LSX 3005/3010

Service Manual

olivetti

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LSX 3005/3010

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PREFACE

This manual is intended for technicians required to service the LSX 3010 and LSX 3005 in field.

SUMMARY

The contents of each of the six chapters and the appendix comprising the manual are outlined below.

Chapter one is an introduction to the systems, specifying in particular the position of the boards in the rack and the compatibility of the boards in relation to the different versions existing.

Chapter two concerns installation and disassembly of the basic modules, lines and workstations.

Chapter three describes all aspects of power supply.

Chapter four is on the controllers and hardware modules, illustrating settings and specific connections required.

Chapter five provides the most important details of the magnetic peripherals which can be connected to the systems.

Chapter six relates to the system autodiagnostic and stand alone test programs.

A summary of the "Progetto di Gestione" and a full system bibliography can be found in the appendix.

SECTORRANGE PRODUCT: BI LSX 3010, LSX 3005

DISTRIBUTION: Internal (Z)

FIRST EDITION: June 1988

CONTENTS

1. OVERVIEW

1.1 INTRODUCTION

This manual deals with the LSX 3010 and LSX 3005 minicomputers, throughout the manual the LSX 3010 will be mentioned till differences arise between them, these systems represent the entry level configuration of the Olivetti LSX 3000 line.

The systems are available in UNIX or MOS operating system enviroment.

The major innovations are the new CPU with a clock of 20 MHz for the LSX 3010 and 16 MHz for the LSX 3005, and uses RAM memory with low access time.

The central unit uses RAM memory with ECC and it may be configured with three magnetic peripherals.

The central unit (UC3068) is a monoprocessor unit, it uses a clock processor, decoupled from the system bus.

Such an architecture.grants processing power of 1.5 MIPS. ~ 2 MIPS

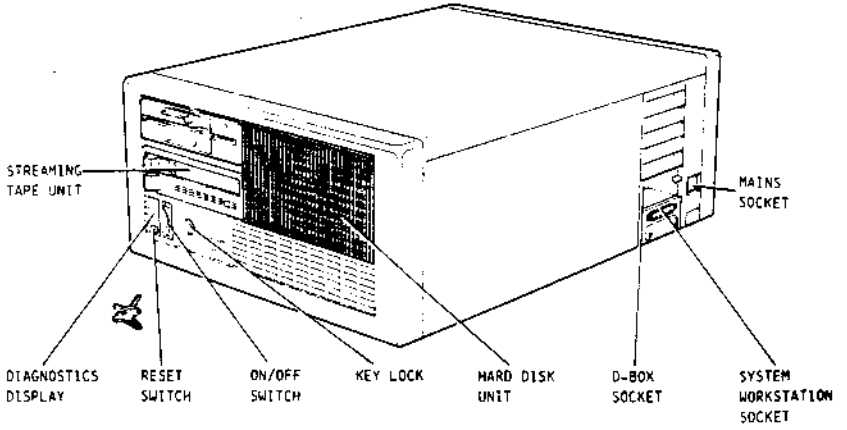

Fig. 1-1 LSX 3010 Front View

The LSX 3010 system consists of a desk top type box containing:

- The Central Processing Unit
- File Processor Unit and associated mass storage devices
- Main Memory
- Operator's panel
- Power supply
- Board rack holding 9 boards of the 3000 type
- Up to four 5 1/4" slim size magnetic peripherals.

Note that external magnetic peripherals may not be used.

A block diagram with the major system components of the machine is shown in the following figure.

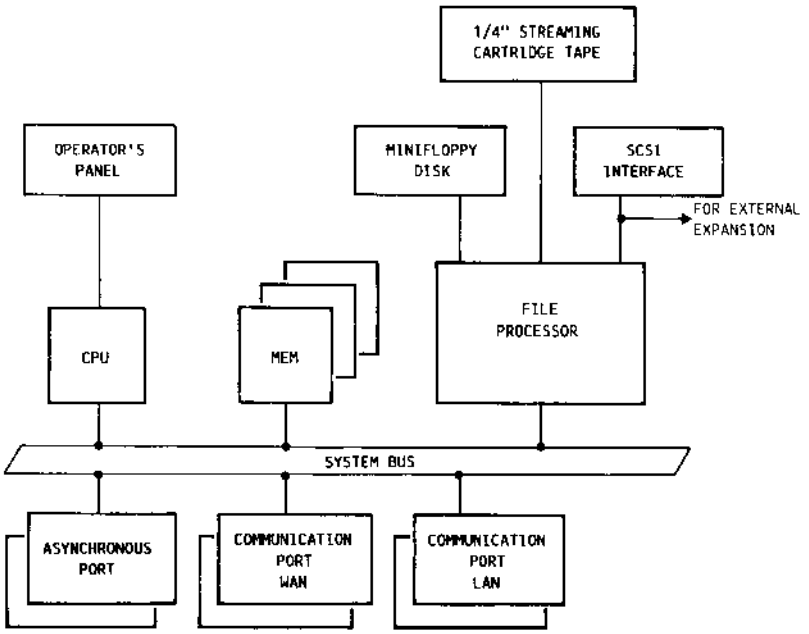

Fig. 1-2 Block Diagram of the LSX 3010

The LSX 3005 system consists of a desk top type box containing:

- The Central Processing Unit
- Mass Storage Device Controllers (mFD, HDU, STC)
- Main Memory
- Four way asynchronous controller
- LAN/WAN communication controllers
- Encryption controller (MOS only)
- Operator's panel
- Power supply
- Board rack holding 9 boards of the 3000 type
- Up to four 5 1/4" slim size magnetic peripherals.

Note that external magnetic peripherals may not be used.

A block diagram with the major system components of the machine is shown in the following figure.

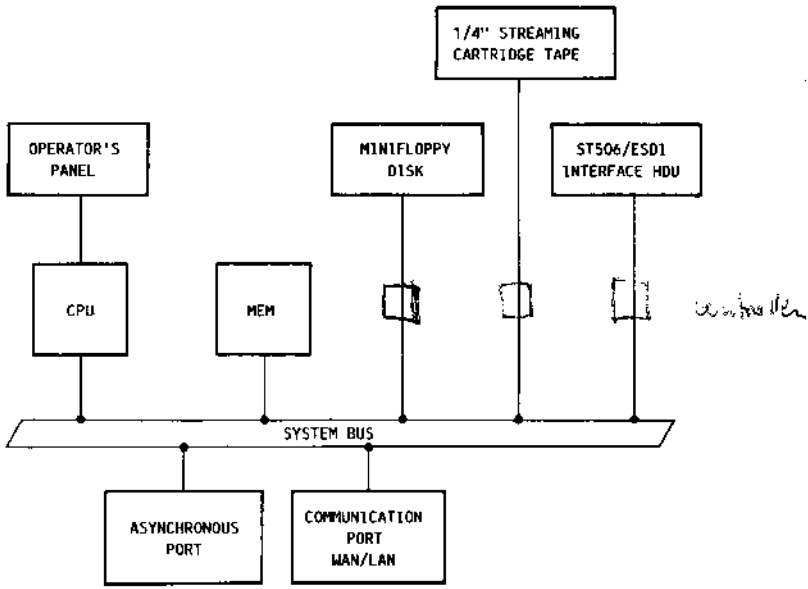

Fig. 1-3 Block Diagram of the LSX 3005

1.1.1 CENTRAL UNIT

The central unit is based on the 32 bit Motorola MC 68020 microprocessor working at 16 or 20 MHz, and contains the following.

The memory management unit that supports the virtual page demand memory. This performs the logical to physical translation for main memory accessing and providing the necessary protection features.

Floating point operations, this is supplied as an option Timer used by the software for calendar and various system parametersocket present on the CPU.
This supports single precession (32-bit) and double precision (64-bit) floating point formats and 8,16, and 32-bit signed and unsigned integer format, performing the basic arithmatic functions as well elementary transcendental functions.

128 KB of erasable programmable read only memory (EPROM) memory.
Provides initialization code for self-diagnostics and debugging purposes, for booting from secondary memory subsystem.

A timer with battery back-up used by the software for clock/calendar, system information (machine type, serial number, manufacturing date, etc) and various system parameters such as configuration informations, default baud rates, passwords, etc.

Two asynchronous serial RS232 interface.
Used to connect the system tty console and the debugging terminal.

1.1.2 FILE PROCESSOR UNIT (USED ON THE LSX 3010 ONLY)

The file processor unit contains in one functional unit a minifloppy disk controller, a streaming cartridge tape controller and a SCSI bus interface adapter, the latter intended for hard disk drives interfacing.

1.1.3 HARD DISK CONTROLLER (USED ON THE 3005 ONLY)

The hard disk controller can control two peripherals with ST506 interface. It requires no settings as it recognises the type of peripheral connected by reading the relative data on track 0.

1.1.4 STREAMING TAPE CONTROLLER (USED ON THE 3005 ONLY)

The STC controller is capable of reading the 20 Mbyte type cartridges recorded on the 4-track serpentine drives with proprietary format and recording standard.

1.1.5 MINIFLOPPY DISK CONTROLLER (USED ON THE 3005 ONLY

The controller can handle up to four 1 MB minifloppy disk drives. The type of unit connected is defined through the DIP-switch TS08 on the board.

1.1.6 MAIN MEMORY

The basic machine has 4 Mb dynamic memory with parity check.
The memory is mounted on the CPU board, it can be expanded to 14 Mbytes with the aid of OLIBUS compatibile modules.

1.1.7 OPERATOR'S PANEL

The panel has the following features:

Key (removable) to place the unit in standby, launch diagnostics and boot the system, with the following positions

- DIAGNOSTICS (for diagnostic/installation purposes)
- STANBY
- ON PRIMARY (initialises the system from HDU)
- ON SECONDARY (initialises the system from a removable media).

Power switch (used to switch on the system)

Reset switch (this is enabled by the presence of the on/off key)

Power on indicator

One digit system error indicator

1.1.8 SYSTEM POWER SUPPLY LS 24

The system uses a 240 W power supply that provides all the voltages needed for the system and its peripherals.
It is also possible to have an Uninterruptable Power Supply (UPS), that serves as a back up supply when there is a power failure.

1.1.9 ENCRYPTION BOARD (MOS ONLY)

The encryption board allows application programs to protect data transfered on communication lines (end to end encryption).

It allows application programs to verify the identity of the user requiring access to the system (pin check).

1.2 BOARDS POSITION ON THE RACK

The boards are numbered starting from the bottom and moving upwards.

Backplane

The central unit board has to be plugged in slot 2, this is a fixed position for the UC.

As from the RAM storage boards, slot 1 holds the first memory module. This position isn't considered in the priority daisy chain and cannot, therefore, be used to house control boards.

There must be no vacant slots between boards.

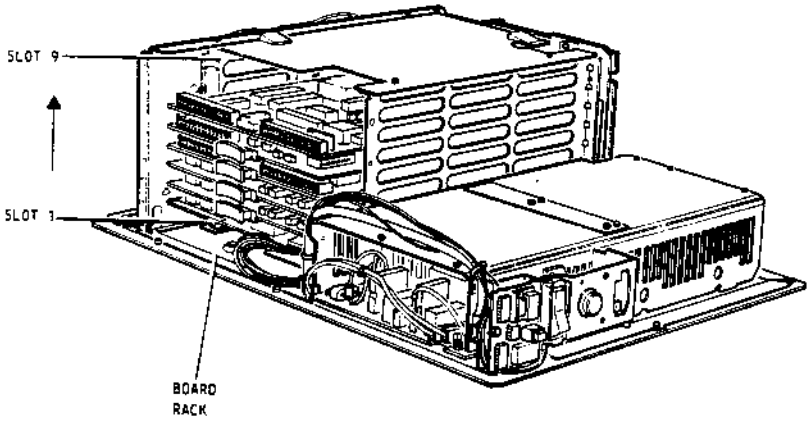

Fig. 1-4 LSX 3010 Board Racks

1.3 COMMUNICTION SUBSYSTEM

Asynchronous communication ports shall be used to connect workstations, personal computers and peripherals through the standard operating system workstation management, or to connect other devices through a general purpose driver under application control.

1.3.1 WAN INTERFACES

The WAN interfaces requested are strictly related to the WAN facilities existing in the countries where Olivetti systems are to be marketed.

The interfaces shall be available in four different combinations:

- V24 + V24
- V24 + X24
- V24 + V35
- V24 + V36

The interfaces shall be implemented on a single printed circuit board with format complying with the 3000 Bus physical standards.

1.3.2 LAN INTERFACES

The LAN is used in a situation in which a very large number of personal computers are connected to one or more minicomputers, acting as generalized or specialized servers and, generally, communicating with a mainframe or with other minicomputers.

The system shall support the STARLAN network as medium range LAN and the ETHERNET network as high performance and universally accepted LAN.

1.4 COMPATIBILITY OF BOARDS TO SYSTEMS

Compatibility of the hardware modules to the LSX 3005 and LSX 3010 is illustrated in the following tables:

BOARD NAME	BOARD DESCRIPTION	M54	LSX 3005	LSX 3010	LSX 3020
	CENTRAL UNITS AND VARIOUS MODULES				
UC3068	Central unit	no	yes	yes	no
GO 257/E	Encryption board	yes	yes	yes	yes
INO 62	Back plane	yes	yes	yes	no
	RAM STORAGE BOARDS				
RA077/D	2 MByte: 256 Kb chip (ECC)	no	yes	yes	no
RA077/C	4 MByte: 256 Kb chip (ECC)	no	yes	yes	no
RA077/B	6 MByte: 256 Kb chip (ECC)	no	yes	yes	no
RA077/A	8 MByte: 256 Kb chip (ECC)	no	yes	yes	no
	POWER SUPPLIES				
LS24	240 W	yes	yes	yes	no
	WORK STATION MODULES				
GO 322 ($)	Multiplexer controller	yes	yes	yes	yes
BA 126	ELB 3684 : Main Board	yes	yes	yes	yes
GO 329	ELB 3684 : Pin Pad and Badge reader option	yes	yes	yes	yes
	FLOPPY/mFLOPPY CONTROLLERS				
GO 280/D	1 MB minifloppy unit	yes	yes	no	yes
	STC AND MTU CONTROLLERS				
GO 437	45/60 MB STC controller	yes	yes	no	yes
	HARD DISK CONTROLLERS				
GO 363	ST506 interface controller	yes	yes	no	no
GO 404 and GO 405	ESDI interface controller	yes	yes	no	no
	FILE PROCESSOR - PERIPHERAL CONTROLLER				
GO 458	MFDU, HDU and STC Controller	no	no	yes	no

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BOARD NAME	BOARD DESCRIPTION	M54	LSX 3005	LSX 3010	LSX 3020
	LINE CONTROLLERS AND SERIAL INTERFACES				
GO 331 ($)	V24 +V24, with microprocessor	yes	yes	yes	yes
GO 212/A($)	Ethernet internal line	yes	yes	yes	yes

Note: All control boards marked $ are "Dual Port Memory" type boards. It is imperative that Dual Port Memory boards on the same system are all of the same type, whole segment or half segment.

2. INSTALLATION

This chapter is divided into four sections, each treating one specific aspect of system installation.

The first section is a brief introduction on preparation of the site chosen for system installation.

The second part deals with assembly and disassembly of the LSX 3010 basic unit.

The third section is on workstation organization, while the fourth part relates to regulations for the installation of internal lines and local networks.

2.1 ENVIRONMENT CONDITIONS CHECK

The hints given below should be followed to prepare the site for installation of LSX 3010 system and peripherals.

Main Power Supply Network

Wires and switches must be able to support both the scheduled work load and the high surge currents at power-on.
Ground resistance must be to national standard requirements. A resistance of 50 Ohms covers disturbance and, as operator protection, Italian ENPI standards demand a resistance of 20 Ohms maximum.

Electrical noise

The system must be insulated against sources of electrical noise and devices causing excessive voltage level variations or which introduce large inductance or capacitance loads into the system.
However, some of the smaller, general office machines may be admitted on the same line as the system just as several LSX systems may be connected to the same mains power source, provided each machine has its own plug.

Temperature and humidity

The tables below indicate the minimum amd maximum temperature and humidity values for the system and magnetic peripherals in operation, when stationary and in storage. All readings are calculated with no condensation.

	OPERATION		STATIONARY		STORAGE	
	TEMP.°C	HUMID. %	TEMP.°C	HUMID. %	TEMP.°C	HUMID.%
LSX 3010	10 - 40	10 - 95	5 - 50	5 - 95	-15 - +55	5 - 95
mFDU	10 - 40	20 - 80	5 - 50	8 - 80	-30 - +53	8 - 90
HDU	10 - 40	8 - 80	5 - 50	5 - 95	-34 - +55	5 - 95
SCT	10 - 40	20 - 80	5 - 50	5 - 90	-30 - +55	5 - 95
BADGE READER	10 - 40	10 - 90	5 - 50	5 - 95	-35 - +55	5 - 95

Static electricity

Extremely low humidity may cause electrostatic charges to be generated effecting the magnetic media in read/write operations and operation of the electronic devices and paper service equipment.
Carpets and mats can also cause electrostatic charge generation.
Humidity must be kept to required levels and anti-static floor coverings must be used.

Dust

Systems may be installed in a normal room designed for office purposes, the maximum dust level permitted is 0.25 mg/mc.
A high dust level effects, in particular, the magnetic media, reducing effective head life.

Operating area

All parts of the system must be accessible to allow for technical service.
Systems should not be installed in full sunlight or near direct heat sources.
A free flow of air should be guarantee the system and all inlets must be left unobstructed.

2.2 ASSEMBLY AND DISASSEMBLY

2.2.1 REMOVING THE UNIT CASING

To remove the casing, slacken the two screws shown in figure 2-1 and lift up firmly.

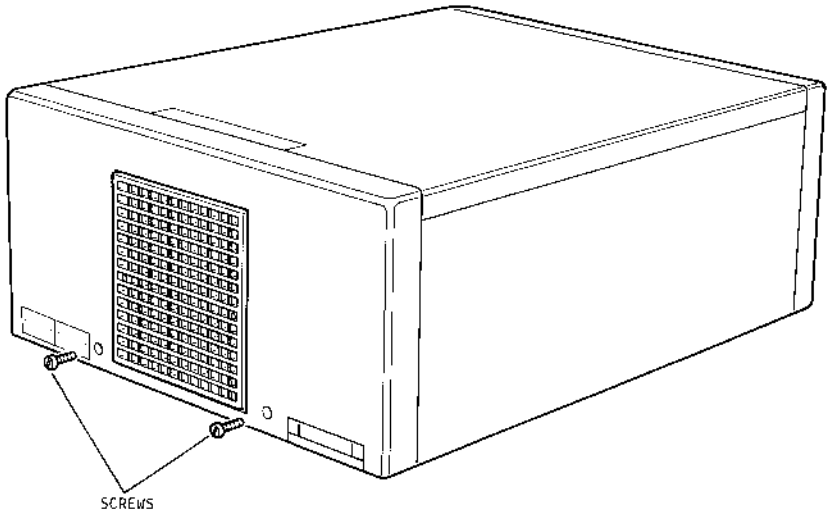


Fig. 2-1 Removing the unit casing

2.2.2 REMOVAL OF THE POWER SUPPLY UNIT

1. Remove the main cover.

2. Unplug the supply and ground fastons shown in figure.

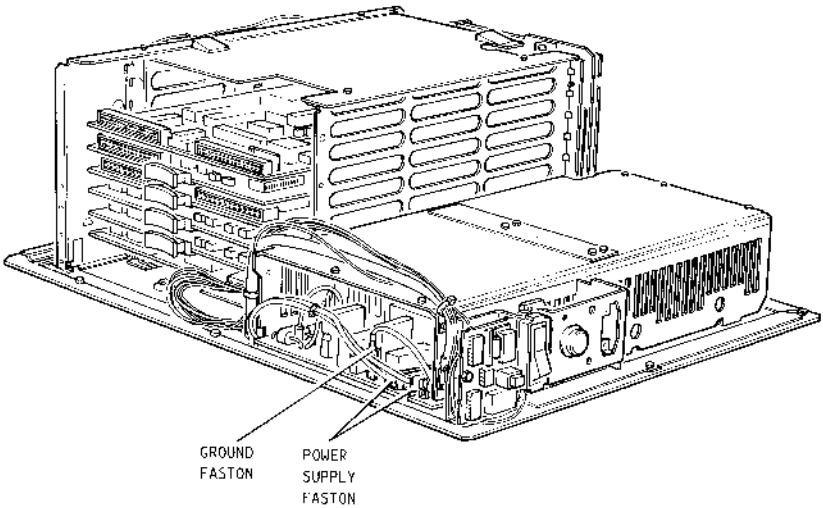


Fig. 2-2 Location of the Fastons

3. Remove the securing bracket by slackening the three screws.

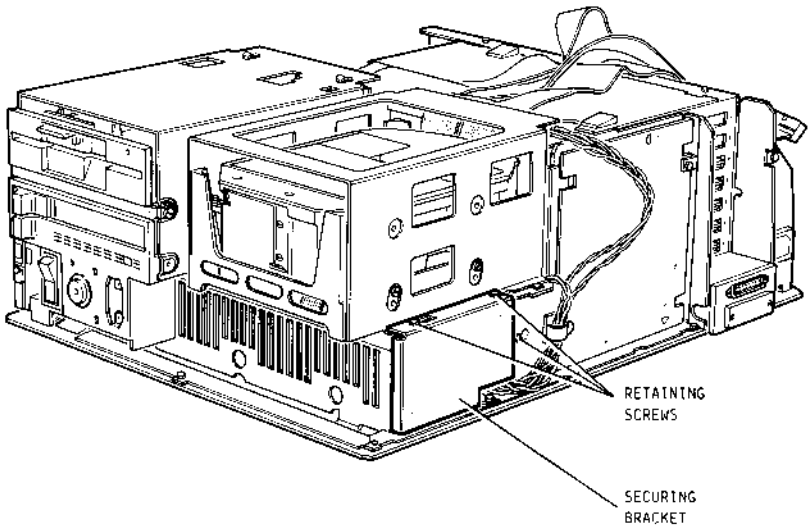


Fig. 2-3 Location of the Securing Bracket and the Retaining Screws

4. Remove the four screws A indicated and slacken the blocking screw B.

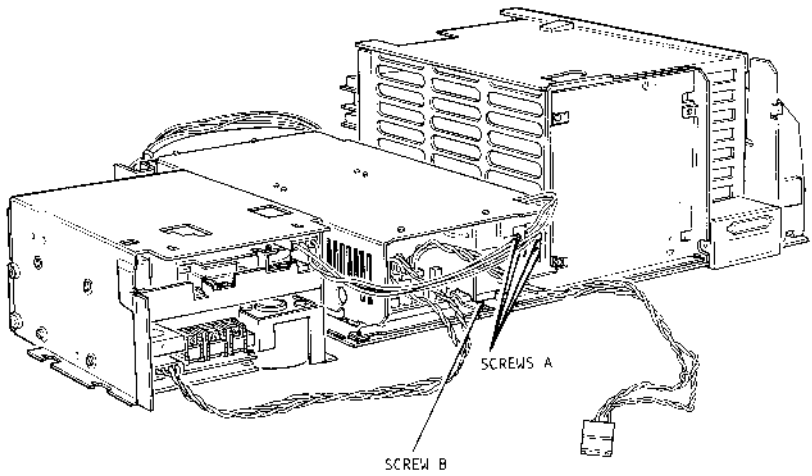


Fig. 2-4 Location of screws A and B

5. Pull the power supply board outwards slowly.

6. Do the reverse for re-assembly.

2.2.3 REMOVAL OF THE CONSOLE BOARD

1. Remove the main cover.
2. Unscrew screw C and unhook the board.

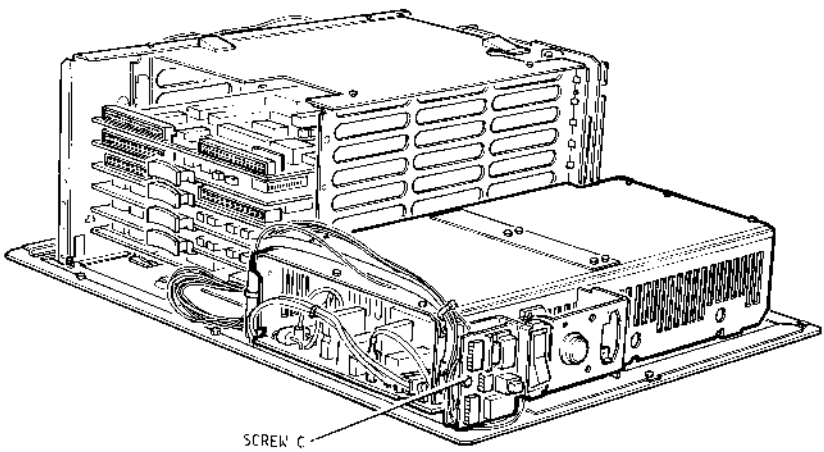


Fig. 2-5 Location of Screw C

3. Unplug the connector.
4. Do the reverse for re-assembly.

2.2.4 REMOVAL OF THE KEY AND MAIN SWITCH BLOCK

1. Remove the main cover.
2. Remove the console board.
3. Remove the two screws D.

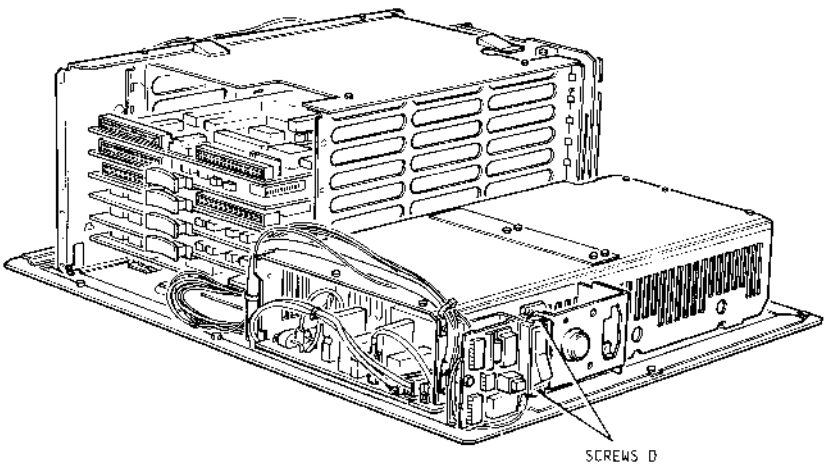


Fig. 2-6 Location of the Screws D

4. Unhook the block and remove the connectors to release it.
5. Do the reverse for re-assembly.

2.2.5 REMOVAL OF THE MINIFLOPPY DISK AND STREAMING TAPE UNIT

The machine can have the following configurations:

Top	Bottom
Minifloppy	Minifloppy
Minifloppy	Streaming Tape Unit
Minifloppy	----------
Streaming Tape Unit	----------

The following procedure has to be followed to disassemble the above peripherals:

1. Remove the main cover as described before.
2. Slacken the four screws E that keep in place the MFDU/STU structure.

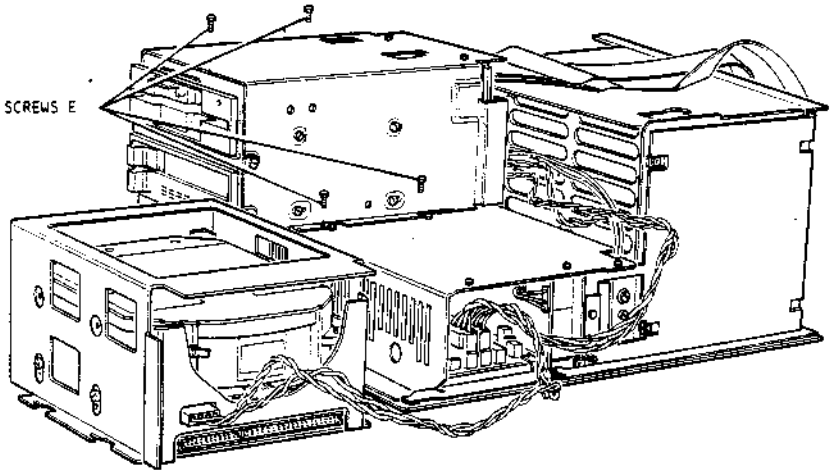


Fig. 2-7 Location of Screws E

3. Slide the MFDU/STU housing outwards.

4. Slacken the two screws F and remove the rear plate to have access for the data/control and supply connectors.

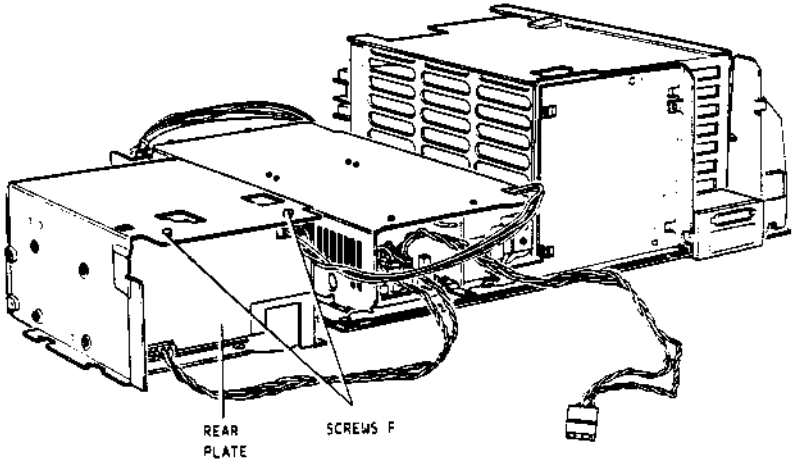


Fig. 2-8 Location of Screws F and Rear Plate

5. Remove the blocking plate between the peripherals by unscrewing screws G.

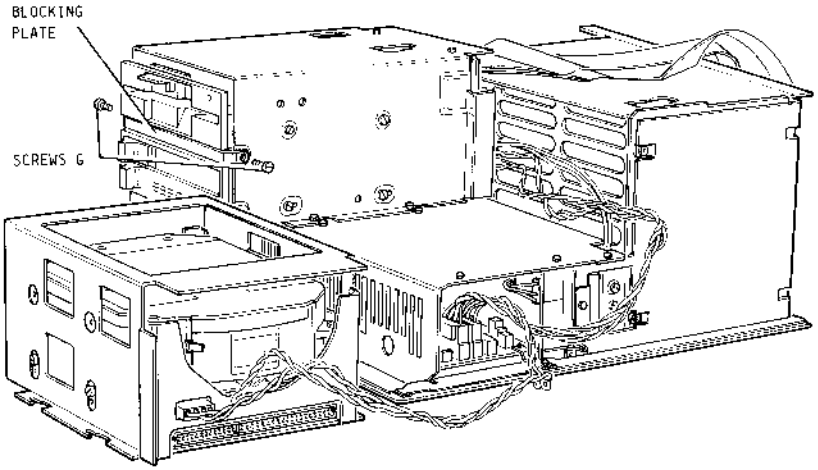


Fig. 2-9 Location of the Blocking Plate and Screws G

6. Remove screws I for the top peripheral and H for the bottom peripheral, slide out the unit concerned.

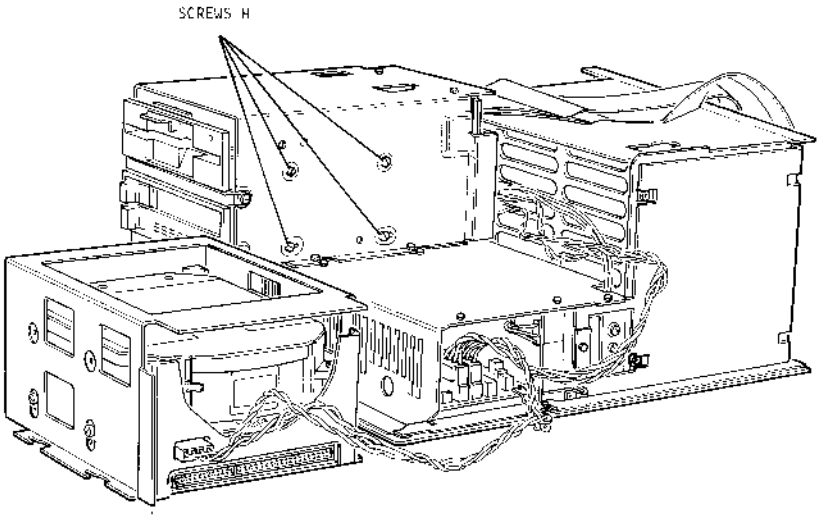


Fig. 2-10 Location of Screws H and I

7. Reverse the procedure for re-assembly.

2.2.6 HDU DISASSEMBLY

1. Remove the main cover as explained in the step before.

2. Slacken the four screws J that hold the HDU housing structure in place as shown in figure.

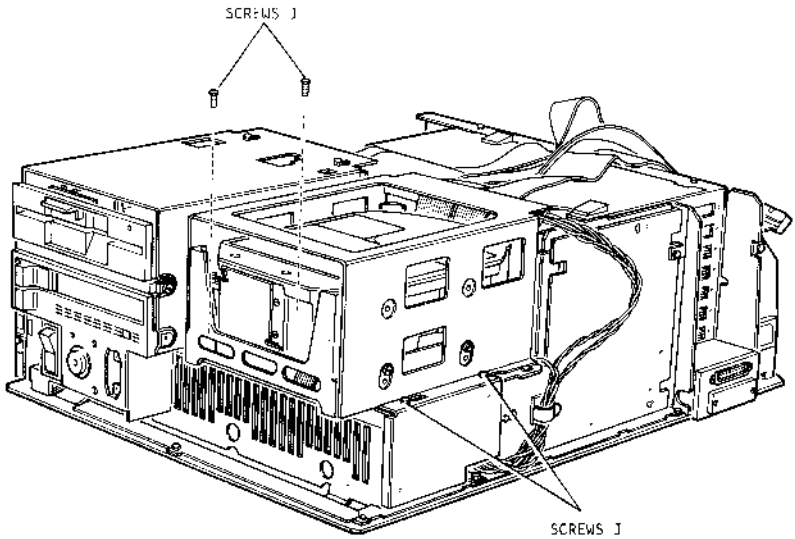


Fig. 2-11 Location of Screws J

3. Slide the HDU housing outwards.

4. Remove the data/control and supply plugs from the HDU.

5. Unscrew the four screws K (used for a full size or bottom slim HDU) and L (used for the upper slim HDU), shown in figure, once this is done pull the relative HDU outwards.

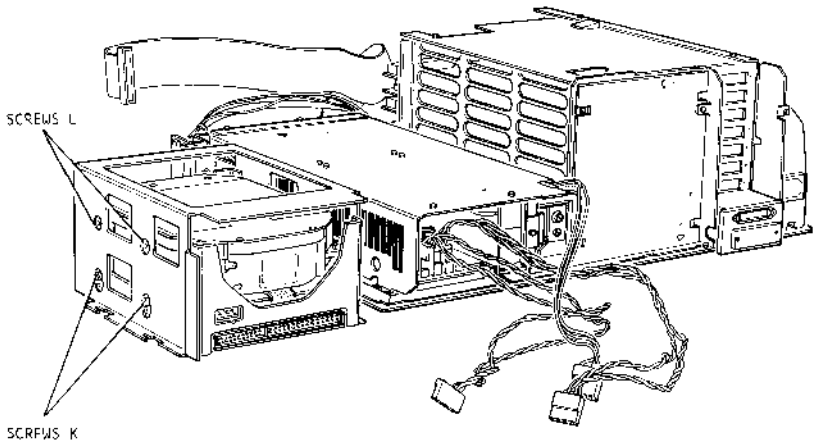


Fig. 2-12 Location of Screws K and L

6. Reverse the procedure to mount a HDU.

2.3 WORKSTATIONS

The LSX 3010 system workstations consist basically of the following elements:

Workstation 1

- Multiplexer controller GO 322
- Distribution box D-BOX
- Electronics box ELB 3684
- Connection cables
- Galvanic separation box T-BOX (TBX 9020)
- Display and keyboard.

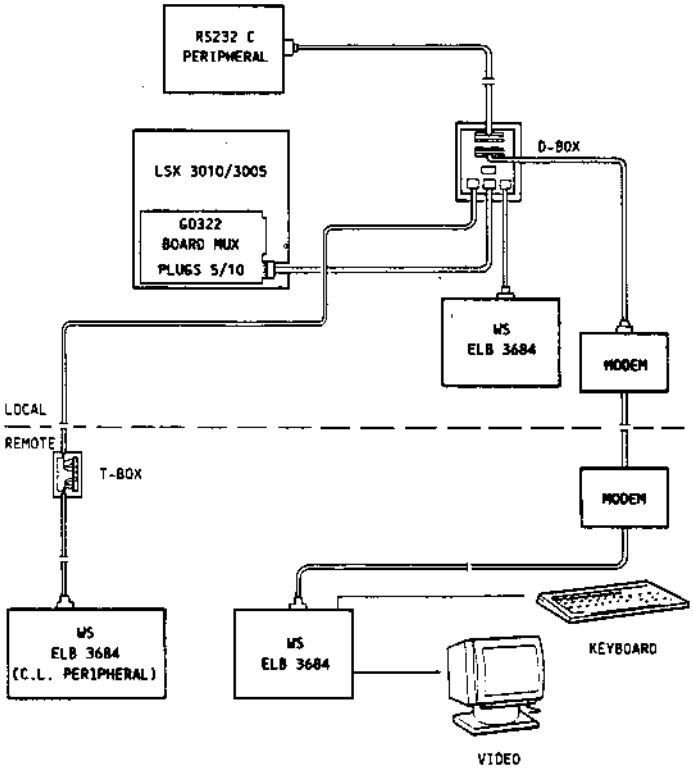


Fig. 2-13 Workstation Installation Diagram

Workstation 2

- Multiplexer controller GO 322
- Distribution box D-BOX
- WS 685 or WS 685/M (M stands for MOS)
- Connection cables
- Galvanic separation box T-BOX (TBX 9020).

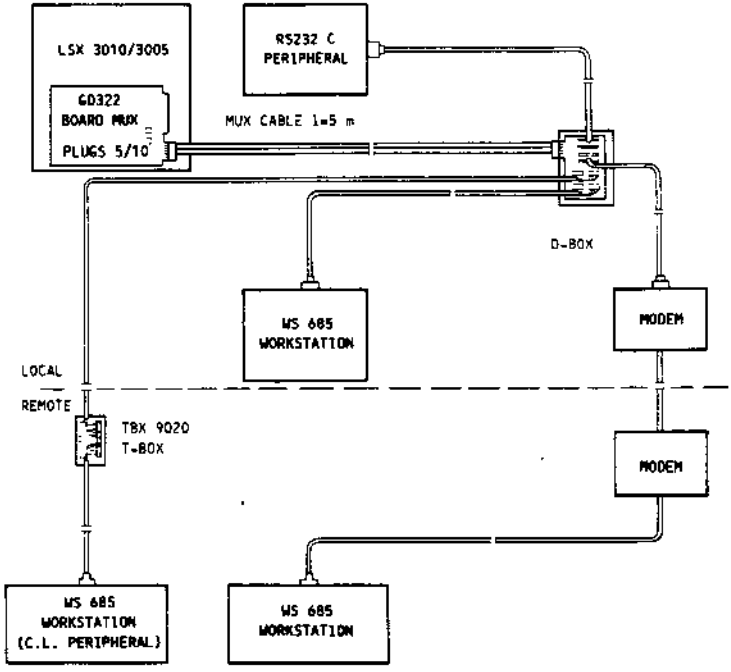


Fig. 2-14 Workstation Installation Diagram

2.3.1 MULTIPLEXER CONTROLLER

This is an intelligent module, capable of handling 4 full duplex connections at speeds of up to 19,200 baud and transfer rate of up to 76,800 bits/sec.
Its interfaces are the "Current Loop" and "RS 232 C".
All connections between this controller and peripherals are by way of the external D-BOX device.

2.3.2 DISTRIBUTION BOX D-BOX

This is a passive device connecting the system multiplexer controller to the different peripherals; in other words, it "distributes" connections (RS 232 and/or Current Loop) to the peripherals.
The cable for connection to the multiplexer controller is 5 metres long.

The D-BOX must be set close to the system and secured to the wall or the floor at a maximum distance of 5 metres.

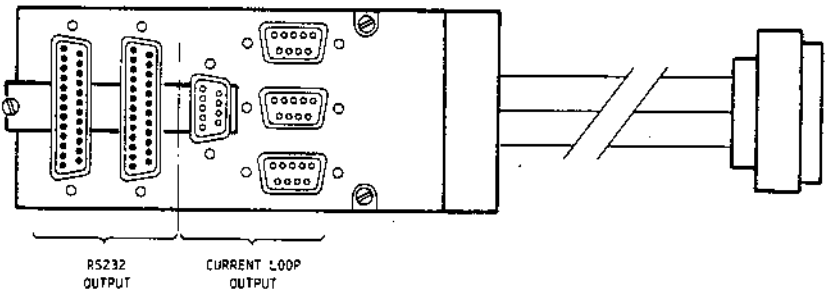


Fig. 2-15 View of the D-BOX

2.3.3 ELECTRONICS BOX ELB 3684

This intelligent module is the central element of the workstation and consists of:

- COMPOSITION:
  - . Power supply unit
  - . Electronics mother board
  - . Pin pad and badge reader optional board G0329
- EXCHANGE WITH SYSTEM: serial, point to point, asynchronous, free running, via multiplexer controller
- INTERFACES WITH SYSTEM:
  - . 20 mA Current Loop for distances of up to 1 km
  - . RS 232 C for distances of up to 15 metres
- INTERFACES WITH PERIPHERALS:
  - . Keyboard interface
  - . Video controller interface
  - . Two RS 232 C interfaces
  - . Two TTL interfaces.

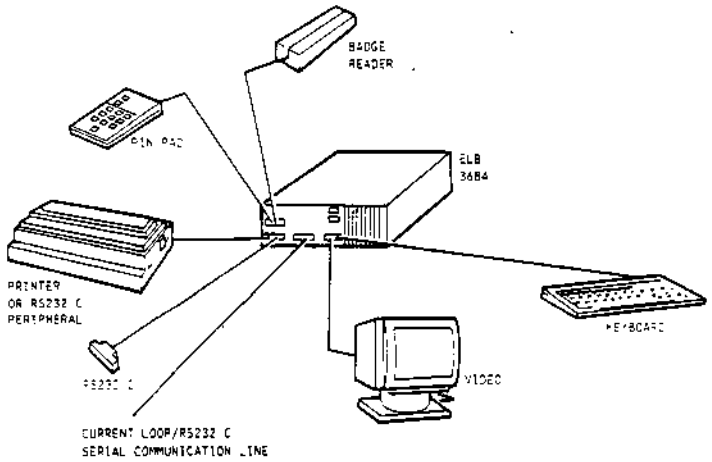


Fig. 2-16 Diagram of Connection Between ELB 3684 and Peripherals

Installation of ELB 3684

The ELB 3684 has a felt-padded base and a cooling fan.
In its workstation context, the ELB may either be set on a table or in a semi-enclosed housing; however, in both cases, a free supply of air must be guaranteed. The ELB 3684 does not have any holes on its upper cover to take a monitor.

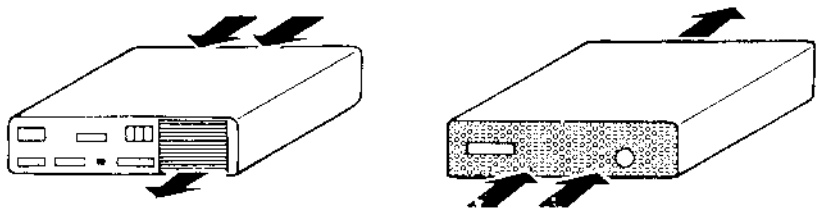


Fig. 2-17 ELB 3684 Ventilation

To remove the ELB 3684, the securing screws on the rear panel must first be slackened and the casing pulled slightly forward so that it can then be turned over backwards and lifted off the base of the ELB without damaging the copper earth springs in the framework contact zones.

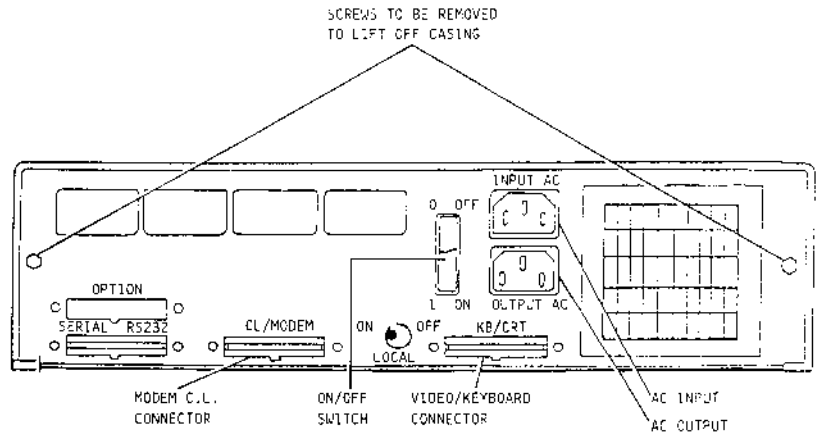


Fig. 2-18 Removing the ELB 3684 Casing

Assembly of the Pin Pad and Badge Reader Option Board G0329

To mount the pin pad and badge reader option board in the ELB, the procedure is as follows (see also figure below):

- Remove the ELB 3684 casing as described earlier
- Mount the option board, securing it with the 3 screws shown in the figure
- Connect the option board to the motherboard and the power supply unit via the 40-way flat cable, plugging into the J124 connectors of the mother board and the pin pad optional board.

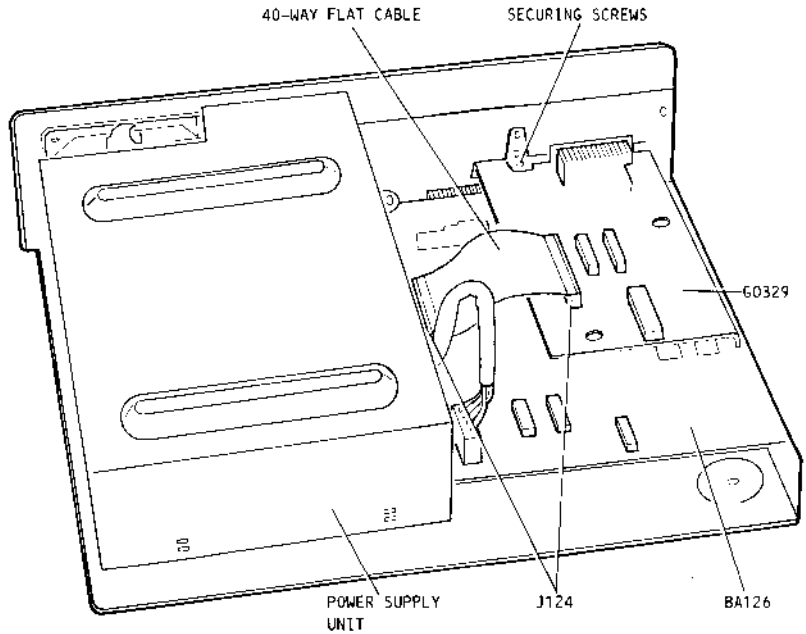


Fig. 2-19 Assembly of Pin Pad and Badge Reader Option Board

Power supply assembly

The power assembly LG03 is contained in a sheet metal structure including the fan, switch, power plug and video socket. The assembly is in two parts:

- Electronics board

- A.C. distribution.

The electrical characteristics of the electronics board, which also includes the mains filter, are:

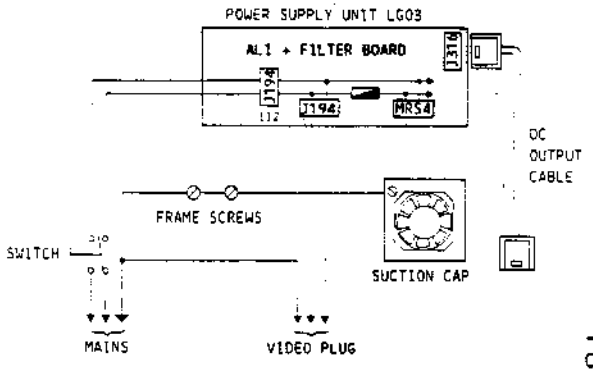
- Frequency: 50-60 Hz ±5%

- Jumper-selected mains voltage: 100-120 V or 220-240 V

- Power absorption: 50 VA

- Power raised: 35 watt.

How the alternating current is distributed is illustrated in the figure below:



CONNECTOR J316		
1	+5 V	RED
2	+5 V	RED
3	M	BLACK
4	M	BLACK
5	+12 V	ORANGE
6	-12 V	ORANGE

Fig. 2-20 ELB 3684 a.c. Distribution

2.3.4 CURRENT LOOP AND T-BOX CONNECTION LINE

For a Current Loop type connection between system and ELB 3684, for distances not greater than 10 metres from the D-BOX, the Current Loop standard cable CBL 3610 is used.
The ELB 3684 can take a twin leaf connection as it has a polarity key; it should be inserted in the "CL/MODEM" connector.

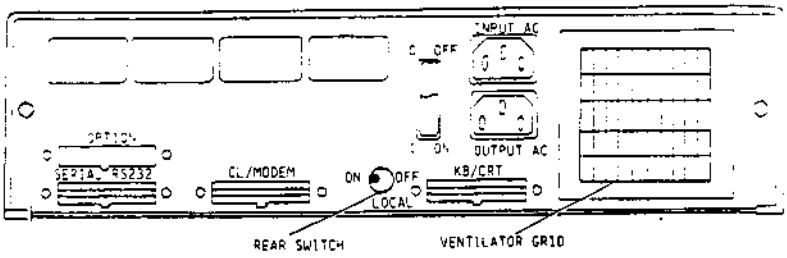
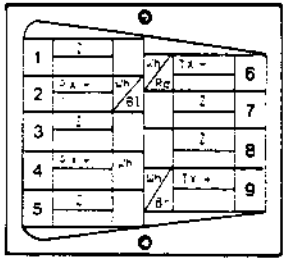


Fig. 2-21 ELB 3684 Rear View

The conditions listed below must be respected in connecting the CBL 3610 cable with the 9-way D-shell connector. The 9-way D-shell connector is inserted into the D-BOX.



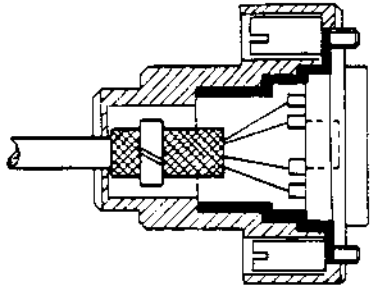


Fig. 2-22 9-way D-shell Connector and Relative Cable Connections

T-BOXes are inserted in remote connections of over 10 metres and also in shorter, local connections where the ELB and D-BOX grounds are not of equal potential.
This has a dual purpose: a) it ensures galvanic separation between the shield grounds of the two devices and b), junction of the CBL 3610 cable and the quadripole, shielded AWG 24 D-BOX connector cable.
The cable connecting D-BOX and T-BOX can be 1 km in length and is available from "Gestione Ricambi" in reels of 500 metres.
The 4 ELB wires are connected to the T-BOX in the same way as seen earlier for the D-BOX and illustrated in figure 2-15.

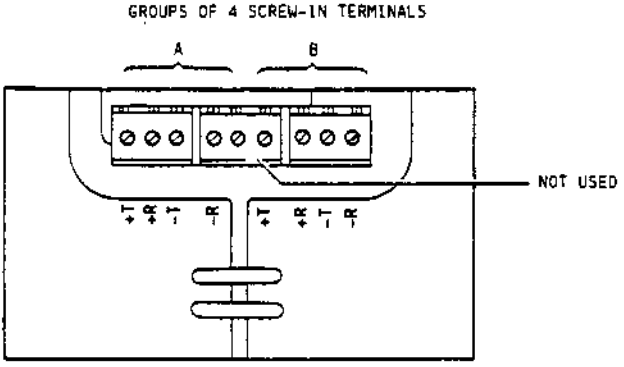
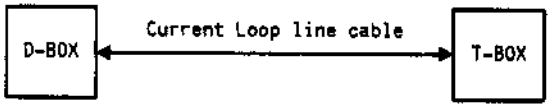


Fig. 2-23 T-BOX Assembly View

The T-BOX has two sets of 4 terminal posts each to which the ELB and D-BOX devices may be connected indifferently.
D-BOX and T-BOX are interconnected in the same way as seen earlier for connection of the D-BOX to the ELB, and as is now shown in the figure below:



T+	WHITE/BROWN	connected to	R+
R+	WHITE	connected to	T+
T-	WHITE/RED	connected to	R-
R-	WHITE/BLACK	connected to	T-

Fig. 2-24 Connection between D-BOX and T-BOX

T-BOX installation

The T-BOX is set at a maximum distance of 10 metres from the ELB and is secured to the wall or floor by wedge-type pressure screws.
The holes are 4.5 mm in diameter and are at a distance of 49 mm, centre to centre.
The T-BOX can only be secured after the cover is lifted off and the printed circuit removed as shown in figure.

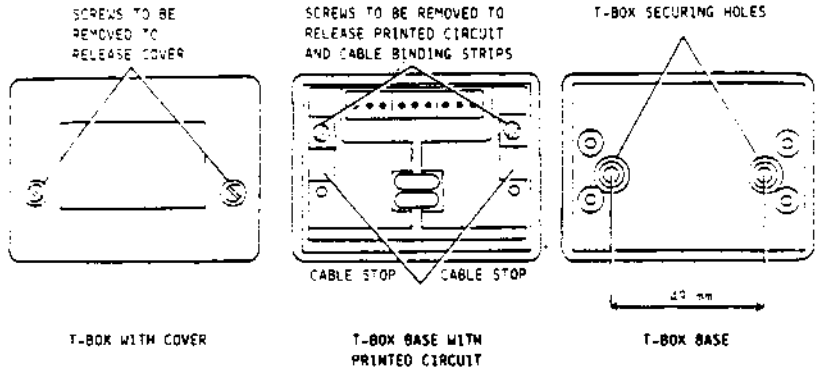


Fig. 2-25 Disassembly of T-BOX

2.4 INSTALLATION OF LINES

Some general points are given below and apply to all types of line.

The cable must not be positioned close to electric power devices which could cause harmful electromagnetic interference. Such noise sources are:

- Electric lighting systems (neon lights in particular)
- Energy generators and distributors, such as transformers and alternators
- Air conditioner motors, elevators and large fans
- Radio and TV transmitters
- Signal generators, communications and safety systems.

Another factor influencing line noise level is the distance the line runs parallel to the noise source.

The table below gives the minimum distance the line is to be kept from the noise source in relation to the distance they run parallel.

IN PARALLEL	MINIMUM DISTANCE BETWEEN LINE CABLE AND NOISE SOURCE
from 0 to 100 m	10 cm
over 100 m	0.30 - 0.50 m

Note: When a line cable and an a.c. cable cross over, they must be kept 15 cms. apart.

The line must also be guaranteed adequate mechanical protection in the more exposed zones of the installation, such as particularly busy passageways. Here, the use of cable ducts is strongly recommended.

2.4.1 ETHERNET LOCAL NETWORK

The Ethernet local network uses a co-axial cable with characteristic impedance of 50 Ohm to link the systems (nodes) by way of transceivers. The main considerations for network configuration are:

- Co-axial cable segments must not exceed 500 metres in length and must have a terminator resistor of 50 Ohm, or the same as the characteristic line impedance.

- Up to 100 nodes, a minimum of 2.5 metres apart, can be connected on any one cable segment.
  As seen in figure, systems are conected to the network by a receive/ transmit cable and a transceiver supplied with cable.

- Repeaters are used to interconnect Ethernet segments.
  There may not be more than two repeaters between any two nodes. A repeater has to be connected to a transceiver (node position) on both segments it connects and, by regulation, it must have local a.c. power supply.

- Maximum length of the transceiver cable (from a transceiver to a control unit) is 50 metres.

- The network extends to a maximum of 2800 metres, as outlined below:

  . Five 500 metre segments (total: 2500 metres)

  . 100 metres per repeater (2 repeaters = 200 metres)

  . 50 metres per system (2 machines in end positions = 100 metres)

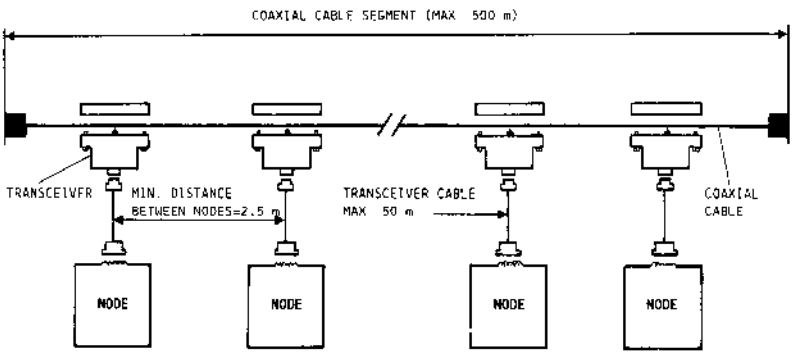
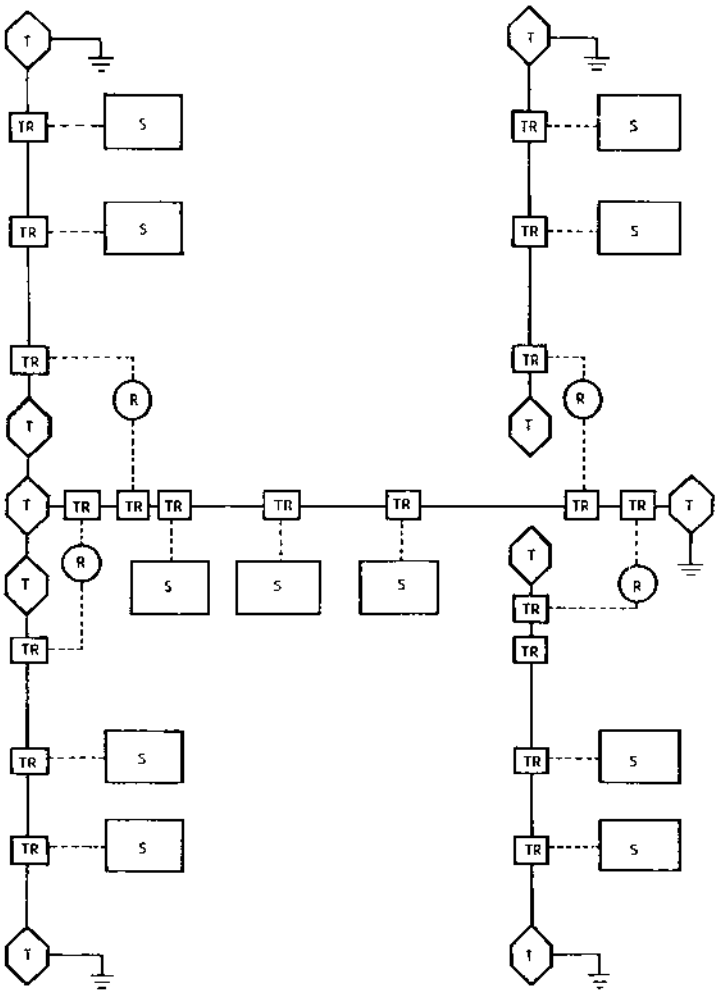


Fig. 2-27 Ethernet Segment Configuration



KEY: R = Repeater
S = System (node)
T = Terminator
TR = Transceiver

Fig. 2-28 Ethernet Network Extended Configuration

2.4.2 STARLAN LOCAL AREA NETWORK

In Olivetti systems the local area networks are being utilized more frquently. By using a Local area network the hardware already installed can be used in a more efficient way.

In the following paragraphs the main characteristics and installation standards of the Starlan LAN.

The Starlan is used on the low cost and medium range Olivetti products. The Starlan can be used to connect a number of PCs and also mini computers used as servers.

The most important characteristics of the Starlan is the possibility to carry out prewiring of a complex building of the Starlan cable at reduced price, and control with simple operations on a connection matrix, the location of the systems on the network or multiple starlan networks.

The main characteristics are:

- Transmission speed : 1 Mbit/s
- Topology:
  - . Star with Hub at the center
  - . Single segments of up to 250 meters
  - . Possibility to have up to 5 HUB levels
  - . Maximum circular area covered is 960 meters.
- Maximum number of connections: not more than 1000
- Transmission technology: low band
- Access method: CSMA/CD standard IEEE 802.3.

A Starlan Network is made up mainly of the following hardware elements:

- Starlan board
- C-BOX: interface between board and network (only for minicomputers)
- Cable: double telephone socket (AGW 22/24/26)
- Hub: 6 or 12 ports network connection box.

6 or 12 ports network connection box

The connection box serves to connect together a maximum of 6 or 12 nodes of the local network.

In the figure below shows a 12 port Hub view.

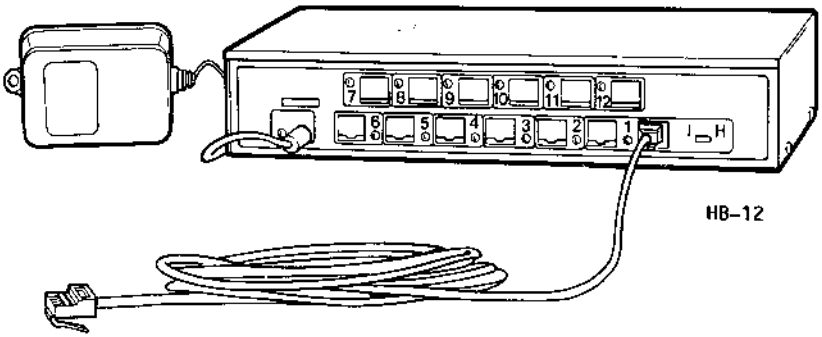


Fig. 2-29 12 Port Hub

The box can be used as a header Hub or as a intermediate Hub. These Hubs can be connected in cascade up to a maximum of two levels for the six port box and a maximum of five levels for the 12 port box.

The operation of the 6 or 12 port box is that to receive the signals from the inferior nodes and provides their timing and retransmit them without amplitude amplification.

In the following figure an example of a local network with more than one Hub and computer (computer stands for a personal or mini computer).

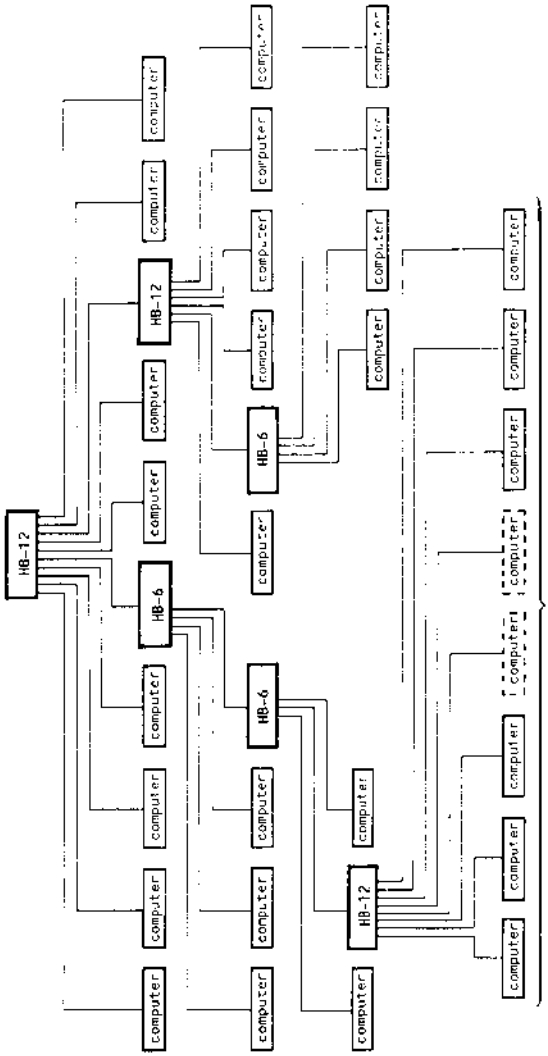


Fig. 2-30 Local Network with Four Level Hub

3. POWER SUPPLY

3.1 GENERAL

The power supply system is made up of one power supply providing both main DC power and peripheral power.
The a.c. distribution diagrams, information on the power unit diagrams illustrating interconnection between power units and back planes and absorption figures for the hardware modules will be given.

The power supply units is the LS24 with a power of 240W.

An Uninterruptable Power Supply (UPS) device is present on the power supply unit. *1st Optional*

Current characteristics for the power unit are given in the table below:

POWER SUPPLY UNIT	POWER (watt)	ABSORPTION (Amps) + 5 V	+12 V	-12 V
LS24	240	~~25.5~~ 32	~~4,3~~ 9	~~0.7~~ 1

3.2 SYSTEM POWER

3.2.1 A.C. POWER DISTRIBUTION

The distribution of a.c. power is illustrated in the diagram below.

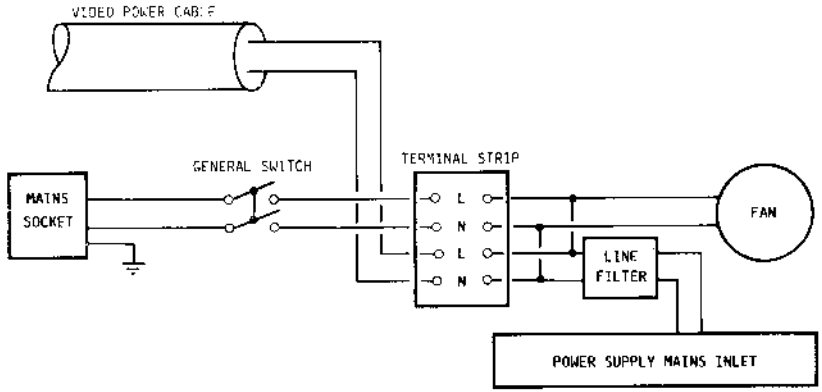


Fig. 3-1 A.C. Power Distribution

3.2.2 BACK PLANE IN062 VOLTAGES

The figure below shows the back plane and the voltages on the connectors.

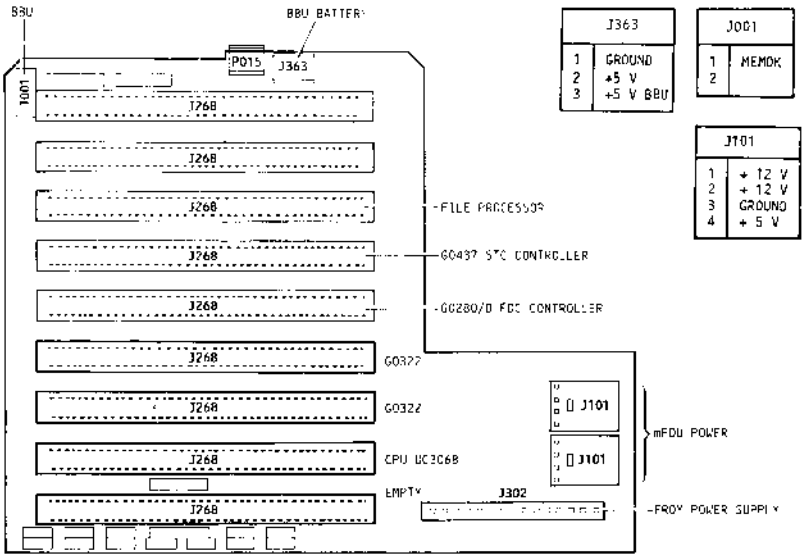


Fig. 3-2 Back Plane IN062

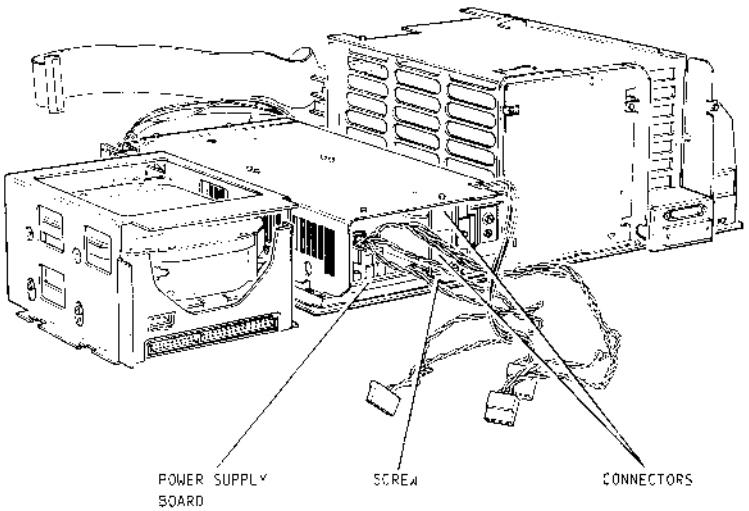
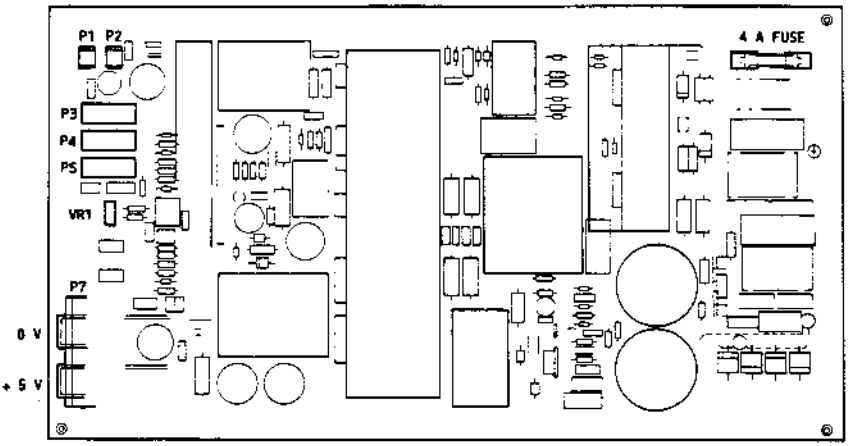


Fig. 3-3 Side View

3.2.3 POWER SUPPLY UNIT LS24



P1, P2	
1	-12 V
2	RESET

NOT USED

P3, P4, P5	
1	+12 V
2	GROUND
3	GROUND
4	+5 V

MFD, STU, HDU SUPPLY UNIT

P7	
1	RESET
2	GATE
3	-12 V
4	+12 V
5	Z
6	Z
7	Z
9	Z
10	Z
11	Z
12	Z

TERMINAL STRIP CONNECTOR

J038	
1	MASSA
2	RESET
3	POWER FAIL
4	+5 V

BBU

VOLTAGE ADAPTER JACK:

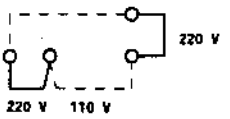


Fig. 3-4 Picture of the LS24 power supply board and connectors

Note:
- The +5 V voltage has a tolerance of ±2%.
- The ±12 V and +5 V voltages should not require regulation. If necessary however then can be measured and regulated by means potentiometer VR1.
- The heat sensor is supplied via the Clickson connector.

3.3 ABSORPTION OF THE HARDWARE MODULES

Absorption of the hardware modules used in LSX 3010 system is illustrated in the table below.

MODULE DESCRIPTION	ABSORPTION (amps) + 5 V	+12 V	-12 V	POWER (watt)	NOTES
Central Unit UC3068	4.50	0.032	0.032		
2 MB memory RA077D	2.50 1.20			12.50 6.00	selected stand-by
4 MB Memory RA077C	2.50 1.20			12.50 6.00	selected stand-by
6 MB Memory RA077B	2.50 1.20			12.50 6.00	selected stand-by
8 MB Memory RA077A	2.50 1.20			12.50 6.00	selected stand-by
Encryption control G0257/E	1.85	0.10		10.45	
V24+V24 line Cont. G0236	2.74	0.12	0.1	16.34	
Ethernet Control G0212/A	2.10	0.50		16.50	
Multiplexer Control G0322	2.32	0.15	0.05	14.00	
1 MB mFDU	0.55	1.25		17.75	
40 MB HDU (SCSI interface)	1.45	1.53		24.00	
80 MB HDU (SCSI interface)	1.45	1.53		24.00	
140 MB HDU (SCSI interface	2.00	3.30		37.50	
ESDI interface controller	2.70			13.50	
70 MB HDU (ESDI interface)					
140 MB HDU (ESDI interface	0.90	2.40		33.30	
315 MB HDU (ESDI interface	1.80	2.20		35.00	

>>>

>>>

MODULE DESCRIPTION	ABSORPTION (amps) + 5 V	+12 V	-12 V	POWER (watt)	NOTES
ST506 interface controller	3.30			16.50	
20 MB HDU (ST506 interface	0.60	1.65		22.80	
40 MB HDU (ST506 interface	0.90	2.40		33.30	
65 MB HDU (ST506 interface	0.90	2.40		33.30	
45/60 MB STC (drive)	0.60	1.70		23.40	
STC Controller	4.30			21.50	
Multifunctional keyboard	0.40	0.05		2.60	
Pin pad PIN 1440	0.35	0.05		2.35	
Badge reader MBR 1932	0.10			0.50	
Badge reader MRW 1810	0.10			0.50	

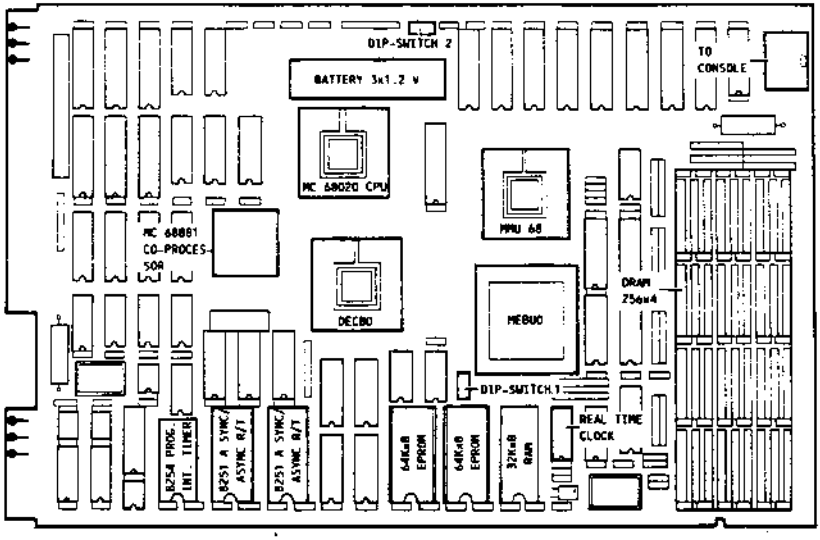
Note: - Current figures shown allow for a tolerance of ±20 %
- Power figures given are for d.c. voltages
- A.C. power can be obtained by multiplying the corresponding d.c. figure by 1.42

4.1 HARDWARE MODULES

The hardware modules discussed in this chapter are listed below:

HARDWARE MODULE DESCRIPTION	MODULE NAME
Central unit	UC3068
RAM: with ECC 2 - 4 - 6 - 8 MByte	RA077 D-C-B-A
Encryption controller	G0257/E
Multiplexer controller	G0322
File Processor	G0458
MFDU controller	G0280/D
ST506 interface controller	G0363
ESDI interface controller	G0404/G0405
STC controller (FORST)	G0437
V24 + V24 intelligent line controller	G0331
Ethernet internal line controller	G0212/A
Starlan (dumb) line controller (MOS)	G0431
Starlan/Ethernet (intelligent) line cont. (UNIX)	G0435

Central Unit UC3068



Characteristics:

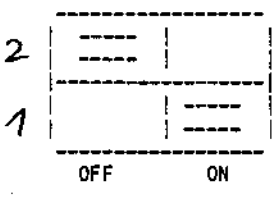
- MC 68020 microprocessor operating with 16 or 20 MHz clock
- MC 68881 Co-processor
- MMU 68 for memory handling

- Two EPROMs (2 x 64 KB) Intel 27512 containing the autodiagnostic and IPL
- EAROM (32 KB static RAM) for the unbundling feature and installation of the line parameters
- DRAM (256 x 4) total of 4 MB
- Two 8251A - Universal asynchronous receive-transmit UART One for the telediagnostics and the other for the ROM debugger
- 8254 TIMER for the baud rate generator fo the UART and system clock
- Real time clock MM58Z74
- MEBUO - Memory contoller includes addressing, control and interface logic
- DECBO - Decoding and control module.

DIP Switch configuration

Two double DIP switches are hosted by the CPU. The position on the board and their meaning are the following:

DIP-Switch 1 NOS.LO

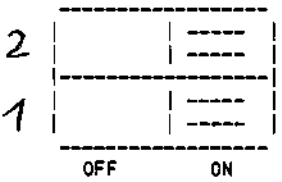


IN010 OFF : Disables the diagnostic loop test

BUS32 ON : Disables the long word transfer on the Olibus

(RA07 + RA06 = 16bit)

DIP-Switch 2 Q01.3H



PILIP ON : Enable the battery back-up for real time clock and non-volatile RAM

4.1.2 RAM MEMORY BOARDS

2 MB, 4 MB, 6 MB and 8 MB Memory boards (1 MB x 1 bit) with ECC

The four storage memory boards RA077/D,/C,/B,/A differ only in the number of RAM chips mounted. The figure below is of the RA077/D. The other boards have more memory banks.

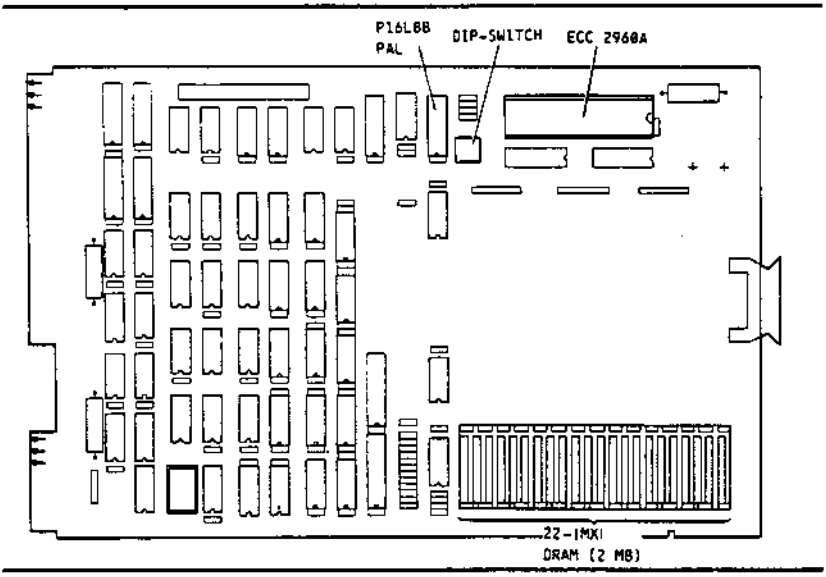


Fig. 4-1 2 MByte Memory Board - RA077/D

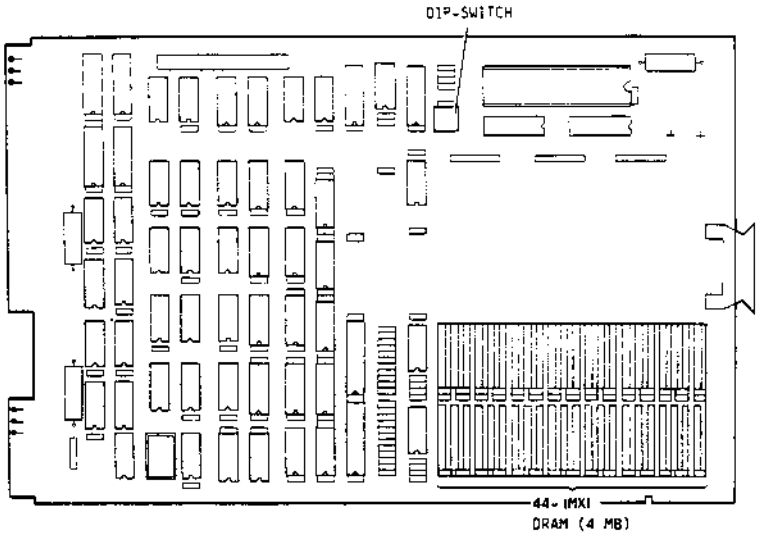


Fig. 4-2 4 MByte Memory Board - RAD77/C

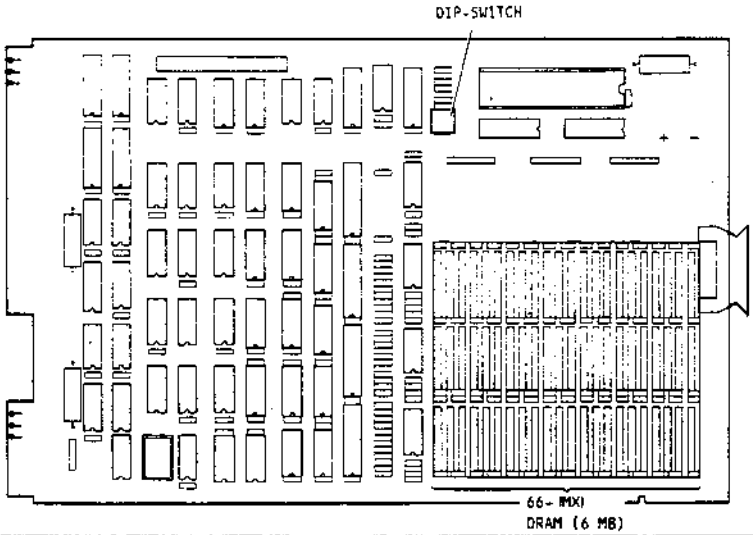


Fig. 4-3 6 MByte Memory Board - RAD77/B

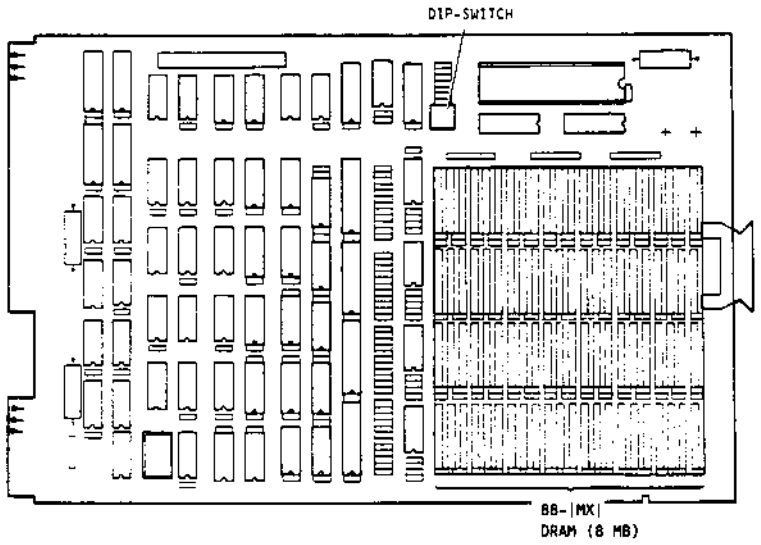


Fig. 4-4 8 MByte Memory Board - RA077/A

Settings Dip-switches

The following table shows the dip-switch configuration used to set the memory boards RA077/A/B/C/D to their starting address.

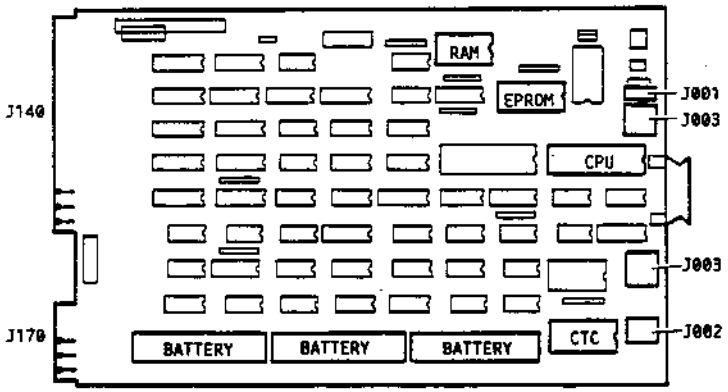
START ADDRESS	JUMPERS 1	2	3	4
000000	C	C	C	C
200000	A	C	C	C
400000	C	A	C	C
600000	A	A	C	C
800000	C	C	A	C
A00000	A	C	A	C
C00000	C	A	A	C
E00000	A	A	A	C

— ab Bei UC03068

Note: The UC3068 central units mount a memory of 4 MByte; therefore, the first free address for the expansion memory board is 600000 hex.

4.1.3 ENCRYPTION CONTROLLER G0257/E

Board G0257/E layout



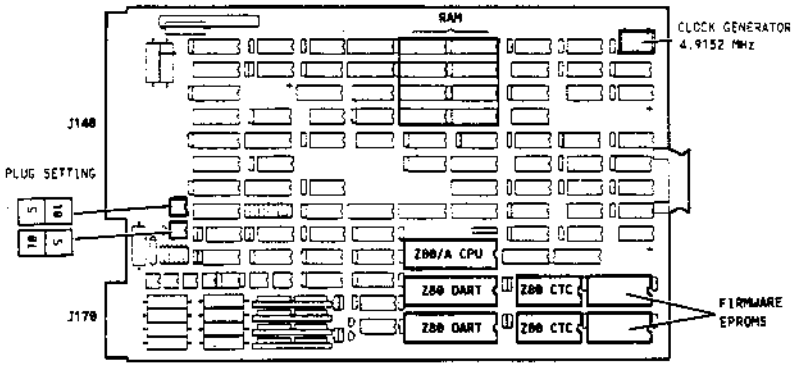
Note: - J01: +5 V power supply connector for ASD module connection
- J02: Customer safety jumper
- J03: Connector for line and ASD module connection

Main Components

- Z80/0 Microprocessor
- Z80/0 Counter Timer Controller (CTC)
- 2K x 8 Dual-Port RAM
- 2K x 8 battery-powered RAM
- 8K x 8 ROM

4.1.4 MULTIPLEXER CONTROLLER: G0322

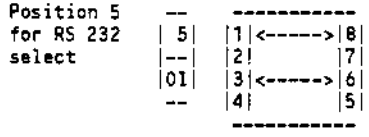
The G0322 is an intelligent controller, used as interface between the system and workstation, and based on the ELB 3684. The 4 board channels are not connected directly to the ELB but via a distribution box D-BOX.

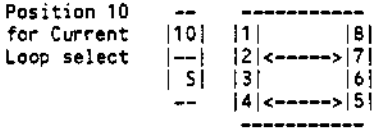


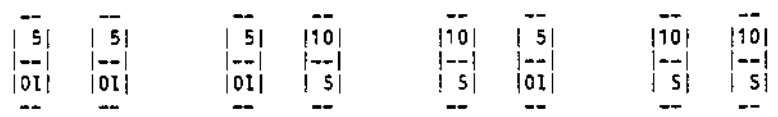
Main Components

- Z80/A Microprocessor
- Z80 Counter Timer Controller (CTC)
- Z80 Dual Asynchronous Receive Transmit (DART)
- 4.9152 MHz clock generator
- 2 - Firmware EPROM sockets

The GO 322 jumper connections made by way of 5|10 plugs and illustrated below must be taken into account in connecting peripherals or the ELB 3684 to the D-BOX:







Channel 1 = RS 232	Channel 1 = RS 232	Channel 1 = C.L.	Channel 1 = C.L.
Channel 2 = C.L.	Channel 2 = C.L.	Channel 2 = C.L.	Channel 2 = C.L.
Channel 3 = RS 232	Channel 3 = C.L.	Channel 3 = RS 232	Channel 3 = C.L.
Channel 4 = C.L.	Channel 4 = C.L.	Channel 4 = C.L.	Channel 4 = C.L.

4.1.5 FILE PROCESSOR: G0458

The file processor unit contains a minifloppy disk controller, a streaming tape controller and a SCSI bus interface adapter, the latter used to interface hard disk drives.

The fileprocessor provides high performance DMA channels between system memory and peripherals.

The local processor contributes to overall system performance off-loading the central processing unit.

The file processor external interfaces comply with the following industry standards:

- Minifloppy Disk
  . SA450

- Streaming Tape Unit
  . QIC-36 (drive level interface)
  . QIC-24 and QIC-24 Olivetti modified (data and recording format)

- SCSI
  . ANSI X3T9.2

Main Components

- 80186 Microprocessor
- FPDMA File Processor Direct Memory Access
- FPARB File Processor Arbitor
- 32 K x 8 RAM
- 32 K x 8 EPROM
- FORST Streaming Tape Unit Gate Array
- WD33C93 SCSI Bus Interface Controller
- WD37C65 Floppy Disk Controller.

Dip Switch and Jumpers

The File Processor board presents two dip switch and a jumper (with important functions), which are used respectively for:

Dip Switch 1

Determines the identification number (ID) of the F.P. board. The position of the micro switch and the ID number, is shown in the following table:

ID NUMBER	MICRO SWITCH 1	2	3	4	
0	O	O	O	O	
1	C	O	O	O	
2	O	C	O	O	
3	C	C	O	O	
4	O	O	C	O	
5	C	O	C	O	
6	O	C	C	O	
7	C	C	C	O	
	X	X	X	C	<-- This combination is used to execute the cyclic autodiagnostics.

Dip Switch 2

Determines some software functions as illustrated in the tabel.

MICRO SWITCH 1	2	DESCRIPTION
O	O	DMA Transfer 16 bit parallelism
C	O	DMA Transfer 32 bit parallelism
O	C	DMA Transfer decided via Firmware
C	C	NOT USED

Jumper 1

The jumper in question has the operation to feed, via the connecting cables, terminators of the last peripheral of the SCSI configuration that is autofed. If this is not possible the File Processor could not figure out the end of this configuration.
The normal condition of the jumper is open.

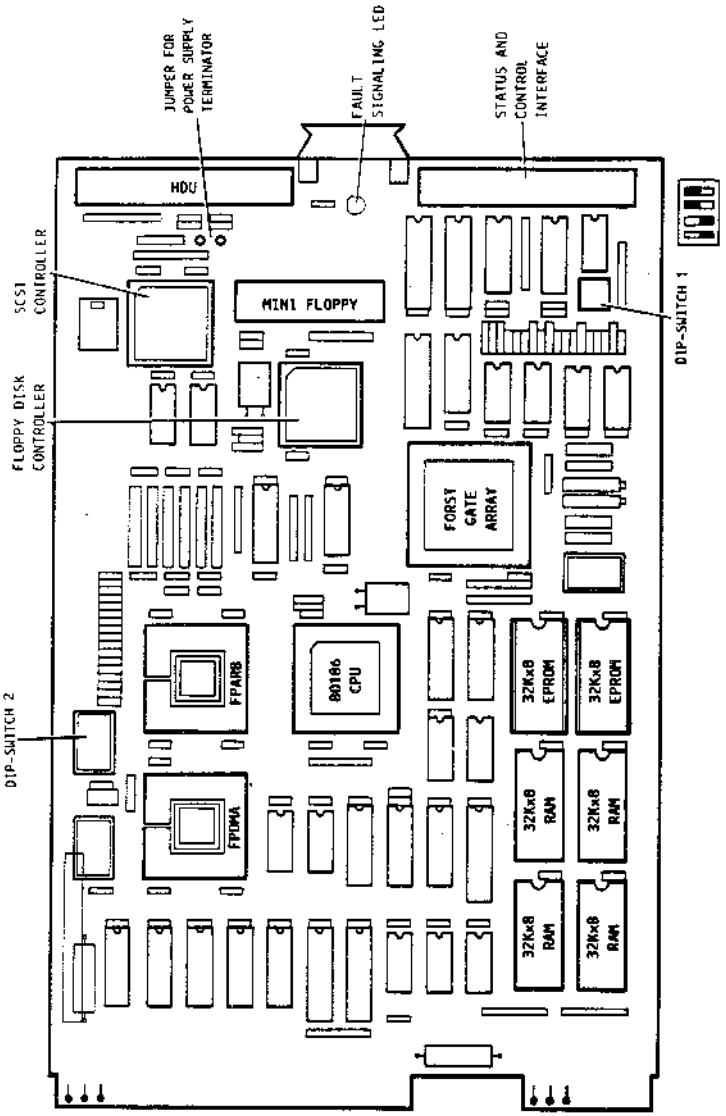
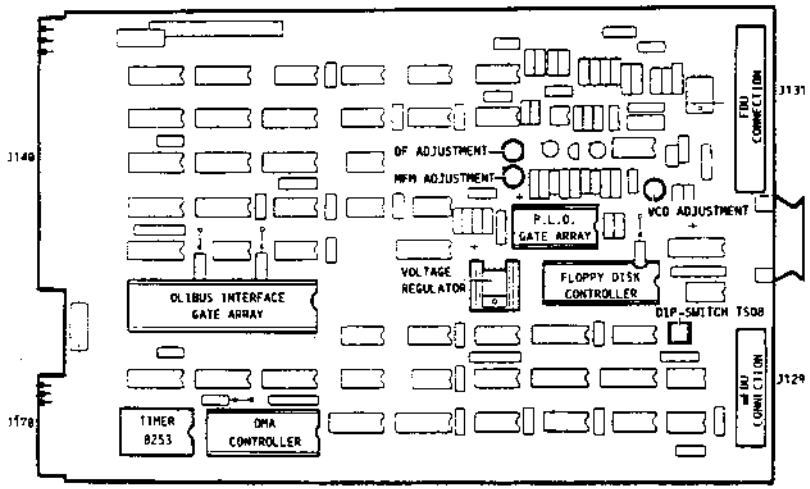


Fig. 4-5 File Processor Board Layout and Component Location

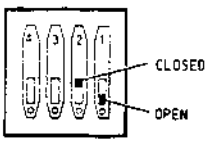
4.1.6 1 MB mFDU CONTROLLER: G0280D

This controller can handle up to four 1 MB floppy or minifloppy disk units. The board structure is based on the NEC Floppy Disk Controller PD765. The type of unit connected is defined through the DIP-switch TS08 (in board position G10).



TS08 DIP-switch configuration

SETTING				SIGNIFICANCE
4	3	2	1	
0	0	0	C	1 MB Floppy
0	0	C	C	1 MB Minifloppy

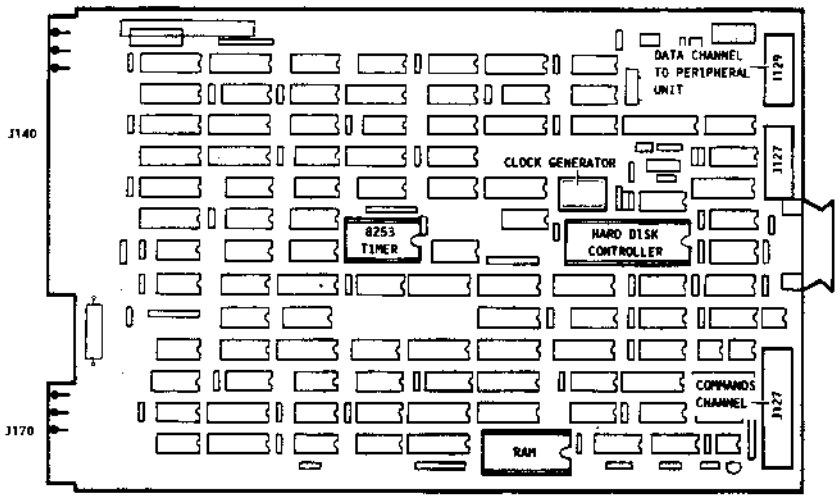


Note: From the above, it will be seen that the same controller cannot simultaneously support configurations with floppy and minifloppy units.

4.1.7 ST506 INTERFACE HDU CONTROLLER: G0363

Unlike other hard disk unit controllers, this is a single board controller. It can control two peripherals with ST506 interface.
It requires no settings as it recognises the type of peripheral connected by reading the relative data on the disk track 0.

The power supply unit mounted (L524) can supply all the voltages the peripheral unit needs.



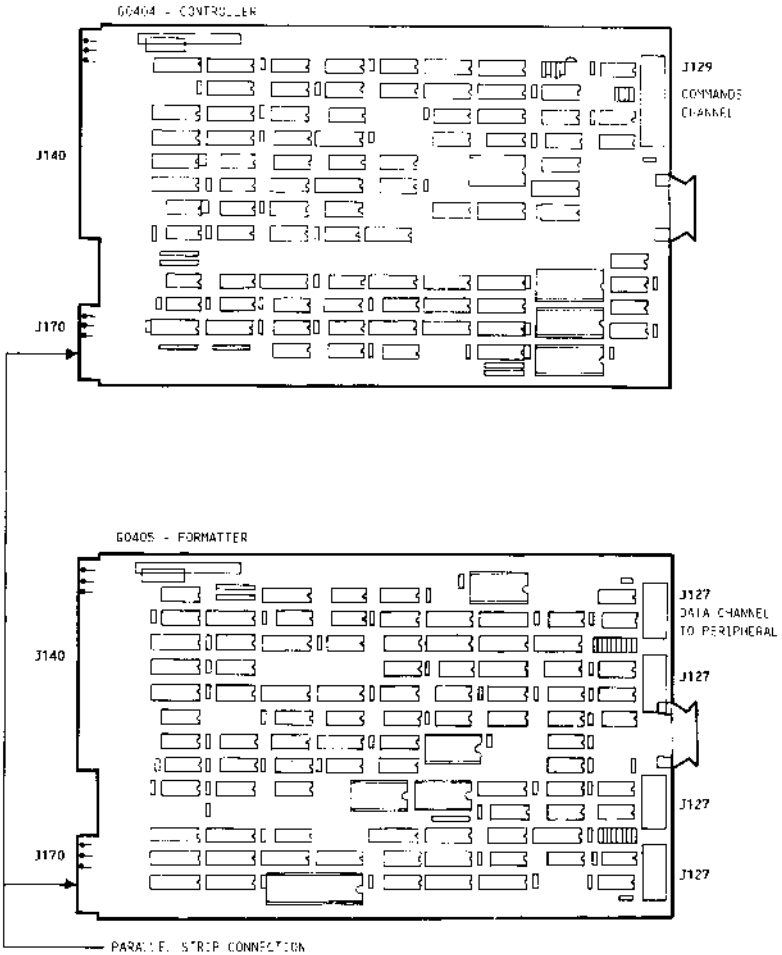
Characteristics:

- Hard disk controller PD 7261
- Programmable timer 8253
- 8K x 8 CMOS RAM
- Clock generator: 20 MHz quartz.

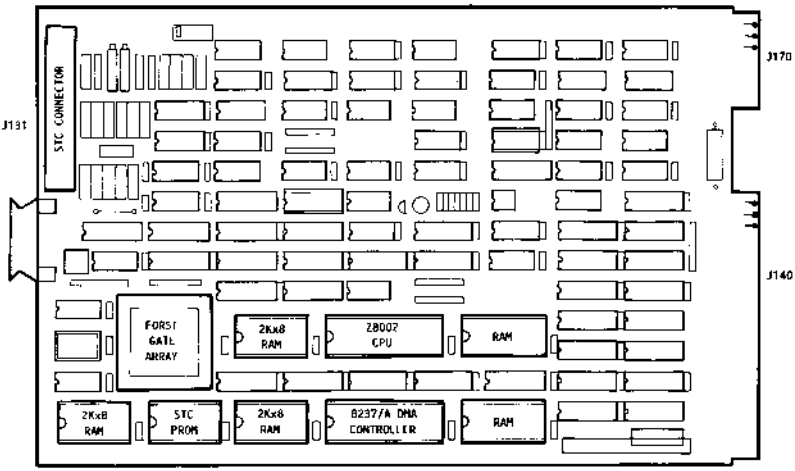
4.1.8 HDU ESDI INTERFACE CONTROLLER

The ESDI interface controller does not require any jumper settings; all that is needed is to connect connector J170 of the controller (board G0404) to connector J170 of the formatter (board G0405) through the connection plate (on the rear of the BACK-PLANE).

Interconnection between controller and peripherals



4.1.9 45/60 MB STREAMING TAPE UNIT CONTROLLER G0437



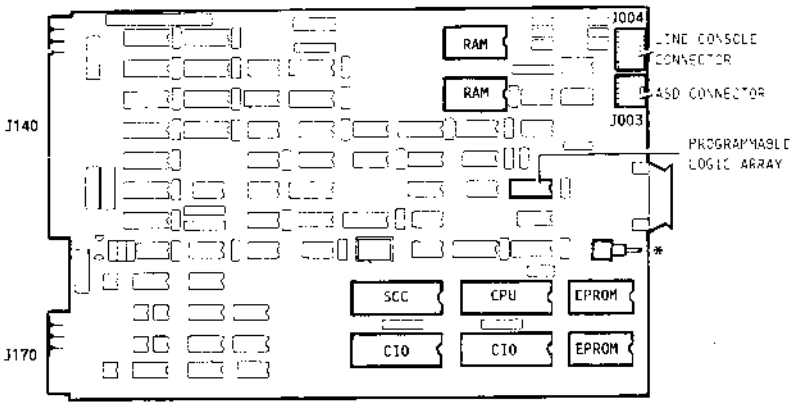
DIP-switch TS08 in position must be set as follows:

4	3	2	1	SIGNIFICANCE
0	C	C	C	Peripheral connected STC 45-60
X	X	X	X	For future use

Main Components

- Z8002 Microprocessor
- FORST Streaming Tape Unit gate array
- 6116P-4 2K x 8 RAM
- 27128 or 27256 16K x 8 or 32K x 8 RAM
- 6341 STC PROM
- 8237/A DMA controller

4.1.10 V24 + V24 INTELLIGENT LINE CONTROLLER: 60331



*Switch for selection of the remote switch-on signals:

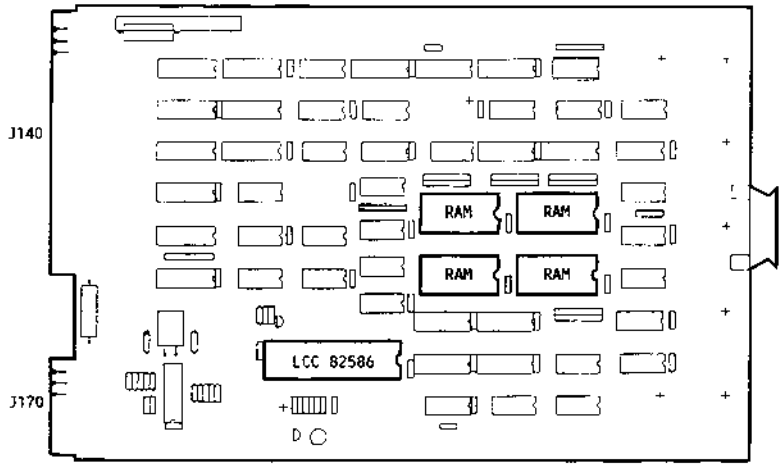
- RING INDICATOR
- NEUTRAL
- DATA CARRIER DETECTOR

Connector J170 is connected to the modem.

Characteristics:

- Two RS232 channels, V24 interface, for remote internal or external lines
- Z8002 microprocessor
- Self-diagnostic feature
- 32 KB ROM to handle lines
- 16 KB RAM to exchange data and parameters
- Character oriented, SDLC, HDLC protocols.

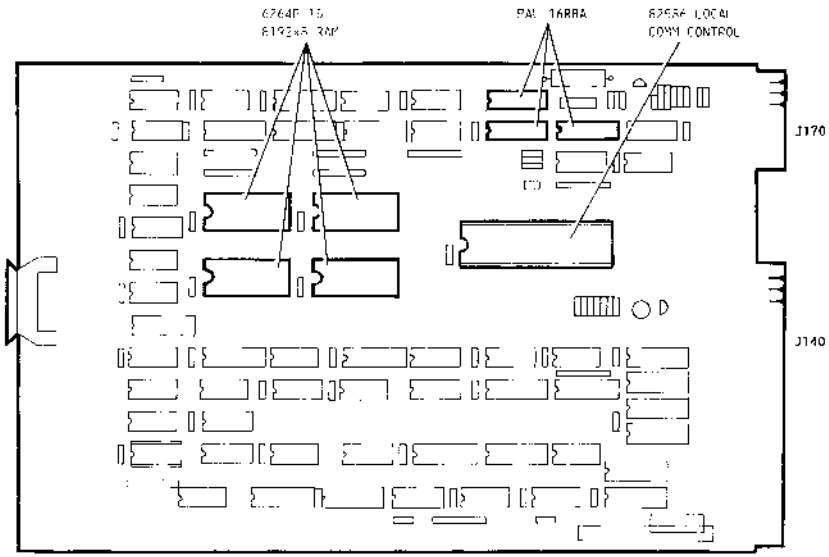
4.1.11 ETHERNET INTERNAL LINE CONTROLLER: GD212/A



Characteristics:

- INTEL kit: 82585 and 82501
- 32 KB Dual-Port memory
- Internal line protocol based on ETHERNET recommendations
- Transfer speed: 10M bps
- CSMA/CD channel control
- Manchester code.

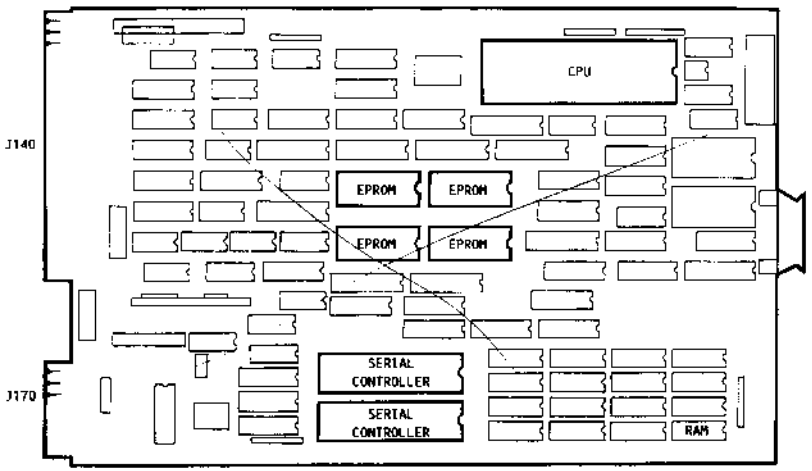
4.1.12 STARLAN (DUMB) LINE CONTROLLER (MOS): 60431



Main Components

- 82586 Local communiction controller
- 4 - 6264P-15 8K x 8 RAM
- PAL 16R8A.

4.1.13 STARLAN/ETHERNET (INTELLIGENT) LINE CONTROLLER (UNIX): G0435



Main Components

- 68000 Microprocessor with an 8 MHz clock
- 64 K byte EPROM
- 512 K byte internal RAM (DRAM)
- Two serial controllers 82520 or Z853.

Jumper bei W5 - W6

5. MAGNETIC PERIPHERALS

5.1 LIST OF PERIPHERAL UNITS

The following is a complete list of the magnetic peripheral units which can be used on the LSX 3010 system. The LSX 3010 can house up to three magnetic peripherals chosen from the ones listed below.

PERIPHERAL TYPE	INTERFACE	NAME	MANUFACTURER
1 Mbyte slim minifloppy	SA450	ND08-DE	TOSHIBA
40 MByte HDU	SCSI	Q250	QUANTUM
80 MByte HDU	SCSI	Q280	QUANTUM
140 MByte HDU	SCSI	1375	MICROPOLIS
315 MByte HDU	SCSI	738	PRIAM
70 MByte HDU	ESDI	1353 2244	MICROPOLIS FUJITSU
140 MByte HDU	ESDI	1355 2246	MICROPOLIS FUJITSU
315 MByte HDU	ESDI	638 .	PRIAM
20 MByte HDU	ST506	XM5221/2	OPE
40 MByte HDU	ST506	1323/A 94155-57	MICROPOLIS CDC
65 MByte HDU	ST506	1325 94155-86	MICROPOLIS CDC
45/60 MByte STC	QIC-36	5945/C	ARCHIVE

5.2 CONFIGURATION RESTRICTIONS AND LIMITATIONS

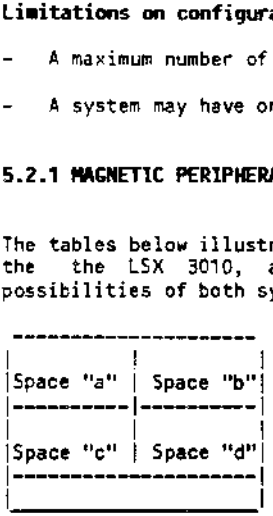
A maximum of four peripherals, 5 1/4" floppy or 40 MB, 80 MB, 140 MB hard disk or 45/60 MB streming tape units are allowed on the system. No external magnetic peripherals are allowed.

Limitations on configurations

- A maximum number of two 5 and 1/4" floppy can be mounted.
- A system may have one STC unit only

5.2.1 MAGNETIC PERIPHERAL CONFIGURATIONS POSSIBLE

The tables below illustrate the spaces for the magnetic peripherals on the the LSX 3010, all configurations possible and the upgrading possibilities of both systems.



LSX 3010 spaces

Configurations

CONFIG.	Space "a"	Space "b"	Space "c"	Space "d"
1	1 mFD	-	-	
2	1 mFD	1 mFD	-	
3	1 mFD	1 HDU	-	
4	-	1 HDU	1 STC	
5	1 mFD	1 HDU	1 STC	
6	1 mFD	1 HDU	-	1 HDU
7	1 mFD	1 HDU	1 STC	1 HDU

Note: Configurations with two mFD units with different factors are not possible.

The peripheral units will be described one by one in the next section, with the information required for installation and service of each.

5.2.2 SLIM MINIFLOPPY UNITS

The mFD magnetic units in the system are mounted in the top part of the support structure for peripheral units If only one removable peripheral is to be housed in the unit, there is a front cover to disguise the vacant space. The minifloppy disk is controlled by two types of controllers, the first is the G0 280D used on the LSX 3005 and the second is the File processor board used on the LSX 3010 this controls all the magnetic peripherals. The connection figure of the latter is shown further on in this chapter.

If the second mini-floppy drive is used, the signals/data flat cable must be daisy chain connected; the double driver must be configured as second driver by removing the jumper in D1 and inserting jumper D2 (see figure below).
For the assembly and disassembly of the unit refer to chapter 2.

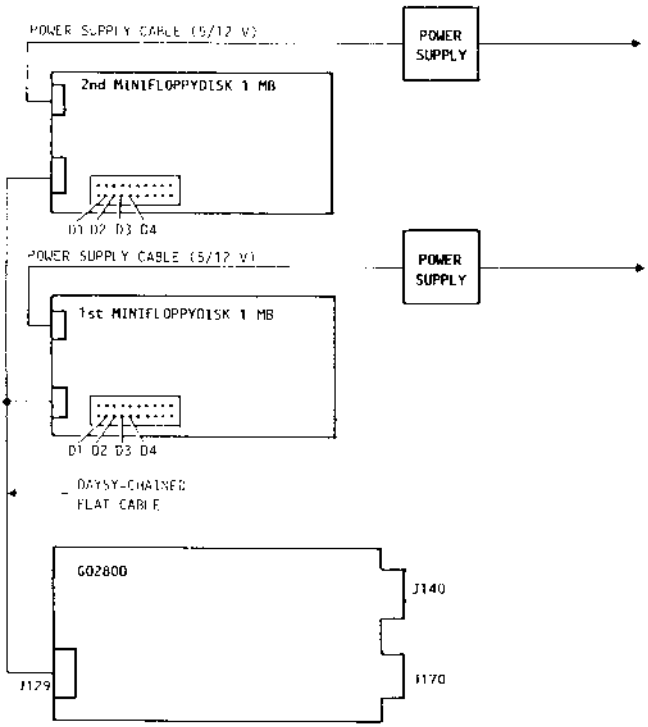


Fig. 5-1 Minifloppy Disk Drive Interconnections with G0 280D

5.2.3 45/60 MB STREAMING TAPE UNITS

The STU is mounted below the minifloppy disk drive when both of them are present. The STU same as for the floppy disk drive has two controllers, one is the G0 437 used on the LSX 3005 and the other is the File Processor board, used on the LSX 3010. For assembly and disassembly see chapter 2.

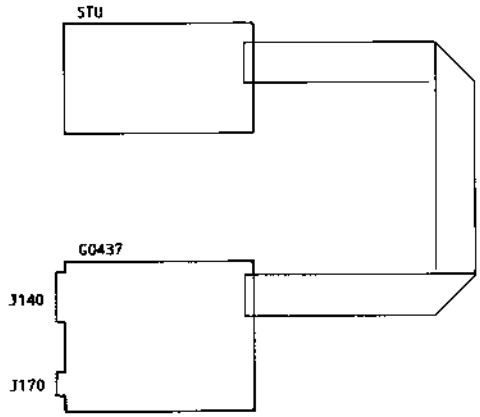


Fig. 5-2 Streaming Tape Unit Interconnections with G0 437

5.2.4 HARD DISK UNITS

The Hard disk drive unit is mounted on the right side of the module, two types of HDU can be mounted, slim or full size, if the full size is installed than the machine cannot house a second one. The interconnection of the Hard disks are the same the only difference is in the jumper setting present on the individual disks. There are three types of controllers for the hard disk units, these are the ESDI and ST506 used on the LSX 3005 and the File processor board used on the LSX 3010 using SCSI interface.

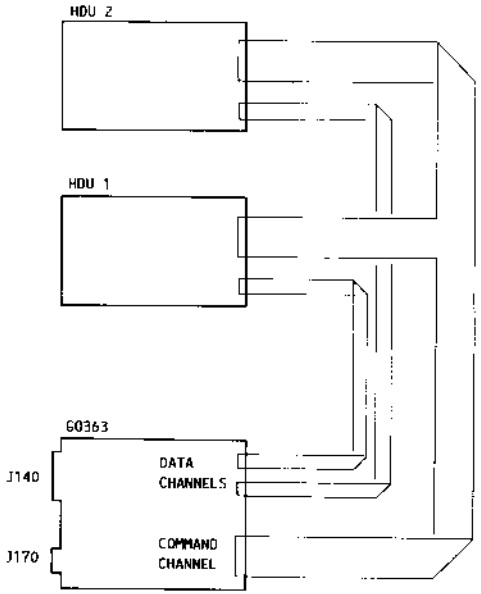


Fig. 5-3 Hard Disk Drive Interconnections - ST506

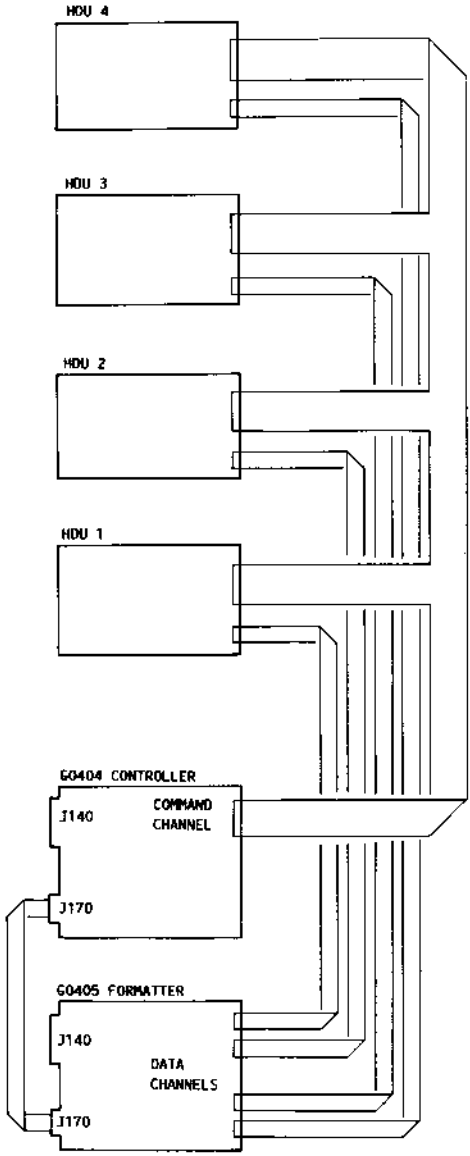


Fig. 5-4 Hard Disk Drive Interconnections - ESDI

5.2.5 ESDI HARD DISK DRIVE UNITS

Some of the hard disk units which can be mounted are:

- MICROPOLIS HDU 70, 140 MByte
- FUJITSU HDU 70, 140 MByte

The following figures illustrate the connectors and setting jumpers of the MICROPOLIS and FUJITSU hard disk units respectively.

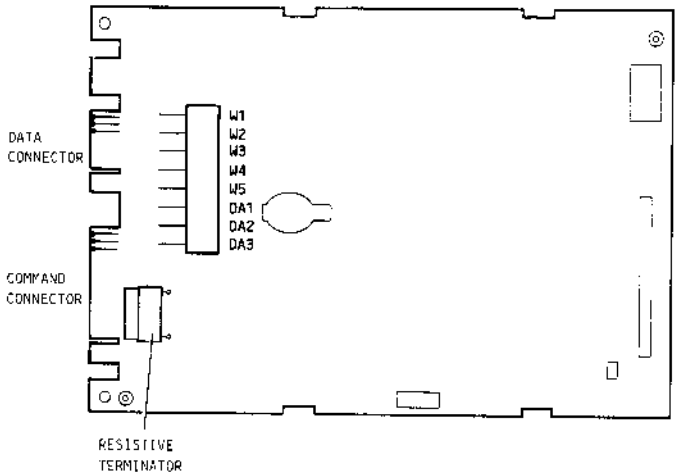


Fig. 5-5 MICROPOLIS 70/140 MByte Hard Disk Unit

The settings of the jumpers of the MICROPOLIS 70/140 MByte unit are shown below:

LOGIC UNIT	JUMPERS DA3	DA2	DA1
1	OFF	OFF	ON
2	OFF	ON	OFF
3	OFF	ON	ON
4	ON	OFF	OFF

The remaining jumpers W1, W2, W3, W4 and W5 must be left open. In addition, each peripheral must have the terminator resistor pack installed.

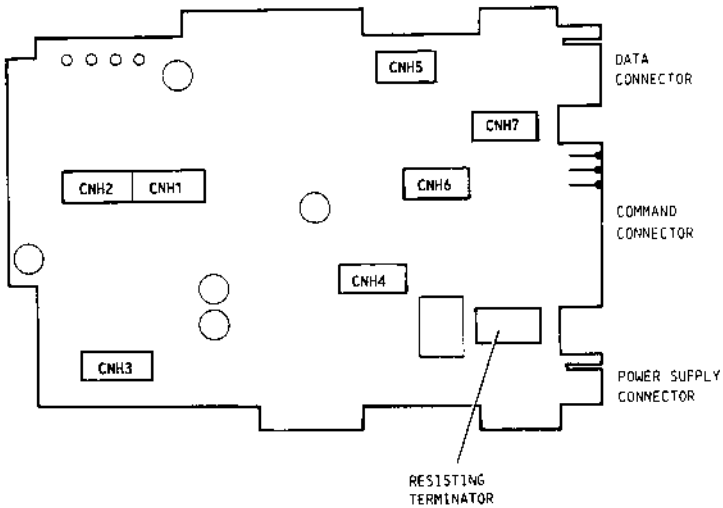


Fig. 5-6 FUJITSU 70/140 MByte Hard Disk Unit

The jumper settings of the 70/140 MByte FUJITSU unit are illustrated below:

LOGIC UNIT	CNH 6 JUMPERS							
	P1	P2	P3	P4	P5	P6	P7	P8
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
3	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
4	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF

HDU MODEL	CNH 7 JUMPERS			
	P3	P4	P5	P6
M2244 (70 MB)	OFF	OFF	OFF	OFF
M2246 (140 MB)	ON	ON	OFF	OFF

SECTORS PER TRACK	BYTES PER SECTOR	CNH 7 JUMPERS					
		P7	P8	P9	P10	P11	P12
35	596	ON	ON	OFF	OFF	ON	ON

HARDWARE SYNCHRONIZATION	CNH 7 JUMPERS					
	P13	P14	P15	P16	P17	P18
	OFF	OFF	OFF	OFF	OFF	OFF

In addition, each peripheral must have the terminator resistor pack installed.

From the viewpoint of the connectors, there are no substantial differences between the two peripherals so the diagram below is general diagram of connection of the hard disk peripheral by way of the ESDI interface.

5.2.6 40/80 MB HARD DISK DRIVES SCSI INTERFACE

These HDUs are constructed by Quantum and can be mounted in the system at ambient temperatures (+10 / +40 degrees C) and altitudes of up to 3000 m.

Power Requirements

The following supply values have to be garanteed for this drive.

Nominal voltage/ tolerance	+12 V / ±5%	+5 V / ±5%
Ripple	150 mV max	50 mV max
Absorption (idle)	1.24 A	1.45 A
(seek)	1.53 A	1.45 A
(start up)	4.4 A	1.8 A

Hardware Jumpers

A line of 8 jumpers are present on the actuations board these are indicated as A0, A1, A2 WS, EP, SS, P1 and P2 these specify the following:

A0, A1, A2 = peripheral name (see table)

WS = to leave without shorting plug (motor spindle starts at power on).

EP = install shorting plug (enables parity on SCSI interface).

SS = to leave without shorting plug (disables seek test indefinitely).

P2, P1 = spare, the jumperimg of these has no influence.

Peripheral ID Setting

Jumper Configurations (X - jumper present)

A2	A1	A0	
-	-	-	Number 0
-	-	X	Number 1
-	X	-	Number 2
-	X	X	Number 3
X	-	-	Number 4
X	-	X	Number 5
X	X	-	Number 6
X	X	X	Number 7

The numbers used by the HDU mounted on the LSX 3010/3005 are "6" and "5".

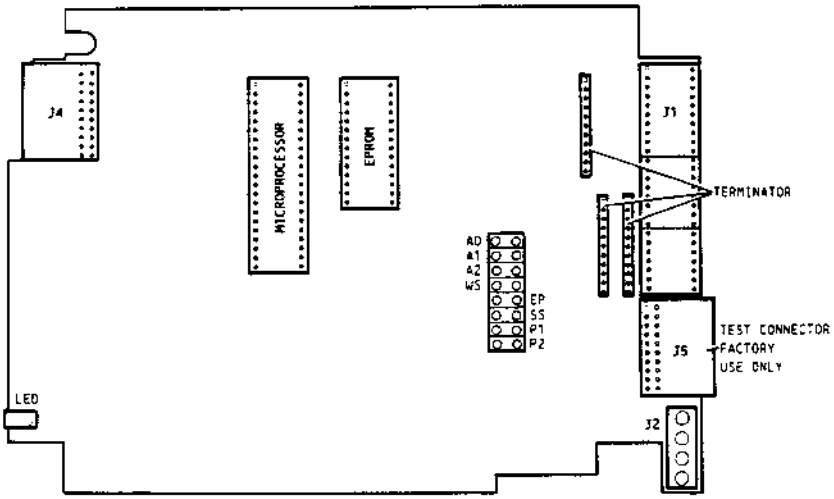


Fig. 5-7 DIP-Switch and Jumpers on the Hard Disk Drive Unit

5.2.7 140 MB HARD DISK DRIVES SCSI INTERFACE

These HDUs are constructed by Micropolis and can be mounted in the system at ambient temperatures (+10 / +40 degrees C) and altitudes of up to 3000 m.

Power Requirements

The following supply values have to be garanteed for this drive.

Nominal voltage/ tolerance	+12 V / ±5%	+5 V / ±5%
Ripple	240 mV max	100 mV max
Absorption (idle)	2.1 A	2 A
(seek)	3.3 A	2 A
(start up)	4.35 A	2 A

Hardware Jumpers

Three SCSI ID jumpers and three interface terminator packs are present on the device electronics board, see figure.

The drive ID jumper settings are shown in the table below:

Jumper Configurations (X - jumper present)

ID2	ID1	ID0	
-	-	-	Number 0
-	-	X	Number 1
-	X	-	Number 2
-	X	X	Number 3
X	-	-	Number 4
X	-	X	Number 5
X	X	-	Number 6
X	X	X	Number 7

The drives are configured with SCSI ID 0 at the factory. The number used by this HDU mounted on the LSX 3010/3005 is "7".

Bus Parity Check Option

A jumper W9 on connector J2 select the parity check option.

When the jumper is installed, the driver neither generates nor detects parity.

When the jumper is not installed (default configuration) the drive generates parity and has parity detection enabled.

Bus Termination Power option

A jumper is installed at W1 or W2 to select the source of terminator power.

When the jumper is installed at W1 (default configuration) the drive provides terminator power.

When the jumper is installed at W2 the terminator power is provided by the host system via interface cable J1.

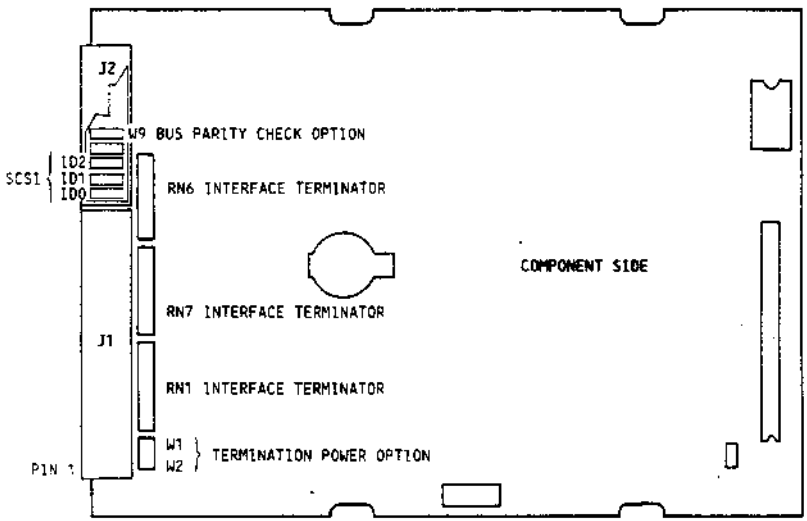


Fig. 5-8 DIP-Switch and Jumpers on the Hard Disk Drive Unit

(PRIAM 638 = ESDI)

5.2.8 315 MB HARD DISK DRIVE SCSI INTERFACE (PRIAM 738)

These HDUs are constructed by Priam and can be mounted in the system at ambient temperatures (+10 / +40 degrees C) and altitudes of up to 3000 m.

Power Requirements

The following supply values have to be garanteed for this drive.

Nominal voltage/ tolerance	+12 V / ±5%	+5 V / ±5%
Ripple	120 mV max	120 mV max
Absorption (idle)	1.7 A	1.8 A
(seek)	2.2 A	1.8 A
(start up)	4.5 A	2.1 A

Hardware Jumpers

DSEL1, DSEL2, DESL3 = peripheral name (see table)

SCINT1, SCINT2 = Sector number selection, leave in this position, SCINT1 = off, SCINT2 = off, for 35 sector number.

SPN OP = to leave in off position, (motor spindle starts at power on).

ASK = to leave in off position (standard interface timeout).

The eight switched is not used and it can be placed in any position as it has no influence.

Peripheral ID Setting

Switch Configurations

DSEL1	DSEL2	DSEL3	
on	off	off	Number 0
off	on	off	Number 1
on	on	off	Number 2
off	off	on	Number 3

Adaty ESDI

All the other configurations possible are not significant.

Switchs 4 and 5 are used for the sector size setting, three physical sector sizes are available, the one used on the LSX system is switch 4 - Off and switch 5 - OFF. For information this is the list of switch settings possible.

6.2.1 NAME UP

ID1	ID2	ID4	
off	off	off	name up = 0
on	off	off	name up = 1
off	on	off	name up = 2
on	on	off	name up = 3
off	off	on	name up = 4
on	off	on	name up = 5
off	on	on	name up = 6
on	off	on	name up = 7

SCSI

6.2.2 INTERFACE TERMINATION

The interface terminator a hybrid dual in-line 24 pin of 220-330 ohm has to be removed from socket J2 only on peripherals connected in tandem to the File Processor and wher the command cable does not terminate.

7. DOCUMENTATION

For the said subsystems the following documentation is expected:

Second level manual

PRIAM 638 ESDI

Cod.02202100 P (ITA) Board Description, Schematics and Components
Cod.02202000 S (ING)

PRIAM 738 SCSI

Cod.02209700 L (ITA) Board Description, Schematics and Components
Cod.02209800 X (ING)

BIT and CDM will have the code of the system utiliser.

6.2 JUMPERS FOR THE SELECTION OF PRIAM 738 SCSI

This HDU has 3 significant jumperson the PCBA interface board (component side) plus a series of another 10 on the interface connector side.

The first three jupers stated above are:

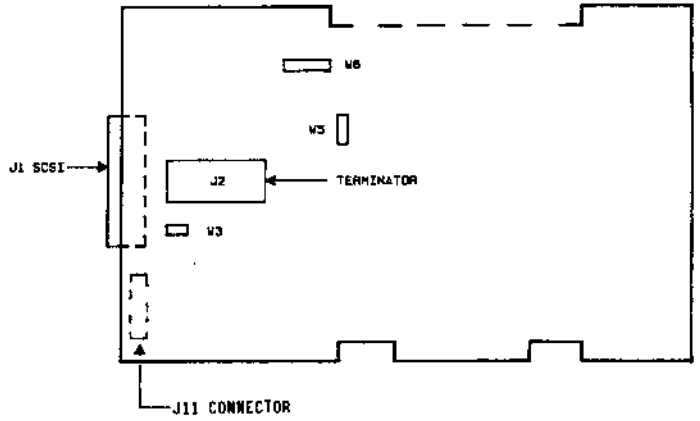


Figure 10 - PCBA SCSI Interface board

W3 :ON	terminators supply
W5 :OFF	start spindle motor power on
W6 :ON	HARD SCSI BUS RESET

The series of 10 jumpers (connettor J11) permit the following settings (OFF means jumper not present):

1-2- 3-4- 5-6-	3 switch selezione device (see table)
7-8- ON	spin up motore on power on
9-10- ON	PARITY ENABLE
11-12- OFF 13-14- ON	512 byte/sector
15-16- OFF 17-18- OFF 19-20- OFF	UNIT ATTENTION ENABLED ENABLE WRITE PROTECT

SCINT1	SCINT2	Physical size in Bytes
off(*)	off	Reserved setting
off	on	64 sectors of 324
on	off	36 sectors of 578
on	on	19 sectors of 1008

(*) Used on system

Interface terminator

The terminators have to be removed or placed accordingly from the socket (position J6).

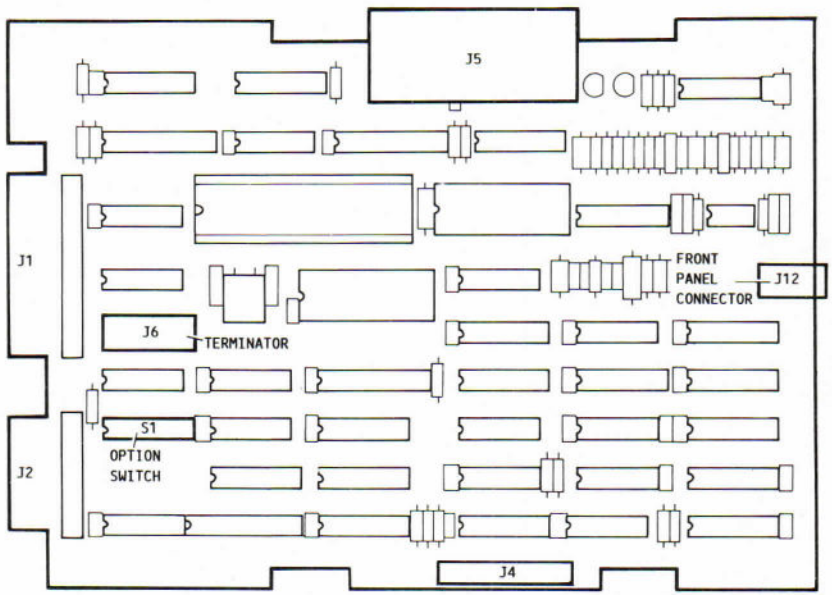
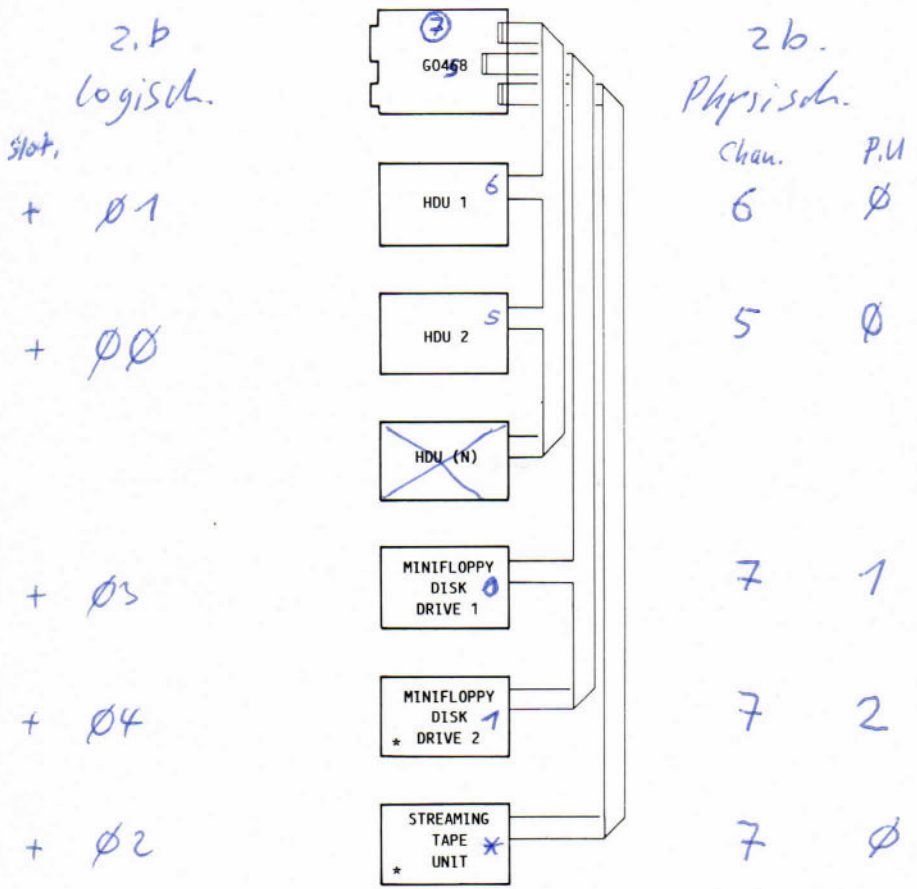


Fig. 5-9 DIP-Switch and Location of the Socket on the Hard Disk Drive Unit

5.3 PERIPHERALS CONNECTION USING THE G0458 FILE PROCESSOR BOARD

As stated in the pages before the LSX 3010 uses one single controller to control all three types of peripherals, this controller can control the following:

- Up to two minifloppy disk drives
- One streaming tape unit
- Up to 56 hard disk drives (in practice this amount is never used).



* THE MFD OR THE STU CAN BE HOUSED IN THE SYSTEM

Fig. 5-10 Peripherals Connection with the G0 458 File Processor Board

6. AUTODIAGNOSTIC AND DIAGNOSTIC

The **autodiagnostic** is resident on cpu rom and is used to check the system ram, system configuration, the initial program loading device and initiate the loading of the customer operating system (OS) or the diagnostic monitor.

The tests are started automatically on power-up and any errors are indicated by a code either on the console or on the video. Fault detection is limited to board level.

The customer operating systems available are in the following environments: emulated and native (provisions are made for the addition of other environments). These systems are not covered in this manual.

The **diagnostic monitor** is a particular type of operating system which provides an interactive diagnostic system and the means for loading the functional checks programs.

The functional checks programs provide the individual tests for checking the operation of a particular system or peripheral and provide trouble shooting facilities.

The diagnostic monitor is loaded from a magnetic medium (as defined above) into system ram using a bootstrapper which is also located on the same magnetic medium.

The bootstrapper is loaded into system ram either by the system rom or by the environment activator as is the case with some HDUs.

The environment module is located on the same magnetic medium as the diagnostic monitor, it is loaded into system ram where it is used to designate and enable the workstation to be used, locate and load the bootstrapper of the required operating system.

6.1 RESIDENT AUTODIAGNOSTIC ORGANIZATION

The resident autodiagnostic performs the following tests:

- Central unit board test
- RAM storage module test
- Search for and test of loading controller
- Program loading.

On switch on the following digits appear.

Character	Signifiance
1	CPU test
2	RAM test
4	Slot scan (Device table set)
5	IPL Phase
.	Bootstrap activation

After the <1> appears a <d> appears this means that a Total Memory Dump (TMD) will be launched if the key is switched.

6.2 LOADING CHANNEL

The channel used to load (IPL) the operating system or the diagnostic monitor (for stand alone diagnostics) is selected in an order established by the position of the key switch on the console.

Primary sequence (switch in position 1)

The operating system or diagnostic monitor (DCOS) in this case is loaded from a fixed peripheral unit. If there are several fixed peripherals, a search is made for the program starting from the peripheral with the lowest logic name; if the program is not found, the search continues in the peripherals with higher logic names.

Secondary sequence (switch in position 2)

In this case, loading takes place from one of the removable peripherals in the system. The procedure starts from the mFD unit.

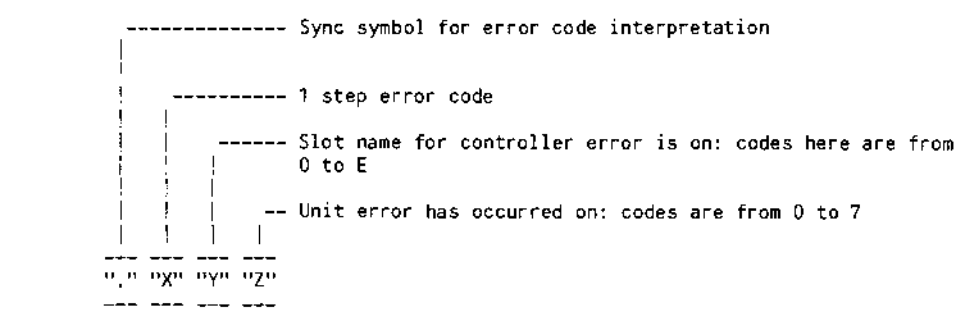
6.3 AUTODIAGNOSTIC MESSAGES

Any errors occurring are displayed through display of an error code on the diagnostic console or on the console and video.
There are two types of message - "non-blinking" and "cycling".
A list of **non blinking messages** with a 1-digit code number is given in the table below:

CODE	CAUSE	RECOMMENDED FORM OF ACTION
1	Fault on central unit board	Replace the Central Unit board
2	Fault on RAM storage boards	Check addressing: if OK, replace memory modules
3	Interrupt level 5 not expected	
4	ROM DEBUGGER activation	If the system does not start up when the ROM DEBUGGER GO is entered, remove ROM DEBUGGER
5	Delay for outcome of 1st IPL effort	Appears during the IPL attempt; bootstrap is activated; for subsequent errors, see table below
7	Interrupt level 7 not expected	
8	An interrupt at 6, 4, 3, 2, 1 level not expected	

Note: If an interrupt level of the one mentioned above accurs after the second activation of the ROM DEBUGGER, and if the relative console is on than no indication will be visualized and the ROM DEBUGGER will take control of the situation.

Cycling error codes refer to exchanges between the CU and the IPL controllers and consist of 4 figures, issued one second after each other. Their significance is as follows:



The **cycling messages** are listed in the table below:

CODE "X"	DESCRIPTION OF ERROR	CODE Y	CODE Z	FAULT TYPE AND FORM OF ACTION RECOMMENDED
1	Controller fault	Name of slot error found in and, thus, the faulty board is displayed	Not valid	Fault on controller performing the IPL: replace board. Possible controllers are: floppy/mini-floppy, HDU, STC controller
2	Peripheral unit fault	Indicates slot name of board to which the faulty peripheral is connected	Indicates unit with fault and displays its code	For all peripheral unit faults, see specific manual
3	Interrupt not expected (or wrong)			

CODE X	DESCRIPTION OF ERROR	CODE Y	CODE Z	TYPE OF FAULT AND FORM OF ACTION RECOMMENDED
4	Fault on medium (disk, tape) in read	Indicates name of slot containing board to which peripheral which gave rise to error is connected	Indicates driver whose medium has given rise to fault & displays code no.	If there is a read error (SO loading), replace magnetic medium: if unit is floppy/mini-floppy, service action may be required; for procedures, see specific manuals.
8	Medium (cassette, disk) not inserted or does not have operating system	See points above	See points above	When this type of error arises, proceed as described below: a) - if there is an ISL switch, see that it is in the correct position b) - when loading from a removable medium, ensure it is a system disk - if it is, it is faulty and should be changed; if it is not, then insert system disk and start again. If the error signal is repeated, see the service procedures in the specific manuals. c) - when loading from a fixed medium, see the service procedures in the relative manuals.

In addition to the code on the console, the following message is displayed on the video:

```
X  Y  Z      REL. N
-  -  -      ------
|  |  |         |
|  |  |          -------- ROM LOADER Release
|  |  |
 ----------------------- Error code (same as on console)
```

6.4 STAND ALONE DIAGNOSTIC PROGRAMS

With the stand alone diagnostic programs, all the modules in the system can be tested.

Errors occurring will give rise to error messages; these messages may be found in the Functional Checks manual where they are explained.

The above manual should be consulted for all details of these programs; a list of all the programs available as of diagnostic release 8.3.3 is given below.

	DIAGNOSTIC MONITOR
DIM080	Diagnostic monitor (Rel. 1.6.0)
	CENTRAL UNIT, CONSOLE AND MEMORY
UC68.FFx	Functional tests for the CPU UC068 and CPU 3068
SSM.CNx	Functional tests for the extended console and SSM
TEST_RAM.FFx	Functional tests for the M80/0 and M80/1/2/3 RAM memory
TCM800.F9x	Functional tests for the TCM board
	UTILITY AND VARIOUS MODULES
ETST24.HDx	Ambient installator on HDU with STD24
ENCRY68.33x	Functional tests for the Encryption controller DEM803c GJ257/E
	WORK STATION VIA 4 WAY MUX
MUX68.30x	Functional tests for the 4 way MUX G0322 board
WS68LIN.30x	Functional tests for the MUX-WS connection
WS68VID.3C	Functional tests for the WS video
WS68KEY.30x	Functional tests for the WS keyboard
WS68PPCR.30x	Functional tests for the pin-pad/card reader of the WS
	LINE CONTROLLERS
ETHR.6Fx	Functional tests for the Ethernet G0212/A line controller
SLAN.6Dx	Functional tests for the Starlan-dumb G0431 line controller
EPSY_C.6Cx	Functional tests for the Epsilon G0435 line controller
ILCB.6Ax	Functional tests for the ILCB G0453 e G0459 dual line controller

>>>

```
================================================================
              FLOPPY AND MINIFLOPPY DISK UNIT
----------------------------------------------------------------
COLL_FDU.E1x Functional tests for the floppy disk unit XU6030
COLL_MFD.E1x Functional tests for the minifloppy disk unit
             XU4305
ERRATE.E1x   Error rate for floppy/minifloppy disk XG7032
================================================================
              STREAMING TAPE CARTRIDGE UNIT
----------------------------------------------------------------
COLLAUDO.E7x Functional tests for the STC G0417+G0418 and G0437
             controllers
ERRATE.E7x   Error rate for STC (STC5)
================================================================
              MAGNETIC TAPE UNIT
----------------------------------------------------------------
COLLAUDO.62x Functional tests for the MTU G0278/B controller
ERRATE.62x   Error rate for MTU (MTC3)
================================================================
              PERIPHERAL UNITS CONNECTED TO THE FILE PROCESSOR
----------------------------------------------------------------
ERR_FDU.68x  Error rate for FDU connected to the File Processor
ERR_STC.68x  Error rate for STC connected to the File Processor
FORMAT.68x   HDU formatting connected to the File Processor
ERR_HDU.68x  Error rate for HDU connected to the File Processor
VER_COR.68x  Verify & correction for HDU connection to the File
             Processor
STD_Q250.68x STD24 installation on HDU 40 MB Quantum 250
STD_Q280.68x STD24 installation on HDU 80 MB Quantum 280
STD_MC75.68x STD24 installation on HDU 140 MB Micropolis 1375
================================================================
              HARD DISK UNIT WITH ESDI INTERFACE
----------------------------------------------------------------
COLLAUDO.66x Functional tests for HDU G0404 + G0405 controller
FORMAT.66x   Formatting of the HDU with ESDI interface
ERRATE.66x   Error rate for HDU with ESDI interface
VER_COR.66x  Verify & correction for HDU with ESDI interface
S24_MC53.66x STD24 installation on HDU 70 MB Micropolis 1353
S24_M1CR.66x STD24 installation on HDU 140 MB Micropolis 1355
S24_WR3.66x  STD24 installation on HDU 140 MB Wren3
S24_FUJI.66x STD24 installation on HDU 140 MB Fujitsu M2246E
S24_P638.66x STD24 installation on HDU 380 MB Priam 638
================================================================
                                                          >>>
```

```
================================================================
             HARD DISK UNIT WITH ST506 INTERFACE
----------------------------------------------------------------
COLLAUDO.65x Functional test for the HDU 60363 controller
FORMAT.65x   Formatting of HDU with ST506 interface
ERRATE.65x   Error rate for HDU with ST506 interface
VER_COR.65x  Verify & correction for HDU with ST506 interface
S24_XU15.65x STD24 installation on HDU 14 MB XU5006
S24_XM20.65x STD24 installation on HDU 20 MB XM5221
S24_NE20.65x STD24 installation on HDU 20 MB NEC5126H
S24_WR20.65x STD24 installation on HDU 27 MB Wren1
S24_WR40.65x STD24 installation on HDU 40 MB Wren2
S24_MI40.65x STD24 installation on HDU 40 MB Micropolis 1323A
S24_WR65.65x STD24 installation on HDU 65 MB Wren2
S24_MI65.65x STD24 installation on HDU 65 MB Micropolis 1325
================================================================
```

A. APPENDIX

A.1 HARDWARE MODULES LISTED IN THE 'PROGETTO DI GESTIONE'

A.1.1 LSX 3010 BASIC UNIT AND OTHER MODULES

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
LSX 3010 BASIC UNIT 4 MB version	Box and 9-slot rack, UC with EAROM, MMU, 20 MHz 2 EIA RS 232 Interface 4 MB RAM with parity Real time clock Console with key 240 W Power supply File Processor (HDU, MFU, STU) Mains Group and fans	BU 8802
Floating point for BU 8802,	Floating point coprocessor	FAU 8816

A.1.2 MAGNETIC PERIPHERALS MOUNTED IN THE SYSTEM

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
1 MB SLIM MINIFLOPPY DISK 1st drive	1 MB slim drive with Signals and Supplies cable	MFU 8097
45/60 MB STREAMING TAPE integrated	STC Drive with Signals and Supplies cable	STU 8098
40 MB HARD DISK UNIT with SCSI Interface	5" Slim Drive with cables	HDU 8840
60 MB HARD DISK UNIT with SCSI Interface	5" Slim Drive with cables	HDU 8880
140 MB HARD DISK UNIT with SCSI Interface	5" Slim Drive with cables	HDU 8140

A.1.3 LSX 3005 BASIC UNIT AND OTHER MODULES

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
LSX 3005 BASIC UNIT 4 MB version	Box and 9-slot rack, UC with EAROM, MMU 16 MHz 2 EIA RS 232 Interface 4 MB RAM with parity Real time clock Console with key 240 W Power supply Mains Group and fans	BU 8801
Floating point for BU 8801	Floating point coprocessor	FAU 8096

A.1.4 MAGNETIC PERIPHERALS MOUNTED IN THE SYSTEM

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
1 MB SLIM MINIFLOPPY DISK 1st drive	1 MB slim drive with Signals and Supplies cable	MFU 8097
1 MB MINIFLOPPY DISK controller	1 MFD controller board	MFC 8054
45/60 MB STREAMING TAPE integrated	STC Drive with Signals and Supplies cable	STU 8098
45/60 MB STREAMING TAPE Cont.	STU Controller Board	STC 8062
ESDI Interface HDU Controller	Two Control Boards	HDC 7050
140 MB HDU with ESDI interface	5" Full Drive -Cables	HDU 8810
70 MB HDU with ESDI interface	5" Full Drive -Cables	HDU 8811
315 MB HDU with ESDI interface	5" Full Drive -Cables	HDU 8812
ST506 INTERFACE CONTROLLER	Controller Board GD 363	HDC 3544
20 MB HDU ST506 interface	Slim drive -Cables	HDU 8813
40 MB HDU ST506 interface	Slim drive - Cables	HDU 8814
65 MB HDU ST506 interface	Slim drive - Cables	HDU 8815

A.1.5 LINE CONTROLLERS

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
STARLAN NETWORK Control UNIT (MOS)	Non intelligent Board	NCU 9115
ETHERNET NETWORK CONTROL UNIT	Non Intelligent Board	LCU 3323
STARLAN/ETHERNET DUAL LAN PROCESSOR UNIT (UNIX)	Intelligent Board	NPU 9125
STARLAN/ETHERNET SELF-STANDING CONDUCTIVITY BOX	C-Box with cable	C-Box 9128
2.V24 LINE CONTROLLER UNIT (MOS)	Non Intelligent Board Cables	LPU 3348
TRANSCEIVER BOX (Ethernet line)	Box	SET 3364
DROP CABLE (Ethernet line)	5 m cable 10 m cable 20 m cable	CBL 3391 CBL 3392 CBL 3393

A.1.6 MODULES FOR WORKSTATIONS

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
9" DISPLAY alphanumeric/trivalent	Display - Filter Tilting support	DSM 3619
15" DISPLAY alpanumeric B/W, tilting	Display with tilting base - Filter	DSM 3615
SPACING/SECURING RING 15" display	Ring	SET 1245

>>>

>>>

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
MULTIPLEXER CONTROL 4-way	Board GO 322	MUX 3388
MULTIPLEXER CONTROL FOR REMOTE CONTROL	Board GO 322	MUX 3688
Signal Distribution BOX for MUX 3388/3688	Box 5 m cable	DBX 8099
WORKSTATION alphanum., monochrome, remote control, can be set for virtual displays, can connect keyboard display, two serial peripherals, Pin Pad and Badge Reader options through EXF 3688	Box Basic board Power supply Display-keyboard cable Mains-display cable	ELB 3684
OPTIONS BOARD pin pad and badge reader (mount only on ELB 3683)	Board GO 329	EXF 3686
SERIAL INTERFACE CABLE for DBX 3389	Cable	CBL 3378
SERIAL INTERFACE CABLE with male connector on peripheral side to be connected to DBX	3 m cable	CBL 3679

KEYBOARDS DESCRIPTION	'PROGETTO GESTIONE'
Alphanumeric + functions, unified multifunction	ANK 1401
Alphanumeric + functions + keys (unified multifunction)	ANK 1402
Numeric + functions, unified multifunction	NKB 1405
Numeric + functions + keys (unified multifunction)	NKB 1406
Pin Pad	PIN 1440

A.1.7 CABLES FOR AUXILIARY PERIPHERAL UNITS

MODULE DESCRIPTION	'PROGETTO GESTIONE'
CABLE, single channel, EIA for serial peripherals with female connector on periph. side	CBL 2657
CABLE, twin channel, EIA for STD 13 serial peripherals with female connector on peripheral side	CBL 2658
CABLE, adapter for PR3300 and read/write modules (50 cm.)	CBL 2661
CABLE, single channel, RS 232 for serial pripherals with male connector on peripheral side	CBL 3657
CABLE, twin channel, for serial peripherals with male connector on peripheral side	CBL 3658
CABLE, adapter for non-STD 13 peripherals (10 cm.)	CBL 3349
CABLE, MODEM extension	CBL 3358
CABLE STD 13, male /male for connection of peripherals with female on modem.	CBL 8092
CABLE TTL single channel	CBL 2659
CABLE TTL bi-channel	CBL 2660

A.2 RECOVERABLE MODULES OF THE L1 LINE

As a result of analysis to see which L1 line modules could be reused in LSX 3000 systems the table below was constructed.

The table lists the recoverable L1 modules with their codes and the names of the LSX 3005/10 modules which result after modification.

DESCRIPTION OF MODULE	L1 ITEM	PDG CODE	LSX 3000 ITEM
INT. 65 MB HDU, ST506 (M30)	HDU 3465	48986 T	HDU 8815
1 INT. 65 MB HDU, ST506 (M44) 2 INT. 65 MB HDU, ST506 (CAB 3558)	HDU 3666 HDU 3668	49096 U 48998 L	HDU 8815
1 INT. 65 MB HDU, ST506 (M40) 2 INT. 65 MB HDU, ST506 (M40)	HDU 3639 HDU 3640	50664 F 50665 H	HDU 8814
ELB 3683	ELB 3683	47299 L	ELB 3684

The following is a list of the items necessary for each module the conversion.

Conversion from HDU 3465 to HDU 8815

This operation not necessity the transformation.

Conversion from HDU 3666/HDU 3668 to HDU 8815

DESCRIPTION	D.R.S. CODE	QUANTITY
COMMAND CABLE	336875 X	1
DATA CABLE	336876 Y	1
CLAMP CABLE	334237 V	1
POWER CABLE	336877 Z	1

Conversion from HDU 3639/HDU 3640 to HDU 8814

DESCRIPTION	D.R.S. CODE	QUANTITY
COMMAND CABLE	336875 X	1
DATE CABLE	336876 Y	1
CLAMP CABLE	334237 V	1
POWER CABLE	336877 Z	1
FIXING SCREW	964317 V	1

Conversion from ELB 3683 to ELB 3684

DESCRIPTION	D.R.S. CODE	QUANTITY
LED COVER	338645 J	1
NYLON SPACER	419734 V	1
SCREW	924423 G	2
WASHER	924715 L	2
CROSS-DRIVE SCREW	924726 P	4
3.6 x 6.5 SCREW	924731 L	2
4.3 x12 ROSETTE WASHER	940136 U	2
ELB 3684 LABEL	963289 H	1
OLIVETTI L1 LABEL	969744 N	1
COVER PLATE	969745 P	1
FAN GRILL	969748 S	1
COVER	969756 J	1
BASE	969757 K	1
FRONT PANEL	969758 U	1

DATE	UPDATED PAGES	PAGES	CODE
15-06-88	1st EDITION	106	4117610 T (0)
30-11-88	**Pages to be replaced:** vi, vii, viii, 1-1, 1-5, 1-7, 1-9, 2-1, 2-10, 2-15÷2-17, 2-22÷2-24, 3-5, 3-6, 4-1, 4-2, 4-4, 4-5÷4-13, 5-1, 5-10, 5-12, 5-14, Updating Status **Pages to be added:** A-6, A-7	53	4117611 U

Pages marked * must be suppressed

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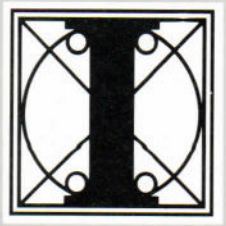

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