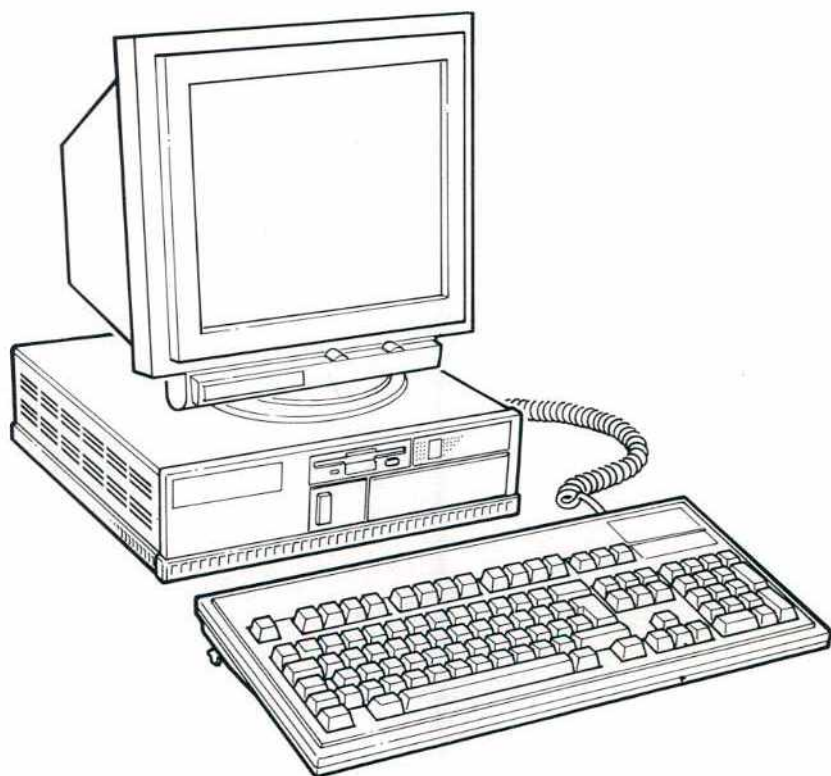


PERSONAL COMPUTER
M290S

GENERAL SERVICE MANUAL



olivetti

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Stampato presso TIP. CASA CIRCONDARIALE IVREA

PREFACE

This manual is designed for service technicians who are required to install, test and service the M290 S Personal Computer.

SUMMARY

Section	1- GENERAL
	2- INSTALLATION AND AUTODIAGNOSTIC TEST
	3- BOARDS DESCRIPTION
	4- MONITOR
	5- REMOVALS
Appendix	A- SPARE PARTS CATALOGUE

SECTOR RANGE / PRODUCT: S3 M290 S

BIBLIOGRAPHY: "INSTALLATION AND OPERATIONS GUIDE" (supplied
with the product)
"SERVICE HANDBOOK" code 0203090N-00

DISTRIBUTION: INTERNAL (Z)

FIRST EDITION: FEBRUARY 1990

SECOND EDITION: FEBRUARY 1991

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FEDERAL COMMUNICATIONS COMMISSION RADIO FREQUENCY INTERFERENCE STATEMENT

INFORMATION TO THE USER

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment to an outlet of a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for assistance.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Connecting of peripherals requires the use of grounded shielded cables.

EMI Requirements for Canadian Market

This digital apparatus does not exceed the class B limits for radio noise emissions from digital apparatuses as set forth in the radio interference regulations of the Canadian Department of Communications.

Spécifications EMI pour le Marché Canadien

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

This equipment conforms to the specifications of EEC directive 87/308 on the prevention and elimination of radio-frequency disturbances.

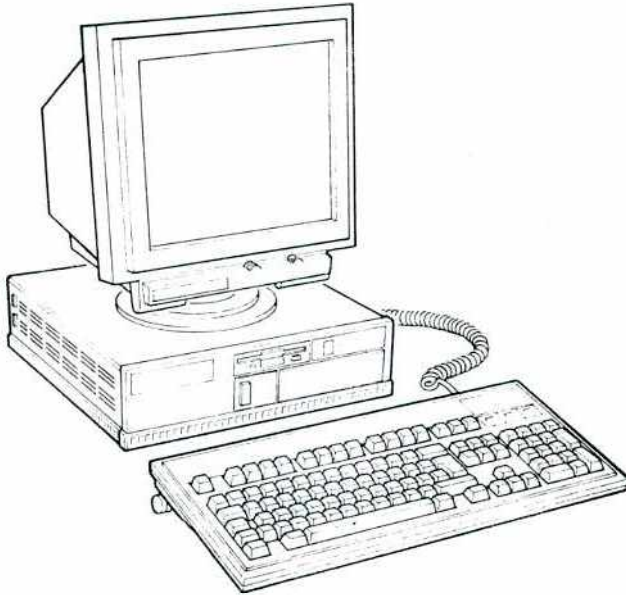
NOTICE

OLIVETTI OFFICE s. r. l. reserves the right to modify the equipment described in this manual at any time and without notice.

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1. GENERAL



1.1 SYSTEM TECHNICAL SPECIFICATIONS

CPU: 80286 16 MHz 0 WS

STANDARD MEMORY: 1 MB

EXPANSION MEMORY: up to 5 MB in motherboard; max 17 MB

SLOTS AVAILABLE:
. 3 full size AT 16 bit

SOCKET FOR MATHEMATIC COPROCESSOR: 80287

INTERFACES AND CONTROLLERS:

- . RS232C SERIAL interface
- . PARALLEL interface
- . PS/2 MOUSE interface
- . PS/2 AT-protocol KEYBOARD interface
- . VGA video controller
- . floppy disk unit controller
- . hard disk unit controller

INTEGRATED PERIPHERALS:

MAGNETICS:

- . 1.44 MB, 3.5" floppy disk unit
- . 1.2 MB, 5.25" floppy disk unit
- . 20 MB, 3.5" hard disk unit - access time 27 ms
- . 40 MB, 3.5" hard disk unit - access time 29 ms
- . 100 MB, 3.5" hard disk unit - access time 19 ms
- . 40 MB, streaming tape unit

OTHERS:

- . CD ROM with or without AUDIO

MONITOR:

- . 14" monochrome VGA flatscreen paper white
- . 14" colour VGA 0.39 dot pitch
- . 14" colour VGA 0.31 dot pitch

KEYBOARD:

- . extended compact 101-102-key keyboard in the different national versions (ANK 27-101 and ANK 27-102)

OPTIONS:

- . motherboard RAM expansion kit-2MB (from 1 to 5 MB) (EXM 2902)
- . RAM expansion board-2 MB + expansion kit-2 MB (from 5 to 17 MB) (AMB 2678 and EXM 25-852)
- . MOUSE (GRD 25-025)
- . mathematic coprocessor 80287 (MAC 2987)
- . external 5.25" floppy disk unit (FDU 2852)
- . external CD ROM driver (CDR 25-550)
- . external WORM driver (WRM 25-810)
- . 5.25" integrated streaming tape unit (STU 2040-40 MB)
- . 3.5" 1.44 MB integrated floppy disk unit (MFD 2944)
- . 5.25" 1.2 MB integrated floppy disk unit (MFD 2912)
- . 5.25" integrated CD ROM units with or without AUDIO (CDR 25-555 and CDR 25-554 audioless)
- . positive graphic display controller (PGC 25-003)
- . 12" positive monitor (DSM 2512 requires PGC 25-003)
- . 14" analog monochr. display (DSM 25-314X)
- . 14" analog color display 0.39 dot pitch (DSM 2914/C)
- . 14" analog color display 0.31 dot pitch (DSM 25-414)

- . single serial port RS 232 Board (SIC 25-232)
- . RS 232 multiport board and cable (SIC 2832)
- . parallel interface cable (CBL 2491)
- . serial interface cable (CBL 2492)
- . serial interface cable (male- female conn.) (CBL 2406)
- . modem extension cable (CBL 2858)

SOFTWARE:

- | | |
|-----------------------|----------|
| . UTILITIES | included |
| . CUSTOMER TEST | " |
| . LIM EMS DRIVER | " |
| . TUTORIAL | " |
| . MS-DOS 4.0, earlier | |
| . MS OS/2 | |
| . XENIX (SCO XENIX V) | |

LAN AND COMMUNICATION:

- . STARLAN in OLINET-LAN environment
- . ETHERNET

PRODUCT CONFIGURATIONS:

- | | |
|-------------------------------|------------------------------|
| . 2 x 1.44 MB MFD | monochrome or colour monitor |
| . 1 x 1.44 MB MFD - 20 MB HD | " " " |
| . 1 x 1.44 MB MFD - 40 MB HD | " " " |
| . 1 x 1.44 MB MFD - 100 MB HD | " " " |
| . 1 x 1.2 MB MFD - 20 MB HD | " " " |
| . 1 x 1.2 MB MFD - 40 MB HD | " " " |
| . 1 x 1.2 MB MFD - 100 MB HD | " " " |
| . DISKLESS version | " " " |

SUPPLIES:

- . WORM cartridge - single side - 405 MB (CARTRIDGE 405)
- . WORM cartridge - double side - 810 MB (CARTRIDGE 810)

PRODUCT DIMENSIONS AND WEIGHT:

- | | | |
|---------------|-------------|-----------------------|
| . BASIC UNIT: | 356x98x373 | (mm), weight: 5.5 kg |
| . VIDEO: | | |
| - monochrome | 330x350x320 | (mm), weight: 7 kg |
| - colour | 360x350x370 | (mm), weight: 12 kg |
| . KEYBOARD | 480x30x170 | (mm), weight: 1.25 kg |

ELECTRIC POWER:

- . maximum power: 80 W
- . voltage: 100/120 V (+10/-15%) 50/60 Hz
200/240 V (+10/-15%) 50/60 Hz

1.2 STARTER KIT

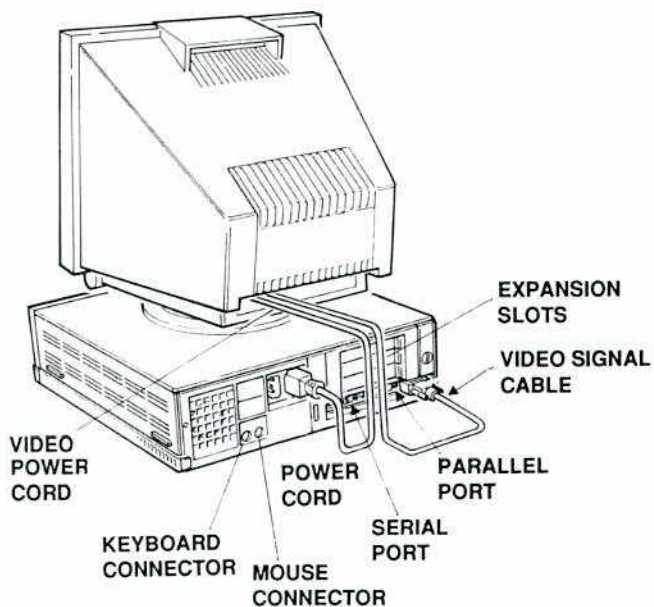
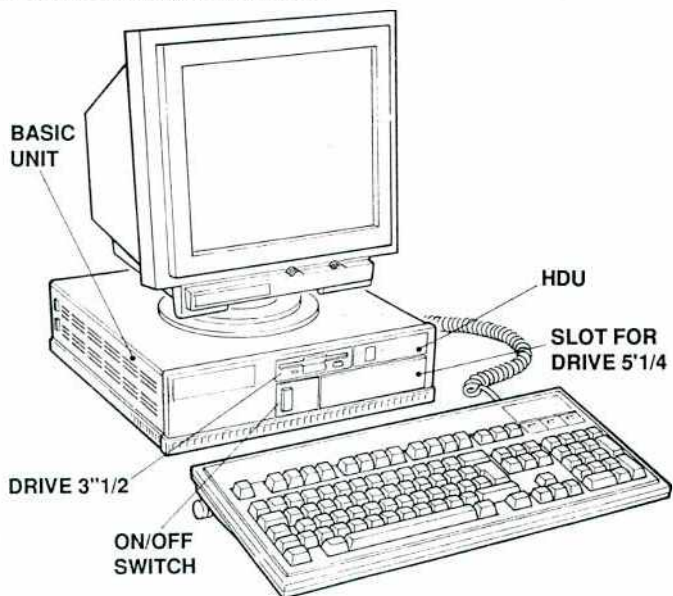
The M290S BASIC UNITS are distributed with a STARTER KIT that is the basic tool for the following operations:

- know the M290S (MANUAL, TUTORIAL)
- test the M290S (CUSTOMER TEST)
- add utilities and drivers (LIM/EMS) for the SW environments

The M290S STARTER KIT contains:

- INSTALLATION AND OPERATIONS MANUAL
- TWO DISKETTES CONTAINED:
 - . CUSTOMER TEST
 - . UTILITIES
 - . LIM/EMS DRIVERS
 - . TUTORIAL

1.3 SYSTEM PRESENTATION



1.4 SYSTEM CONFIGURATIONS DESCRIPTION

A - DUALFLOPPY VERSION

Basic units with:

- 2 x 3.5", 1.44 MB MFDU
- 1 x 5.25", free site
- 1 MB RAM, expanding up to 5 MB on motherboard
- 3 free slots - 16 bit AT
- VGA controller for B/W or colour monitor
- parallel, RS232C serial, mouse, keyboard and monitor interfaces

B - 20/40/100 MB HARD DISK VERSIONS (1x3.5" 1.44 MB MFD)

Basic units with:

- 1 x 3.5", 1.44 MB MFDU
- 1 x 3.5", 20 or 40 or 100 MB HDU
- 1 x 5.25", free site
- 1 MB RAM, expanding up to 5 MB on motherboard
- 3 free slots - 16 bit AT
- VGA controller for B/W or colour monitor
- parallel, RS232C serial, mouse, keyboard and monitor interface

These configurations may be upgraded with: 5.25" STREAMING TAPE or 5.25" 1.2 MB MFD or CD ROM with or without AUDIO.

The following external boxes can be added to these configurations:

- 5.25" floppy driver
- CD ROM
- WORM

C - 20/40/100 MB HARD DISK VERSIONS (1X5.25" 1.2 MB MFD)

Basic units with:

- 1 x 5.25", 1.2 MB MFDU
 - 1 x 3.5", 20 or 40 or 100 MB HDU
 - 1 x 3.5", free site
 - 1 MB RAM, expanding up to 5 MB on motherboard
 - 3 free slots - 16 bit AT
 - VGA controller for B/W or colour monitor
 - parallel, RS232C serial, mouse, keyboard and monitor interfaces
- These configurations may be upgraded with 3.5" 1.44 MB MFD.

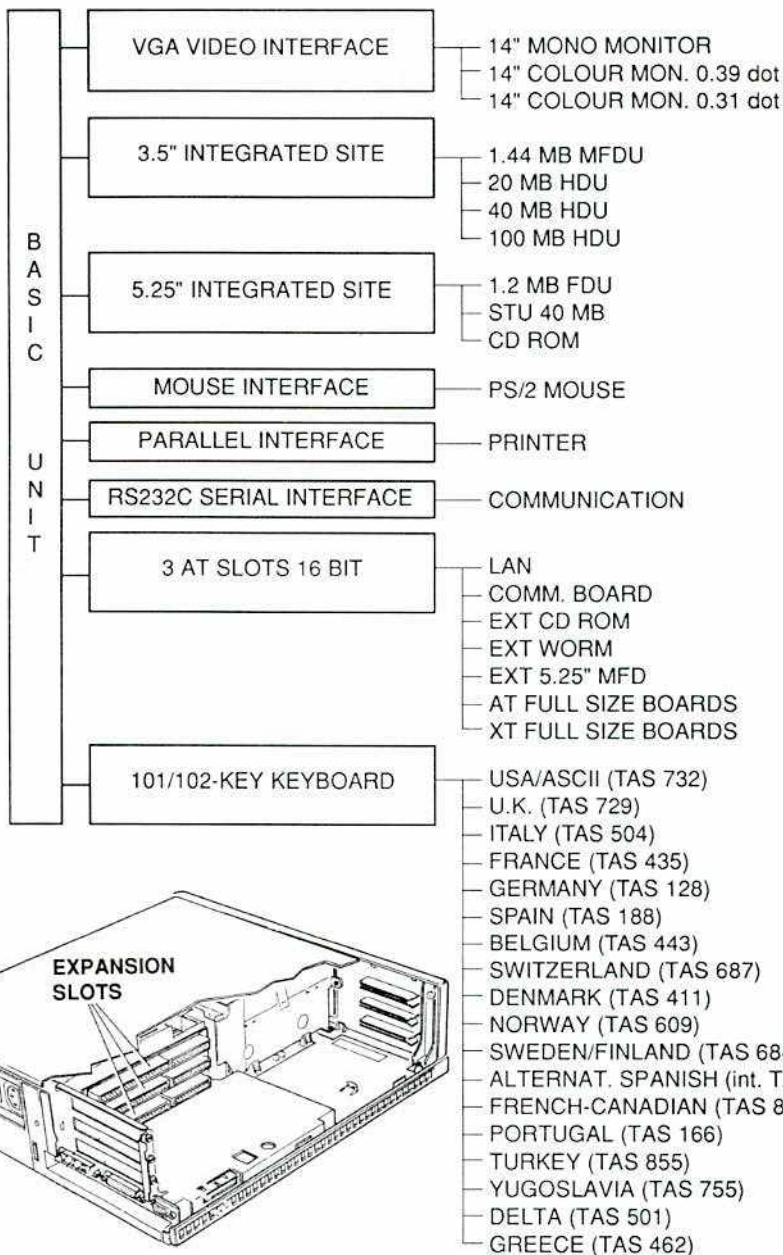
The following external boxes can be added:

- CD ROM
- WORM

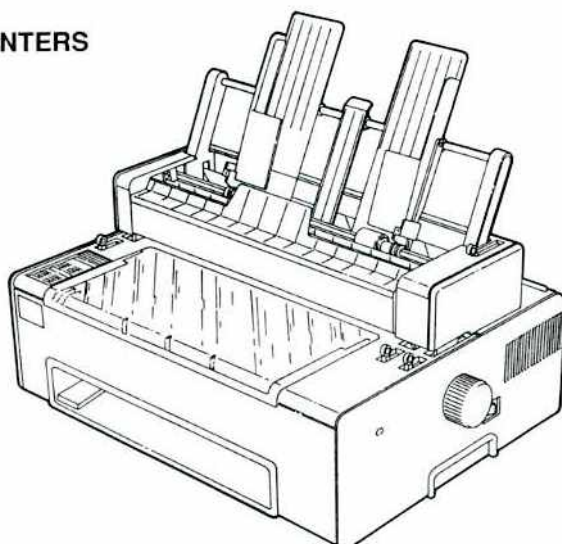
D - DISKLESS VERSION

Used exclusively in a LAN environment or as a multiuser system Work Station.

1.5 CONFIGURATION DIAGRAM



1.6 PRINTERS

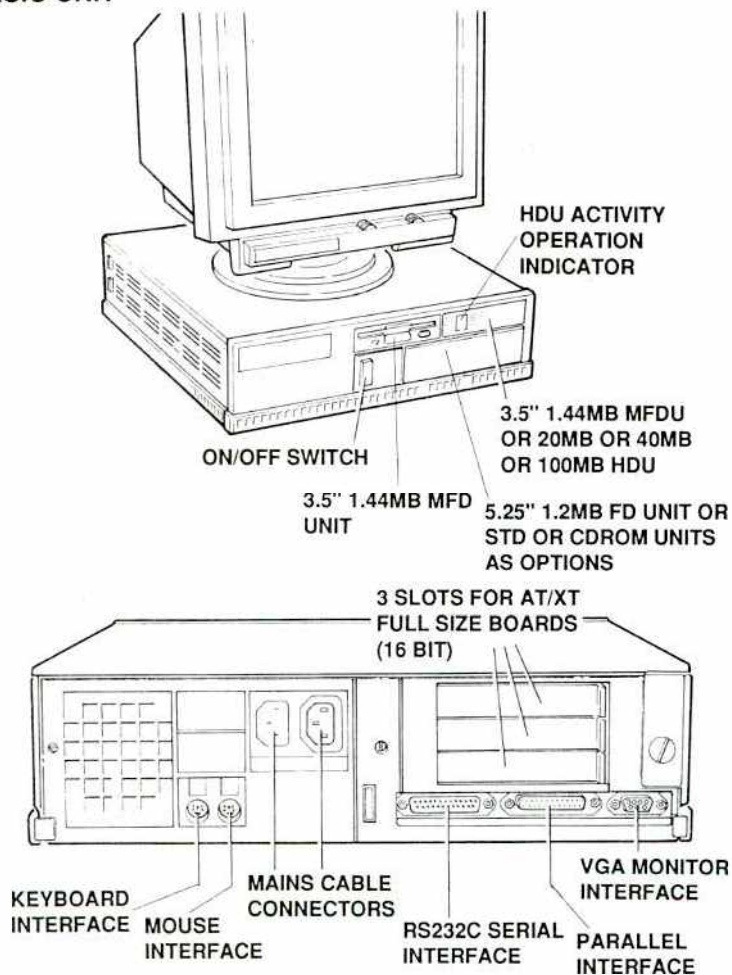


The product can connect printers with PARALLEL CENTRONICS or SERIAL RS232 interface.

NAME	TYPE	SPEED
DM 100 S/105 S	dot matrix 9 needles	120 cps DRAFT, 15 cps NLQ
DM 282/292	"	240 cps HSD, 180 cps DRAFT, 40 cps NLQ
DM 250/250 L	dot matrix 24 needles	240 cps HSD, 180 cps DRAFT, 60 cps NLQ
PR 24/24 R	dot matrix 9 n front feed	240 cps HSD, 180 cps DRAFT, 40 cps NLQ
TH 760 S	ETR 40 Tph	80 cps at 10 cpi, 96 cps at 12 cpi, 120 cps at 15 cpi
PG 208 M1/M2	laser printer 300 dots/inch	8 pages/min. first print 24 sec.

1.7 PRODUCT DESCRIPTION

1. BASIC UNIT



The basic unit integrates up to 3 magnetic units 2 of 3.5" format and 3 FULL SIZE expansion slots.

All the 3 peripherals sites have an external access.

The VGA controller and the PC STANDARD interface are directly integrated on the motherboard.

The basic unit therefore comprises:

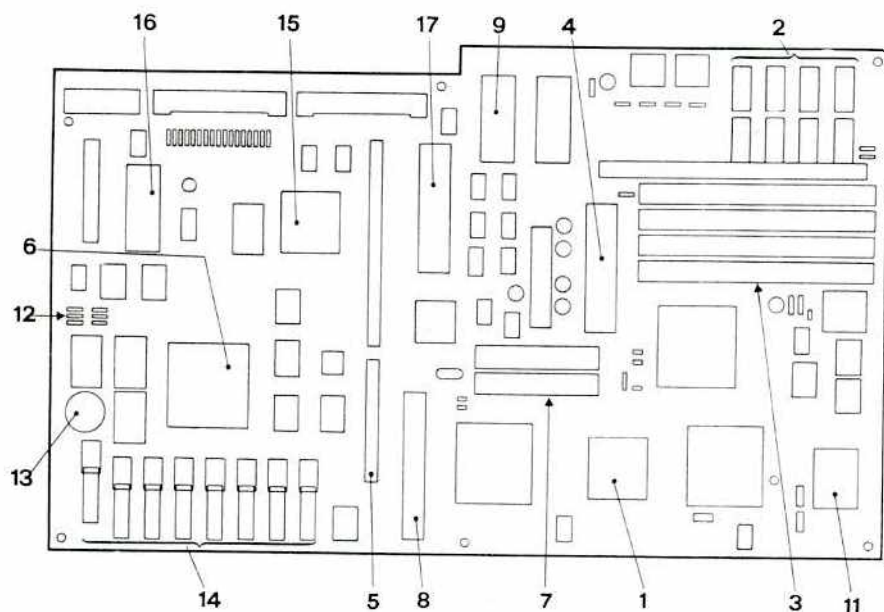
- POWER SUPPLY and FAN
- MOTHERBOARD
- 2 x 3.5" integrated peripherals:
 - . (1/2), 1.44 MB MFD UNITS
 - . 3.5", 20 MB or 40 MB or 100 MB HD UNITS as an alternative to the second MFD
- 1 x 5.25" integrated peripheral:
 - . 5.25", 1.2 MB FD UNIT or (STD or CD ROM UNITS as options)
- 3 EXPANSION SLOTS:
 - . 3 16 bit slots for AT/XT compatible boards
- INTERFACES
 - . Serial RS 232
 - . Parallel

2. MOTHERBOARD

The motherboard is made up of:

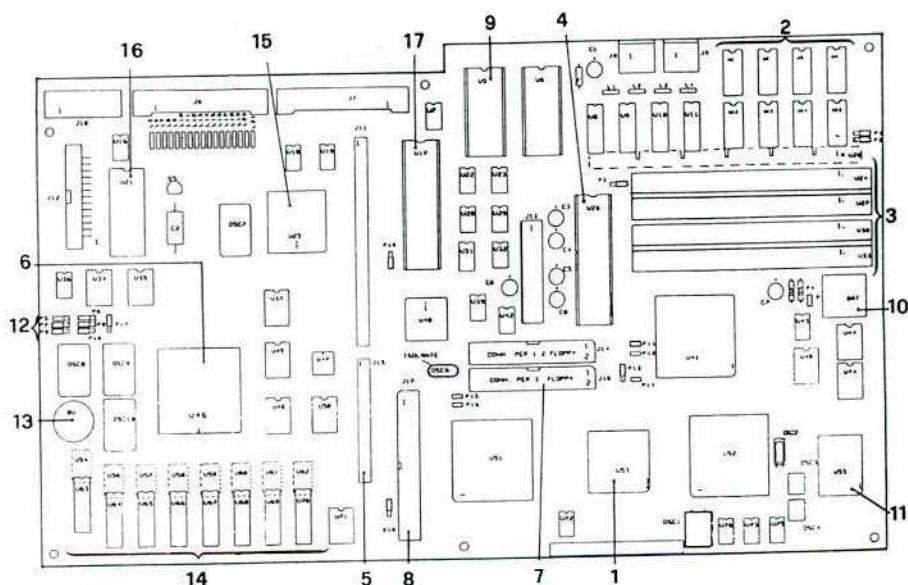
- 16 MHz 80286 CPU, 0 ws
- 1 MB RAM expandable up to 5 MB
- 128 KB BIOS ROM
- LIM/EMS hw predisposition
- C MOS memory for: real time clock/calendar
configuration SET UP
- DMA and AT system peripherals
- VGA graphics controllers
- MFD and STU controllers
- socket for MATHEMATIC COPROCESSOR 80287
- connectors for MFD/STD units
- HDU interface (AT)
- PRINTER PARALLEL interface (bidirectional)
- RS 232C SERIAL interface
- PS/2 MOUSE interface (mini-din-connector)
- PS/2 KEYBOARD interface (mini-din-connector)
- MONITOR interface
- BUS expansion (AT) board connector
- BUZZER and SOUND circuitry

MOTHERBOARD LAYOUT (Code 029230C)



- 1) CPU
- 2) STANDARD RAM MEMORY
- 3) EXPANSION RAM MEMORY
- 4) SOCKET FOR 80287 MATH. COPROCESSOR
- 5) BUS CONNECTOR
- 6) VGA CONTROLLER
- 7) MFD/STD CONNECTORS
- 8) HD CONNECTOR
- 9) ROM BIOS
- 10) C MOS MEMORY AND CLOCK CALENDAR BATTERY
- 11) MCU WITH LIM/EMS REGISTERS
- 12) MFD/STD JUMPERS
- 13) BUZZER
- 14) VIDEO MEMORY (256 Kb)
- 15) SERIAL/PARALLEL INTERFACES
- 16) COLOR PALETTE
- 17) KEYBOARD INTERFACE

MOTHERBOARD LAYOUT (Code 029245F - 030036N))



- 1) CPU
- 2) STANDARD RAM MEMORY
- 3) EXPANSION RAM MEMORY
- 4) SOCKET FOR 80287 MATH. COPROCESSOR
- 5) BUS CONNECTOR
- 6) VGA CONTROLLER
- 7) MFD/STD CONNECTORS
- 8) HD CONNECTOR
- 9) ROM BIOS
- 10) C MOS MEMORY AND CLOCK CALENDAR BATTERY
- 11) MCU WITH LIM/EMS REGISTERS
- 12) MFD/STD JUMPERS
- 13) BUZZER
- 14) VIDEO MEMORY (256 Kb)
- 15) SERIAL/PARALLEL INTERFACES
- 16) COLOR PALETTE
- 17) KEYBOARD INTERFACE

3. RAM

M290 S is able to support RAM with or without parity feature.

In the basic configuration, the M290S has 1 MB of RAM without parity on the motherboard. The RAM parity check has been foreseen to be available for not standard product specifically requested only.

Memory expansion on the motherboard of up to 5 MB is possible as follows:

FACTORY	EXPANSION IN FIELD
- 1 MB (soldered)	- 3 MB (2 x 1 MB SIMMs) - 5 MB (4 x 1 MB SIMMs)

Memory expansion with AMB BOARD 4 MB (AMB 2678 with EXM 25-852)

Memory expansion with board AMB 2678 up to 17 MB is possible as follows:

BOARD (5 MB)	TOTAL RAM
MOTHER BOARD (5 MB)	5 MB
AMB BOARD N. 1 - 4 MB	9 MB
AMB BOARD N. 2 - 4 MB	13 MB
AMB BOARD N. 3 - 4 MB	17 MB

4. MATHEMATIC COPROCESSOR

The 80287 mathematic coprocessor provides functions meant specifically for high performance numeric processing requirements.

Trigonometric, logarithmic and exponential functions are available for essentially scientific, engineering, navigational or military applications.

It provides extension of arithmetic and logical instruction support for a variety of numeric data types: over fifty numeric processing instructions are added to the 80286 instructions set to support several data types (32, 64 bit integers, 32, 64, 80 bit floating point and 18 digit BCD operands).

5. MICRO FLOPPY UNITS

3.5", 1.44 MB MICRO FLOPPY DISK UNIT

The mini-floppy unit can handle both 1 and 2 MByte unformatted media (3.5").

The drive used on the M290S is compatible with drives used on the PS/2 systems and it is able to write and read 720 KB 1.44 MB diskettes.

The diskettes written on the M290S can be interchangeable on:

- PS/2 PCs using 1.44 MB drives
- all OLIVETTI PCs using 1.44 MB drives

CHARACTERISTICS

Form factor	3.5	inch
Formatted capacity	0.720/1.44	MB
Transfer rate	250/500	Kbps
Average access time	94	ms
Cylinder n.	80	
Track n.	160	
Track density	135	bpi
Record density	8.7/17.4	Kbpi
Automatic media detector	yes	
Rotational speed	300	rpm
Motor start time	500	ms
Heads n.	2	
SW error rate	10E-9	/bit
HW error rate	10E-12	/bit

This unit is also available as an option for the 5.25" MFD configurations.

6. 5.25" - 1.2 MB FLOPPY DISK UNITS

The mini-floppy unit can handle both 0.5 and 1.5 MByte unformatted media (5.25").

The drive used on the M290 S is compatible with drives used on the PS/2 system and it is able to write and read 360 Kb and 1.2 MB diskettes.

CHARACTERSTICS

Form factor	5.25"	inch
Formatted capacity	0.360/1.2	MB
Transfer rate	250/500	Kbps
Average access time	94	ms
Cylinder n.	40/80	
Track n.	80/160	
Track density	48/96	tpi
Record density	5922/9646	bpi
Automatic media detector	yes	
Rotational speed	300/360	rpm
Motor start time	500	ms
Heads n.	2	
SW error rate	10E-9	/bit
HW error rate	10E-12	/bit
Automatically ejects media	yes	

This unit is also available, as an option for the HDU configurations with the 3.5" MFD, in two version:

- INTEGRATED VERSION
- EXTERNAL VERSION

The external 5.25" FLOPPY unit is connected to a specific BOARD installed in a M290 S slot.

The BOARD is connected to the MFD connector on the motherboard through specific cable.

7. HARD DISK UNITS

The motherboard of the M290 S is provided with one AT HD interface to connect the 3.25" 20/40/100 MB HDU.

The HDU are intelligent drives with controller.

All the M290 S HDU CONFIGURATIONS are offered factory in two versions:

- 20/40/100 MB HDU and MFD 3.25" 1.44 MB
- 20/40/100 MB HDU and NFD 5.25" 1.2 MB

The main characteristics of the HDU are as follow:

HDU 5.5" 20 MB CP 3024 AT

CHARACTERISTICS:

Form factor	3.5	inch
Interface	AT BUS	
Capacity	21.4	MB formatted
Average access time	27	ms
Interleave	1 to 1	
Rotational speed	3575	rpm
Data transfer rate to/from media	1.25	MB/s
Data transfer rate to/from buffer	4	MB/s
Disk n.	1	
Cylinder n.	636	
Heads n.	2	
Sectors n.	33	
Bytes per sectors n.	512	
Self parking heads	yes	
Heads, mechanical lock	yes	

HDU 3.5" 40 MB CP 3044 AT

CHARACTERISTICS:

Form factor	3.5	inch
Interface	AT BUS	
Capacity	42.6	MB formatted
Average access time	25	ms
Interleave	1 to 1	
Rotational speed	3557	rpm
Data transfer rate to/from media	1.5	MB/s
Data transfer rate to/from buffer	4/5	MB/s
Disk n.	1	
Cylinder n.	1047	
Heads n.	2	
Sectors n.	40	
Bytes per sectors n.	512	
Self parking heads	yes	
Heads, mechanical lock	yes	

HDU 3.5" 100 MB CP 30104 AT

CHARACTERISTICS:

Form factor	3.5	inch
Interface	AT BUS	
Capacity	121.5	MB formatted
Average access time	19	ms
Interleave	1 to 1	
Rotational speed	3399	rpm
Data transfer rate to/from media	1.5	MB/s

8. STREAMING TAPE UNITS

There are available as options STD units to backup data of the HDU, for dimensional reasons, on the M290 S is only possible to integrate 5.25" STD units.

40 MB STD UNIT/120 MB

40 MB STD

120 MB STD

CHARACTERISTICS:

Form factor	5.25	inch	5.25	inch
Formatted capacity	40	MB	120	MB
Floppy disk interface	yes		yes	
Transfer rate	500	Kb/s	500	Kb/s
Average backup/restore time	20	min.	60	min.
Recording format	IRWIN		IRWIN	
Cartridge type	DC 2000		DC 2120	
Recording density	10	Kbpi	20	Kbpi

9. CD ROM/WORM UNITS

On the M290 S is possible to integrate a CD ROM (Compact Disk Read Only Memory) unit with or without AUDIO into the 5.25" basic unit slot.

It is also possible to connect with the M290S an external CD ROM unit or an external WORM (Write One Read Many) unit.

The controllers, for the CD ROM and WORM unit, must be installed on a motherboard slot.

CD ROM

CDU-510 is a drive unit for CD ROM disks, which store as much as 540 MB of digital data.

The drive unit has the following features:

- 5.25" half-height drive form factor
- Fast access time. The average, less than 0.5 seconds, required to access information from a disk assures high-speed reading operations.
- Interchangeable caddy for disk protection.
- Automatic locking of the optical pick-up when the caddy is ejected manually.

To read data from CD ROM disks that follow the High Sierra Group (HSG) logical format standard for CD ROM, you can use Sony OPA-332-11 MS-DOS CD ROM EXTENSIONS.

CHARACTERISTICS:

Disk

Acceptable disks:	CD ROM mode 1 data disks CD ROM mode 2 data disks CD AUDIO disk Audio coMBined CD ROM disks
-------------------	--

Disk diameter	12 cm
---------------	-------

Rotational speed (varies from disk to disk):

Innermost track	530 rpm at CVL = 1.4 m/s
Outermost track	200 rpm at CLV = 1.2 m/s

Drive transfer rate

Sustained rate	150 Kb/s
Burst rate	600 Kb/s

Drive access time

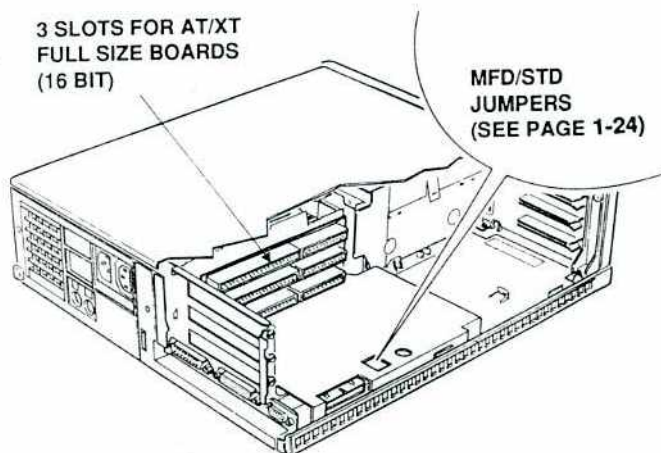
Full stroke	0.8 s (typical)
Average	0.5 s (typical)

Drive error rate (includes retry)

L-EC on	1 Block/10E12 bits
L-EC off	1 Block/10E9 bits

10. EXPANSION SLOTS

The area reserved for the expansion SLOTS is easy to access by removing the rear panel.



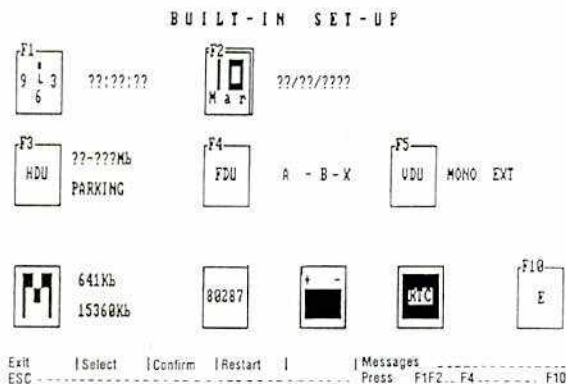
11. CONFIGURABILITY

The system can be configured using the following facilities:

- BUILT-IN-SETUP - EXTENDED-SETUP - MFD/STD JUMPERS

BUILT-IN-SETUP

The system is automatically set conforming to the standard factory configurations, when the user adds or changes something (options, RAM, magnetic peripherals, graphics controller) the following menu is automatically displayed and it is possible to arrange the right configuration.

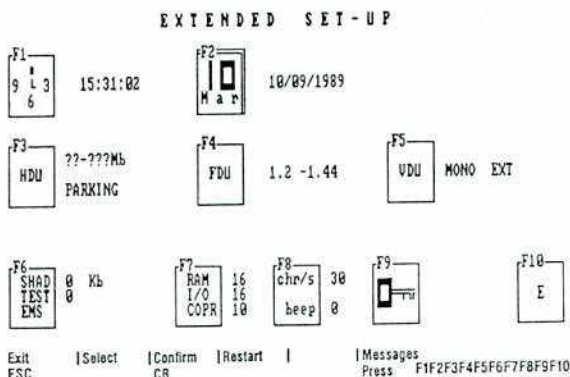


EXTENDED-SETUP

The EXTENDED-SETUP allows to change, when you reset (by press in the same time the keys SHIFT-CTRL-ALT-DEL) via KEY FUNCTIONS THE FOLLOWING CONFIGURATION PARAMETERS:

- LANGUAGE (F10)
 - DATE (F1)
 - TIME (F2)
 - HDU (F3)
 - MFD (F4)
 - VDU (F5)
- allow to assign an external graphics controller

- SHAD-TEST-EMS (F6)
to define the size of: RAM SHADOW MEMORY, extended and expanded MEMORY and RAM test LEVEL
- RAM-I/O COPR (F7)
to define the speed (MHz) of: RAM, I/O expansion board and MATHEMATIC COPROCESSOR
- CHR/S-BEEP (F8)
modify the "repeat key speed" and the "buzzer volume"
- PASSWORD (F9)



The BUILT-IN-SETUP & EXTENDED-SETUP have a user autoexplaining MENU.

MFD/STD JUMPERS (see ref. 12 on page 1-12)

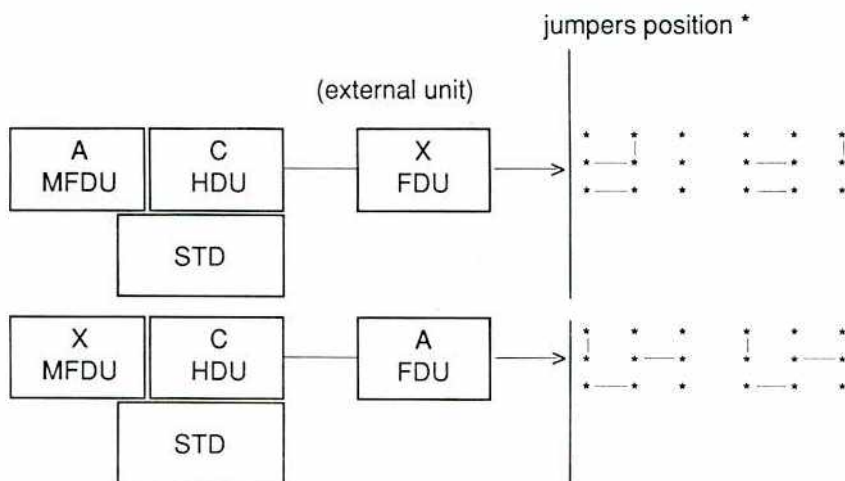
With the FDU SETUP is possible to assign the logical characteristics of max two MFD/STD drives.

Physically, via JUMPERS, it is possible to select the MFD connected as drives: A, B, or X (X means that the esacky name will assigned with the command DRIVE.SYS inserted in the CONFIG.SYS file.

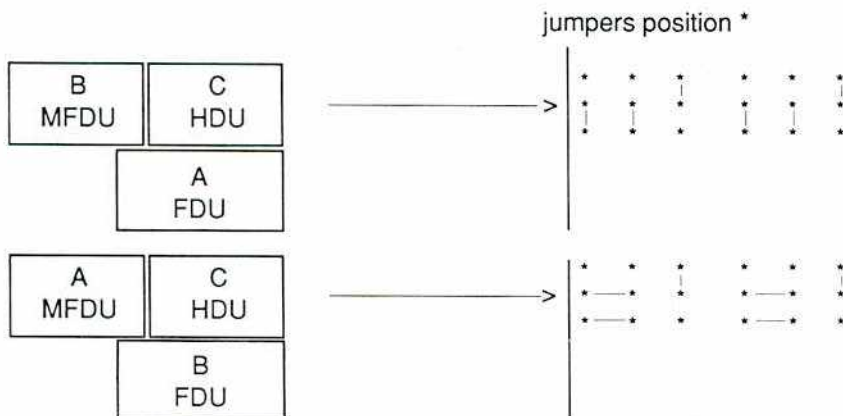
ESAMPLE FOR 1.2 Mbyte drive: DEVICE = DRIVE.SYS /D:2 /T:80 /S:15 /C:/F:7.

The following diagram show the principal possibilities according to the configurations and the options connected.

CONFIGURATION: - HDU 20/40/100 MB, MFD 3.5" 1.44 MB
 OPTIONS: - STD 5.25"
 - EXTERNAL FD 5.25" 1.2 MB



CONFIGURATION: - HDU 20/40/100 MB, FD 5.25" 1.2 MB
 OPTIONS: - INTEGRATED MFD 3.5" 1.44 MB



* See jumper's location on page 1-20.

12. VGA VIDEO CONTROLLER

Integrated on the motherboard is a VGA graphics controller (OVC) compatible with CGA, EGA mode and with 640 x 400 OLIVETTI M24 mode in colour and monochrome environment.

Feature are:

- IBM EGA and MCGA BIOS level compatibility
- CGA hardware and BIOS level compatibility
- OLIVETTI 640 x 400 graphics compatibility
- 256 colours palette
- 64 shade of grey

GRAPHICS MODES

RESOLUTION	COLOURS SHADE of GREY	EMULATION
320 x 200	4	CGA
640 x 200	2	CGA
320 x 200	16	EGA
640 x 200	16	EGA
640 x 350	4	EGA monoch.
640 x 350	16	EGA
640 x 480	2	MCGA and VGA
640 x 480	16	VGA
320 x 200	256 colours/64 shades of grey	MCGA and VGA
640 x 400		OLIVETTI M24

ALPHA MODES

SCREEN FORMAT	RESOLUTION SHADE of GREY	COLOURS	EMULATION
40 x 25	320 x 200	16	CGA
40 x 25	320 x 350	16	EGA
40 x 25	320 x 400	16	MCGA
40 x 25	360 x 400	16	VGA
80 x 25	640 x 200	16	CGA
80 x 25	640 x 350	16	EGA
80 x 25	640 x 400	16	MCGA
80 x 25	720 x 400	16	VGA
80 x 25	720 x 350	4	EGA/MDA
80 x 25	720 x 400	4	VGA

The system can use an external video controller other than the STANDARD VGA controller integrated on the motherboard.

An external video controller consists of an XT or AT type board inserted on an available slot.

The system on which a new controller BOARD has been installed requires a new VDU SET-UP.

When an external video controller is installed the system runs as follows:

EXTERNAL GRAPHIC CONTROLLER	SYSTEM OVC
EGA board	disable
CGA "	MONO
MDA "	COLOUR
PGA "	MONO

13. MONITORS

The video controller is designed to support VGA monochrome and colour monitors.

The type of monitor attached is automatically recognized by the hardware, without requiring any jumper or switch.

The monitors are IBM VGA compatible, and may be connected to the same 15-ways, female connector present on the motherboard.

MONOCHROME MONITOR

SCREEN SIZE: 14"

- FLATSQUARE - HIGH CONTRAST - ANTI GLARE - PAPER WHITE

CONNECTOR: 15 PIN - PS/2 COMPATIBLE

SIGNAL: ANALOG

ALPHANUMERIC RESOLUTION: 40/80 x 25

GRAPHIC RESOLUTION: 640 x 480 (60 HZ)

640 x 400 (70 HZ)

640 x 350 (70 HZ)

HORIZONTAL FREQUENCY: 31.5 KHZ

VERTICAL FREQUENCY: 60/70HZ

CONTROLS: BRIGHTNESS

CONTRAST

MAINS VOLTAGE: 110/220 V

MAINS FREQUENCY: 50/60 Hz

PEDESTAL: TILT and SWIVEL included

COLOUR MONITOR

SCREEN SIZE: 14"

CONNECTOR: 15 PIN - PS/2 COMPATIBLE

SIGNAL: ANALOG

ALPHANUMERIC RESOLUTION: 40/80 x 25

GRAPHIC RESOLUTION: 640 x 480 (60 Hz)

640 x 400 (70 Hz)

640 x 350 (70 Hz)

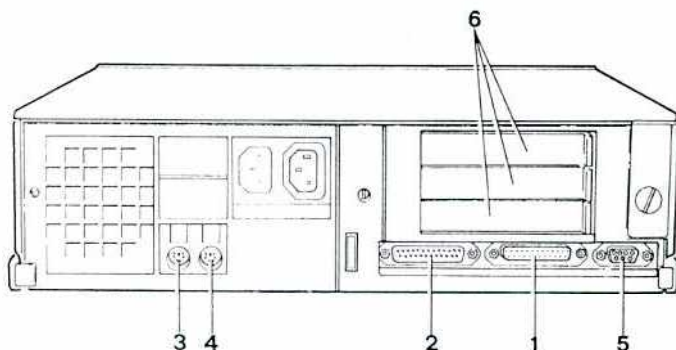
DOT PITCH: 0.39 mm
HORIZONTAL FREQUENCY: 31.5 KHz
VERTICAL FREQUENCY: 50/60/70 Hz
CONTROLS: BRIGHTNESS
 CONTRAST
MAINS VOLTAGE: 110/220 V
MAINS FREQUENCY: 50/60 Hz
PEDESTAL: TILT and SWIVEL included

ENHANCED COLOUR MONITOR

SCREEN SIZE: 14"
CONNECTOR: 15 PIN - PS/2 COMPATIBLE
SIGNAL: ANALOG
ALPHANUMERIC RESOLUTION: 40/80 x 25
GRAPHICS RESOLUTION: 640 x 480 (60 HZ)
 640 x 400 (70 HZ)
 640 x 350 (70 HZ)

DOT PITCH: 0.31 mm
HORIZONTAL FREQUENCY: 31.5 KHz
VERTICAL FREQUENCY: 60/70 Hz
CONTROLS: BRIGHTNESS
 CONTRAST
MAINS VOLTAGE: 110/220 V
MAINS FREQUENCY: 50/60 Hz
PEDESTAL: TILT and SWIVEL included

14. INTERFACES ON MOTHERBOARD



1) PARALLEL INTERFACE

The parallel interface is a bidirectional Centronics port, XT/AT compatible, with a 25-pin, female connector.

2) SERIAL RS232 INTERFACE

The serial interface is a RS232 asynchronous port, XT/AT compatible, with a 25-pin, male connector.

3) KEYBOARD INTERFACE

The keyboard interface is PS/2 compatible with a 6-pin, MINI-DIN, female connector.

4) MOUSE INTERFACE

The mouse interface is PS/2 compatible, with a 6-pin, MINI-DIN, female connector.

5) DISPLAY INTERFACE

The DISPLAY interface is a VGA compatible, with a 6-pin, female connector.

6) I/O EXPANSION SLOTS

3 x 16 bit I/O slots for AT/XT compatible full size boards.

15. KEYBOARD

This system uses the keyboard "OLIVETTI COMPACT 101/102 keys" with PS/2 interface.

The keyboard is available in the following:

NATIONAL VERSIONS

101 keys: USA/ASCII
LATIN-GREEK
DELTA

102 Keys: U.K.	BELGIUM
ITALY	SWITZERLAND
FRANCE	DENMARK
FRANCE/CANADIAN	NORWAY
GERMANY	SWEDEN/FINLAND
SPAIN 2 NATIONAL	PORTUGAL
SPAIN INTERNATIONAL	TURKEY
	YUGOSLAVIA

16. MOUSE

This option is the one used by the OLIVETTI PS/2 compatible machine and consists of:

- MOUSE
- SOFTWARE (1 diskette)
- USER MANUAL

17. POWER SUPPLY

The power supply unit accepts the following voltages and frequencies with the relative tolerances:

100/120 Vac (+10%/-15%) 50/60 Hz
220/240 Vac (+10%/-15%) 50/60 Hz

MAX POWER = 80 W

It provides power for the motherboard, the integrated units (MFD, HDU, STD, CD ROM) the external units and the optional boards.

The load currents are as follows:

NOMINAL OUTPUT (Vdc)	LOAD CURRENT (A)		
	total	peak	on slots
+ 5	9	10	5.5
+12	2.5	3.1	1.4
-12	0.15		0.15
-5	0.15		0.15

VOLTAGE DROPS: 0 Volt for less than 10 ms do not cause functional defects.

1.8 SYSTEM DIMENSIONS & WEIGHT

BASIC UNIT

- height	98 mm
- width	356 mm
- depth	373 mm
- weight	5.5 kg

MONOCHROME MONITOR

- height	min 160/max 320 mm
- width	min 200/max 330 mm
- depth	320 mm
- weight	7 kg

COLOUR MONITOR

- height	min 200/max 350 mm
- width	min 260/max 360 mm
- depth	370 mm
- weight	12 kg

ENHANCED COLOUR MONITOR

- height	365 mm
- width	369 mm
- depth	391 mm
- weight	16.6 kg

MONITOR PEDESTAL

- height	50 mm
----------	-------

KEYBOARD

- height	30 mm
- width	480 mm
- depth	170 mm
- weight	1.25kg

1.9 ENVIRONMENT CONDITIONS

TEMPERATURE

operational:	+10 °C to +40 °C
non operational:	- 40 °C to +60 °C

There must be a transition period of 2 hours between the two conditions.

RELATIVE HUMIDITY

operational:	20% to 80%, non condensing
non operational:	5% to 95%, non condensing

1.10 SOFTWARE OPERATING SYSTEMS

1. MS-DOS 3.30a

The MS-DOS 3.30a Operating System, provides all the functions contained in the previous version adding the following features:

- I/O performance improvements
- new and improved commands
- new national languages support
- 3.5", 1.44 MB MFD support
- miscellaneous small changes

MS-DOS 3.30a provides extended National Language -support at two levels. First a new file COUNTRY.SYS will include extended information such as currency formats, collating sequences time formats and so forth.

Second MS-DOS 3.30a lets the user switch from the character sets associated with some devices to different, country specific character sets.

This feature is referred to as code page switching.

MS-DOS Version 3.30a Rev. 1.03, available today, is distributed in two different type of media:

- 5.25" 360 Kb formatted diskettes
- 3.5" 720 Kb formatted diskettes

2. MS-DOS 4.0

A new version of MS-DOS named 4.01, offers new functions with regards to features and system uses, particularly:

- support files/partitions greater than 32 MB (up to a maximum of 2 GB)
- can use extended memory, for buffers and cache, under the control of a LIM 4.0 driver (if such a driver is used)
- optimize File System features based on FAT

MS-DOS 4.01 use at least 10 KB of more memory space than MS-DOS 3.3.

MS-DOS is equipped with a graphics interface, using screen windows, functionally compatible with MS-OS/2's PRESENTATION MANAGER.

This release is available in two types of media:

- 5.25" 360 Kb formatted diskettes
- 3.5" 720 Kb formatted diskettes

3. MS-OS/2

MS Operating System/2 is the new generation operating system for Personal Computers.

It is not just a new version of MS-DOS but it is a new operating system designed specifically for 80286 and 80386 based PC.

MS-OS/2 can be thought of consisting of two components:

- 1. BASE OPERATING SYSTEM or KERNEL
- 2. USER INTERFACE

The main features of MS-OS/2 ver. 1.1 are:

- PRESENTATION MANAGER
- Concurrent processing of multiple applications
- Exploits 80286/80386 real and protected modes
- Runs most MS-DOS applications
- New CALL based application program interface (API)
- Structured architecture
- Enhanced usability
- Open system philosophy continuation

The graphic user interface, PRESENTATION MANAGER, provides a more intuitive and easy to learn product. The user does not have to remember a number of commands, he looks at the screen for visual representation of the physical objects he is accustomed to and points at it in order to work with it.

MS-OS/2 provides enhanced usability. In addition to the user interface, the error message display and error handling is much improved from the previous generation.

Multiple applications can run simultaneously under MS-OS/2.

It is priority based multitasking operating system, this means that it can run multiple applications or tasks simultaneously with each task's execution based upon its priority.

MS-OS/2 exploits the 80286 and 80386 real and protected modes. It is not constrained to 1 MB of memory addressability, up to 16 MB of RAM can be addressed.

MS-OS/2 can run most existing MS-DOS applications preserving the users investment in application software.

MS-OS/2 1.1 is distributed in two different kits:

- 5.25" MFD (1.2 MB media)
- 3.5" MFD (720 KB media)

4. XENIX

XENIX V is the current OLIVETTI solution for PC multi-user environments.

HIGHLIGHTS of SCO XENIX O.S. product:

- Internationalization; providing software developers with a suitable framework for writing applications for the European market. The enhancements consist of an 8 bit data path through XENIX kernel and drivers that allow to support European alphabets, a new character mapping facility and a generic TTY driver to support national character sets.
- Device drivers; providing drivers for previously unsupported peripherals, such as: Streaming Tapes, SERIAL cards, FLOPPY DISK, both for 5.25" and 3.5", Hard Disk not preconfigured in the computer's ROM, Screen driver allowing to access the bit-map display directly.
- System Installation, Administration and Configuration facilities: providing to users utilities to easy install and administer the system and to configure new drivers.

A new "Independent Link Kit" has been added to allow the XENIX System Administrator to "fine-tune" the kernel and install new drives without the XENIX Development System.

Improvements on the system configurability as expansion to the maximum number of files per process, processes, files and i-nodes has been done.

In addition the SCO XENIX SYSTEM V version for OLIVETTI PCs supplies special enhancements to give "ad hoc" support for OLIVETTI including:

- Character map files for each OLIVETTI national keyboard version available on system console (both 86 keys and 101/102 keys) and terminals OLIVETTI WS 584 and WS 685.
- Specific support for OLIVETTI terminals WS 584 and WS 685.
- VFE, the 8 bit Video File Editor ported from MS-DOS that allows to write files containing national characters.

2. INSTALLATION AND AUTODIAGNOSTIC TEST

The product is to be installed by the user. If the need arises, however, (e.g. for information on the environmental conditions), follow the instructions given in the Installation and Operations Guide, supplied together with the product. For mains power, make sure that the input values correspond to those given on page 1-26.

To connect optional devices or expansion modules, follow the instructions in their installation kits.

2.1 POWER-ON AUTODIAGNOSTIC TEST

-Each time the PC is switched on, it runs an internal autodiagnostic routine.

-The autodiagnostic program is stored in the system ROM and is run to check that the essential components are working properly.

2.2 HOW TO RUN THE AUTODIAGNOSTIC TEST

-Switch on the PC. Adjust the brightness on the monitor.

-While the test is running, a series of messages regarding the components tested appears on the screen.

-At the end of the test, if no errors are detected, the following screen appears.

```
Resident Diagnostics      Rev 1.22

CPU (i80286)              Pass      (Motherboard)
ROM Checksum              Pass      (Motherboard)
Memory Refresh            Pass      (Motherboard)
Keyboard Controller       Pass      (Keyboard)
Parity Circuitry          Pass      (Motherboard)
Interrupt Controllers     Pass      (Motherboard)
DMA Controllers           Pass      (Motherboard)
Keyboard                  Pass      (Keyboard)
Clock/Calendar            Pass      (Motherboard)
CPU Protected Mode        Pass      (Motherboard)
CMOS RAM                  Pass      (Motherboard)
Fixed Disks:              1 Present
Floppy Disks:             Present

Primary boot-strap

Microsoft MS-DOS version 3.30
Copyright 1981, 1986, 1987 Microsoft Corp.
Copyright (C) Olivetti Inc., 1987, 1988 All Rights Reserved
Rev. 1.03 02/12/1988
```

2.3 AUTODIAGNOSTIC TEST MESSAGES

-If an error is detected during the autodiagnostic test, an error message appears on the screen. If this happens, switch off the PC, wait for a few moments and then switch it on again. If the error persists, replace the component indicated.

(*)If the component is located on the motherboard, replace the board. In this case, it is necessary to make the same jumper settings on the new motherboard (pag.3-4) as on the board replaced and then run the setup program described in the Installation and Operations Guide.

When the motherboard is replaced, the password is also lost. To reset it, follow the instructions given in the Installation and Operations Guide.

2.4 AUTODIAGNOSTIC TEST NOT RUN

If no message appears at power on, a check must be made to see if the error is located in the system power supply or the monitor.

If the monitor and leds on the keyboard and drives stay off:

-Make sure that the cables are connected properly and the mains voltage is present.

-Check the VCC voltages generated by the power supply: +5V, +12V, -5V, -12V (page 3-2). If the voltages are not present, check that the fuse is O.K. and, if it is, replace the power supply board.

-If all the VCC voltages are present, the motherboard must be replaced as explained above (*).

If the monitor stays off but the leds on the keyboard and drives come on:

-Check that the brightness control is not set to its minimum.

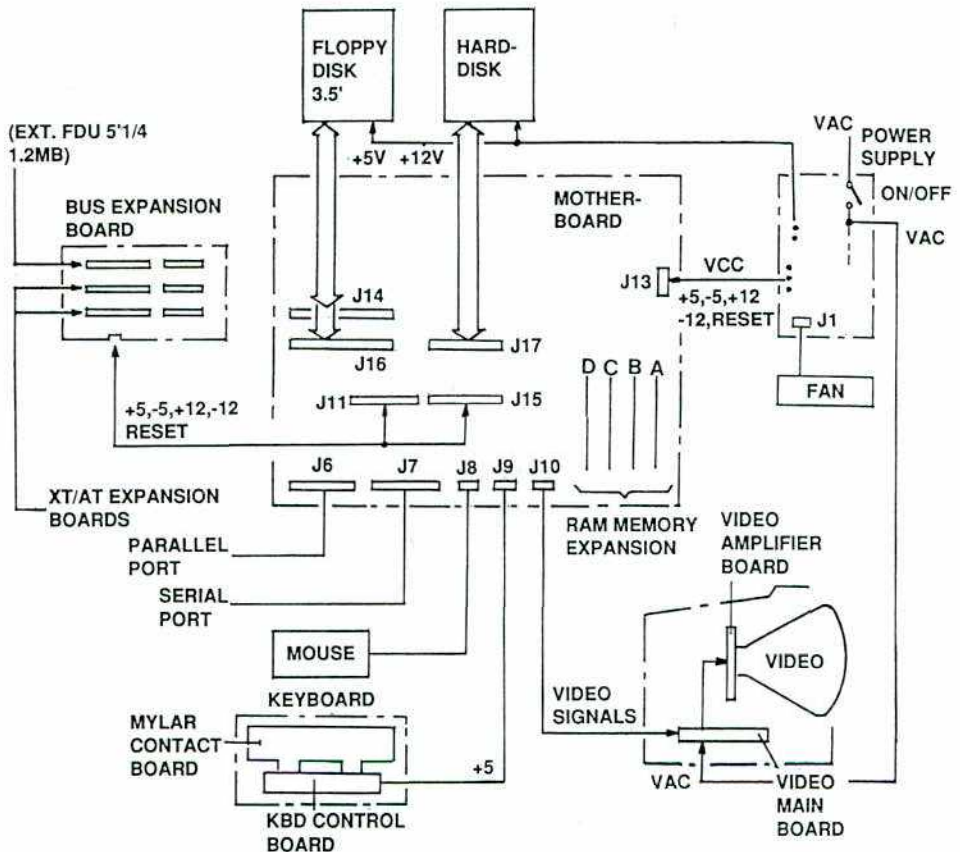
If the fault persists, it may be present on the monitor or monitor controller chip on the motherboard.

-To see if the monitor is working, detach the monitor signal cable from the system and if the monitor comes on, the motherboards must be replaced as described above (*).

-If the monitor does not come on, it must be replaced.

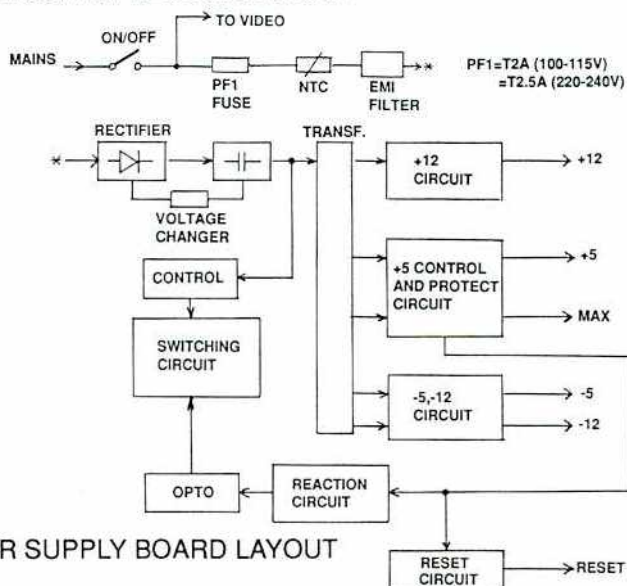
3. BOARDS DESCRIPTION

BOARDS CONNECTION DIAGRAM

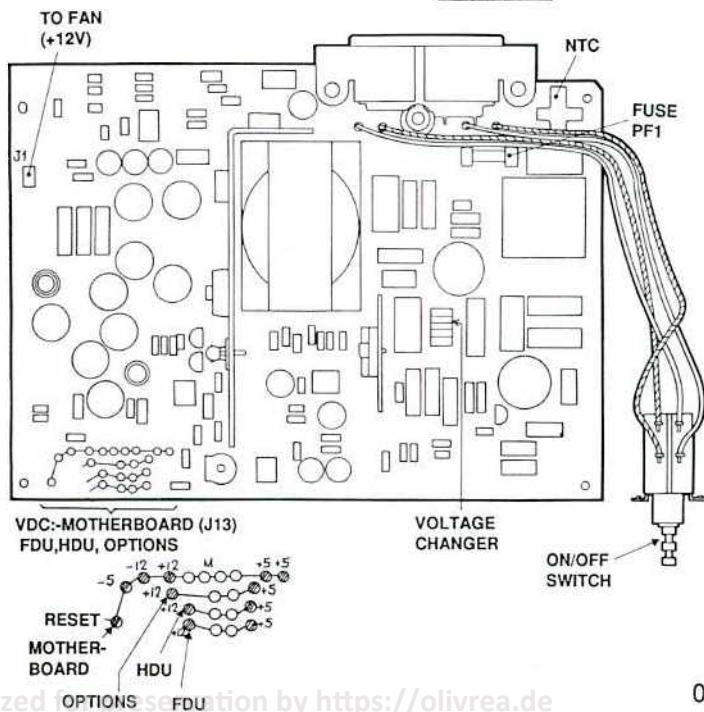


3.1. POWER SUPPLY

- POWER SUPPLY BLOCK DIAGRAM



- POWER SUPPLY BOARD LAYOUT



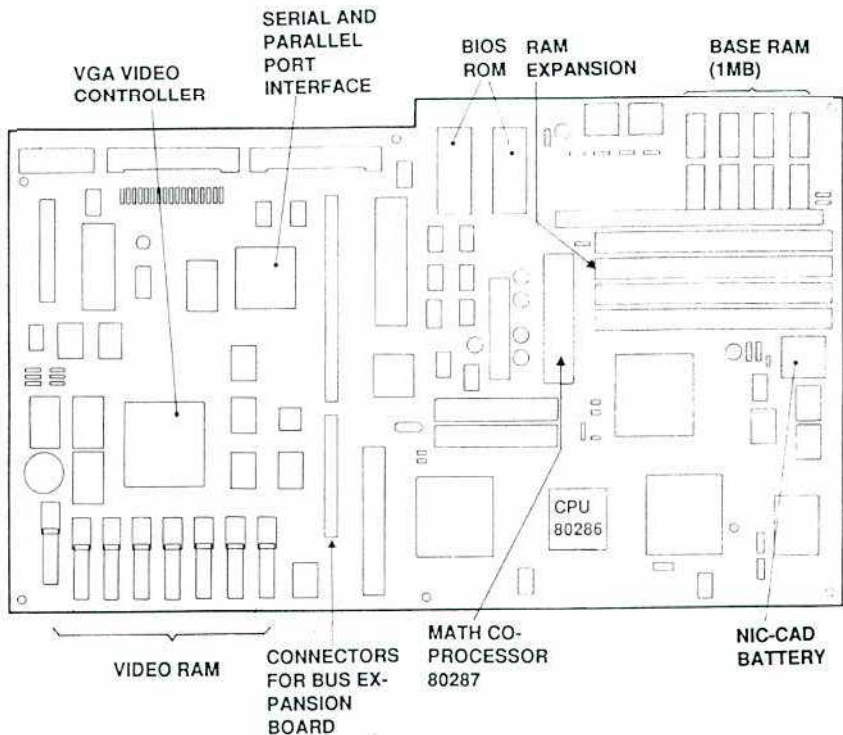
3.2 MOTHERBOARD

The unit controlling the whole apparatus is the CPU 80286 microprocessor operating at 16 MHz without wait states. The use of mathematic coprocessor 80287 operating at 16 MHz is feasible for functions requiring it.

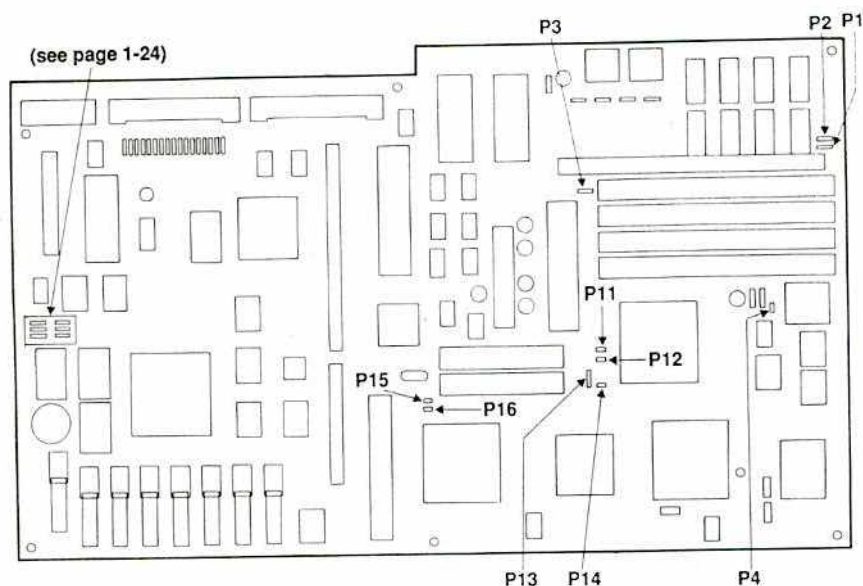
RAM memory is sized to 1 MB with expansion feasibility up to 5 MB on same motherboard; bios ROM memory has 128 Kb.

The board contains a clock/calendar (with back-up battery) and controls keyboard and mouse peripherals; two floppy drives, a hard disk unit and an asynchronous RS 232 serial port and a Centronics parallel port.

By means of a Bus Expansion board inserted on the motherboard three AT/XT compatible boards may be used.



MOTHERBOARD-JUMPERS LOCATION (Code 029230C)



The function of each jumper is described in the following page.

ON = jumper connected

OFF = no connection (open)

Important NOTE:

Jumpers P11, P12, P15 and P16 must be always OFF (open).

- P11 (wait in DMA)
- P12 (wait in refresh)
- P14 (256 Kb RAM memory) (Always ON 1-3 position)
- P15 (wait cycles)
- P16 (wait cycles)

JUMPERS SETTINGS

- P1 - PASSWORD

2-3 = ON = Password active (default)

1-2 = ON = Password deleted

- P2 and P13 - PARITY CHECK

2-3 (P2) = ON = Parity check active (default)

1-2 (P2) = ON = No parity check

1-2 (P13) = ON = Parity check active (default)

2-3 (P13) = ON = No parity check

- P3 - BIOS ROM ADDRESS

2-3 = ON = address E0000 (default)

1-2 = ON = address C0000

- P4 - CMOS RAM BATTERY CONNECTION

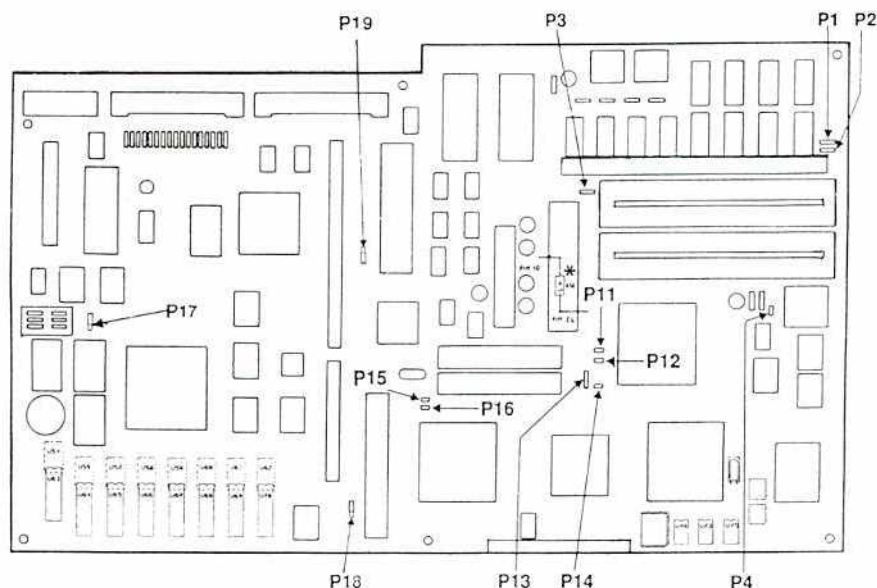
ON = Battery Connected

OFF = Battery Disconnected

- P5, P6, P7, P8, P9, P10 - JUMPERS FOR DRIVE CONFIGURATION (see page 1-22).

When replacing the motherboard check that the jumper settings correspond to those on the old one - see instructions described on page 5-10. Removal and replacement of motherboard.

MOTHERBOARD - JUMPERS LOCATION (Cod. 029245F - 030036N)



The function of each jumper is described in the following page.

ON = Jumper connected

OFF = No connection

NOTE: Jumpers P11, P12, P15 and P16 must be always off (open)

NOTE: Jumpers P5, P6, P7, P8, P9 and are used for drive configuration (see page 1-20)

- P11 DMA wait selection
- P12 Selection of wait for RAM refresh
- P15 Wait cycles selection
- P16 Wait cycles selection

When replacing the motherboard check that the jumper settings correspond to those on the old one - see instructions described on page 5-10. Removal and replacement of motherboard.

JUMPERS SETTING

P1 Password

1	2	3
---	---	---

2-3 = ON = Password active (default)

1-2 = ON = Password deleted

P2 and P13 Parity Check

1	2	3
---	---	---

2-3 (P2) and 1-2 (P13) = ON = Parity check active (default)

1-2 (P2) and 2-3 (P13) = ON = No parity check

1
2
3

P3 ROM Bios Address

1	2	3
---	---	---

2-3 = ON = Address E0000 (default)

1-2 = ON = Address C0000

P4 CMOS RAM Battery Connection

--	--

ON = Battery connected

ON = Battery disconnected

P14 Selection base memory on motherboard

--	--

1-2 = ON = 256 Kb of memory

1-3 = ON = More than 256 Kb of memory

P17 Selection mono/bidirectional of parallel interface

1
2
3

1-2 = ON = Monodirectional interface (default)

2-3 = ON = Bidirectional interface

P18 HDU Interrupt Selection

1
2
3

1-2 = ON = Interrupt for HDU 20/40 Mb

2-3 = ON = Interrupt for HDU 100 Mb

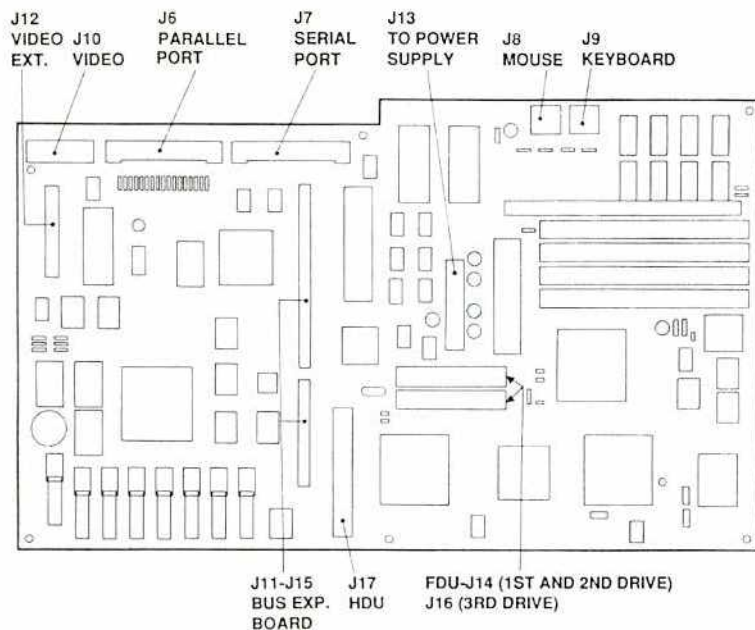
P19 Clock Selection for expansion Slot

1
2
3

1-2 = ON = Clock 8 MHz (default)

2-3 = ON = Clock 16 MHz

MOTHERBOARD (CONNECTORS AND SIGNALS)



J10 VIDEO

Pin	Signal	Pin	Signal
1	RED	8	GND
2	GREEN	9	N.C.
3	BLUE	10	GND
4	N.C.	11	ID1
5	GND	12	ID0
6	GND	13	VHSYNC
7	GND	14	VVSYNC

J13 POWER SUPPLY

Pin	Signal	Pin	Signal
1	+5 V	6	GND
2	+5 V	7	+12 V
3	GND	8	-12 V
4	GND	9	-5 V
5	GND	10	PWGOOD

J9 KEYBOARD

Pin	Signal	Pin	Signal
1	KBDAT	4	+5 V
2	N.C.	5	KBCLK
3	GND	6	N.C.

J8 MOUSE

Pin	Signal	Pin	Signal
1	MSDAT	4	+5 V
2	N.C.	5	MSCLK
3	GND	6	N.C.

J14 FDU UNITS 1 and 2

Pin	Signal	Pin	Signal
1	GND	18	DIRC
2	PCVAL	19	GND
3	GND	20	STEP
4	N.C.	21	GND
5	GND	22	WD
6	N.C.	23	GND
7	GND	24	WE
8	IDX	25	GND
9	GND	26	TR00
10	MOTON2	27	GND
11	GND	28	WP
12	SELA	29	GND
13	GND	30	RRD
14	SELB	31	GND
15	GND	32	HS
16	MOTON1	33	GND
17	GND	34	DCHGN

J12 EXTENSION VIDEO

Pin	Signal	Pin	Signal
1	VIDX0	14	N.C.
2	GND	15	VDX7
3	VDX1	16	GND
4	GND	17	EXCLK
5	VDX2	18	GND
6	GND	19	EXBLNK~
7	VIDX3	20	GND
8	ENXDAT~	21	EXHSYN
9	VIDX4	22	GND
10	ENXSIN~	23	EXVSYN
11	VIDX5	24	N.C.
12	ENXSIN~	25	GND
13	VIDX6	26	+5 V

J16 FDU UNIT 3

Pin	Signal	Pin	Signal
1	GND	18	DIRC
2	PCVAL	19	GND
3	GND	20	STEP
4	N.C.	21	GND
5	GND	22	WD
6	N.C.	23	GND
7	GND	24	WE
8	IDX	25	GND
9	GND	26	TR00
10	N.C.	27	GND
11	GND	28	WP
12	SELEC	29	GND
13	GND	30	RRD
14	N.C.	31	GND
15	GND	32	HS
16	MOTON3	33	GND
17	GND	34	DCHGN

J17 HARD DISK

Pin	Signal	Pin	Signal
1	RESETZ	21	N.C.
2	GND	22	GND
3	SD7	23	IOWZ
4	SD8	24	GND
5	SD6	25	IORZ
6	SD9	26	GND
7	SD5	27	N.C.
8	SD10	28	BALE
9	SD4	29	N.C.
10	SD11	30	GND
11	SD3	31	HIRQ14
12	SD12	32	IOCS16Z
13	SD2	33	SA1
14	SD13	34	GND
15	SD1	35	SA0
16	SD14	36	SA2
17	SD0	37	HDU0CSZ
18	SD15	38	HDU1CSZ
19	GND	39	ENRIQ14
20	N.C.	40	GND

J7 SERIAL PORT

Pin	Signal	Pin	Signal
1	GND	14	N.C.
2	SOUT0	15	N.C.
3	SIN0	16	N.C.
4	RTS0	17	N.C.
5	CTS0	18	N.C.
6	DSR0	19	N.C.
7	GND	20	DTR0
8	RLSD0	21	N.C.
9	N.C.	22	RI0
10	N.C.	23	N.C.
11	N.C.	24	N.C.
12	N.C.	25	N.C.
13	N.C.		

J6 PARALLEL PORT

Pin	Signal	Pin	Signal
1	STBNF	14	AFDNF
2	PD0F	15	ERRNF
3	PD1F	16	INITNF
4	PD2F	17	SLINNF
5	PD3F	18	GND
6	PD4F	19	GND
7	PD5F	20	GND
8	PD6F	21	GND
9	PD7F	22	GND
10	ACKNF	23	GND
11	BUSYF	24	GND
12	PEF	25	GND
13	SLCTF		

J15 BUS EXPANSION BOARD

Pin	Signal	Pin	Signal
1	SBHEZ~	2	MECS16Z~
3	LA23	4	IOCS16Z~
5	LA22	6	IRQ10
7	LA21	8	IRQ11
9	LA20	10	IRQ12
11	LA19	12	IRQ13
13	LA18	14	IRQ14
15	LA17	16	DACK0
17	MEMRZ~	18	DRQ0
19	MEMWZ~	20	DACK5
21	SD8	22	DRQ5
23	SD9	24	DACK6
25	SD10	26	DRQ6
27	SD11	28	DACK7
29	SD12	30	DRQ7
31	SD13	32	+5 V
33	SD14	34	MASTERZ~
35	SD15	36	GND
37	GND	38	GND

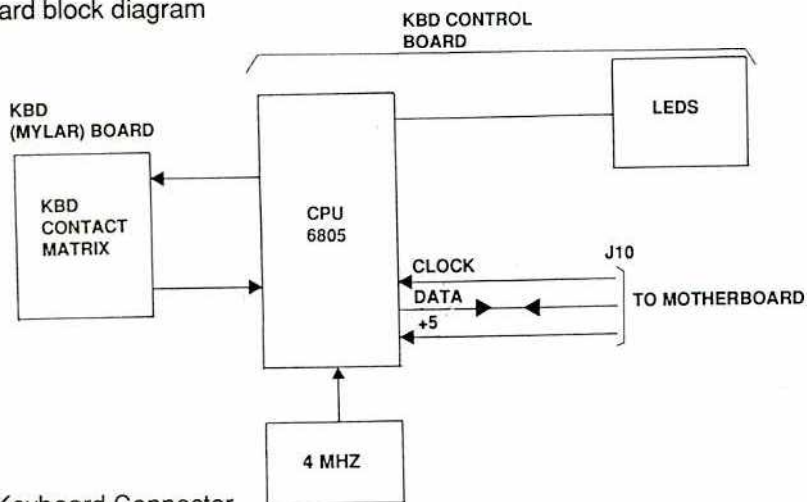
J15 BUS EXPANSION BOARD

Pin	Signal	Pin	Signal
1	IOCHCKZ~	2	GND
3	SD7	4	RESET
5	SD6	6	+5 V
7	SD5	8	IRQ9
9	SD4	10	-5 V
11	SD3	12	DRQ2
13	SD2	14	-12 V
15	SD1	16	WSZ0~
17	SD0	18	+12 V
19	IOCHRDY	20	GND
21	AEN	22	SMEMWZ~
23	SA19	24	SMEMRZ~
25	SA18	26	IOWZ~
27	SA17	28	IORZ~
29	SA16	30	DACK3
31	SA15	32	DRQ3
33	SA14	34	DACK1
35	SA13	36	DRQ1
37	SA12	38	RFRESHZ~
39	SA11	40	SYSCLK
41	SA10	42	IRQ7
43	SA9	44	IRQ6
45	SA8	46	IRQ5
47	SA7	48	IRQ4
49	SA6	50	IRQ3
51	SA5	52	DACK2
53	SA4	54	TC
55	SA3	56	BALE
57	SA2	58	+5
59	SA1	60	OSC1
61	SA0	62	GND
63	GND	64	GND

3.3. KEYBOARD

The keyboard is IBM Compatible and has 101 keys (USA) or 102 keys. The key-contact board is a mylar type and is connected to the KBD control board where there is the microprocessor 6805. The 6805 manages the key-contact matrix and the communication protocol AT/PS2.

Keyboard block diagram



J10 - Keyboard Connector

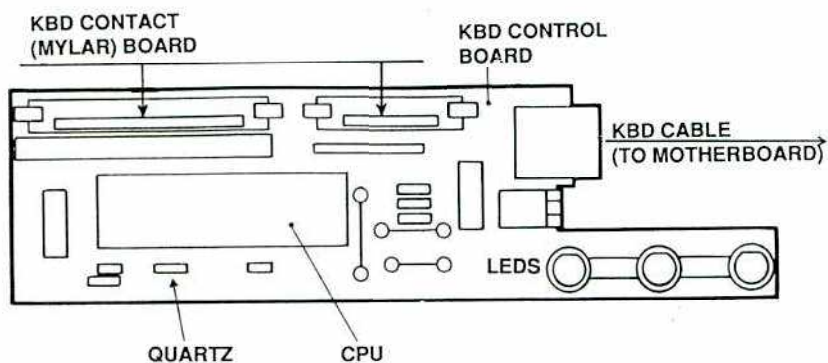
- 1 - GND
2 - +5 V
3 - GND
4 - CLOCK
5 - DATA
6 - DATA

Keyboard matrix

The keyboard matrix is obtained with the intersection of rows and columns that are scanned by the microprocessor. A key depression causes the electrical contact between the related row and column.

The mylar board is connected to the KBD control board that is connected to the Basic Unit by means of the KBD cable.

KEYBOARD CONTROL BOARD



4. MONITOR

4.1 DSM25-314/X 14" MONOCHROME MONITOR

This monitor is available in two versions: HANTAREX and PHILIPS. The only difference in appearance between the two is the position of the control knobs.

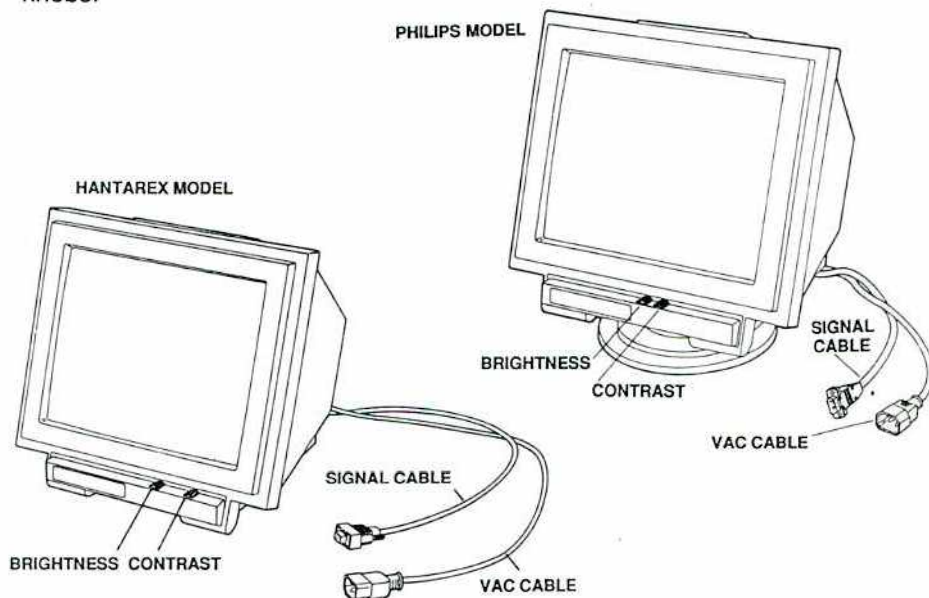


Fig. 4-1 View of the 14" monochrome monitor

CHARACTERISTICS OF THE MONOCHROME MONITOR

A 14", 640 x 480 VGA monochrome monitor with a flat, white phosphor screen with average persistence.

A monitor which has its own power supply, with VAC supplied directly by the system module and with no ON/OFF switch.

A 3-core D-type signal connector with 15 contacts.

CRT with electromagnetic deflection, square line flat screen.
The video image is handled in reverse mode.

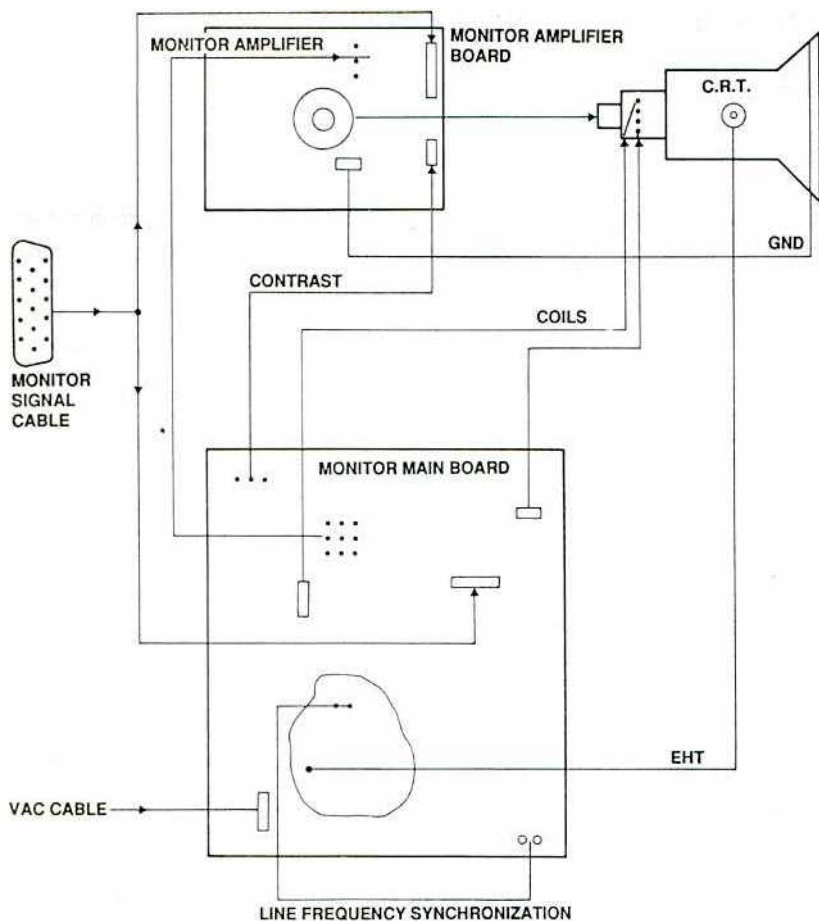
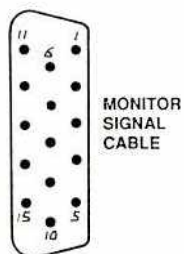


Fig.4-3 Internal connections of the Hantarex monochrome monitor

15-pin MONITOR SIGNAL CONNECTOR

PIN SIGNALS

2	Monitor
5	Self Test
7	Ground
10	Ground
12	Ground
13	H Sync.
14	V Sync.



VIEW OF THE HANTAREX MONITOR BOARDS

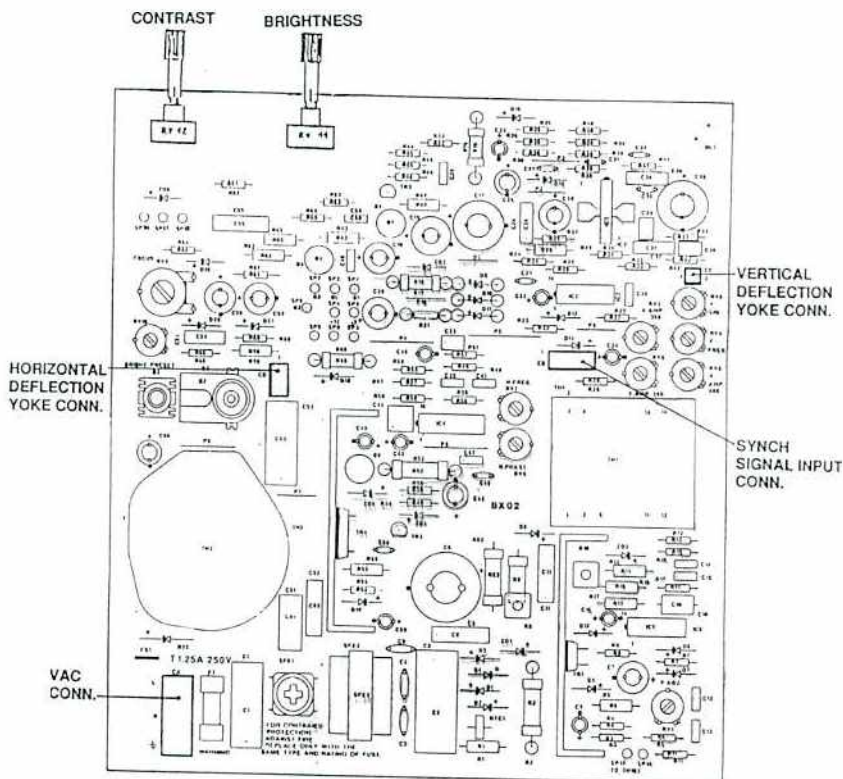


Fig.4-4 Monitor main board

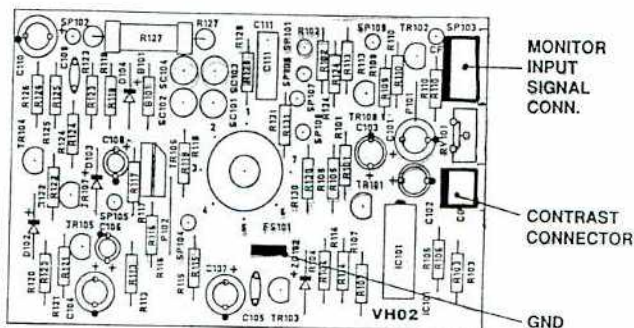


Fig. 4-5 Monitor amplifier board

To open the Hantarex monitor casing, follow the procedure described on page 4-10.

4.1.2 PHILIPS MONOCHROME MONITOR

The monitor control circuitry is divided between three boards.

- The main board contains: the power supply, the circuits for decoding the signals generated by the ETV motherboard, the horizontal and vertical synchronization circuits and the pre-amplifier.
- The second board contains the mains filter.
- The third board, connected directly to the picture tube, controls the final amplifier and CRT drive circuits.

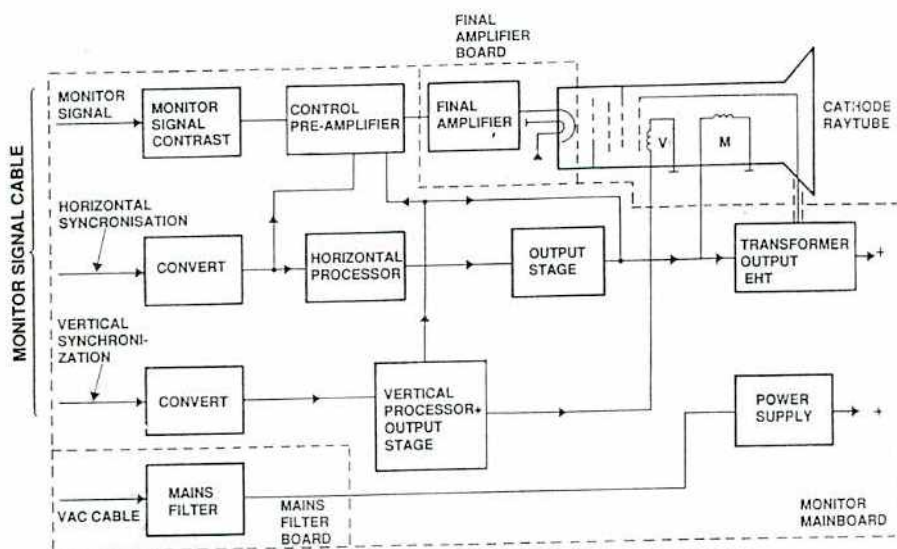


Fig. 4-6 Block diagram of the Philips monochrome monitor

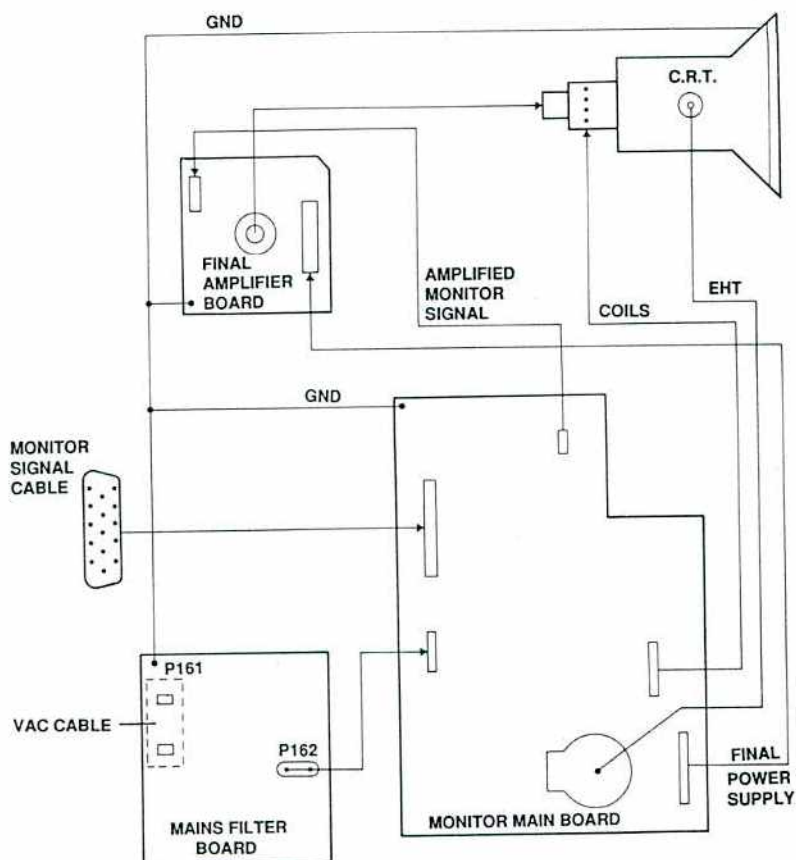
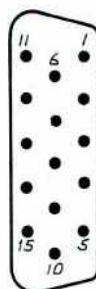


Fig. 4-7 Internal connections of the Philips monochrome monitor

15-pin MONITOR SIGNAL CONNECTOR

PIN SIGNALS

2	Monitor
5	Self Test
7	Ground
10	Ground
12	Ground
13	H Sync.
14	V Sync.



VIEW OF THE PHILIPS MONITOR BOARDS

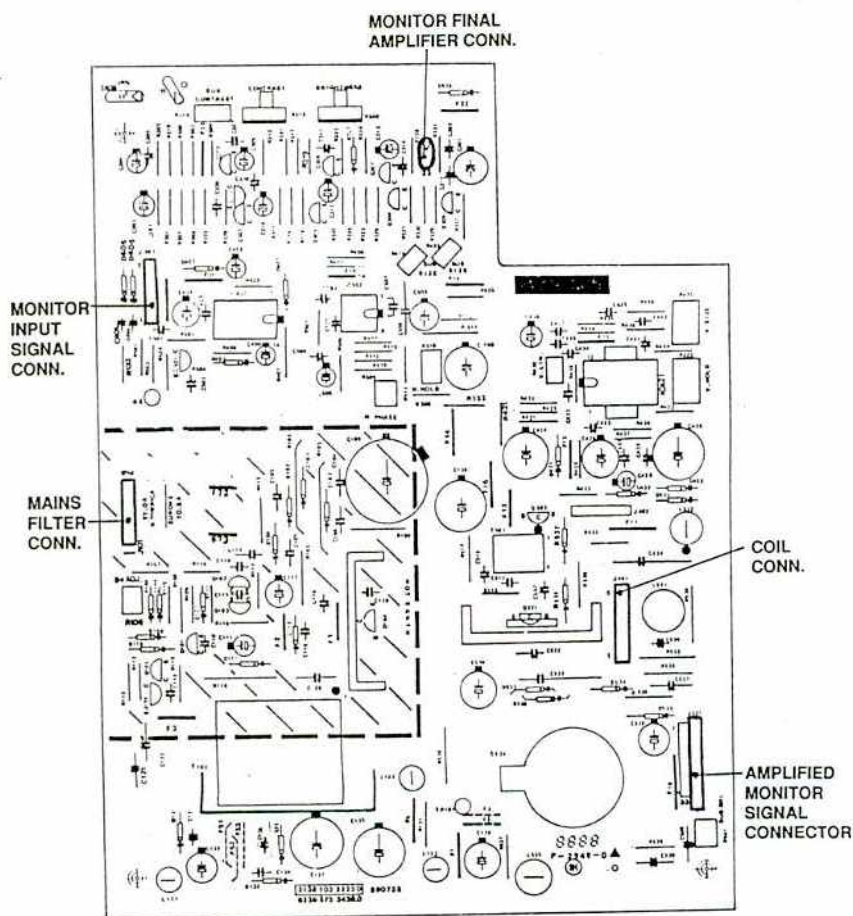


Fig. 4-8 Monitor main board

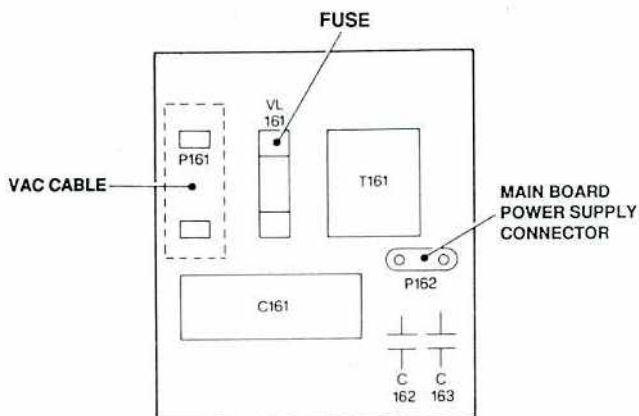


Fig. 4-9 Mains filter board

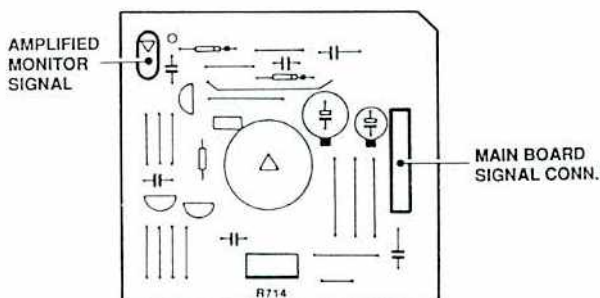


Fig. 4-10 Final amplifier board

To open the monitor casing, follow the procedure described on the following pages.

4.1.3 DISASSEMBLING THE 14" MONOCHROME MONITOR

Before opening the monitor casing, switch off the system and then unplug the display power supply cable from the system module.

Place the monitor on a soft cloth.

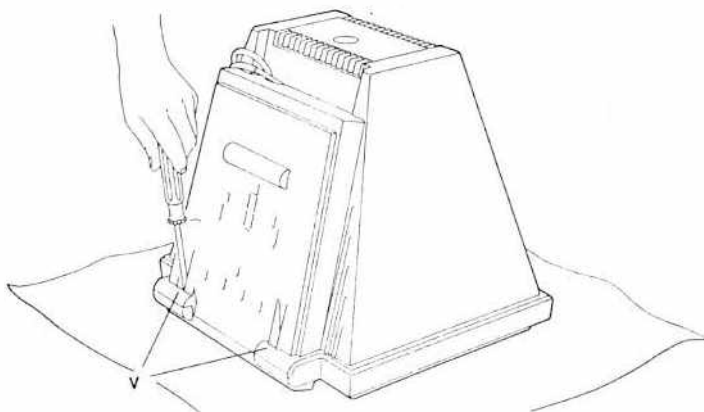


Fig. 4-11 Position for opening the monitor casing

To open the monitor casing, remove the four screws V.

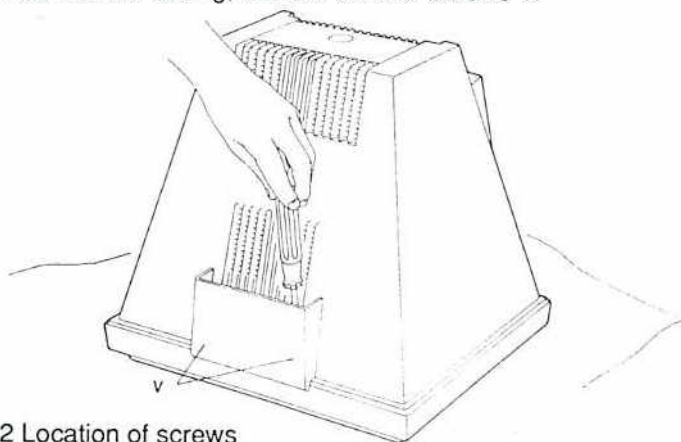


Fig. 4-12 Location of screws

To remove the casing, lift it gently passing the cables through the slots.

Warning !

Having opened the monitor casing, proceed with caution as there may be high voltages present, even when the monitor is switched off and disconnected.

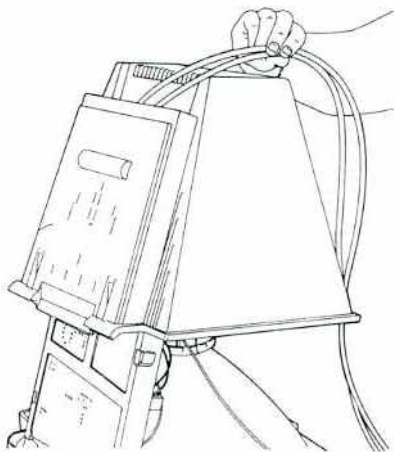


Fig. 4-13 Removing the casing

DISASSEMBLING THE HANTAREX MONITOR

(The disassembly procedure for the Philips monitor is described on page 4-14). Before removing the high voltage cable, it must be discharged to ground using a screwdriver to link it to a metal part M that is connected to ground.

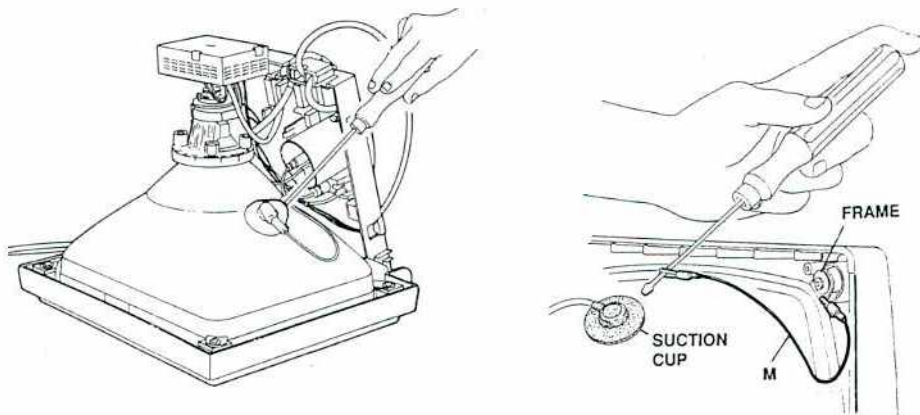


Fig. 4-14 Discharging the high voltage cable to ground

To remove the main board, detach the connectors, insert the blade of a screwdriver in slots A and press outwards.

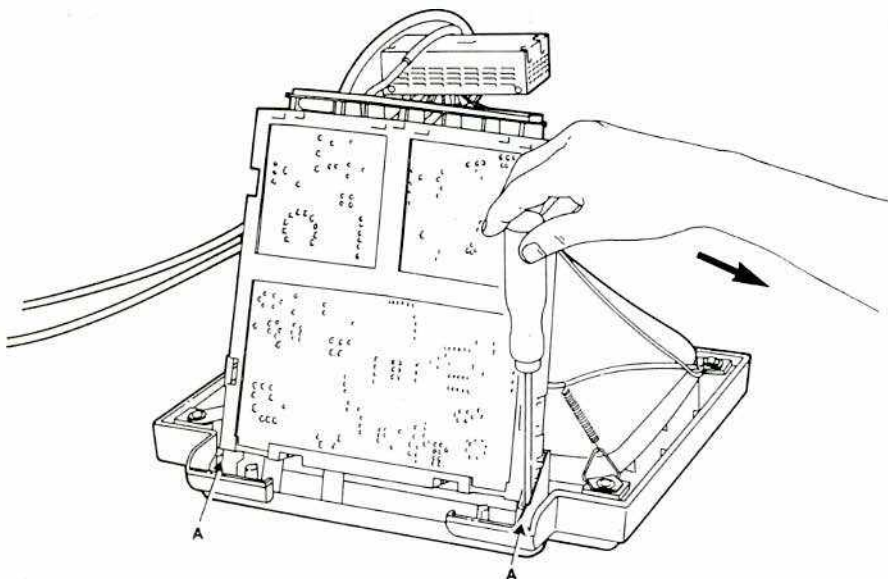


Fig. 4-15 Removing the main board

The monitor amplifier board is removed by pulling it upwards, taking care not to bend it, and detaching the connectors.

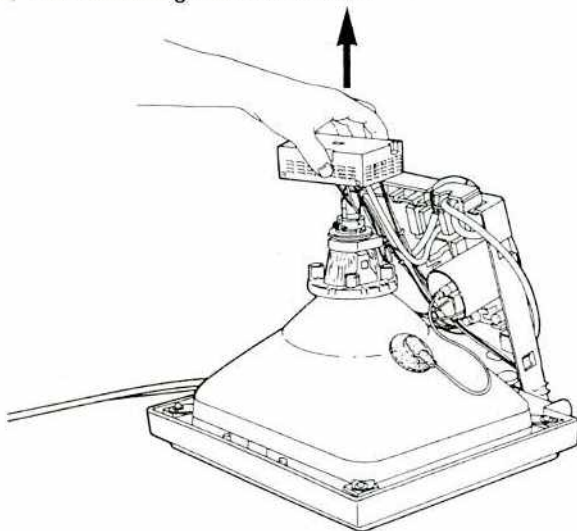


Fig. 4-16 Removing the amplifier board

The VAC cable may be removed by unplugging it from the socket.

To separate the main board from its support, release the 8 retaining tabs G using a screwdriver, and pull out the external control knobs M.

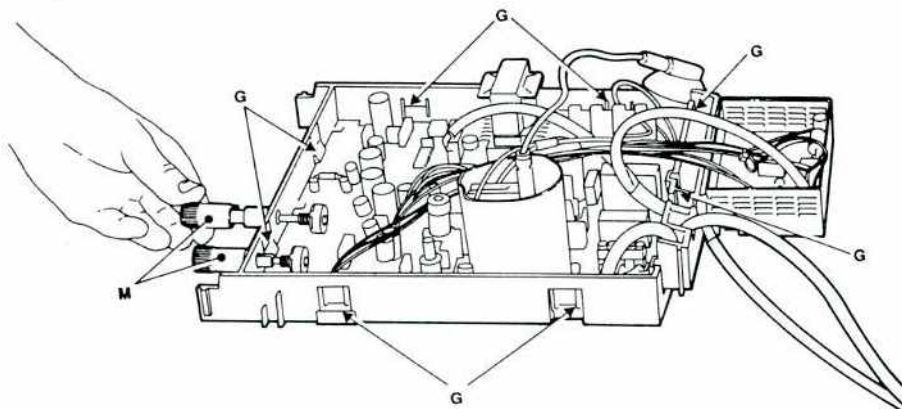


Fig. 4-17 Separating the main board from its support

To remove the CRT, unscrew the four screws V.

The deflection yoke D should only be removed if absolutely necessary. First loosen screw V1 and then pull out the yoke.

To reinstall and adjust it, follow the procedure described on page 4-25.

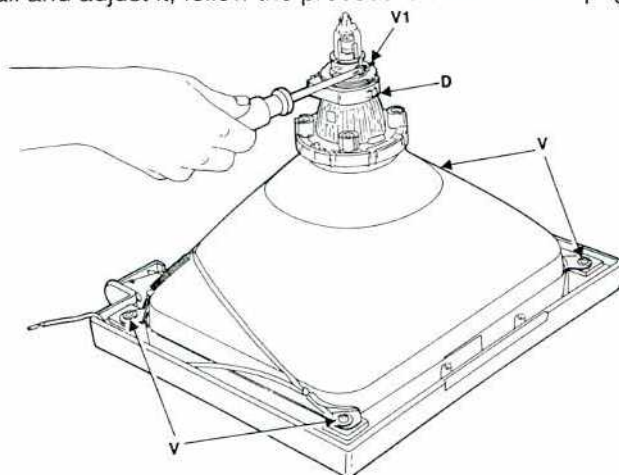


Fig. 4-18 Removing the CRT and deflection yoke

DISASSEMBLING THE PHILIPS MONITOR

Before removing the high voltage cable, it must be discharged to ground, using a screwdriver to link it to a metal part M that is connected to ground.

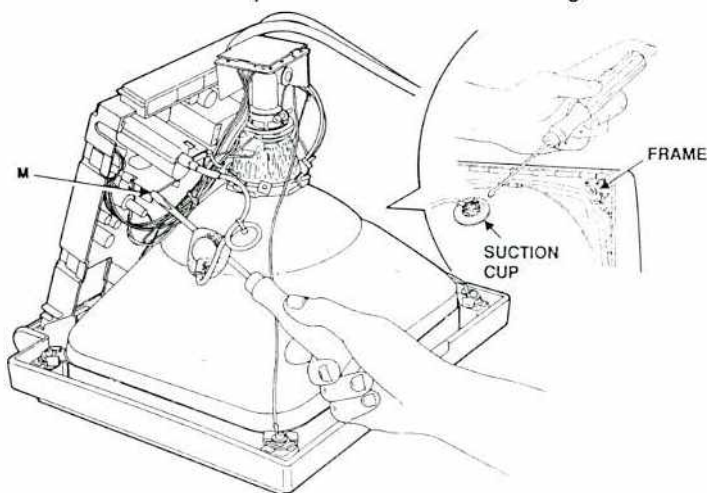


Fig. 4-19 Discharging the high voltage cable to ground

To remove the main board, detach the connectors, cut the bands and then insert the blade of a screwdriver in slots A and press outwards.

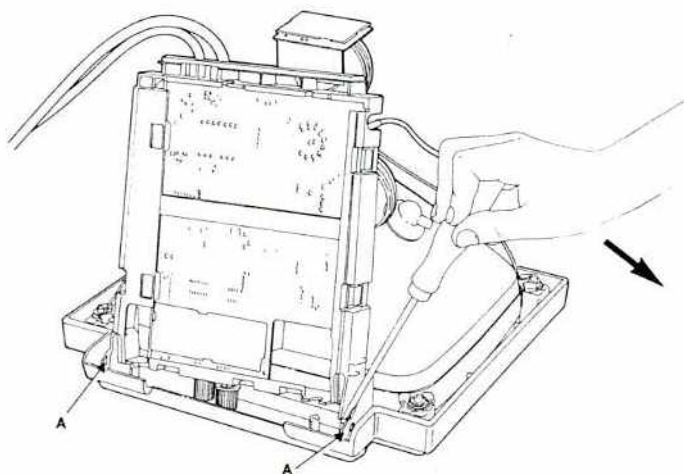


Fig. 4-20 Removing the main board

The final amplifier board is removed by pulling it upwards, taking care not to bend it, and unscrewing screw V1.

To remove the VAC cable and the mains filter board, unscrew screws V2 and V3.

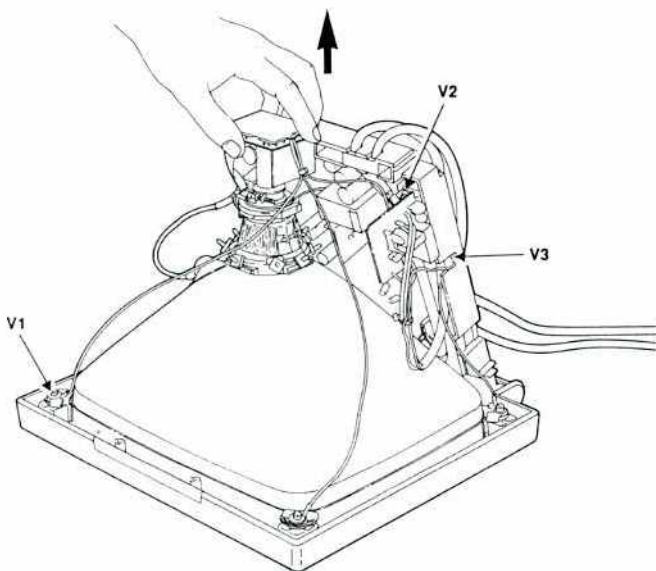


Fig. 4-21 Removing the final amplifier board and mains filter board

To separate the main board from its support, release the 8 retaining tabs G using a screwdriver.

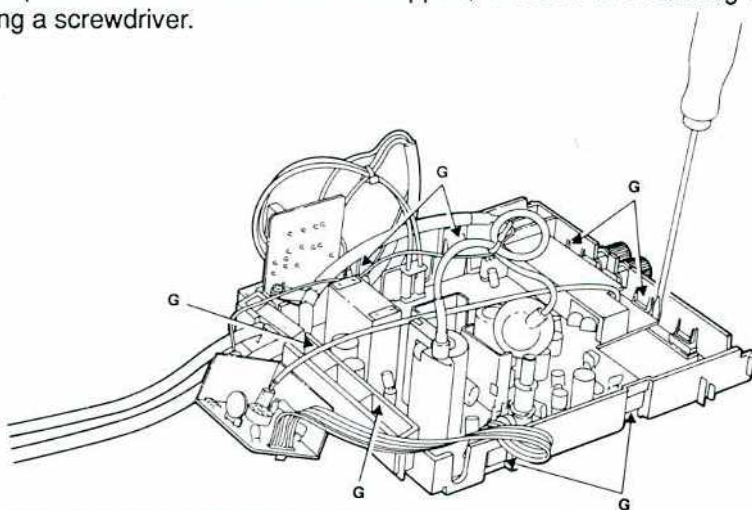


Fig. 4-22 Separating the main board from its support

To separate the CRT from the casing, unscrew the four screws V.

The deflection yoke D should only be removed if absolutely necessary. First loosen screw V1 and then remove the yoke.

To reinstall and adjust it, follow the procedure described in step 10 of "HANTAREX MONOCHROME MONITOR ADJUSTMENTS".

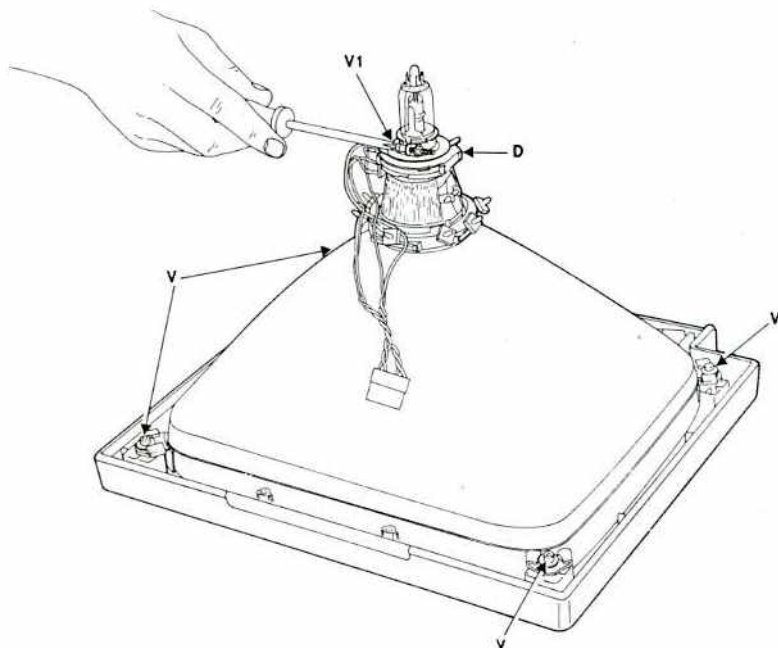


Fig. 4-23 Removing the CRT and deflection yoke

Fig. 4-25 Hantarex monitor amplifier board with adjustment points



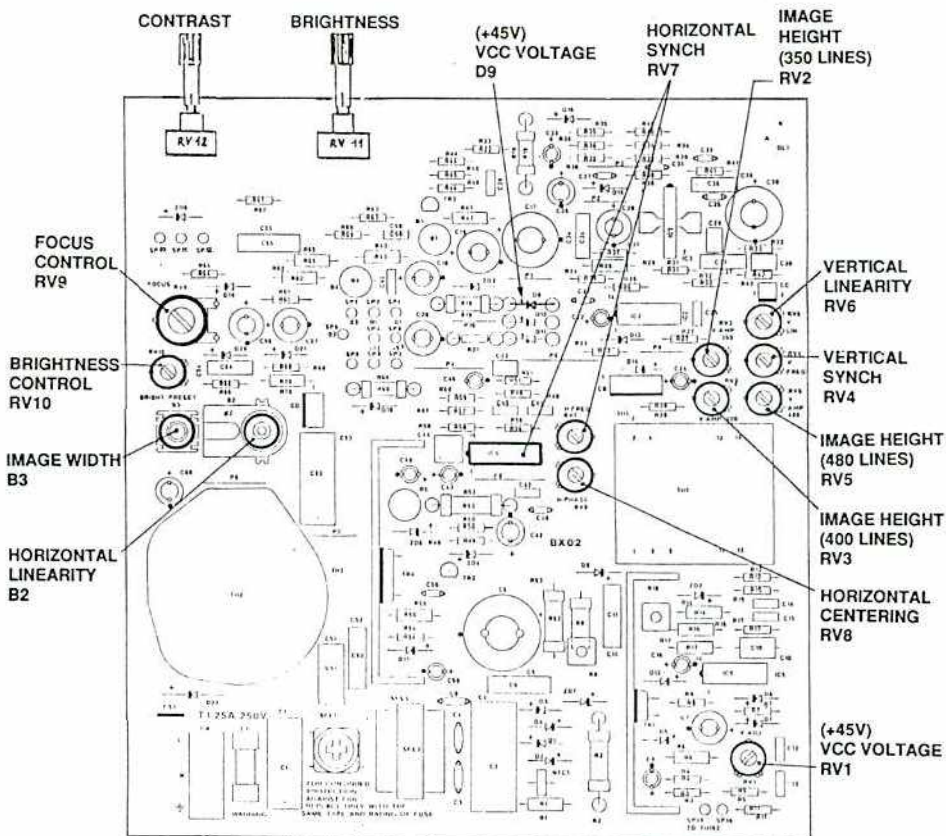


Fig. 4-26 Hantarex monitor main board with adjustment points

1. VCC voltage adjustment (+45 V.)

- Set the brightness and contrast controls to an intermediate position
- Connect a voltmeter between the cathode of diode D9 and ground.
- Adjust RV1 so as to obtain +45 V.

2. Horizontal synchronization

- Short circuit pin 9 of IC4 to ground.
- Adjust RV7 so as to obtain a perfectly vertical image
- Remove the short circuit.

3. Vertical synchronization

- Adjust RV4 so as to obtain a completely still image.

4. Presetting the brightness

- Adjust the brightness by setting the external control knob RV11 to its maximum.
- Turn the external contrast knob RV12 to its minimum.
- Set RV10 so that the horizontal flyback cannot be seen.

5. Presetting the contrast

- Turn the external brightness control knob RV11 to its maximum.
- Turn the external contrast control knob RV12 to its minimum.
- Adjust RV101 until the image can just be seen on the screen.

6. Horizontal linearity

- Adjust B2 so that the width of the characters in a text is uniform throughout the screen.

7. Vertical linearity

- Adjust RV6 so that the height of the characters in a text is uniform throughout the screen.

8. Image width

- Adjust B3 so as to obtain an image width of 232 mm.

9. Horizontal position

- Adjust RV8 so that the image appears in the centre of the screen.

10. Image height

- Adjust RV5 so as to obtain an image height (480 lines) of 170 mm.
- Adjust RV2 so as to obtain an image height (350 lines) of 170 mm.
- Adjust RV3 so as to obtain an image height (400 lines) of 170 mm.

11. Focus

- Exact focusing may be achieved by adjusting RV9.

12. Deflection yoke

- To adjust the deflection yoke, having loosened it (as described on page 4-12), rotate the unit until the image is aligned on the screen.
- The centering magnets are adjusted by turning them in the opposite direction until the raster area is exactly in the centre of the screen.

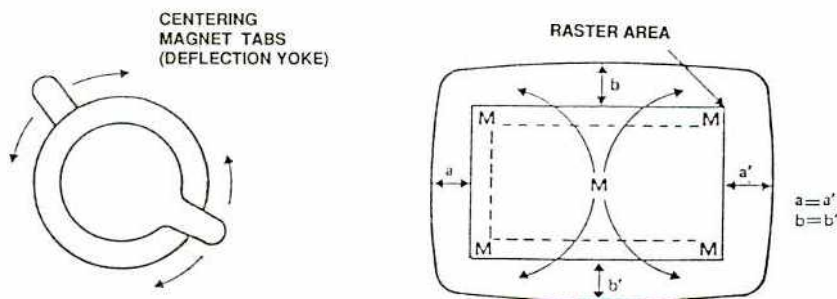


Fig.4-27 Adjusting the centering magnets

- The distortion correcting magnets are adjusted by turning them until the raster area on the screen ceases to have the form of a rectangle.

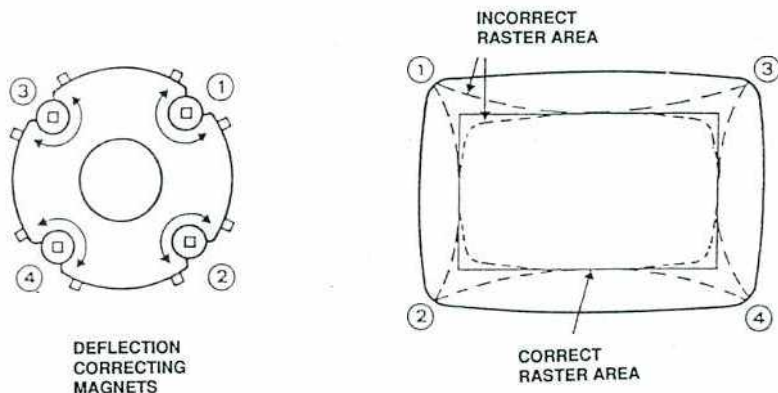


Fig. 4-28 Adjusting the correcting magnets

To reassemble the monitor, follow the disassembly procedure in reverse order.

PHILIPS MONOCHROME MONITOR ADJUSTMENTS

Warning !

When making adjustments with the machine switched on, use an isolated, non-magnetic fibre screwdriver, taking care not to touch any live components.

When measuring the high voltages on the power supply section, on the final line part and on the picture tube, exercise great care and work under conditions of complete isolation.

To replace the picture tube, you must take all the precautions necessary, which consist of the use of a face mask, leather gloves and overalls.

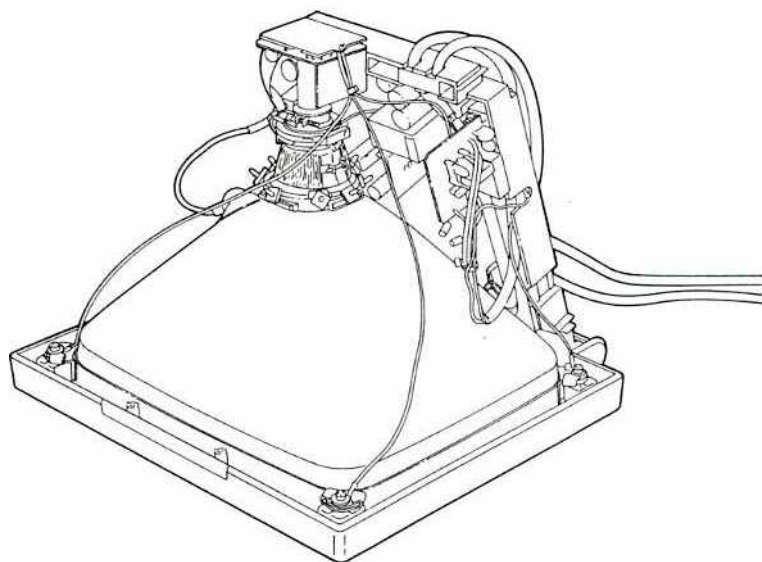
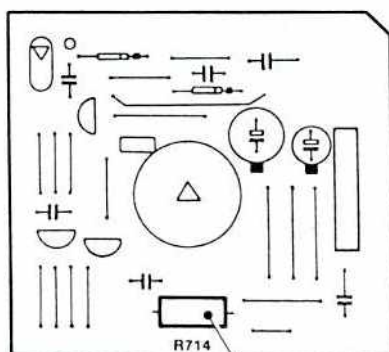


Fig. 4-29 View of the monitor without casing



FOCUS CONTROL R714

Fig. 4-30 Philips monitor amplifier board with adjustment points

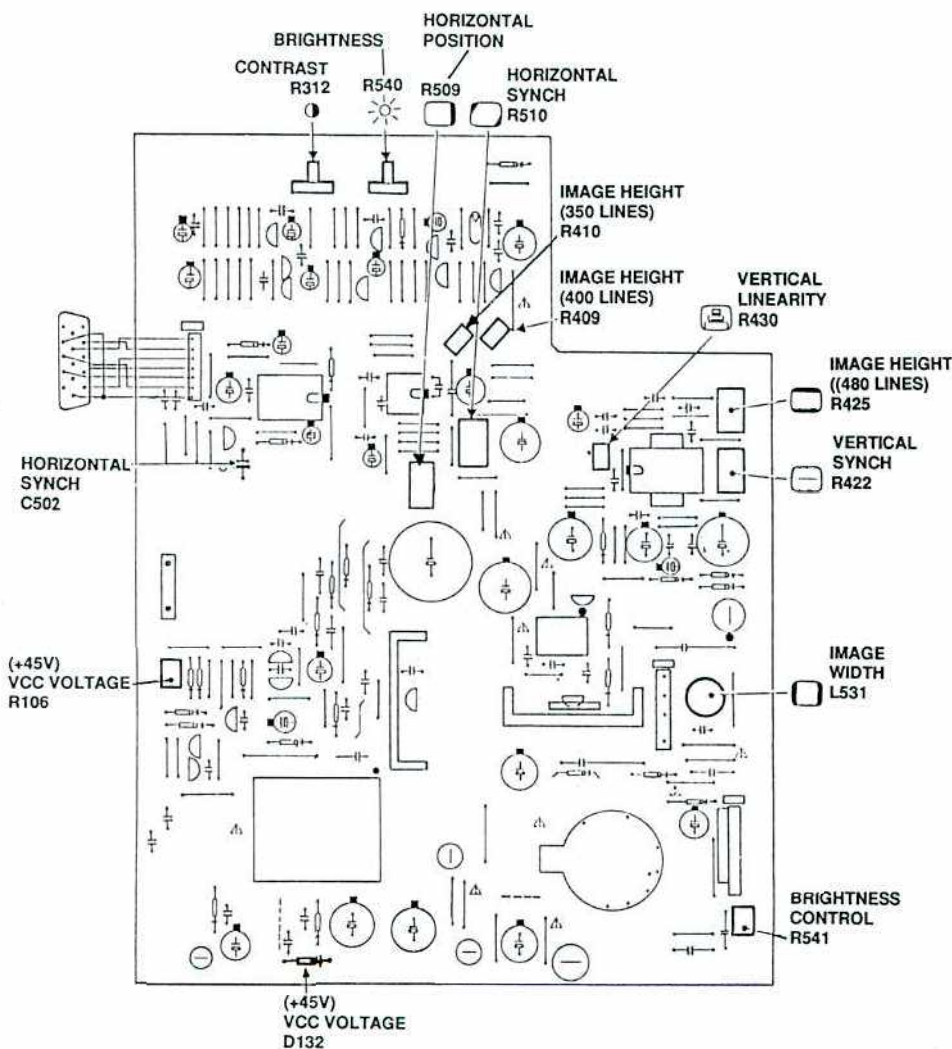


Fig. 4-31 Philips monitor main board with adjustment points

1. VCC voltage adjustment (+45 V.)

- Connect a voltmeter between the cathode of diode D132 and ground.
- Adjust R106 so as to obtain +45 V.

2. Horizontal synchronization

- Short circuit C502 to ground.
- Set R509 in an intermediate position.
- Adjust R510 so as to obtain a perfectly vertical image.
- Remove the short circuit.

3. Vertical synchronization

- Adjust R422 so as to obtain a completely still image.

4. Presetting the brightness

- Turn the external brightness control knob R540 to its maximum.
- Turn the external contrast control knob R312 to its minimum.
- Adjust R541 so that the line return may no longer be seen.

5. Vertical linearity

- Adjust R430 so that the height of the characters in a text is uniform throughout the screen.

6. Image width

- Adjust L531 so as to obtain an image width of 232 mm.

7. Horizontal position

- The best horizontal position may be obtained by adjusting R509.

8. Image height

- Adjust R425 so as to obtain an image height (480 lines) of 170 mm.
- Adjust R410 so as to obtain an image height (350 lines) of 170 mm.
- Adjust R409 so as to obtain an image height (400 lines) of 170 mm.

9. Focus

- Exact focusing may be achieved by adjusting R714.

10. Deflection yoke

- To adjust the deflection yoke, having loosened it (as described on page 4-13) , rotate the unit until the image is aligned on the screen.
- The centering magnets are adjusted by turning them in the opposite direction until the raster area appears exactly in the centre of the screen.

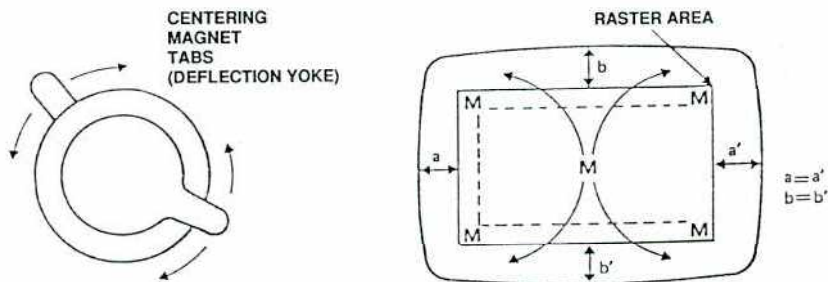


Fig. 4-32 Adjusting the centering magnets

- The distortion correcting magnets are adjusted by rotating them until the raster area on the screen no longer has the form of a rectangle.

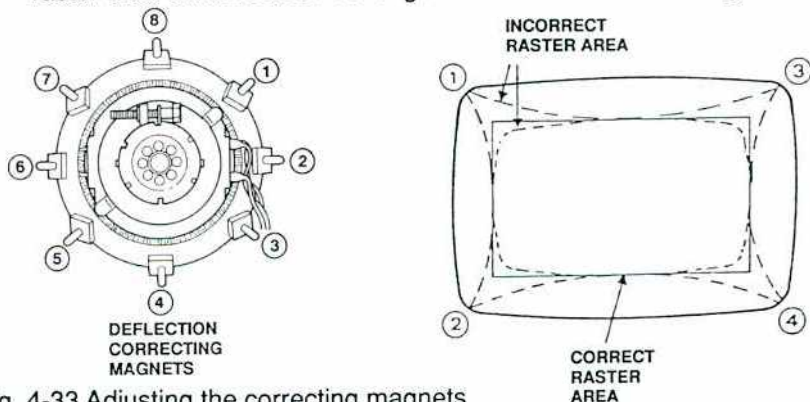


Fig. 4-33 Adjusting the correcting magnets

To reassemble the monitor, follow the disassembly procedure in reverse order.

4.2 HANTAREX 14 INCH COLOUR MONITOR - DSM 2914/C

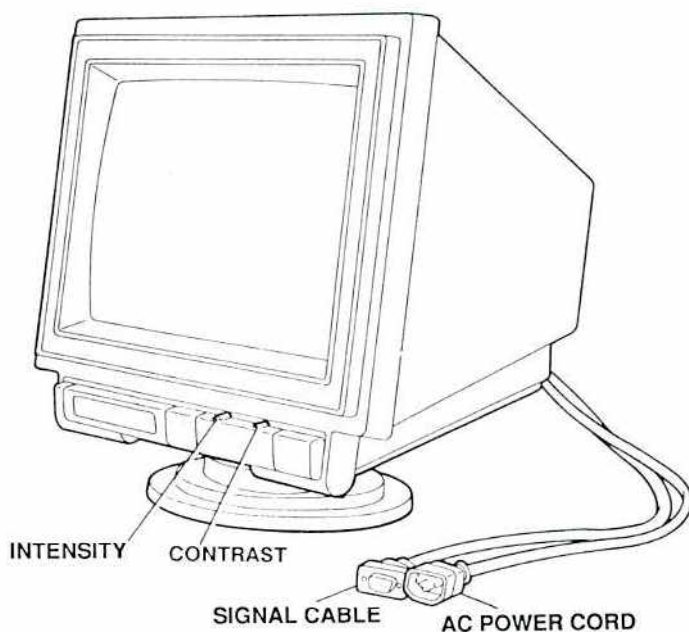


Fig. 4-34 View of colour monitor DSM 2914/C.

4.2.1 TECHNICAL CHARACTERISTICS

It is a monitor equipped with a built-in power supply, the AC power requirement being provided directly by a power outlet installed in the basic module. The monitor has no ON/OFF switching provision.

The signal cable is terminated with a 15 way shell type D male connector.

CONTRAST and INTENSITY controls are adjustable at front.

ELECTRICAL CHARACTERISTICS

Power supply

- AC voltages
220 V version 170 V - 264 V AC
110 V version 82 V - 132 V AC
- Power requirement 85 Watts max.
- AC frequency 47 Hz - 63 Hz
- Degaussing automatic at turn-on
- E.A.T. 24 KV - 25 KV

Input signals

- Video
Amplitude Linear steps of voltage (63 steps).
from zero to 0,7 Vpp max.
- Polarity positive
- Horizontal synchronism TTL pos./neg.
- Vertical synchronism TTL pos./neg.

Resolution

- Horizontal 640 pixels
- Vertical 480 pixels (max)

Dimensions

- Width 365 mm
- Height 400 mm (with swivel base fitted)
- Depth 390 mm

COLOUR MONITOR DSM 2914/C

The circuits of the monitor unit are distributed on two printed cards.

- The main board contains the power supply, the circuits that decode the synch. signals coming in from the basic module, and the horizontal and vertical deflection circuits.
- The second board, that is directly plugged into the picture tube socket, contains the complete video amplifier and the biasing circuits of the electrodes of the picture tube.

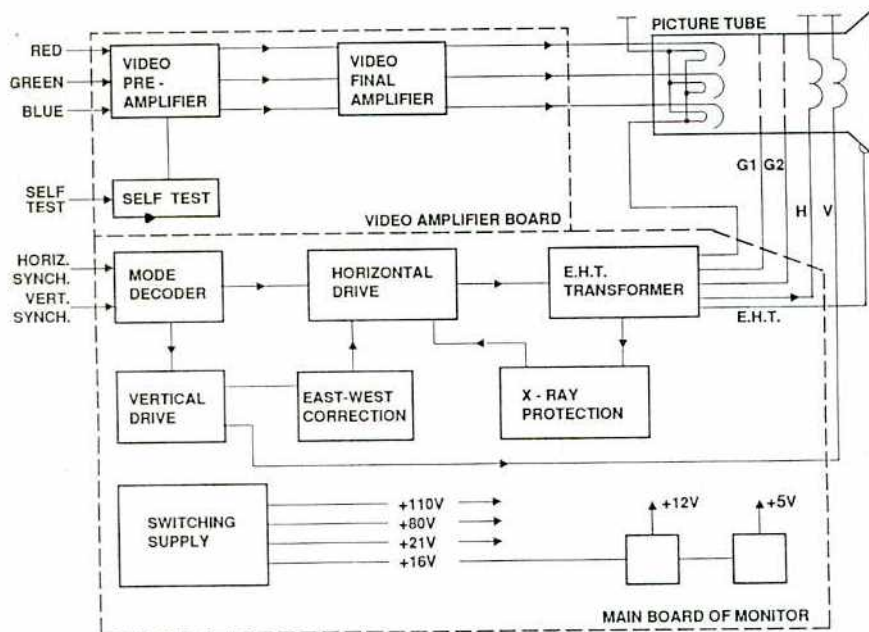


Fig. 4-35 Block diagram of colour monitor DSM 2914/C.

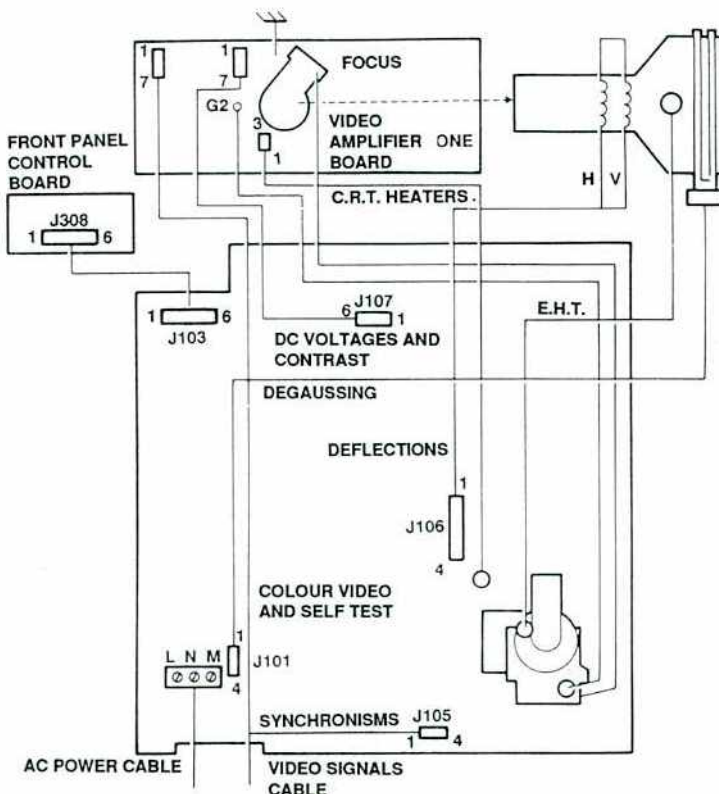
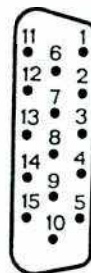


Fig. 4-36 Board interconnections in colour monitor DSM 2914/C.

15 - WAY SHELL TYPE D CONNECTOR

- 1 - RED video input
- 2 - GREEN video input
- 3 - BLUE video input
- 5 - Self test input
- 6 - RED video ground
- 7 - GREEN video ground
- 8 - BLUE video ground
- 10 - Logic ground
- 11 - IDENT output - connected to pin 10
- 12 - IDENT output - not connected
- 13 - Horizontal synch.
- 14 - Vertical synch.

FRONT
VIEW



VIEW OF BOARDS WITHIN COLOUR MONITOR DSM 2914/C

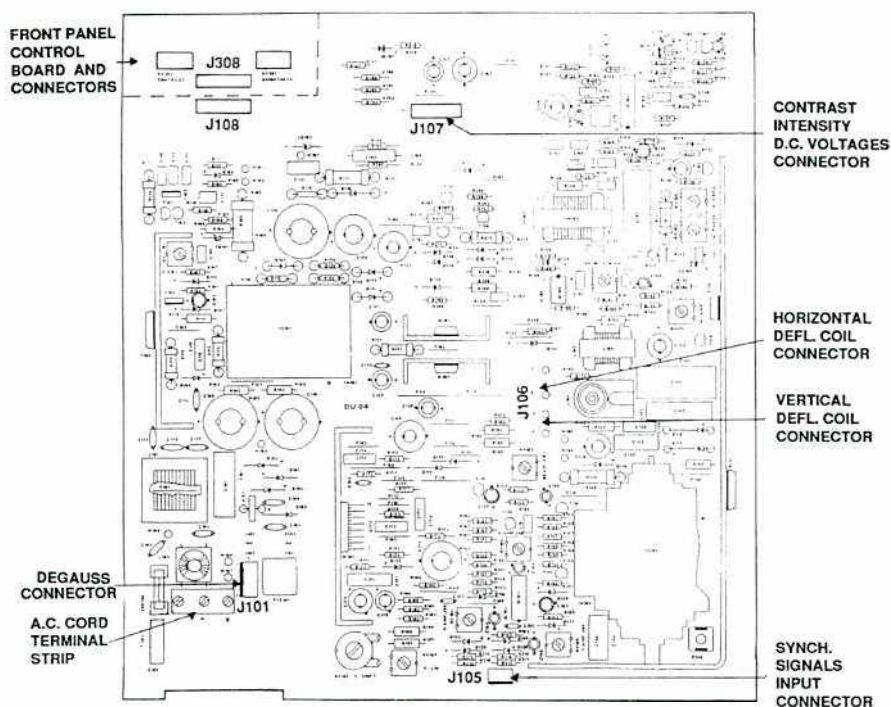


Fig. 4-37 Main board of monitor.

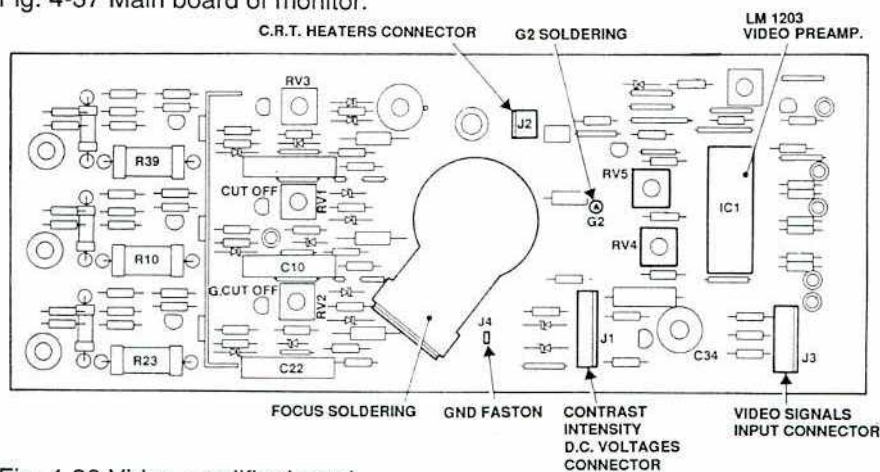


Fig. 4-38 Video amplifier board.

4.2.2 DISMANTLING THE COLOUR MONITOR DSM 2914/C

Before proceeding to dismantling, switch OFF the basic module and then disconnect both cables from basic module.

Lay the monitor face down on a piece of soft cloth.

Withdraw the swivel base by pushing in the plastic detent **F** and sliding downwards the base.

Unscrew four self tapping screws marked **V** (figures 4-39 and 4-40).

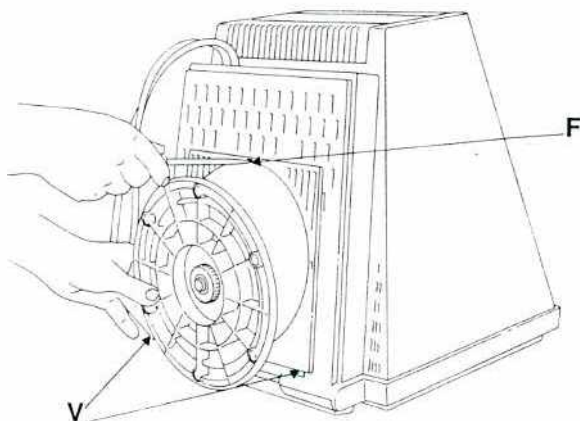


Fig. 4-39 Position of monitor for remotion of base and covering.

Unhook from covering the cable retainer by pushing its dent along the left hand side toward the cables and by pressing in the opening the retainer itself.

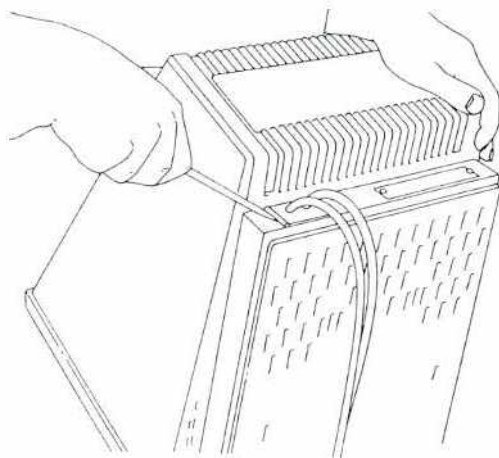


Fig. 4-40 Removal of cable retainer.

Important notice !

After having opened the monitor, be careful about high voltages that are present even in a unit that is non powered and disconnected.

Slip the covering out upwards.

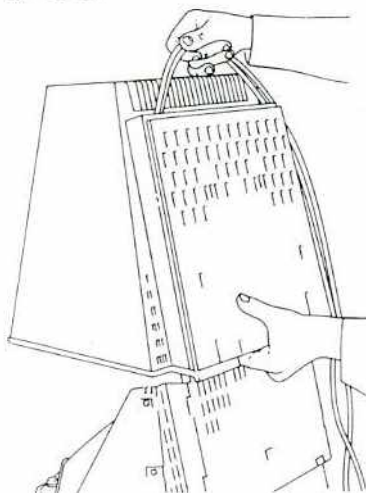


Fig. 4-41 Removal of covering.

The E.H.T. anode must be discharged to ground before attempting unhooking its cap and cable. Use a screwdriver connected first to a metal part **M** connected to ground.

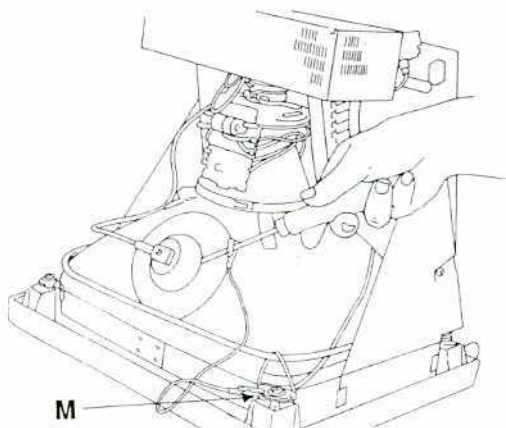


Fig. 4-42 Discharging to ground the high voltage anode.

Unsolder 6 tinned spots marked **S** and the ground lead **M**, slip out ground faston clip **M1**.

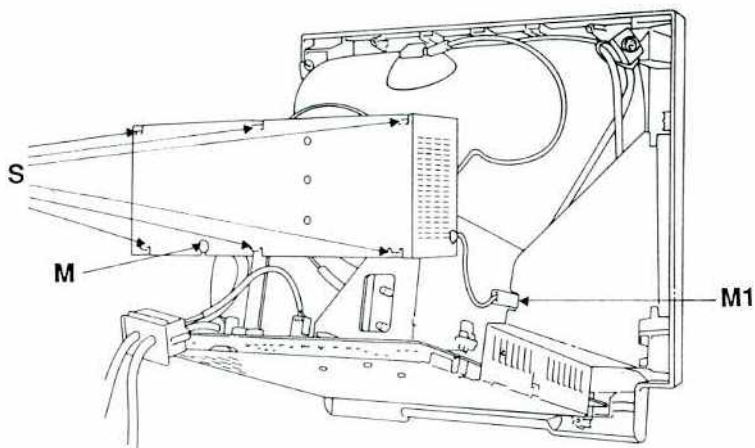


Fig. 4-43 Removal of shielding cage from video amplifier card.

Lift up and remove the shield. If the main board must be taken out as well, unscrew 7 screws marked **V** in figure 4-44 following.

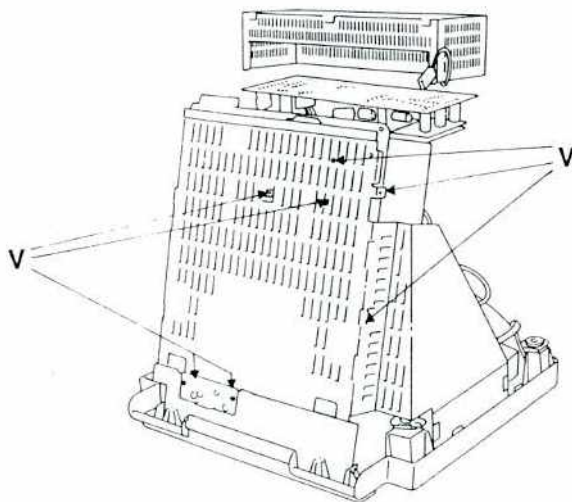


Fig. 4-44 Location of screws fixing the main board to frame.

The video amplifier can be disconnected by simply pulling it upwards avoiding swinging it, and then by slipping off its connectors. First unsolder the focus lead **F** located inside the C.R.T. socket, then unsolder the red lead **G2** from the soldering side of the card. Slip off connectors **J1**, **J2**, **J3**, **J4**. If the main board must also be removed, unscrew the ground screw **M** shown in figure 4-45 following.

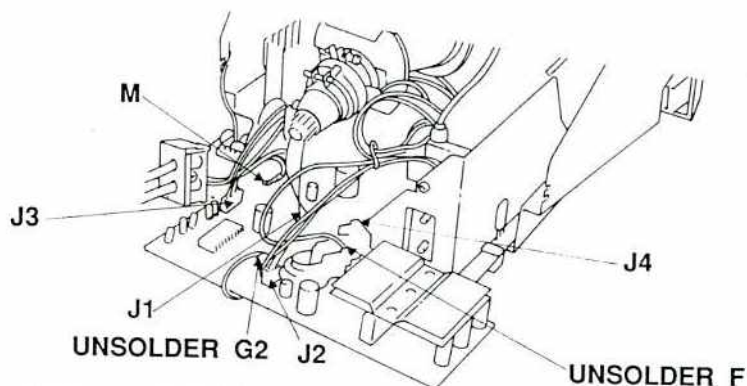


Fig. 4-45 Removal of video amplifier board.

To remove from monitor the main board, if the screws listed in the previous figures 4-44 and 4-45 have been taken away, it is only required to remove now two grounding screws marked **M** in figure 4-46 following. Detach the E.H.T. cap from tube anode, unplug connectors **J101**, **J106** and then slip out the board.

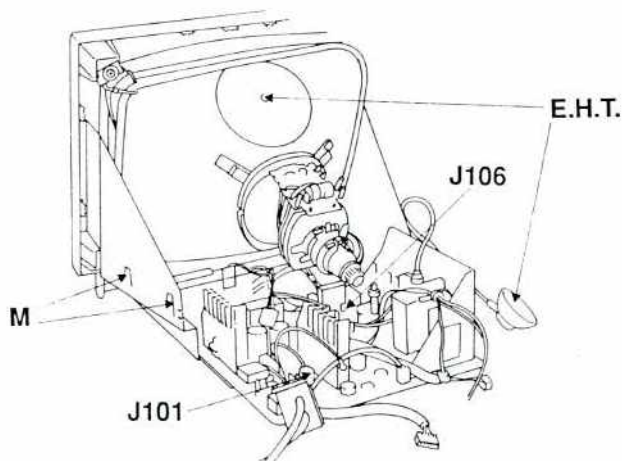


Fig. 4-46 Removal of main board from monitor

To remove the sheet metal frame, unscrew four screws marked **V**. To remove the picture tube unscrew four screws marked **V1**. Removal of deflection yoke from neck of tube should never be required as every tube is supplied with the yoke already positioned and adjusted to the particular geometry of tube.

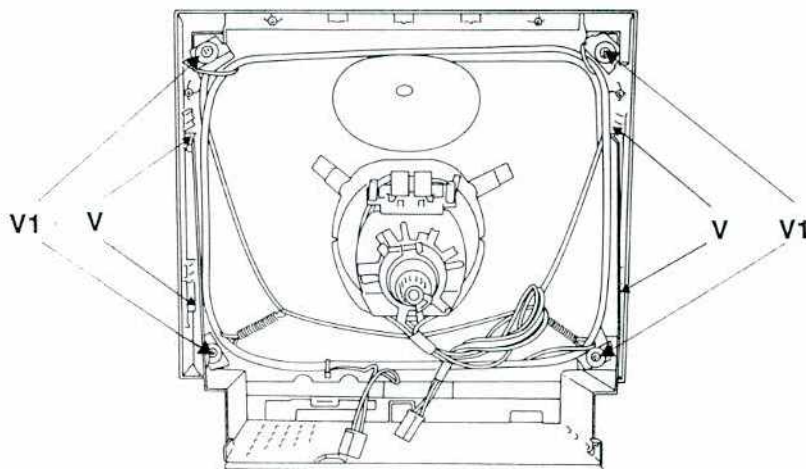


Fig. 4-47 Removal of sheet metal bracket and of picture tube.

4.2.3 CALIBRATION OF COLOUR MONITOR DSM 2914/C

Important notice !

Use fiber or non magnetic material made screwdrivers when adjusting on apparatus turned on. Pay attention not to touch live parts. Operate cautiously and in a special condition of isolation from ground potential.

Adjustments

VIDEO AMPLIFIER BOARD.

The gain of green colour amplifier is fixed while gains of red and blue colour amplifiers can be respectively varied by **RV4** and **RV5**.

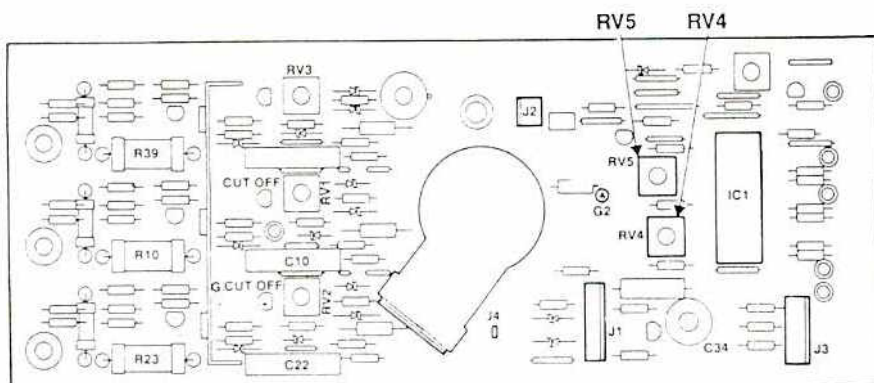


Fig. 4-48 Adjusting parts on video amplifier card.

MAIN BOARD OF MONITOR.

Screen image geometry (figure 4-49).

The best signal to be used for image adjustments is a black grid of horizontal and vertical bars on a white background. Start warming up the unit for ten minutes to stabilize the temperature of operation. Adjust the intensity and contrast controls at front to their middle position.

- 1) Focus and grid 2 voltages are set by manufacturer, and sealings on these controls should not be altered.
- 2) East-west correction. If vertical sides of displayed image show a convex or concave distortion, adjust **RV110** for the best possible linearity. Horizontal amplitude of raster can be varied turning **RV111**. Nominal amplitude is of 240 mm +/- 3 mm.
- 3) In case the image tears into horizontal lines, retouch **RV102** and **RV108** that adjust respectively the phase and frequency of horizontal oscillator.
- 4) Vertical amplitude is of 176 mm +/- 3 mm and can be individually adjusted for each vertical definition by means of **RV104** (350 lines), **RV105** (400 lines) and **RV106** (480 lines).
- 5) Vertical shift of image is achieved by variation of **RV109**.
- 6) Vertical linearity of image is altered by variation of **RV107**.

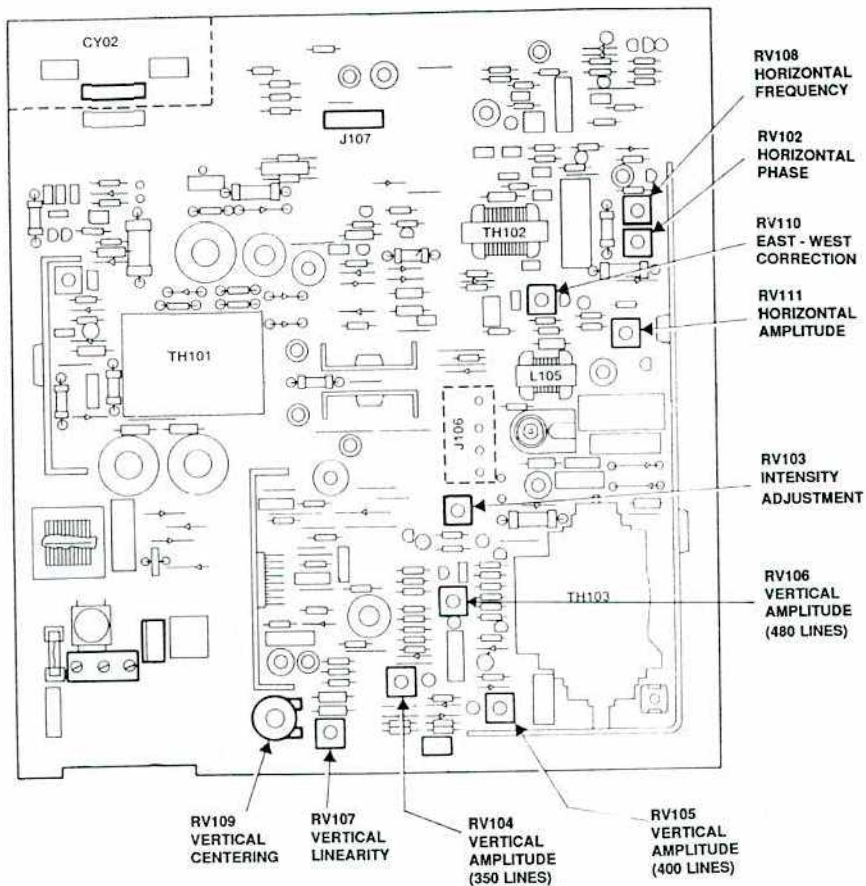


Fig. 4-49 Location of adjusting parts on main board of colour monitor.

5. REMOVALS

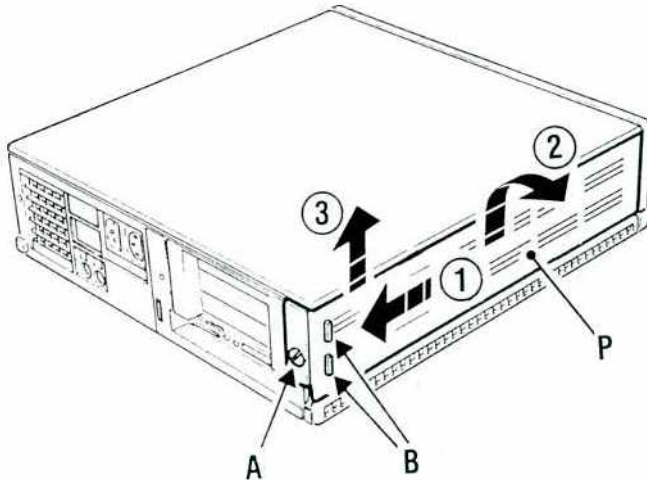
The sequence of removal procedures is related to the position of the units in the system. The re-assembling should be done following the removal procedure in reverse sense.

The removal of the video is described in section 4.

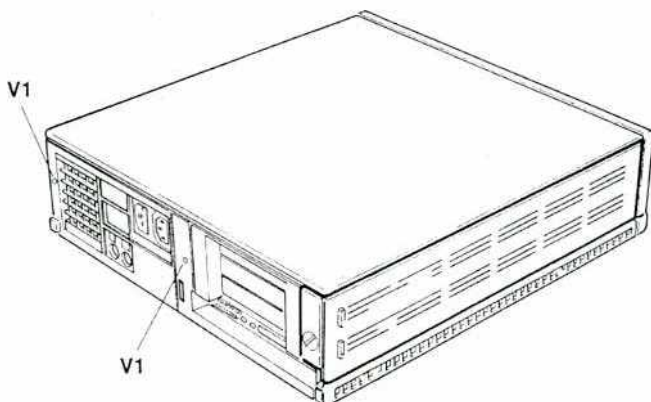
NOTE: Before doing any removal operation, switch the system OFF, disconnect the power cords and all peripheral units connected to the system.

5.1 COVER

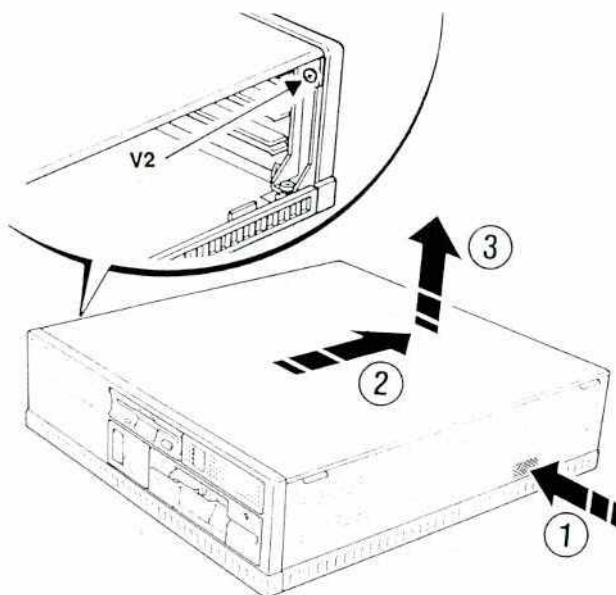
- 1) Rotate the plastic screw A to OPEN position. Then by acting on wings B, shift the side panel P.



2) Remove the back panel (two screws V1).



3) Remove screw V2, then press the button of the side panel and simultaneously slide the cover away.

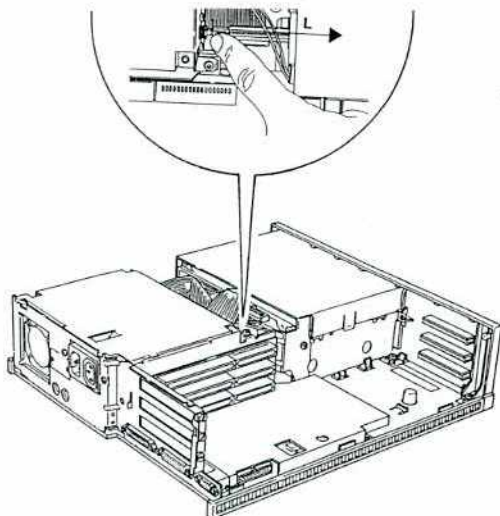


5.2 POWER SUPPLY UNIT

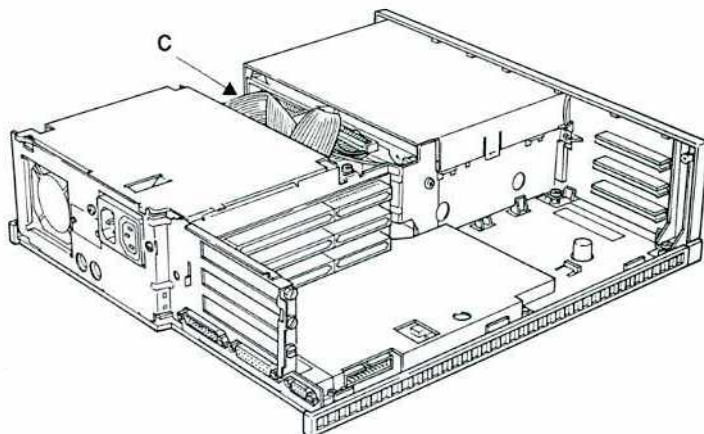
The power supply unit and the fan are assembled together on the same support.

To remove the power supply unit:

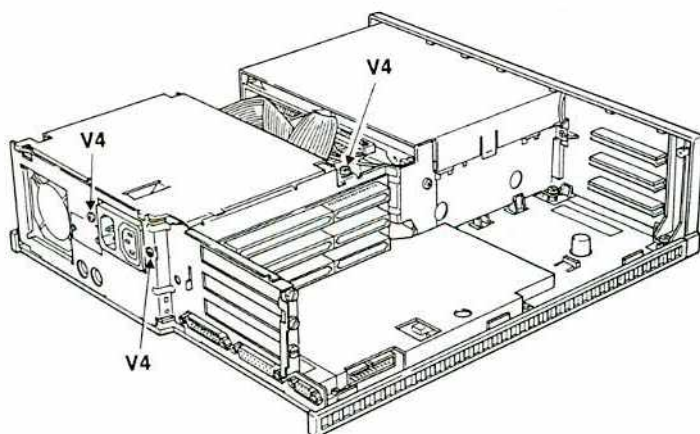
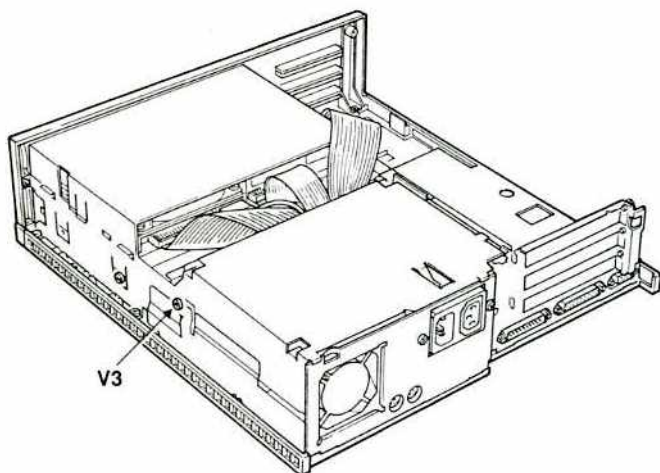
- 1) Remove the cover.
- 2) Set the switch ON/OFF to ON then unhook (see the arrow) the switch lever L.



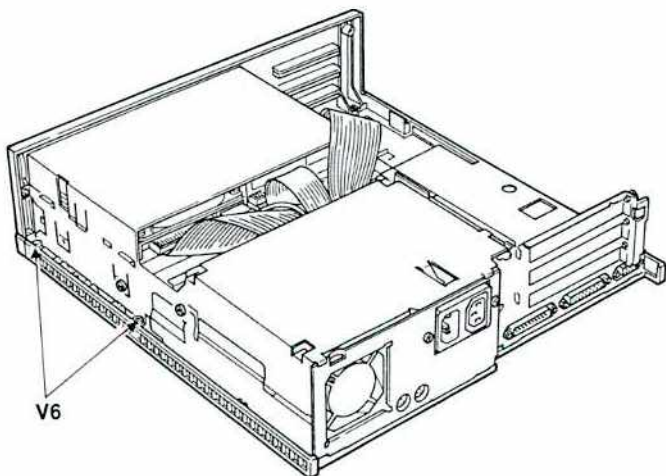
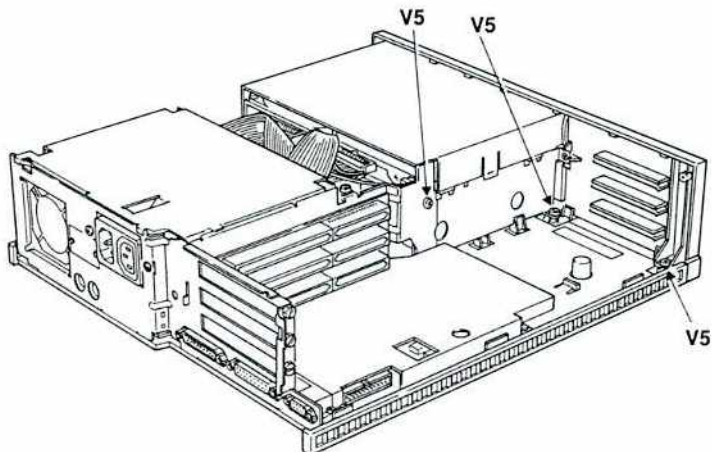
- 3) Disconnect the power supply wirings C from drives.



4) Loosen the screw V3, then remove the tree screws V4.

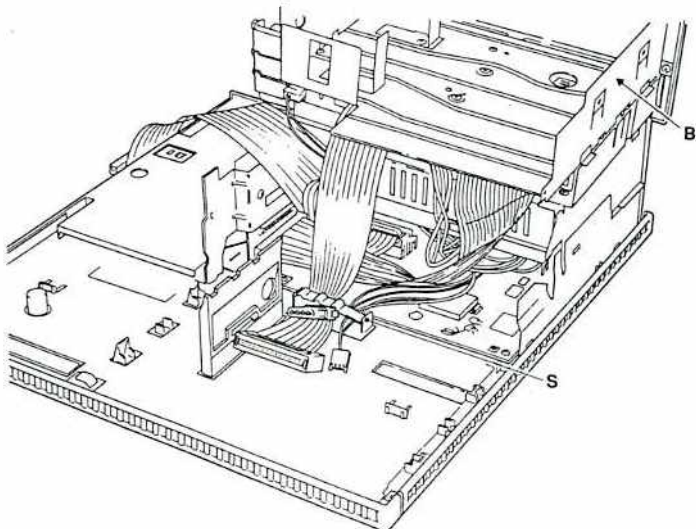


5) Remove screws V5 and V6 of the drive support unit.



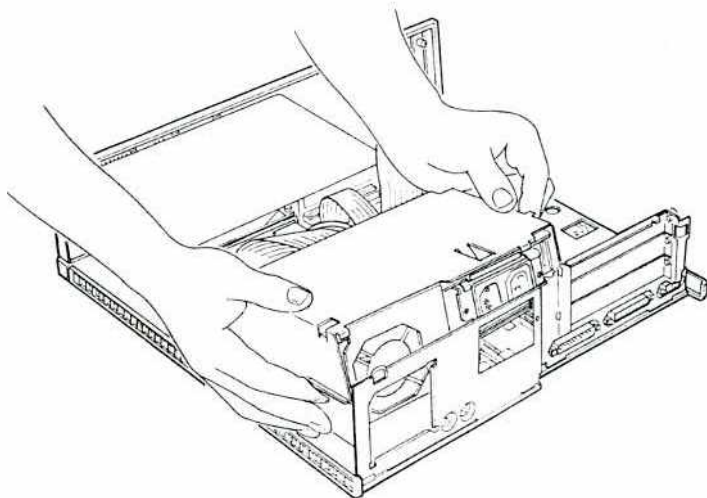
6) Upset the drive support unit B on the power supply unit.

7) Release the wire clip S and pull out the wires.

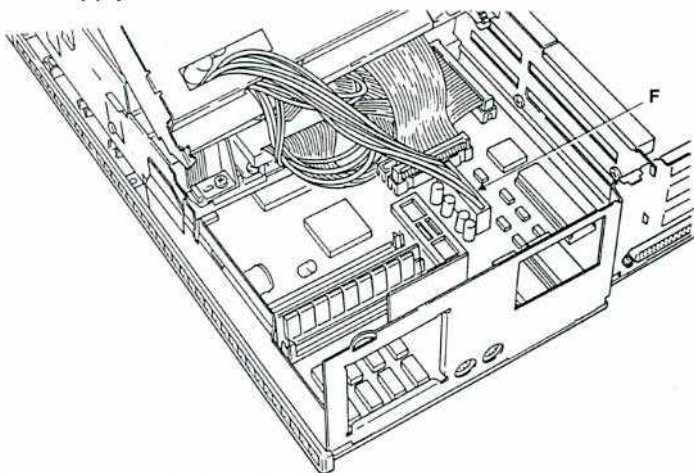


8) Re-place the drive support unit B to its position.

9) Remove the power supply unit from its support then set it vertically on the drive unit.

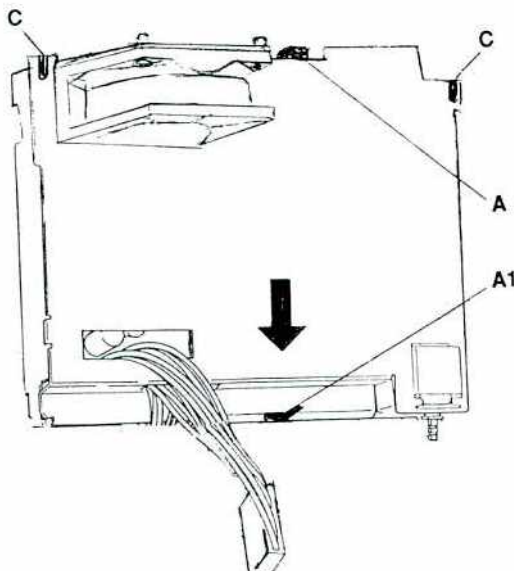


- 10) Disconnect the power supply wires F from the motherboard then remove the power supply unit.



To reach the power supply board:

- Straighten the wings A and A1, then release the cover from wing A1. Shift the cover (see the arrow) and make it free from hooks C then upset it towards VDC output wires.



5.3 DRIVE UNIT

Follow the removal sequence of the power supply unit (steps 5, 6 and 8). The drive unit remains connected to the motherboard only through the signal flat-cables.

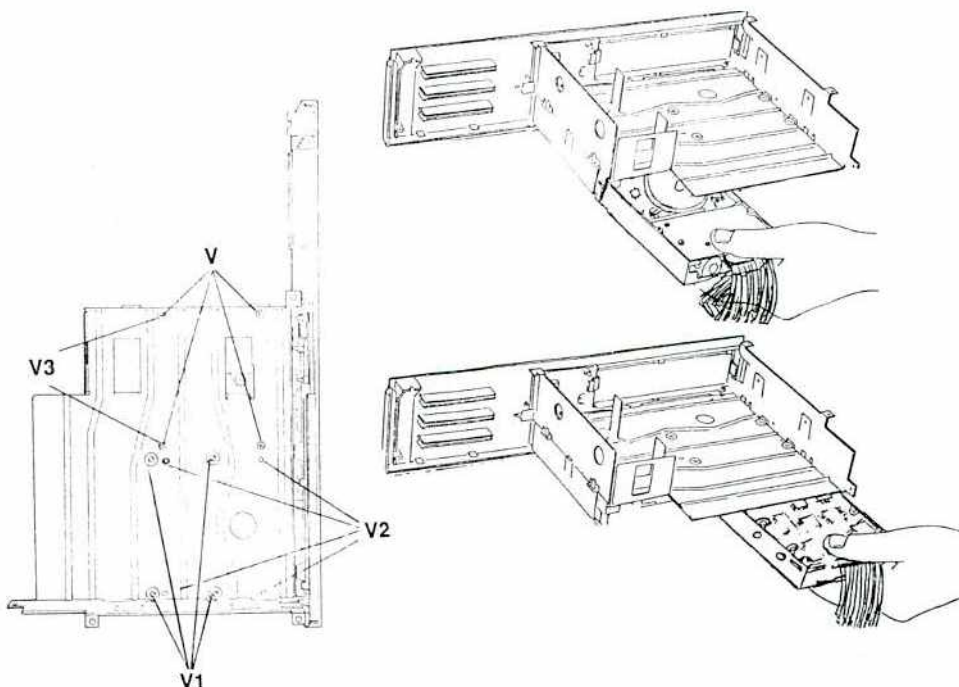
NOTE

The drive front panel remains assembled to the drive support and its removal is not necessary.

Removal of the drive unit from its support.

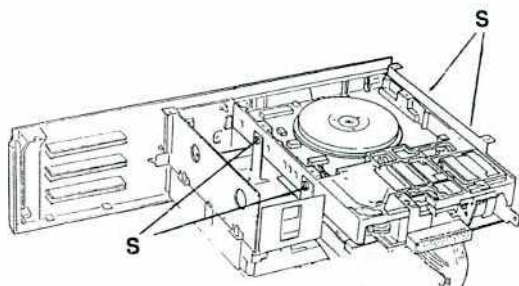
Removal of the 3 1/2 inch MFDU and the HDU:

- 1) To remove the MFDU, unscrew the four screws V then remove the drive unit.
- 2) To remove the HDU, unscrew the four screws V1 then remove the HDU unit.

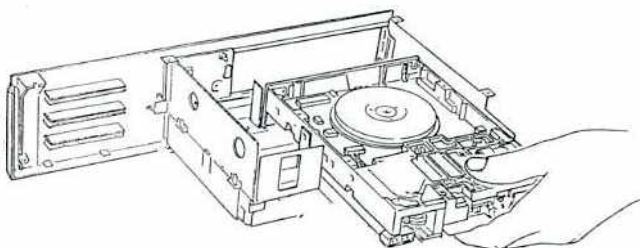


3) Removal of the 5 1/4 inch MFDU

Unscrew the four screws S.



Remove the MFDU.



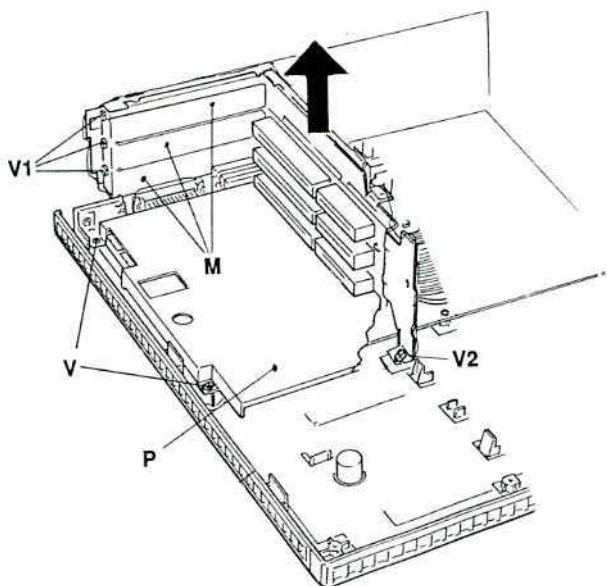
NOTE

A) If the system has two 3 1/2 inch MFDUs, for the removal of the second drive unit, see the previous step 2 (removal of the HDU). Remind that the set-screws of this unit are V2.

B) If the system is configured with a 5 1/4 inch MFDU, the set-screws of the 3 1/2 inch MFDU are only two V3 (see previous step 1).

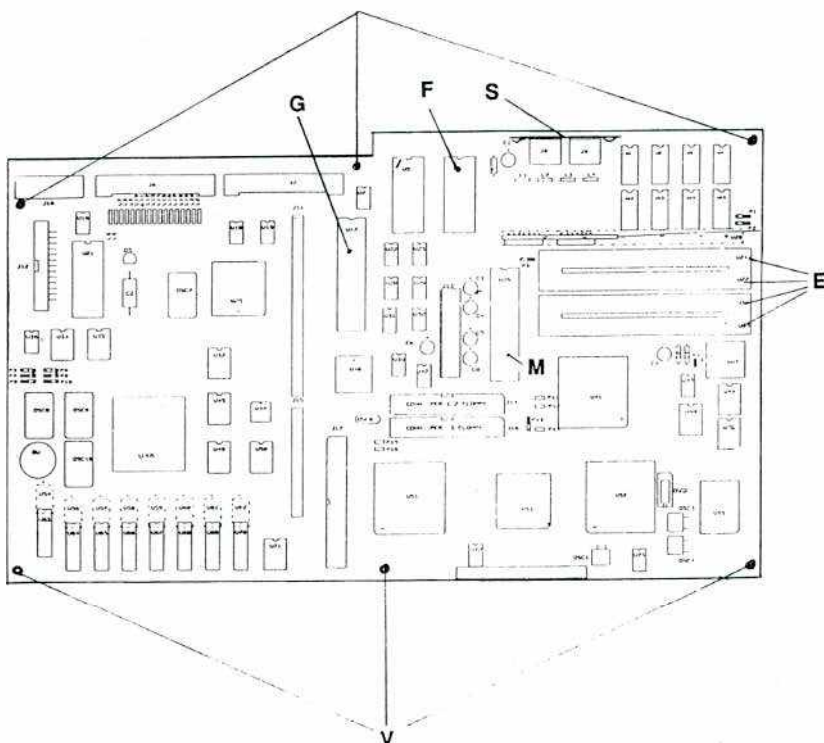
5.4 REMOVAL OF THE BUS EXPANSION UNIT

- 1) Remove first the boards connected to this unit.
- 2) Unscrew the two screws V then remove protection P.
- 3) Remove plates M (screws V1).
- 4) Remove the screw V2, lift the expansion support in the direction of arrow to disconnect the unit from the motherboard.



5.5 REMOVAL OF THE MOTHERBOARD

- 1) Remove the six screws V.
- 2) Slightly lift the motherboard from the I/O connectors opposite side.
- 3) Shift the motherboard making the connectors free from their places on the back panel, then remove the motherboard.



If the motherboard must be replaced with a new one:

Parts of the old motherboard to be assembled on the new one:

- Plate S of the mouse and keyboard connectors
- Math coprocessor M (U26)
- Memory expansion strips E (U24, U27, U30, U33)
- BIOS ROMs F (U5, U6)
- Keyboard and mouse interface component G (U17)
- Set the jumpers on the new motherboard as they were on the old one (jumpers P1 to P16 ; also see page 3-4)

NOTE

When replacing the motherboard, the password and the time are to be re-entered with set-up operation.

**A. CATALOGO PARTI DI RICAMBIO
A. SPARE PARTS CATALOGUE**

M290S

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PER ORDINARE LE PARTI DI RICAMBIO.

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D.R.S. TELEX: 210030 - FAX: 39 (0) 125 521122.

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DI 3 - 4 MESI DATA ORDINE).

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N = NON STOCK (PARTS NOT HELD IN STORES WITH LEAD TIMES OF 3 TO
4 MONTHS FROM DATE OF ORDER).

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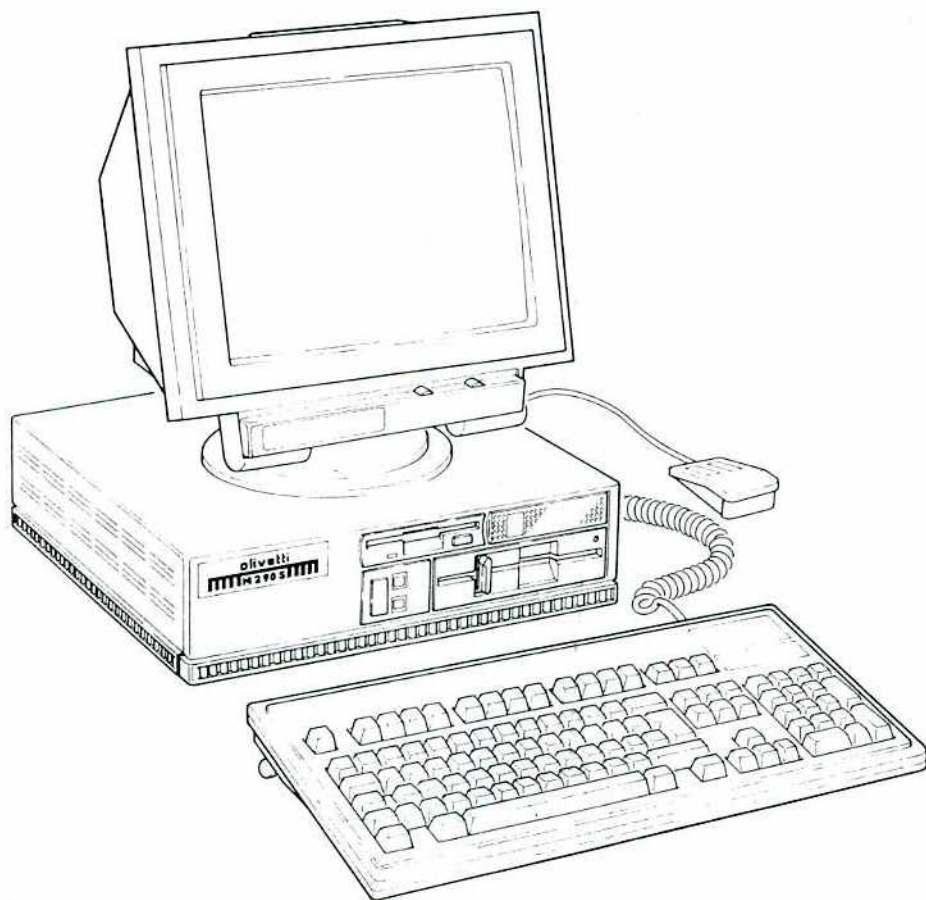
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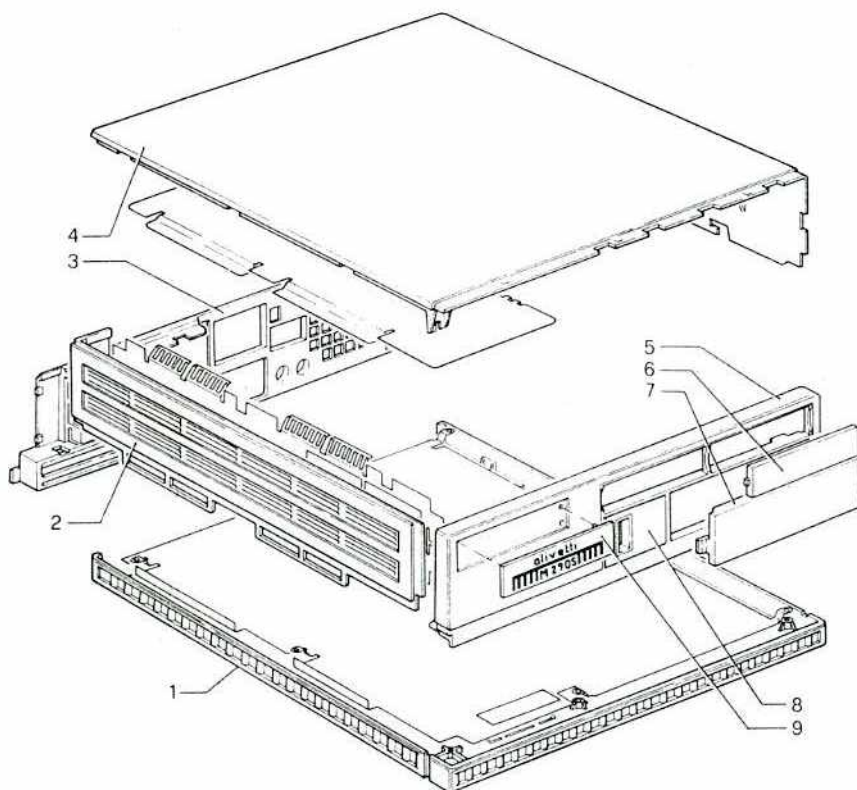
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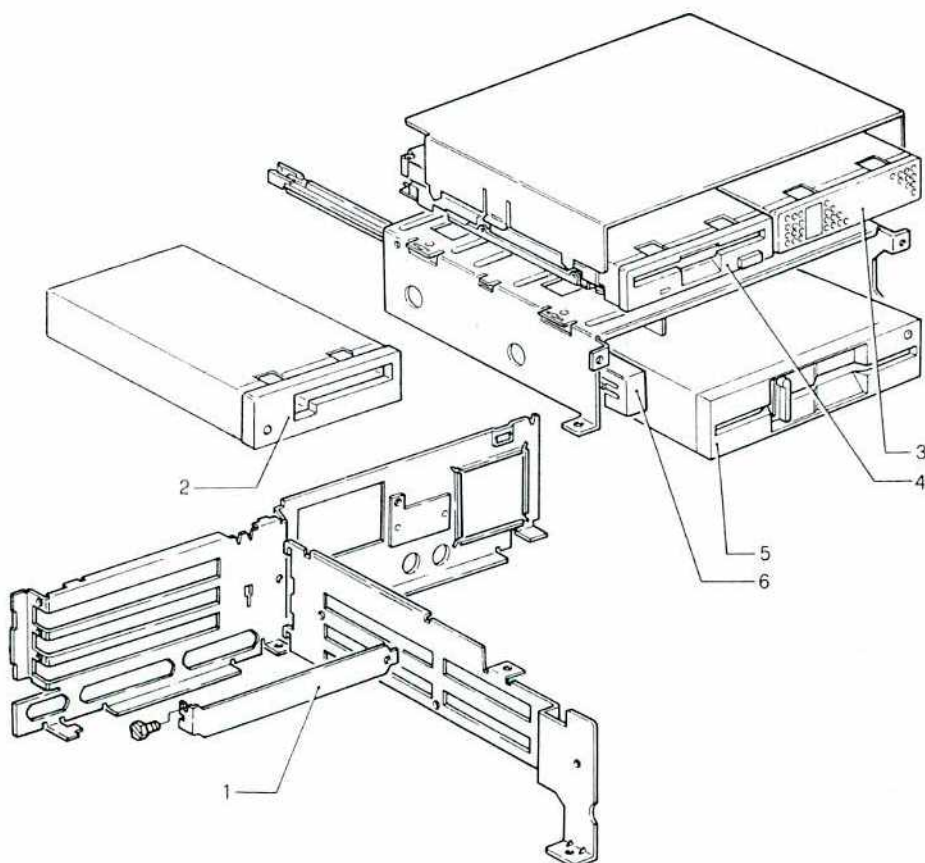
CARROZZERIA - CASING

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	059083 X	N	FONDELLO	BOTTOM
2	059071 A	N	SPORTELLLO SLOT	SLOT COVER
3	020881 R	N	COPERTURA POSTERIORE	REAR COVER
4	059345 R	N	SCOCCA	UPPER COVER
5	059346 J	N	FRONTALINO	FRONTAL PANEL
6	020890 W		TAPPO VANO FDU 3.5"	3.5" FDU PLASTING PLUG
	020891 K		TAPPO VANO HDU	HDU PLASTING PLUG
7	020895 P		TAPPO VANO FDU 5" 1/4	5" 1/4 FDU PLASTING PLUG
8	020896 Q		MASCHERINA INTERRUOTORE	SWITCH COVER
9	022681 N		TARGHETTA NOME PRODOTTO	SYSTEM LOGO LABEL



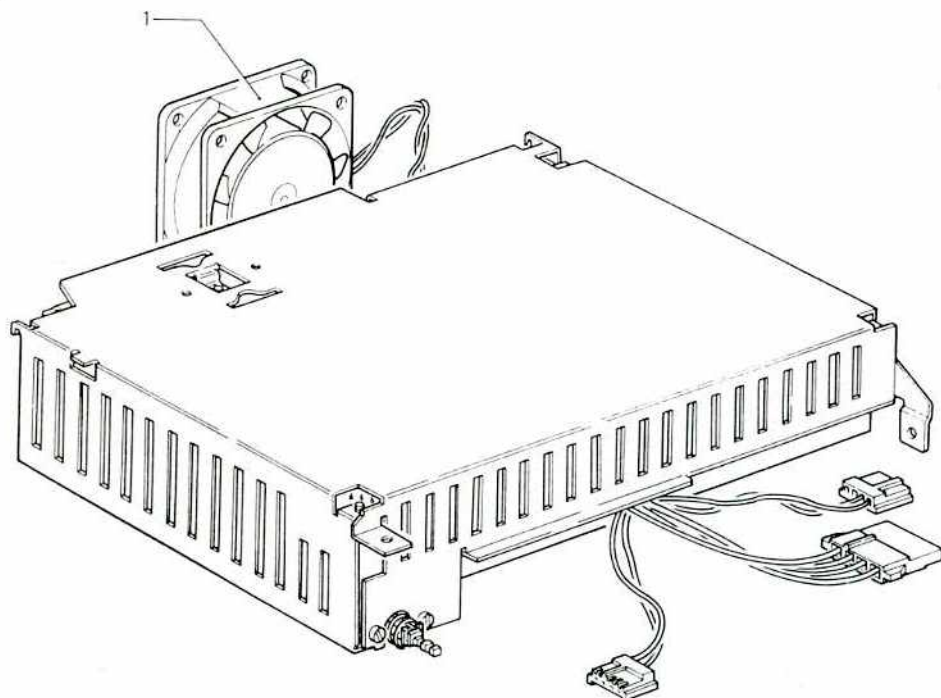
STRUTTURA - FRAME

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	059204 M		MOSTRINA CHIUSURA	PLUG METAL SHIELD
2	412440 U	N	STU 40 MB 3,5"	40 MB 3.5" STU
3	413068 X	N	HDU 20 MB 3,5"	20 MB 3.5" HDU
	413078 Z	N	HDU 40 MB 3,5"	40 MB 3.5" HDU
	413157 M	N	HDU 100 MB 3,5"	100 MB 3.5" HDU
4	413067 N	N	FDU 1,44 MB 3,5"	1.44 MB 3.5" FDU
5	413156 L	N	FDU 1,2 MB 5" 1/4	1.2 MB 5" 1/4 FDU
6	020893 M		LEVA INTERRUETTORE	SWITCH LEVER



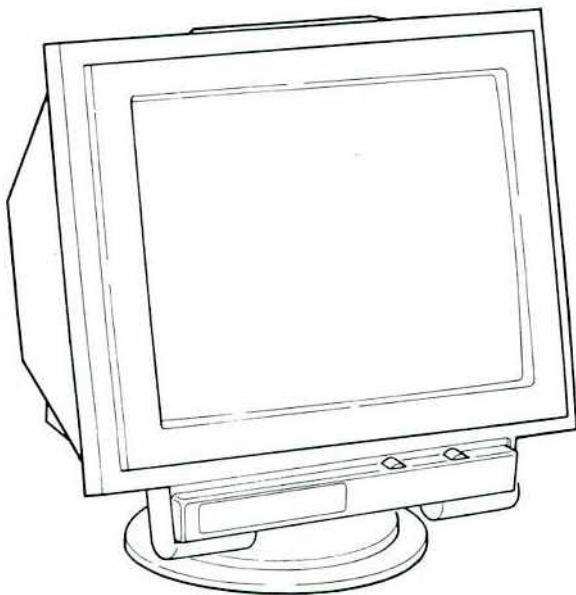
GRUPPO ALIMENTATORE - POWER SUPPLY ASSEMBLY

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	9022218 S		GR. VENTILATORE	FAN ASSEMBLY



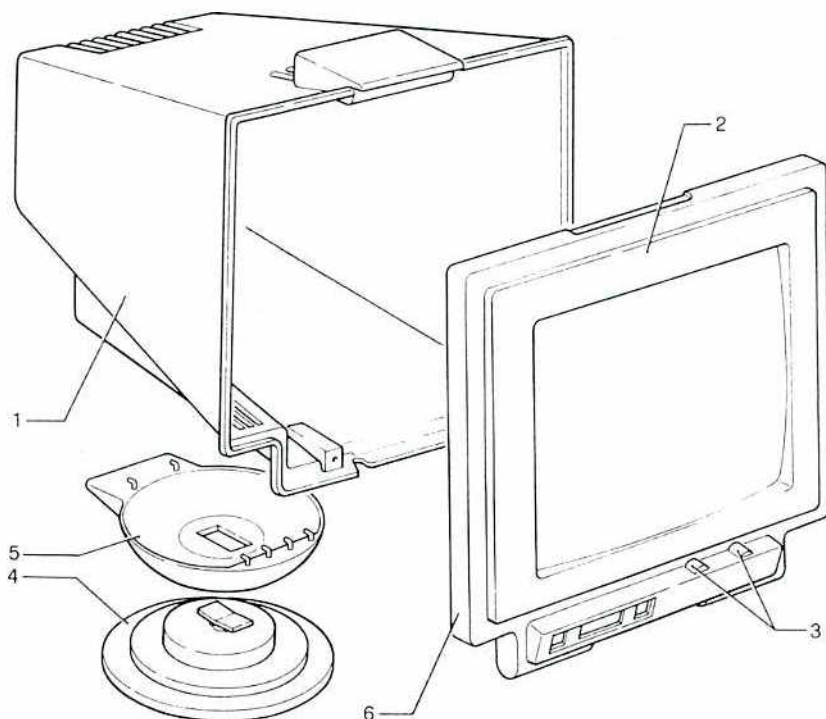
COMPLESSIVO MONITOR 14" - 14" MONITOR ASSEMBLY

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
02309 A	DPDP		DSM 25 - 314/X - MONITOR B/W 14" COMPLETO (ITEM COMMERCIALE)	DSM 25 - 314/X - MONITOR UNIT B/W 14" (COMMERCIAL ITEM)
02310 R	DPDP		DSM 2914/C - MONITOR COLORE 14" COMPLETO (ITEM COMMERCIALE)	DSM 2914/C - MONITOR UNIT COLOUR 14" (COMMERCIAL ITEM)



PARTI ESPLOSE MONITOR 14" - 14" MONITOR EXPLODED PARTS

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	029552 T	N	COPERTURA (B/W) HANTAREX	COVER (B/W) HANTAREX
1	059001 D	N	COPERTURA (B/W) PHILIPS	COVER (B/W) PHILIPS
1	029082 Q	N	COPERTURA (COLORE)	COVER (COLOUR)
2	029553 U	N	CORNICE (B/W) HANTAREX	FRAME (B/W) HANTAREX
2	059000 Q	N	CORNICE (B/W) PHILIPS	FRAME (B/W) PHILIPS
2	029081 P	N	CORNICE (COLORE)	FRAME (COLOUR)
3	029557 Y		MANOPOLA POTENZ. (B/W) HANTAREX	POTENTIOM. KNOB (B/W) HANTAREX
3	059003 F		MANOPOLA POTENZ. (B/W) PHILIPS	POTENTIOM. KNOB (B/W) PHILIPS
3	029088 W		MANOPOLA POTENZ. (COLORE)	POTENTIOM. KNOB (COLOUR)
4	029554 V	N	SUPP. MONITOR-BASE (B/W) HANTAREX	BASE MONITOR SUPP. (B/W) HANTAREX
4	059009 M	N	SUPP. MONITOR-BASE (B/W) PHILIPS	BASE MONITOR SUPP. (B/W) PHILIPS
4	029093 K	N	SUPP. MONITOR-BASE (COLORE)	BASE MONITOR SUPP. (COLOUR)
5	029555 W	N	SUPP. MONITOR PARTE SUP. (B/W) HANT.	UPPER PART MONITOR SUPP. (B/W) HANT.
5	059008 L	N	SUPP. MON. PARTE SUP. (B/W) PHILIPS	UPPER PART MON. SUPP. (B/W) PHILIPS
5	029092 J	N	SUPP. MONITOR PARTE SUP. (COLORE)	UPPER PART MON. SUPP. (COLOUR)
6	059002 E	N	TELAIO (B/W) PHILIPS	FRAME (B/W) PHILIPS

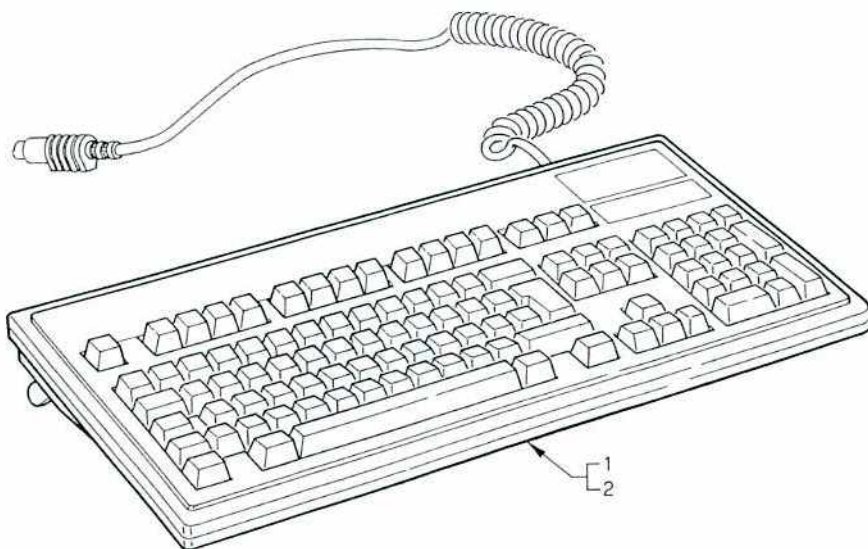


COMPLESSIVO TASTIERA - KEYBOARD ASSEMBLY
OPC 002 - 101 TASTI / 101 KEYS

REF.	CODE	CODE KIT TASTI	VARIANTI VARIANTS	NAZIONALITA'	COUNTRY
1	31231 Y	731043 U 731038 X 731046 X 731131 R	TAS 732 TAS 462 TAS 501	U.S.A. GRECIA LATINO / EBRAICA KIT TASTI NEUTRI	U.S.A. GREEK LATIN / HEBREW NEUTRAL KIT KEYS

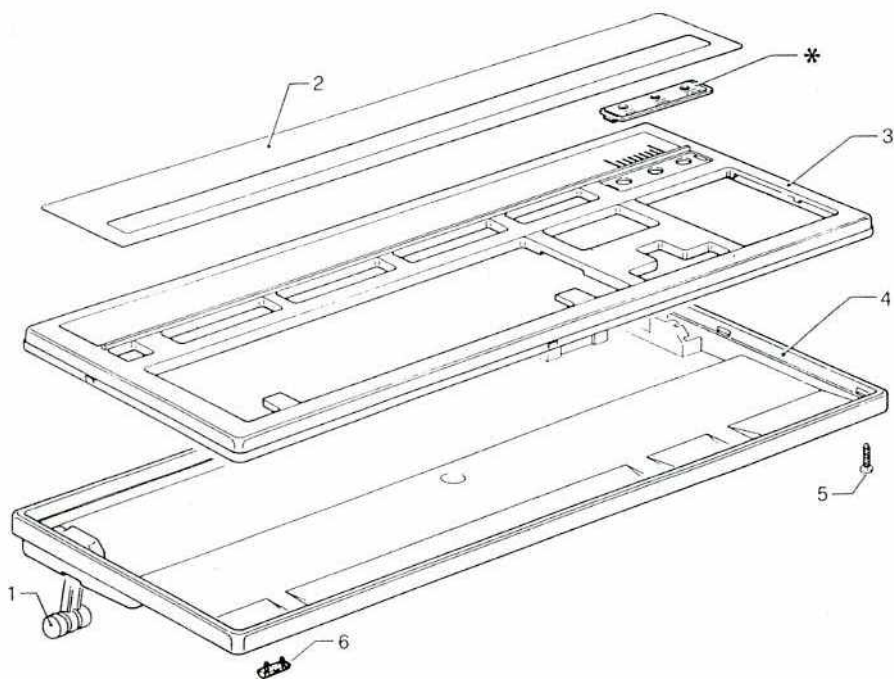
OPC 001 - 102 TASTI / 102 KEYS

REF.	CODE	CODE KIT TASTI	VARIANTI VARIANTS	NAZIONALITA'	COUNTRY
2	31232 S	731049 A 731040 D 731047 Y 731039 Y 731045 W 731052 V 731042 T 731050 F 731037 N 731048 H 731044 V 731051 U 731129 X 731132 J	TAS 128 TAS 166 TAS 187 TAS 188 TAS 411 TAS 435 TAS 443 TAS 504 TAS 609 TAS 684 TAS 687 TAS 729 TAS 851	GERMANIA PORTOGALLO SPAGNA 1-INTERNAZIONALE SPAGNA 2-NAZIONALE DANIMARCA FRANCIA BELGIO ITALIA NORVEGIA SVEZIA-FINLANDIA SVIZZERA U.K. CANADA /FRANCESE KIT TASTI NEUTRI	GERMANY PORTUGAL SPAIN 1-INTERNATIONAL SPAIN 2-NATIONAL DENMARK FRANCE BELGIUM ITALY NORWAY SWEDEN-FINLAND SWITZERLAND U.K. FRENCH/CANADIAN NEUTRAL KIT KEYS



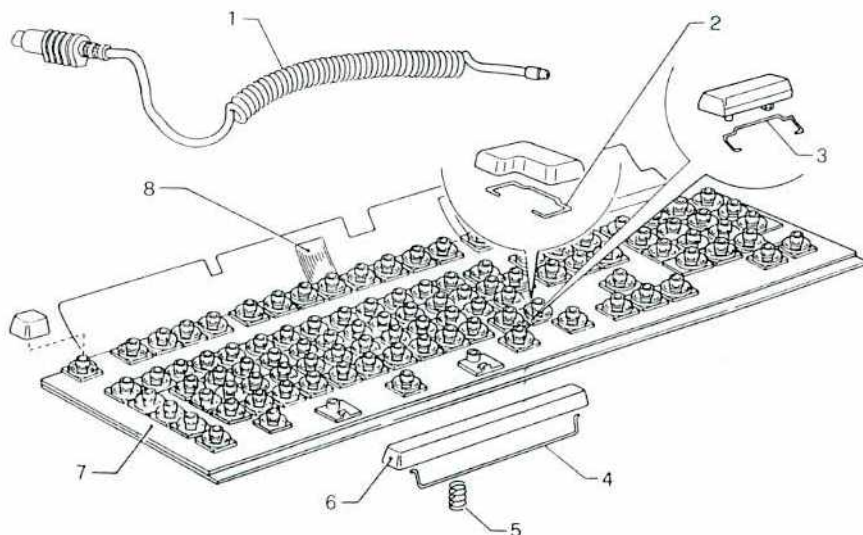
CARROZZERIA TASTIERA - KEYBOARD CASING

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	045103 S		CAMMA DI SOLLEVAMENTO	LIFTING CAM
2	045161 T		TEMPLATE PER 101/102 TASTI	TEMPLATE FOR 101/102 KEYS
3	045100 B	N	COPERTURA TASTIERA	KEYBOARD COVER
4	045101 Y	N	FONDELLO TASTIERA	KEYBOARD BOTTOM
5	924918 Q		VITE AUTOFILETTANTE	SELF TAPPING SCREW
6	646458 L		GOMMINO PER FONDELLO	BOTTOM GASKET
	045117 P		MASC. LED - FRANCIA/ALT. FRANCIA	LED MASK - FRANCE/ALT. FRANCE
	045119 Z		MASC. LED - GERMANIA	LED MASK - GERMANY
	045115 M		MASC. LED - SPAGNA 1/SPAGNA 2	LED MASK - SPAIN 1/SPAIN 2
*	045116 N		MASC. LED - ITALIA	LED MASK - ITALY
	045118 Y		MASC. LED - BELGIO	LED MASK - BELGIUM
	045105 U		MASC. LED - U.K.	LED MASK - U.K.
	045120 W		MASC. LED - CANADA/FRANCESE	LED MASK - FRENCH/CANADIAN



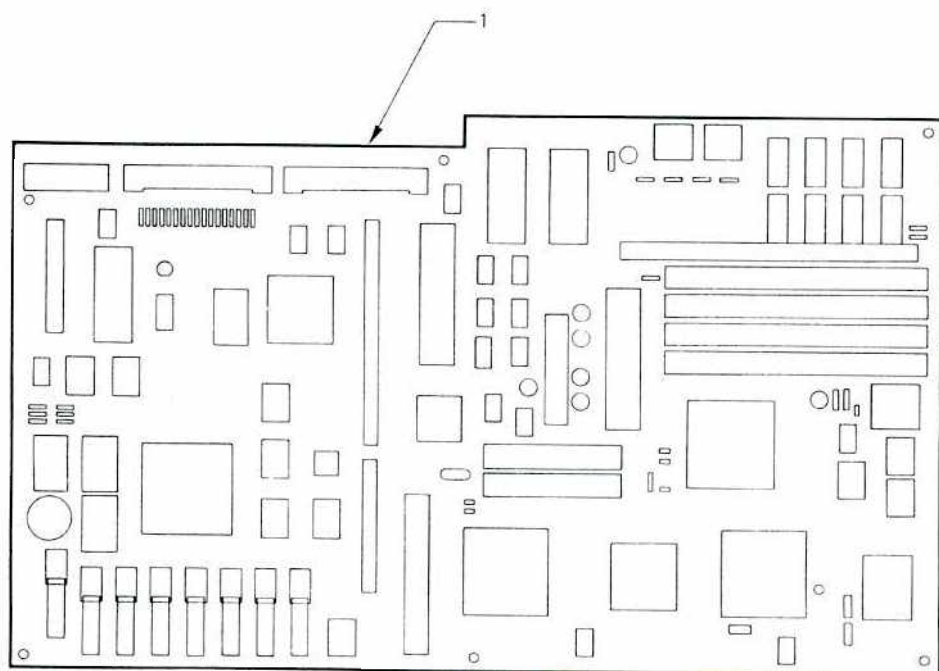
STRUTTURA TASTIERA - KEYBOARD FRAME

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	731153 X		CAVO TASTIERA	KEYBOARD CABLE
2	646351 Q		FILO GUIDA TASTO NEW-LINE	NEW-LINE KEY GUIDE WIRE
3	646352 R		FILO GUIDA TASTO 2P 3/4	2P 3/4 KEY GUIDE WIRE
4	676810 F		FILO GUIDA BARRA SPAZIO	SPACE BAR GUIDE WIRE
5	297931 R		MOLLA PER BARRA SPAZIO	SPACE BAR SPRING
6	646284 E		BARRA SPAZIO	SPACE BAR
7	045171 V 045108 F		MODULO TASTIERA 101 TASTI MODULO TASTIERA 102 TASTI	101 KEYS KEYBOARD MODULE 102 KEYS KEYBOARD MODULE
8	731154 Y 731140 E		ASSIEMAG. MYLAR RES. 101 TASTI ASSIEMAG. MYLAR RES. 102 TASTI	SANDWICH MYLAR RES. 101 KEYS SANDWICH MYLAR RES. 102 KEYS



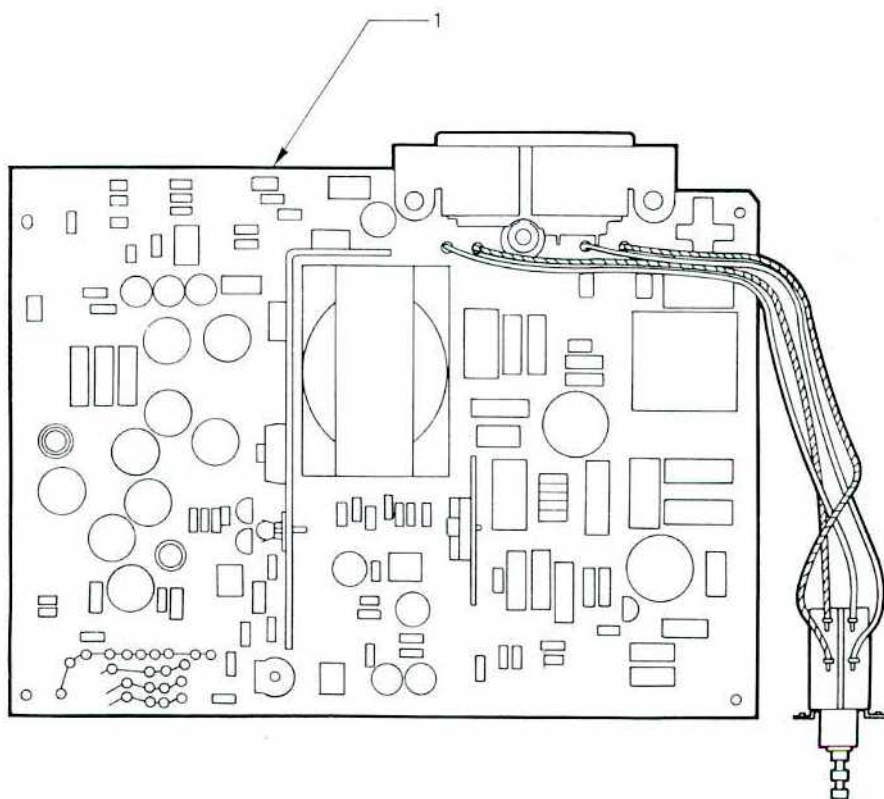
PIASTRE - BOARDS

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	413080 Q	N	PIASTRA BASE	BASIC BOARD



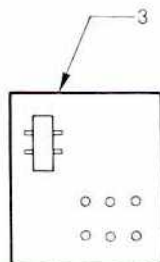
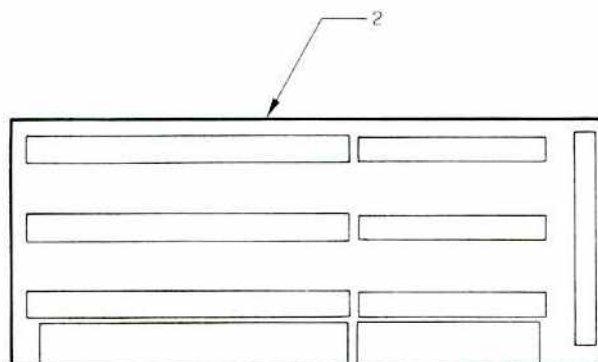
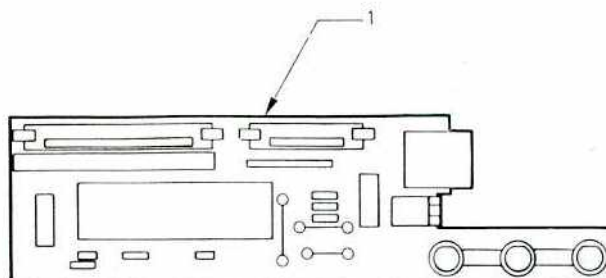
PIASTRE - BOARDS

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	413079 S	N	PIASTRA ALIMENTATORE	POWER SUPPLY BOARD



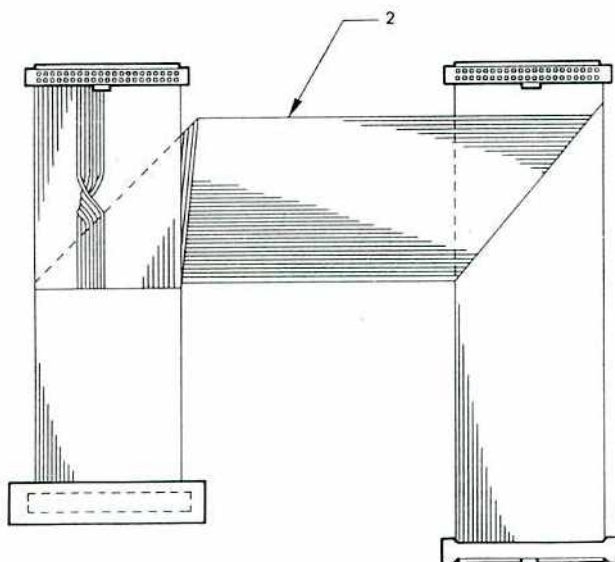
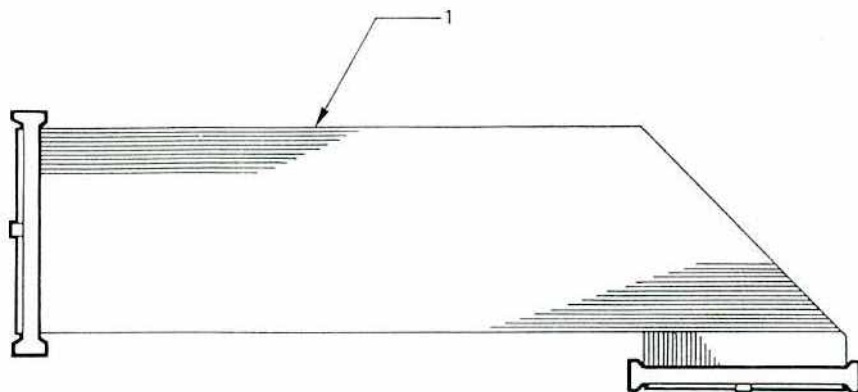
PIASTRE - BOARDS

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	731143 V		PIASTRINO TASTIERA	KEYBOARD BOARD
2	029231 Z		PIASTRA ESPANSIONE	EXPANSION BOARD
3	029232 S		PIASTRINO LED HDU	LED HDU BOARD



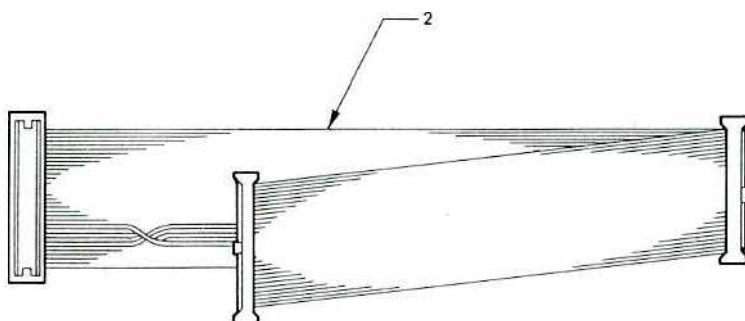
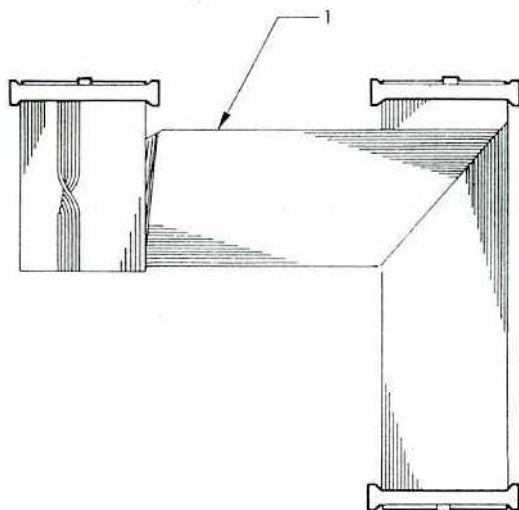
CAVI - CABLES

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	029218 C		CAVO SEGNALI HDU	HDU SIGNAL CABLE
2	059316 C		CAVO SEGNALI FDU	FDU SIGNAL CABLE



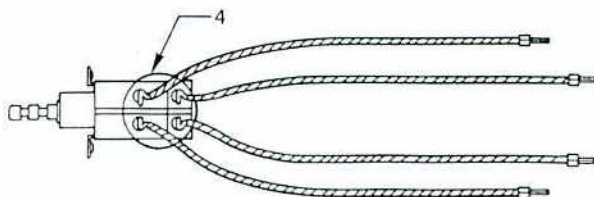
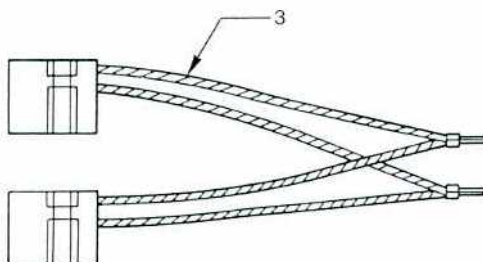
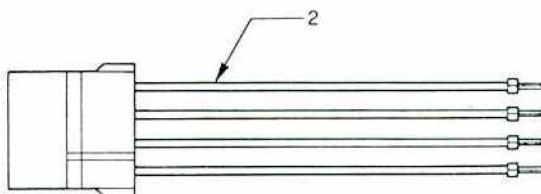
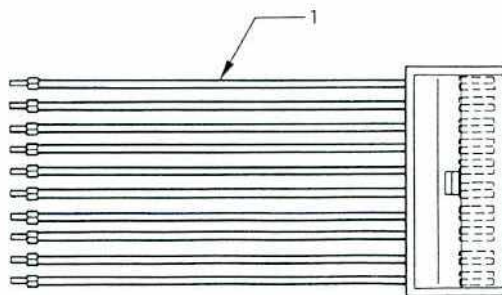
CAVI - CABLES

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	059317 D		CAVO SEGNALI DOPPIO FDU	DOUBLE FDU SIGNAL CABLE
2	059318 N		CAVO SEGN. 1 FDU 3,5" + 1 FDU 5",25	1 FDU 3,5" + 1 FDU 5",25 SIGN. CABLE



CAVI - CABLES

REF.	CODE	NOTE	DESCRIZIONE	DESCRIPTION
1	022209 D		CAVO ALIMENTAZ. PIASTRA BASE	BASIC BOARD POWER CABLE
2	022210 Z		CAVO ALIMENTAZ. HDU-OPZIONI	OPTION-HDU POWER CABLE
3	022212 P		CAVO ALIMENTAZ. FDU 3,5"	3.5" FDU POWER CABLE
4	022213 Q		GRUPPO INTERRUTTORE	SWITCH UNIT



INDICE GENERALE DEI CODICI - GENERAL CODES INDEX

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020891K	4	059318N	16		
020893M	5	059345R	4		
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029232S	14	676810F	11		
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