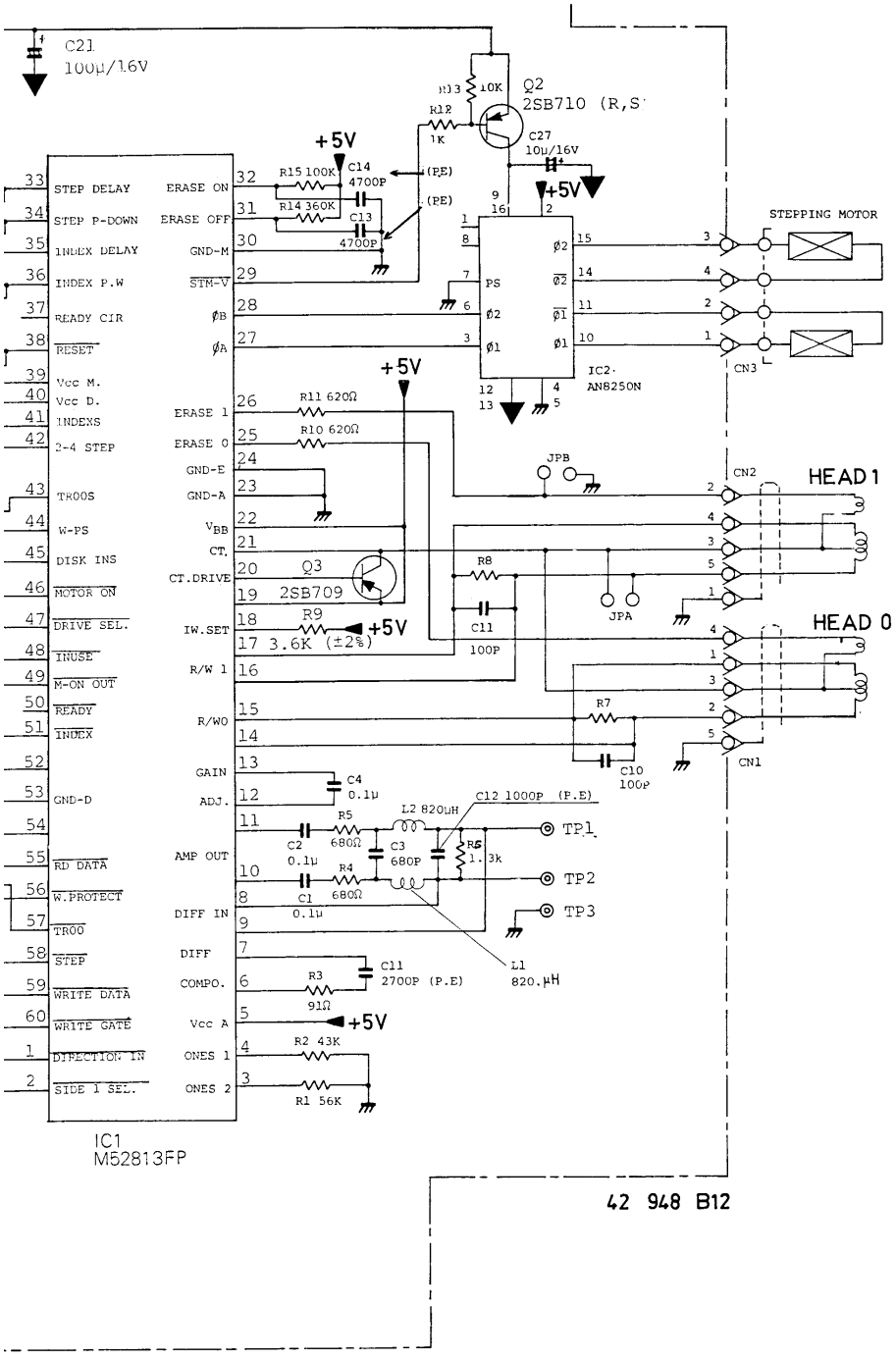
Fig. 5 39 580 A12

WIRING DIAGRAM




SPINDLE MOTOR
CN4
FG.
+12V
Q1
2SB710(R,S)
R30
1Ω
C21
100μ/
R28
10K
R27
1K
+5V
R16
150k
TRACK 00
SENSOR
T1
T2
T3
GPS17
R17
1KΩ
R18
68K
TP5
I1
ON2270
W1
W2
LN258
R21
300Ω
0.1μ
C7
I2
I3
R19
390
R20
1K
C8
R24
33K
TP4
R25
33K
PH1
PT361
WRITE PROTECT SENSOR
R22
1.5K
C15
0.027μ(PE)
C23
0.1μ
C24
0.22μ
C26
0.47μ
160KX
SW1
ESE-15302
R23
1.5K
INDEX
DRIVE SELECT 1
NC
SIDE 1 SELECT
MOTOR ON
DIRECTION INNER
STEP
WRITE DATA
WRITE GATE
TRACK 00
WRITE PROTECTED
READ DATA
JP1
JP2
R26
390Ω
D1
GL5-PR15
R29
1K
RB1
1Kx6
C9
C8
330PF
330PF
GND
C22
22μ/6.3V
C5
0.1μ
+5V
GND
+12V
9 NC
STEP DEI
STEP P-I
INDEX DI
INDEX P
READY C
RESET
Vcc M.
Vcc D.
INDEXS
2-4 STEI
TROOS
W-PS
DISK IN
MOTOR O
DRIVE SE
INUSE
M-ON OU
READY
INDEX
GND-D
RD DATA
W.PROTE
TROO
STEP
WRITE D
WRITE G
DIRECTI
SIDE 1

ELECTRICAL DIAGRAM FDD



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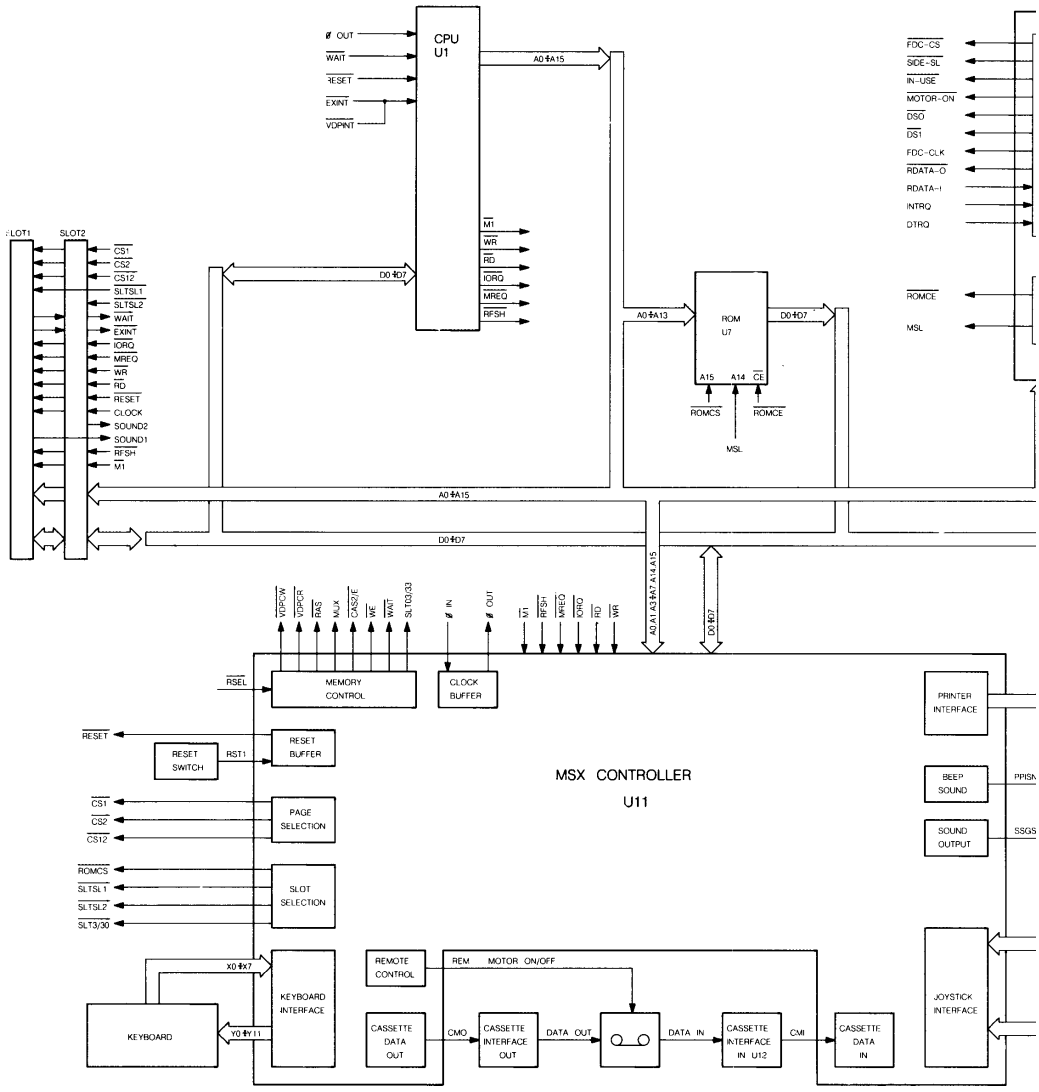
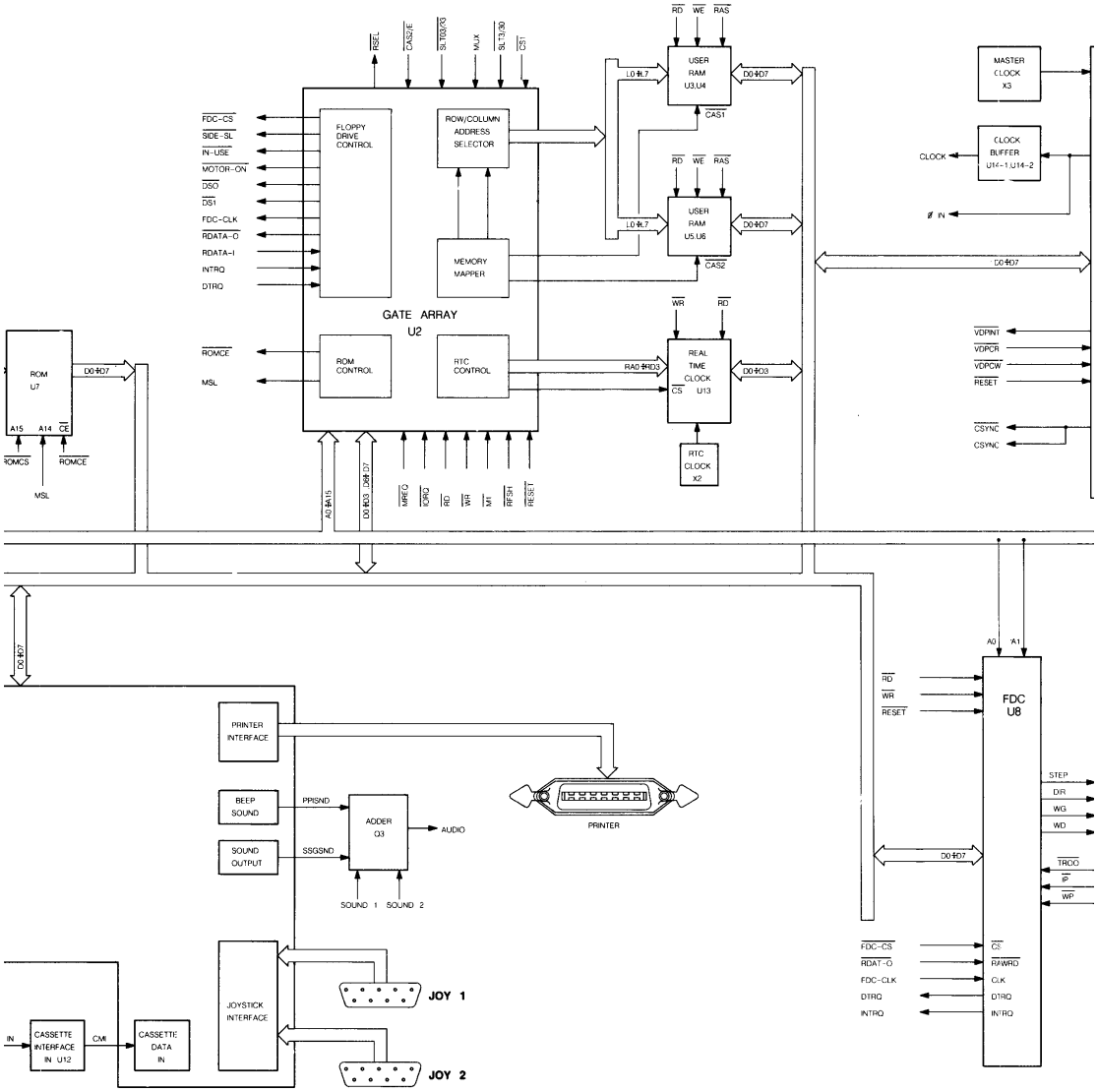
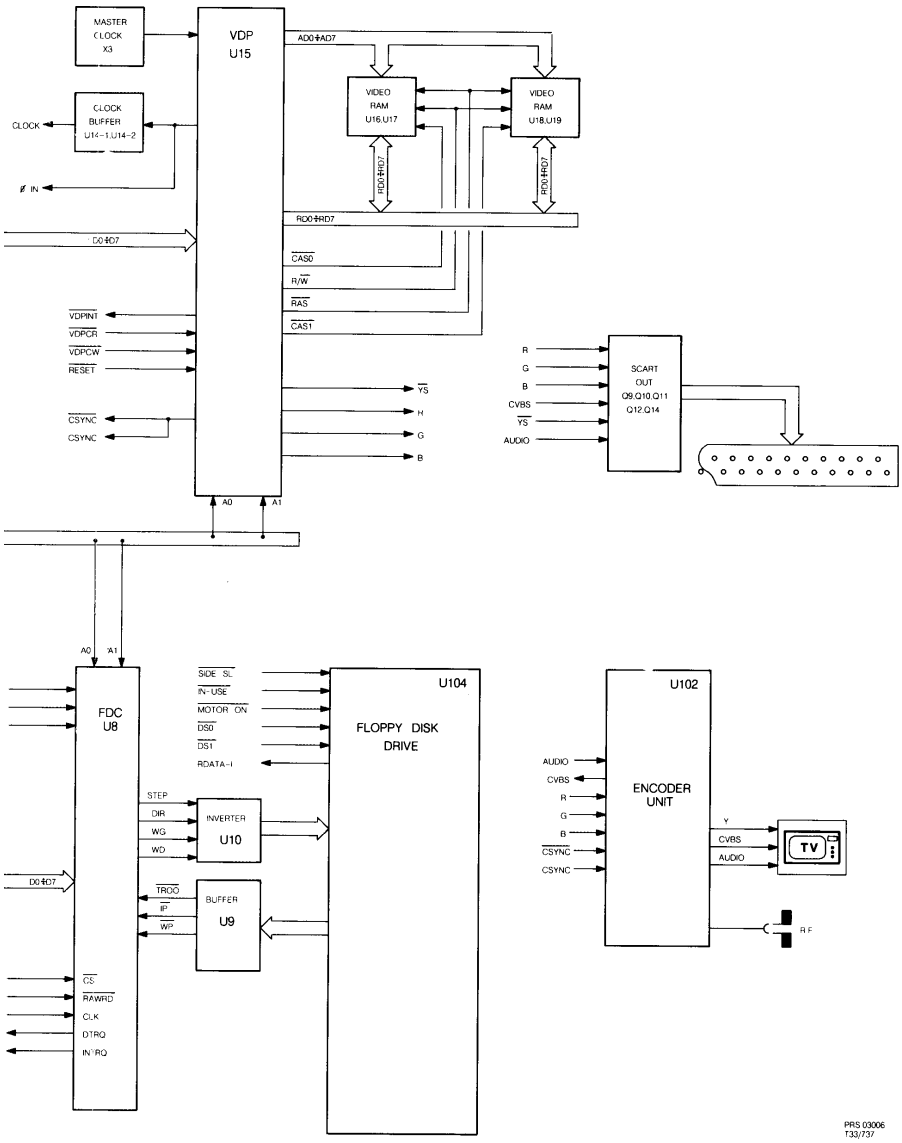
FUNCTIONAL DIAGRAM




GATE ARRAY
U2
FLOPPY DRIVE CONTROL
ROW/COLUMN ADDRESS SELECTOR
MEMORY MAPPER
ROM CONTROL
RTC CONTROL
USER RAM U3,U4
USER RAM U5,U6
REAL TIME CLOCK U13
RTC CLOCK X2
MASTER CLOCK X3
CLOCK BUFFER U14-1,U14-2
ROM U7
FDC U8
PRINTER INTERFACE
BEEP SOUND
SOUND OUTPUT
ADDER Q3
AUDIO
PRINTER
JOYSTICK INTERFACE
JOY 1
JOY 2
CASSETTE INTERFACE IN U12
CASSETTE DATA IN
FDC-CS
SIDE-SL
IN-USE
MOTOR-ON
DS0
DS1
FDC-CLK
RDATA-O
RDATA-I
INTRQ
DTRQ
ROMCS
ROMCE
MSL
RESET
CLOCK
CSYNC
VDPINT
VDPCR
VDPCW
STEP
DIR
WG
WD
TRCO
IP
WP
RAWRD
CLK


MASTER CLOCK X3
VDP U15
AD0-AD7
VIDEO RAM U16,U17
VIDEO RAM U18,U19
CLOCK BUFFER U14-1,U14-2
CLOCK
RD0-RD7
D0-D7
CAS0
R/W
RAS
CAS1
VDPINT
VDPCR
VDPCW
RESET
CSYNC
CSYNC
YS
H
G
B
A0
A1
R
G
B
CVBS
YS
AUDIO
SCART OUT
C9,Q10,Q11
Q12,Q14
FDC U8
SIDE SL
IN-USE
MOTOR ON
DS0
DS1
RDATA-I
U104
FLOPPY DISK DRIVE
STEP
DIR
WG
WD
INVERTER U10
TR00
IP
WP
BUFFER U9
CS
RAWRD
CLK
DTRQ
INTRQ
U102
ENCODER UNIT
Y
CVBS
AUDIO
TV
RF
PRS 03006
T33/737

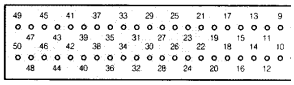
CS 11 835

LAY-OUT KEYBOARD MATRIX FOR SPANISH VERSION

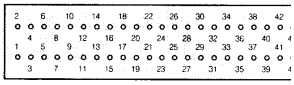
X0	X1	X2	X3	X4	X5	X6	X7	
0	1	2	3	4	5	6	7	Y0
8	9	–	=	\	[	]	Ñ	Y1
´	;	,	.	/	DEAD KEY	A	B	Y2
C	D	E	F	G	H	I	J	Y3
K	L	M	N	O	P	Q	R	Y4
S	T	U	V	W	X	Y	Z	Y5
	CTRL		⇧		F1	F2	F3	Y6
F4	F5	ESC	TAB	STOP	⇐	SE-LECT	↵	Y7
SPACE	HOME	INS	DEL	←	↑	↓	→	Y8
⇧								Y9
		GRPH						Y10
				CODE				Y11

PIN LAYOUT CARTRIDGE SLOTS

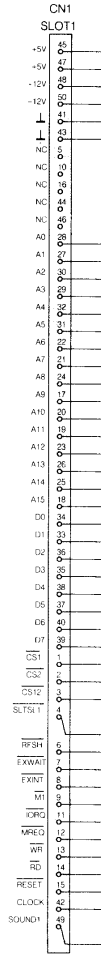
CN1



CN2



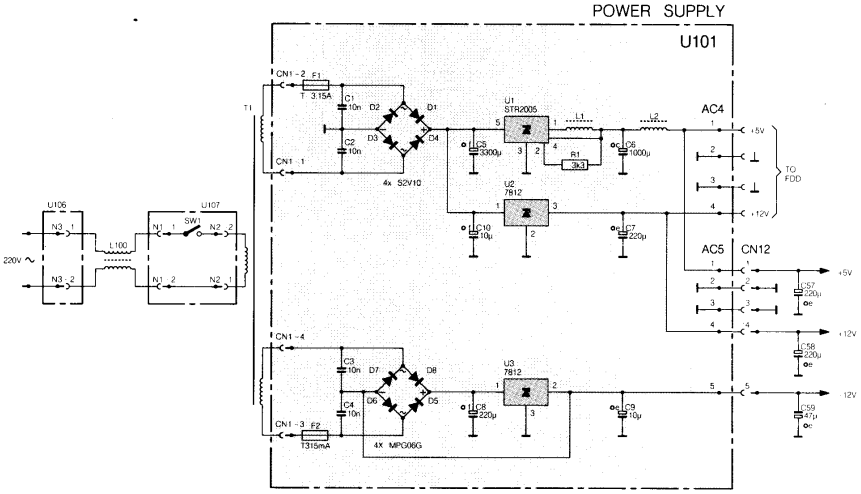
CN1 SLOT1

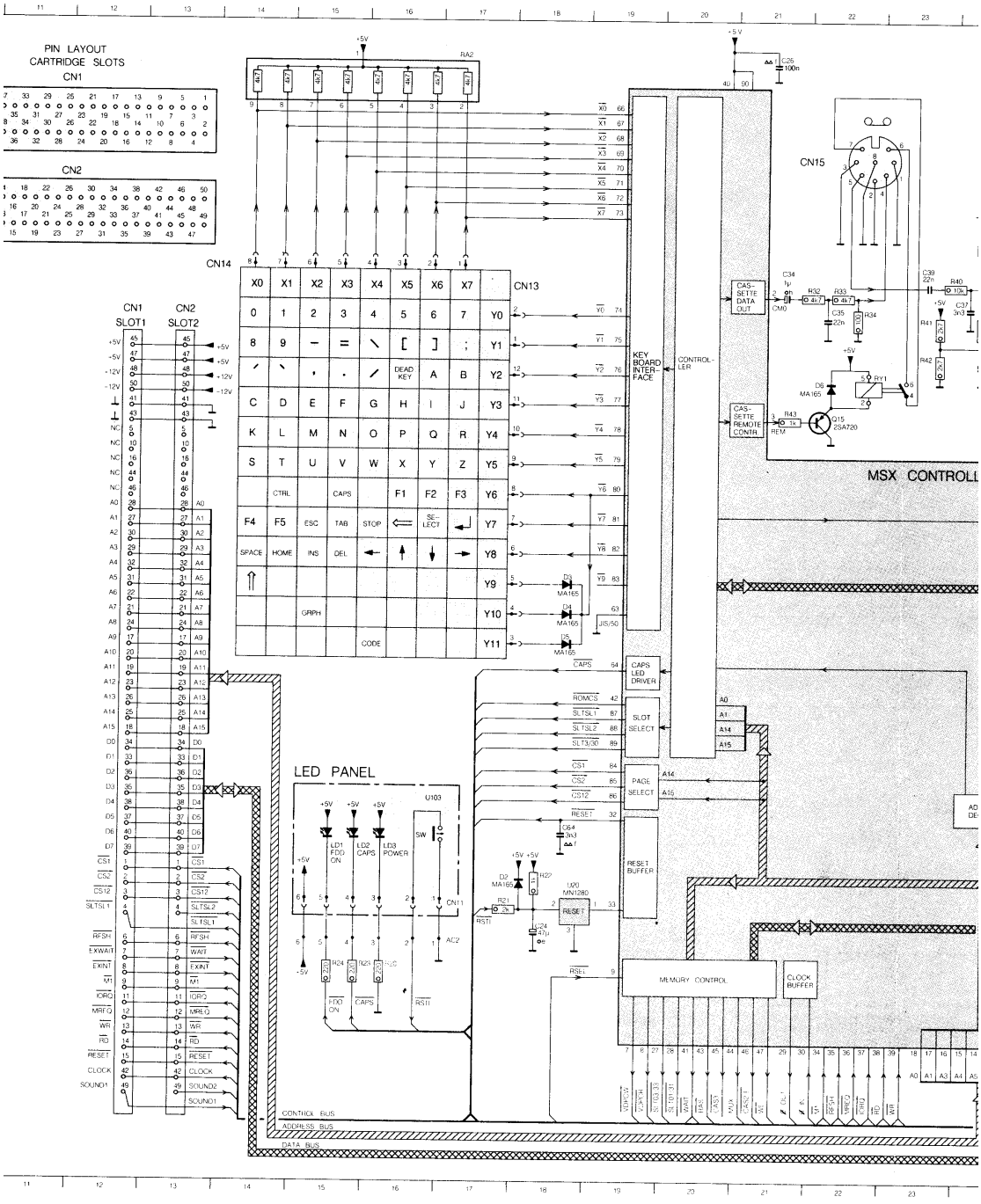


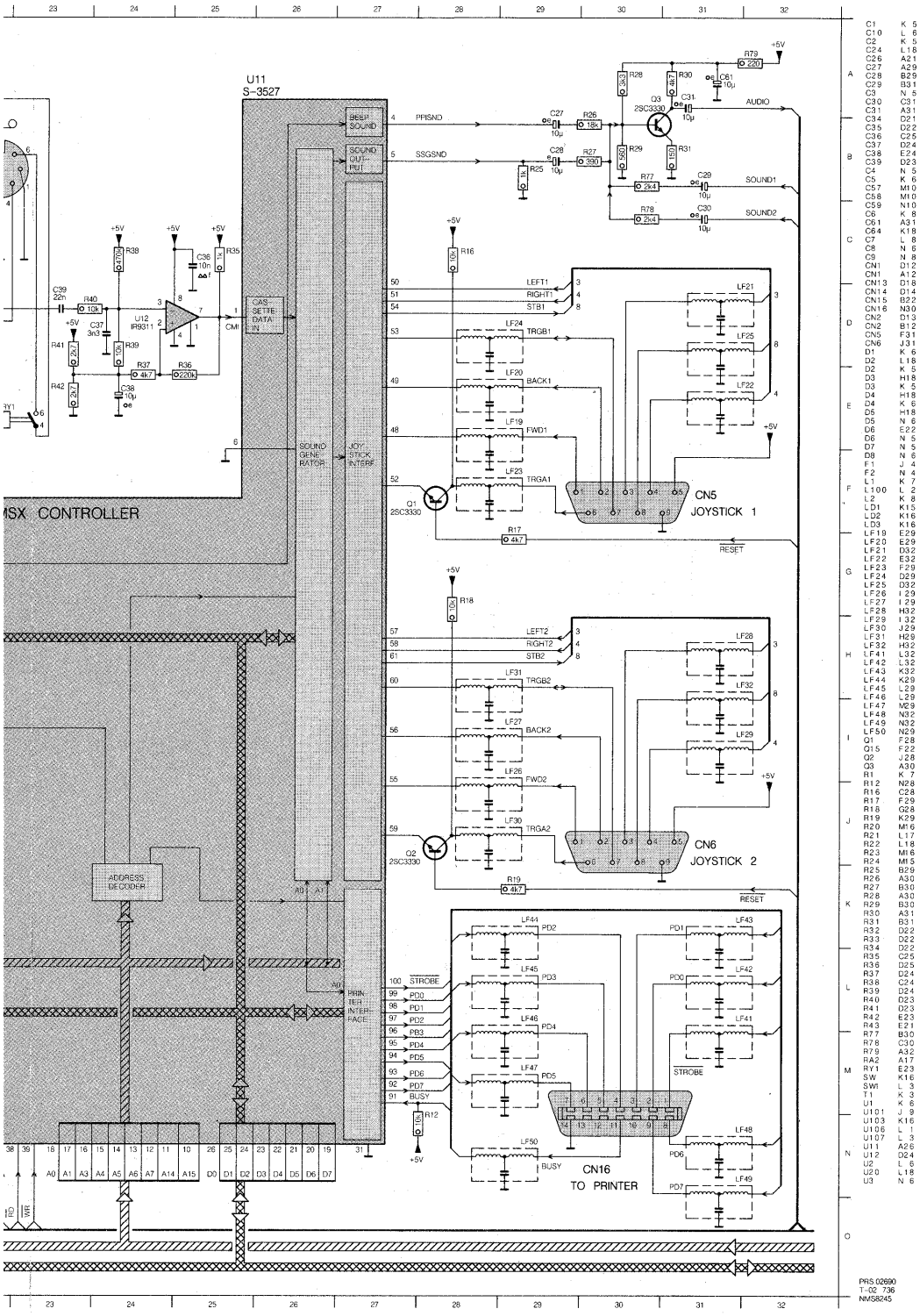
TYPENUMBERS AND POWERSUPPLY-CONNECTIONS OF IC'S				
POS.NR.	TYPE	DESCRIPTION	+5V	⊥
U9	74LS14	6 S.T. INVERTERS	14	7
U10	7416	6 INVERTERS OPEN COLLECTOR	14	7
U14	74LS04	6 INVERTERS	14	7

POWER SUPPLY

U101

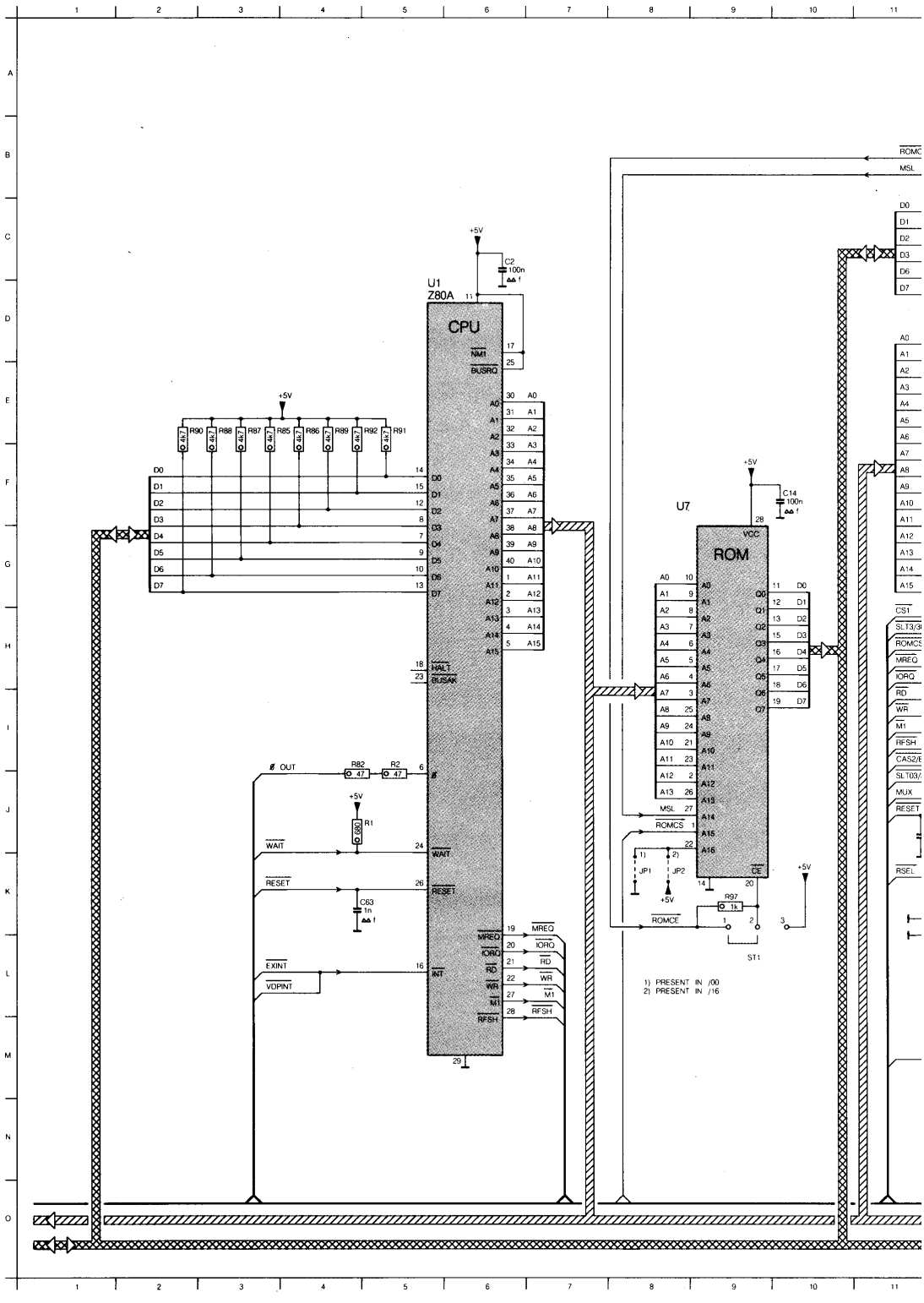


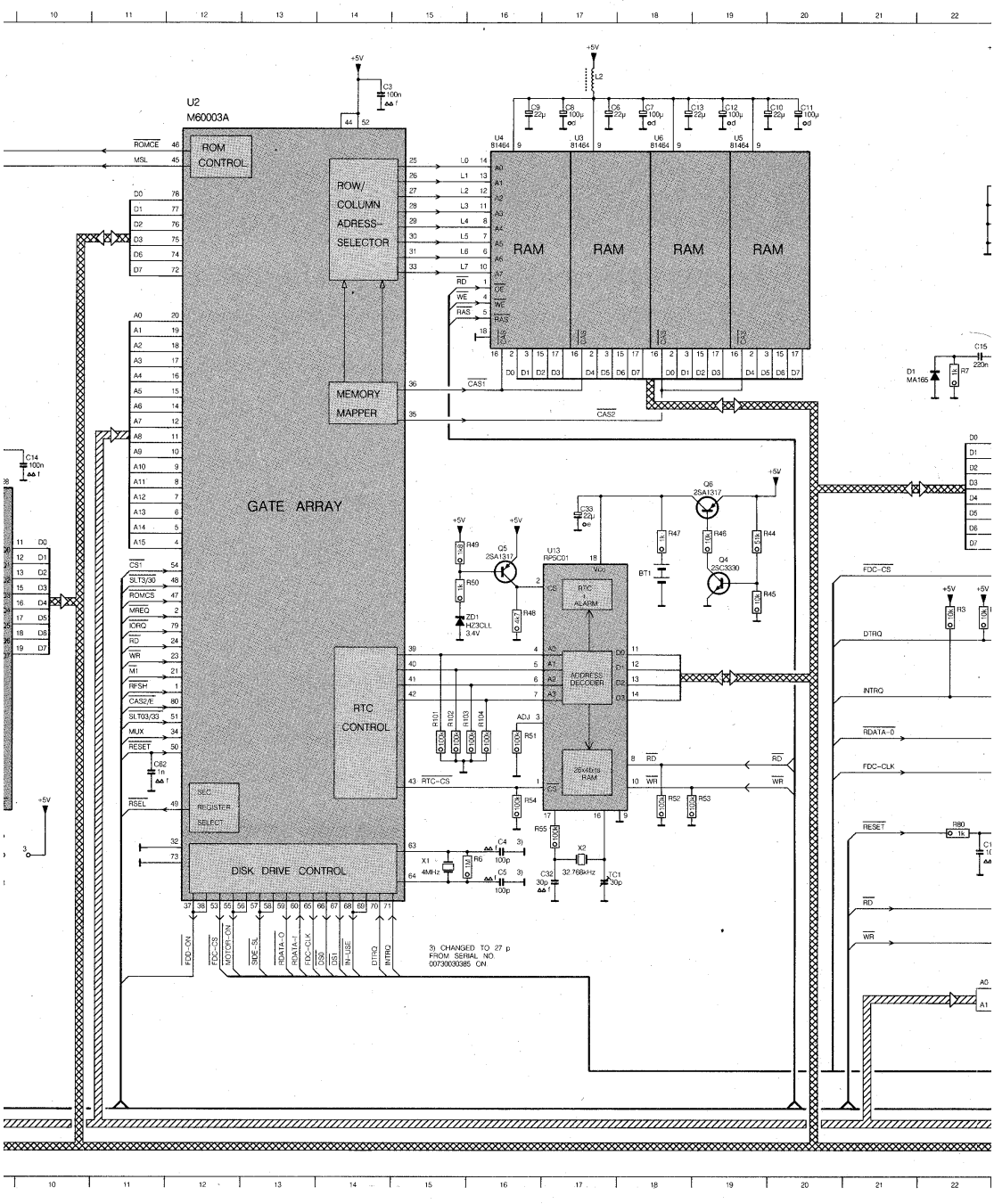

PIN LAYOUT
CARTRIDGE SLOTS
CN1
CN2
CN14
CN13
CN15
CN1
SLOT1
CN2
SLOT2
LED PANEL
KEY BOARD INTER-FACE
CONTROL-LER
CAS-SETTE DATA OUT
CAS-SETTE REMOTE CONTR
CAPS LED DRIVER
SLOT SELECT
PAGE SELECT
RESET BUFFER
MEMORY CONTROL
CLOCK BUFFER
MSX CONTROLL
CONTROL BUS
ADDRESS BUS
DATA BUS

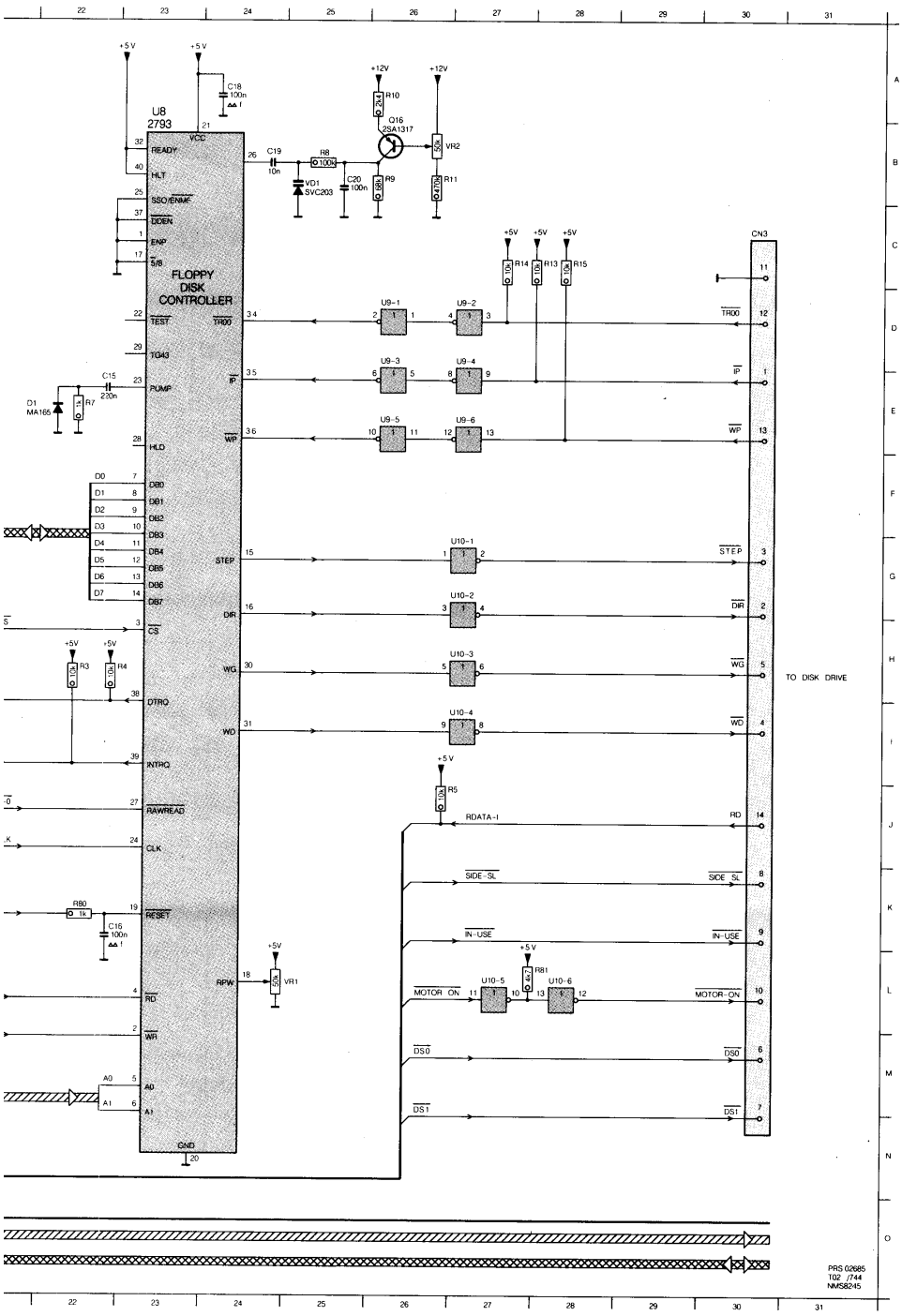


C1	K 5
C10	L 6
C2	K 5
C24	L18
C26	A21
C27	A29
C28	B29
C29	B31
C3	N 5
C30	C31
C31	A31
C34	D21
C35	D22
C36	C25
C37	D24
C38	E24
C39	D23
C4	N 5
C5	K 6
C57	M10
C58	M10
C59	N10
C6	K 8
C61	A31
C64	K18
C7	L 8
C8	N 6
C9	N 8
CN1	D12
CN1	A12
CN13	D18
CN14	D14
CN15	B22
CN16	N30
CN2	D13
CN2	B12
CN5	F31
CN6	J31
D1	K 6
D2	L18
D2	K 5
D3	H18
D3	K 5
D4	H18
D4	K 6
D5	H18
D5	N 6
D6	E22
D6	N 5
D7	N 5
D8	N 6
F1	J 4
F2	N 4
L1	K 7
L100	L 2
L2	K 8
LD1	K15
LD2	K16
LD3	K16
LF19	E29
LF20	E29
LF21	D32
LF22	E32
LF23	F29
LF24	D29
LF25	D32
LF26	I 29
LF27	I 29
LF28	H32
LF29	I 32
LF30	J 29
LF31	H29
LF32	H32
LF41	L32
LF42	L32
LF43	K32
LF44	K29
LF45	L29
LF46	L29
LF47	M29
LF48	N32
LF49	N32
LF50	N29
Q1	F28
Q15	F22
Q2	J 28
Q3	A30
R1	K 7
R12	N28
R16	C28
R17	F29
R18	G28
R19	K29
R20	M16
R21	L17
R22	L18
R23	M16
R24	M15
R25	B29
R26	A30
R27	B30
R28	A30
R29	B30
R30	A31
R31	B31
R32	D22
R33	D22
R34	D22
R35	C25
R36	D25
R37	D24
R38	C24
R39	D24
R40	D23
R41	D23
R42	E23
R43	E21
R77	B30
R78	C30
R79	A32
RA2	A17
RY1	E23
SW	K16
SW1	L 3
T1	K 3
U1	K 6
U101	J 9
U103	K16
U106	L 1
U107	L 3
U11	A26
U12	D24
U2	L 6
U20	L18
U3	N 6

PRS.0269O
1-92 736
NMS8245

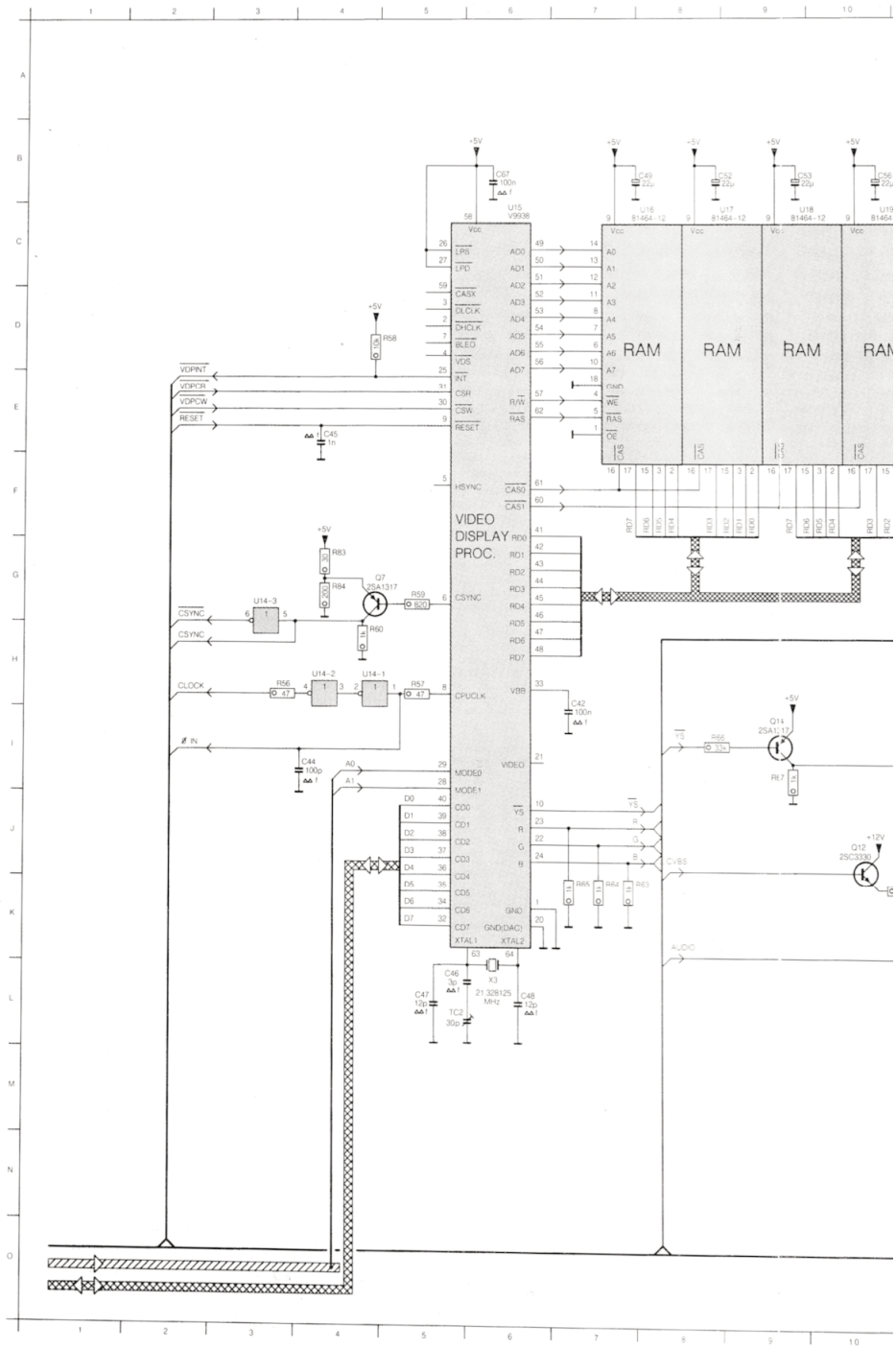

U1
Z80A
CPU
U7
ROM
+5V
C2
100n
C14
100n
R90
R88
R87
R85
R86
R89
R92
R91
47
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
A15
NMI
BUSRQ
HALT
BUSAK
OUT
R82
R2
R1
680
WAIT
RESET
C63
1n
EXINT
VDPINT
INT
MREQ
IORQ
RD
WR
M1
RFSH
VCC
CE
MSL
ROMCS
ROMCE
JP1
JP2
R97
1k
ST1
1) PRESENT IN /00
2) PRESENT IN /16
CS1
SLT3/3
MUX
RESET
RSEL


U2
M60003A
ROM CONTROL
ROW/ COLUMN ADRESS-- SELECTOR
MEMORY MAPPER
GATE ARRAY
RTC CONTROL
DISK DRIVE CONTROL
SEC. REGISTER SELECT
RAM
RAM
RAM
RAM
ROMCE
MSL
RD
WE
RAS
CAS1
CAS2
RTC-CS
RSEL
RESET
+5V
C3 100n
L2
C14 100n
C82 1n
C4 100p
C5 100p
C32 30p
X1 4MHz
X2 32.768kHz
TC1 30p
R6 1M
R49 15k
R50 1k
R48 4.7k
R47 1k
R46 10k
R44 2.2k
R45 10k
R51 100k
R52 100k
R53 100k
R54 100k
R55 100k
R101 100k
R102 100k
R103 100k
R104 100k
ADJ
Q5 2SA1317
Q6 2SA1317
Q4 2SC3330
BT1
ZD1 HZ3CLL 3.4V
U13 RP5C01
RTC & ALARM
ADDRESS DECODER
256x4bits RAM
C33 22µ
C15 220n
D1 MA165
R7 1k
R3 10k
R80 1k
FDC-CS
DTRQ
INTRQ
RDATA-0
FDC-CLK
FDC-ON
MOTOR-ON
SIDE-SL
RDATA-I
FDC-CLK
DS0
DS1
IN-USE
3) CHANGED TO 27 p FROM SERIAL NO. 007300930985 ON

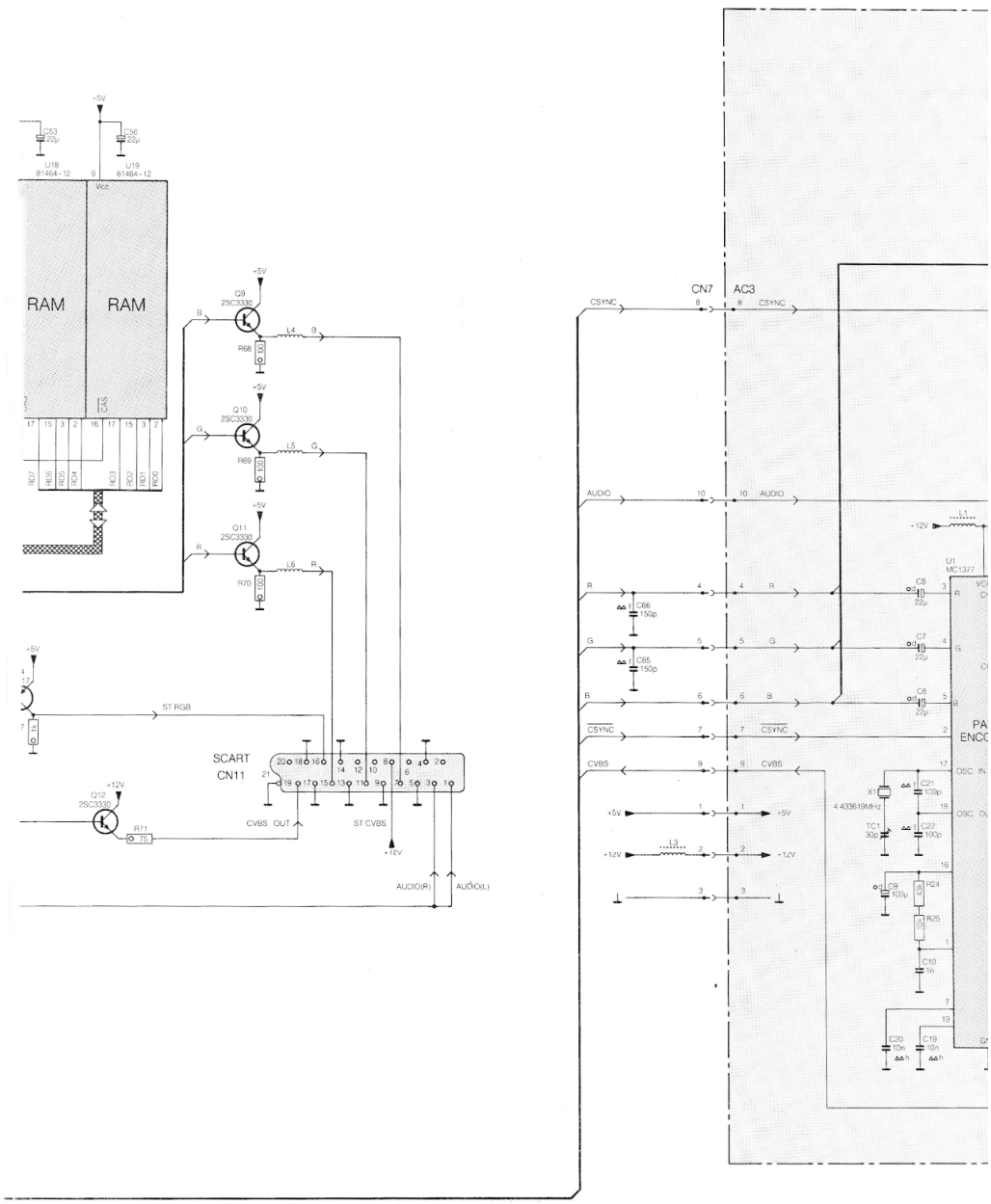


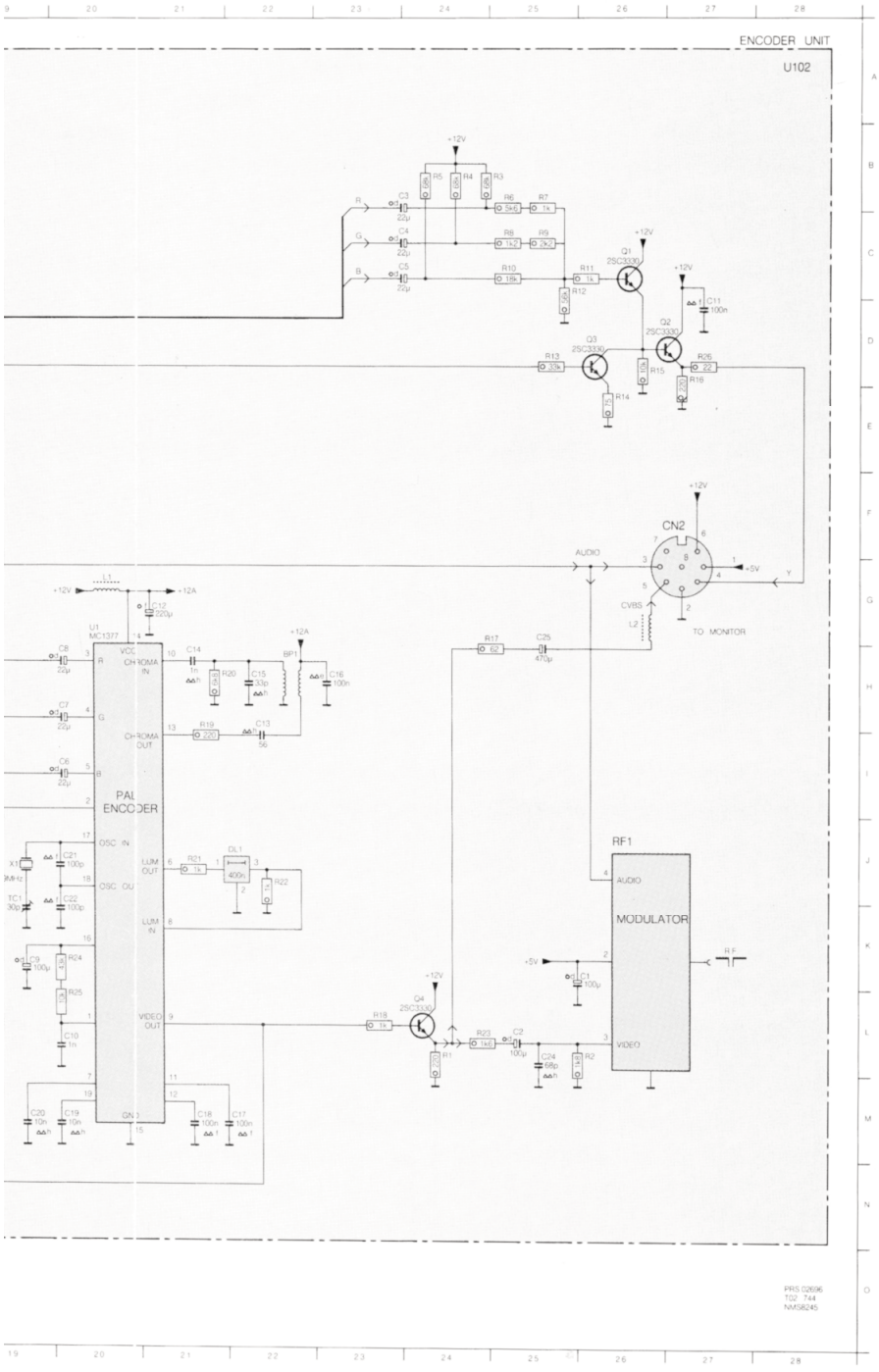
BT1	H18
C10	A20
C11	A20
C12	A19
C13	A19
C14	F10
C15	E22
C16	K23
C18	A24
C19	B24
C2	C 6
C20	B25
C3	A15
C32	L17
C33	G17
C4	K16
C5	L16
C6	A18
C62	J11
C63	K 5
C7	A18
C8	A17
C9	A17
CN3	C30
D1	E22
L2	A17
Q16	A26
Q4	G19
Q5	G16
Q6	F19
R1	J 5
R10	A26
R101	J15
R102	J15
R103	J15
R104	J16
R11	B27
R13	C28
R14	C27
R15	C28
R2	I 5
R3	H22
R4	H23
R44	G20
R45	H20
R46	G19
R47	G18
R48	H16
R49	G16
R5	J27
R50	H16
R51	J16
R52	K18
R53	K19
R54	K16
R55	K17
R6	K16
R7	E22
R8	B25
R80	K22
R81	L28
R82	I 4
R85	E 4
R86	E 4
R87	E 3
R88	E 3
R89	E 4
R9	B26
R90	E 3
R91	E 5
R92	E 5
R97	K 9
TC1	L18
U1	D 6
U10-1	G27
U10-2	G27
U10-3	H27
U10-4	I 27
U10-5	L27
U10-6	L28
U13	G17
U2	A12
U3	B17
U4	B16
U5	B19
U6	B18
U7	F 9
U8	A23
U9-1	D26
U9-2	D27
U9-3	D26
U9-4	D27
U9-5	E26
U9-6	E27
VD1	B25
VR1	L25
VR2	B27
X1	K15
X2	K17
ZD1	H16

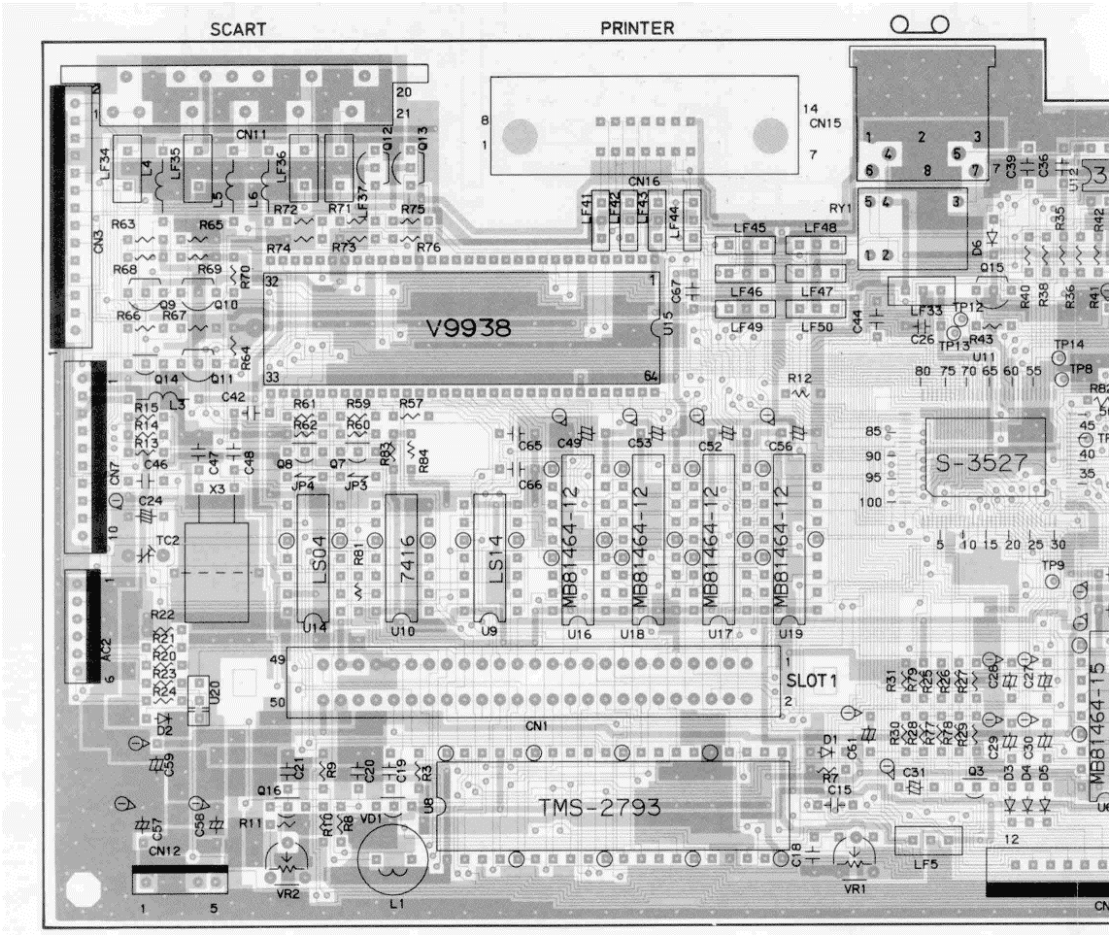
CS 11 837

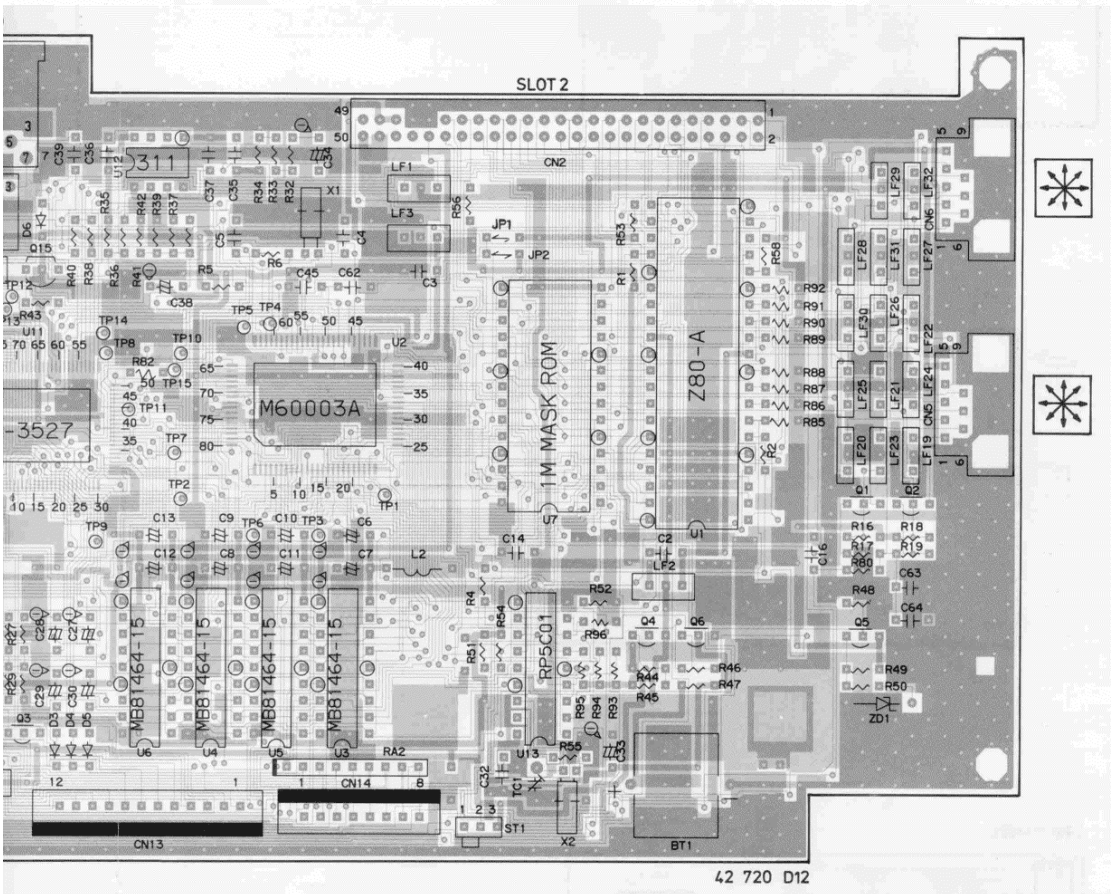

VIDEO
DISPLAY
PROC.
RAM
RAM
RAM
RAM
U15
V9938
U16
81464-12
U17
81464-12
U18
81464-12
U19
81464
+5V
+12V
VDPINT
VDPCR
VDPCW
RESET
HSYNC
CSYNC
CSYNC
CLOCK
Ø IN
CPUCLK
VDB
VIDEO
MODE0
MODE1
CSR
CSW
R/W
RAS
CAS0
CAS1
CSYNC
GND(DAC)
XTAL1
XTAL2
X3
21.328125
MHz
Q7
2SA1317
Q14
2SA1317
Q12
2SC3331
CVBS
AUDIO
C57
100n
C45
1n
C42
100n
C44
100p
C46
3p
C47
12p
TC2
30p
C48
12p
C49
22µ
C52
22µ
C53
22µ
C56
22µ
R58
1.5k
R83
200
R84
200
R59
820
R60
1k
R56
47
R57
47
R66
33k
R67
1k
R65
1k
R64
1k
R63
1k
U14-1
U14-2
U14-3

CS 11 838

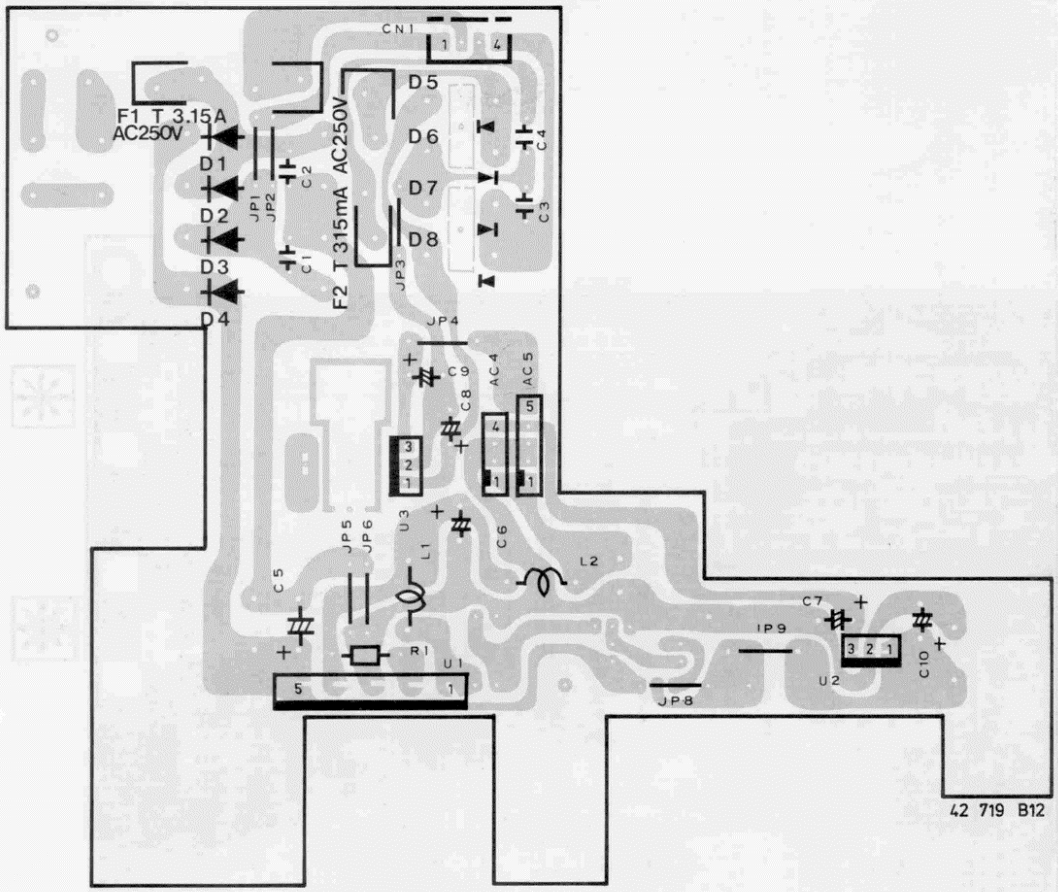

RAM
RAM
U18
81464-12
U19
81464-12
C53
22µ
C56
22µ
+5V
Vcc
CAS
Q9
2SC3330
Q10
2SC3330
Q11
2SC3330
R68
150
R69
150
R70
150
L4
L5
L6
R
G
B
ST.RGB
R71
75
Q12
2SC3330
+12V
SCART
CN11
CVBS OUT
ST.CVBS
AUDIO(R)
AUDIO(L)
CN7
AC3
CSYNC
AUDIO
CVBS
C66
150p
C65
150p
C8
22µ
C7
22µ
C6
22µ
L1
U1
MC13777
X1
4.433619MHz
TC1
30p
C21
100p
C22
100p
C9
100µ
R24
1k
R25
1k
C10
1n
C20
10n
C19
10n



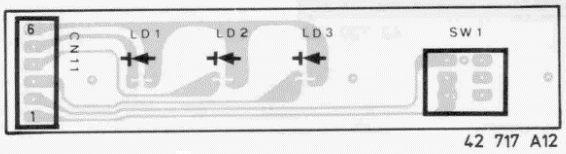

SCART
PRINTER
V9938
S-3527
TMS-2793
SLOT 1
CN1
CN11
CN15
CN16
CN12
CN7
CN3
CN4
MB81464-12
MB81464-15
LS04
7416
LS14
VR1
VR2
L1


SLOT 2
CN2
CN13
CN14
M60003A
1M MASK ROM
Z80-A
RP5C01
MB81464-15
BT1
X2
ST1
42 720 D12

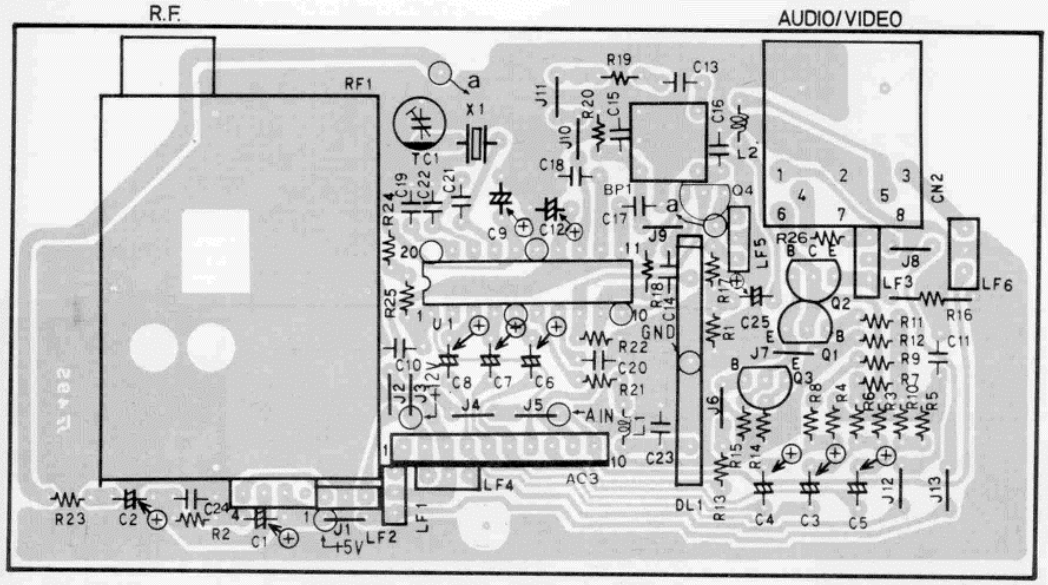
POWER SUPPLY



LED PANEL



PAL ENCODER



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MAIN PRINTED BOARD

U100	Main printed board /00/16 [1])	4822 219 81089

U1	Z80A	4822 209 10569
U2	M60003A	4822 209 71325
U3	81464-12	4822 209 83426
U4	81464-12	4822 209 83426
U5	81464-12	4822 209 83426
U6	81464-12	4822 209 83426
U7	ROM/00/16	4822 209 72581
U8	2793	4822 209 11146
U9	74LS14	5322 209 85199
U10	7416	5322 209 84035
U11	S-3527	4822 209 11097
U12	UPC311	5322 209 85503
U13	RP5C01	4822 209 83431
U14	74LS04	5322 209 81625
U15	V9938	4822 209 83425
U16	81464-12	4822 209 83426
U17	81464-12	4822 209 83426
U18	81464-12	4822 209 83426
U19	81464-12	4822 209 83426
U20	MN1280	4822 209 83414

RA2	8x4k7	4822 116 90191
VR1	50 k Trimmer	4822 100 11106
VR2	10 k Trimmer	4822 100 11105

Q1-Q4	2SC3330	4822 130 60945
Q5-Q7	2SA1317	4822 130 60944
Q9-Q12	2SC3330	4822 130 60945
Q14	2SA1317	4822 130 60944
Q15	2SA720A	4822 209 11045
Q16	2SA1317	4822 130 60944

D1-D6	MA165	4822 130 32362
ZD1	HZ3CLL	4822 130 33009
VD1	Vari. cap SVC203-M	4822 125 11009

C6 ,C9 C10,C13	Tantal	22 µF 16 V	4822 124 10527
C15	Mylar	220 nF 50 V	4822 121 42931
C19	Mylar	10 nF 50 V	4822 121 90038
C35,C39	Mylar	22 nF 50 V	4822 121 42417
C37,C64	Mylar	3n3 50 V	4822 121 42784
C49,C52 C,53,C56	Tantal	22 µF 16 V	4822 124 10527
TC1,TC2	Trimmer	30 pF	4822 125 50299

VARIOUS

X1	4 MHz	4822 242 72073
X2	32.768 kHz	4822 242 71345
X3	21.328125 MHz	4822 242 71347
BT1	NI-CD accumulator	4822 138 10235
RY1	Relay	4822 280 60514
ST1	Service jumper	4822 276 11572

1) Install jumper JP2 and remove jumper JP1 for /16 version.

POWER SUPPLY

U...		
U101	Power supply board	4822 219 81091
U1	STR2005	4822 209 70871
U2	UPC7812HF	4822 209 72579
U3	MC7812CT	4822 209 81726
D1–D4	S2V–10	4822 130 32814
D5–D8	MPG06G	4822 130 80631
L1	Coil	4822 157 52805
L2	180 µ	4822 157 53326

LED PANEL

U...		
U103	Complete LED panel	4822 219 81118
LD1	LED yellow	4822 130 32984
LD2	LED green	4822 130 32983
LD3	LED green	4822 130 32983

VARIOUS

SW1	Reset switch	4822 277 10862
	Reset knob	4822 410 24402

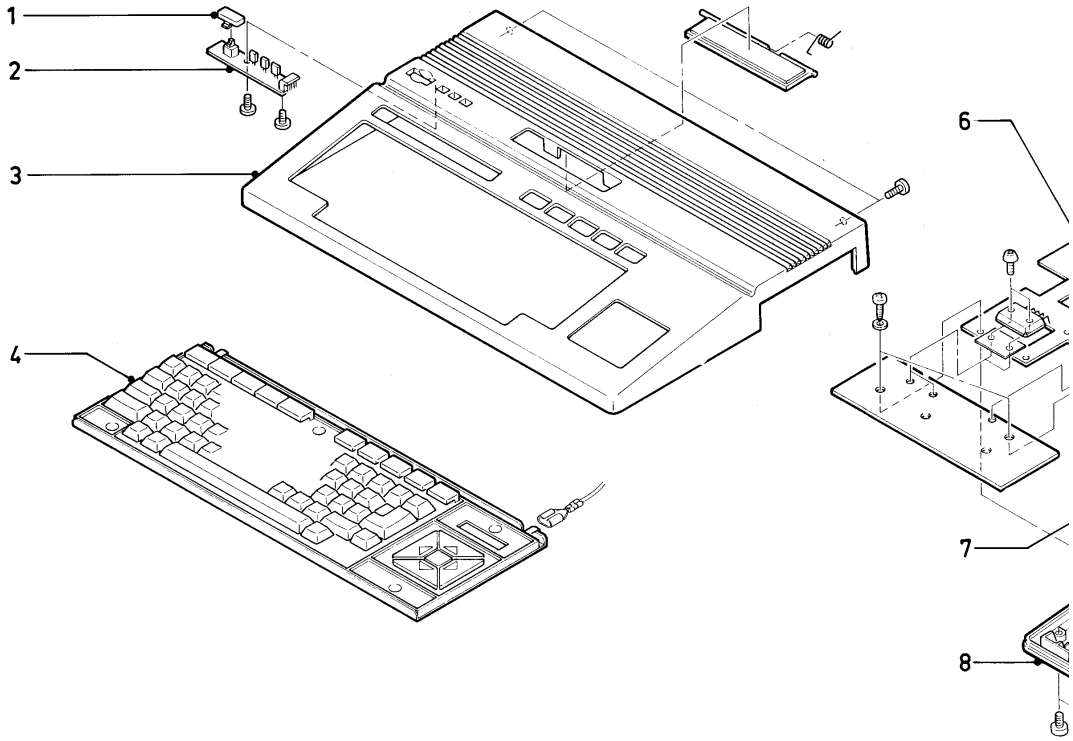
U...		
U102	Encoder unit	4822 219 81092
IC1	MC1377	4822 209 71415
Q1-Q4	2SC3330	4822 130 60945
R24	43k 1%	4822 111 41359
R25	10k 1%	4822 111 41358
C10	1nF 50 V film	4822 121 42945
TC1	30pF trimmer	4822 125 50299

VARIOUS

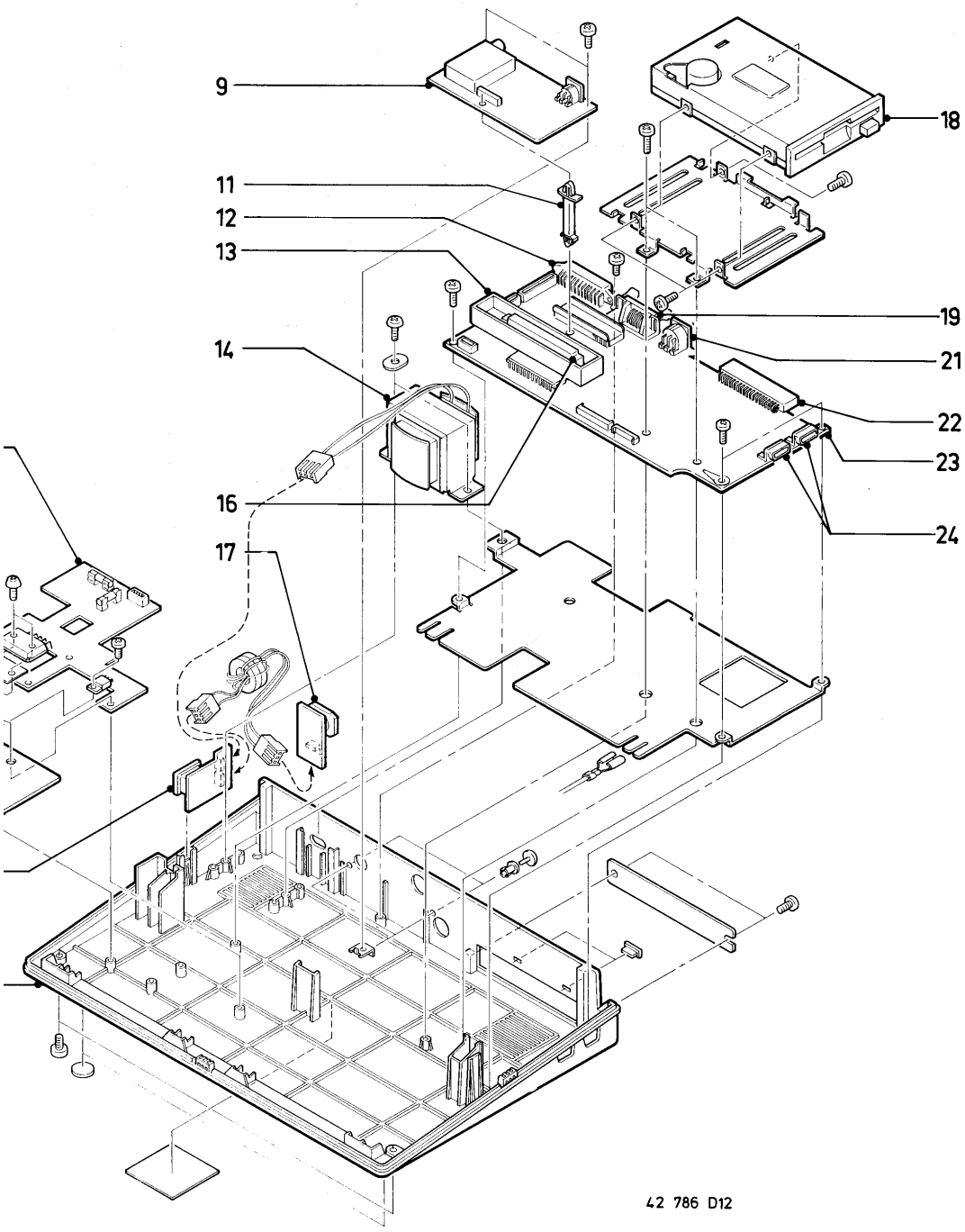
BP1	Transformer	4822 157 53332
DL1	Delay 400 nS	4822 157 53327
X1	4.433619 MHz	4822 242 72074
	Modulator	4822 212 10215
CN2	Monitor connector	4822 267 50711

FLOPPY DISK DRIVE

U...		
U104	Floppy disk drive	4822 212 22883



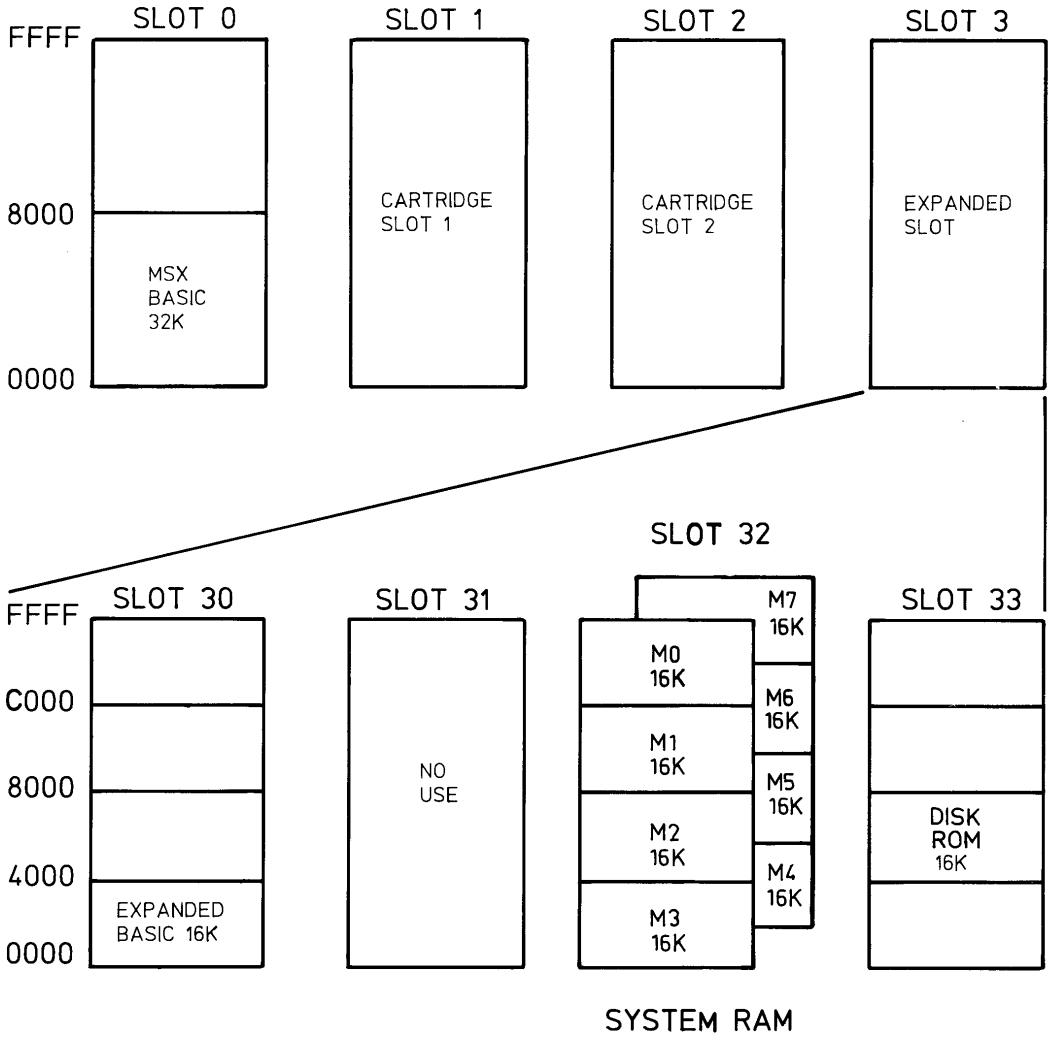
CS 11 842


9
18
11
12
13
19
14
21
22
23
16
24
17
42 786 D12

MECHANICAL PARTS LIST

1	4822 410 24402	Reset Knob
2	4822 219 81118	LED panel
3	4822 432 10643	Cabinet top case
4	4822 219 81088	Keyboard /00
	4822 219 81093	Keyboard /16
6	4822 219 81091	Power supply
7	4822 276 12322	Mains switch
8	4822 432 10644	Cabinet bottom case
9	4822 219 81092	Encoder unit
11	4822 404 60413	PCB support
12	4822 267 50604	SCART connector
13	4822 404 60412	Slot guide
14	4822 146 30646	Transformer
16	4822 267 60167	Connector (50p)
17	4822 265 20264	AC inlet
18	4822 212 22883	Floppy drive
19	4822 267 50709	Printer connector
21	4822 267 50711	Recorder connector
22	4822 267 70168	Connector (50p)
23	4822 219 81089	Main panel/00/16
24	4822 267 30915	Joystick connector

MEMORY LAY-OUT



SYSTEM RAM

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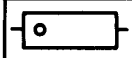
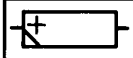
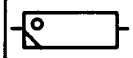
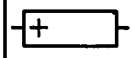
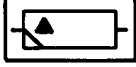
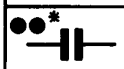
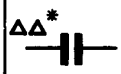
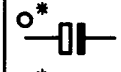
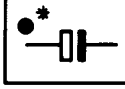
SYMBOLS USED IN CIRCUIT DIAGRAMS

SYMBOL	TYPE	$t_{P\ amb}^{70°}$	TOLERANCE	SERIES
	SFR16T	0.5	1E - 3M 5%	E24
	SFR25H	0.5	1E - 10M 5%	E24
	MRS25	0.6	1E - 1M 1%	E24
	MR30	0.5	1E - 1M 1% (2%)	E24
	VR37	0.5	220K - 33M 5%	E24
	PR37	1.6	1E - 1M 5%	E24
	VR68	1	100K - 68M 5%	E24
	MRS 16T	0.4	10R – 100K	E24/E96

SYMBOL	TYPE	VOLTAGE DC	TOLERANCE
	POLYESTER FLATFOIL	SEE NOTE	10%
	PLATE CERAMIC	SEE NOTE	DEPENDING ON CAPACITY
	ELCO MINIATURE SINGLE	SEE NOTE	-10+50%
	ELCO SINGLE ENDED	SEE NOTE	±20%

NOTE:

*

	f = 25V	q = 200V	x = 1000V	E = 20V
	g = 40V	r = 250V	z = 1600V	F = 35V
a = 2.5V	h = 63V	s = 300V	A = 1.6V	G = 50V
b = 4V	j = 100V	t = 350V	B = 6V	H = 75V
c = 6.3V	l = 125V	u = 400V	C = 12V	I = 80V
d = 10V	m = 150V	v = 500V	D = 15V	
e = 16V	n = 160V	w = 630V		

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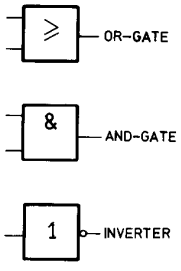

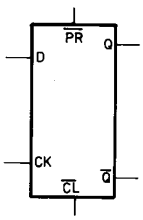

FLIP FLOP