Home computer

NMS8245/00/16





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

				F CARACTERISTIQUES TECHNIQUES		
Microprocessor	: Z80A	Microprocessor	: Z80A	Microprocesseur :	Z80A	
Memory	: 48k ROM 16k disk ROM 128k video RAM 128k user RAM	Geheugen	: 48k ROM 16k disk ROM 128k video RAM 128K gebruikers RAM	Mémoire :	48k ROM 16k ROM à disque 128k RAM vidéo 128k RAM utilisateur	
Video processor	: V9938	Video processor	: V9938	Processeur vidéo :	V9938	
MSX controller	: S-3527	MSX controller	: S-3527	Contróle MSX :	S-3527	
Floppy-disk drive	: 3.5",1 MB	Floppy-disk drive	: 3.5",1 MB	Lecteur de disquette :	3.5",1 MB	
Interfaces	: RF output (UHF channel E36) Monitor output SCART Cassette recorder 2 joysticks Printer 2 cartridge slots	Interfaces	: RF uitgang (UHF kanaal E36) Monitor uitgang SCART Cassette recorder 2 handbedieningen Printer 2 cartridge sleuven		Sortie RF (Canal UHF E36) Sortie monitor SCART Magnétophne cassette 2 poignées imprimante 2 "slots" cartouche	
Keyboard	: QWERTY/00/16	Toetsenbord	: QWERTY/00/16		QWERTY/00/16	
Power supply voltage	: 220 V ± 10%, 50Hz	Voedingsspanning	: 220 V ± 10%, 50Hz	Tension d'alimentation :	220 V ± 10%, 50Hz	
	D TECHNISCHE DATE	: <b>Z80A</b>	DATA TECHICI     Microprocessore     Memoria	: Z80A : 48k ROM		
	Speicher	: 48k ROM 16k Disk-ROM 128k Video-RAM 128k Gebrauchers-RAM	Memona	16k ROM A disco 128k RAM video 128k RAM utilizzatori		
	Videoprozessor	: V9938	Processore video	: V9938		
	MSX-Steureinheit	: S-3527	MSX di controllo	: S-3527		
	Floppy Disk-Laufwerk	: 3.5",1 MB	Lettore di dischetto	: 3.5",1 MB		
	Schnittstellen	: RF Ausgang (UHF Kanal E36)	Interfaccie	: Uscita RF (Canale UHF E36)		
		Monitorausgang SCART Cassettenrecorder 2 Handbedienungen Drucker 2 Kassettenschlitze		Uscita monitore SCART Registratore a cassetta 2 leve manuali Stampa 2 connettore per cartuccia	a	
	Tastatur	Monitorausgang SCART Cassettenrecorder 2 Handbedienungen Drucker	Tastiera	SCART Registratore a cassetta 2 leve manuali Stampa 2 connettore per cartuccia : QWERTY/00/16	a	
	Tastatur Versorgungsspannung	Monitorausgang SCART Cassettenrecorder 2 Handbedienungen Drucker 2 Kassettenschlitze	Tastiera Tensione di aliment.	SCART Registratore a cassetta 2 leve manuali Stampa 2 connettore per cartuccia	a	

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



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CS 11 823

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# 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  $\pm$  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  $\pm$  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  $\pm$  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
- 17-01.

#### 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  $\langle ESC \rangle$ ). Loosen the screws A (see figure 4) of the stepping
  - motor a quarter turn. Read track 40, side 0 continuously (with  $\langle F3 \rangle$ ). 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  $\langle ESC \rangle$ . Read track 00, side 0 (with  $\langle F3 \rangle$ ) 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  $\mu$ s/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.

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(GB)

#### 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
- Adjust the index sensor so, that the period time 1 becomes  $400 \pm 200 \ \mu s$  (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.

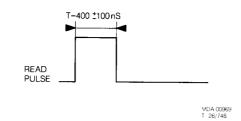


Fig. 1



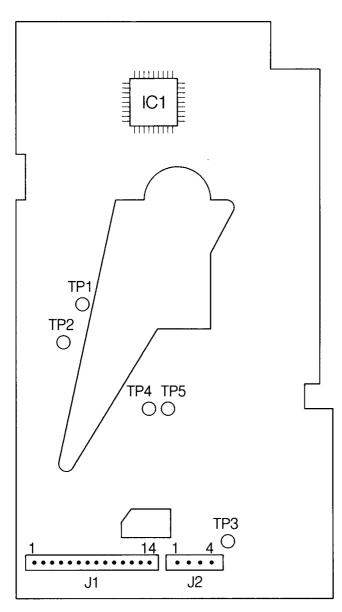
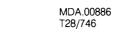


Fig. 2



#### 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

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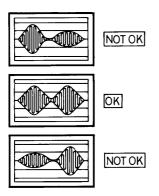
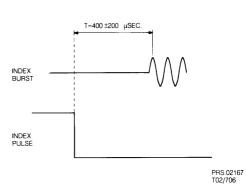
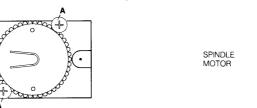


Fig. 3

0







39 578 A12



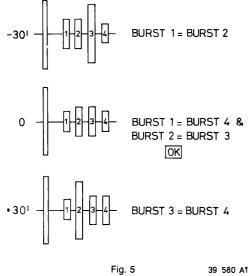
4 CLARK A

A

STEPPER MOTOR



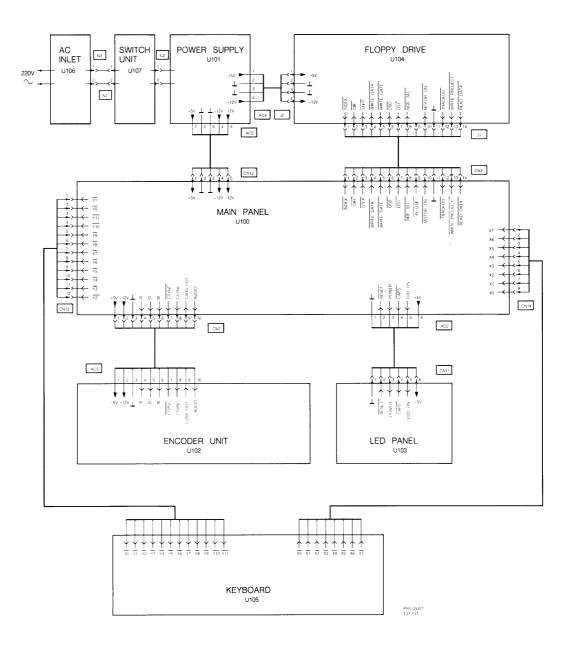


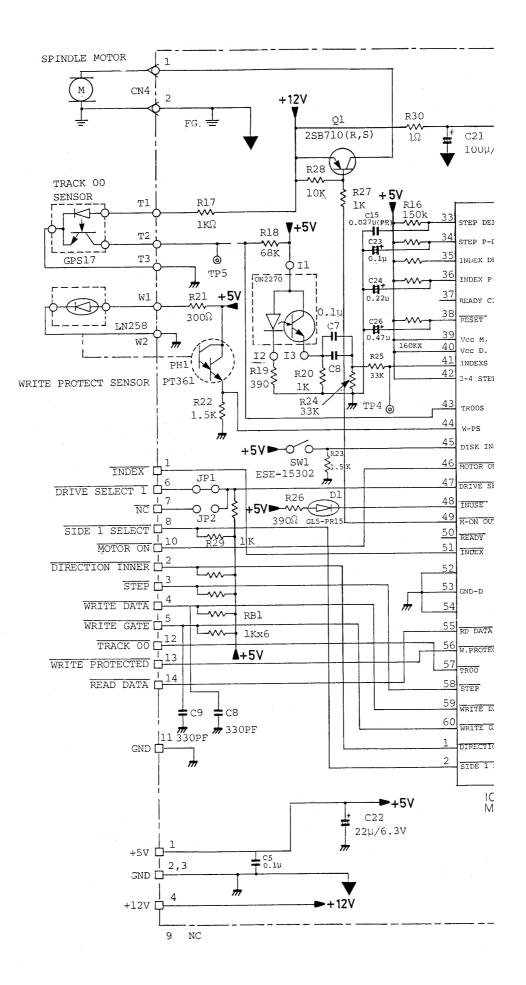


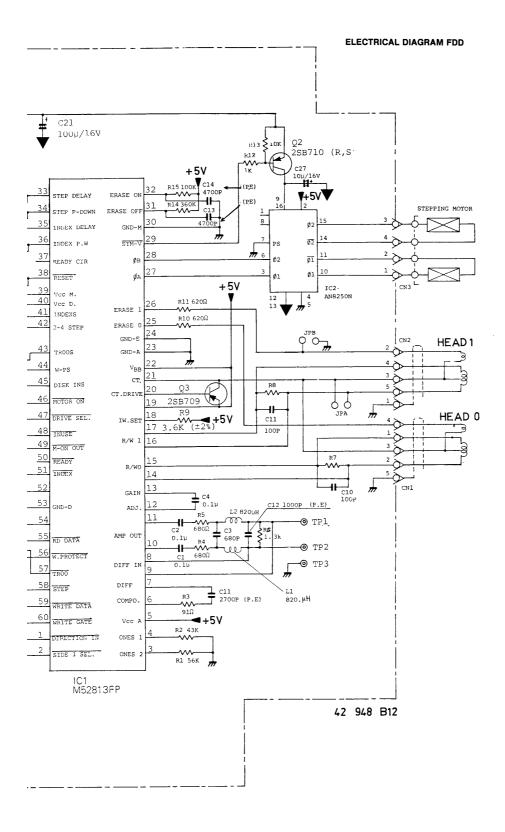
39 580 A12



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WIRING DIAGRAM
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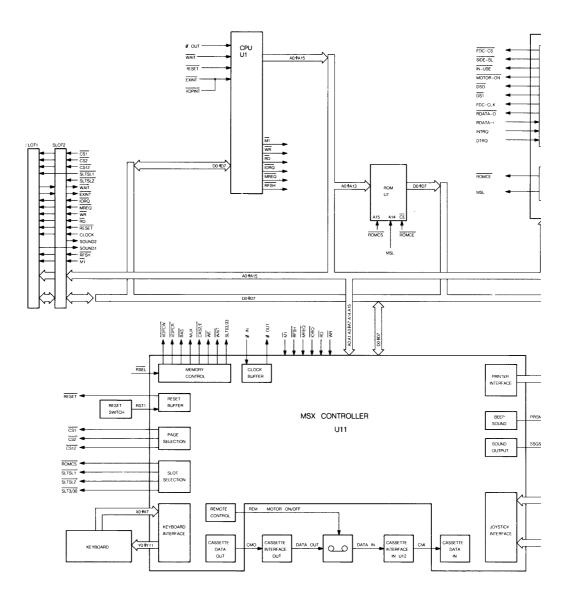


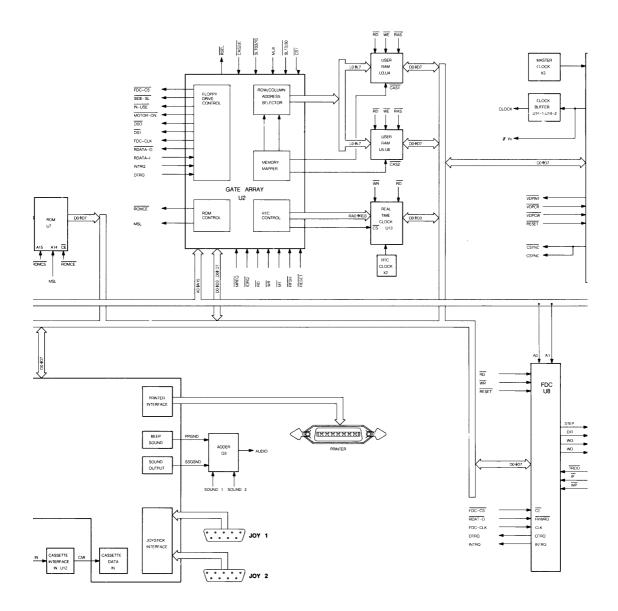


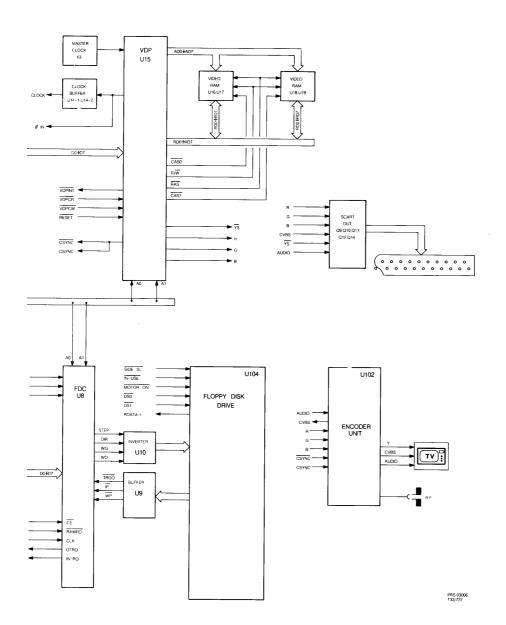


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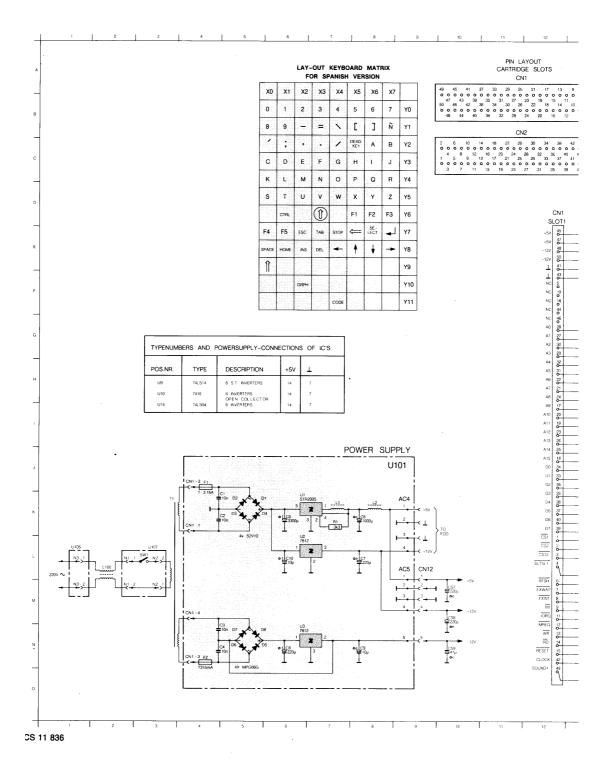
#### FUNCTIONAL DIAGRAM

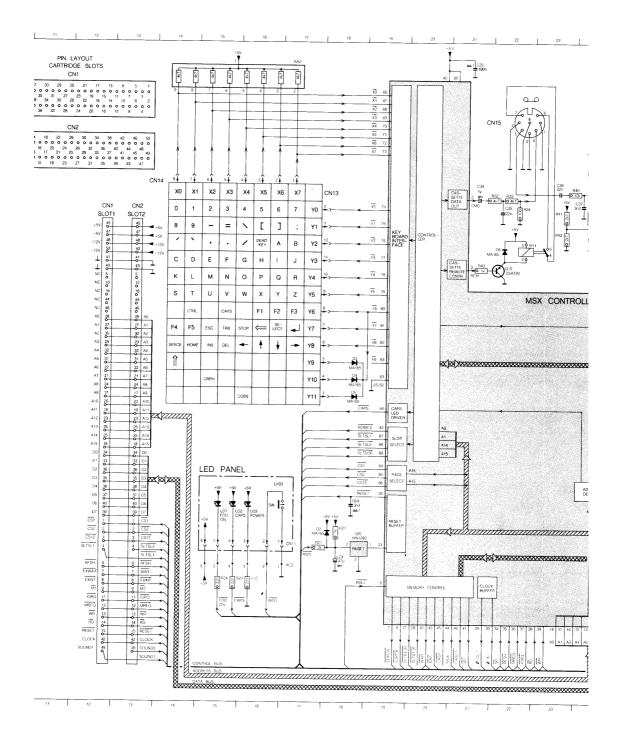


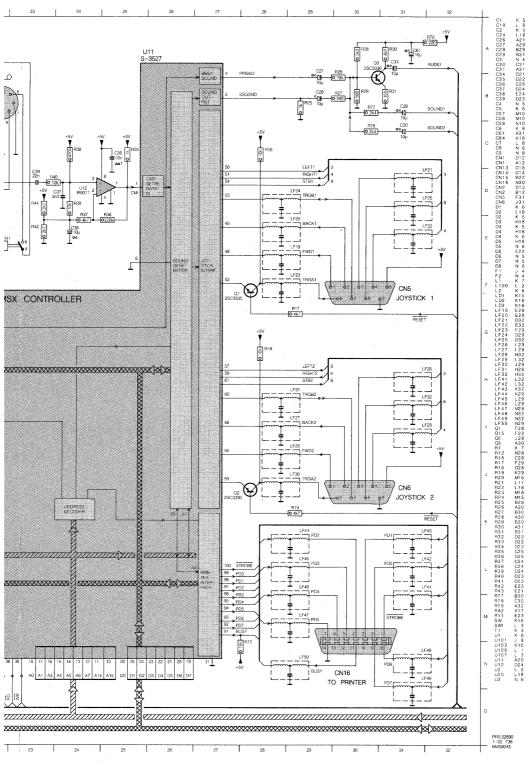


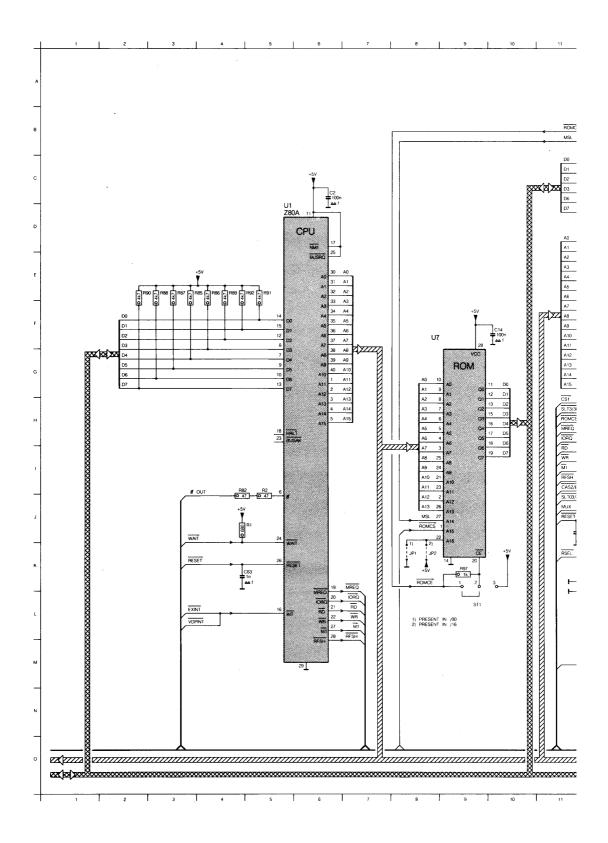


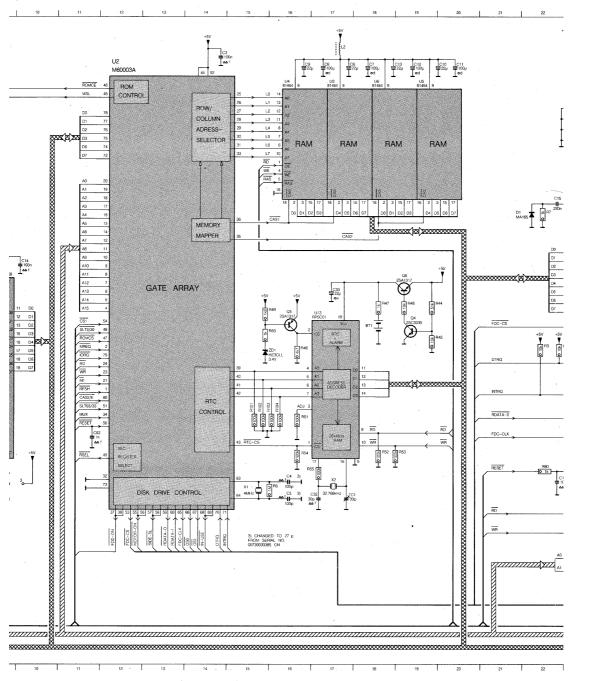
CS 11 835



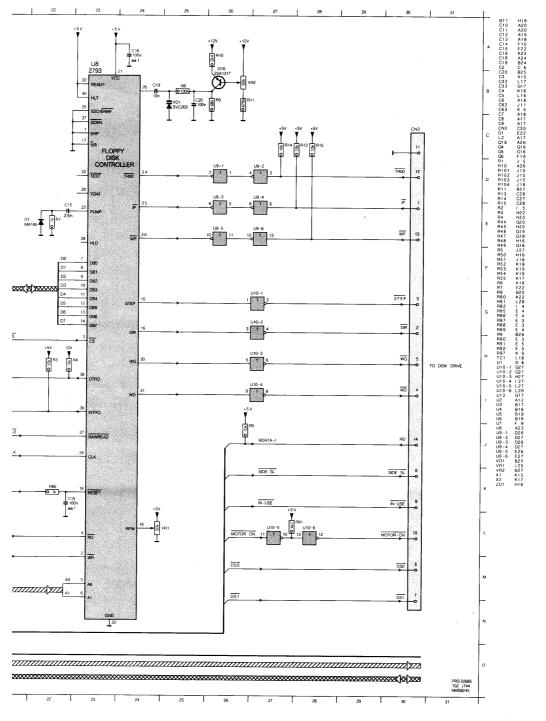




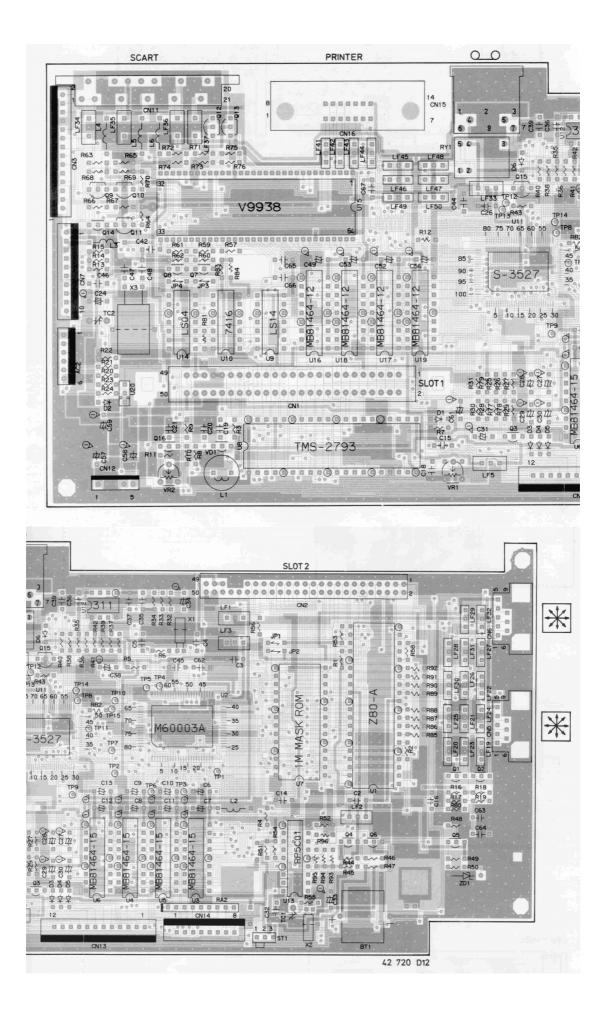


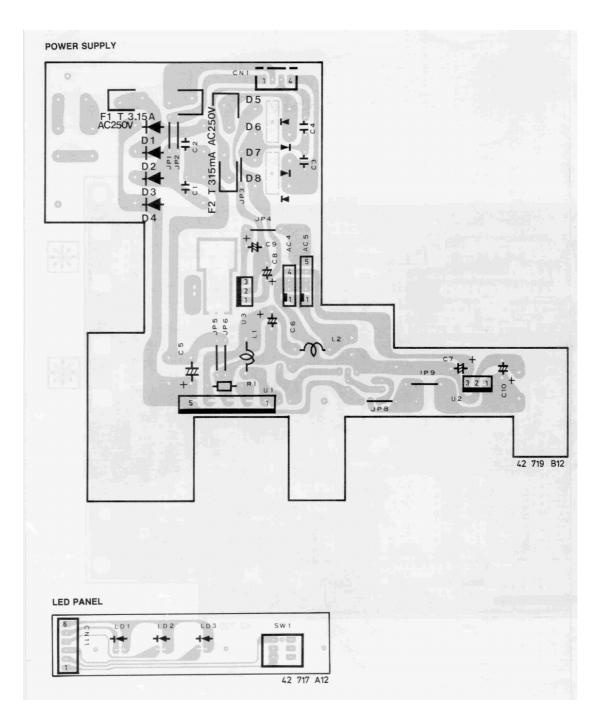


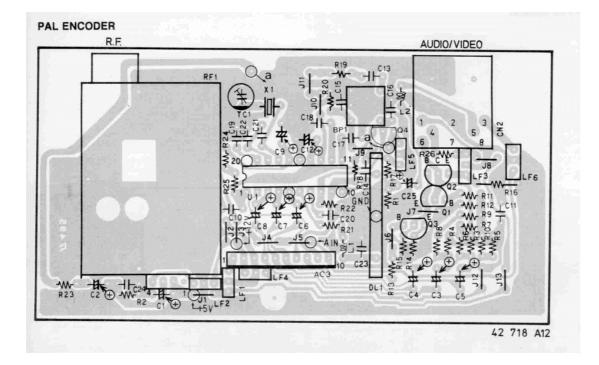
50 B



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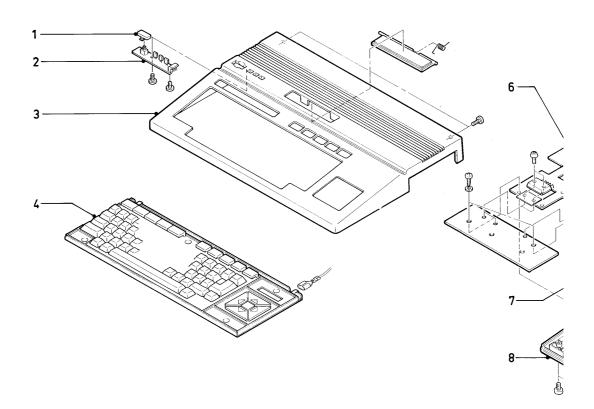
U			→	<b>→</b>	
U100	Main printed board /00/16 <sup>1</sup> )	4822 219 81089	D1-D6 ZD1	MA165 HZ3CLL	4822 130 32362 4822 130 33009
<b>6</b> )			VD1	Vari. cap SVC203-M	4822 125 11009
U1	Z80A	4822 209 10569	_   _ <b>I⊢</b> _		
U2 U3	M60003A 81464-12	4822 209 71325 4822 209 83426	C6 ,C9 -	٦	
			C10,C13	- Tantal 22 μF 16 V	4822 124 10527
U4 U5	81464-12	4822 209 83426 4822 209 83426	C10,C13 -	Mylar 220 nF 50 V	4822 121 42931
	81464-12		C19	Mylar 10 nF 50 V	
U6	81464-12	4822 209 83426	C35,C39		
U7	ROM/00/16	4822 209 72581		,	
U8	2793	4822 209 11146	C37,C64	Mylar 3n3 50 V	4822 121 42784
U9	74LS14	5322 209 85199	C49,C52	- Tantal 22 μF 16 V	4822 124 10527
U10	7416	5322 209 84035	C,53,C56 _	_ ·	
U11	S-3527	4822 209 11097	TC1,TC2	Trimmer 30 pF	4822 125 50299
U12	UPC311	5322 209 85503			
U13	RP5C01	4822 209 83431			
U14	74LS04	5322 209 81625	VARIOUS		
U15	V9938	4822 209 83425			
U16	81464-12	4822 209 83426	X1	4 MHz	4822 242 72073
U17	81464-12	4822 209 83426	X2	32.768 kHz	4822 242 71345
Ū18	81464-12	4822 209 83426	X3	21.328125 MHz	4822 242 71347
Ú19	81464-12	4822 209 83426	BT1	NI-CD accumulator	4822 138 10235
U20	MN1280	4822 209 83414	RY1	Relay	4822 280 60514
020			ST1	Service jumper	4822 276 11572
RA2	8×4k7	4822 116 90191			
VR1	50 k Trimmer	4822 100 11106			
VR2	10 k Trimmer	4822 100 11105			
Ø					
Q1-Q4	2SC3330	4822 130 60945	1		
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			

MAIN PRINTED BOARD

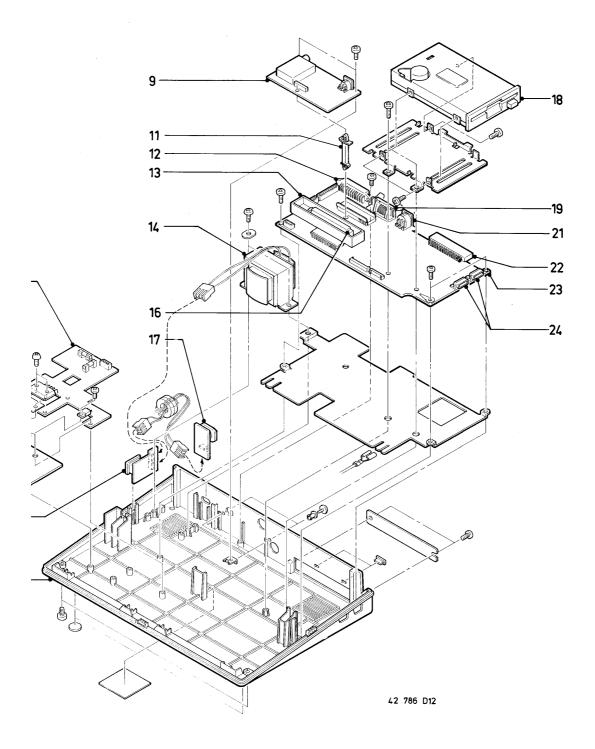
1) Install jumper JP2 and remove jumper JP1 for /16 version.

#### POWER SUPPLY

U			U		
U101	Power supply board	4822 219 81091	U102	Encoder unit	4822 219 81092
e)			Enner Street		
U1 U2	STR2005 UPC7812HF	4822 209 70871 4822 209 72579	IC1	MC1377	4822 209 71415
U3	MC7812CT	4822 209 81726	- Q		
-₩-	<b>-₩</b> -		Q1-Q4	2SC3330	4822 130 60945
D1-D4 D5-D8	S2V-10 MPG06G	4822 130 32814 4822 130 80631			
			R24 R25	43k 1% 10k 1%	4822 111 41359 4822 111 41358
L1 L2	Coil 180 μ	4822 157 52805 4822 157 53326	-11-		
	-		C10 TC1	1nF 50 V film 30pF trimmer	4822 121 42945 4822 125 50299
[U]			VARIOUS		
U103	Complete LED panel	4822 219 81118	BP1 DL1	Transformer Delay 400 nS	4822 157 53332 4822 157 53327
→			X1 CN2	4.433619 MHz Modulator Monitor connector	4822 242 72074 4822 212 10215 4822 267 50711
LD1 LD2 LD3	LED yellow LED green LED green	4822 130 32984 4822 130 32983 4822 130 32983	FLOPPY D	DISK DRIVE	<u>.</u>
VARIOUS			[U]		
SW1	Reset switch Reset knob	4822 277 10862 4822 410 24402	U104	Floppy disk drive	4822 212 22883



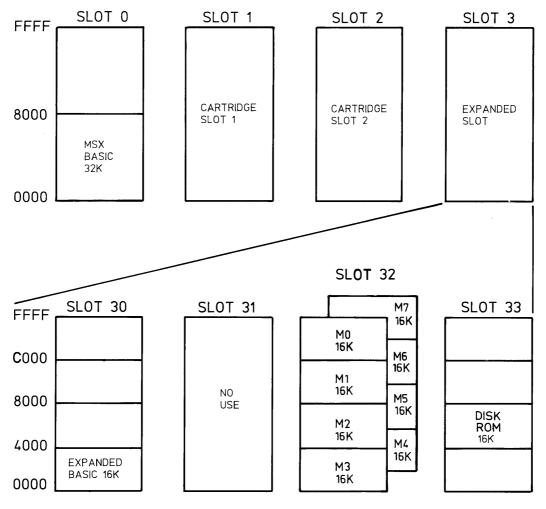
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## **MECHANICAL PARTS LIST**

1 2 3 4	4822 410 24402 4822 219 81118 4822 432 10643 4822 219 81088 4822 219 81093	Reset Knob LED panel Cabinet top case Keyboard /00 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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SY	MBOLS	USED	CUIT	DIAGRAI	MS
			 _		

STREES USED IN CIRCON		I DIAGRAMS		
SYMBOL	TYPE	t <sup>P</sup> 70° amb	TOLERANCE	SERIES
-	SFR16T	0.5	1E - 3M 5%	E24
-0	SFR25H	0.5	1E - 10M 5%	E24
-Æ	MRS25	0.6	1E - 1M 1%	E24
	MR30	0.5	1E - 1M 1% (2%)	E24
-+	VR37	0.5	<b>2</b> 20K - 33M 5%	E24
-	PR37	1.6	1E - 1M 5%	E24
	VR68	1	100K - 68M 5%	E24
-	MRS 16T	0.4	10 <b>R</b> -100K	E24⁄E96

SYMBOL	TYPE	VOLTAGE DC	TOLERANCE
•••	POLYESTER FLATFOIL	SEE NOTE	10%
	PLATE CERAMIC	SEE NOTE	DEPENDING ON CAPACITY
° <u>+</u> 0	ELCO MINIATURE SINGLE	SEE NOTE	-10+50%
• <b>*</b> -0 <b> -</b> -	ELCO SINGLE ENDED	SEE NOTE	±20%

NOTE:				
*	f = 25V	q = 200V	x = 1000V	E = 20V
	<b>g</b> = 40V	r = 250V	z = 1600∨	F = 35V
a = 2.5V	h = 63V	s = 300V	A= 1.6V	G = 50V
b = 4V	<b>j =</b> 100V	t = 350V	B= 6V	H = 75V
<b>c</b> = 6.3V	l = 125V	u = 400V	C= 12V	I = 80V
d = 10V	m= 150V	v = 500V	D= 15V	
e = 16V	n = 160V	w= 630V		
				39 301 A13

