



PHILIPS

Field Service Manual P2000

(Excl. PRINTERS)

TABLE OF CONTENTS

| CHAPTER | | PAGE |
|---------|--------------------------------------|--------------------------|
| 1 | P2000 T+M | 1-1 thr. 1-45 |
| 2 | P2121 DMIST WHEEL PRINTER | 2-1 thr. 2-19 |
| 3 | P2123 MATRIX PRINTER | 3-1 thr. 3-15 |
| 4 | SPARE PARTS | 4-1 thr. 4-9 |

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1

SECTION

SYSTEM DESCRIPTION

SYSTEM DESCRIPTION

PAGE 1-5

| | | | |
|-----|-----------|--------------------------------------|------|
| 1.1 | 1.1.1 | Introduction | 1-5 |
| 1.1 | 1.1.2 | System Structure | 1-5 |
| 1.1 | 1.1.2.1 | T-Version | 1-7 |
| 1.1 | 1.1.2.2 | M-Version | 1-7 |
| 1.1 | 1.1.3 | Physical Description | 1-9 |
| 1.1 | 1.1.3.1 | Basic Cabinet | 1-9 |
| 1.1 | 1.1.3.2 | Monitor Cabinet | 1-11 |
| 1.1 | 1.1.4 | Technical Data | 1-12 |
| 1.1 | 1.1.4.1 | Performance Data | 1-12 |
| 1.1 | 1.1.4.1.1 | T-Version | 1-12 |
| 1.1 | 1.1.4.1.2 | M-Version | 1-12 |
| 1.1 | 1.1.4.1.3 | Cassette Drive | 1-13 |
| 1.1 | 1.1.4.1.4 | Floppy Drive | 1-13 |
| 1.1 | 1.1.4.2 | Power Requirements | 1-14 |
| 1.1 | 1.1.4.2.1 | Basic Cabinet | 1-14 |
| 1.1 | 1.1.4.2.2 | Monitor Cabinet | 1-14 |
| 1.1 | 1.1.4.3 | Physical | 1-14 |
| 1.1 | 1.1.4.3.1 | Basic Cabinet | 1-14 |
| 1.1 | 1.1.4.3.2 | Monitor Cabinet | 1-14 |
| 1.1 | 1.1.4.4 | Environmental | 1-14 |
| 1.1 | 1.1.4.5 | Approvals | 1-15 |
| 1.1 | 1.1.5 | Interfaces | 1-15 |
| 1.1 | 1.1.5.1 | T-V Interface | 1-15 |
| 1.1 | 1.1.5.1.1 | Hf | 1-15 |
| 1.1 | 1.1.5.1.2 | RGB | 1-15 |
| 1.1 | 1.1.5.2 | Printer Interface | 1-15 |
| 1.2 | 1.2 | MAINTENANCE | 1-19 |
| 1.2 | 1.2.1 | Tools | 1-19 |
| 1.2 | 1.2.2 | Preventive Maintenance | 1-19 |
| 1.2 | 1.2.2.1 | Cleaning | 1-19 |
| 1.2 | 1.2.3 | Safety Procedures | 1-19 |
| 1.2 | 1.2.4 | Trouble Shooting | 1-19 |
| 1.2 | 1.2.4.1 | T-Version | 1-21 |
| 1.2 | 1.2.4.2 | M-Version | 1-21 |
| 1.2 | 1.2.4.3 | Maintenance Program | 1-23 |
| 1.2 | 1.2.5 | Replacements | 1-25 |
| 1.2 | 1.2.5.1 | Extension Board | 1-31 |
| 1.2 | 1.2.5.2 | Video-Board | 1-31 |
| 1.2 | 1.2.5.3 | CPU-Board | 1-33 |
| 1.2 | 1.2.5.4 | Cassette Drive | 1-35 |
| 1.2 | 1.2.5.5 | Keyboard | 1-35 |
| 1.2 | 1.2.5.6 | Monitor Assembly | 1-37 |
| 1.2 | 1.2.5.7 | Floppy Drive | 1-37 |
| 1.2 | 1.2.5.8 | Power Supply Monitor | 1-37 |
| 1.2 | 1.2.5.9 | CPM-Board | 1-39 |
| 1.2 | 1.2.6 | Strapsettings | 1-41 |
| 1.2 | 1.2.6.1 | CPU-Board | 1-41 |
| 1.2 | 1.2.6.2 | Floppy Drive | 1-41 |
| 1.2 | 1.2.7 | Adjustments | 1-41 |
| 1.2 | 1.2.7.1 | Picture Quality Adjustment T-Version | 1-41 |
| 1.2 | 1.2.7.2 | Picture Quality Adjustment M-Version | 1-43 |
| 1.2 | 1.2.8 | Installation CPM Board | 1-45 |

LIST OF ILLUSTRATIONS

| FIGURE | | PAGE |
|--------|------------------------|------|
| 1.1 | T-VERSION | 1-4 |
| 1.2 | M-VERSION | 1-4 |
| 1.3 | BLOCKDIAGRAM T-VERSION | 1-6 |
| 1.4 | BLOCKDIAGRAM M-VERSION | 1-6 |
| 1.5 | BASIC CABINET | 1-8 |
| 1.6 | MONITOR CABINET | 1-10 |
| 1.7 | KEYBOARD LAYOUT | 1-16 |
| 1.8 | BASIC CABINET | 1-20 |
| 1.9 | MONITOR CABINET | 1-22 |
| 1.10 | EXTENSION BOARD | 1-30 |
| 1.11 | VIDEO BOARD | 1-32 |
| 1.12 | CPU BOARD T/M VERSION | 1-34 |
| 1.13 | FLOPPY DRIVE SA 400 | 1-36 |
| 1.14 | CPM BOARD | 1-38 |
| 1.15 | FLOPPY DRIVE SA 400L | 1-40 |
| 1.16 | MODULATOR ADJUSTMENT | 1-40 |
| 1.17 | MONITOR ADJUSTMENTS | 1-42 |
| 1.18 | INSTALLED CPM BOARD | 1-44 |

LIST OF TABLES

| TABLE | | |
|-------|-------------------------------------|------|
| 1.1 | SCREEN CHARACTERSET (INTERNAL CODE) | 1-17 |

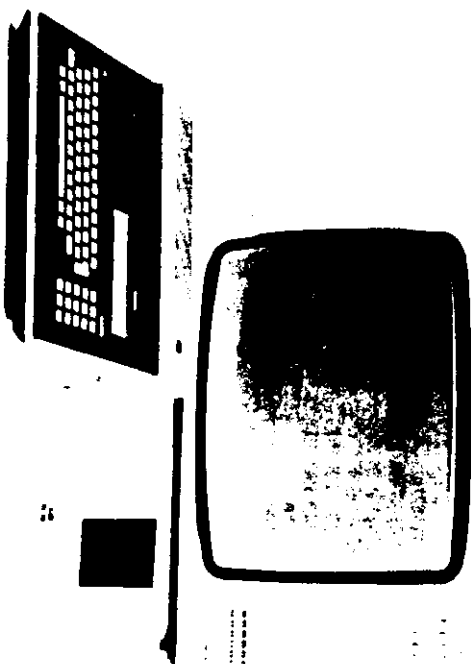


Figure 1.1 T-VERSION

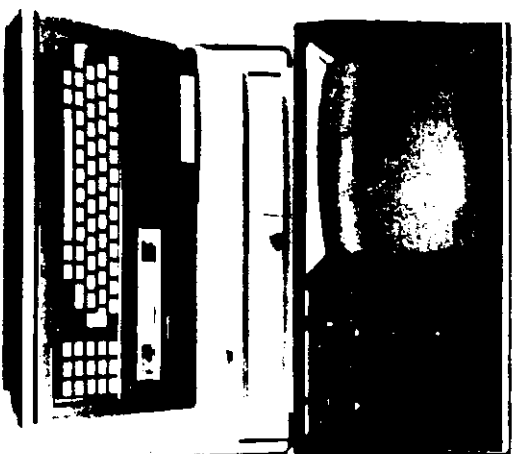


Figure 1.2 M-VERSION

1.1 SYSTEM DESCRIPTION

1.1.1 INTRODUCTION

The P2000 microcomputer is available in two versions:

- T-Version
- M-Version

The T-version consists of one cabinet, the basic cabinet (figure 1.1).

This computer interfaces to a standard black and white or colour television. It includes a keyboard and mini-cassette drive and is equipped with a serial printer interface. Standard programs (e.g. Word Processing, Basic) are available on ROM-cartridges which can be plugged into a slot on the cabinet.

Another slot is available for installation of an optional interface adaptor (e.g. Serial Interface). The T-version can optionally be equipped with a mini floppy disc interface.

The M-version consists of two cabinets, the basic cabinet and the monitor cabinet (figure 1.2).

The Basic Cabinet includes the same functions as the T-version, but interfaces to a professional monitor of the monitor cabinet. This monitor cabinet is also the housing for upto 2 mini floppy disc drives.

For both, T- and M-version, a printer interface is available to connect one of the printers available for the P2000 series.

This manual is intended to give the information about maintenance on both versions upto the level of replaceable modules.

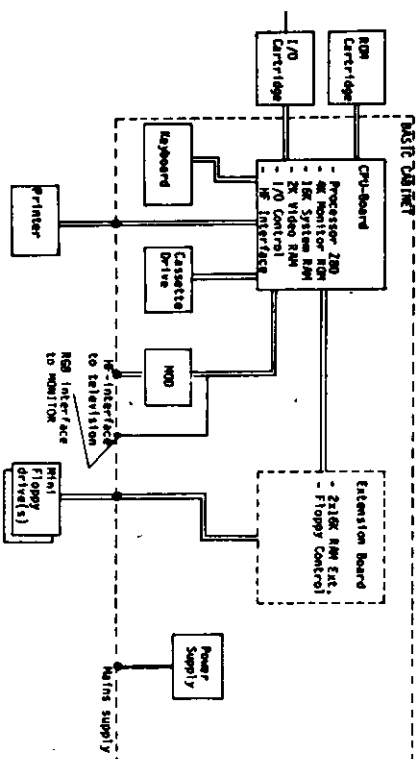


Figure 1.3 BLOCKDIAGRAM T-VERSION

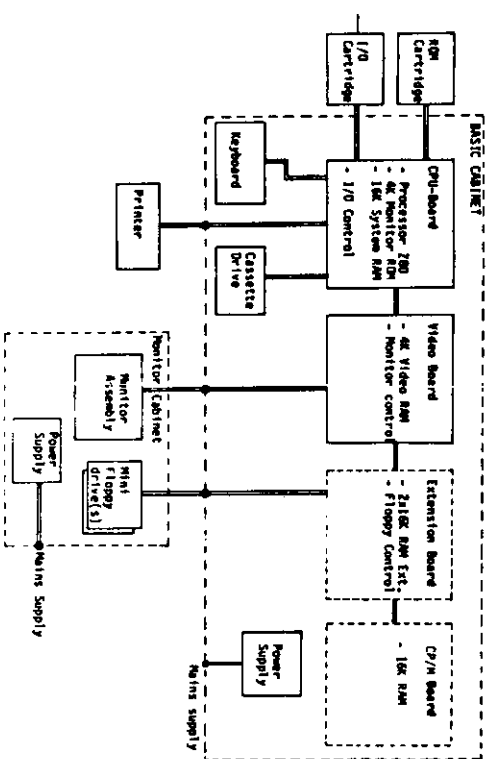


Figure 1.4 BLOCKDIAGRAM M-VERSION

1.1.2 SYSTEM STRUCTURE

1.1.2.1 T-VERSION

The T-version consists of the basic cabinet including the following units:

- A power supply unit delivering all necessary DC voltages.
- A CPU Board containing a microprocessor, 4K monitor ROM, 2K Video Memory, 16K system memory and interface circuitry to keyboard, cassette, cartridges, printer and TV.
- A standard typewriter keyboard including control functions and numeric pad.
- A mini cassette drive to save programs or data.
- An optional extension board including a floppy disc interface and upto 32K memory extension.

1.1.2.2 M-VERSION

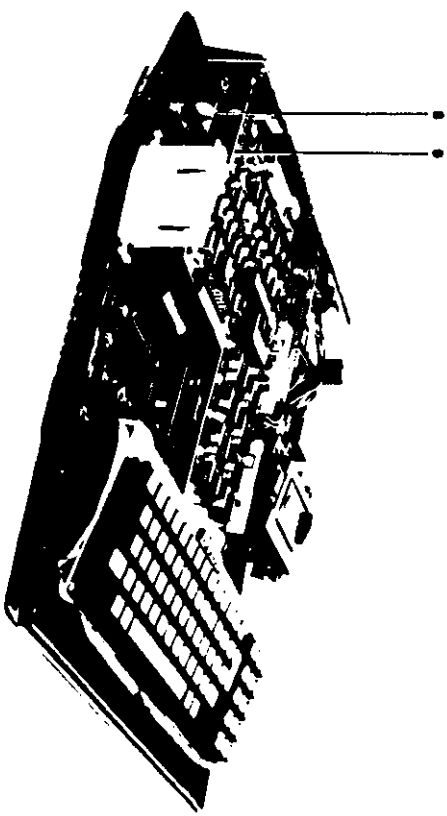
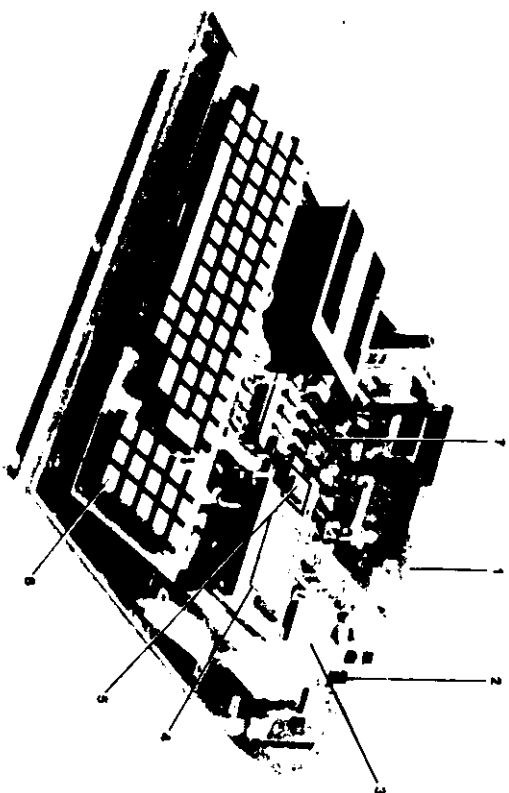
The M-version consists of the same basic cabinet as the T-system, however, with the following differences:

- The CPU-board does not contain a Video and TV-interface.
- A Video Board is included which contains a 4K Video Memory and Monitor Interface.
- A CP/M Board option is available. By means of this memory remapping kit the P2000 can run the original P2000 software or software under the CP/M operating system.

The Monitor Cabinet consists of the following units:

- A power supply unit
- 12" monitor
- Upto 2 mini floppy disk drives

The same extension board as the T-version is available.



1.1.3 PHYSICAL DESCRIPTION

1.1.3.1 BASIC CABINET (Figure 1.5)

The FRAME consists of a formed plastic moulding upon which the modules are mounted. The base is ventilated. Four rubber feed provide stability and clear the ventilation grills.

A moulded plastic COVER is attached to the frame by seven Phillips screws which are accessible from underneath. The cover also has a grill to provide air-ventilation. The cover contains a hatch for cartridge insertion. Directly behind the keyboard is a window through which a chart of special key functions may be displayed.

An ALUMINIUM BACKPLATE (1) forms the heat sink for the power supply regulators. The power supply board is physically connected to the backplate, the other end being supported by a groove in the frame.

The POWER-ON SWITCH (2) and MAINS TRANSFORMER (3) are screwed to the frame.

The MINICASSETTE UNIT (4), which also carries the RESET KEY (5), screws to the frame and is accessible through an opening in the cover.

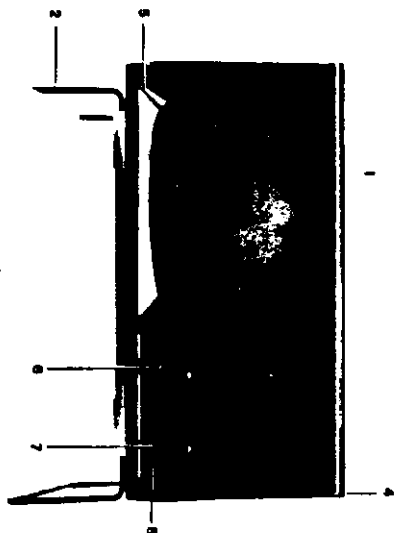
The KEYBOARD (6) requires no fastenings. It is located onto the frame and is then clamped by the cover.

In both T- and M-versions the CPU-BOARD (7) is mounted directly on the base of the frame. If a CP/M board is available in the M-version then this board will be fixed on the CPU-board. The other PCB's are located above the CPU Board. They are slotted between three plastic blocks which form a Card-Cage.

The lower slot is empty in the T-version but houses the VIDEO BOARD (8) in the M-version.

The upper slot may be used, in both versions, for an EXTENSION BOARD (9).

Figure 1.5 BASIC CABINET



1.1.3.2 MONITOR CABINET (Figure 1.6)

The FRAME (1) consists of a plastic moulding upon which the modules are mounted. It is supported by a METAL STAND (2). The frame can be positioned against this stand with help of a TILT SCREW (3) at the backside of the frame.

A plastic COVER is attached to the frame with screws accessible from underneath. At the front side the cover is clamped by the FRONT COVER (4). This front cover is also mounted to the frame and supports the BRIGHTNESS POTENTIOMETER (5), the POWER-ON SWITCH (7) and POWER INDICATOR LAMP (8).

The MONITOR ASSEMBLY (9), including tube and electronics, is screwed to the frame.

The power supply of the cabinet consists of a MAINS TRANSFORMER (10) which is mounted to the frame, and a POWER SUPPLY UNIT (11) consisting of a PCB and Heat-sink.

One or two DISK DRIVE UNITS (12) may be installed in the cabinet. The drives are mounted to a metal plate which is screwed to the frame.

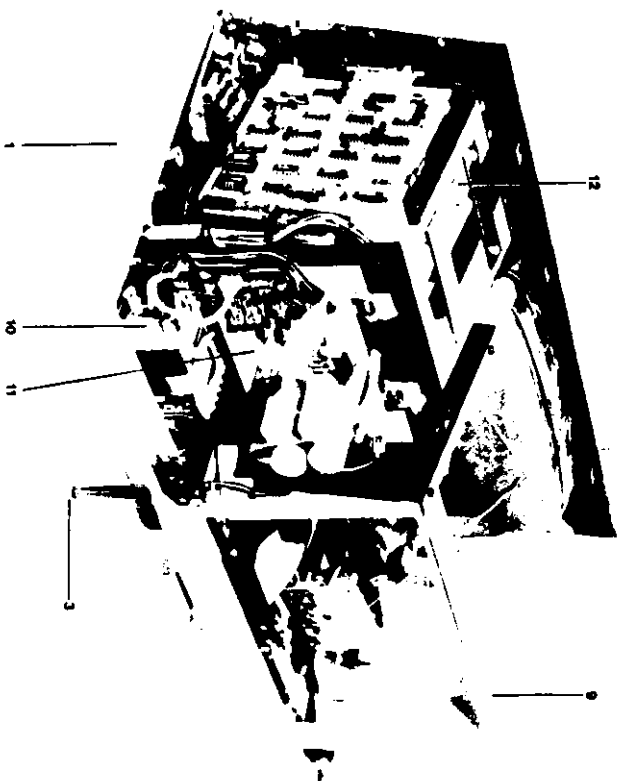


Figure 1.6 MONITOR CABINET

1.1.4 TECHNICAL DATA

1.1.4.1 PERFORMANCE DATA

1.1.4.1.1 T-VERSION

| | | |
|------------------|---------------------|---|
| CPU | : | 280 |
| ROM: | : - Monitor | 4K8 |
| | - Cartridge | 16K8 |
| RAM: | : - Video Page | 2K8 |
| | - System | 16K8 |
| | - Extension | 16/32K8 |
| Keyboard | : - Typewriter | 48 keys |
| | - Functions | 15 keys |
| | - Control/numeric | 11 keys |
| | - National versions | English, German, Dutch, Swedish |
| Beeper | : | TV - Audio |
| Cassette | : | Yes, See 1.1.4.1.3 |
| Floppy Disk | : | Optional, See 1.1.4.1.4 |
| Printer I/F | : - Type | V24/RS232C |
| | - Mode | Asynchronous |
| | - Speed | 1200 B/SEC Standard 75/110/300/600/2400 Possible |
| I/O Cartridges : | Serial Interface | IEC-Bus Interface |
| Screen | : - Interface | HF Standard and RGB |
| | - Type | MONO-or COLOUR TV |
| | - Capacity | 24 lines |
| | - Scrolling | 40 characters/line |
| | - Character set | 40 characters horizontal scrolling |
| | - National Version | Teletext (Table 1.1) English, German, Swedish |

1.1.4.1.2 M-VERSION

| | | |
|----------|---------------------|---------------------------------|
| CPU | : | 280 |
| ROM | : - Monitor | 4K8 |
| | - Cartridge | 16K8 |
| RAM | : - Video Page | 4K8 (2K12) |
| | - System | 16K8 |
| | - Extension | 16/32K8 |
| Keyboard | : - Typewriter | 48 keys |
| | - Functions | 15 keys |
| | - Control/numeric | 11 keys |
| | - National versions | English, Dutch, German, Swedish |

1-12

P2000 F. SERV.

8210

8210

P2000 F. SERV.

1-13

Basic Cabinet

Cassette

Floppy Disk

Printer I/F

: - Type

- Mode

- Speed

- Interface

- Type

- Format

- Character set

- Attributes

- Encoding method

- Media

- Speed

- Transport time

- Encoding method

- Type

- Media

- Capacity

- Formatting

- Access time

- Encoding method

- Type

- Media

- Capacity

- Formatting

- Access time

- Encoding method

Yes, See 1.1.4.1.3

Optional, See 1.1.4.1.4

V24/RS232C

Asynchronous

1200 B/5 Standard

300/600/2400/75/110 possible

Serial Interface

IEC-Bus Interface

FBIAS

FIM 12"/90° Monitor

P31 Phosphor (Screen)

Antiglare finish

24 rows

80 characters/row

6 x 10 Character Matrix

Teletext (restricted), see table 1.1

Cursor (81inking underline)

Inverse

81inking

Underline

Graphics

ELA Mini Cassette Drive

Mini Cassette DB4401 or equivalent

6K8/Sec Data Transfer

95 sec

PE

5" Mini, Single Sided

SA104 or Similar

140 KB (Formatted)

35 tracks

16 sector/track (Soft-sectored)

256 bytes/sector

40ms track to track

643ms average

MFM

1.1.4.2 POWER REQUIREMENTS

1.1.4.2.1 BASIC CABINET

Mains Voltage :

220V \pm 10% (Factory wired)
110V \pm 10%

Power Consumption:
(Incl. Options)

52VA Nominal

Fuses :

5A (+5V)
2 x 1A Fast (+12V/-V)

1.1.4.2.2 MONITOR CABINET

Mains voltage :

220V \pm 10% (Factory wired)
.240V \pm 10%

Power Consumption:
(Incl. 2 floppy drives)

58VA Nominal
80VA Peak

Fuses :

1.25A Monitor Assembly
2A (T)
4A (T)

1.1.4.3 PHYSICAL

1.1.4.3.1 BASIC CABINET

Dimensions :

410W x 466D x 110Hmm

Weight :

- Equipment
- Packed

7.6 KG
9.0 KG

1.1.4.3.2 MONITOR CABINET

Dimensions :

396W x 380D x 335Hmm

Weight :

- Equipment
- Packed

11.0 KG
12.5 KG

1.1.4.4 ENVIRONMENTAL

Operation Temperature
Storage Temperature
Humidity
Vibration
Shock
Operating position

5°C to 40°C
-15°C to 50°C
20% to 90%

horizontal

1.1.4.5 APPROVALS

United Kingdom, BSI
Holland, VDE, (IEC)
Germany, VDE, (IEC)
Austria, VDE, (IEC), (OVE)

1.1.5 INTERFACES

1.1.5.1 TV INTERFACE (T-VERSION)

1.1.5.1.1 HF

- VHF/UHF MODULATED
- Coax Connector
- PAL, NTSC, SECAM Compatible

1.1.5.1.2 RGB

| PIN | NAME |
|-----|-------|
| 1 | GREEN |
| 2 | SYNC |
| 3 | GND |
| 4 | RED |
| 5 | BLUE |
| 6 | BEEP |

1.1.5.2 PRINTER INTERFACE

Connector : - 25P Cannon

Interface Signals:

| PIN | NAME | FUNCTION |
|-----|-------|--------------------------------|
| 3 | CT103 | Data Out |
| 2 | CT104 | Received Data (Service Signal) |
| 7 | CT102 | Logic Ground |
| 20 | CT108 | Printer Ready |

1.2 MAINTENANCE

1.2.1 TOOLS

The materials prescribed for use during maintenance, apart from a standard set of tools, are listed below:

- Scotts Wiper
- Isopropyl Alcohol
- Maintenance Program

1.2.2 PREVENTIVE MAINTENANCE

1.2.2.1 CLEANING

Wipe or brush clean all exposed surfaces, paying particular attention to the key-tops. For stubborn accumulation of dirt and CRT-screen, a scott wiper dampened with Isopropyl alcohol should be used. Over longer periods the covers should be removed, and the assemblies cleaned with a vacuum cleaner.

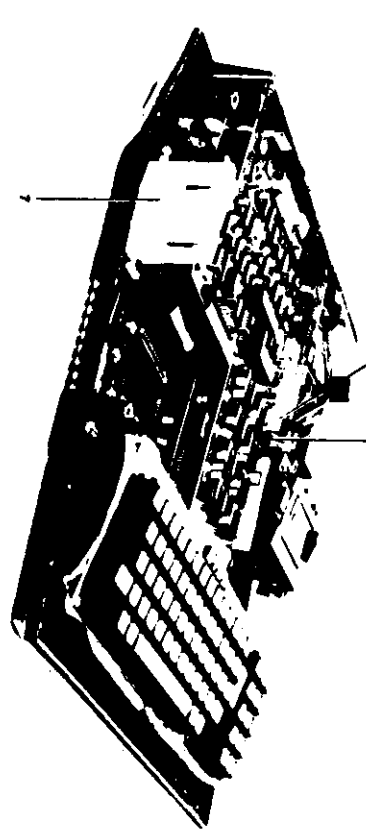
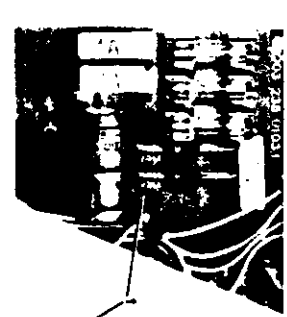
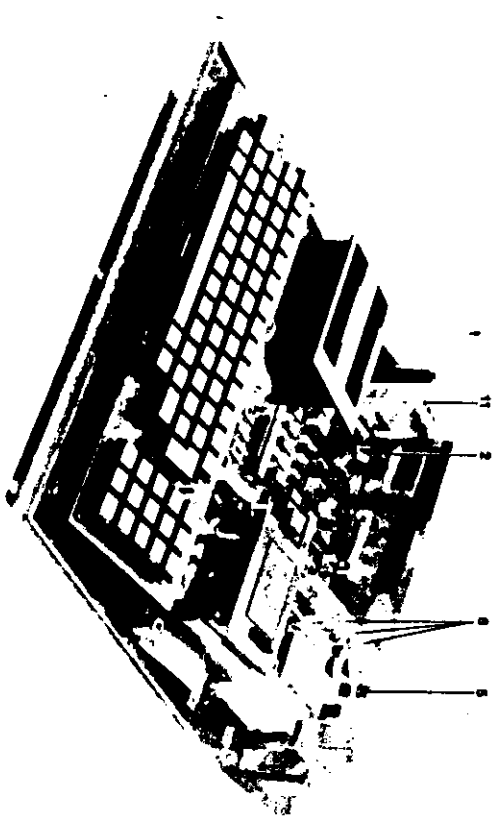
1.2.3 SAFETY PROCEDURES

The safety procedures, which should be adhered to at all times, are as follows:

- a) Never remove a module without first removing the plug from the power source.
- b) Before handling the monitor assembly always discharge the CRT by shortening the anode connection to the chassis ground. This can be done by unclipping the high voltage wire from the CRT and shortening the anode itself via a wire brought from the chassis ground.
- c) Extreme care should be taken when handling or transporting the monitor assembly as rough handling may cause it to implode.

1.2.4 TROUBLE SHOOTING

In this manual trouble shooting is based on the level of isolating the faults and the exchange of spare modules.



1.2.4.1 TROUBLE SHOOTING T-VERSION

PROCEDURE STEPS

REACTION

MAINTENANCE ACTION

1. Remove Cartridge(s)
Remove Cassette
Switch power-on
(Basic Cabinet)

Power-on
Indicator Lite
No power-on
Indicator

Continue step 3
Check Mains Supply
Connection
Continue step 2

2. Insert any cassette
Push Reset Button

Cassette
moving

Check keyboard connection,
fig. 2.12/3
Replace Keyboard,
sect. 1.2.5.5
(Indicator defect)

No reaction

Check fuses, fig. 1.8/1
Check Power supply connec.
fig. 1.8/3
Check cassette conn.,
fig. 2.12/2
Check power supply, cont.
step 7 sect. 1.2.4.2

3. Switch power-on
Television

TV Screen:
Philips/P2000
Microcomputer

Continue step 4

No (Correct)
Screen

Check TV interface, fig. 1.8/2
Select HF Band
Adjust Channel
Check insertion of
Modulator, fig. 1.8/4
Check fuses, fig. 1.8/1
Check CPU-Board conn.
fig. 1.12/1
Replace TV
Replace CPU-Board, sect. 1.2.5.1

4. Insert maintenance
Program (First
Socket
Push reset button

Screen:
"Test Menu"

Continue Maintenance
Program, sect. 1.2.4.3

Screen:
Philips/P2000
Microcomputer

Continue step 5

5. Switch power-off
Wait 10 seconds
Switch power-on

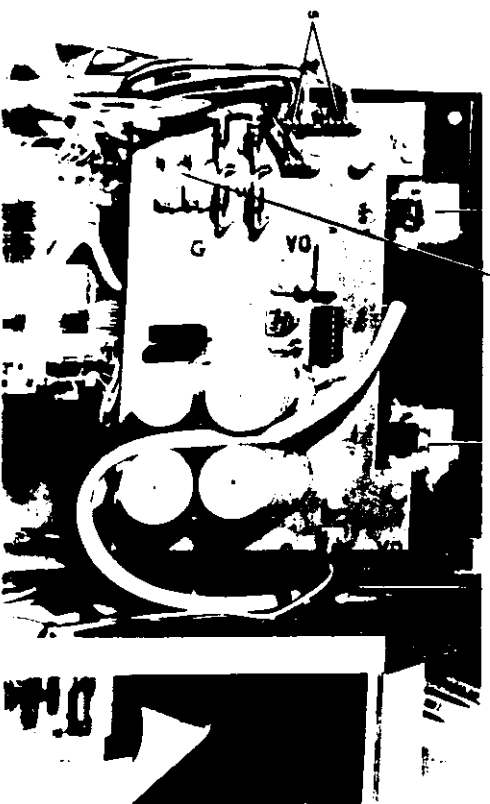
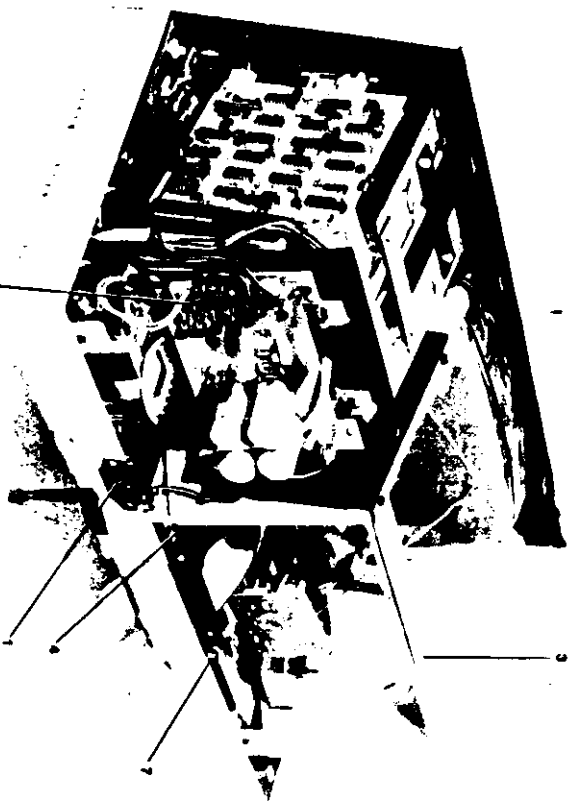
Screen:
"Test Menu"

Check reset button wiring,
fig. 1.12/4
Replace reset key,
sect. 1.2.5.4
Replace CPU-Board,
sect. 1.2.5.1

Screen:
Philips/P2000
Microcomputer

Check/Clean socket, fig. 1.12/5
Replace CPU-Board, sect. 1.2.5.1
Replace Maintenance
Cartridge

Figure 1.8 BASIC CABINET



1.2.4.2 TROUBLE SHOOTING M-VERSION

PROCEDURE STEPS

REACTION

1. Switch power-on Monitor unit

Power indicator monitor lit

No power on indication

MAINTENANCE ACTION
Wait 30 seconds
Continue step 2

Check mains connection, fig. 1.9/1
Check fuses, fig. 1.9/2
Check power supply wiring
Check indicator lamp
Replace power-supply, sect. 1.2.5.8

2. Remove Cartridge(s)

Remove Cassette
Switch power-on
Basic cabinet

Power indicator keyboard lit
No power indication

Continue step 4

Check mains connection
Continue step 3

3. Push Reset Button

Beep-tone

No Beep

Check keyboard connection, fig. 1.12/3
Replace keyboard, sect. 1.2.5.5 (LED defective)
Check fuses, fig. 1.8/1
Check connections, fig. 1.8/3
Check power supply
Continue step 7

4. Push Reset Button

Screen: Philips/P2000 Microcomputer
No screen, Beep-tone

No Screen
No Beep

Turn brightness potential fully clockwise
Check monitor interface, connection fig. 1.11/2
Check monitor fuse, fig. 1.9/4
Replace video board, sect. 1.2.5.2
Try screen adjustments, sect. 1.2.7.2
Replace monitor assembly, sect. 1.2.5.6
Replace monitor unit Power Supply, sect. 1.2.5.8
Check wiring basic cabinet, fig. 1.8/3 and fig. 1.12
Replace boards, sect. 1.2.5
Check power supply
Continue step 7

Figure 1.9 MONITOR CABINET

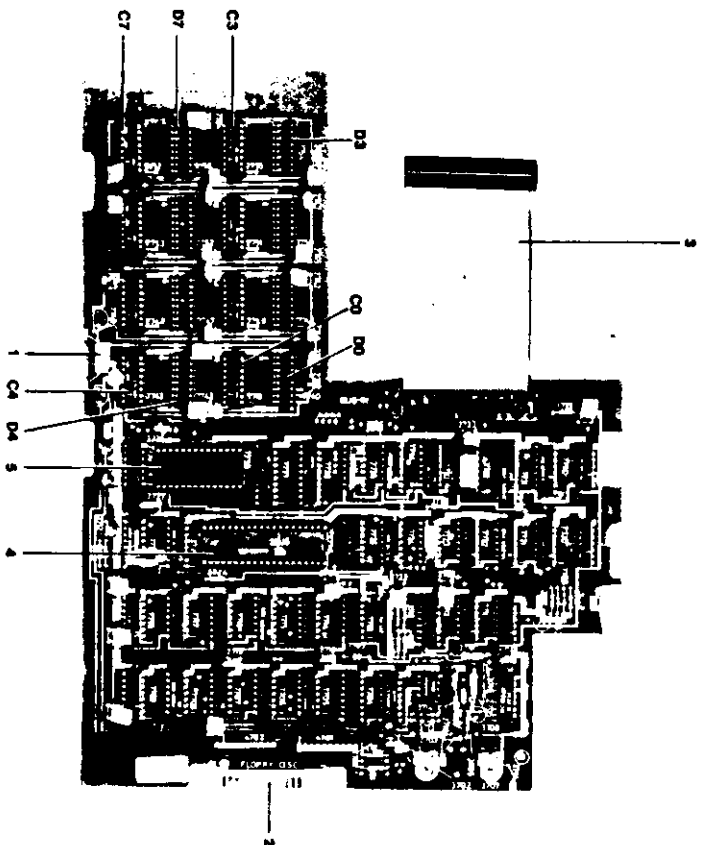
| PROCEDURE STEPS | REACTION | MAINTENANCE ACTION |
|--|--|---|
| 5. Insert maintenance Program (First Slot) | Screen: "Test Menu" Screen: Philips/P2000 Microcomputer | Continue maintenance program, sect. 1.2.4.3 Continue step 6 |
| 6. Switch power off Wait 10 seconds Switch power on | Screen: "Test Menu" | Check wiring reset button, fig. 1.12/5 Replace reset button |
| 7. Remove power supply cables of CPU-, Video-, Extension Board | Screen: Philips/P2000 Microcomputer | Check/clean socket, fig. 1.12 Replace CPU-Board, sect. 1.2.5/3 Replace Maintenance Cartridge fig. 1.8/3 |
| Check 5 volt supplies. Measure between right socket pin and second left socket pin. Perform this action for CPU-, Video-, and Extension Board sockets. | 5 volt avail. 5 volt not available at all. No 5 volt on: CPU-socket. Video socket | Continue step 8, fig. 1.8/6 Replace power supply Replace upper regulator, fig. 1.8/5 Replace regulator second from top, fig. 1.8/5 Replace regulator second from bottom, fig. 1.8/5 Replace bottom regulator, fig. 1.8/5 |
| 8. Check 12 volt supply. Measure between left socket pin and second left socket pin of CPU Board socket | Extension socket 12 volt not available | |

1.2.4.3 MAINTENANCE PROGRAM

| PROCEDURE STEPS | REACTION | MAINTENANCE ACTION |
|--------------------------------------|---|--|
| 0. Start: Select National Version | 1:(Austria) or 0(Germany) 2:(Spain) 3:(France) 4:(Italy) 5:(Netherlands) or UK(England) 6:(Sweden) | No reaction: - Push reset 3 times Continue step 3. |
| Select Test | 1:RAM 2:V24 3:Keyboard 4:Screen 5:Tape Drive 6:Beeper 7:Floppy Drive 8:Summary | |
| 1. RAM Test: Global Error Test | After some minutes: 5000 - 5FFF 5800 - 5FFF 6000 - 9FFF A000 - DFFF E000 - FFFF (1) E000 - FFFF (2) Extra CPM Range Not available: Bad Bits: | Video RAM (T) sect. 1.2.5.3 (T) Video RAM (M) sect. 1.2.5.2 (M) System RAM sect. 1.2.5.3 Extension RAM sect. 1.2.5.1 Extension RAM sect. 1.2.5.1 Extension RAM sect. 1.2.5.1 CPM RAM sect. 1.2.5.9 - Check if RAM is installed - Check Power Supply - Check Connections - Replace Board - Replace RAM Circuits - Replace Board |
| 2. V24 Test: Select Test | 1:Printer Char. Test 2:Serial Interface 3:Viewdata Interface 4:Socket Static Test | |
| 2.1 Printer Char. Test | Print Character Set. Print Character Set underlined. Print Graphic Pattern Print 5 lines only indicating begin and end. Print 8 lines of 80 characters. | |

| PROCEDURE STEPS | REACTION | MAINTENANCE ACTION | PROCEDURE STEPS | REACTION | MAINTENANCE ACTION |
|---|---|---|--------------------------------------|---|---|
| 2.2 Serial Interface Select Baudrate | 1:75 2:150 3:300 4:600 5:1200 6:2400 7:4800 8:9600 | | 4.3 National Version | Some unique characters for this version are displayed on screen. | Press particular key. If not correct: - check selected nat. version - check character generator sect. 1.2.5.3 (T) sect. 1.2.5.2 (M) |
| | No start bit: Wrong data: | - Insert module connector in printer socket - Reset, type in correct baud rate - Replace serial interface | 4.4 Screen Adjustment | Screen Pattern for Adjustment | - Adjust screen, sect. 1.2.7.2 (M), sect. 1.2.7.1 (T) |
| 2.3 View Data Interface | Wrong Data | - Connect pins 6-8 - Replace view data interface | 4.5 Special Screen Test | Display of screen attributes | - Verify screen. If sect. 2.7.1 not correct: - Replace attribute RAM (M), sect. 1.2.5.2 - Replace character generator (T), sect. 1.2.5.3 - Replace video board (M) sect. 1.2.5.2 - Replace CPU-board sect. 1.2.5.3 |
| 2.4 Socket Static Test | Plug layout of interface pins | - Make required connections - Printer interface defective: - Replace CPU-board | 5. Tape Drive Test: Select Test | 1:Read Master Tape 2:Write skip-back read test 3:Continue status test | If not correct: - Clean read/write head - Replace cassette medium - Replace MOCR sect. 1.2.5.4 - Replace CPU-board sect. 1.2.5.3 |
| 3. Keyboard Test: | Geometric arrangement of all keys on screen, Inverted for M-colored for T-version | - Depress key with blinking character. After depression the symbol returns to normal (white T-version). - If sequence error is made: - Beeper sounds - Replace keys which do not change - If no action - Replace keyboard interface - Replace CPU Board | 5.1 Read Master tape | A predefined master tape is read (created in 5.2) | |
| 4. Screen Test Select test: | 1:Character test 2:Graphics test 3:Screen Nat. version test 4:Screen adjust. test 5:Special screen test | | 5.2 Write Skipback Read Test | Write Skip Back Read Tape 44 records | |
| 4.1 Character Test | Each character is displayed one full row. | - Scroll the picture by depressing tab-key - Define Erroneous row (cursor positioning, define key) - Replace character generator sect. 1.2.5.3 (T) sect. 1.2.5.2 (M) | 5.3 Continuous Status Test | Status of, Cassette is checked | - Check cassette inserted switch - Check write protected switch - Check cassette interface - Replace MOCR sect. 1.2.5.4 |
| 4.2 Graphics Test | A picture using all graphics appears. | - Check picture, if not correct: replace character generator sect. 1.2.5.3 (T) sect. 1.2.5.2 (M) | 6. Beeper Test | Test Beeper | If not correct: - Increase volume TV (T) - Replace CPU-board sect. 1.2.5.3 (T/M) |
| | | | 7. Floppy Drive Test: Select Test | 1:Read Master Disk 2:Write Read Test Disk 3:Cont. Read on track | |

| PROCEDURE STEPS | | REACTION | MAINTENANCE ACTION |
|----------------------------|--|--|--|
| 7.1 Read Master Disk | | From a Master Disk Track 0-34 is read (created in 7.2) | If not correct: <ul style="list-style-type: none"> - Check interface - Try Drive 2 (if available) - Replace Master Disk - Replace drive sect. 1.2.5.7 - Replace extension board sect. 1.2.5.1 |
| 7.2 Write/Read Test Disk | | Write, Read Step all tracks | If not correct: <ul style="list-style-type: none"> - Clean head - Replace medium - Replace drive sect. 1.2.5.7 - Replace extension board sect. 1.2.5.1 |
| 7.3 Contin. read one track | | Step to asked track | |
| 8. Summary | | List of Test Protocol on screen and printer (if available) | Enter asked data |

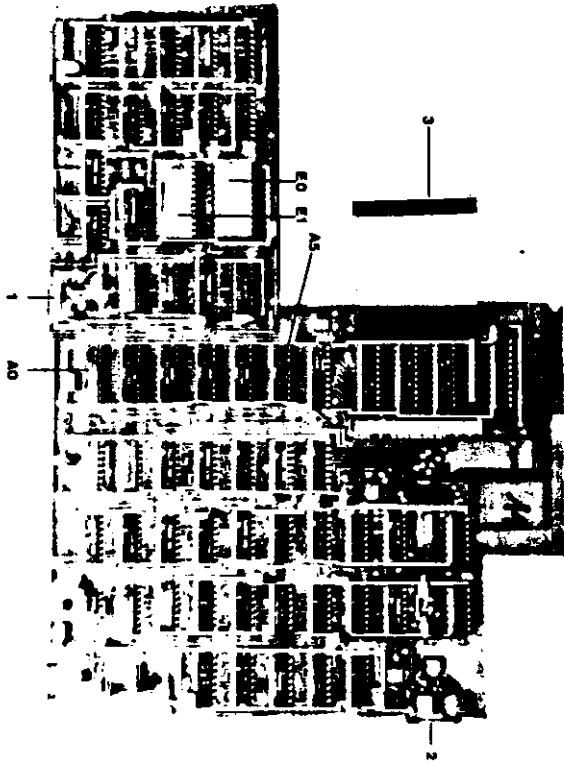


1.2.5 REPLACEMENTS

1.2.5.1 EXTENSION BOARD

- Disconnect mains supply
- Remove cover (basic cabinet)
- Disconnect floppy interface (if used), (figure 1.10/2)
- Disconnect Power supply connection (red wire down), (figure 1.10/1)
- Unclasp board from card cage
- Disconnect Bus connector
- Replace board (figure 1.10/3)
- Memory Circuits : A000 - DFFF B170 (figure 1.10 - C0)
B177 (figure 1.10 - C7)
- E000 - FFFF B170 (figure 1.10 - D0)
B177 (figure 1.10 - D7)
- Floppy Controller : uPD765
- Timer Circuit : Z80-CTC

Figure 1.10 EXTENSION BOARD



1.2.5.2 VIDEO BOARD

- Remove extension board (if used)
 - Disconnect power supply connection (red wire down)
 - Disconnect monitor interface
 - Unclasp board from card cage
 - Disconnect Bus connection
 - Replace board
- (section 1.2.5.1)
(figure 1.11/1)
(figure 1.11/2)
(figure 1.11/3)
- Memory Circuits : 5000-57FF BIT0-3 Upper Lines: (figure 1.11/A3)
BIT0-3 Lower Lines: (figure 1.11/A2)
BIT4-7 Upper Lines: (figure 1.11/A4)
BIT4-7 Lower Lines: (figure 1.11/A5)
5800-5FFF BIT0-3 Upper Lines: (figure 1.11/A1)
BIT0-3 Lower Lines: (figure 1.11/A0)
 - Character Generator : Upper 8 scan lines (figure 1.11/E0)
Lower 4 scan lines (figure 1.11/E1)

Figure 1.11 VIDEO BOARD

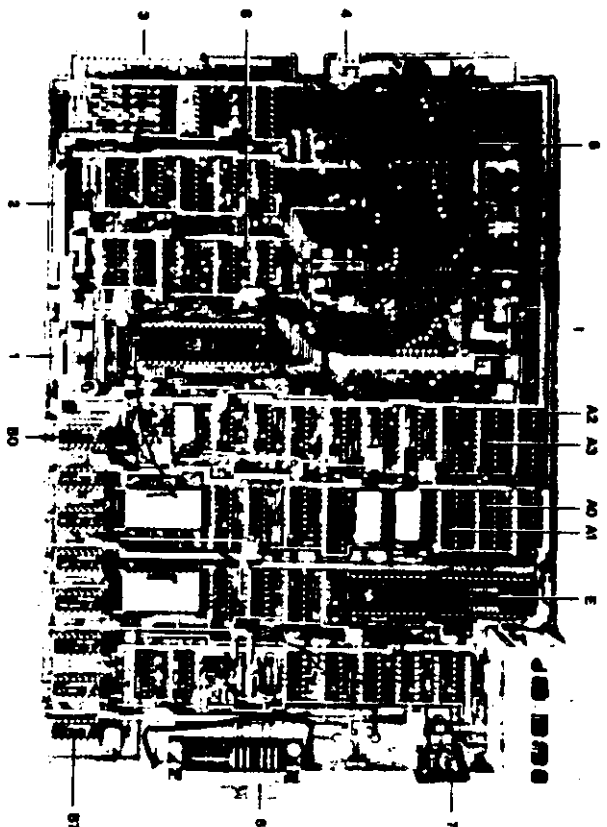


Figure 1.12 CPU BOARD T-VERSION

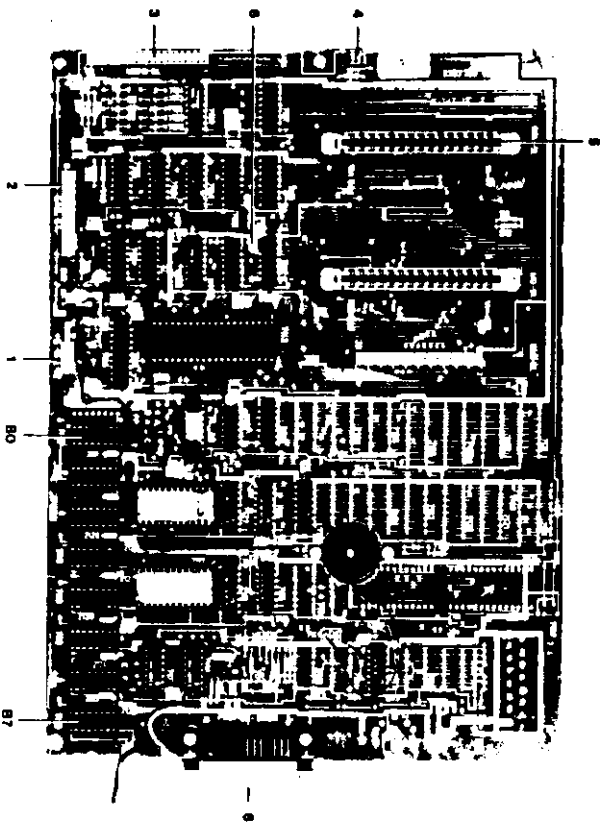


Figure 1.12 CPU BOARD M-VERSION

1.2.5.3 CPU-BOARD

- Remove extension board (if used) (section 1.2.5.1)
- Remove video board (M-version only) (section 1.2.5.2)
- Remove CPM board (if available) (section 1.2.5.9)
- Disconnect wiring power supply (red wire down) (figure 1.12/1)
- Disconnect wiring cassette (figure 1.12/2)
- Disconnect wiring keyboard (figure 1.12/3)
- Disconnect wiring reset key (figure 1.12/4)
- Disconnect wiring printer interface (if used) (figure 1.12/6)
- Disconnect wiring TV interface (T-version only) (figure 1.12/7)
- Unscrew cartridge-cage (figure 1.8.7)
- Loosen left hand board cage (if used)
- Unscrew CPU board
- Replace CPU board
- Memory Circuits : 6000-9FFF BIT0
BIT7 (figure 1.12/80)
(figure 1.12/87)
- (T-version) 5000-57FF BIT0-3 Upper
BIT0-3 Lower (figure 1.12/A1)
BIT4-7 Upper (figure 1.12/A0)
BIT4-7 Lower (figure 1.12/A3)
(figure 1.12/A2)
- Character Generator SAA505X (T-version) (figure 1.12/E)

1.2.5.4 CASSETTE DRIVE

- Remove extension board (if used) (section 1.2.5.1)
- Remove video board (M-version only) (section 1.2.5.2)
- Disconnect wiring reset key (figure 1.12/4)
- Disconnect cassette interface (figure 1.12/2)
- Unscrew cassette unit
- Replace cassette unit

1.2.5.5 KEYBOARD

- Remove extension board (section 1.2.5.1)
- Remove video board (section 1.2.5.2)
- Disconnect keyboard interface (figure 1.12/3)
- Replace keyboard

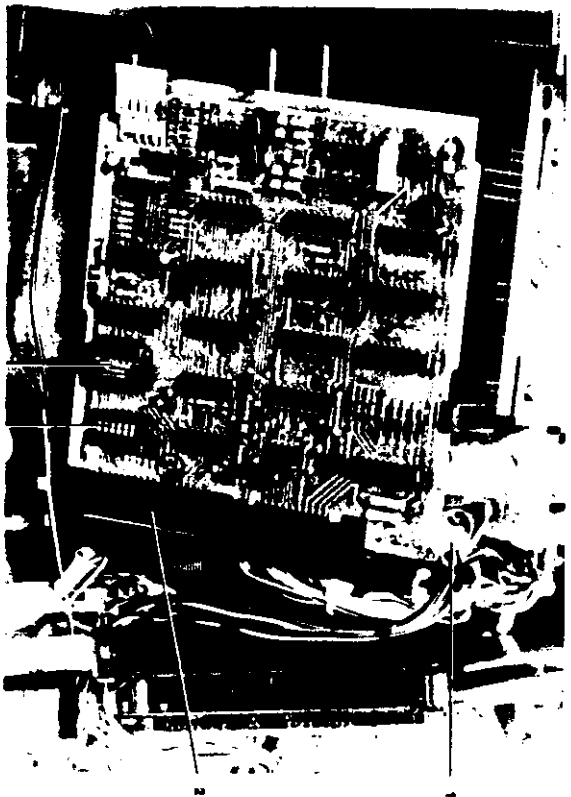


Figure 1.13 FLOPPY DRIVE SA 400

1.2.5.6 MONITOR ASSEMBLY

- Disconnect mains supply connection
- Position cabinet upside-down on flat surface, use soft cloth
- Loosen 4 screws monitor assembly
- Unscrew cover
- Position cabinet on its stand
- Remove cover
- Disconnect monitor interface cable
- Unscrew monitor assembly
- Replace monitor assembly

(figure 1.9/1)

(figure 1.9/7)

1.2.5.7 FLOPPY DRIVE UNIT(S)

- Disconnect mains supply connection
- Position cabinet right side down on flat surface
- Loosen 4 screws floppy assembly
- Unscrew cover
- Position cabinet on its stand
- Remove cover
- Unscrew floppy assembly
- Disconnect power supply wiring
- Disconnect floppy interface connections
- Remove floppy assembly from cabinet
- Unscrew defective floppy unit
- Replace floppy drive

(figure 1.9/1)

(figure 1.13/1)

(figure 1.13/2)

1.2.5.8 POWER SUPPLY MONITOR

- Disconnect mains connection
- Disconnect wiring from power supply PCB
- Unclip regulators from frame plate and heat-sink
- Replace power supply PCB

(figure 1.9/1)

(figure 1.9/6)

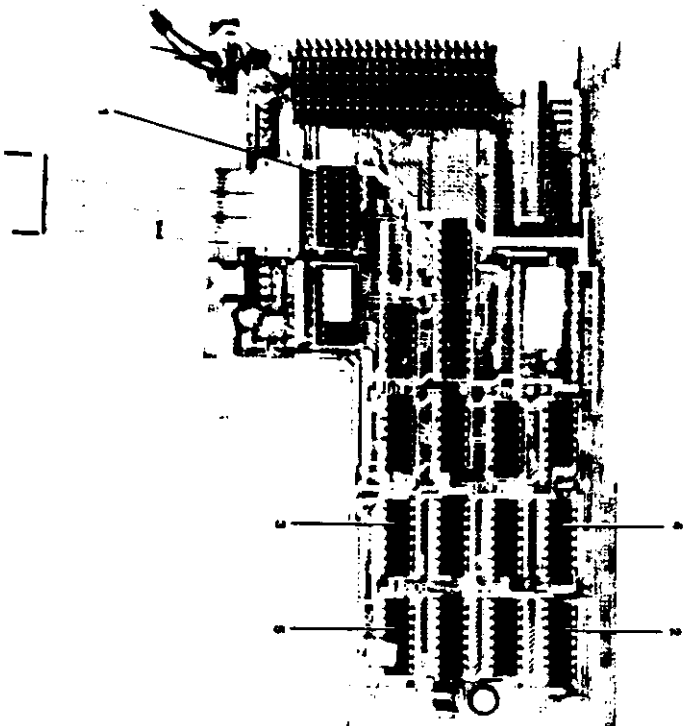


Figure 1.14 CPM BOARD

1.2.5.9 CPM BOARD

- Remove extension board (section 1.2.5.1)
 - Remove video board (section 1.2.5.2)
 - Disconnect CPM board power supply cable from power supply unit
 - Disconnect CPU board power supply cable from CPM board
 - Remove flat cable from socket on CPU board
 - Remove left rear fastening screw
 - Loosen left hand board cage
 - Replace CPM board
 - Place the ROM circuit (figure 1.14/1) from the old on the new CPM board if none is available.
- | | |
|----------------------------------|-----------------|
| - Memory circuits : CPM RAM BIT0 | (figure 1.14/2) |
| BIT3 | (figure 1.14/3) |
| BIT4 | (figure 1.14/4) |
| BIT7 | (figure 1.14/5) |

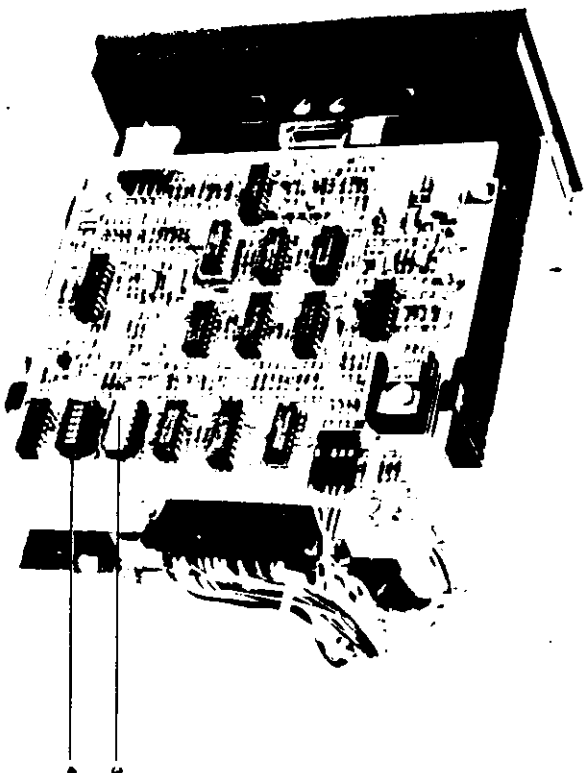


Figure 1.15 FLOPPY DRIVE SA 400L

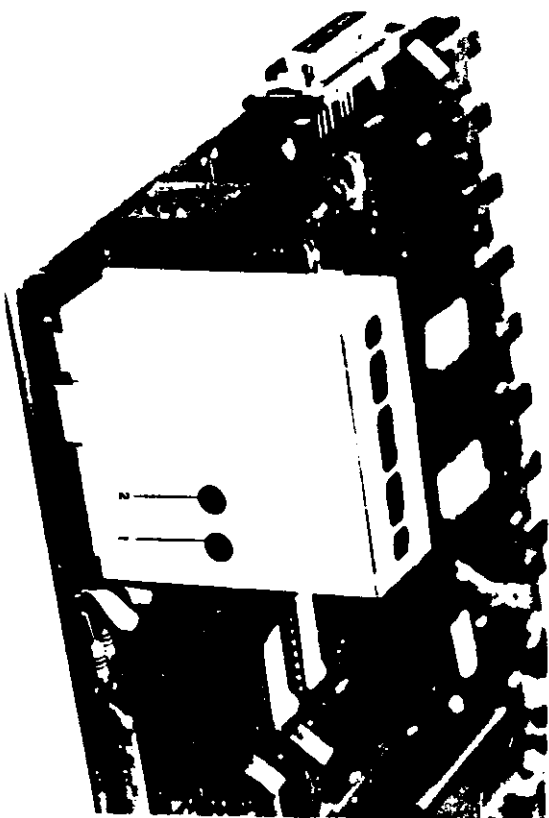


Figure 1.16 MODULATOR ADJUSTMENTS

1.2.6 STRAPSETTING

1.2.6.1 CPU BOARD

- Strap Open : Daisy Wheel Printer (figure 1.12/8)
- Strap Closed : Matrix Printer

1.2.6.2 FLOPPY DRIVE

- Terminator:

One drive installed : Insert terminator

SA 400 (figure 1.13/3)
SA 400L (figure 1.15/3)

Two drives installed: Terminator only on
Right-hand floppy

- DS2 : Closed for 1st Drive (Drive Select 1) (figure 1.13/4)
- DS1 : Closed for 2nd Drive (Drive Select 2) (figure 1.15/4)
- DS3 : Open (Multiple drive)
- MX : Open (No need to load at drive select)
- HL : Open (Head load at motor on)
- MH : Closed

1.2.7 ADJUSTMENTS

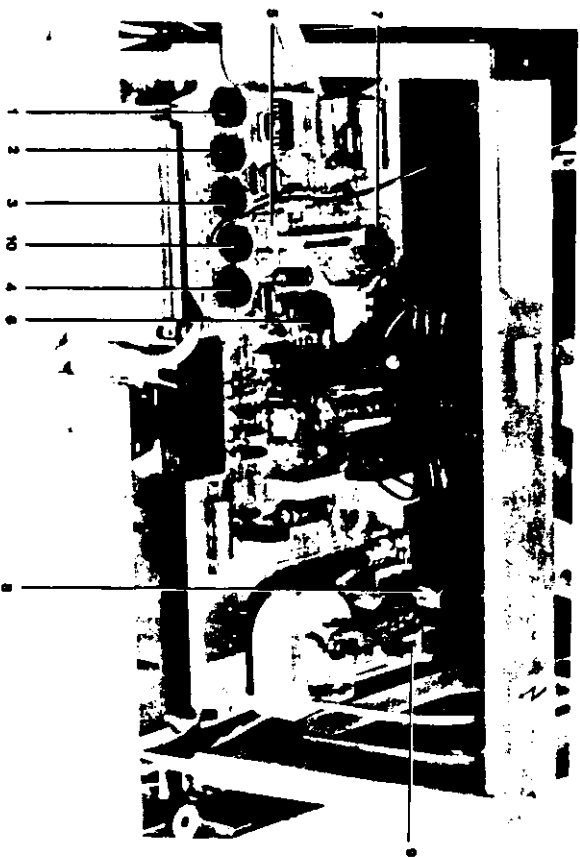
1.2.7.1 PICTURE QUALITY ADJUSTMENT T-VERSION

Note: No adjustments for UHF-Modulator.

Picture Quality: Adjust TV to VHF Band
(Channel 3 : 58MHz) to Maximum Quality

Colour : Adjust variable capacitor on modulator to maximum chrominancy
if colour fails (figure 1.16/1)

Sound : 1) Increase volume on TV
2) Adjust variable inductor on modulator to minimum
background noise (figure 1.16/2)



1.2.7.2 PICTURE QUALITY ADJUSTMENT M-VERSION

Brightness

- 1) Turn brightness control at front cover fully clockwise
- 2) Turn video brightness potmeter (R1) to maximum brightness (figure 1.17/10)
- 3) Adjust brightness potmeter (R41) so that background is just invisible (figure 1.17/4)
- 4) Adjust brightness control at front-cover to normal brightness

Picture Width

: Adjust picture width to an active raster width of about 200mm using adjustable coil L1 (figure 1.17/8)

Picture Centering

: Adjust horizontal set potmeter (R9) to center the horizontal, so that the first character is completely visible (figure 1.17/6)

Picture Height

: Adjust with potmeter (R11) the picture height to an active raster of about 150mm. (figure 1.17/2)

Vertical Hold

: Adjust potmeter (R8) to achieve a stable picture in case of rolling screen (figure 1.17/1)

Focus

: Adjust potmeter (R45) for maximum focussing of the character on the screen (figure 1.17/7)

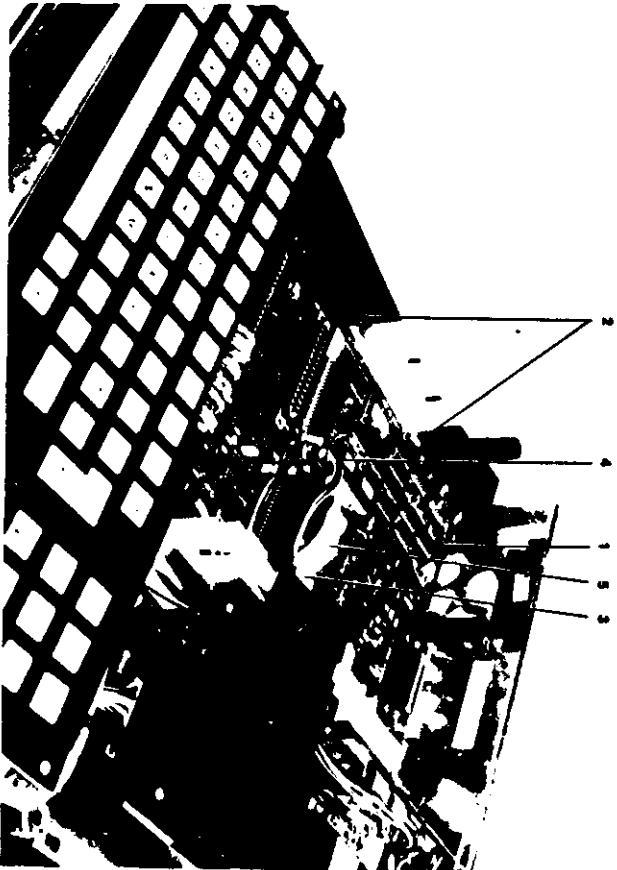
Vertical Linearity

: Adjust potmeter (R15) to maximise linearity, comparing the height of upper, middle and lower row on the screen (figure 1.17/3)

Horizontal Linearity

: Adjust variable inductor L2 to maximum horizontal linearity, comparing the width of the first, middle and last character on a row (figure 1.17/9)

Figure 1.17 MONITOR ADJUSTMENTS

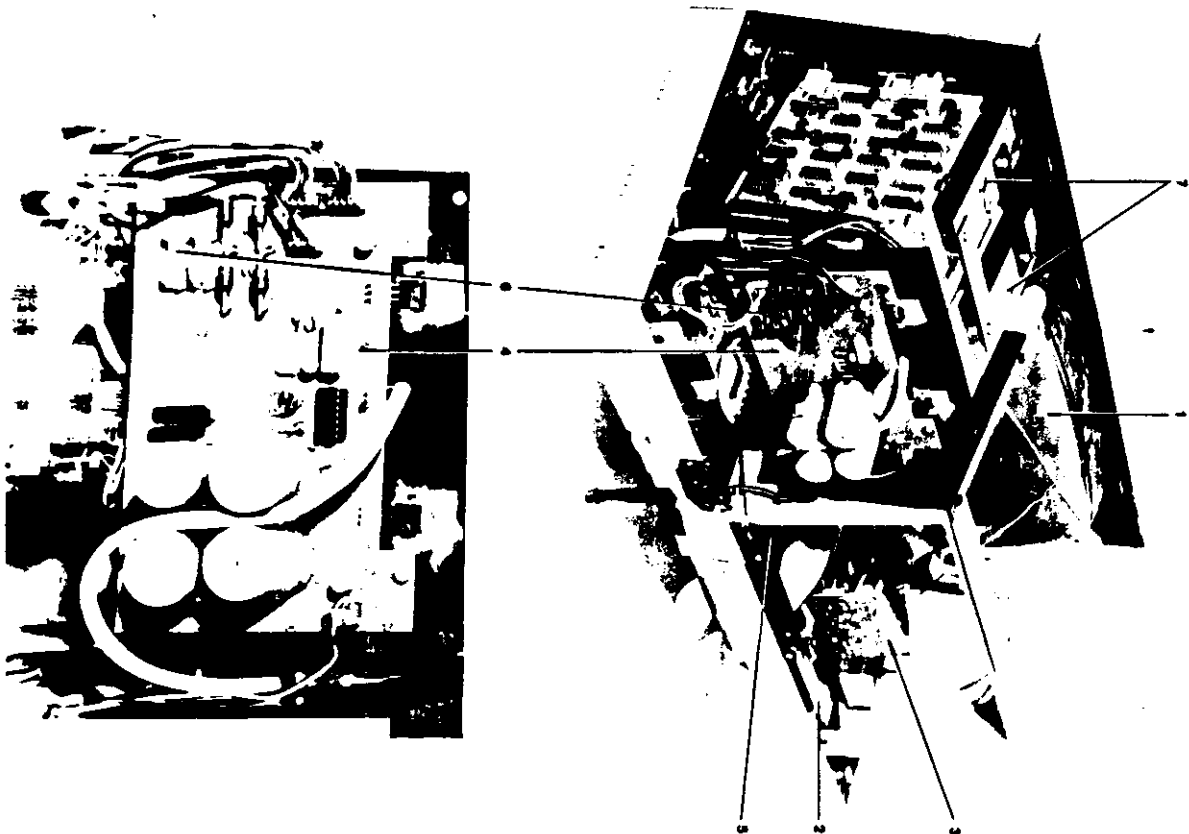


1.2.8 INSTALLATION CPM BOARD

- Remove extension board (section 1.2.5.1)
- Remove video board (section 1.2.5.2)
- Unscrew cartridge cage
- Remove left rear fastening screw of CPU board
- Plug CPM board on bus connector of CPU board (figure 1.18)
- Fasten CPM board by means of longer screw (figure 1.18/1)
- Mount two small brackets under the screws that secure the left hand board cage (figure 1.18/2) in such a way that the CPM board fits into the small slots of these brackets.
- Disconnect power cable of CPU board from power supply unit
- Plug power cable of CPU board in the corresponding plug on the CPM board.
- Remove IC7140 (figure 1.18/3) from CPU board and plug it into the empty socket (figure 1.18/4) on the CPM board (same direction)
- Plug flat cable (figure 1.18) into empty socket from which IC7140 has been removed.
- Plug power cable of CPM board into power supply socket from which CPU board power cable has been removed

Figure 1.18 CPM BOARD INSTALLED

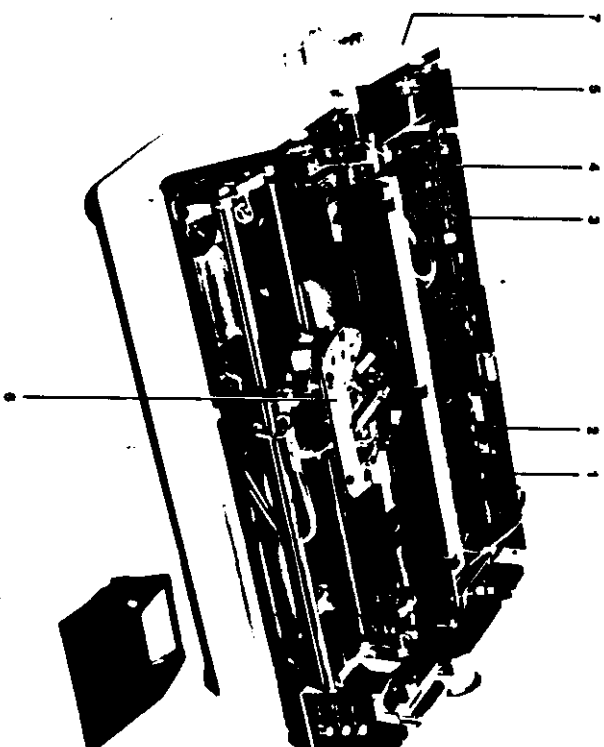
| 4.1 P2000 BASIC CABINET | | | | Description |
|-------------------------|----------------|--|--|--|
| Pos. | Code Number | | | |
| 4.1/1 | 5322 216 25635 | | | CPU PCB T-Version |
| 4.1/1 | 5322 216 25636 | | | CPU PCB M-Version |
| 4.1/1 | 5322 216 25637 | | | Video PCB M-Version |
| 4.1/2 | 5322 216 25638 | | | Extension PCB T/M-Version |
| 4.1/3 | 5322 216 25639 | | | CPM PCB M-Version |
| 4.1/4 | 8702 308 11001 | | | Power Supply PCB T/M-Version |
| 4.1/5 | 4822 209 80593 | | | SAA 5051 Character Generator (G+A) |
| 4.1/5 | 4822 209 80546 | | | SAA 5052 Character Generator (S) |
| 4.1/5 | 4822 209 10046 | | | SAA 5050 Character Generator (UK+NL) T-Version |
| 4.1/6 | 5322 209 14956 | | | RAM 16K1 MK 4116-4 |
| 4 | 5322 209 54663 | | | RAM 2K4 Video HM 472114/4 |
| 4.1/7 | 5322 216 25641 | | | VHF Modulator T-Version |
| 4.1/7 | T.B.F. | | | UHF Modulator T-Version |
| 4.1/8 | 4822 253 20018 | | | Fuse 1A |
| 4.1/8 | 4822 253 20027 | | | Fuse 5A |
| 4.1/9 | 5322 209 81331 | | | 7805 +5 Regulator |
| 4.1/9 | 5322 209 86176 | | | 7812 +12 Regulator |
| 4.1/10 | 5322 209 86434 | | | 7905 -5 Regulator |
| 4.1/10 | 5322 209 86435 | | | 7912 -12 Regulator |
| 4.1/11 | 5322 278 14006 | | | Keyboard Switch |
| 4.1/12 | 5322 218 74542 | | | MDCR |
| 8702 | 248 40001 | | | VHF/UHF Interface Cable (T-Version) |
| 8702 | 248 50001 | | | RGB Interface Cable (T-Version) |
| 5322 | 397 34018 | | | Maintenance Cartridge |



4.2. MONITOR CABINET

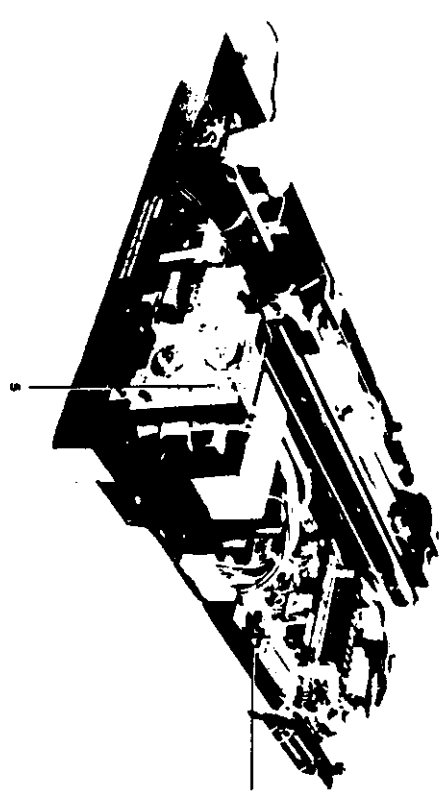
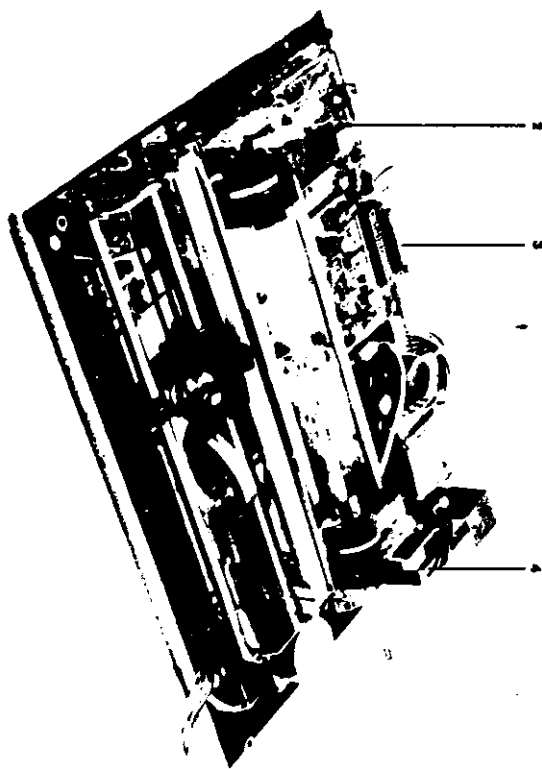
| Pos. | Code Number | Description |
|-------|----------------|--------------------------|
| 4.2/1 | 5322 218 74547 | Monitor Assembly |
| 4.2/2 | 5322 214 45347 | Main PCB |
| 4.2/3 | 5322 214 45348 | Video PCB |
| 4.2/4 | 5322 218 74567 | Power Supply PCB |
| 4.2/5 | 4822 253 30022 | Fuse 1.25 A/T |
| 4.2/6 | 4822 253 30028 | Fuse 2A |
| 4.2/6 | 4822 253 30025 | Fuse 4A |
| 4.2/7 | 8702 214 20001 | MFD |
| | 5322 395 84119 | Alignment Diskette SA124 |

Figure 4.2 MONITOR CABINET



| 4.3 DAISY WHEEL PRINTER | | |
|-------------------------|----------------|-------------------|
| Pos. | Code Number | Description |
| 4.3/1 | 5322 216 25654 | CPU PCB |
| 4.3/2 | 5322 216 25659 | I/O PCB |
| 4.3/3 | 5322 216 25662 | DV1 PCB |
| 4.3/4 | 5322 216 25652 | DV2 PCB |
| 4.3/5 | 5322 218 74546 | Power Supply Unit |
| 4.3/6 | 5322 218 74545 | Carriage |
| 4.3/7 | 5322 253 54037 | Fuse 3A |

Figure 4.3 DAISY WHEEL PRINTER



4.4 MATRIX PRINTER

| Pos. | Code Number | Description |
|-------|----------------|----------------------|
| 4.4/1 | 5322 216 25728 | Main Circuit Board |
| 4.4/2 | 5322 216 25729 | Driver Board |
| 4.4/3 | 5322 216 21007 | Serial Board |
| 4.4/4 | 5322 216 25732 | Filter Circuit Board |
| 4.4/5 | 5322 216 25731 | Control Panel |
| | 4822 253 30014 | Fuse 3.15A |

Figure 4.4 MATRIX PRINTER