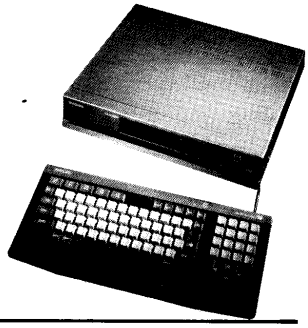
Home computer

NMS8250/00/16/19

NMS8255/00/16/19

Service
Service
Service



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 AZERTY/19
Power supply voltage	: 220V ± 10%, 50Hz

(NL) SPECIFICATIE

Microprocessor	: Z80A
Geheugen	: 48k ROM 16k disk ROM 128k video RAM 128k gebruikers RAM
Videoprocessor	: 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 AZERTY/19
Voedingsspanning	: 220V ± 10%, 50Hz

(F) CARACTERISTIQUES TECHNIQUES

Micro processeur	: Z80A
Mémoire	: 48k ROM 16k ROM à disque 128k RAM vidéo 128k RAM utilisateur
Processeur vidéo	: V9938
Controle 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 AZERTY/19
Tension d'alimentation	: 220V ± 10%, 50Hz

(D) TECHNISCHE DATEN

Mikroprozessor	: Z80A
Speicher	: 48k ROM 16k Disk-ROM 128k Video-RAM 128k Gebrauchers-RAM
Videoprozessor	: V9938
MSX-Steuereinheit	: 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 AZERTY/19
Versorgungsspannung	: 220V ± 10%, 50 Hz

(I) DATA TECNICI

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 connetori per cartuccia
Tastiera	: QWERTY /00/16 AZERTY/19
Tensione d'aliment.	: 220V ± 10%, 50 Hz

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

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CS 7 567

(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.

ALIGNMENTS

RTC clock frequency

- Connect a frequency meter via a 10:1 probe to test point TP107 and connect the mass terminal of the probe with test point TP111.
- Set the frequency on TP107 to 32.768 kHz by means of VC101.

Analogue unit

1. Frequency

- Connect a frequency meter via a 10:1 probe to test point TP303 and connect the mass terminal of the probe with test point TP302.
- Using VC301, set the frequency on TP303 to 4.433619 MHz.

2. Burst

- Connect an oscilloscope via a 10:1 probe to test point TP301 and connect the mass terminal of the probe with test point TP302.
- Using VR301, set the time T2 of the burst signal (see figure 1) to 2.5 - 3 µs.
  T1 and T2 should then be 0.2 – 0.3 µs.

FDC

1. Read-pulse width

- Connect TP108 with TP109.
- Connect an oscilloscope via a 10:1 probe with TP106 and connect the mass terminal of the probe with TP109.
- Adjust the pulse width on TP108 for 0.5 µs by means of VR102, see figure 2.
- Interrupt the connection between TP108 and TP109.

2. VCO frequency

- Connect a frequency meter via a 10:1 probe to TP102 and connect the mass terminal of the probe with TP109.
- Switch the computer on.
- Connect TP108 with TP109.
- Using VR104, set the frequency on TP102 to 250 kHz.
- Interrupt the connection between TP108 and TP109.

Floppy Disk Drive

1. Required measuring equipment

- Dual trace oscilloscope, for example PM3211.
- Alignment disk, code nummer 4822 395 30274.
- FDD test cartridge, code number 4822 397 30135.

2. Use of the FDD test cartridge

- Switch the computer off and insert the FDD cartridge.
- Switch the computer on again.
- After start-up type: Poke&HFD9F,&HC9.
- 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 TPN (for a survey of the test points, see figure 3.)
- Connect channel B via a 10:1 probe with test point TPP.
- Connect the mass terminal of the probe with GND.
- Oscilloscope alignments
  - Trigger externally with the index signal (IC140 pin 13 in the computer)
  - 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 continuously track 40, side 0 (with <F3>).
- Check that the cat's eye pattern (see figure 4) 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 3) of the stepping motor a quarter turn.
- Read track 40, side 0 continuously (with <F3>).
- Rotate the stepping motor (by means of a screwdriver in alignment point B, see fig. 3) 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 continuously (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 continuously (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

- Carry out point A of the radial alignment, however with the sensitivity of the time base at 5 µs/div.
- Place the alignment disk in the drive and read continuously 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, adjust the track 00 sensor until the 62.5 KHz signal will be visible.
- 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 TPT and ground.
- 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:
  - 4.5V on track 00
  - 4.5V on track 01
  - 0 V on track 02
- If the measured values do not correspond with the values given above, decrease the track number by 1 to track 01.
- Adjust the track 00 sensor until the voltage across the sensor is 4.5 V at track 01.
- Check the voltages across the sensor at track 00, track 01 and track 02.
- Step to track 02 and lower the track number to track 00. Meanwhile check the voltage across the track 00 sensor at track 02, track 01 and track 00.

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 in the drive and read continuously 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 TPN.
- Connect channel B via a 10:1 probe with the index signal (IC140 pin 13 in the computer).
- Connect the mass terminal of the probe, connected to channel A, with GND.
- Oscilloscope alignments:
  - Trigger on channel B.
  - Sensitivity time base: 0.1 ms/div.
  - Sensitivity channel A: 2mV/div.
  - Sensitivity channel B: 0.2V/div.
- Insert the alignment disk in the floppy drive and read track 40, side 0 continuously (with <F3>).
- Adjust VR2 for a period time T (see figure 6) of 400 ± 200 µs.

7. Side 1

- Check alignments 3 to 6 for side 1.

(NL)

WAARSCHUWING

1. Het uitwisselen van cartridges dient plaats te vinden bij een uitgeschakeld apparaat.

2. ESD

Alle IC's en vele andere halfgeleiders zijn gevoelig voor elektrostatische ontladingen (ESD). Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen. Zorg ervoor, dat u tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat. Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.

INSTELLINGEN

RTC klokfrequentie

- Sluit via een 10:1 probe een frequentiemeter aan op testpunt TP107 en verbindt de massa van de probe met testpunt TP111.
- Regel de frequentie op TP107 af op 32,768 kHz door middel van VC101.

Analoge unit

1. Frequentie

- Sluit via een 10:1 probe een frequentiemeter aan op testpunt TP303 en verbindt de massa van de probe met testpunt TP302.
- Regel de frequentie op TP303 af op 4,433619 MHz door middel van VC301.

2. Burst

- Sluit via een 10:1 probe een oscilloscoop aan op testpunt TP301 en verbindt de massa van de probe met testpunt TP302.
- Regel de tijd T2 van het burst-signaal (zie fig. 1) af op 2,5 - 3 µs, door middel van VR301.
  T1 en T2 moeten dan 0,2 - 0,3 µs zijn.

FDC

1. Read-puls breedte

- Verbindt TP108 met TP109.
- Sluit via een 10:1 probe een oscilloscoop aan op TP106 en verbindt de massa van de probe met TP109.
- Regel de pulsbreedte op TP108 af op 0,5 µs door middel van VR102, zie figuur 2.
- Onderbreek de verbinding tussen TP108 en TP109.

2. VCO frequentie

- Sluit via een 10:1 probe een frequencymeter aan op TP102 en verbindt de massa van de probe met TP109.
- Schakel de computer in.
- Verbindt TP108 met TP109.
- Regel de frequentie op TP102 af op 250 kHz door middel van VR104.
- Onderbreek de verbinding tussen TP108 en TP109.

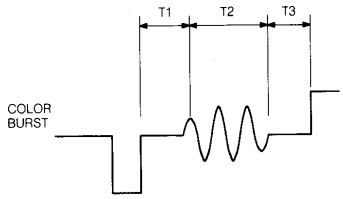


Fig. 1

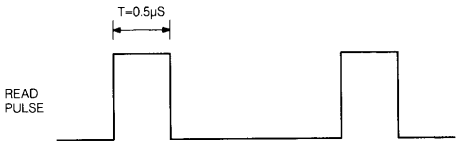


Fig. 2

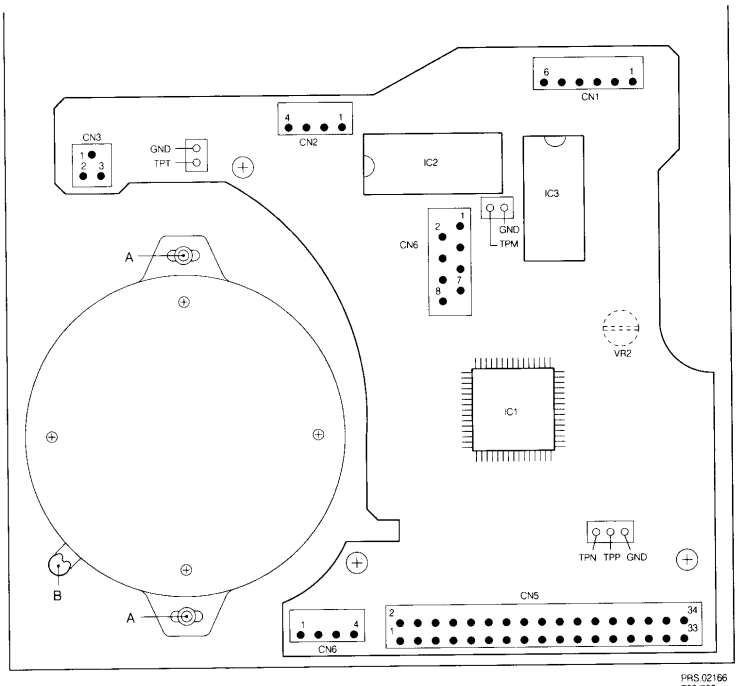


Fig. 3

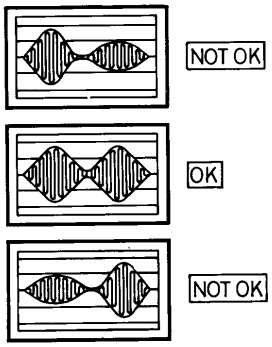
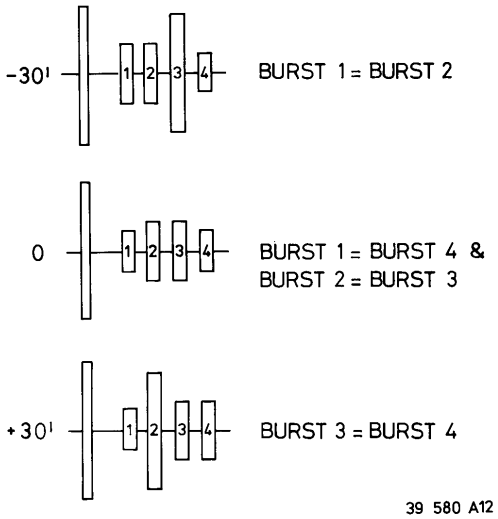


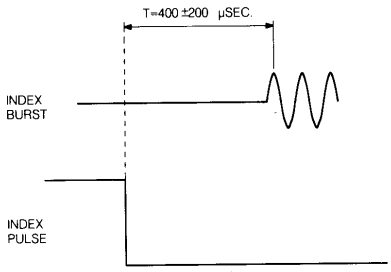
Fig. 4

39 578 A12



39 580 A12

Fig. 5



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T02/706

Fig. 6

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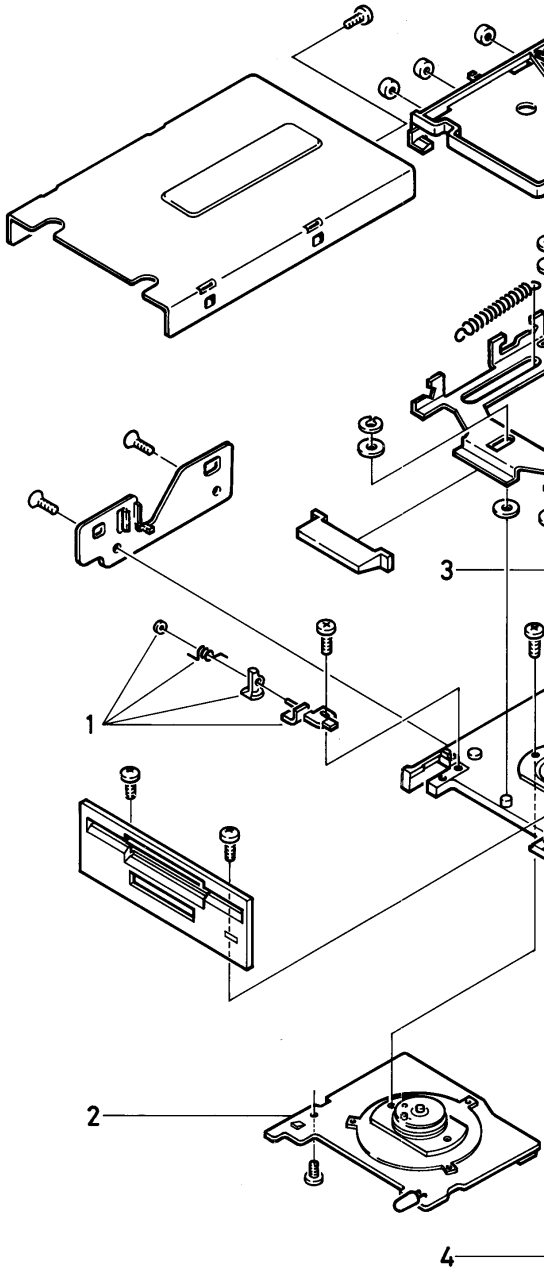
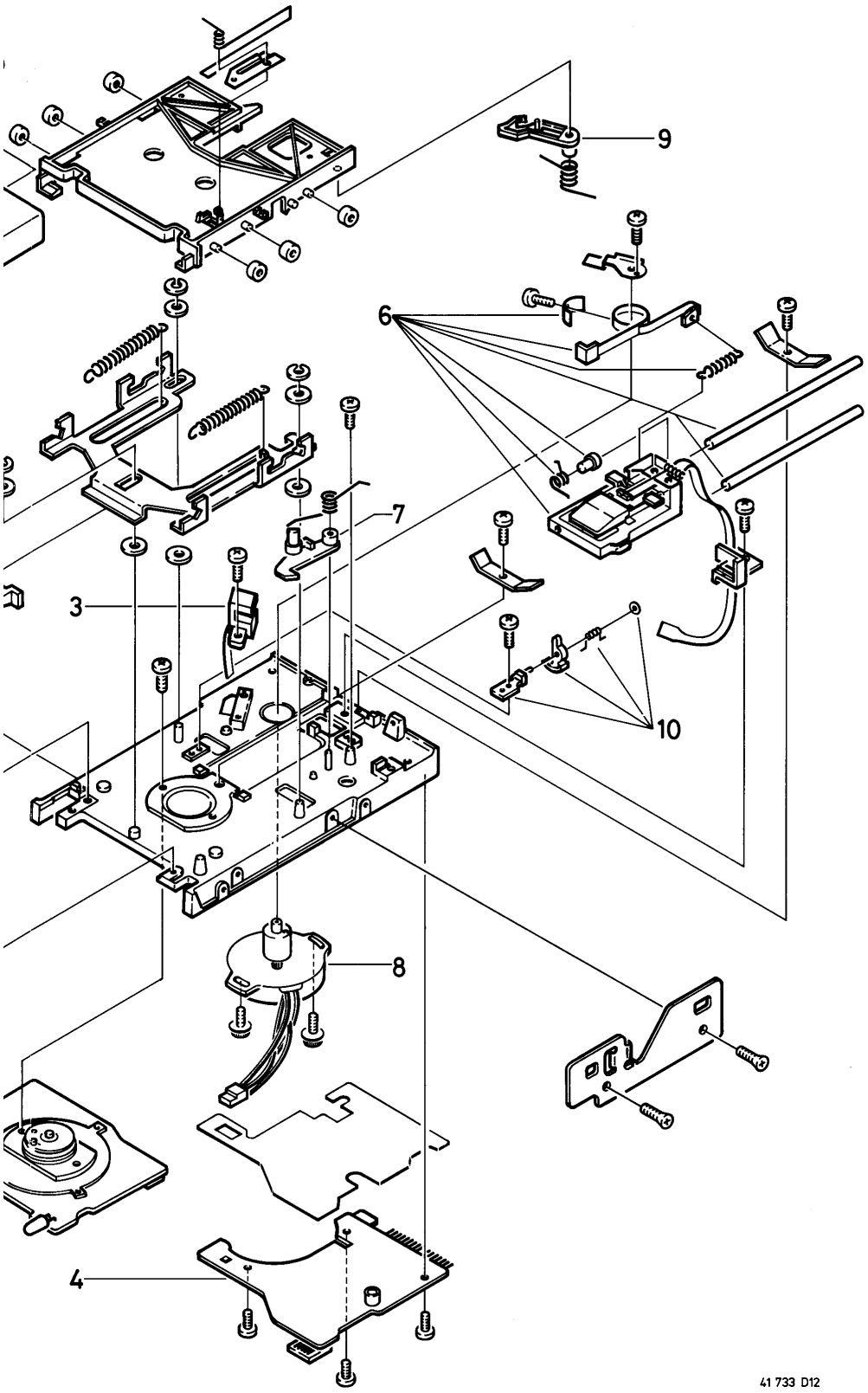
EXPLODED VIEW FDD

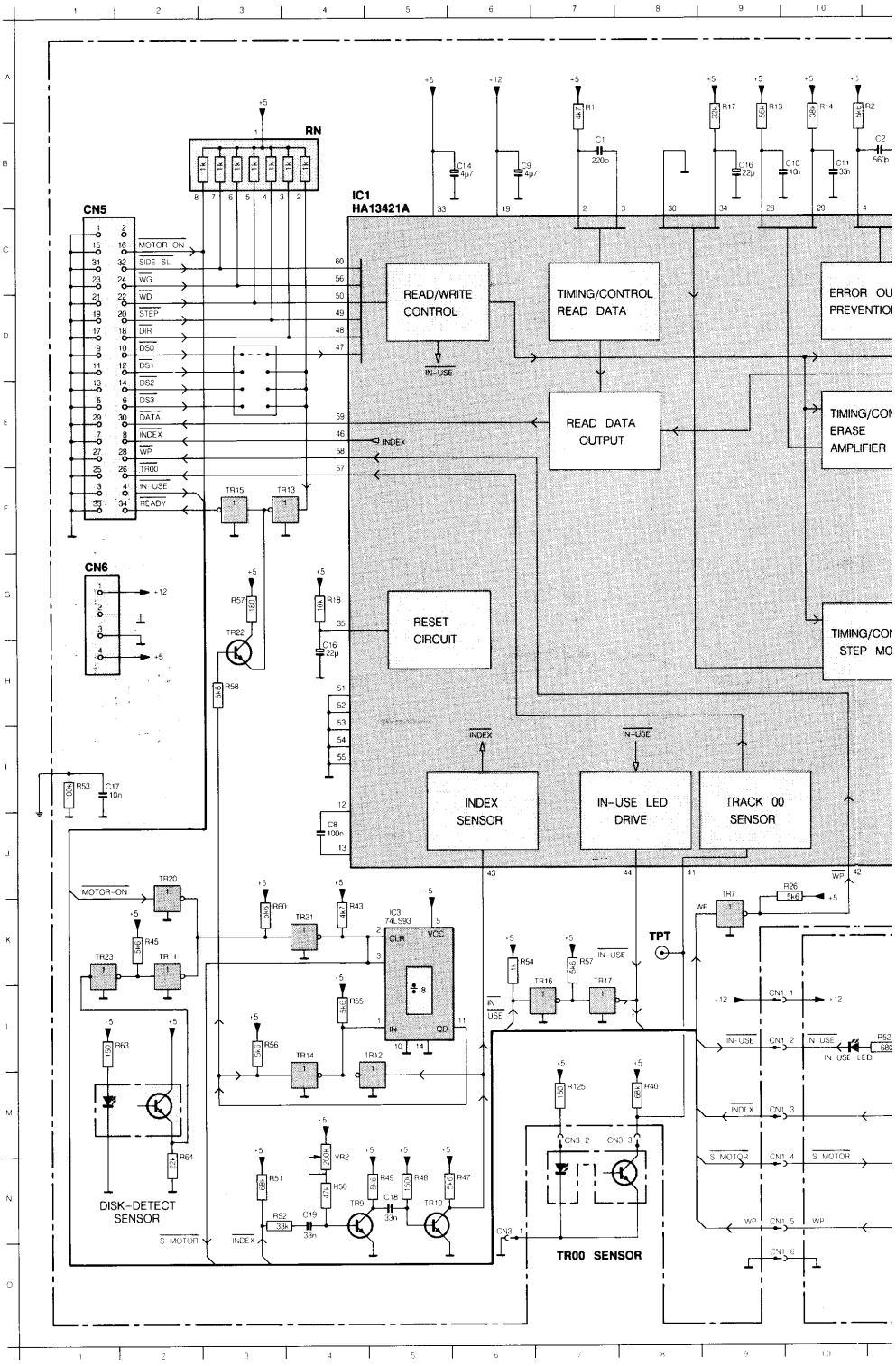


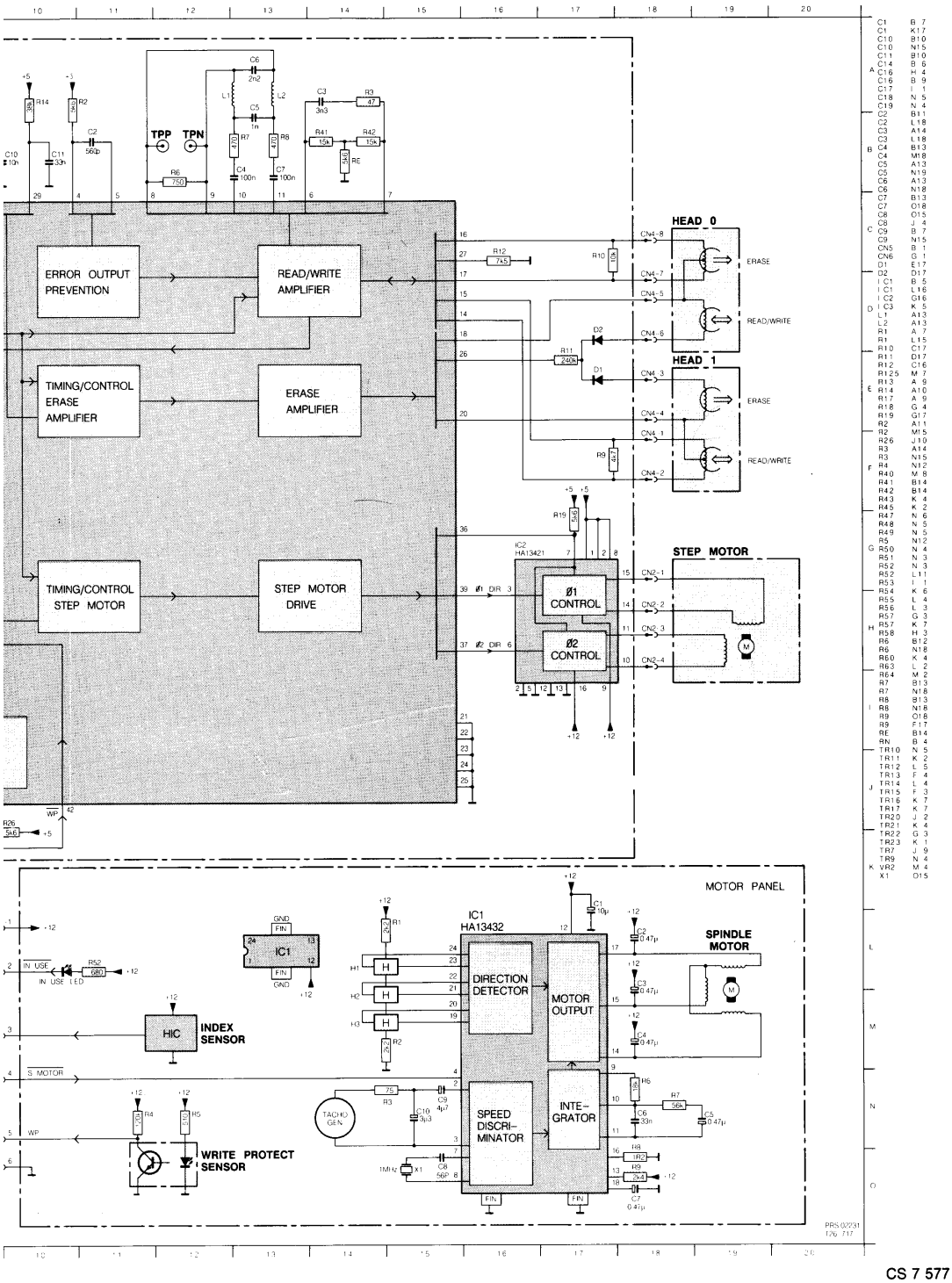
FDD PARTS LIST

1	4822 277 10978	Write protect switch assy
2	4822 212 22744	Spindle motor + PCB
3	4822 130 10011	Track 00 sensor
4	4822 212 22743	Complete printed board
6	4822 693 91126	Carriage assy
7	4822 404 60382	Eject hook bracket
8	4822 361 30236	Stepper motor
9	4822 404 60381	Eject bracket
10	4822 277 10979	Disk detect switch assy


9
6
7
3
10
8
4
41 733 D12

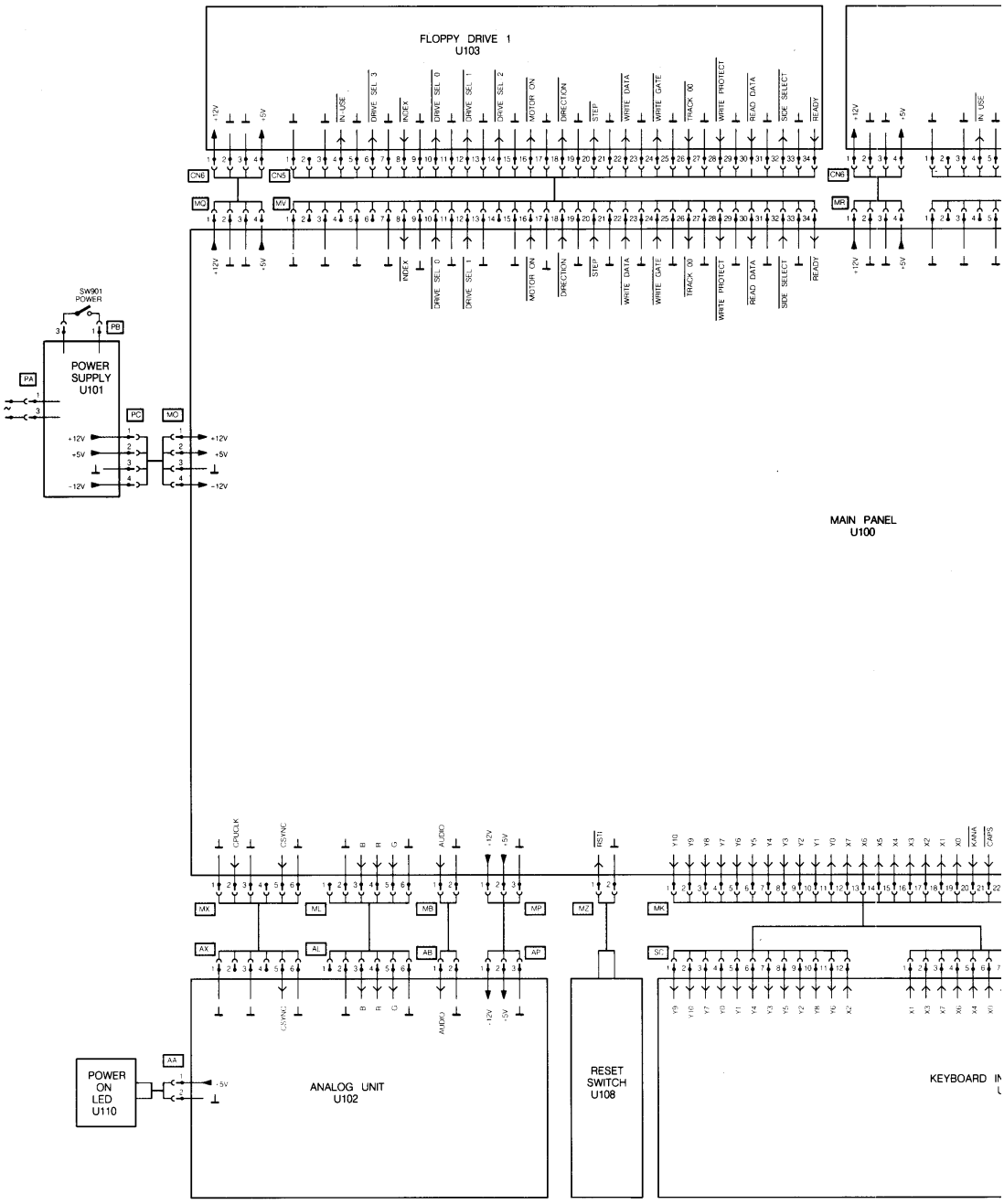
ELECTRICAL DIAGRAM FDD

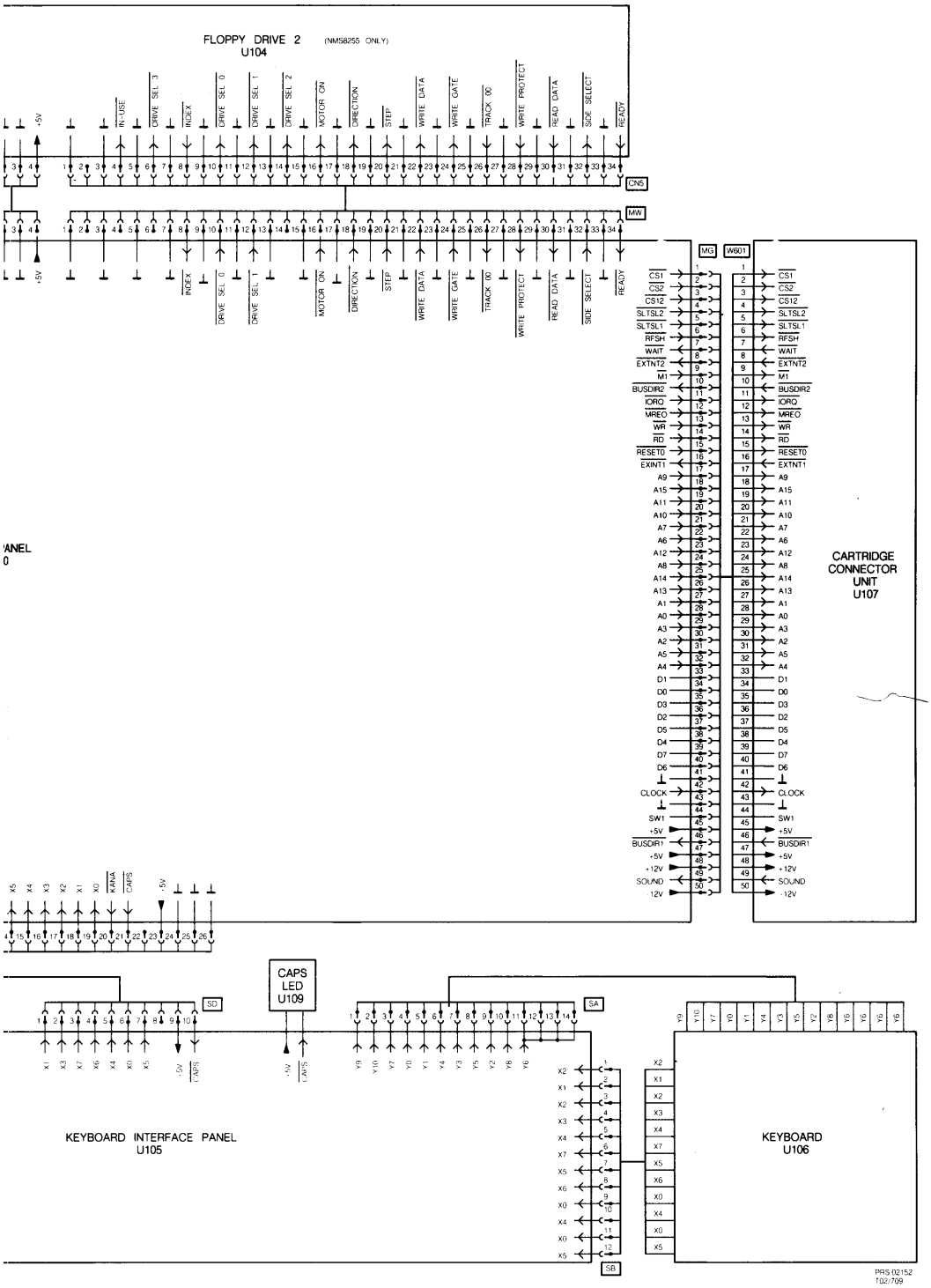



ERROR OUTPUT PREVENTION
READ/WRITE AMPLIFIER
TIMING/CONTROL ERASE AMPLIFIER
ERASE AMPLIFIER
TIMING/CONTROL STEP MOTOR
STEP MOTOR DRIVE
HEAD 0
HEAD 1
ERASE
READ/WRITE
STEP MOTOR
Ø1 CONTROL
Ø2 CONTROL
MOTOR PANEL
IC1 HA13432
DIRECTION DETECTOR
MOTOR OUTPUT
SPEED DISCRI-MINATOR
INTE-GRATOR
SPINDLE MOTOR
HIC
INDEX SENSOR
WRITE PROTECT SENSOR
TACHO GEN

CS 7 577

WIRING DIAGRAM

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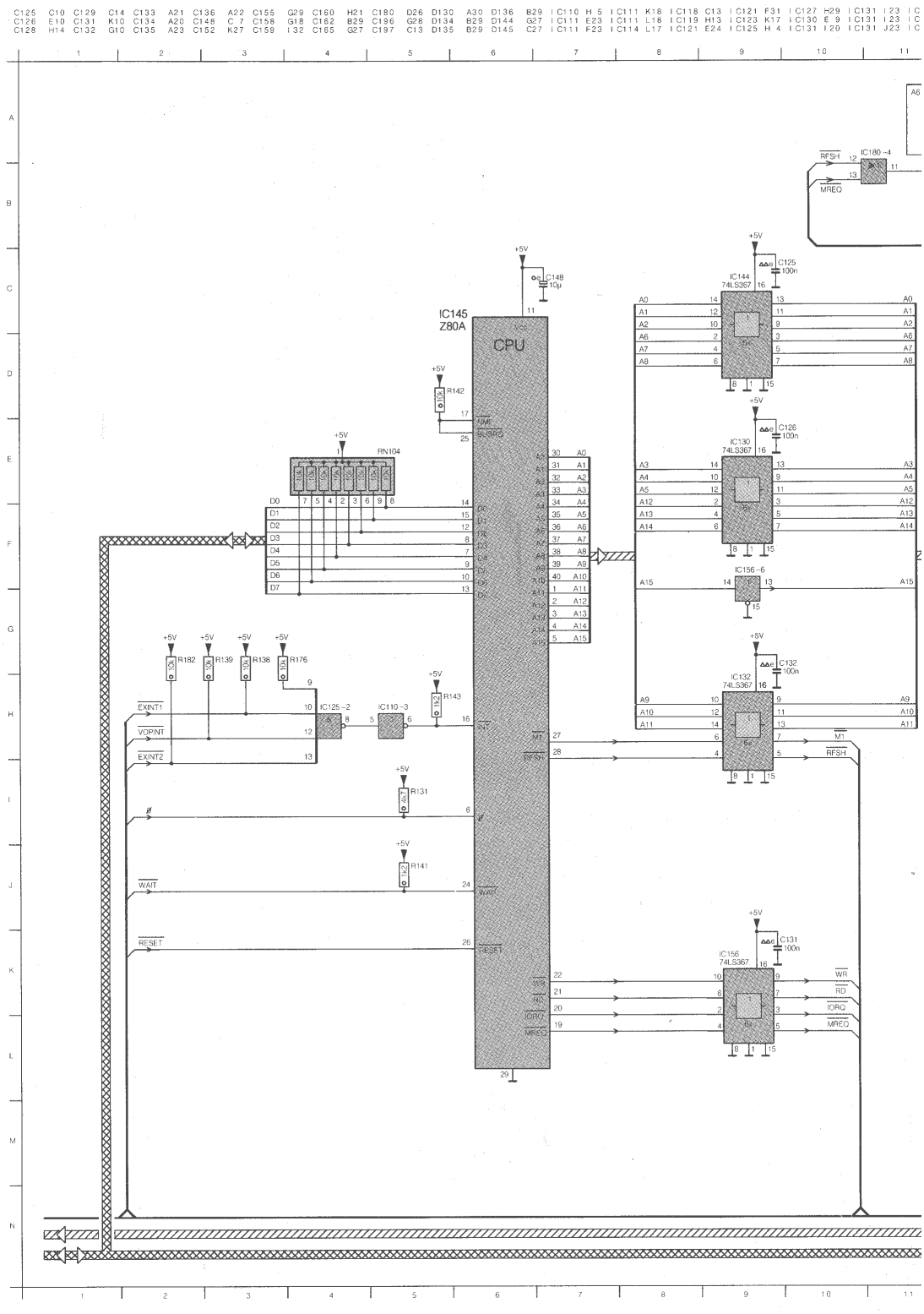
U104
(NMS8255 ONLY)
CN5
MW
MG
W601
CARTRIDGE
CONNECTOR
UNIT
U107
CAPS
LED
U109
SD
SA
SB
KEYBOARD INTERFACE PANEL
U105
KEYBOARD
U106
PRS 02152
702/709


IC145
Z80A
CPU
+5V
C148
10µ
R142
10k
RN104
10k
D0
D1
D2
D3
D4
D5
D6
D7
IC144
74LS367
IC130
74LS367
IC156-6
IC132
74LS367
IC156
74LS367
C125
100n
C126
100n
C132
100n
C131
100n
IC180-4
RFSH
MREQ
R182
R139
R138
R176
10k
EXINT1
VDPINT
EXINT2
IC125-2
IC110-3
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4k7
R141
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RESET
M1
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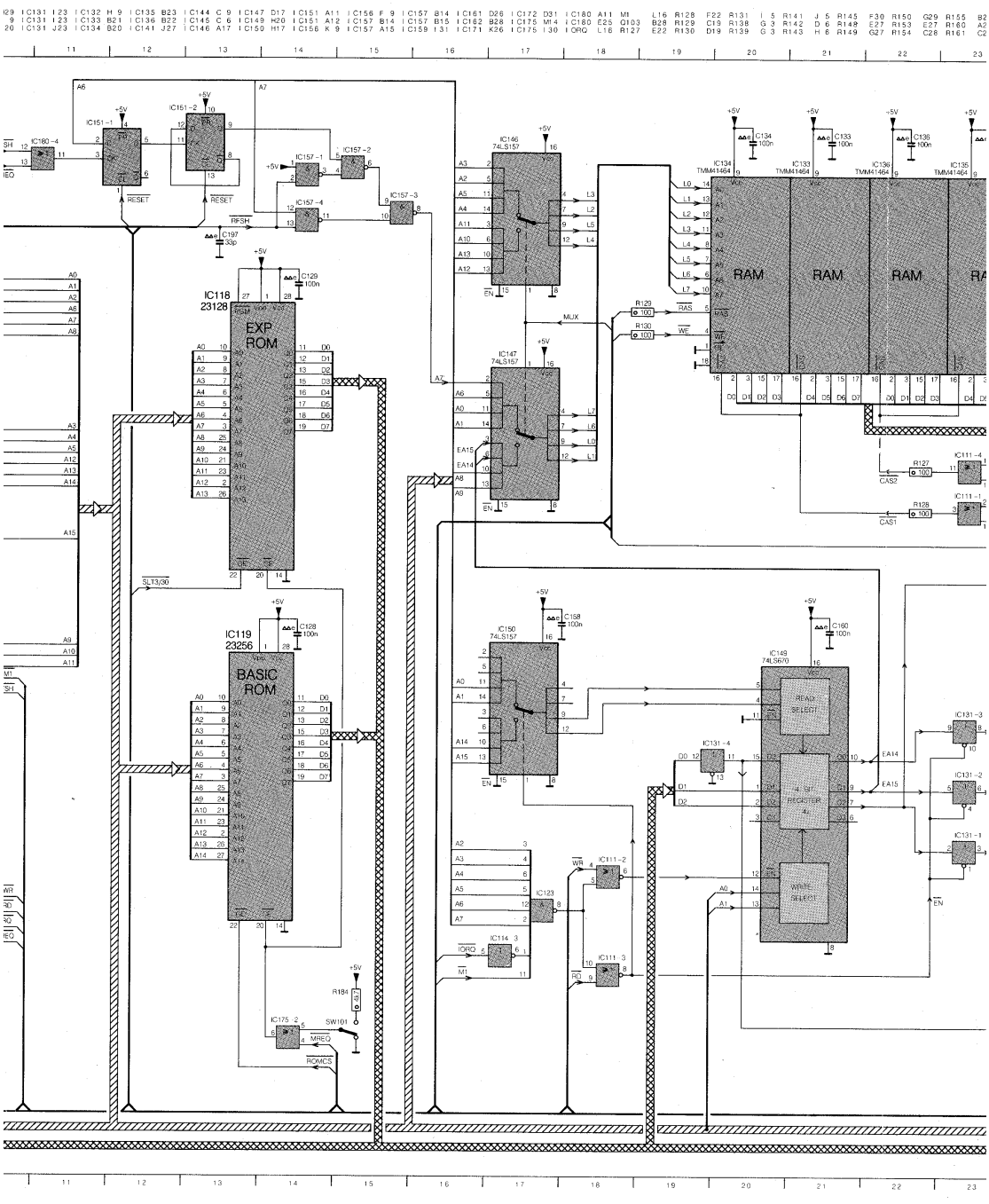
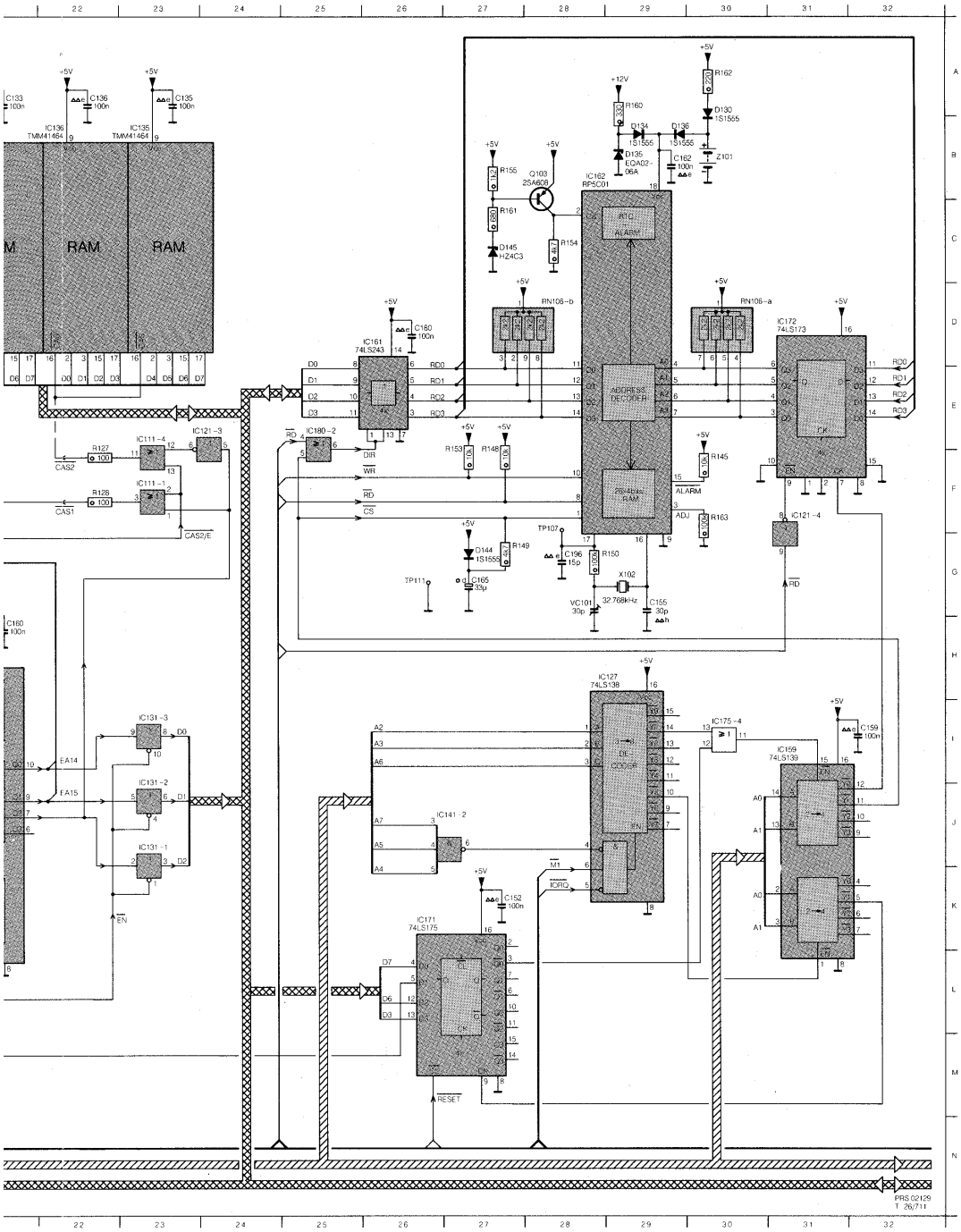
WR
RD
IORQ
MREQ


IC118
23128
EXP ROM
IC119
23256
BASIC ROM
IC146
74LS157
IC147
74LS157
IC150
74LS157
IC149
74LS670
READ SELECT
4 OF REGISTER 4
WRITE SELECT
RAM
RAM
RAM
IC134
TMM41464
IC133
TMM41464
IC136
TMM41464
IC135
TMM41464
MUX
RAS
WE
CAS2
CAS1
RESET
RFSH
SW101
MREQ
ROMCS
SL13/30
EA14
EA15

R145 F30 R150 G29 R155 B27 R162 A30 R182 G 2 RN104 E 5 VC101 G28 Z101 B30
R148 E27 R153 E27 R160 A29 R163 F30 R184 L15 RN105 D28 WR K18
R149 G27 R154 C28 R161 C27 R176 G 4 RD L18 RN106 D30 X102 G29



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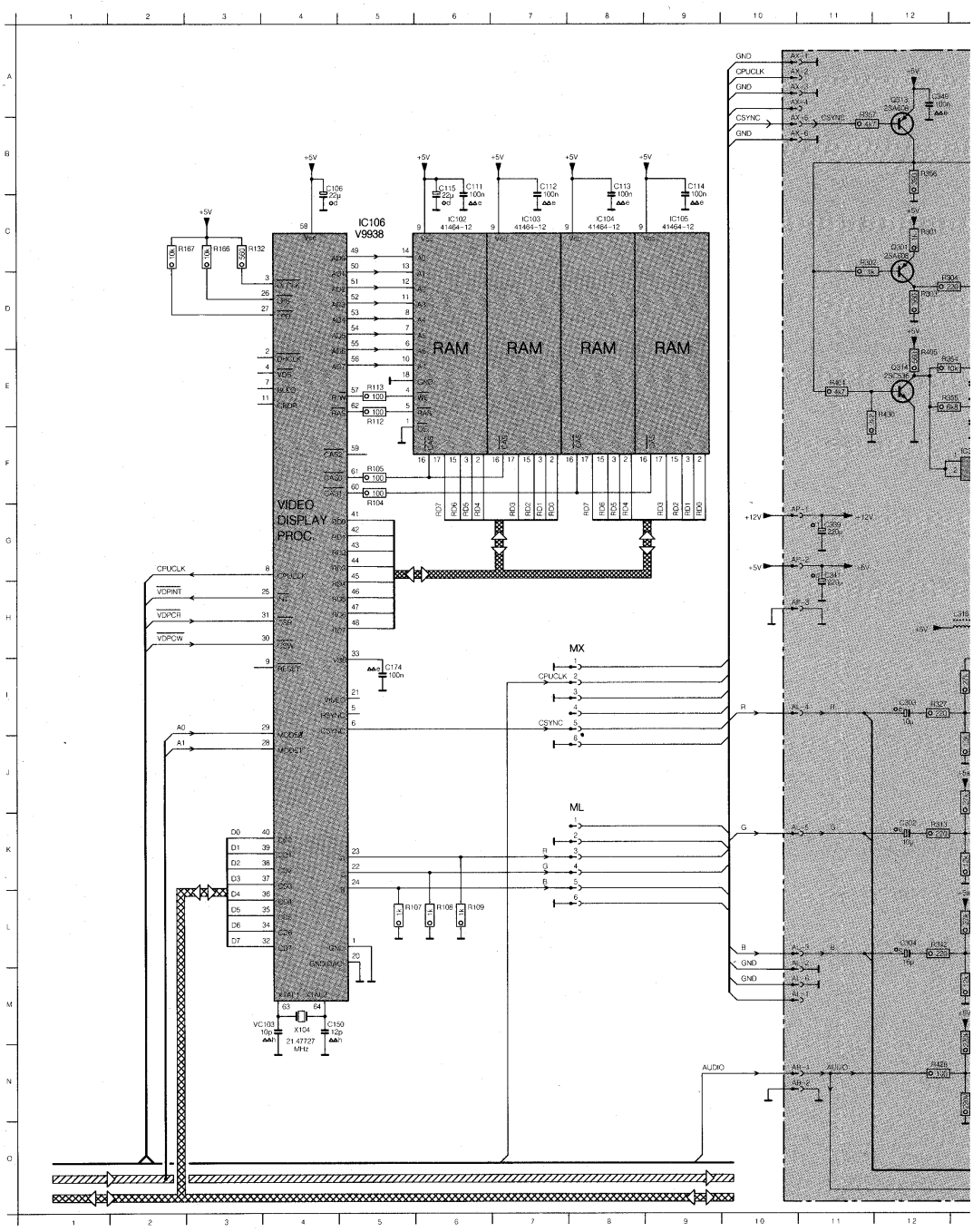
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V9938
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RAM
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VIDEO
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PROC.
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ML
CPUCLK
VDPINT
VDPCR
VDPCW
CSYNC
AUDIO
GND
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+12V
-12V
X104
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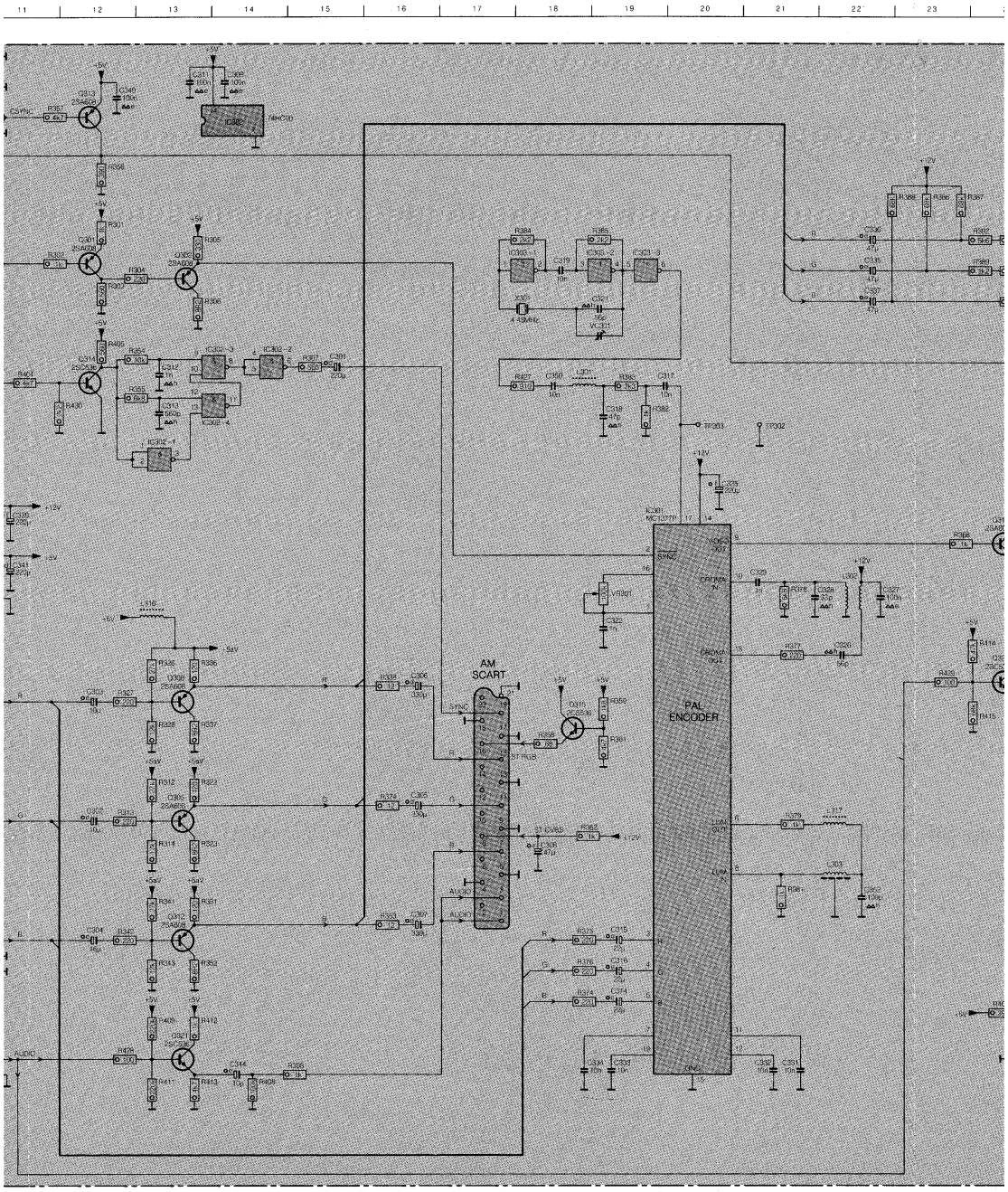
MHz

CS 7 582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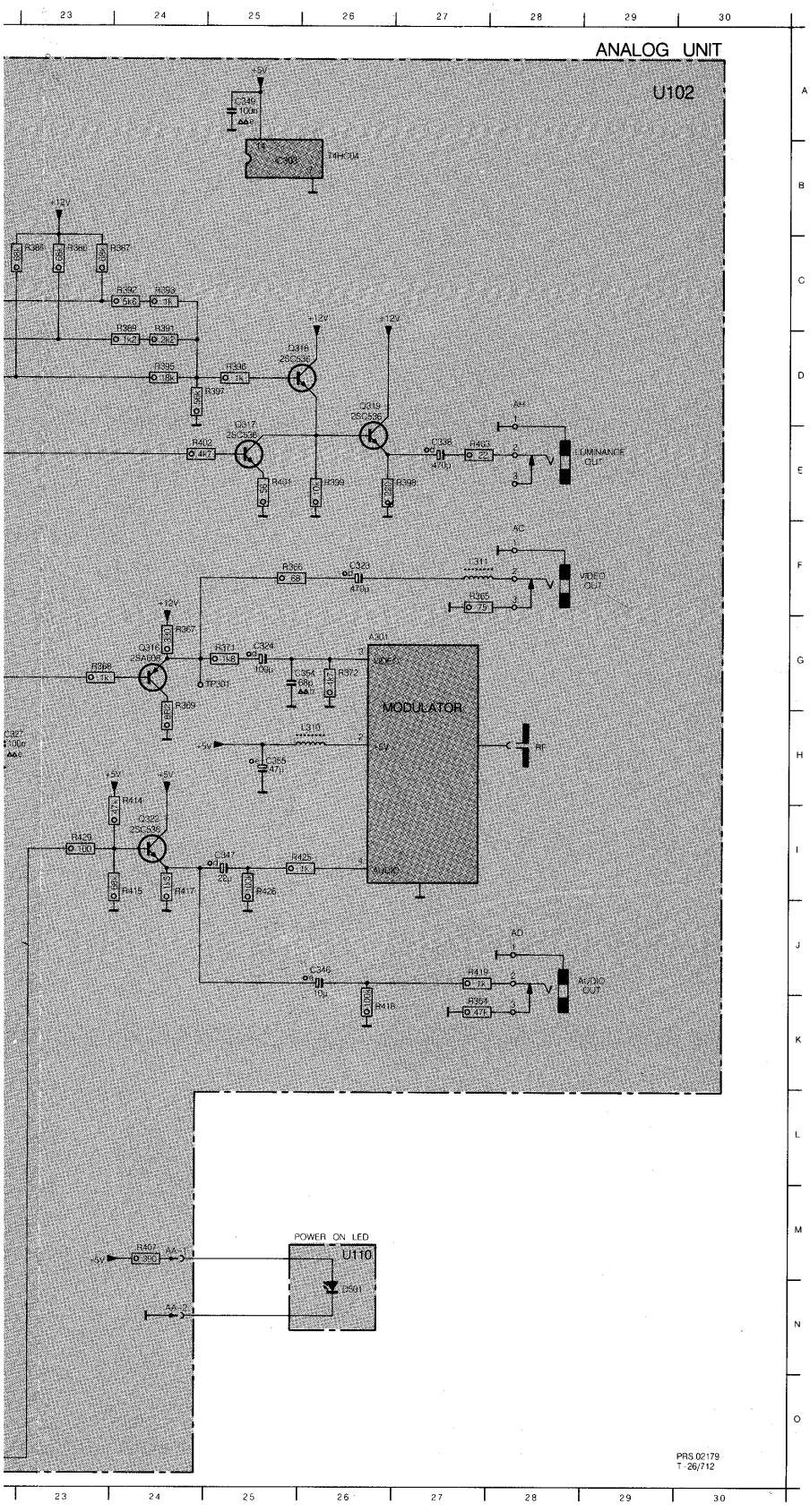
SCART
PAL
ENCODER



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	C106	B 4	R379	K21
	C111	B 6	R381	L21
	C112	B 7	R382	E19
	C113	B 8	R383	E19
A	C114	B 9	R384	C18
	C115	B 6	R385	C19
	C150	M 4	R386	C23
	C174	I 5	R387	C24
	C301	E15	R388	C23
	C302	K12	R389	C24
	C303	I 12	R391	C24
	C304	L12	R392	C24
	C305	J16	R393	C24
B	C306	I 16	R395	D24
	C307	L16	R396	D25
	C308	K18	R397	D25
	C309	A14	R398	E27
	C311	A13	R399	E26
	C312	E13	R401	E25
	C313	E13	R402	E24
	C314	M19	R403	E27
	C315	L19	R404	E11
	C316	M19	R405	E12
	C317	E19	R407	M24
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	C319	C18	R409	M13
	C321	D19	R411	N13
	C322	H19	R412	M13
	C323	F26	R413	N13
	C324	G25	R414	H24
	C325	F20	R415	I 24
	C326	H22	R417	I 24
	C327	H22	R418	K26
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	C331	N21	R426	I 25
	C332	N21	R427	E18
	C333	N19	R428	N12
	C334	N19	R429	I 23
	C335	C22	R430	E12
	C336	C22	U102	A30
	C337	D22	U110	M26
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	C349	A12		
	C350	A25		
	C352	E18		
	C354	L22		
F	C355	G26		
	D501	H25		
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	I C104	C 7		
	I C105	C 8		
	I C106	C 9		
	I C302	C 5		
G	I C302	B14		
	I C302	F14		
	I C302	E13		
	I C302	E14		
	I C303	E14		
	I C303	C18		
	I C303	C19		
	I C303	C19		
	I C303	B25		
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	Q317	D25		
	Q318	D25		
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	Q321	N13		
	Q322	I 24		
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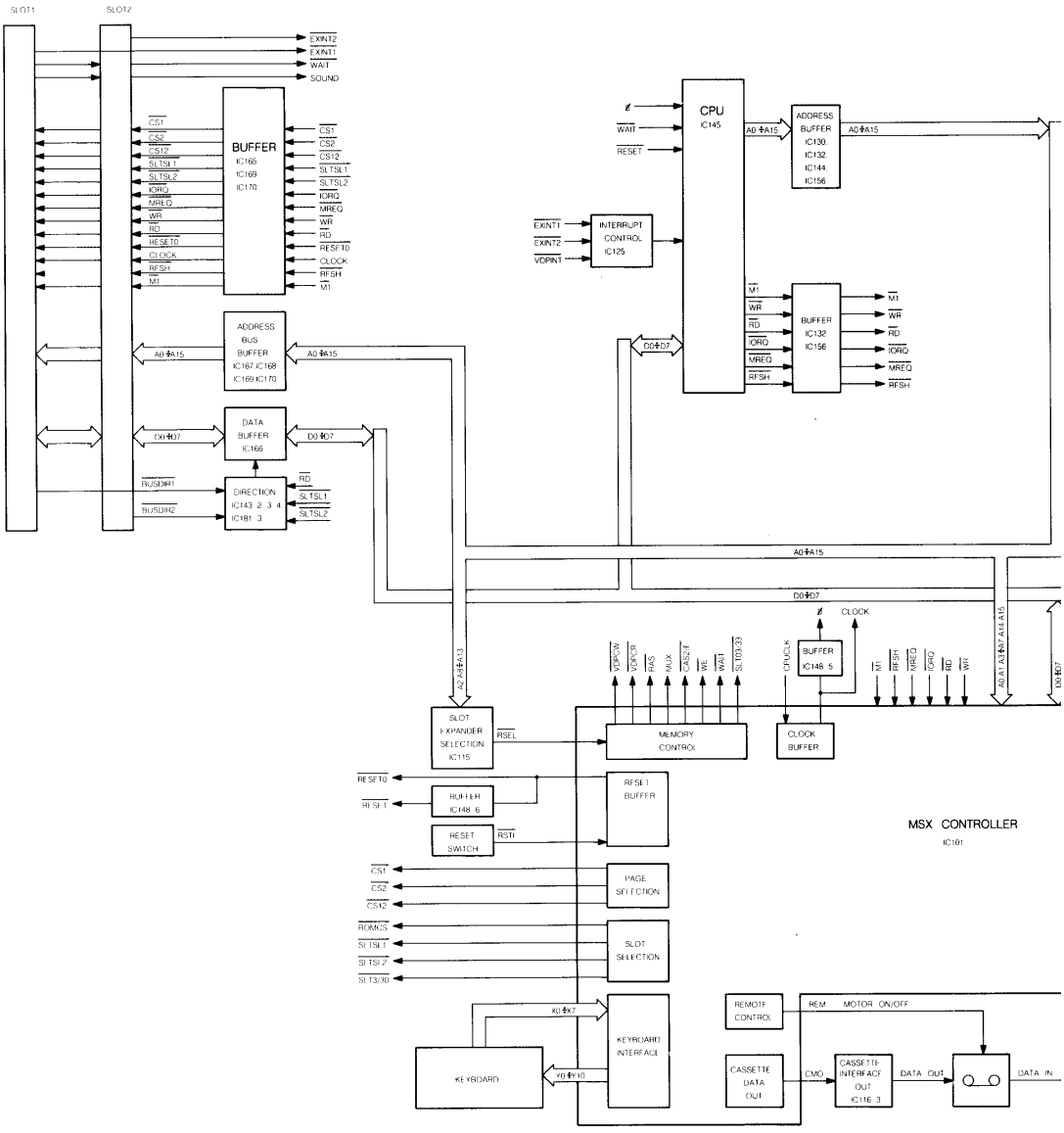
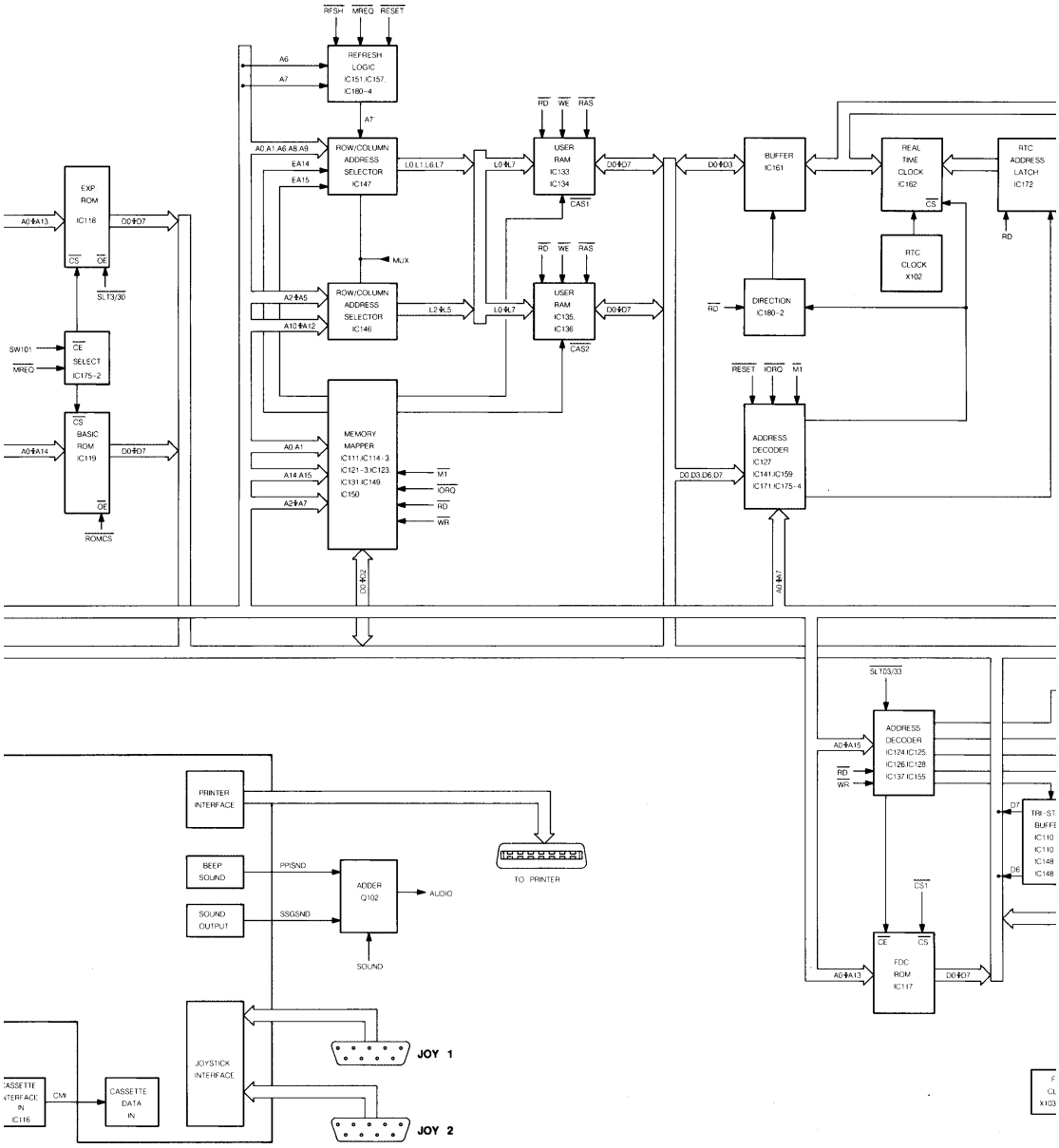
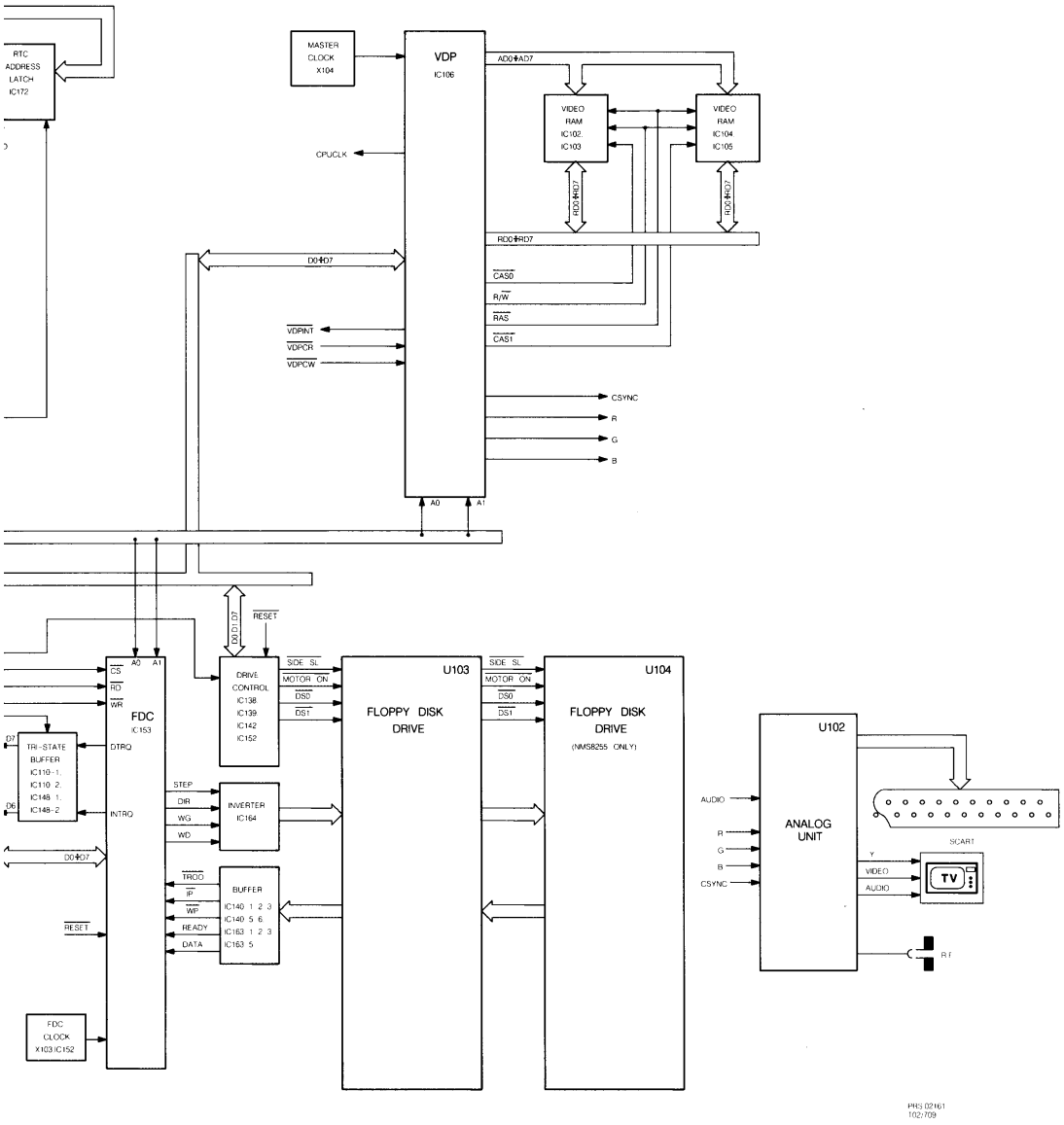
	R105	F 5		
	R107	L 6		
	R108	L 6		
	R109	L 6		
	R112	E 5		
	R113	E 5		
	R132	C 3		
	R166	C 3		
	R167	C 3		
K	R301	C12		
	R302	C11		
	R303	D12		
	R304	D13		
	R305	C14		
	R306	D14		
	R307	E15		
	R308	N15		
	R312	J13		
L	R313	K12		
	R314	K13		
	R322	J13		
	R323	K13		
	R324	J16		
	R326	I 13		
	R327	I 12		
	R328	J13		
	R336	I 13		
	R337	J13		
M	R338	I 16		
	R341	L13		
	R342	L12		
	R343	M13		
	R351	L13		
	R352	M13		
	R353	L16		
	R354	E13		
	R355	E13		
	R356	B12		
N	R357	A11		
	R358	J18		
	R359	I 19		
	R361	J19		
	R362	K18		
	R364	K27		
	R365	F27		
	R366	F25		
	R367	G24		
	R368	G23		
O	R369	G24		
	R371	G25		
	R372	G26		
	R374	M18		
	R375	L18		
	R376	M18		
	R377	I 21		

FUNCTIONAL DIAGRAM

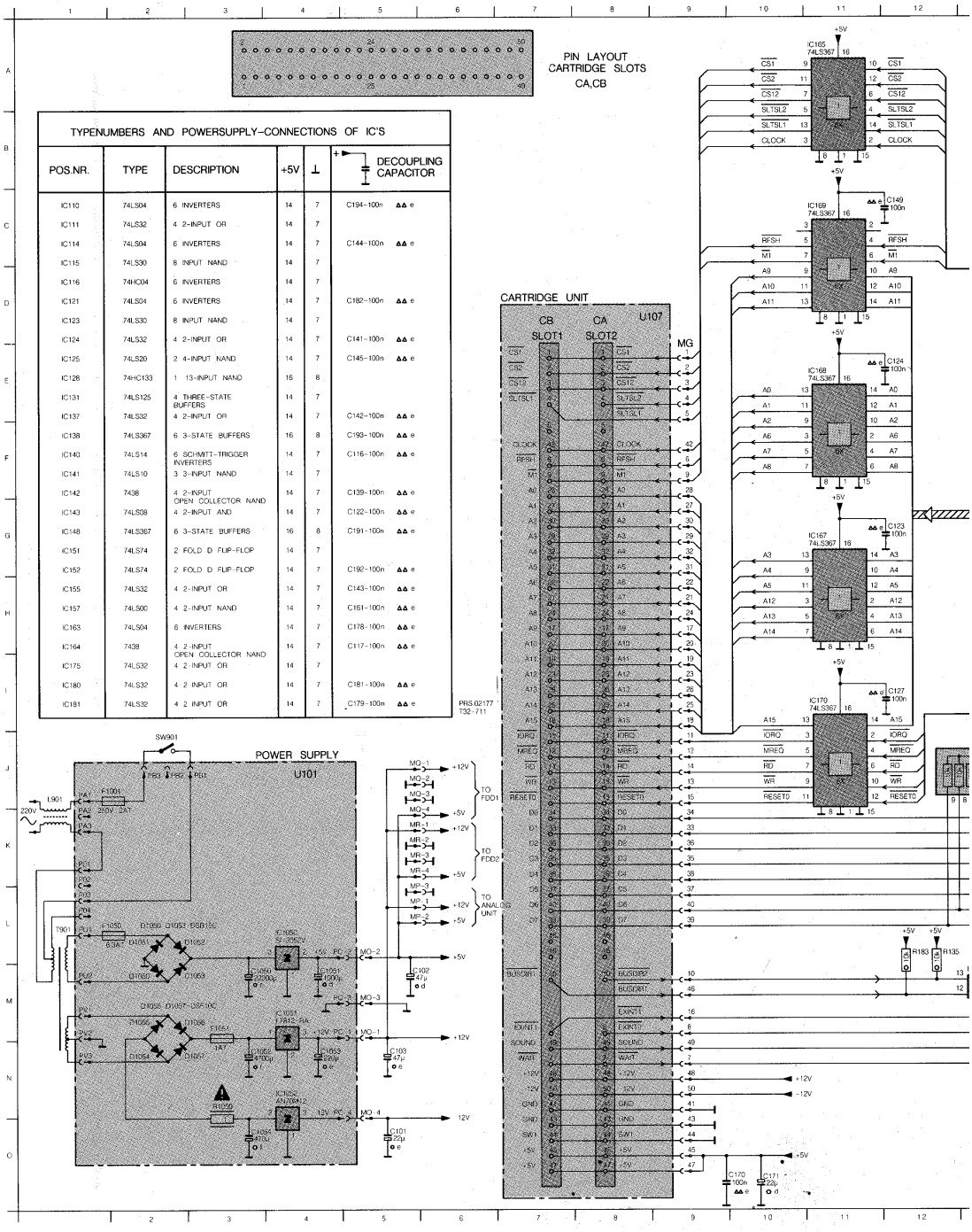



RFSH
MREQ
RESET
REFRESH LOGIC IC151,IC157, IC180-4
A6
A7
ROW/COLUMN ADDRESS SELECTOR IC147
A0,A1,A6,A8,A9
EA14
EA15
MUX
ROW/COLUMN ADDRESS SELECTOR IC146
A2-A5
A10-A12
L0,L1,L6,L7
L2-L5
L0-L7
USER RAM IC133, IC134
USER RAM IC135, IC136
RD
WE
RAS
CAS1
CAS2
D0-D7
D0-D3
BUFFER IC161
REAL TIME CLOCK IC162
RTC ADDRESS LATCH IC172
RTC CLOCK X102
DIRECTION IC180-2
EXP ROM IC118
A0-A13
CS
OE
SLT3/30
SW101
CE
SELECT IC175-2
BASIC ROM IC119
A0-A14
ROMCS
MEMORY MAPPER IC111,IC114-3, IC121-3,IC123, IC131,IC149, IC150
A0,A1
A14,A15
A2-A7
M1
IORQ
WR
D0,D3,D6,D7
RESET
IORQ
M1
ADDRESS DECODER IC127, IC141,IC159, IC171,IC175-4
A0-A7
SLT3/33
ADDRESS DECODER IC124,IC125, IC126,IC128, IC137,IC155
A0-A15
FDC ROM IC117
PRINTER INTERFACE
TO PRINTER
BEEP SOUND
SOUND OUTPUT
PPISND
SSGSND
ADDER Q102
AUDIO
SOUND
JOYSTICK INTERFACE
JOY 1
JOY 2
CASSETTE DATA IN
CMI



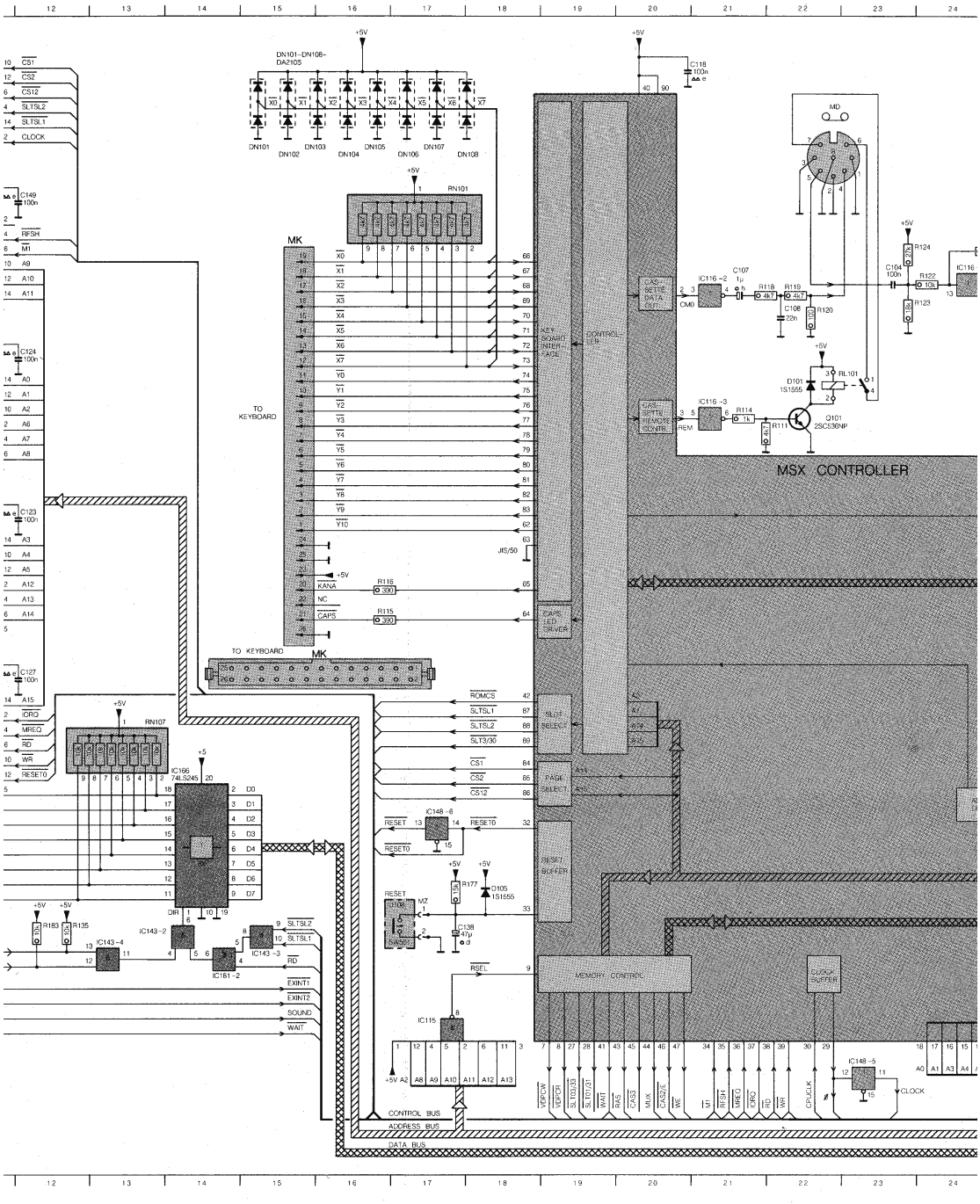
PRS 02161
102-709

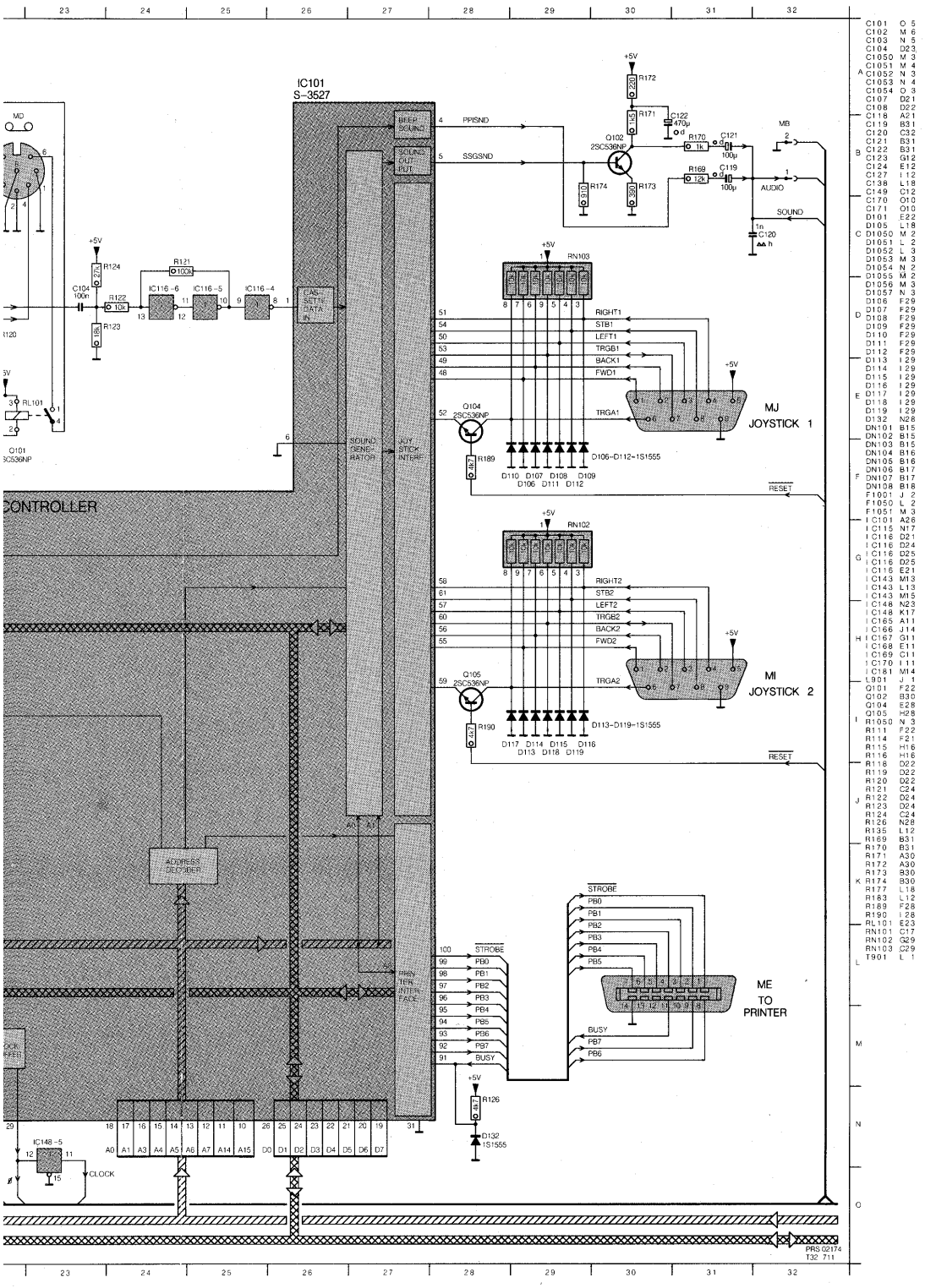
CS 7 579

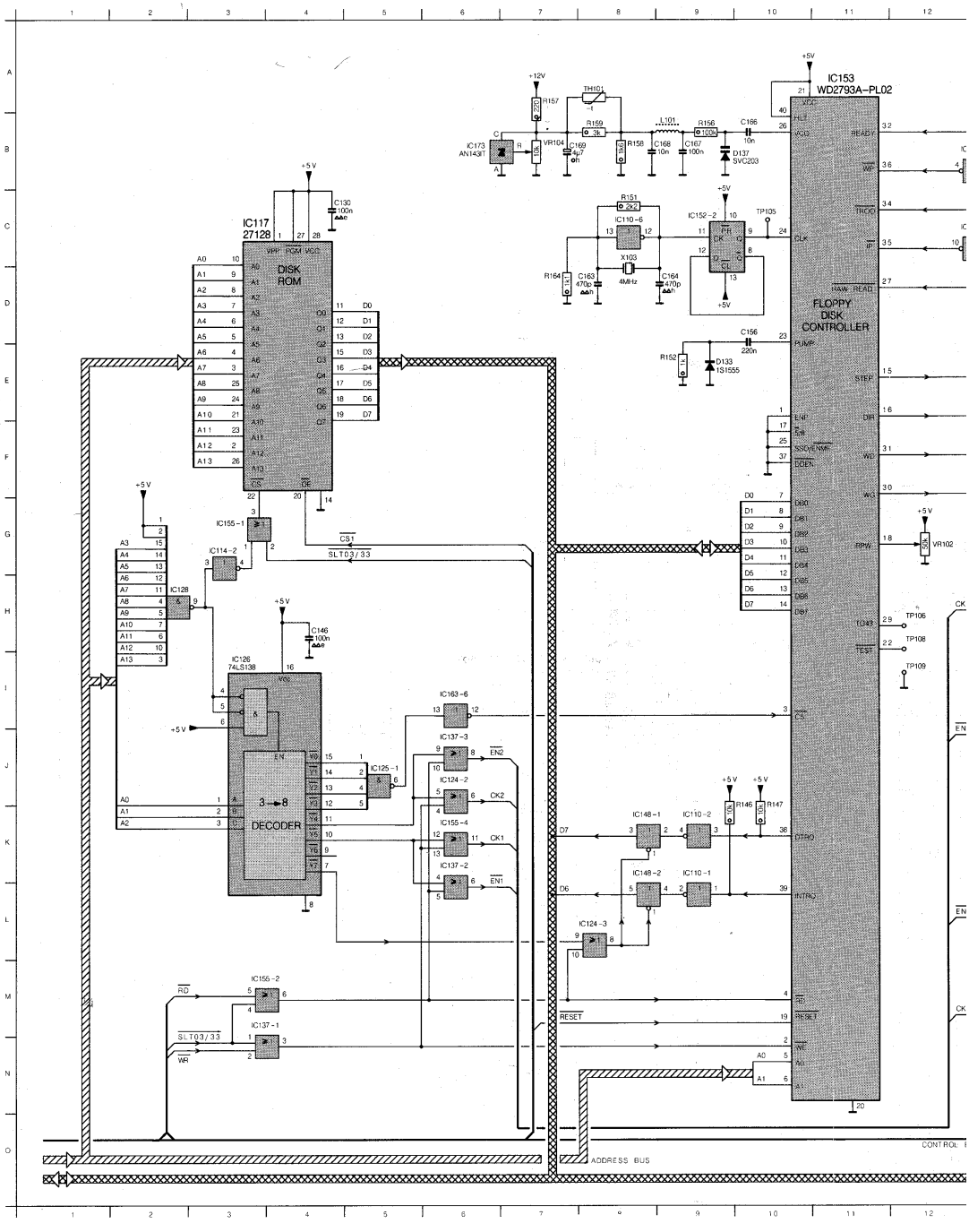


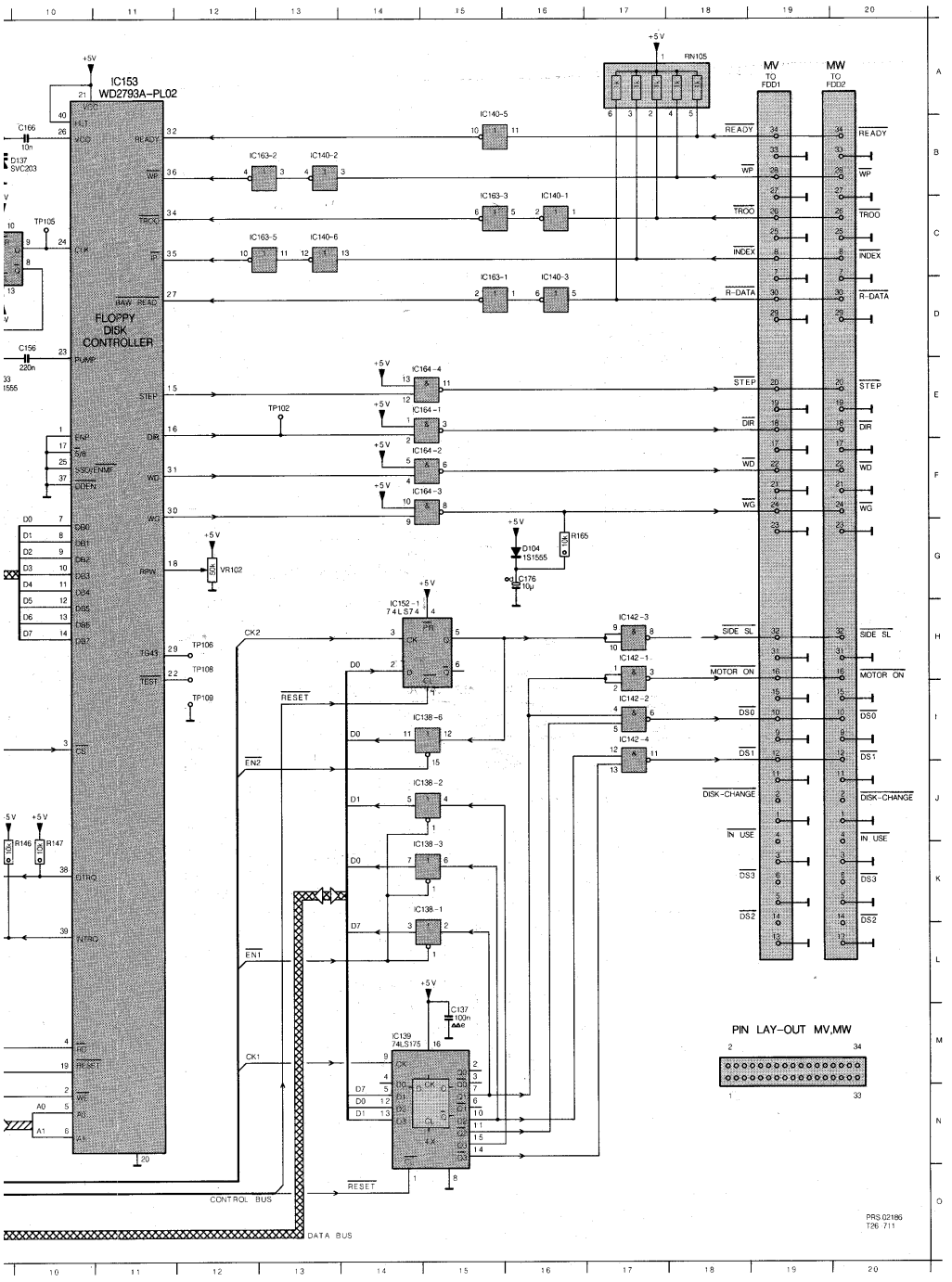
TYPENUMBERS AND POWERSUPPLY-CONNECTIONS OF IC'S

POS.NR.	TYPE	DESCRIPTION	+5V	⊥	+ DECOUPLING CAPACITOR
IC110	74LS04	6 INVERTERS	14	7	C194-100n ΔΔ e
IC111	74LS32	4 2-INPUT OR	14	7	
IC114	74LS04	6 INVERTERS	14	7	C144-100n ΔΔ e
IC115	74LS30	8 INPUT NAND	14	7	
IC116	74HC04	6 INVERTERS	14	7	
IC121	74LS04	6 INVERTERS	14	7	C182-100n ΔΔ e
IC123	74LS30	8 INPUT NAND	14	7	
IC124	74LS32	4 2-INPUT OR	14	7	C141-100n ΔΔ e
IC125	74LS20	2 4-INPUT NAND	14	7	C145-100n ΔΔ e
IC126	74HC133	1 13-INPUT NAND	16	8	
IC131	74LS125	4 THREE-STATE BUFFERS	14	7	
IC137	74LS32	4 2-INPUT OR	14	7	C142-100n ΔΔ e
IC138	74LS367	6 3-STATE BUFFERS	16	8	C193-100n ΔΔ e
IC140	74LS14	6 SCHMITT-TRIGGER INVERTERS	14	7	C116-100n ΔΔ e
IC141	74LS10	3 3-INPUT NAND	14	7	
IC142	7438	4 2-INPUT OPEN COLLECTOR NAND	14	7	C139-100n ΔΔ e
IC143	74LS08	4 2-INPUT AND	14	7	C122-100n ΔΔ e
IC148	74LS367	6 3-STATE BUFFERS	16	8	C191-100n ΔΔ e
IC151	74LS74	2 FOLD D FLIP-FLOP	14	7	
IC152	74LS74	2 FOLD D FLIP-FLOP	14	7	C192-100n ΔΔ e
IC155	74LS32	4 2-INPUT OR	14	7	C143-100n ΔΔ e
IC157	74LS00	4 2-INPUT NAND	14	7	C161-100n ΔΔ e
IC163	74LS04	6 INVERTERS	14	7	C178-100n ΔΔ e
IC164	7438	4 2-INPUT OPEN COLLECTOR NAND	14	7	C117-100n ΔΔ e
IC175	74LS32	4 2-INPUT OR	14	7	
IC180	74LS32	4 2-INPUT OR	14	7	C181-100n ΔΔ e
IC181	74LS32	4 2-INPUT OR	14	7	C179-100n ΔΔ e


MSX CONTROLLER
TO KEYBOARD
TO KEYBOARD
CONTROL BUS
ADDRESS BUS
DATA BUS
MEMORY CONTROL
KEY-SCANNING INTERFACE
CONTROLLER
CAPS LED DRIVER
SLOT SELECT
PAGE SELECT
RESET BUFFER
CLOCK BUFFER
CAS-/SETTING DATA OUT
CAS-/SETTING REMOTE CONTR
MD
D101 1S1555
RL101
Q101 2SC536NP
IC116 -2
IC116 -3
IC148 -6
IC148 -5
IC143 -2
IC143 -3
IC143 -4
IC161 -2
IC115
IC166 74LS245
RN101
RN107
DN101-DN108 DA210S
C118 100n
C104 100n
C107 1µ
C108 22n
C138 47µ
R177 10k
R124 2k2
R122 10k
R123 18k
R118 4k7
R119 4k7
R120 100
R111 100
R114 1k
R116 330
R115 330
R183 10k
R135 10k
C149 100n
C124 100n
C123 100n
C127 100n
CS1
CS2
CS12
SLTSL2
SLTSL1
CLOCK
RFSH
M1
IORQ
MREQ
RD
WR
RESET0
EXINT1
EXINT2
SOUND
WAIT
ROMCS
SLTSL1
SLTSL2
SLT3/30
CS1
CS2
CS12
RESET
RSEL
JIS/50
KANA
NC
CAPS
CLOCK
+5V

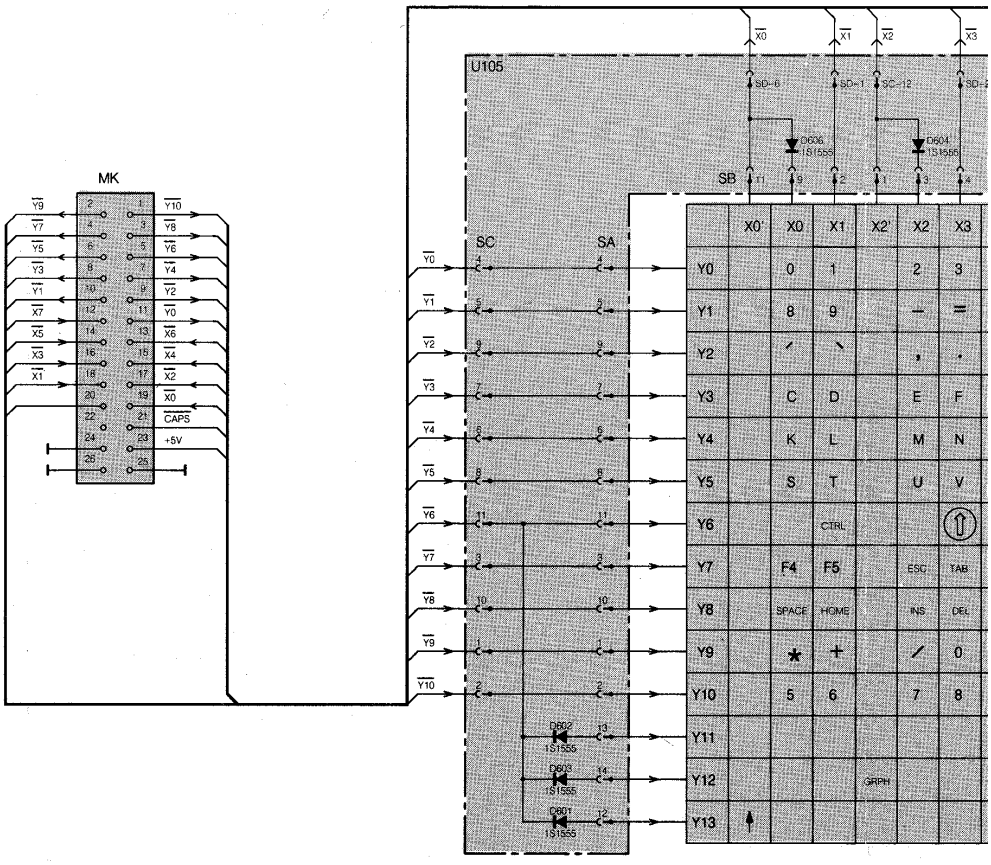



IC153
WD2793A-PL02
FLOPPY
DISK
CONTROLLER
IC117
27128
DISK
ROM
IC128
74LS138
3→8
DECODER
IC163-6
IC137-3
IC124-2
IC155-4
IC137-2
IC125-1
IC155-1
IC114-2
IC155-2
IC137-1
IC148-1
IC110-2
IC148-2
IC110-1
IC124-3
IC152-2
IC110-6
IC173
AN1431
TH101
X103
4MHz
D133
1S1555
D137
SVC203
VR104
VR102
TP105
TP106
TP108
TP109
CS1
SLT03/33
RD
WR
RESET
EN1
EN2
CK1
CK2
ADDRESS BUS
CONTROL



C130 C 5
C137 M1 5
C146 H 4
C156 D10
C163 D 8
C164 D 9
C166 B10
C167 B 9
C168 B 9
C169 B 8
C176 G16
D104 G16
D133 E 9
D137 B10
I C110 C 8
I C110 K 9
I C110 K 9
I C114 G 3
I C117 C 3
I C124 J 6
I C124 L 8
I C125 J 5
I C126 I 3
I C128 H 2
I C137 J 6
I C137 K 6
I C137 M 3
I C138 K15
I C138 K15
I C138 J15
I C138 I15
I C139 M14
I C140 A15
I C140 B13
I C140 B16
I C140 C13
I C140 C16
I C142 H17
I C142 H17
I C142 I17
I C142 I17
I C148 K 8
I C148 K 8
I C152 H14
I C152 C 9
I C153 A11
I C155 G 3
I C155 K 6
I C155 M 3
I C163 I 6
I C163 B13
I C163 B15
I C163 C13
I C163 C15
I C164 E15
I C164 E15
I C164 F15
I C164 F15
I C173 B 6
L101 B 9
R146 J10
R147 J10
R151 C 8
R152 E 9
R156 E 9
R157 A 7
R158 B 8
R159 B 8
R164 D 7
R165 G16
RN105 A18
TH101 A 8
VR102 G12
VR104 B 7
X103 C 8

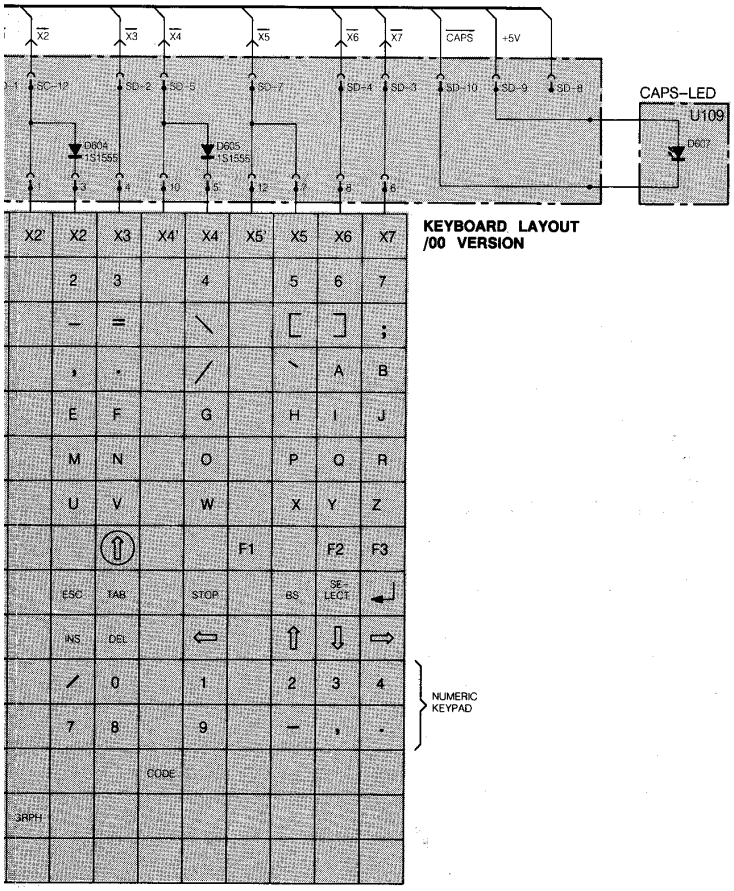
CS 7 583



KEYBOARD LAYOUT /16 VERSION

	X0'	X0	X1	X2'	X2	X3	X4'	X4	X5'	X5	X6	X7
Y0		0	1		2	3		4		5	6	7
Y1		8	9		:	;		,		@	[	^
Y2		¥	;		,	-		.		/	]	\
Y3		C	D		E	F		G		H	I	J
Y4		K	L		M	N		O		P	Q	R
Y5		S	T		U	V		W		X	Y	Z
Y6			CTRL			⇧			F1		F2	F3
Y7		F4	F5		ESC	TAB		STOP		BS	SELECT	↵
Y8		SPACE	HOME		INS	DEL		←		↑	↓	→
Y9		*	+		/	0		1		2	3	4
Y10		5	6		7	8		9		-	,	.
Y11							CODE					
Y12				GRPH								
Y13	↑											

NUMERIC KEYPAD



KEYBOARD LAYOUT /00 VERSION

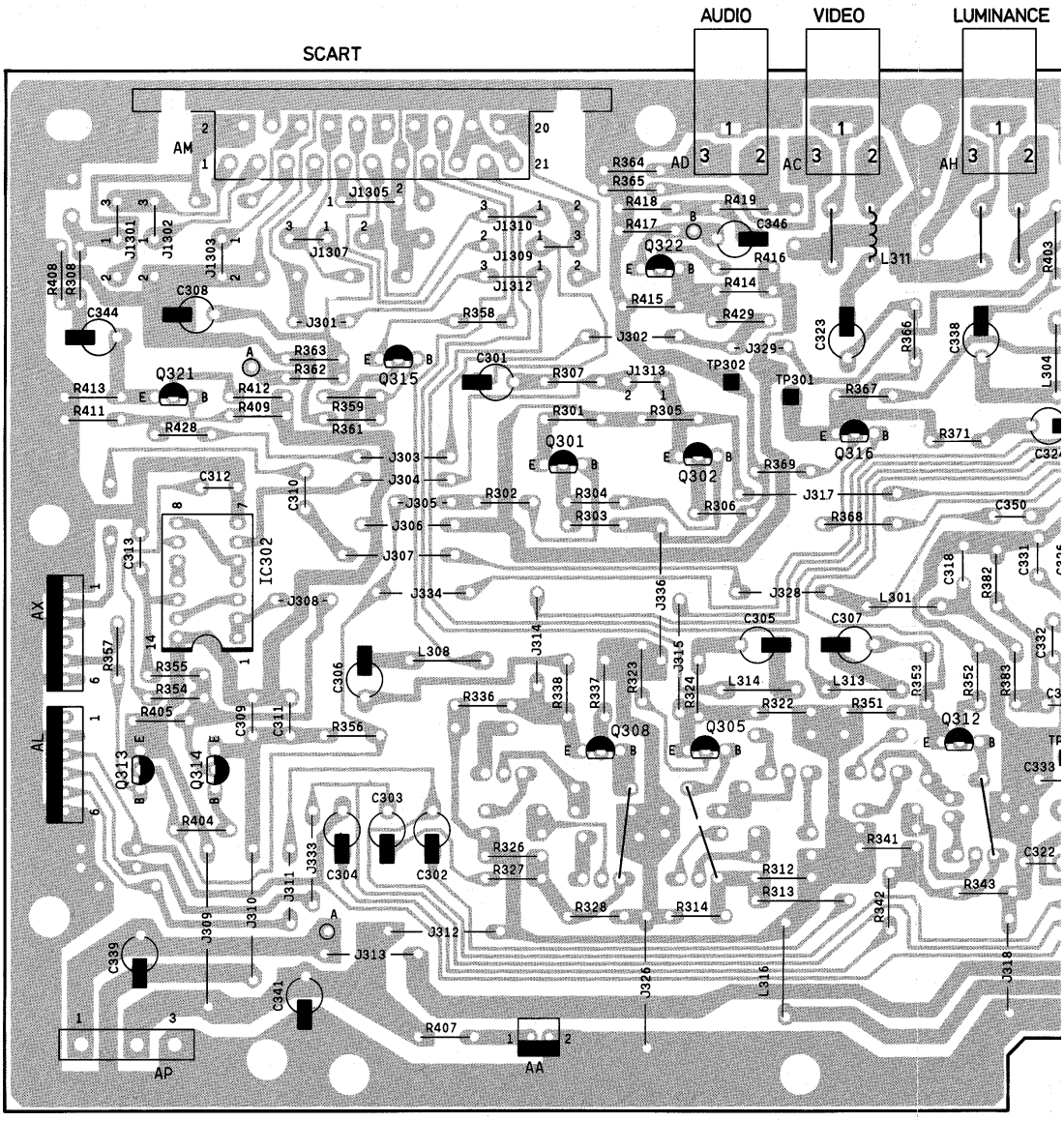
KEYBOARD LAYOUT /19 VERSION

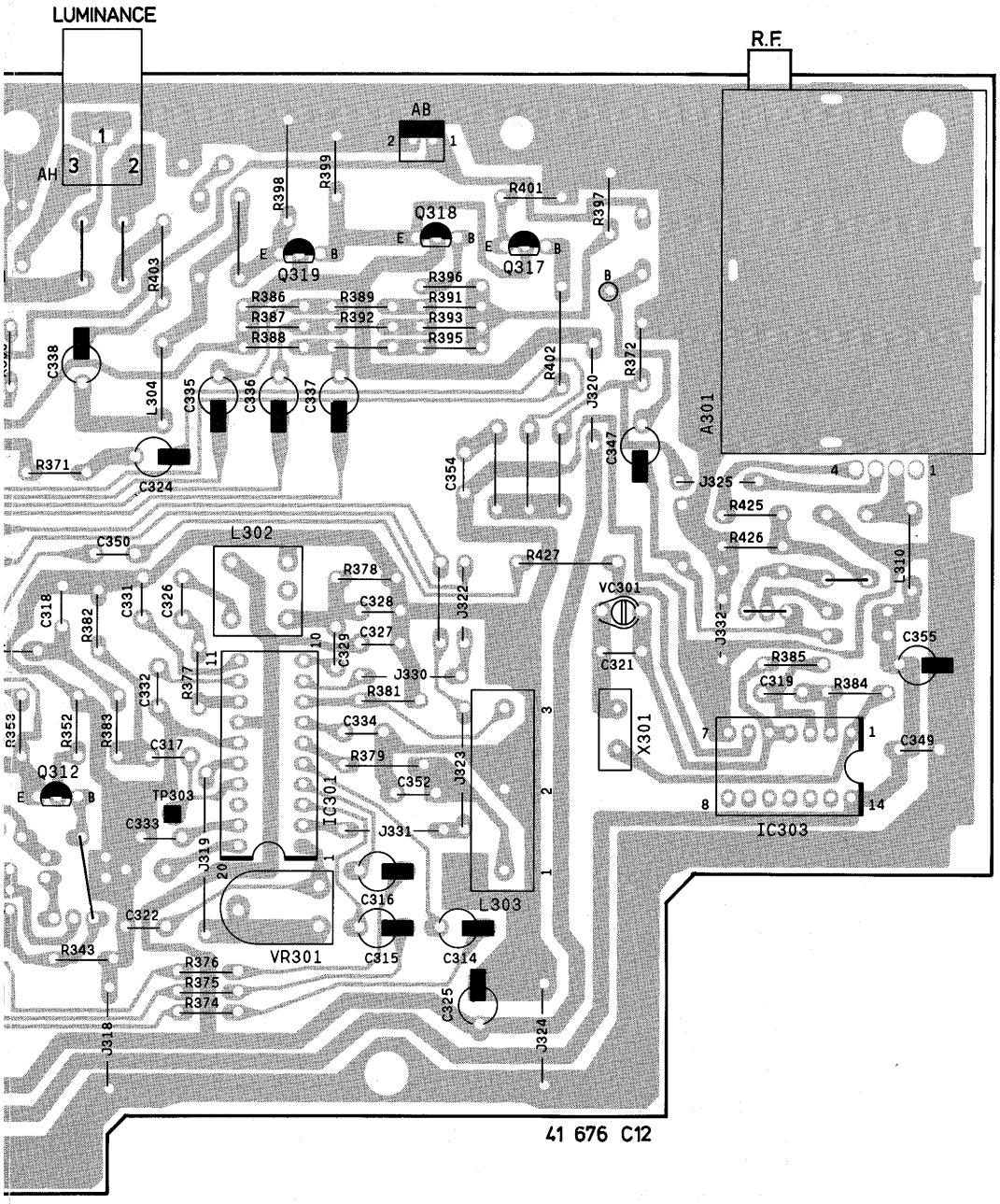
	X0'	X0	X1	X2'	X2	X3	X4'	X4	X5'	X5	X6	X7
Y0		0	1		2	3		4		5	6	7
Y1		8	9		°	—		>		••	★	M
Y2		%	£		;	:		=		↑	Q	B
Y3		C	D		E	F		G		H	I	J
Y4		K	L		'	N		O		P	A	R
Y5		S	T		U	V		Z		X	Y	W
Y6			CTRL			⇧			F1		F2	F3
Y7		F4	F5		ESC	TAB		STOP		BS	SE-LECT	↵
Y8		SPACE	DEP		INS	SUP		⇦		⇧	⇩	⇨
Y9		★	+		/	0		1		2	3	4
Y10		5	ö		7	8		9		—	,	.
Y11							CODE					
Y12				GRAPH								
Y13	↑											

NUMERIC KEYPAD

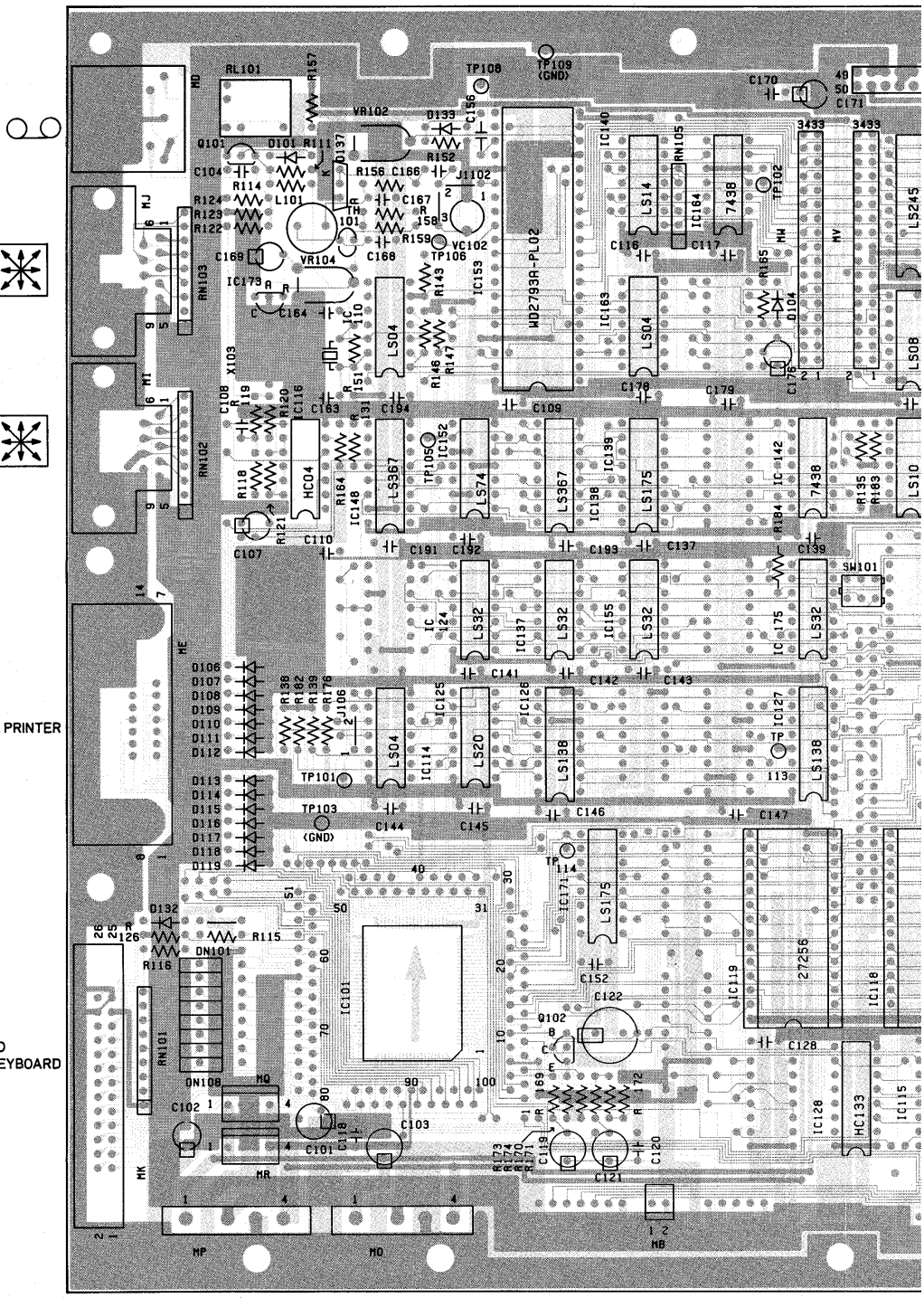
PRS 02178
T32-712

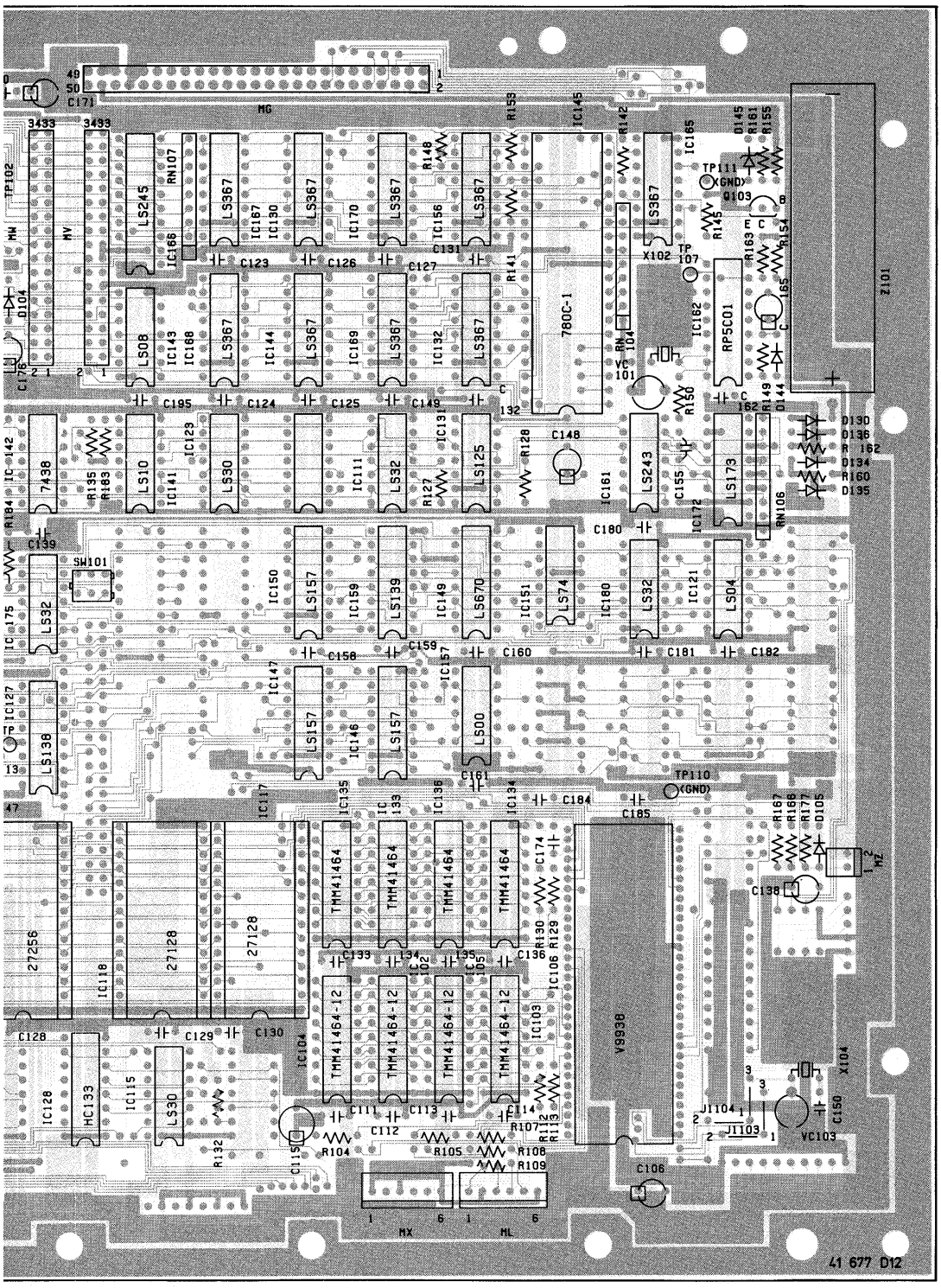
ANALOG UNIT


SCART
AUDIO
VIDEO
LUMINANCE
AM
AD
AC
AH
AX
AL
AP
AA
IC302
Q321
Q315
Q301
Q302
Q316
Q322
Q308
Q305
Q312
Q313
Q314
L311
L301
L304
L308
L314
L313
TP302
TP301

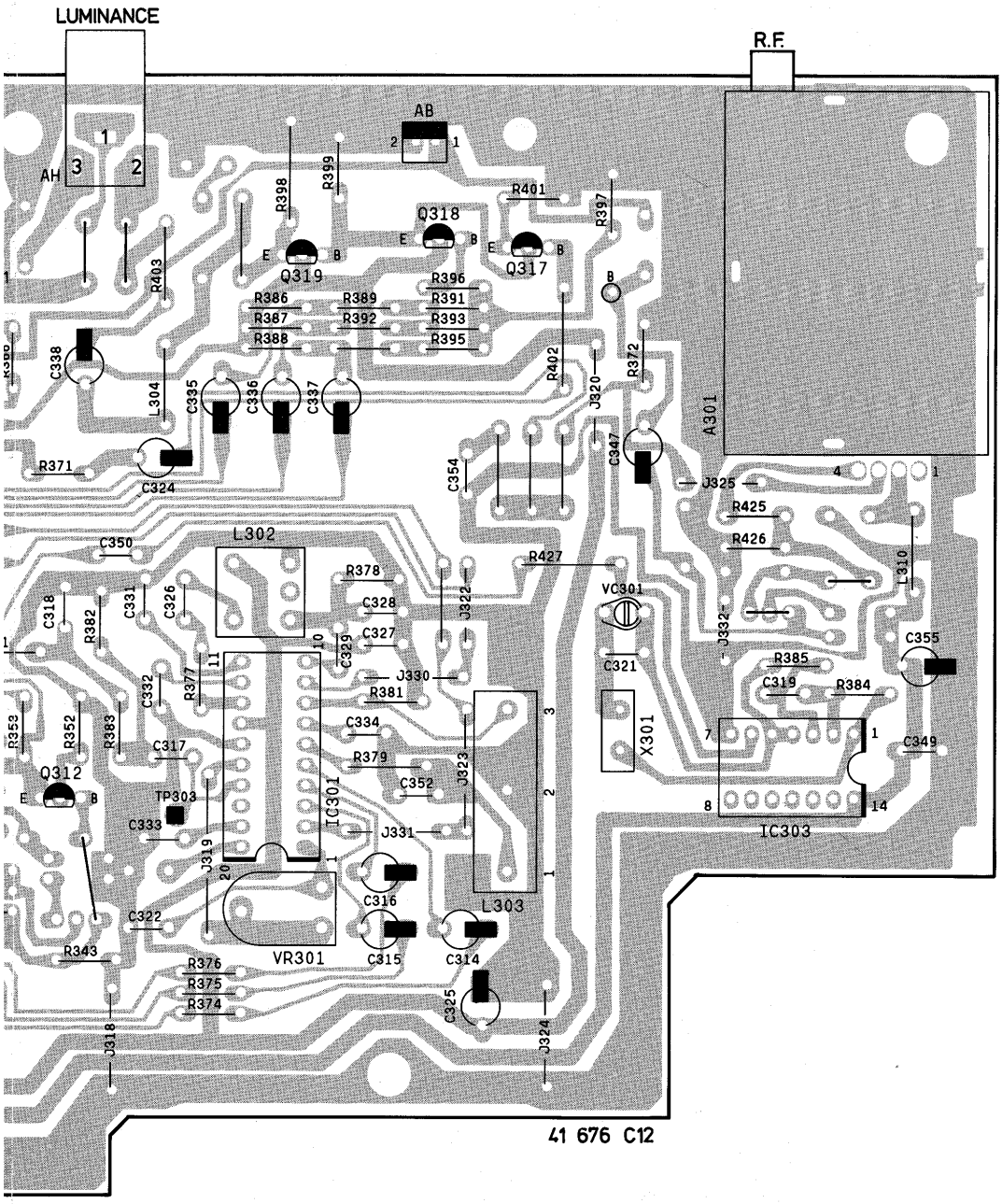

LUMINANCE
R.F.
AB
AH
Q318
Q319
Q317
Q312
L302
L303
L304
IC301
IC303
VR301
TP303
X301
VC301
A301
41 676 C12

MAIN PRINTED BOARD

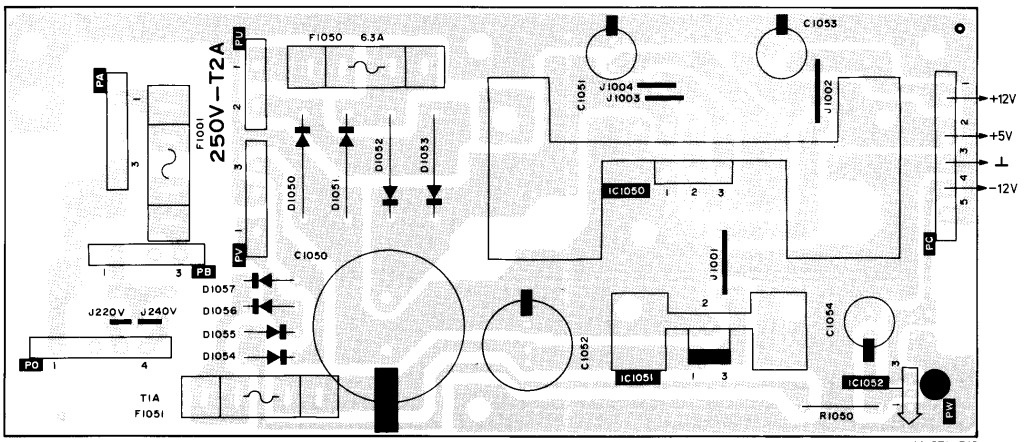




CS 7 585

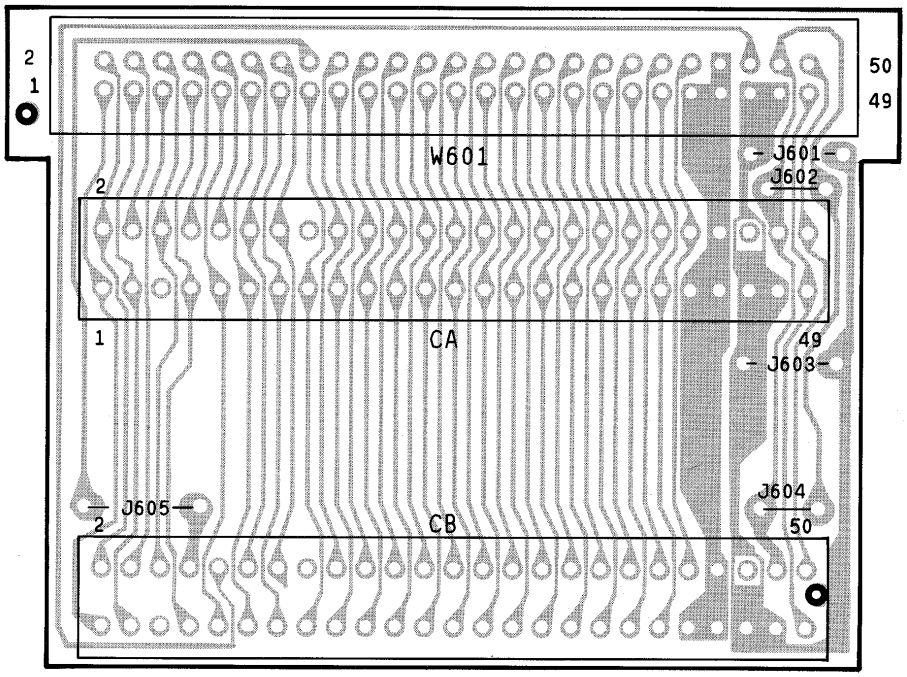

LUMINANCE
R.F.
AB
AH
Q318
Q319
Q317
Q312
L302
L303
L304
L310
VR301
IC301
IC303
X301
A301
VC301
TP303
41 676 C12

POWER SUPPLY



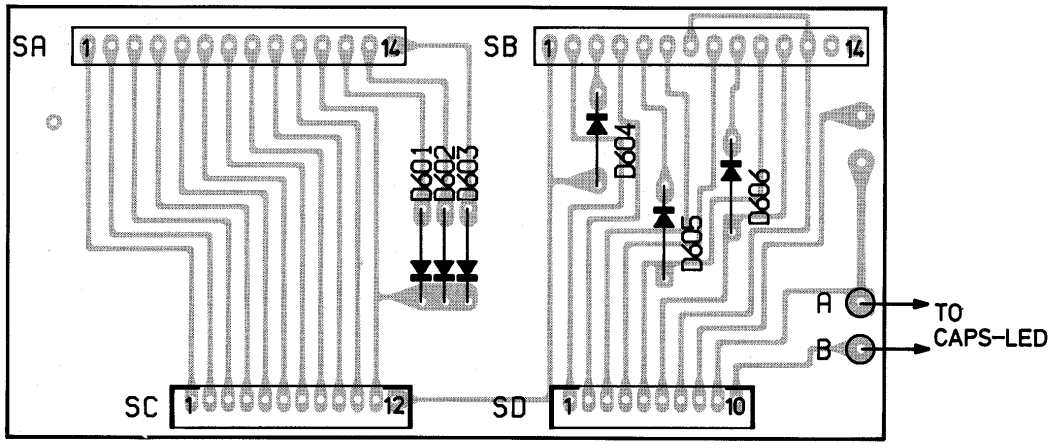
41 674 B12

CARTRIDGE CONNECTOR UNIT

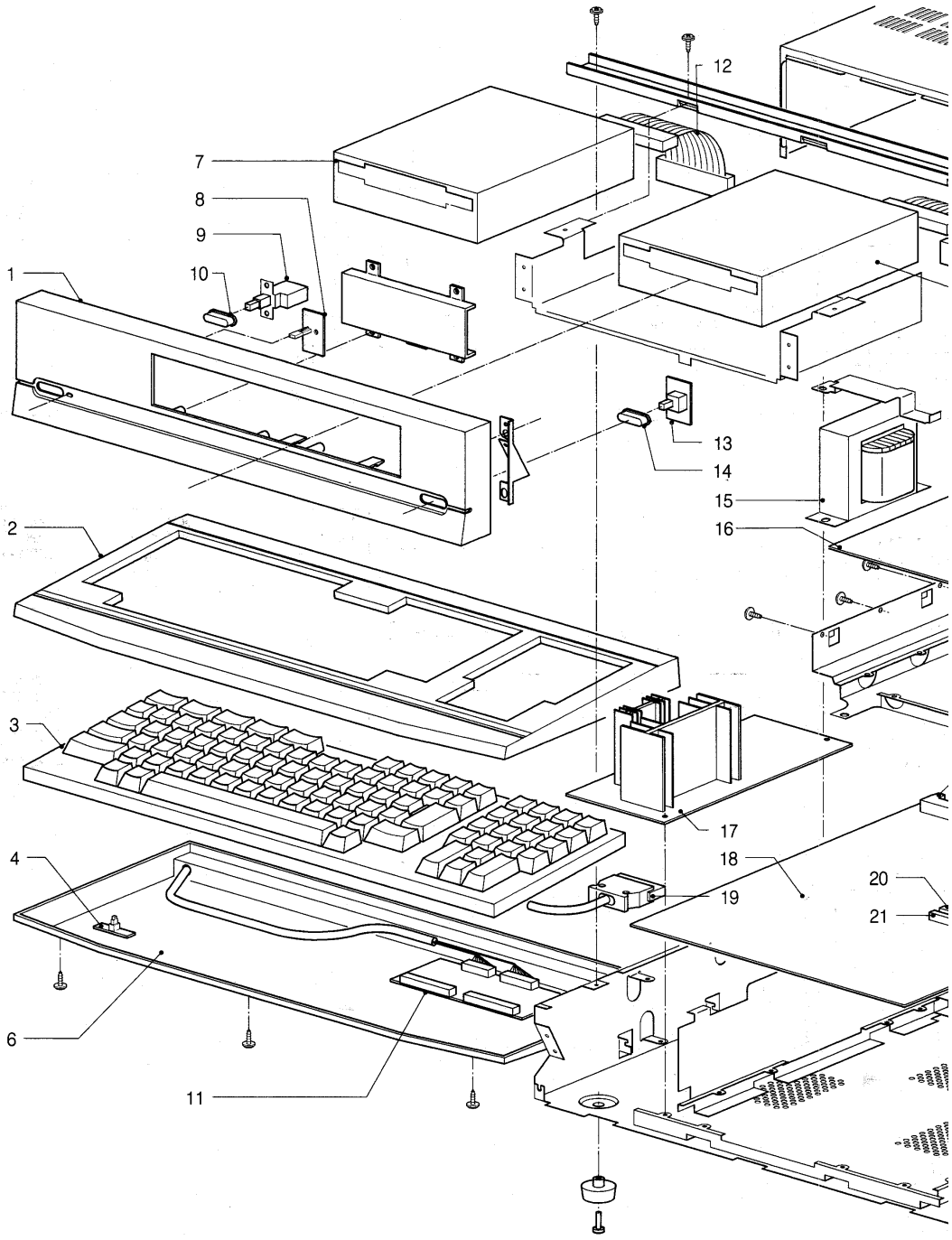


41 675 A12

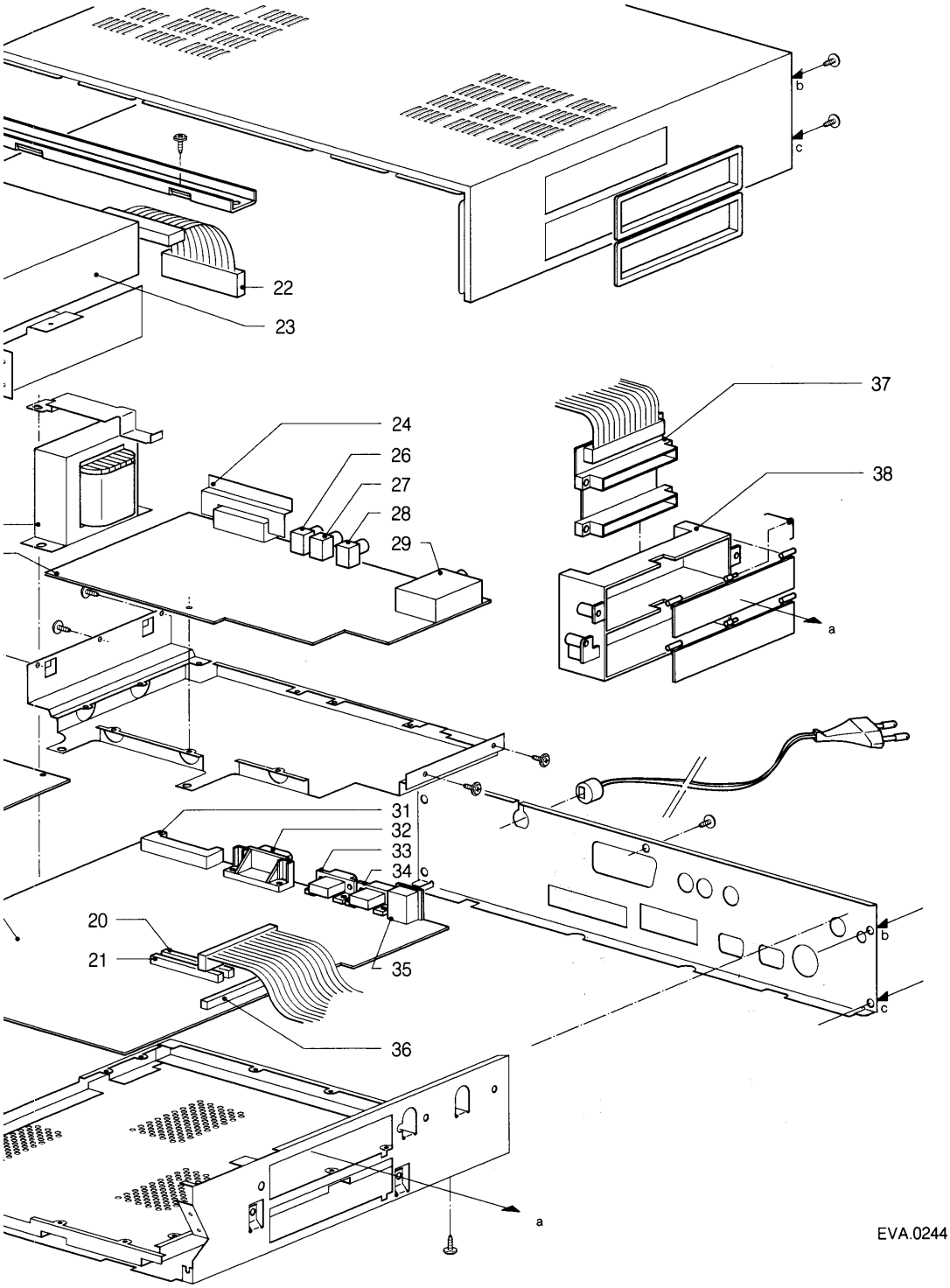
KEYBOARD INTERFACE PANEL



41 673 A12



CS 7 590


22
23
24
26
27
28
29
37
38
a
31
32
33
34
20
21
35
36
b
c
a
EVA.0244

MAIN PRINTED BOARD

U100	Main printed board/00	4822 219 80952
	Main printed board/16	4822 219 80961
	Main printed board/19	4822 219 80962
IC101	S-3527	4822 209 11097
IC102-IC105	81464-12	4822 209 83426
IC106	V9938	4822 209 83425
IC110	74LS04	4822 209 70979
IC111	74LS32	4822 209 71402
IC114	74LS04	4822 209 70979
IC115	74LS30	4822 209 83428
IC116	74HC04	4822 209 70194
IC117	DISK-ROM	4822 209 51209
IC118	EXP. ROM /00	4822 209 51212
	EXP. ROM /16	4822 209 51282
	EXP. ROM /19	4822 209 51283
IC119	BASIC-ROM /00	4822 209 51211
	BASIC-ROM /16	4822 209 51279
	BASIC-ROM /19	4822 209 51281
IC121	74LS04	4822 209 70979
IC123	74LS30	4822 209 83428
IC124	74LS32	4822 209 71402
IC125	74LS20	4822 209 71411
IC126,IC127	74LS138	4822 209 71403
IC128	74HC133	4822 209 83416
IC130	74LS367	4822 209 71406
IC131	74LS125	4822 209 83413
IC132	74LS367	4822 209 71406
IC133-IC136	81464-12	4822 209 83426
IC137	74LS32	4822 209 71402
IC138	74LS367	4822 209 71406
IC139	74LS175	4822 209 71399
IC140	74LS14	4822 209 83427
IC141	74LS10	4822 209 71412
IC142	7438	4822 209 71413
IC143	74LS08	4822 209 71407
IC144	74LS367	4822 209 71406
IC145	Z80A	4822 209 10569
IC146,IC147	74LS157	4822 209 71404
IC148	74LS367	4822 209 71406
IC149	74LS670	4822 209 71422
IC150	74LS157	4822 209 71404
IC151,IC152	74LS74	4822 209 71408
IC153	WD2793A	4822 209 11146
IC155	74LS32	4822 209 71402
IC156	74LS367	4822 209 71406
IC157	74LS00	4822 209 71401
IC159	74LS139	4822 209 71409
IC161	74LS243	4822 209 71417
IC162	RP5C01	4822 209 83431
IC163	74LS04	4822 209 70979
IC164	7438	4822 209 71413
IC165	74LS367	4822 209 71406
IC166	74LS245	4822 209 71405
IC167-IC170	74LS367	4822 209 71406
IC171	74LS175	4822 209 71399
IC172	74LS173	4822 209 71416
IC173	AN1431T	4822 209 71418
IC175,IC180, IC181	74LS32	4822 209 71402

Q101,Q102	2SC536NP	4822 130 41397
Q103	2SA608	4822 130 41202
DN101-DN108	DA210S	4822 130 80157
D101, D104-D119, D130-D134, D136,D144	1S1555	4822 130 31031
D135	EQA02-06A	4822 130 80155
D137	SVC203	4822 130 80156
D145	HZ4C3 Zener	4822 130 80109
RN101	8x4K7	4822 111 91302
RN102-RN104	8x10K	4822 111 91304
RN105	5x1K	4822 111 91305
RN106	8x2K2	4822 111 91303
RN107	8x10K	4822 111 91304
TH101	N.T.C. SDT-100	4822 116 30295
VR102	Variable 50K	4822 100 20611
VR104	Variable 10K	4822 100 20612
C104	100n 50V mylar	4822 121 42944
C108	22n 50V mylar	4822 121 42417
C156	220n 50V mylar	4822 121 42996
C166	10n 50V mylar	4822 121 42946
C167	100n 50V mylar	4822 121 42944
C168	10n 50V mylar	4822 121 42946
VC101	Trimmer	4822 125 50333
X102	32.768 KHz	4822 242 71345
X103	4 MHz	4822 242 71665
X104	21.47727 MHz	4822 242 71685

VARIOUS

RL101	Relay	4822 280 20277
Z101	NI-CD Accumulator	4822 138 10213
L101	Coil	4822 157 52909
SW101	Service switch	4822 276 12227

MAIN PRINTED BOARD

U100	Main printed board/00	4822 219 80952
	Main printed board/16	4822 219 80961
	Main printed board/19	4822 219 80962
IC101	S-3527	4822 209 11097
IC102-IC105	81464-12	4822 209 83426
IC106	V9938	4822 209 83425
IC110	74LS04	4822 209 70979
IC111	74LS32	4822 209 71402
IC114	74LS04	4822 209 70979
IC115	74LS30	4822 209 83428
IC116	74HC04	4822 209 70194
IC117	DISK-ROM	4822 209 51209
IC118	EXP. ROM /00	4822 209 51212
	EXP. ROM /16	4822 209 51282
	EXP. ROM /19	4822 209 51283
IC119	BASIC-ROM /00	4822 209 51211
	BASIC-ROM /16	4822 209 51279
	BASIC-ROM /19	4822 209 51281
IC121	74LS04	4822 209 70979
IC123	74LS30	4822 209 83428
IC124	74LS32	4822 209 71402
IC125	74LS20	4822 209 71411
IC126,IC127	74LS138	4822 209 71403
IC128	74HC133	4822 209 83416
IC130	74LS367	4822 209 71406
IC131	74LS125	4822 209 83413
IC132	74LS367	4822 209 71406
IC133-IC136	81464-12	4822 209 83426
IC137	74LS32	4822 209 71402
IC138	74LS367	4822 209 71406
IC139	74LS175	4822 209 71399
IC140	74LS14	4822 209 83427
IC141	74LS10	4822 209 71412
IC142	7438	4822 209 71413
IC143	74LS08	4822 209 71407
IC144	74LS367	4822 209 71406
IC145	Z80A	4822 209 10569
IC146,IC147	74LS157	4822 209 71404
IC148	74LS367	4822 209 71406
IC149	74LS670	4822 209 71422
IC150	74LS157	4822 209 71404
IC151,IC152	74LS74	4822 209 71408
IC153	WD2793A	4822 209 11146
IC155	74LS32	4822 209 71402
IC156	74LS367	4822 209 71406
IC157	74LS00	4822 209 71401
IC159	74LS139	4822 209 71409
IC161	74LS243	4822 209 71417
IC162	RP5C01	4822 209 83431
IC163	74LS04	4822 209 70979
IC164	7438	4822 209 71413
IC165	74LS367	4822 209 71406
IC166	74LS245	4822 209 71405
IC167-IC170	74LS367	4822 209 71406
IC171	74LS175	4822 209 71399
IC172	74LS173	4822 209 71416
IC173	AN1431T	4822 209 71418
IC175,IC180, IC181	74LS32	4822 209 71402

Q101,Q102	2SC536NP	4822 130 41397
Q103	2SA608	4822 130 41202
DN101-DN108	DA210S	4822 130 80157
D101, D104-D119, D130-D134, D136,D144	1S1555	4822 130 31031
D135	EQA02-06A	4822 130 80155
D137	SVC203	4822 130 80156
D145	HZ4C3 Zener	4822 130 80109
RN101	8x4K7	4822 111 91302
RN102-RN104	8x10K	4822 111 91304
RN105	5x1K	4822 111 91305
RN106	8x2K2	4822 111 91303
RN107	8x10K	4822 111 91304
TH101	N.T.C. SDT-100	4822 116 30295
VR102	Variable 50K	4822 100 20611
VR104	Variable 10K	4822 100 20612
C104	100n 50V mylar	4822 121 42944
C108	22n 50V mylar	4822 121 42417
C156	220n 50V mylar	4822 121 42996
C166	10n 50V mylar	4822 121 42946
C167	100n 50V mylar	4822 121 42944
C168	10n 50V mylar	4822 121 42946
VC101	Trimmer	4822 125 50333
X102	32.768 KHz	4822 242 71345
X103	4 MHz	4822 242 71665
X104	21.47727 MHz	4822 242 71685

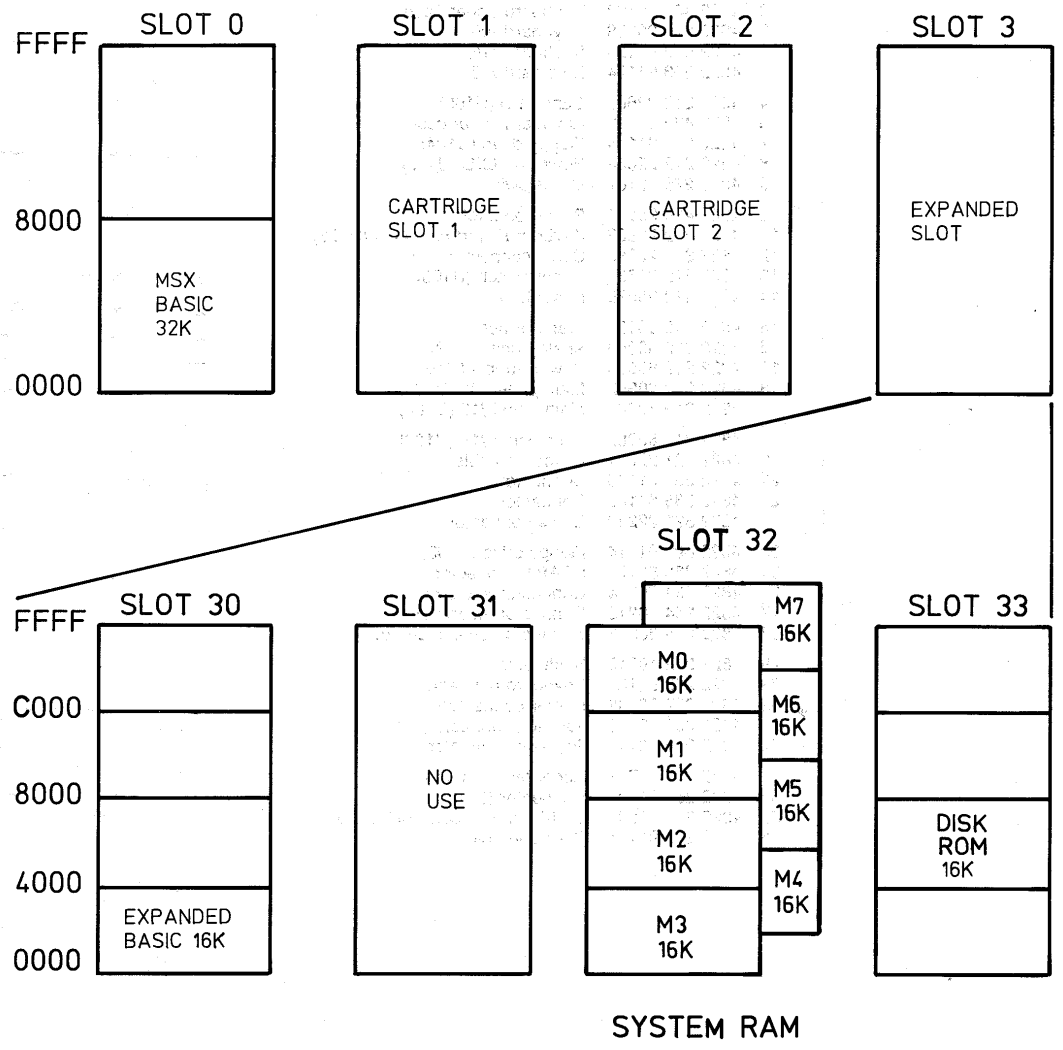
VARIOUS

RL101	Relay	4822 280 20277
Z101	NI-CD Accumulator	4822 138 10213
L101	Coil	4822 157 52909
SW101	Service switch	4822 276 12227

MECHANICAL PARTS LIST

1	4822 432 10591	Front panel
2	4822 432 10593	Keyboard upper case
3	4822 273 20259	Keyboard /00
	4822 693 91125	Keyboard /16
	4822 693 91124	Keyboard /19
4	4822 212 22687	Caps LED (U109)
6	4822 432 10592	Keyboard lower case
7	4822 693 91114	Floppy drive (U104)
8	4822 212 22684	Power-on LED (U110)
9	4822 276 12167	Mains switch
10	4822 410 25574	Power on knob
11	4822 212 22683	Keyboard interface panel (U105)
12	4822 321 22388	Cable connector
13	4822 212 22685	Reset switch (U108)
14	4822 410 25575	Reset knob
15	4822 148 60157	Transformer
16	4822 219 80953	Analog unit (U102)
17	4822 219 80954	Power supply (U101)
18	4822 219 80952	Main panel /00 (U100)
	4822 219 80961	Main panel /16 (U100)
	4822 219 80962	Main panel /19 (U100)
19	4822 321 22291	Keyboard cable
20	4822 265 61108	Connector
21	4822 265 61108	Connector
22	4822 321 22289	Cable connector
23	4822 693 91114	Floppy drive (U103)
24	4822 265 51179	SCART connector
26	4822 264 30214	Connector audio out
27	4822 264 30215	Connector video out
28	4822 264 30215	Connector luminance out
29	4822 212 10215	Modulator
31	4822 265 51181	Keyboard connector
32	4822 267 50709	Printer connector
33	4822 266 40148	Joystick connector
34	4822 266 40148	Joystick connector
35	4822 267 50711	Recorder connector
36	4822 265 61109	Connector (50 p)
37	4822 212 22686	Cartridge connector unit (U107)
38	4822 256 91171	Cartridge holder

MEMORY LAY-OUT



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CS 7 592

SYMBOLS USED IN CIRCUIT DIAGRAMS

SYMBOL	TYPE	t_{amb}^{P} 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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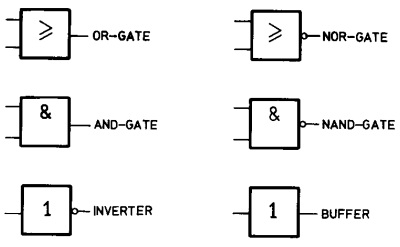

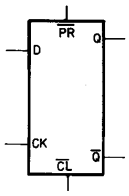

FLIP FLOP

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