L1

M64-M70-M70/2/3

Service Manual

olivetti

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Service Manual

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PREFACE

This manual is designed for technicians involved in field service of L1 M64 and M70/2/3 systems.

SUMMARY

The manual is divided into seven chapters and an appendix laid out as follows:

Chapter one is an introduction to the systems, specifying the position of boards in the rack and their compatibility in relation to the different L1 systems.

Chapter two deals with installation of system modules, lines and workstations.

Chapter three deals with power supply for the different modules.

Chapter four is concerned mainly with controllers, illustrating their settings and all specific connections to be made.

Chapter five provides the main information on the magnetic peripherals which can be connected to the systems.

Chapter six deals with system autodiagnostic and lists the stand alone diagnostic programs.

Chapter seven deals with system upgrading.

Finally, the appendix summarizes relevant aspects of the "Progetto di Gestione".

BIBLIOGRAPHY:

M34/44/54	- Service Manual	- Code no. 4105740 T (0)
LSX 3010/05	- Service Manual	- Code no. 4117610 T (0)
LSX 3020/30/40	- Service Manual	- Code no. 4114030 N (0)
ELB 3684	- General Service Manual	- Code no. 4114250 B (0)

SECTOR RANGE PRODUCTS: B1 M54, M64, LSX 3005, LSX 3010

B2 M70, LSX 3020, LSX 3030, LSX 3040

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1. GENERAL

1.1 INTRODUCTION

The M64 and M70 are the medium/high range models of the L1 line.
The central unit of the two models is based on the Z8000 microprocessor which works at a clock frequency of 10 MHz.

Both have stand-up type structures (figure 1-1). The M64 is based on the OLIBUS architecture (3000 format boards) and the M70 on the SYSTEM BUS, i.e. olibus + extension bus, in which double height boards (8000 format) may also be used.

It is possible to upgrade the M64 and M70 to M64 SP and LSX 3020, respectively.

The resulting models will therefore be based on the MC68000 microprocessor and not the L1 line Z8000.

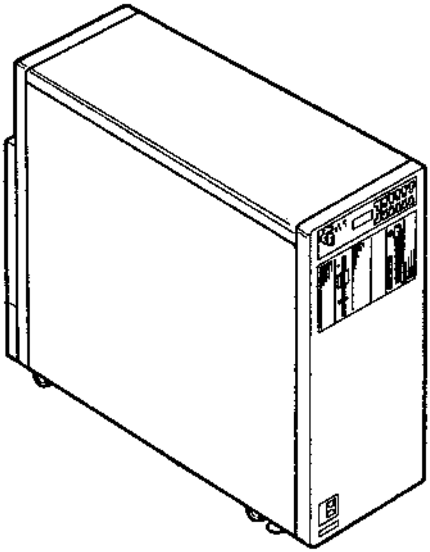

Fig. 1-1 Front View of M64 and M70

Note: As regards the M70 and its multiprocessor versions (M70/2 and M70/3), differences between the versions are not great enough to warrant separate descriptions. Therefore, only the monoprocessor version is referred to in the following description, except in cases where it is necessary to make explicit reference to the multiprocessor versions.

The following are the main modules used on the M64 and M70 systems:

BASIC UNIT SB0 designed to house the electronic boards, the integrated magnetic peripherals, the operator console.

SB1 CABINET designed for one removable magnetic peripheral, 8" size, or one or two 5 and 1/4" fixed peripherals. It may be mounted on the M70 to increase rack capacity by a further 5 board slots.

SB2 CABINET used to contain the MTU unit and one or two hard disk units with SMD interface.
The magnetic peripheral configurations possible are defined in tables in chapter five.

1.1.1 BASIC UNIT SB0

The SB0 cabinet physical dimensions are: 750x302x650 mm. It houses the following elements:

Power supply unit, LB40 type, 350 W power.

Board rack (max. 11 board slots) in which the control and memory boards are inserted. The relative back plane will be 3000 type for the M64, 8000 type for the M70.

Space for the magnetic peripherals - a maximum of four is allowed (all 5 and 1/4"), two of which are removable and are mounted on the cabinet front and the other two are fixed on the rear of the cabinet.

Console for service and diagnostic operations. There are three types:

- BASIC CONSOLE, for M64 only, with minimum functions, i.e.:
  ISL (Initial System Loading) switch
  One digit diagnostic display
  Reset key.

- EXTENDED CONSOLE, comprising the three interfaces with the operator, system and services, RTC (Real Time Clock) and unattended features included.

- CONSOLE WITH TELEDIAGNOSTIC, same features as the extended console with, in addition, the telediagnostic feature.

1.1.2 EXPANSION CABINET SB1

The cabinet physical dimensions are: 750x181x650 mm.
Its use depends on the model with which it is associated. On the M64, the SB1 is used exclusively to house one removable, 8" magnetic peripheral (1 MB FDU or 20 MB STC) or two 5 and 1/4" fixed peripherals (70, 40 or 300 MB HDU with ESDI interface). In the latter case, an auxiliary power supply (LS10) must be installed as well as the fixed peripherals.
On the M70, in addition to the peripherals used for the M64 system, the SB1 Expansion cabinet can house a 5-slot board rack which, when associated with the 11-slot SB0 board rack, gives a total capacity of 16 double height board slots (8000 format). The relative 16-slot board rack can be used to replace the previous 11-slot rack. To meet the increased power requests, expansion power supply LB12 (125 W power) is mounted in the bottom part of the SB1.
The fixed peripherals mounted in the SB1 can be shared with other systems by way of Dual-Port board IF 206.

1.1.3 EXPANSION CABINET SB2

The cabinet physical dimensions are: 750x542x650 mm. This is a cabinet for a magnetic tape unit (MTU) and for 60/120 MB (SMD interface) hard disk units with, in some cases, the dual-port option. With respect to the previous SB2, the main new feature is that the MTU is no longer compulsory.

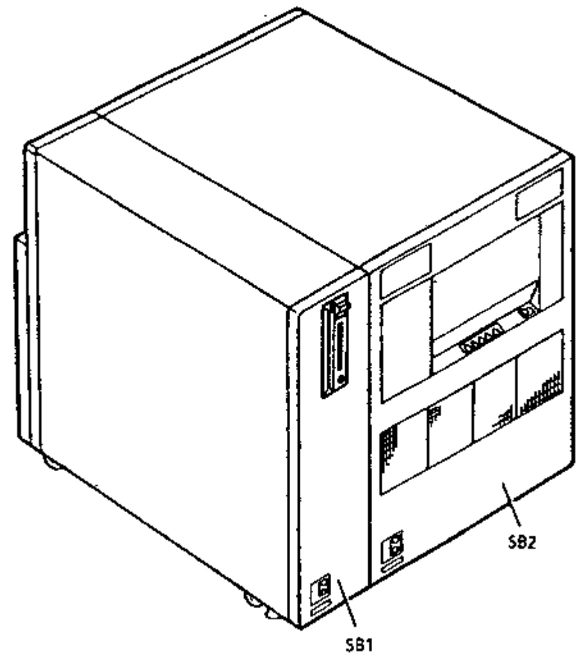

Fig. 1-2 External Cabinets SB1 and SB2 for Magnetic Peripherals

1.2 POSITION OF THE BOARDS IN THE RACK

1.2.1 PRIORITY AND RESTRICTIONS FOR BOARDS IN RACK ON M64 SYSTEMS

The numbering of boards in the rack goes from right to left, looking at the system from the front (figure 1-3).

Restrictions

Never leave empty positions between the boards in the rack.

Position 0 is filled by the central unit board, followed in position 1 by the first memory board.

Though memory boards may go almost anywhere, for the sake of order, it is best to set them in the last slots, starting from the left.

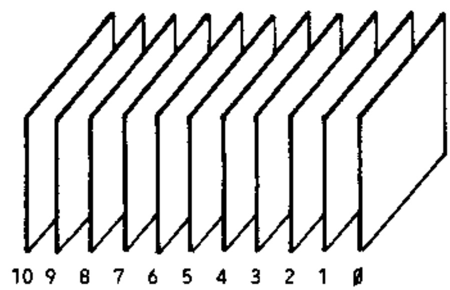

Fig. 1-3 M64 Board Rack

The exact order for boards in the rack is determined, in addition to the conditions already mentioned, by the following priority chains:

DMA priority:

The priority of boards working in DMA decreases the closer they are placed to the central unit board.

Interrupt priority:

There are three interrupt levels which, in decreasing order, are:

Level 1A: The highest priority; board priority increases the closer it is to the central unit.

Level 1B: Board priority decreases the closer it is to the central unit.

Level 2: The lowest priority: a board's priority is greater the closer it is to the central unit.

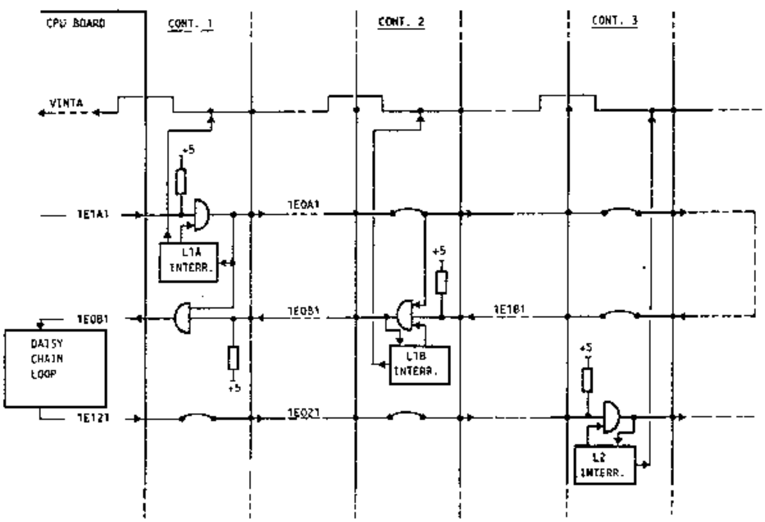

Fig. 1-4 Priority Daisy Chain on M64 Systems

1.2.2 PRIORITY AND RESTRICTIONS FOR BOARDS IN RACKS ON M70 SYSTEMS

The numbering of boards in the rack goes from left to right, looking at the system from the front (figure 1-5).

Restrictions

Never leave empty positions between boards in the rack.

Position 0 is occuppied by the central unit board, followed by the other CPU boards on the M70/2 and the M70/3.

The TCB board is placed immediately to the right of the last control board.

Though memory boards can be placed almost anywhere, for the sake of order, it is best to set them to the right of the TCB.

Note: The TCB and memory boards can be replaced with suitably jumpered 2 or 4 Mbyte TCM boards (see chapter 4).

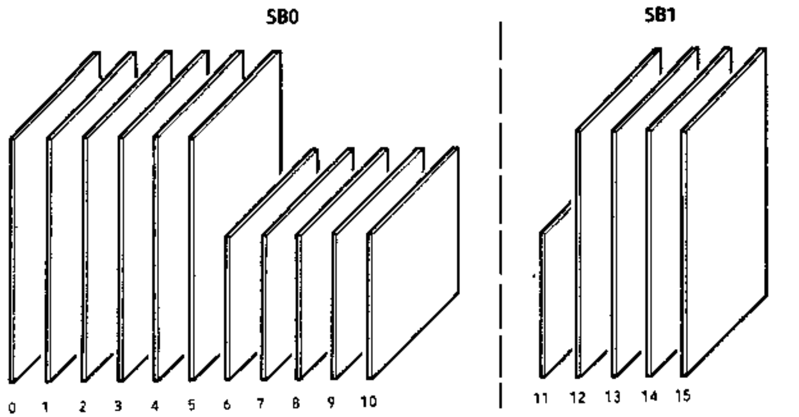

Fig. 1-5 M70 Board Rack

The exact order for boards in the rack is determined, in addition to the conditions already mentioned, by the following priority chains:

DMA priority:

The priority of boards working in DMA decreases in the direction from left to right, i.e. the farther they are from the central unit board.

Interrupt priority:

There are three interrupt levels which, in decreasing order, are:

Level 1A: The highest priority; starts from TCB and decreases from right to left.

Level 1B: A board's priority decreases from left to right, i.e. the closer it is to the TCB board.

Level 2: The lowest priority; a board's priority increases the closer it is to the TCB board.

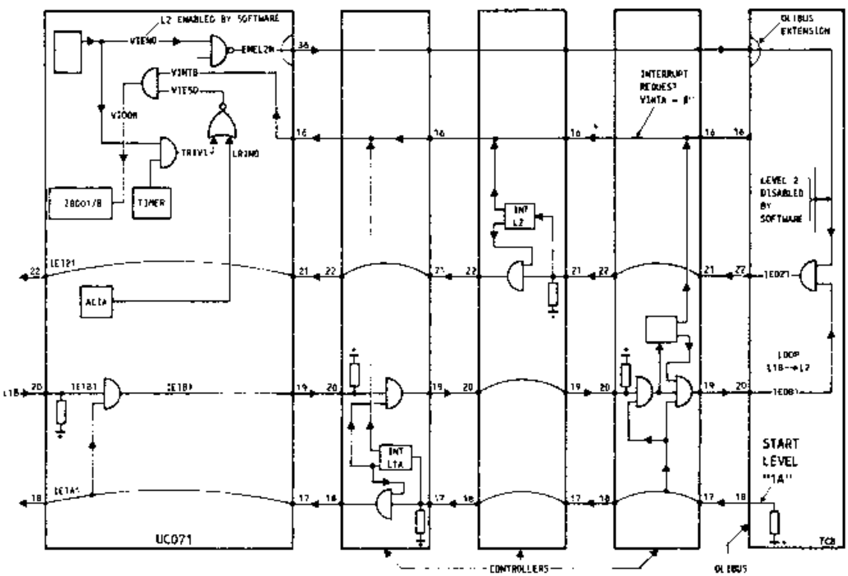

Fig. 1-6 Priority Dasiy Chain for M70 Systems

1.2.3 CORRECT ORDER OF BOARDS IN RACK

The tables in this section illustrate the correct order of boards in the rack for M64 and M70. System configuration limits obviously have to be considered for which it may be useful to refer to the list of modules in the "Progetto di Gestione" given in "Appendix A".

M64 rack

HARDWARE MODULE	BOARD NAME	LOGIC NAME	INTERRUPT LEVEL
Central Unit	UC070	FF	AC1A: L1A or L1B (software programmable); TIMER: L2
First memory board	RA65-/B RA57/E-/C-/B-/A	--	Memory boards with ECC Memory boards without ECC
MTU Control	G0278/B	62	L2
Encryption control with RTC	G0257	21	L1B (line/disks)
Encryption control	G0257/C	21	L1B (pin check + CAT alg.)
V24 + V24 line controller	G0236	22/28	L1B
V24 + LION200 line control	G0256	23/27	L1B Intelligent controller (with microprocessor)
V24 + LION9.6 line control	G0340/A	25/26	L1B
Ethernet line control	G0212/A	6F	L1B
Multiplexer control	G0322	30	L1B/L2
B/W alphanum. KDC control	G0252	FE	L1B Video controllers not connected to ELB 1381/1382
Graphics expansion	G0255/A	FD	L1B
Omninet local network contr.	G0308	6B	L1B
B/W alphanum. KDC control	G0252	FE	L1B Video controllers connected to ELB 1381/1382
Graphics expansion	G0255/A	FD	L1B

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HARDWARE MODULE	BOARD NAME	LOGIC NAME	INTERRUPT LEVEL	
V24 external line control	G0300	D3/D2	L1A	Line controls without microprocessor (not intelligent)
X21 external line control	G0303	D5	L1A	
LION 9.6 line control	G0333	D7	L1A	
StarLan Dump control	G0431	6D	L2	
HDU control ST506 interface	G0363	65	L2	All controls in this category work in DMA
HDU control, SMD interface Controller and Formatter	G0302/A G0301/A	61 --	L2	
HDU control, ESDI interface Controller and Formatter	G0404 G0405	66 --	L2	
20 MB STC control (Archive) Controller and Formatter	G0200/B G0342/B	E6 --	L2	
45/60 MB STC control Controller and Formatter	G0417 G0418	E7 --	L2	
1 MB FDU/mFDU control	G0280/B	E0	L2	
MOIN 5.2 integrated modem	IF 192			

Note:

- Alphanumeric controls are never placed between two graphic video controls.
- Logic names "22","23" and "25" are whole segment memory boards; logic names "28","27" and "26" are for half segment boards.
- Logic name "D3" represents normal mode, "D2" unattended mode.
- The MTU control has highest priority in the L2 daisy-chain; at the same time, it has lowest priority of the boards which work in DMA.
- MOIN 5.2 takes up two board slots and, for this resaon, is put on the extreme right in the last physical position in the rack. The control board is put in the position its priority demands.

M70 rack

HARDWARE MODULE	BOARD NAME	LOGIC NAME	INTERRUPT LEVEL	
Central unit	UC071	FF	ACIA: L1A or L1B (software programmable); TIMER: L2	
1 MB FDU/mFDU control	G0280/D	E1	L2	Controls in this group work in DMA.
45/60 MB STC control Formatter and Controller	G0418 G0417	-- E7	L2	
HDU control, SMD interface Formatter and Controller	G0301/A G0302/A	-- 61	L2	
HDU control, ESDI interface Formatter and Controller	G0405 G0404	-- 66	L2	
HDU control, ST506 interface	G0363	65	L2	
B/W alphanum. KDC control	G0252	FE	L1B	Video controllers not connected to ELB 1381/ 1382
Graphics expansion	G0255/A	FD	L1B	
Omninet local network contr.	G0308	6B	L1B	
B/W alphanum. KDC control	G0252	FE	L1B	Video controllers not connected to ELB 1381/ 1382
Graphics expansion board	G0255/A	FD	L1B	
Multplexer control	G0322	30	L1B/L2	
Ethernet line control	G0212/A	6F	L1B/L2	
StarLan Dump control	G0431	6D	L2	
V24 + Lion 200 line control	G0340	27	L1B	Controls with micro-processor: intelligent controls
V24 + Lion 9.6 line control	G0340/A	26	L1B	
V24 + V24 line control	G0331	28	L1B	
Encryption control	G0257/C	33	L1B	
MTU control	G0278/B	62	L2	
TCB board	TCB82/A	F8		
TCM board 2 or 4 Mbyte	TCM	F9		
MOIN 5.2 integrated modem	IF 192			

1.3 COMPATIBILITY OF BOARDS WITH SYSTEMS

Compatibility of the hardware modules with the M40 (BU 3515), M34, M44, M60, M54, M64 and M70 systems is illustrated below.

BOARD	BOARD DESCRIPTION	M40	M34	M44	M60	M54	M64	M70
	CENTRAL UNTS AND OTHER MODULES							
UC042	Central unit	yes	no	no	no	no	no	no
UC048	Central unit	no	yes	yes	no	no	no	no
UC070	Central unit	no	(*)	(*)	no	yes	yes	no
UC071	Central unit	no	no	no	no	no	no	yes
UC040-40/A	Central unit	no	no	no	yes	no	no	no
UC041	Cache Memory	no	no	no	yes	no	no	no
TCB82/A	Timing Control Board	no	no	no	yes	no	no	yes
TCM 2/4 MB	Timing Control Memory (Master)	no	no	no	yes	no	no	yes
REDAC MR-MC	Redac board	no	no	no	yes	no	no	no
AT 112	Automatic Start Device	yes	yes	yes	no	no	no	no
GO 257	Encryption + Real time clock	yes	yes	yes	yes	yes	yes	no
GO 257/B	Encryption (pin check)	yes	yes	yes	yes	no	no	no
GO 257/C	Encryp. (pin check + CAT alg.)	yes	yes	yes	yes	yes	yes	yes
GO 257/A	Real Time Clock module	yes	yes	yes	no	no	no	no
INO 62	Back plane	no	yes	no	no	yes	no	no
INO 51/61	Back plane	yes	no	no	no	no	no	no
INO 60	Back plane	no	no	no	yes	no	no	no
INO 74	Back plane	yes	no	yes	no	no	no	no
INO 80	Back plane	no	no	no	no	no	yes	yes
INO 87	Back plane, 11 board slots	no	no	no	no	no	no	yes
INO 88	Back plane, 16 board slots	no	no	no	no	no	no	yes
	RAM STORAGE BOARDS							
ME027-32	256/384/512 KByte: 64 Kb chip	yes	no	no	no	no	no	no
RA57/E	512 KByte: 64 Kb chip	yes	yes	yes	no	yes	yes	no
RA57/C-B-A	1/1.5/2 MByte: 256 Kb chip	yes	yes	yes	no	yes	yes	no
RA65/B	1 MByte: 256 Kb chip (ECC)	no	(*)	(*)	no	yes	yes	no
RA065	2 MByte: 256 Kb chip (ECC)	no	(*)	(*)	no	yes	yes	no
RA800-800/A	1/0.5 MByte: 64 Kb chip	no	no	no	yes	no	no	no
RA80/D-F	1/0.5 MByte: 64 Kb chip (ECC)	no	no	no	yes	no	no	no
RA80/C-A	1/3 MByte: 256 Kb chip (ECC)	no	no	no	yes	no	no	no
RA80/B-N	2/4 MByte: 256 Kb chip (ECC)	no	no	no	yes	no	no	yes
TCM 2/4 MB	Timing Control Memory (Array)	no	no	no	yes	no	no	yes

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(*) Note: Boards used in upgrading to M34/SP and M44/SP.

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BOARD	BOARD DESCRIPTION	M40	M34	M44	M60	M54	M64	M70
	POWER SUPPLIES							
LA13-LA30	130/360 W	yes	no	no	no	no	no	no
LA 17	170 W	no	yes	no	no	yes	no	no
LA 40	345 W (PSU 3567)	yes	no	yes	no	no	no	no
LA 40	345 W (PSU 3545) for SB3	yes	no	yes	yes	no	no	no
LD 10	100 W (expansion for PSU 3567)	yes	no	yes	no	no	no	no
LB 40	350 W for SB0 cabinet	no	no	no	no	no	yes	yes
LB 12	125 W for SB1 cabinet	no	no	no	no	no	no	yes
LB 30	300 W for SB0 cabinet	no	no	no	yes	no	no	no
LA 17	170 W (expansion for LB30)	no	no	no	yes	no	no	no
LA 04	40 W for REDAC	no	no	no	yes	no	no	no
LS 10	106 W for SB1 cabinet HDU	no	no	no	yes	no	yes	yes
	DISPLAY/KEYBOARD CONTROLS							
GO 157	B/W, alphanumeric	yes	no	no	no	no	no	no
GO 207	Graphic expansion, with GO157	yes	no	no	no	no	no	no
GO 252-A-B	B/W, alphanumeric trivalente	yes	yes	yes	yes	yes	yes	yes
GO 255	Graphic expansion, with GO252	yes	no	no	no	no	no	no
GO 255/A	Graphic expansion, with GO252	yes	yes	yes	yes	yes	yes	yes
GO 224	Alphanumeric colour	yes	yes	yes	yes	no	no	no
GO259-60-61	Graphic and alphanumeric colour	yes	yes	yes	yes	no	no	no
GO 322 ($)	Multiplexer	yes	yes	yes	yes	yes	yes	yes
	FLOPPY/mFLOPPY CONTROLS							
GO 240	320 KB minifloppy unit	yes	no	no	no	no	no	no
GO 280/A	320 KB minifloppy unit	yes	no	no	no	no	no	no
GO 280/C-E	320 KB minifloppy unt	yes	yes	yes	yes	yes	no	no
GO 229	1 MB floppy unit	yes	no	no	no	no	no	no
GO 280	1 MB floppy/minifloppy unit	yes	no	no	no	no	no	no
GO 280/B-D	1 MB floppy/minifloppy unit	yes	yes	yes	yes	yes	yes	yes
	SCT AND MTU CONTROLS							
GO200A+201A	20 MB STC Dei (XU 1120)	yes	no	no	no	no	no	no
GO200X+201B	20 MB STC (XU 1120)	yes	no	no	no	no	no	no
GO200B+201B	20 MB STC (XU 1120)	yes	no	yes	yes	no	no	no
GO200B+342	20 MB STC Cypher (XU 1130)	yes	no	yes	yes	no	no	no
GO200B+342	20 MB STC Cypher (Archive)	no	no	yes	yes	no	yes	no
GO417+418	45/60 MB STC	no	no	yes	yes	yes	yes	yes
GO 278/B	40 MB MTU (XU 1705)	yes	no	yes	yes	no	yes	yes

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BOARD	BOARD DESCRIPTION	M40	M34	M44	M60	M54	M64	M70
	HARD DISK CONTROLS							
DTC510BP/BO	14 MB HDU Control, SASI interf.	no	yes	no	no	no	no	no
GO 298-299	Bus adapter for 14 MB HDU	no	yes	no	no	no	no	no
GO 363	ST506 interface control	yes	yes	yes	yes	yes	yes	yes
GO230-231	18 MB HDU Control (XU 5010)	yes	no	no	no	no	no	no
GO230-231/A	18 MB HDU Control	yes	no	yes	yes	no	no	no
GO301-302	SMD3 interface control	yes	no	no	yes	no	no	no
GO301A-302A	SMD3 interface control	yes	no	yes	yes	no	yes	yes
GO404-405	ESDI interface control	no	no	no	yes	yes	yes	yes
	LINE CONTROLS AND SERIAL INTERFACES							
GO 156	V24, remote internal/external	yes	no	no	no	no	no	no
GO 300	V24, remote internal/external	yes	yes	yes	no	yes	yes	no
IF 192	MOIN 5.2 integrated modem	yes	yes	yes	yes	yes	yes	yes
GO 234	Lion 9.6	yes	no	no	no	no	no	no
GO 333	Lion 9.6	yes	yes	yes	no	yes	yes	no
GO 303 ($)	X21, external line	yes	yes	yes	no	yes	yes	no
GO 236 ($)	V24 + V24, with microprocessor	yes	yes	yes	yes	no	no	no
GO 331 ($)	V24 + V24, with microprocessor	yes	yes	yes	yes	yes	yes	yes
GO 256 ($)	V24 + Lion 200, with microproc.	yes	yes	yes	yes	no	no	no
GO 340 ($)	V24 + Lion 200, with microproc.	yes	yes	yes	yes	yes	yes	yes
GO 340/A($)	V24 + Lion 9.6, with microproc.	yes	yes	yes	yes	yes	yes	yes
GO 308 ($)	Omninet local network	yes	yes	yes	yes	yes	yes	yes
GO 212/A($)	Ethernet internal line	yes	yes	yes	yes	yes	yes	yes
GO 431	StarLan local network Dump	yes	yes	yes	yes	yes	yes	yes
GO 151	RS 232 and current loop interf.	yes	no	no	no	no	no	no
GO 327	RS 232 and current loop interf.	yes	yes	yes	no	no	no	no
GO 195	Pin pad/badge reader interf.	yes	no	no	no	no	no	no

Note: All control boards marked $ are Dual Port Memory type boards, of which there are two types, whole segment and half segment, the latter being the more recent.
The GO212/A, GO303, GO340/A and GO322 boards are exceptions and exist only in the new version.
The GO236 and GO331 are interchangeable if the former is modified to half segment.

It is essential for all Dual Port Memory boards on a system to be of the same type, i.e. all whole segment or all half segment.

2. INSTALLATION

This chapter is divided into 4 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 basic unit SB0 and the external modules SB1 and SB2.

The third section is on workstation organization, while the fourth and final 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 systems and system peripherals. For more detailed information, see the "Site Preparation Guide", code number 3932790 N.

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 Italian ENPI standards require a resistance of 20 ohms maximum for operator protection.

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 L1 systems may be connected to the same mains power source, provided each machine has its own plug.

Temperature and humidity

The table below indicates 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.

MODULE	OPERATION		STATIONARY		STORAGE	
	TEMP. °C	UMID. %	TEMP. °C	UMID. %	TEMP. °C	UMID. %
M64 - M70	10 - 40	10 - 95	5 - 50	5 - 95	-15 - +55	5 - 95
FDU - 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
MTU	10 -32.8	15 - 95	5 - 50	10 - 90	-30 - +50	10 - 90
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 used.

Dust

Systems may be installed in a normal room designed for office purposes so 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 technical service.
Systems should not be installed in full sunlight or near direct heat sources.
A free flow of air should be guaranteed the system and all inlets left unobstructed.

2.2 ASSEMBLY/DISASSEMBLY

As stated, the modules making up the M64 and M70 systems are the SB0, SB1 and SB2. While for the SB0 and SB2, there are no major differences between their use on the M64 and M70 systems, use of the SB1 is strictly related to the type of system and configuration. Therefore, the procedures for assembly and disassembly of the modules will be described below irrespective of the system used and any differences from system to system pointed out.

Note: After unpacking the system, the blocking plates must be removed. These plates are generally inside the system and are designed to block the boards in the board rack and to block peripherals, etc. They are easily recognized by their distinctive yellow colour, forming a strong contrast with the rest of the system. They must be removed before the system is powered for the first time so as to avoid possible damage to the system parts.

2.2.1 REMOVING THE SB0 CABINET PANELS

To remove the panels of the SB0 cabinet casing (see figure 2-1), the procedure is as follows:

- **Upper shelf:** Lift up and remove the upper shelf, applying pressure with a screwdriver in position "1"

- **Side panels:** After removing the upper cover panel from the machine, loosen the two screws (position 2) securing each panel and then remove the panels by lifting upwards

- **Front panel:** Loosen the two screws towards the top in position "3" and remove the panel by first pulling it backwards and then lifting up.

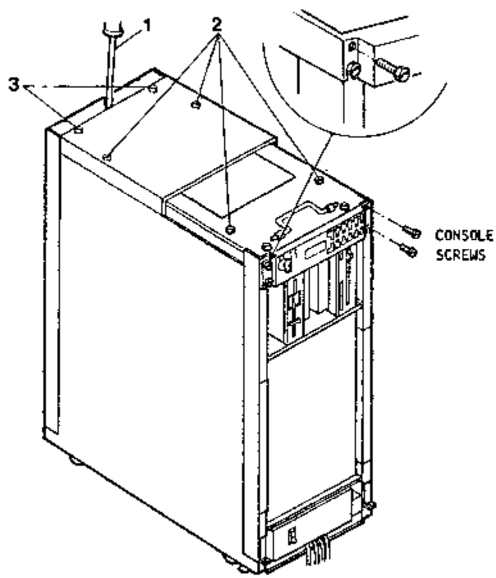


Fig. 2-1 Removing the SB0 Cabinet Panels From the Front

- **Rear panels:** the rear of the cabinet consists of three panels (see figure 2-2):

  . D-BOX support frame cover - unscrew the screw in position "1" and remove panel by drawing backwards

  . Rear cover - unscrew the two screws towards panel top and remove panel by drawing it back and then lifting it upwards

  . Power supply grid panel - slacken the four screws in position "3" and remove panel by drawing backwards.

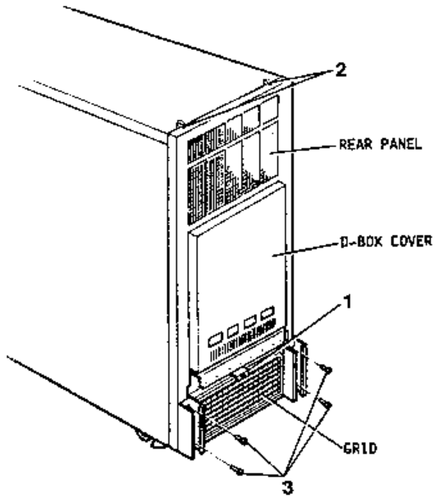


Fig. 2-2 Removing Panels at Rear of SB0 Cabinet

2.2.2 REMOVING SB1 CABINET PANELS

The procedure for removal of the SB1 cabinet casing panels (see figure 2-3) is as described below:

- **Upper shelf:** Lift up and remove the upper shelf, applying pressure in position "1" with a screwdriver
- **Right side panel:** After removing the upper cover panel of the SB1 cabinet, slacken the two screws (position 2) securing the panel and remove by lifting upwards
- **Front panel:** After removing the upper cover panel of the SB1 cabinet, loosen the two screws at panel top in position "3" and remove panel by first drawing backwards and then upwards
- **Rear panel:** After removing the upper cover panel of the SB1 cabinet, slacken the two screws at panel top in position "4" (see figure 2-4) and remove panel by first pulling backwards and then upwards.

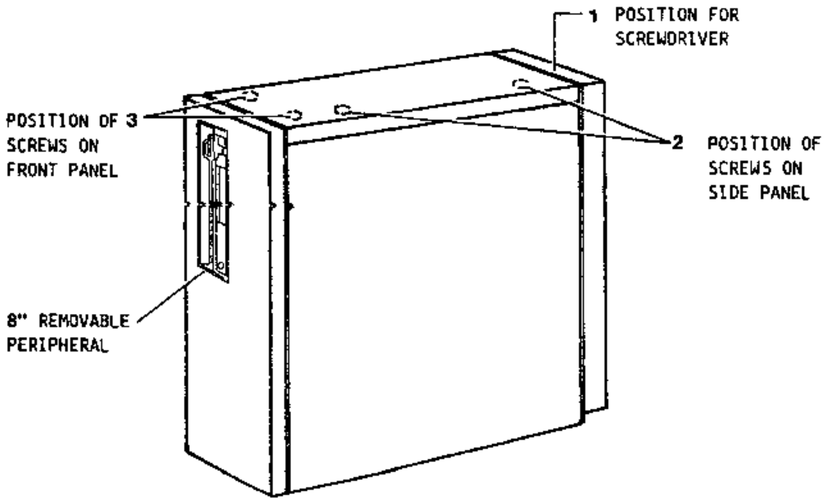


Fig. 2-3 Front View of SB1 Cabinet

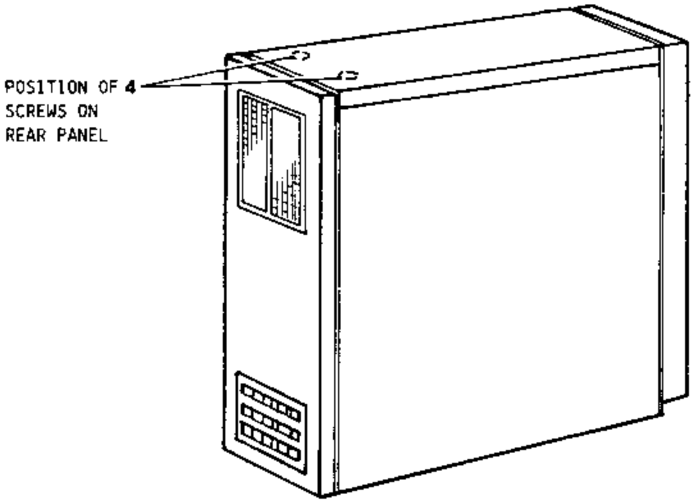


Fig. 2-4 Rear View of SB1 Cabinet

2.2.3 BASIC CONSOLE ASSEMBLY AND DISASSEMBLY (M64 ONLY)

Disassembly

See figure 2-5.

- Unscrew the two upper screws and loosen the two lower screws securing the console to the frame (see figure 2-1)
- Lift out console and disconnect the following connectors:
    - . Console power supply signals connector (white flat cable)
    - . Back plane signals connector
    - . Connector to and from C.U.
    - . Mains assembly connector.

Assembly

To reassemble console, reverse the disassembly operations outlined above.

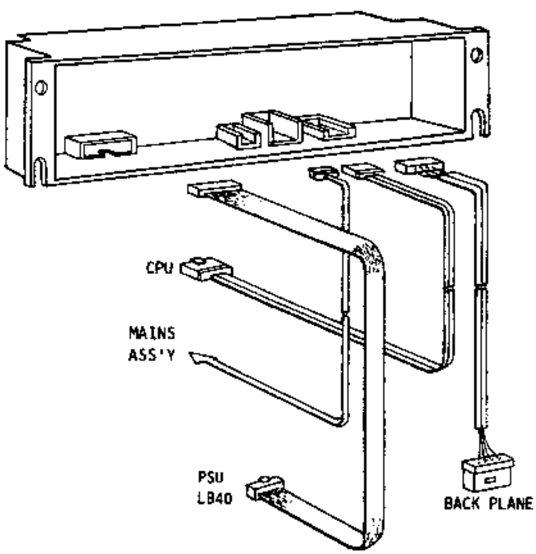


Fig. 2-5 Rear View of Basic Console and Connectors

2.2.4 DISASSEMBLY AND ASSEMBLY OF EXTENDED CONSOLE

Disassembly

See figure 2-6.

- Remove the SB0 upper panel (see section 2.2.1)
- Remove the cover from the top of the SB0 by unscrewing the screw securing it to the frame (to have access to the connectors on the rear of the REDAC board)
- Unscrew the screw securing REDAC board to frame
- Disconnect all connectors on rear of REDAC board (see figure below)

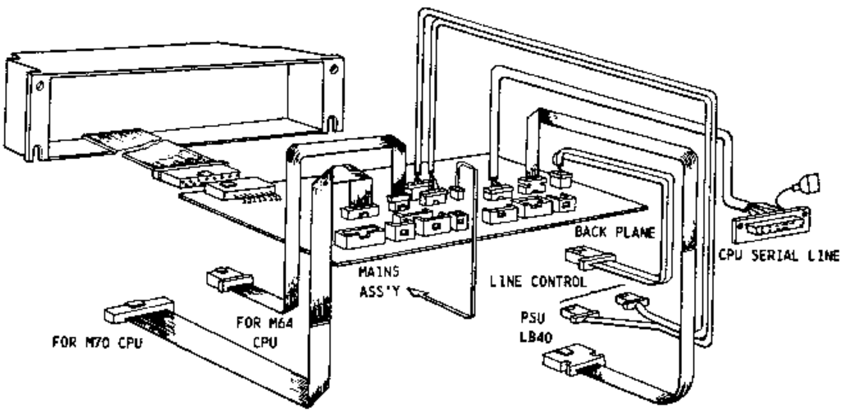


Fig. 2-6 Rear View of Extended Console and REDAC Board

. Unscrew two upper screws and slacken the two lower screws securing console to structure (see figure 2-1)

. Remove console and REDAC board.

Assembly

To reassemble console, reverse the disassembly operations outlined above.

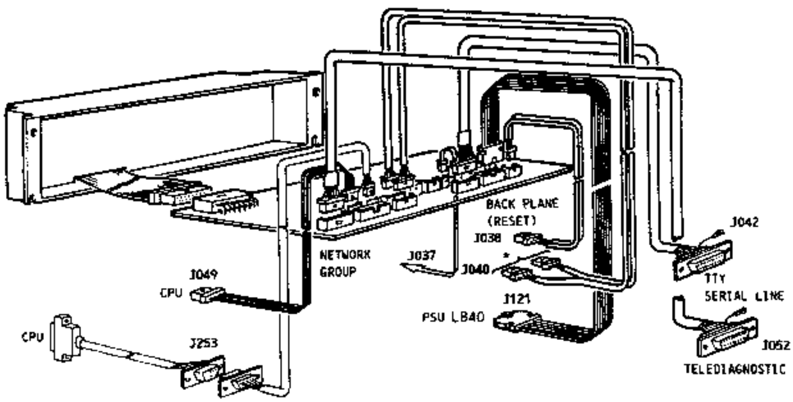
2.2.5 DISASSEMBLY AND ASSEMBLY OF SSM CONSOLE

The procedure below is valid for consoles both with and without the telediagnostic feature.

Disassembly

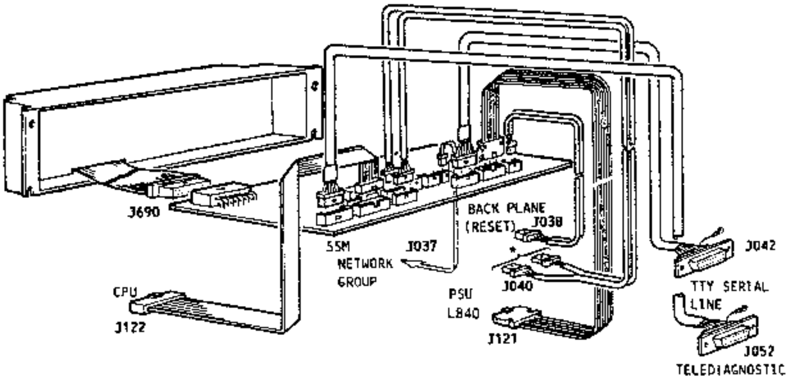
See figure 2-7 for M64 and 2-8 for M70.

- Remove the SB0 top panel (see 2.2.1)
- Remove the cover on the top of the SB0 after unscrewing the screw securing it to the frame (to access the connectors on the rear of the SSM board)
- Unscrew the screw securing the SSM board to the structure
- Disconnect all connectors on the rear of the SSM board.



* LINE CONTROLLER (UNATTENDED)

Fig. 2-7 Rear View of Extended Console and SSM Board for M64



* LINE CONTROLLER (UNATTENDED)

Fig. 2-8 Rear View of Extended Console and SSM Board for M70

. Unscrew the two upper screws and loosen the two lower ones securing the console to the frame (see figure 2-1)

. Remove the console together with the SSM board.

Assembly

To reassemble the console, reverse all the disassembly operations outlined above.

2.2.6 DISASSEMBLY AND ASSEMBLY OF CONSOLE IN SB1

Disassembly

See figure 2-9 and proceed as follows:

- Remove the top panel of the SB1 (see section 2.2.2).
- Unscrew the two upper screws and loosen the two lower screws securing the console to the frame.
- Disconnect the connectors connecting to the console (only for SB1 with a HDU).

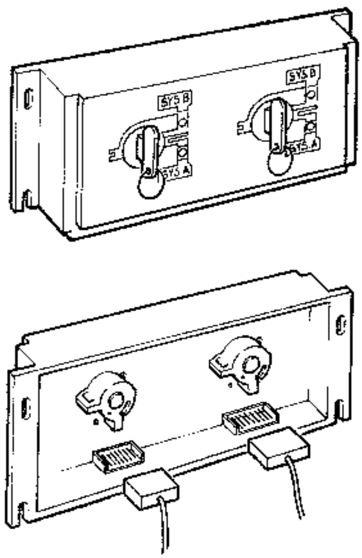


Fig. 2-9 Front and Rear Views of Console in SB1 Cabinet for 2 HDU's

Assembly

To reassemble the console, reverse all the disassembly operations outlined above.

2.2.7 DISASSEMBLY AND REASSEMBLY OF POWER SUPPLY LB40

Disassembly

See figure 2-10.

- Remove the grid panel at the bottom of the lower part of the SB0 cabinet (see section 2.2.1)
- Remove the AMP MOD 1 10x2-way connector (console signals)
- Remove the white 4-way connector for the +35 V and ground
- Remove the green connector of the +12 V and -12 V
- Unscrew the three screws connecting the ground cables (black) and remove the cord ends from the nuts
- Unscrew the three screws securing the three +5 V cables (red) and remove cord ends from nuts
- Unscrew the two screws of the "L"-shape band connecting the logic ground to the system ground and securing the LB40 power supply board to the frame
- Remove the power supply from its position by sliding it backwards on its guide-rails.

Assembly

- Set power supply in position by sliding it along its guides
- Reverse the disassembly procedure outlined above.

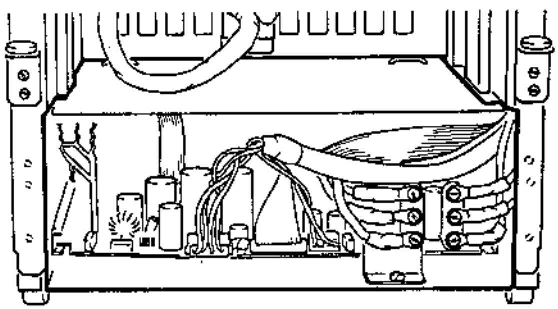


Fig. 2-10 Rear View of Power Supply LB40

2.2.8 DISASSEMBLY AND REASSEMBLY OF POWER SUPPLY LB12 (M70 ONLY)

Disassembly

See figure 2-11.

- Remove the rear panel of cabinet SB1 (see section 2.2.2)
- Remove the grid at the bottom of the lower part of the SB1 cabinet by unscrewing the two screws securing it to the frame
- Remove the black, 4-way connector (LB40 control signals)
- Unscrew the three screws securing the three ground cables (red) and remove plugs from nuts
- Unscrew the three screws connecting the three +5 V cables (red) and remove plugs from nuts
- Unscrew the two screws of the "L"-shape band connecting the logic ground to the system ground and blocking the LB12 power supply board to the frame
- Remove power supply from its position by sliding backwards along guide-rails.

Assembly

- Set power supply in position by sliding it along its guides
- Reverse the disassembly operations outlined above.

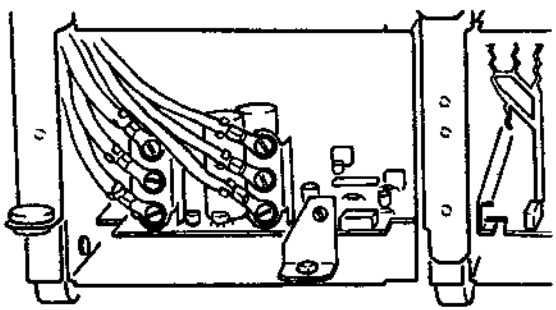


Fig. 2-11 Rear View of Power Supply LB12

2.2.9 DISASSEMBLY AND REASSEMBLY OF LS10 POWER SUPPLY

This power supply is used to power one or two HDU mounted in the SB1 cabinet with a Dual-port board if the HDU are to be shared between two systems.

Disassembly

See figure 2-12 and proceed as follows:

- Remove the rear panel of the SB1 cabinet (see section 2.2.2).
- Remove the protective grid on the top rear of the SB1 cabinet unscrewing the two screws securing it to the structure.
- Remove the 6-way, MODU I input connector (110/220 V power supply voltage coming from the SB0 mains box).
- Remove the 4-way, MODU I (+5 V power supply voltage plus reset signal for the Dual-port board) and the 4-way MATE-N-LOK output connectors (+5 V and +12 V power voltages for the HDU peripherals).
- Unscrew the two screws of the "L"-shape band connecting the logic ground to the system ground and blocking the LS10 power supply to the system frame.
- Slide the power supply backwards to remove it from its housing.

Assembly

- Insert the power supply by sliding it along its guide rails.
- Reverse the power supply disassembly operations outlined above.

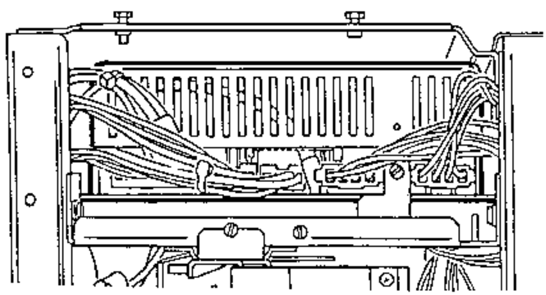


Fig. 2-12 Rear View of LS10 Power Supply

2.2.10 DISASSEMBLY AND ASSEMBLY OF REMOVABLE PERIPHERALS ON SB0

Disassembly

See figure 2-13.

- Remove front panel (see section 2.2.1)
- Remove peripheral shielding grid
- Unscrew two screws securing peripheral to frame
- Disconnect the signals/data flat cable on rear of peripheral
- Disconnect power cable on front of peripheral unit
- Remove peripheral by sliding it along the guide-rails.

Assembly

To reassemble peripheral, reverse the disassembly operations outlined above.

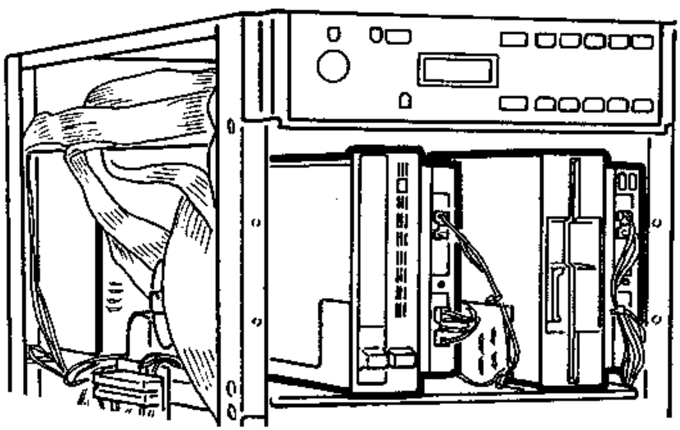


Fig. 2-13 View of Removable Peripherals

2.2.11 DISASSEMBLY AND ASSEMBLY OF FIXED PERIPHERALS ON SB0

Disassembly

See figure 2-14.

- Remove the rear panel and the left side panel (see section 2.2.1)

- Remove peripheral unit shield grid

- Unscrew the two screws securing peripheral to frame

- Disconnect the AMP MOD 4 connector (green colour) of the +35 V e relative ground (red and black wires, respectively)

- On the SB0 left side, disconnect the small, data flat cable (one for each peripheral)

- On the SB0 left side, disconnect the flat cable of the peripheral unit control signals

- Remove the peripheral by sliding it along its guides.

Assembly

To assemble peripheral, reverse the disassembly operations outlined above.

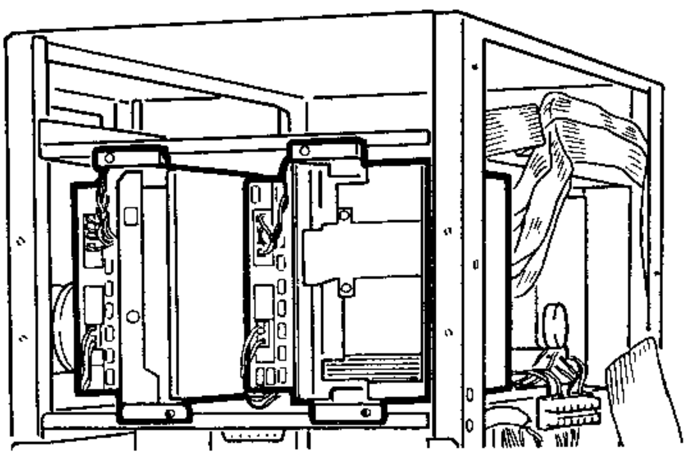


Fig. 2-14 Rear View of Fixed Peripheral Units

2.2.12 ASSEMBLY/DISASSEMBLY OF DC/DC CONVERTER FOR FIXED AND REMOVABLE PERIPHERALS

Disassembly

See figure 2-15. Remove the peripheral (see relative section: 2.2.7 for removable peripheral, 2.2.8 for fixed peripheral) Disconnect connector of +35V power supply and relative ground (green AMP MOD 4 connector) of the DC/DC converter Disconnect the connector of the +12 V (for DC/DC 36/512) or 24 V (for DC/DC 36/524), 5 V power and ground (green AMP MOD 6 connector on side of DC/DC converter, white 4-way on side of peripheral) Unscrew the four screws (see figure below) securing the DC/DC converter to the left side of the peripheral frame.

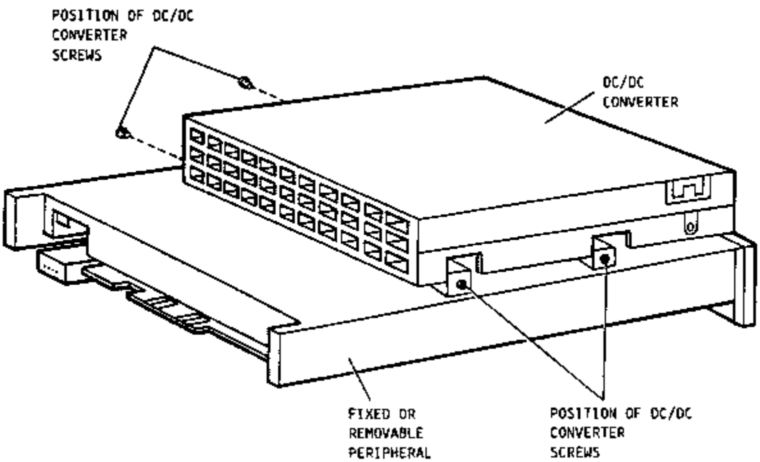


Fig. 2-15 Side View of DC/DC Converter

Assembly

To mount DC/DC converter on peripheral, reverse the disassembly operations outlined above.

The two power wires of the DC/DC converter on the open side must be connected to the +35 V and ground of the LB40 power supply; this connection can be made directly on a terminal strip on the left of the basic cabinet.

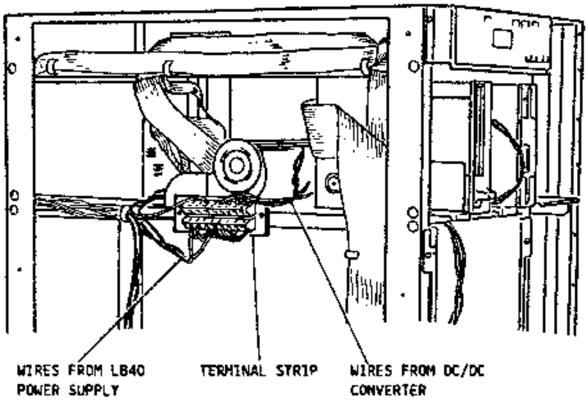


Fig. 2-16 Side View of Terminal Strip for DC/DC Converter Power

2.2.13 DISASSEMBLY AND ASSEMBLY OF D-BOX

Disassembly

See figures 2-2 and 2-17 and proceed as follows:

- Remove the SB0 rear panels.

- Disconnect any cables connected to D-BOX.

- Unscrew the two screws securing the D-BOX connector to the MUX and disconnect the connector.

- If the D-BOX is old type, unscrew the two screws securing it to the structure.

  If D-BOX is new type, the procedure is:

  . Unscrew the three screws securing the D-BOX to the support board

  . Remove the D-BOX support plate after unscrewing the four screws securing it to the frame

  . Unscrew the four frame spacer screws.

Assembly

To set the D-BOX back in position, reverse the disassembly operations described above.

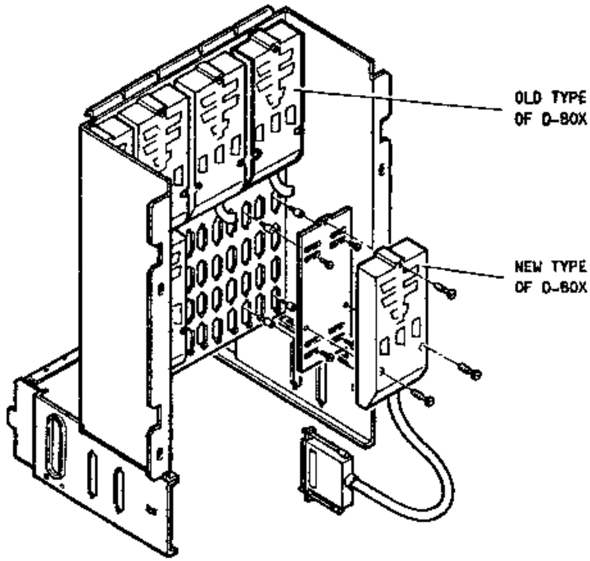


Fig. 2-17 New and Old Types of D-BOX

2.2.14 DISASSEMBLY AND ASSEMBLY OF C-BOX

Disassembly See figures 2-2 and 2-18 and proceed as follows:

- Remove the S80 rear panels
- Disconnect any cables connected to the C-BOX
- Unscrew the two screws securing the C-BOX connector to the line controller and remove connector
- Unscrew the three screws securing the C-BOX to the support plate
- Remove the C-BOX support plate after unscrewing the four screws securing it to the frame
- Unscrew the four frame spacer screws.

Assembly

To set the C-BOX back in position, reverse the disassembly operations described above.

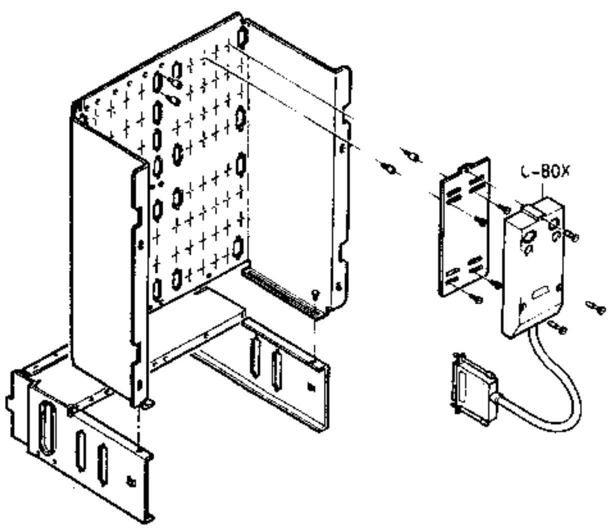


Fig. 2-18 C-BOX and Support

2.2.15 DISASSEMBLY/ASSEMBLY OF BACK PLANE IN080 (M64 ONLY)

Disassembly

- Remove the front panel and side panel of the SB0 (see section 2.2.1)
- Remove all the 3000-type boards from system
- Remove the SB0 rear panels
- Remove all D-BOXes and connectors connected to the MUX (see figure 2-19)
- Unscrew the four screws of the D-BOX support structure (see figure 2-19)
- Remove D-BOX support

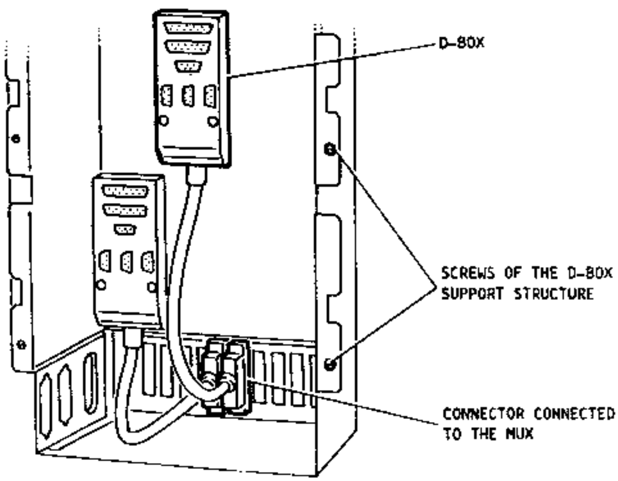


Fig. 2-19 D-BOX Support

- Disconnect the three, red +5V power cables and the three black ground cables (see figure 2-21) on the left of the SB0 (see figure 2-20)
- Remove the +/- 12V line connector beside the power cables (see figure 2-21)
- Disconnect connector of the RESET and POWFA signals beside the power supply cables (see figure 2-21)
- Unscrew the six screws securing the back plane to the casing and remove.

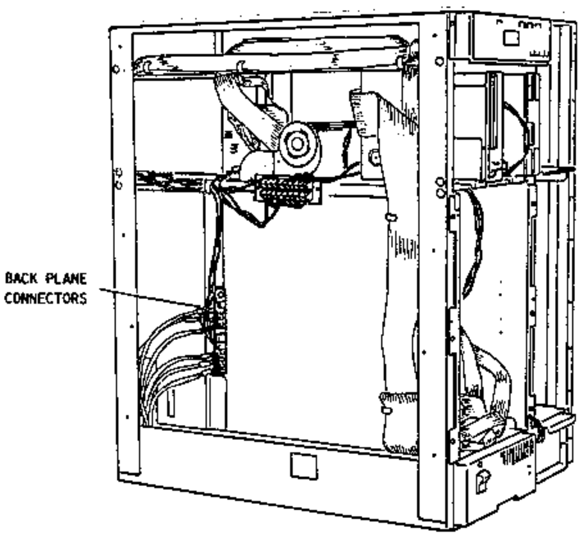


Fig. 2-20 Position of Back Plane Connectors in System Structure

Assembly

To mount back plane, reverse the disassembly operations described above.

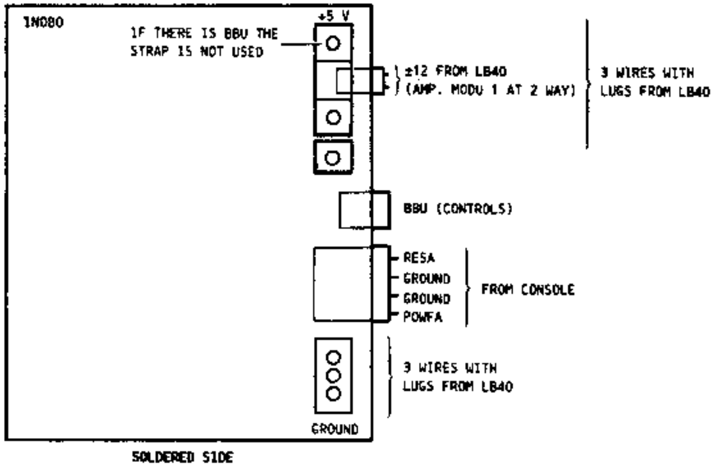


Fig. 2-21 Rear View of Back Plane and Connectors

2.2.16 DISASSEMBLY/ASSEMBLY OF BACK PLANE 1N087 (M70 ONLY)

Disassembly

- Remove the SB0 front and side panels (see section 2.2.1)
- Remove all 3000 and 8000-type boards from system
- Remove SB0 rear panels
- Remove all D-BOXes and D-BOX connectors connected to the MUX (see figure 2-19)
- Unscrew the four D-BOX support structure screws (see figure 2-19)
- Remove D-BOX support
- Disconnect the three, red +5V power cables and the three black cables (see figure 2-23) on the left side of the SB0 (see figure 2-22)
- Remove the +/- 12V line connector beside the power cables (see figure 2-23)
- Disconnect connector of the RESET and POWFA signals beside the power supply cables (see figure 2-23)
- Unscrew the screws (twelve) securing the back plane to the casing and remove.

Assembly

To mount back plane, reverse the disassembly operations described above.

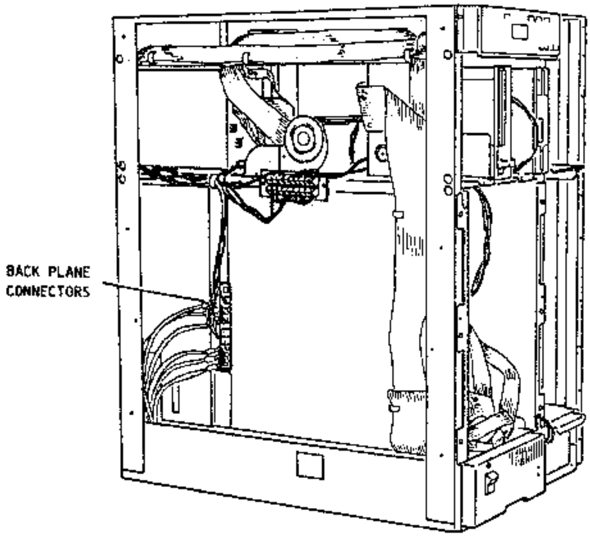


Fig. 2-22 Position of Back Plane Connectors in System Structure

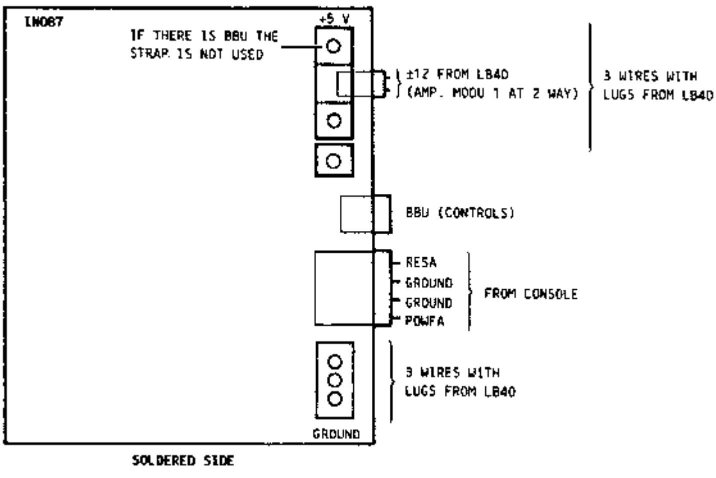


Fig. 2-23 Rear View of Back Plane and Connectors

2.2.17 DISASSEMBLY/ASSEMBLY OF BACK PLANE IN088 (M70 ONLY)

Disassembly

- Remove SB0 front and side panels (see section 2.2.1)
- Remove the front and right side panels of the SB1 (see section 2.2.2)
- Remove all the 3000 and 8000-type boards from the SB0 and SB1
- Remove the rear panels of the SB0 and the rear panel of the SB1
- Remove all the D-BOXes and connectors connected to the MUX (see figure 2-19)
- Unscrew the four screws of the D-BOX support structure (see figure 2-19)
- Remove the D-BOX support
- Disconnect the three red +5V power cables and the three black ground cables (see figure 2-25) from the SB0 left side (see figure 2-24)
- Disconnect the three red +5V power cables and the three black ground cables (see figure 2-25) from the SB1 right side (see figure 2-24)
- Remove the +/- 12V line connector beside the power cables on the SB0 left side (see figure 2-24)
- Disconnect the RESET and POWFA signals connector beside the cables on the left side of the SB0 (see figure 2-24)
- Unscrew the screws (twenty) securing the back plane to the casing and remove.

Assembly

To mount the back plane, reverse the disassembly operations described above.

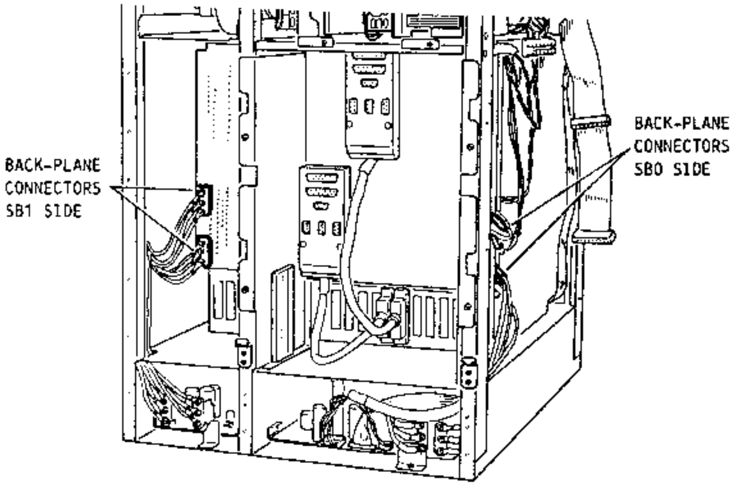


Fig. 2-24 Position of the Back Plane Connectors in the System

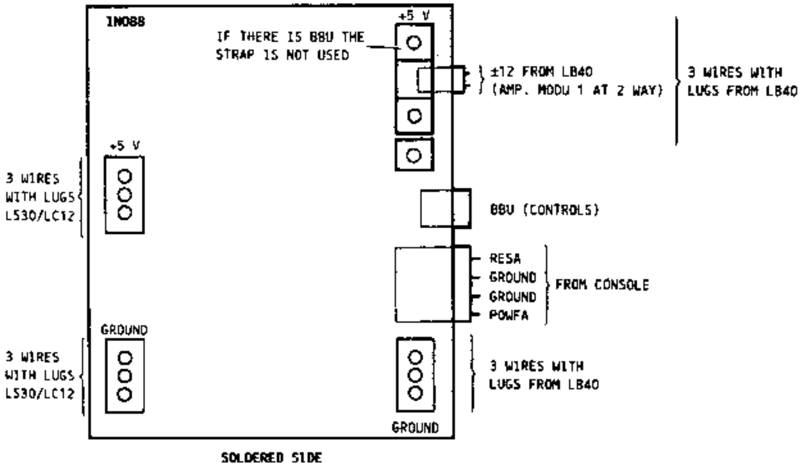


Fig. 2-25 Rear View of Back Plane and Connectors

2.2.18 DISASSEMBLY/ASSEMBLY OF MAINS GROUP ON SB0 CABINET

Disassembly

See figure 2-26.

- Remove the front panel (see section 2.2.1)

- Unscrew the screws securing the mains group to the frame

- Remove the following connectors:

  . Mains 110/220 V (3 brown, green, yellow-green wires)

  . Floppy power in SB1 (for OPE 8" floppy)

  . SB0 fan power

  . Fan and mains group for SB1 cabinet on M70 with 16 board slot back plane.

- Remove the mains box by pulling outwards (there are no guides).

Assembly

To mount the mains group, reverse the disassembly operations described above.

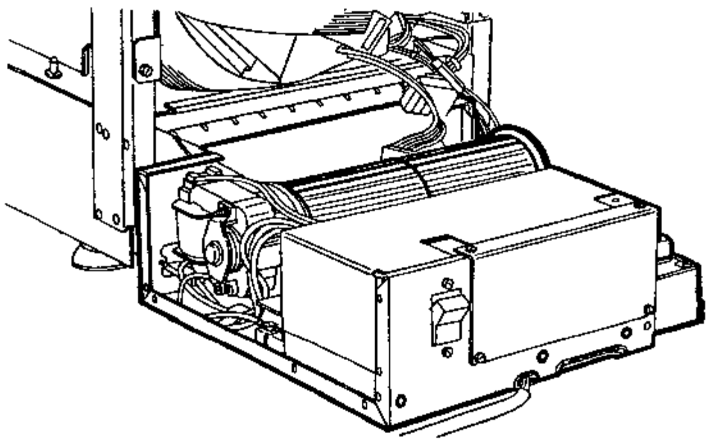


Fig. 2-26 Mains Group on SB1 Cabinet

2.2.19 DISASSEMBLY/ASSEMBLY OF MAINS GROUP ON SB1 CABINET

Disassembly

See figure 2-27.

- Remove front panel (see section 2.2.2)
- Unscrew screws securing mains group to frame
- Remove mains 110/220 V connector (3 brown, yellow, yellow-green wires)
- Remove mains box by pulling outwards (there are no guides).

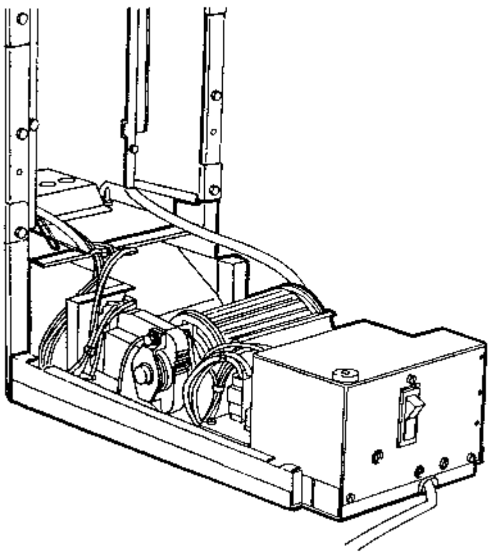


Fig. 2-27 Mains Group on SB1 Cabinet

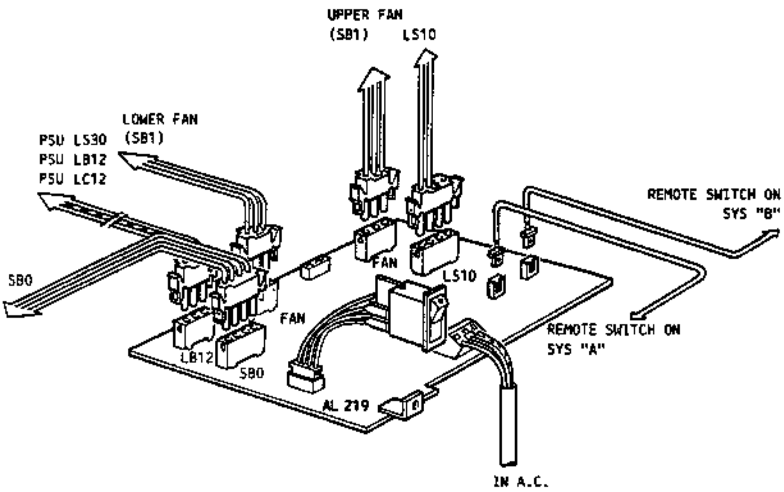


Fig. 2-28 SB1 Mains Group Connectors

2.2.20 INSTALLATION OF SB1 CABINET

The procedure to attach SB1 cabinet to SB0 cabinet is as follows:

- Remove the SB0 and SB1 upper shelves (see section 2.2.1)
- Remove the SB0 right side panel (see section 2.2.1)
- Unscrew the terminals on the SB0 frame lower right (see figure 2-29) and mount them on the bottom right of the SB1
- Set the SB1 and the SB0 side by side and secure by tightening the two screws on the upper protrusion of the SB0 and the six internal screws
- Replace the upper shelves and the right side panel (removed from the SB0) on the SB1.

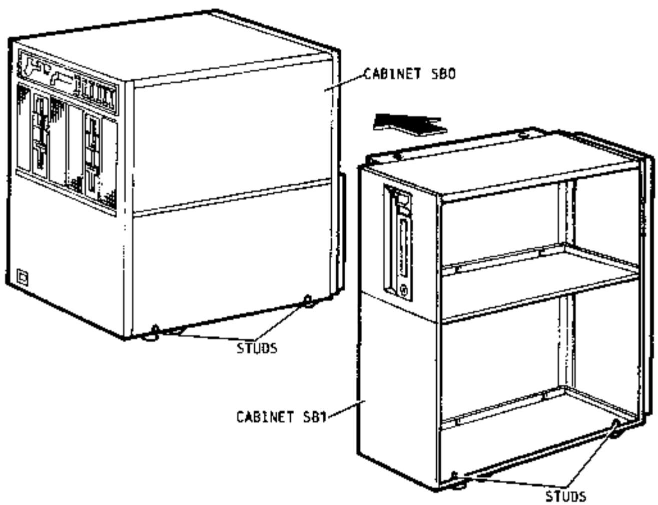


Fig. 2-29 Front View of SB0 and SB1 Frames

2.2.21 REMOVABLE PERIPHERAL DISASSEMBLY/ASSEMBLY ON SB1

Disassembly

See figure 2-30.

- Remove shelf and front panel of SB1
- Remove SB1 side panel
- Unscrew the two screws securing the peripheral to the frame
- Disconnect the signals/data flat cable on the peripheral rear
- Disconnect the power cable coming from the DC/DC converter DCA 36/524 (6-way orange connector) on the right-hand side of the peripheral
- Disconnect the power (220 V) cable from the terminal strip on the top part of the peripheral and which is accessed through the slot on the upper shelf of the SB1 cabinet (the slot is normally covered by a plate screwed to the SB1 frame)
- Remove the peripheral by sliding it along its rails.

Assembly

To mount the peripheral, reverse the disassembly operations described above.

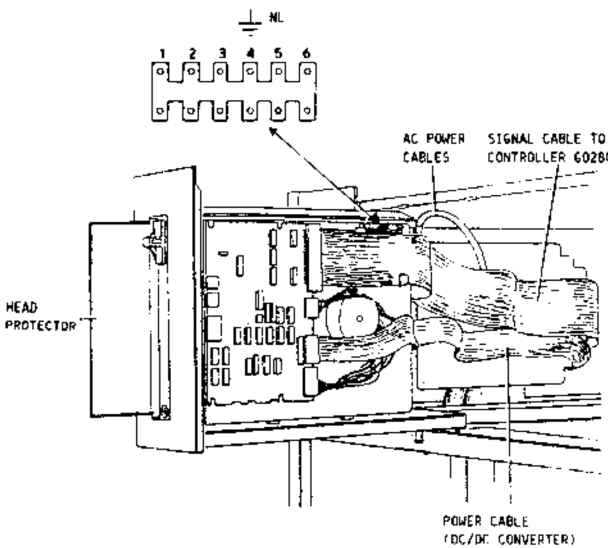


Fig. 2-30 Peripheral Unit on SB1 Cabinet

2.2.22 FIXED PERIPHERAL ASSEMBLY/DISASSEMBLY ON SB1

Disassembly

See figure 2-31 and proceed as follows:

- Remove the SB1 rear or front panel (depending on whether the peripheral is to the front or the rear) and right side panel (see 2.2.2)
- Remove the shielding grid on the peripheral (if present)
- Unscrew the two screws securing the peripheral to the frame
- Disconnect the peripheral power supply connector coming from the LS10 power supply
- On the SB1 right side, disconnect the small data flat cable (one for each peripheral) coming from the HDU controller (ESDI interface)
- On the SB1 right side, disconnect the commands flat cable (one for each peripheral) coming from the HDU controller (ESDI interface)
- Slide the peripheral along its guides and remove.

Assembly

To set the peripheral back in position, reverse the disassembly operations outlined above.

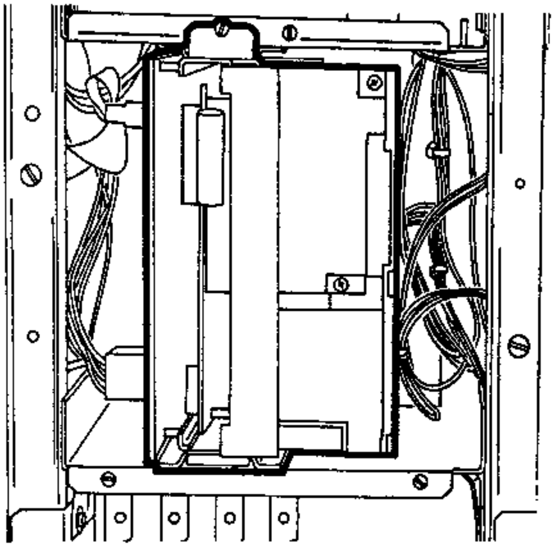


Fig. 2-31 Rear View of Fixed Peripheral in SB1

2.2.23 INSTALLATION OF CABINET FOR MTU (SB2)

There are no particular installation conditions for this module. The main operations to be performed are:

Check power cables are connected correctly.

Connect cables from controllers to relative controllers.

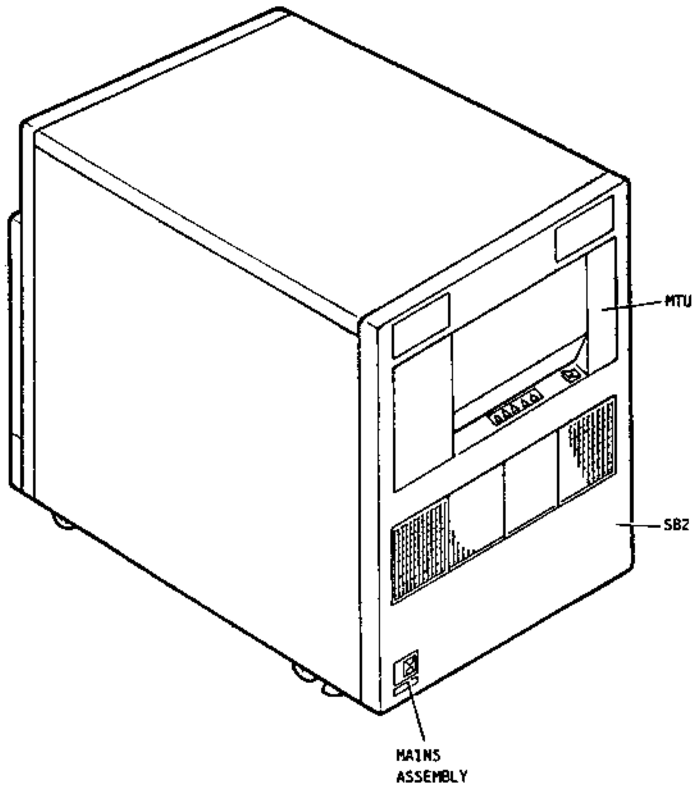


Fig. 2-32 SB2 Cabinet Front

2.2.24 INSTALLATION OF CPU BOARDS FOR M64, M70 AND M70/2/3 SYSTEMS

Disassembly

- Remove the upper panel and the front panel of the S80 cabinet
- Remove the console signals connector from the CPU board in logic position "zero" (first board on left of rack in S80 for M64 and M70 monoprocessor)
- **For M70/2 and M70/3 multiprocessor systems only**
  Remove the flat connector for connection of CPU boards (in logic positions "zero" and "one", and "zero", "one" and "two" for M70/2 and M70/3 systems, respectively)
- Remove the 3000-type CPU board UC070 for M64 and the 8000-type UC071 for M70/2/3 by pulling it out of the rack.

Assembly

To mount the CPU board, reverse the disassembly operations described above.

For M70/2 and M70/3 multiprocessor systems only

For M70/2 and M70/3 multiprocessor systems, connect the CPU boards as shown in figure 2-33 using the flat cable illustrated in figure 2-34.

Note: The CPU board UC071, the flat cable and the system name plates are part of the kit APU 7070.

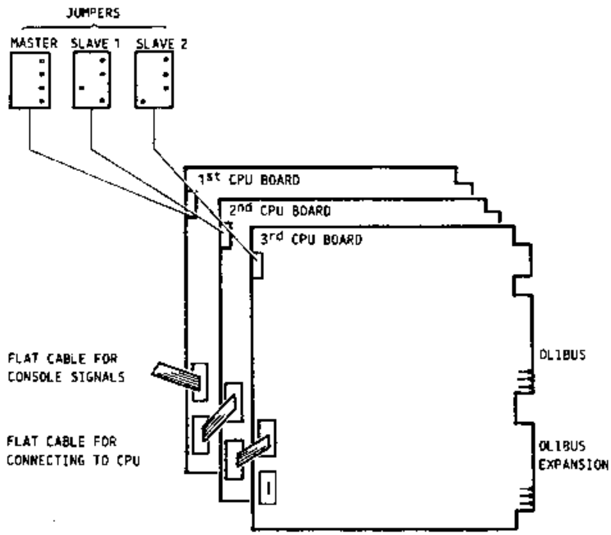


Fig. 2-33 Connection of CPU Boards for Multiprocessor Systems

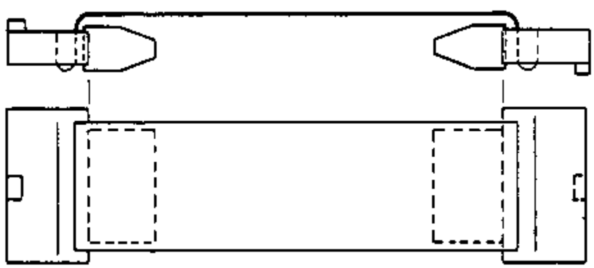


Fig. 2-34 Flat Cable for Connection of CPU Boards on Multiprocessor Systems

2.3 WORKSTATIONS

L1 system workstations consist basically of the following elements:

- Multiplexer controller GO 322
- Distribution box D-BOX
- Electronics box ELB 3683 or ELB 3684
- Current Loop connection line
- Galvanic separation box T-BOX (TBX 9020).

These elements are examined individually in the following sections.

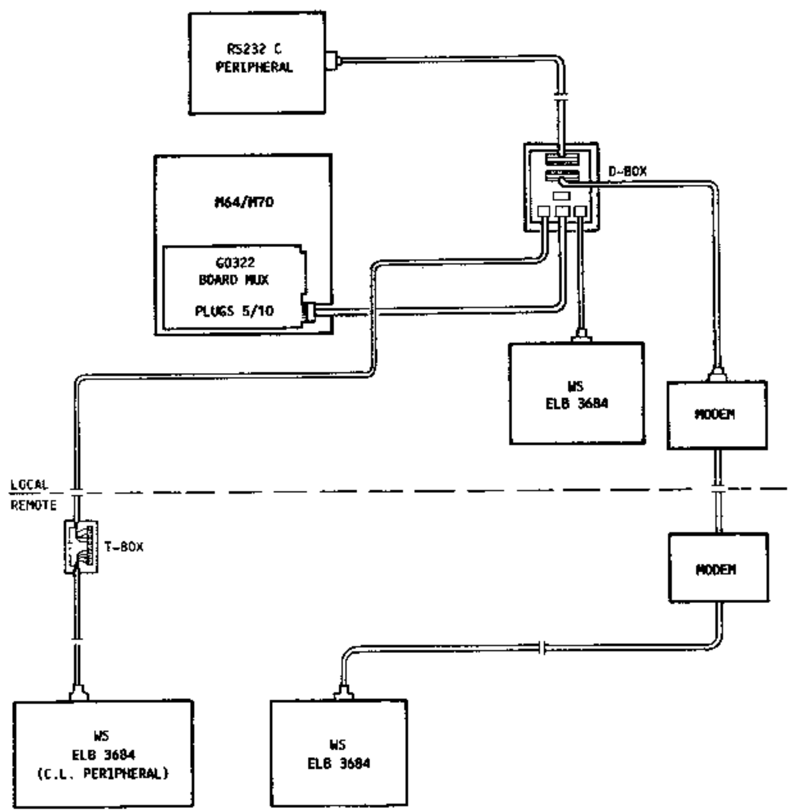


Fig. 2-35 Workstation Installation Diagram

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/s.
Its interfaces are the "20 mA Current Loop" and "RS 232 C".
All connections between this controller and peripherals are by way of the 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.
It is mounted on a frame (on the rear of the SB0 cabinet) supporting up to a maximum of 8 D-BOXes.

It also has a cable 30 cms. long with, at one end, a connector plugging into the MUX board.

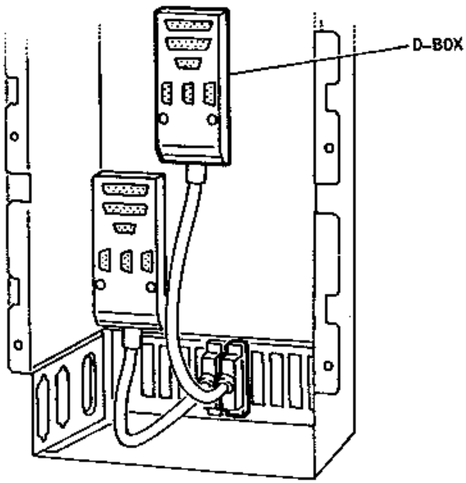


Fig. 2-36 D-BOX Support Frame on SB0 Cabinet

2.3.3 ELECTRONICS BOX ELB 3683/4

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

- COMPOSITION:

  Power supply unit LG03
  Electronics motherboard BA126
  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:

  Video-keyboard interface
  Two RS 232 C interfaces
  Two TTL interfaces

Note: The ELB 3684 differs from the ELB 3683 only because it is possible to have several virtual channels on the Host line. This manual, therefore, refers only to workstations based on the ELB 3684.

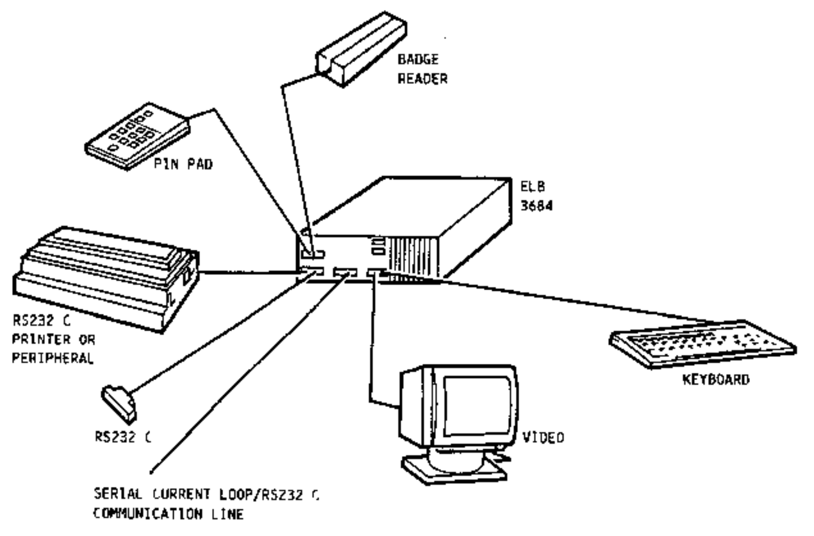


Fig. 2-37 Diagram of Connection Between ELB 3684 and Peripherals

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.

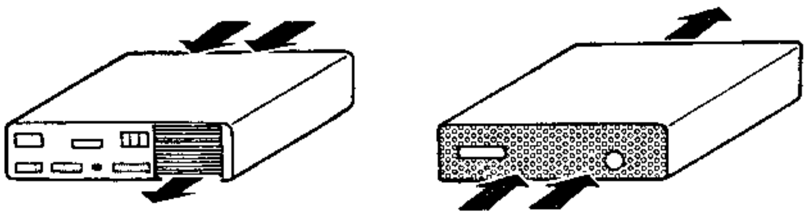


Fig. 2-38 ELB 3684 Ventilation

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.

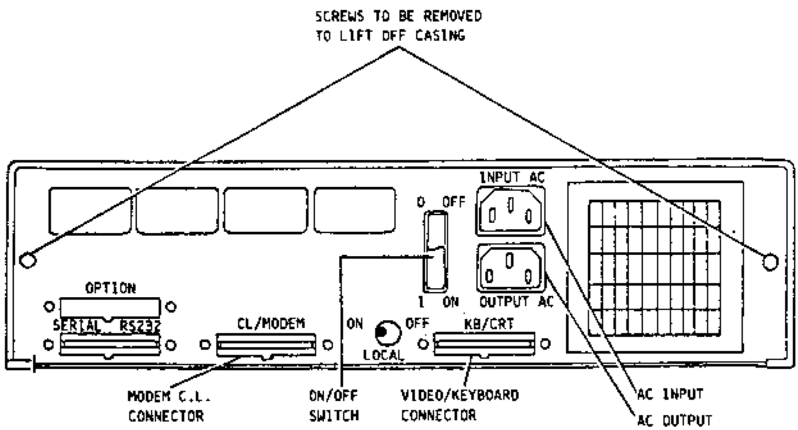


Fig. 2-39 Removing the ELB 3684 Casing

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 BA126 and G0329.

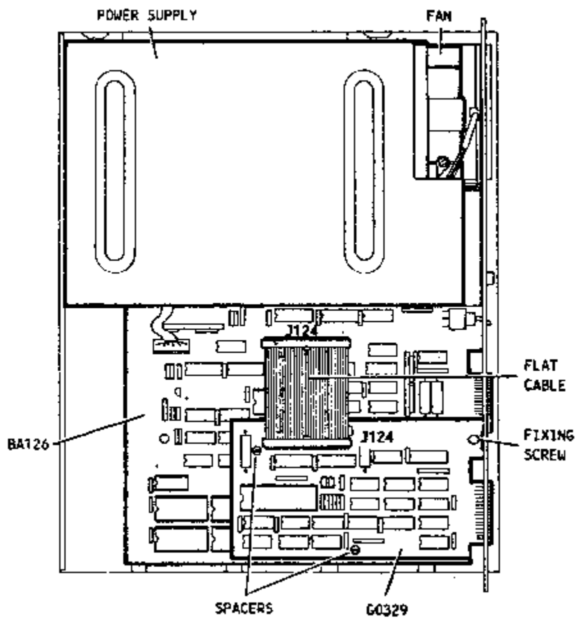


Fig. 2-40 Assembly of Pin Pad and Badge Reader Option Board

Power supply assembly

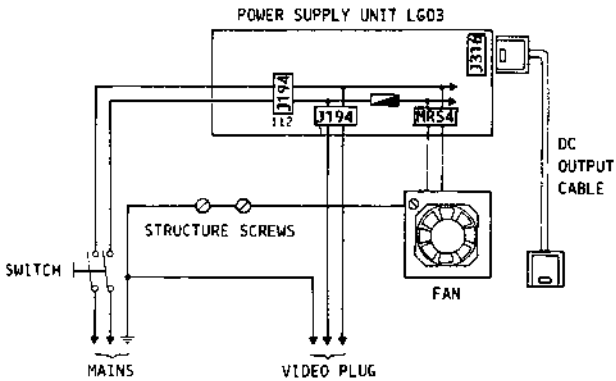
The power assembly LG03 is contained in a sheet metal structure including the fan, switch, power plug and video socket. The assembly is in two parts:

- 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. 2-41 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 7090 is used.
The twin leaf connector plugs into the connector marked 'CL/MODEM' on the ELB 3684; the other end goes into one of the four 9-pin connectors on the D-BOX, depending on the channel used.

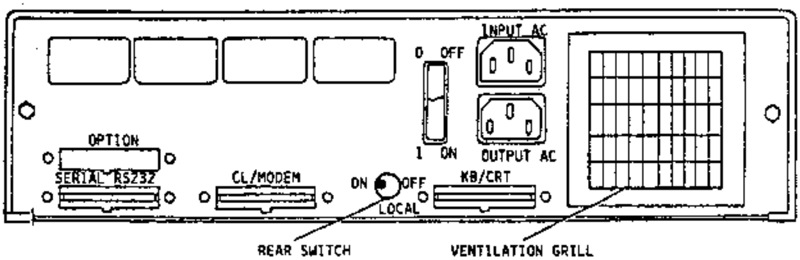


Fig. 2-42 ELB 3684 Rear View

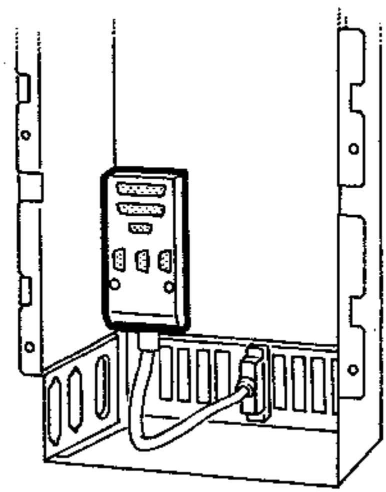


Fig. 2-43 D-BOX Front View

Power supply assembly

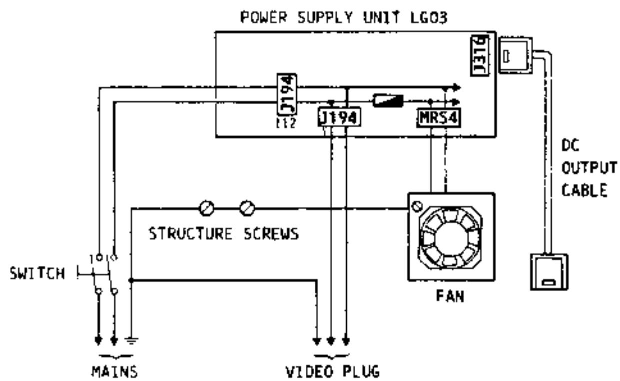
The power assembly LG03 is contained in a sheet metal structure including the fan, switch, power plug and video socket. The assembly is in two parts:

- 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. 2-41 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 7090 is used.
The twin leaf connector plugs into the connector marked 'CL/MODEM' on the ELB 3684; the other end goes into one of the four 9-pin connectors on the D-BOX, depending on the channel used.

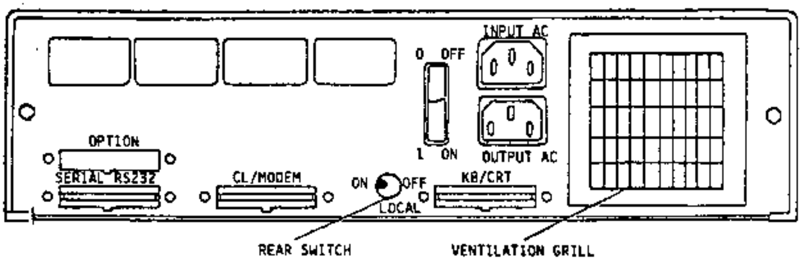


Fig. 2-42 ELB 3684 Rear View

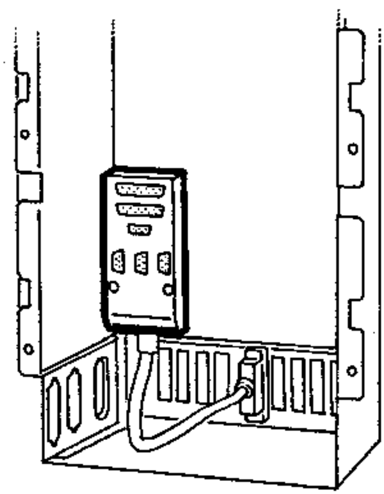


Fig. 2-43 D-BOX Front View

T-Boxes are inserted in remote connections of over 10 metres and also in shorter, local connections where the ELB 3684 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 3684 wires are connected to the T-Box in the same way as seen earlier for the D-Box and illustrated in figure 2-16.

T-BOX TERMINAL	CBL 3610
+T	R+ WHITE/BROWN
+R	T+ WHITE
-T	R- WHITE/RED
-R	T- WHITE/BLACK

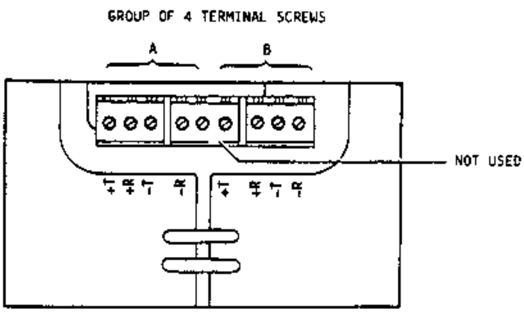
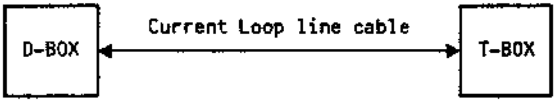


Fig. 2-44 T-Box Assembly View

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. 2-45 Connection Between D-Box and T-Box

On the T-BOX side, the cable wires are connected to the T-BOX terminals which are accessed only after the device cover is removed while on the D-BOX side, there is a 9-way, D-shell connector plugged directly into one of the four "Current Loop" connectors on the D-BOX (depending on the channel).

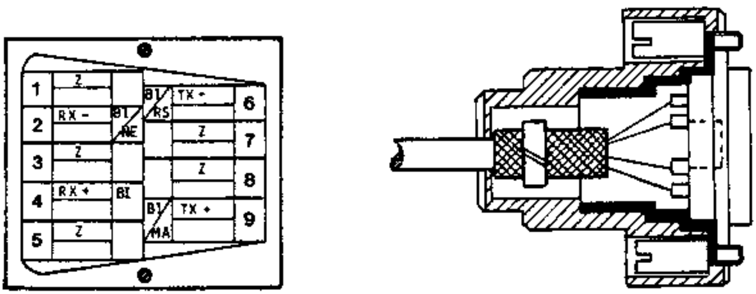


Fig. 2-46 9-Way D-Shell Connector and Cable Connections

T-Box installation

The T-BOX is set at a maximum distance of 10 metres from the ELB 3684 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 2-19.

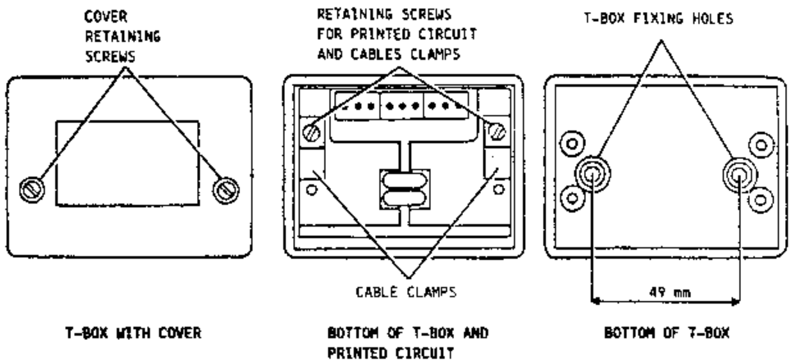
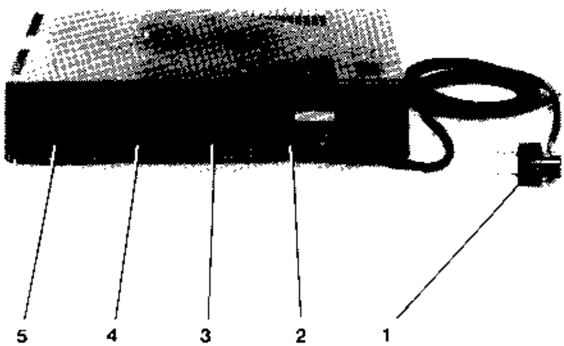


Fig. 2-47 Disassembly of T-Box

2.3.5 ELB 1381/1382 ADAPTER

In addition to the ELB 3684, there is a further type of ELB with, however, more modest performances.
With the 1381 version, workstations with video and keyboard only can be set up at a maximum distance of 100 metres from the system.
The 1382 version should be used to connect workstations with peripherals with RS 232 serial interfaces and pin pad/badge reader devices as well as the video and keyboard. Maximum distance is still 100 metres.

The ELB 1382 adapter connectors are illustrated in the figure below.



1- Cable for connection to mains voltage

2- Connector for video/keyboard controller (in M60 rack)

3- Connector for connection to video and keyboard

4- Connector for peripherals with RS 232 serial interface

5- Connector for Pin pad and Badge reader

Note: The ELB 1381 does not have the connectors numbered 4 and 5 present on the 1382.

Fig. 2-48 ELB 1382 Cables and Connectors

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 cm

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 cableducts is strongly recommended.

2.4.1 MOIN INTERNAL LINE

The following types of network can be obtained in master-slave configurations:

- Point to point
- Multipoint.

In both types, maximum trunk length is 4 km., maximum number of systems to be connected 32 with a transmission speed of from 1,200 to 19,200 bps.

Description of transmission means

The MOIN internal line trunk is a cable with specific characteristics, code number 5715270 R. The cable is shielded with continuity wire and consists of two teflon-insulated AWG22 conductors.

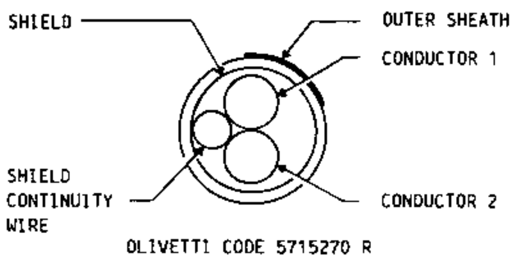


Fig. 2-49 MOIN Line Cable

Description of junction

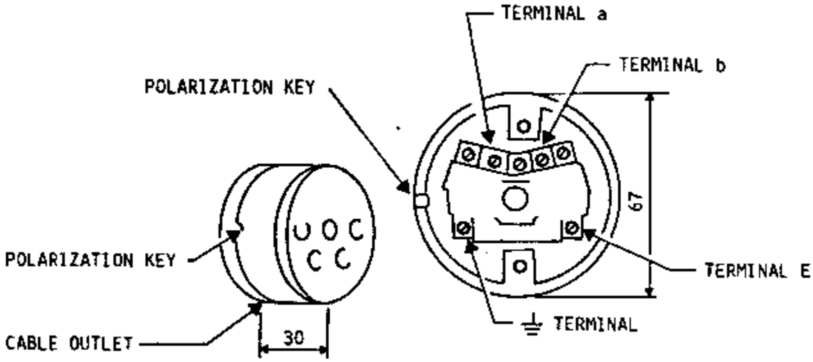
Systems are connected to the trunk by way of junction points. A telephone type junction box, better known as "Ackermann" plug, is recommended for use on the MOIN line.
The system is connected to the Ackermann plug via a cable code no. 335228 D with the following characteristics:

- Double connector for connection to controller

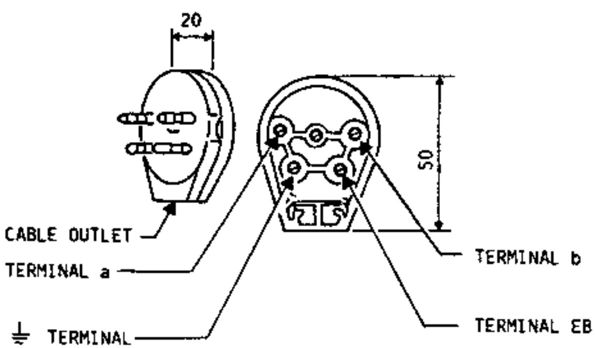
- Shielded cable with twin AWG24 conductors, length 5 metres

- Ackermann socket for connection to junction.

SOCKET



PLUG



Note: All dimensions are in millimetres.

Fig. 2-50 Ackermann Socket and Plug

Wiring of lines with two wires

In a two-wire connection, great care should be taken with the polarity of the conductors when connecting the cable to the Ackermann plugs to avoid completely disabling communications between the terminals.

Looking at the figure below, it will be seen that the white wire (dotted line) of the trunk is connected to post "a" of the plugs and the blue wire (continuous line) to post "b".
The shields of the various trunk sections are interconnected to ensure shield continuity.
The shield is grounded at one point only of the trunk, generally the beginning or end of the line. The ground plug the system is connected to may also be used simply by connecting the trunk shield to junction cable shield. However, only one system should have its ground connected to the trunk shield to avoid a dangerous lack of equilibrium between grounds.

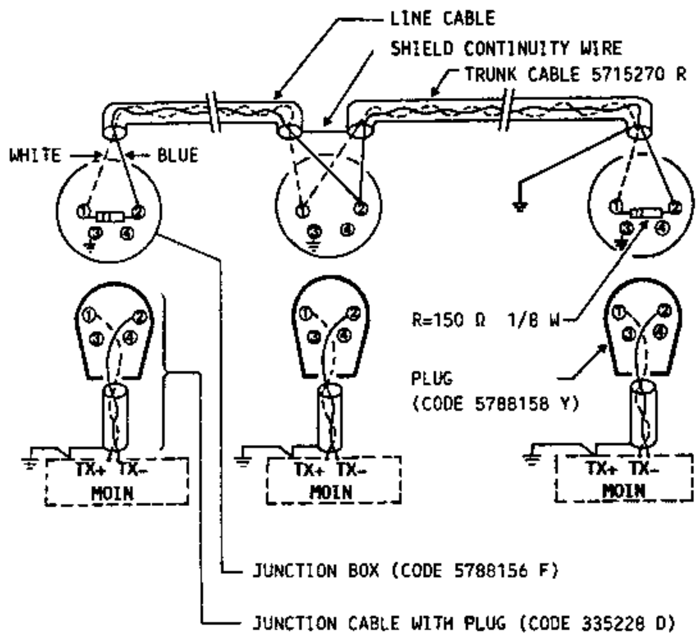


Fig. 2-51 Extremity and Intermediate Junction Boxes

Wiring of lines with 4 wires

In a 4-wire connection, as well as the points made on conductor polarity in 2-wire connection, another important factor is the crossing of the line on the master system terminals: the two conductors of the master transmission line become the reception line of all the slaves while the two conductors of the master reception line become the transmission line of all the slaves. This signal crossing should, therefore, be made in the Ackermann plug of the master junction cable, leaving the trunk wires inside the Ackermann sockets connected to the same terminals, as illustrated in the figure below. In this way, the master is not subject to particular considerations regarding position and may be connected to any junction of the trunk.

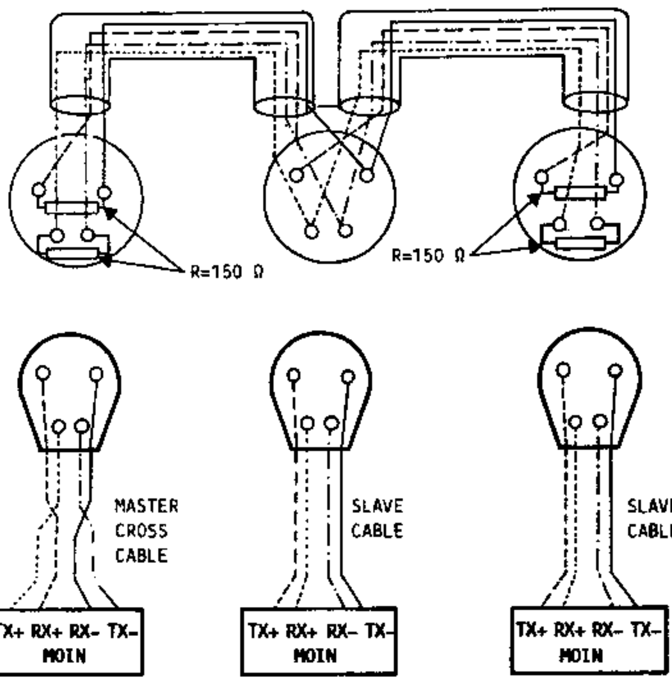


Fig. 2-52 Four-Wire Connection

2.4.2 LION INTERNAL LINE

The LION (Local Internal Olivetti Network) internal line is used with systems in cluster configurations.

It is produced using a controller implementing two internal lines only.

Maximum trunk length is 2 Km with AWG 20 cable or 1.2 Km with AWG 22 cable. The maximum number of systems connected to the trunk is 32.
The protocol used is polling-selecting type (master-slave).
The maximum number of systems which can be connected with TAP-Boxes is eight. The minimum distance between two TAP-Boxes is 5 metres with two junctions or 2.5 metres with one junction only.

Description of the transmission means

The LION internal line trunk must have a cable with specific characteristics, code no. 5731835 M. The cable has two twisted AWG20 conductors, each of which is made up of 7 elementary AWG28 wires.

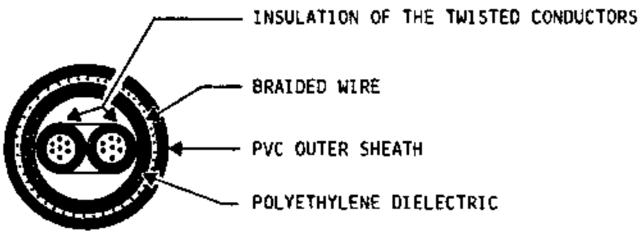


Fig. 2-53 LION Line Cable

Description of junction

A junction box, known as TAP-BOX, is used in LION internal lines, allowing for connection on a terminal strip of the two trunks, the trunk shield and one or two junctions for terminals.

Each Tap-box allows one or two junctions to be connected: to order the correct number of Tap-boxes, a precise installation plan is required.
Tap-boxes come without plugs. The plugs are part of the corresponding line controller commercial module and have the wires needed for connection of the junction to the trunk on their pins; they also come with a 0.1 microfarad soldered to the ground wire.

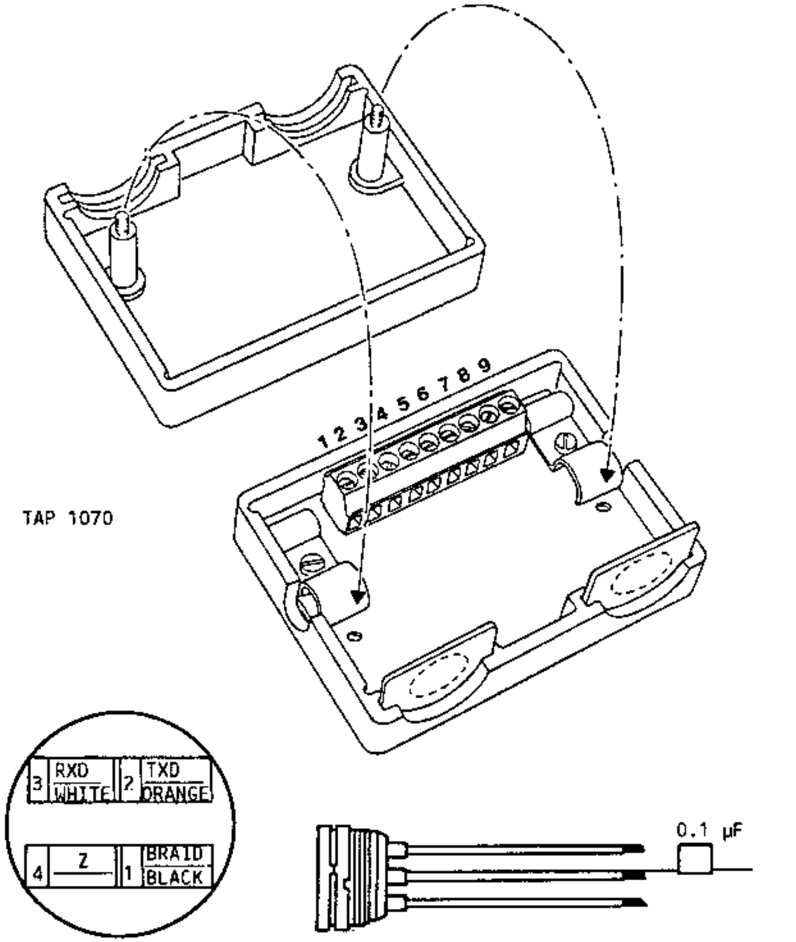


Fig. 2-54 Tap-Box for LION Internal Line

There is also a more recent version of the TAP-BOX with the capacitor already inserted in the printed circuit. In this case, the female connector coming with the cable, in addition to the capacitor, also has a ground connection bracket mounted, so that, depending on the type of TAP-BOX used, either the capacitor or the bracket has to be removed.

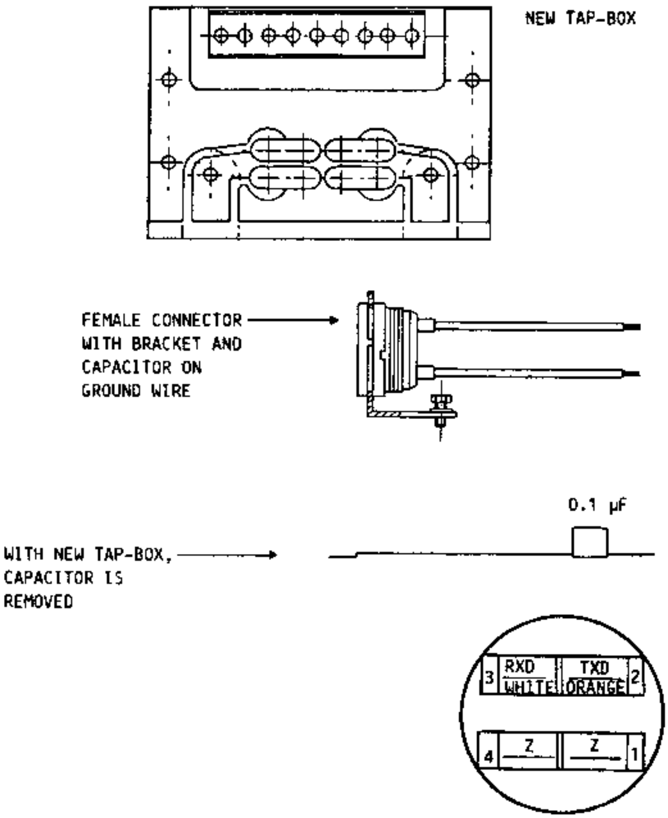


Fig. 2-55 TAP-BOX With Capacitor Mounted on Printed Circuit

Connection of trunk to Tap-Box

Each Tap-box connects a maximum of two junctions, one per system; the only restriction is that there should be a minimum of 10 metres between tap-boxes.
Inside the Tap-box, there is a terminal strip with 9 points to take all the cables. When the Tap-box has been attached to the wall, the two trunks should be connected as described (see figure 2-27):

- The trunk cables enter the Tap-box via two inlets on the sides.

- The two AWG20 wires of each trunk, incoming and outward, are connected, respectively to terminal strip points 1-2 and 8-9. The red copper wires are connected to points 1 and 9 and the copper plate wires to points 2 and 8.

- The trunk shields are taken to the Tap-box ground via the cable clips at the lateral inlets. The cable clips also hold the trunk cable in position. However, it must be fixed securely, by the braiding wire, after an appropriate amount (11 mm approx.) of the PVC insulating cover has been stripped off.

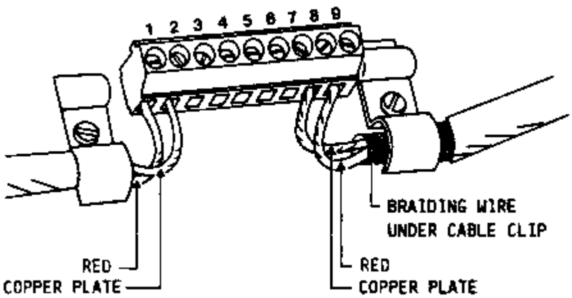


Fig. 2-56 Connection of Trunk to Tap-Box

- Each Tap-box has a 110 Ohm, 1/2 W terminator resistor, mounted between terminal strip pins 1 and 2 or 8 and 9.
  This resistor should be removed from intermediate Tap-boxes and left in place only in the Tap-boxes at either end of the line (see fig. 2-28).

Trunk shield ground connection

The trunk shield must be connected to ground at one of the ends of the line.
A unipolar, AWG18 wire with an eyelet to be positioned under the cable clip on the same side as the terminator resistor should be inserted.
The other end of the wire should be attached to the ground terminal of a power plug to be inserted in a nearby mains socket. One of the Tap-boxes at the end of the trunk must, therefore, be set up close to a mains source.

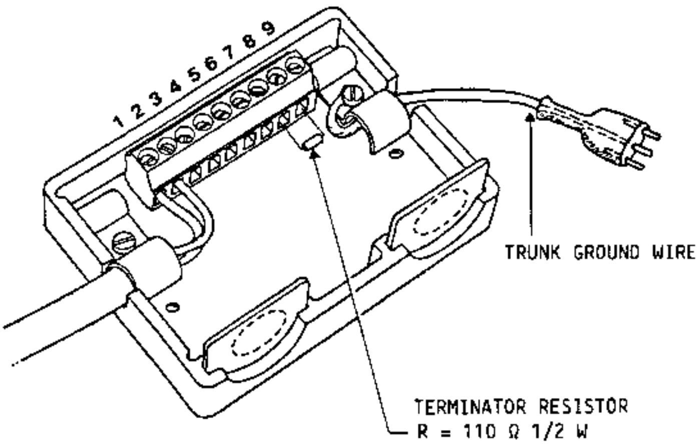


Fig. 2-57 Tap-Box at End of Trunk

Junction connections

The outlets towards junctions in the Tap-box are sealed with plastic plugs. The female connector code no. 336470 D can only be inserted after the plug is removed. Three wires are soldered to this connector, one white, one orange and the third black with a capacitor on the free end. The type of connection to be made is shown in the table below:

WIRE COLOUR	CONNECT TO TERMINAL STRIP PIN NO. - FIRST JUNCTION	- SECOND JUNCTION
WHITE	4	6
ORANGE	3	7
BLACK	5	5

The capacitors on the trunk shields ensure that there is no galvanic coupling between the junction shields and the trunk shield while a.c. coupling is maintained.

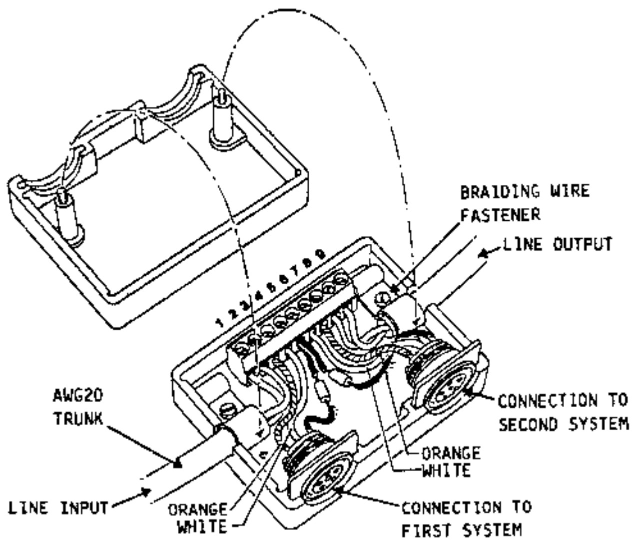


Fig. 2-58 Example of a Two Terminal Junction

2.4.3 OMNINET LOCAL NETWORK

The OMNINET local network is a fast (1 MHz), internal line consisting essentially of:

- Trunk cable
- TAP-BOX
- Ground cable
- Workstation connection cables
- Repeater

Network configuration

The Omninet network must meet the following conditions:

- Maximum distance between Tap-boxes or Repeaters: 150 metres
- Maximum length of segment without Repeater: 150 metres
- Maximum number of Repeaters to be used: 3
- Maximum length of line: 600 m
- A maximum of 16 systems can be connected to a line segment. Two systems can be connected to a Repeater.

An example of a network is shown in the figure below.

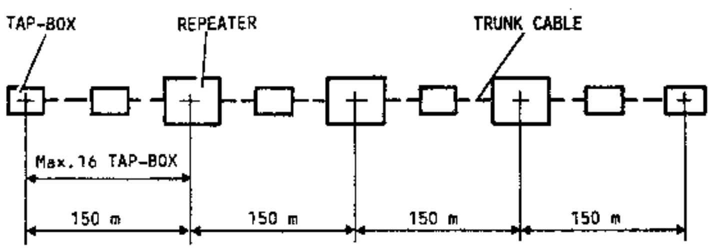


Fig. 2-59 Example of an Omninet Network

Trunk

A twisted, shielded pair code no. 5731835 M is used as trunk.

TAP-BOX

Both the Tap-boxes described earlier for the LION network and a more recent type with capacitors inserted in the printed circuit can be used in an Omninet network. The female connector coming with the cable has both the capacitor and a bracket on its ground cable. Depending on the type of Tap-box used, either the capacitor or the bracket will have to be removed.

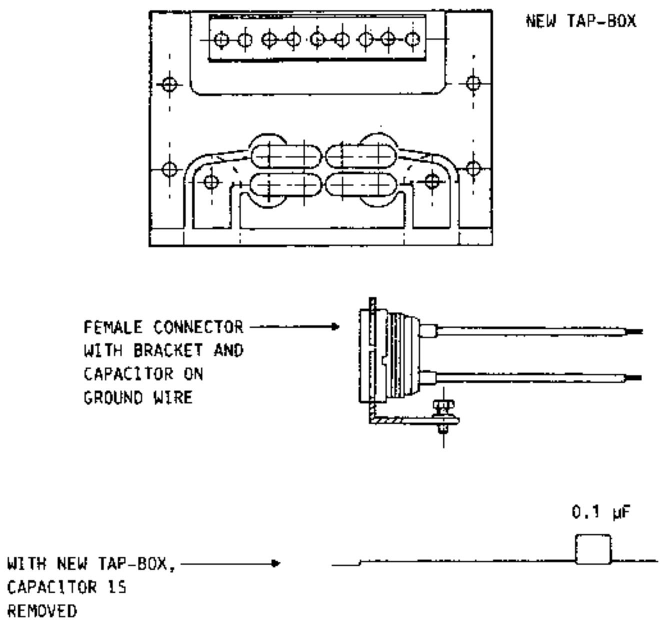


Fig. 2-60 Tap-Box With Capacitor Inserted in Printed Circuit

Junction cable (drop cable)

The cable used to connect systems to the network, like the trunk, is of AWG20 wires, and is a maximum of 2.5 metres long.

Repeater

Repeaters must be used when the trunk exceeds 150 metres in length.

Safety of line

For correct Omninet operation, these conditions should be satisfied:

- The entire area served by the network is to be connected to the same ground

- All systems connected, including repeaters and the trunk braiding wire, are to be connected to the same ground

- There should, if possible, be only one power supply station; if not possible, all stations should have the same ground

- The network should be installed inside the same building

- Maximum voltage should be 3V; a potential difference of more than 12 V could damage the line drivers connected.

2.4.4 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 2-32, systems are conected to the network by a receive/ transmit cable and a transceiver supplied with cable.

- Repeaters are used to interconnect Ethernet segments (see figure 2-33).
  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).

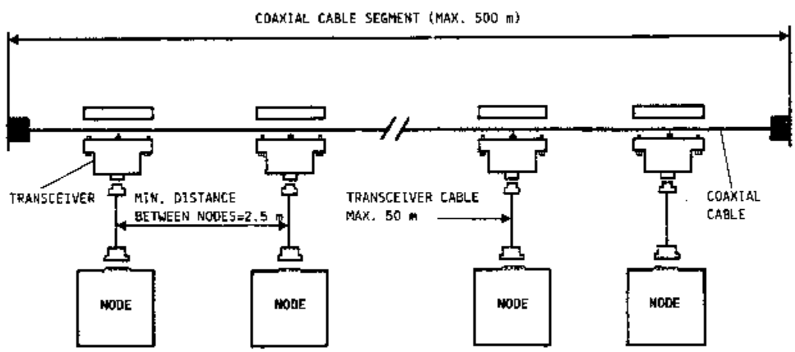
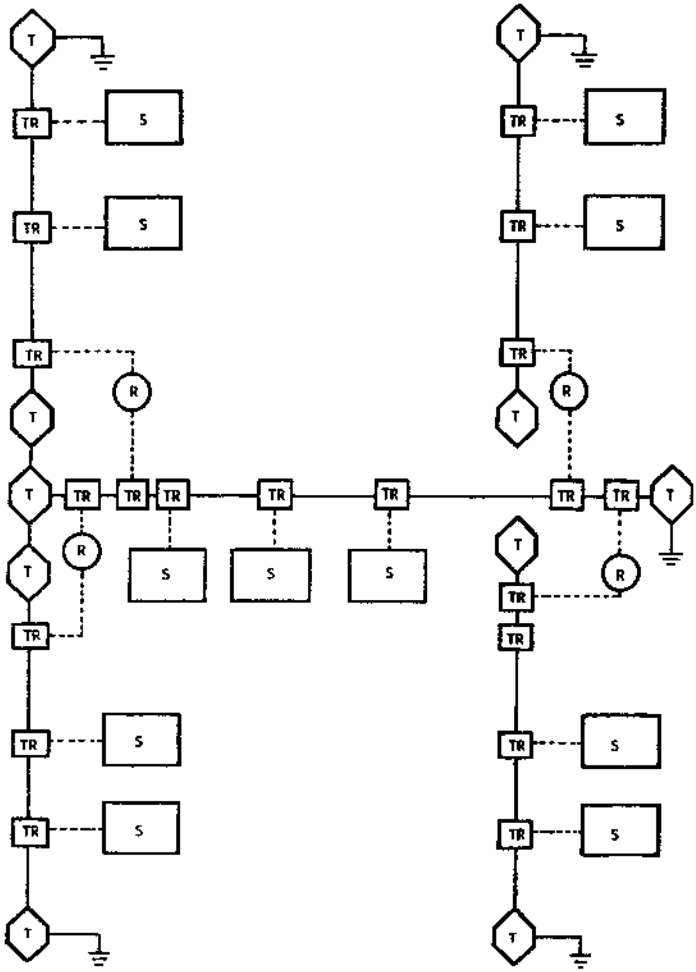


Fig. 2-61 Ethernet Segment Configuration



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

Fig. 2-62 Ethernet Network Extended Configuration

2.4.5 STARLAN LOCAL NETWORKS

The main characteristics and installation procedures of a Starlan local area network are described below.

The Starlan is mainly used to cover network configurations consisting of several PC's or with tens of PC's and Minis used as Servers.

An important characteristic of the Starlan local network is the possibility of pre-wiring a complex building with the Starlan wiring (double telephone pair) at reduced costs and relocating systems in the network or in multiple Starlan networks with a number of easy operations.

The Starlan network main characteristics are:

- Transmission speed: 1 Mbit/s
- Topology:
  - . Star-shape with Hub in centre of star
  - . Single segment of up to 250 metres
  - . Possibility of including up to 5 Hub levels
  - . Circular area of max. radius 960 metres covered.
- Maximum number of connections: not more than 1,000
- Transmission technology: base band
- Access method: CSMA/CD, IEEE standard 802.3.

A Starlan local area network is composed mainly of the following hardware items:

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

6-Port and 12-Port Network Connection Box

The 6-port or 12-port network connection box is used to connect, respectively, a maximum of 6 or 12 nodes of a local network.

The figure is a view of a 12-port hub.

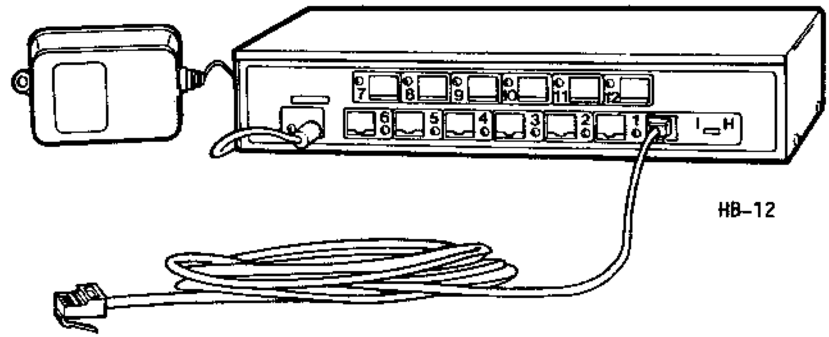


Fig. 2-63 12-Port Hub

The box may be used as Header hub or Intermediate hub. Hubs may then be cascade-linked to up to a maximum of two levels for the 6-port hub and a maximum of five levels for the 12-port hub.

The function of the 6 or 12 port hubs is to receive signals from lower nodes, give them fresh timing and re-transmit them after suitable width amplification.

The example illustrated in the figure below is of a local network with several hubs and computers.

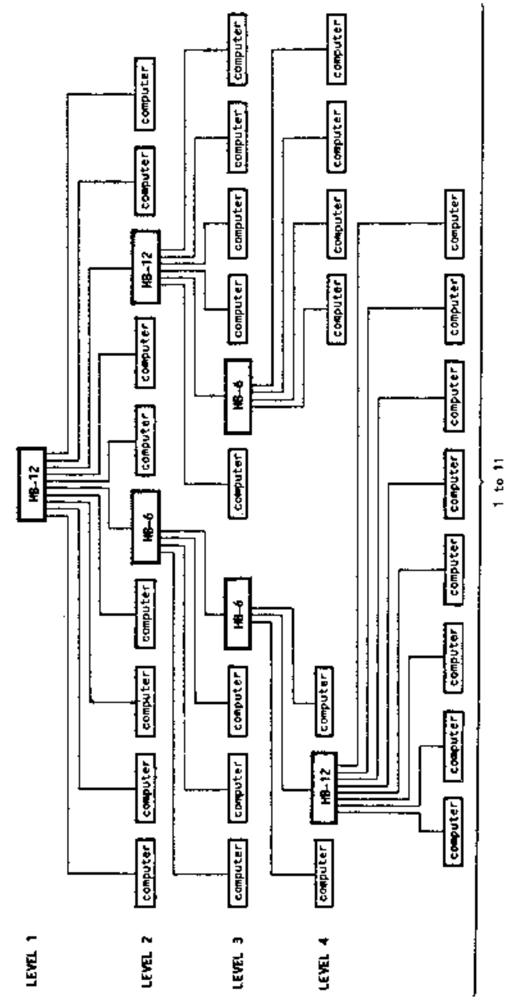


Fig. 2-64 Local Network with Four Hub Levels

Note: In the figure above, the term computer is used to refer to both PC's and Minicomputers, with no distinction being made.

2.4.6 RS232 INTERFACE STATIC MULTIPLIER (MSW 3369)

This is a manual, mechanical two-way switch used in connections to devices with RS 232 interface. It comes in a desk-top version and consists of one board with three RS 232 outputs.

Typical applications of the static multiplier are:

- Alternating an external line between two systems
- Alternating a printer between two systems
- Alternate connection of two printers to the same system.

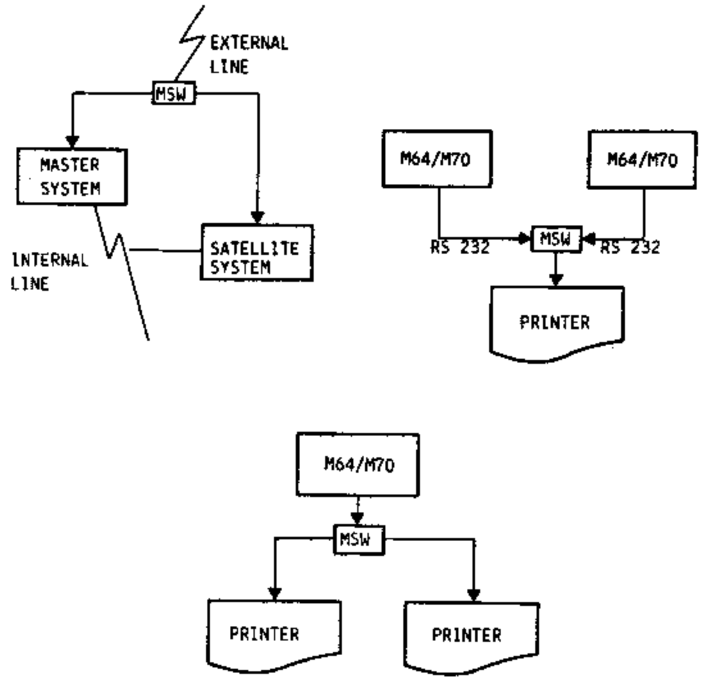


Fig. 2-65 Configurations With the RS232 Interface Static Multiplier

3. POWER SUPPLY

3.1 GENERAL

This chapter deals with the power supply for M64 and M70 systems: It includes the following:

- Diagrams of a.c. distribution in SB0 and SB1 cabinets
- Primary power supply LB40 characteristics
- Expansion power supply LB12 characteristics
- Power supply LS10 characteristics
- DC/DC converter - DCA 36/512 and DCA 36/524 type - characteristics
- A table showing power absorption figures for the hardware modules.

3.2 MAINS ASSEMBLY FOR M64 AND M70 SYSTEMS

The input mains assembly is responsable for power distribution to the whole system and consists of:

- Circuit Breakers
- Main mains filter
- Auxiliary mains filter
- Connectors
- Mains control device
- Fans.

The printed circuit board used must be able to support all the connections needed for both the full and the reduced versions; current density must not however exceed 6A/sq.mm., unless otherwise stipulated by the board manufacturer. The standard specified safety distance between tracks must be adhered to in all cases.

The international standards applying are as follows:

UL_478	(Data Processing)
CSA22.2-154	(Data Processing)
IEC_435	(Data Processing)
IEC_380	(Office Machine)

The assembly is mechanically designed to ensure complete shielding between the internal mains and the external mains by way of springs or similar devices.

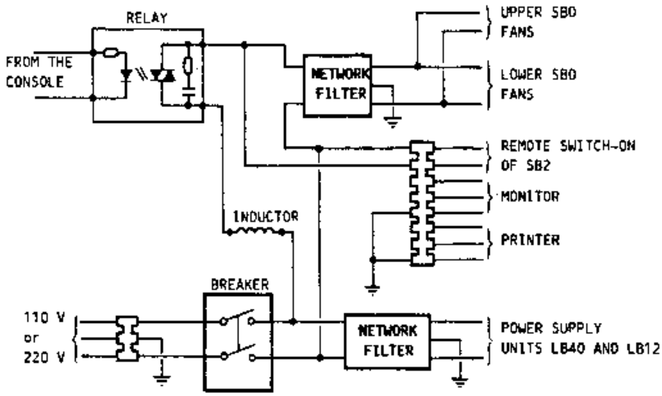


Fig. 3-1 Diagram of a.c. Distribution in the SB0 Cabinet for M64 and M70 Systems

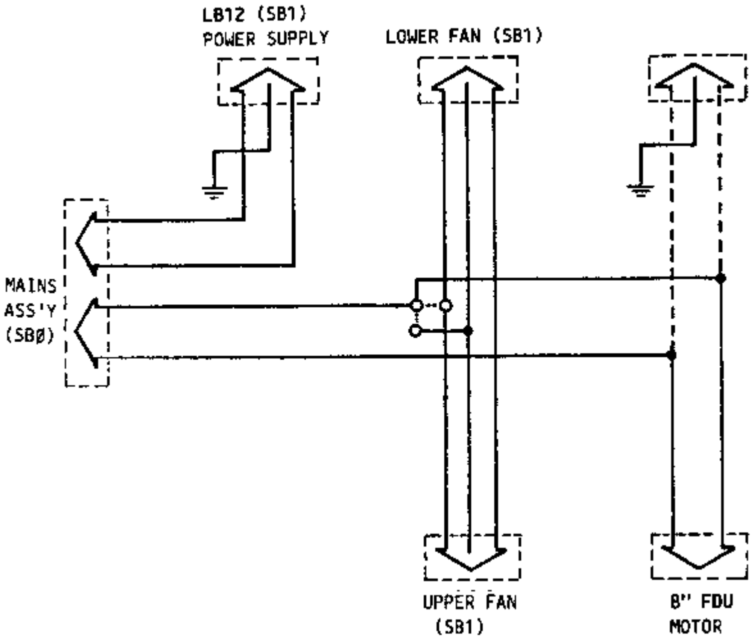


Fig. 3-2 Diagram of a.c. Distribution in the SB1 Cabinet for M70 Systems

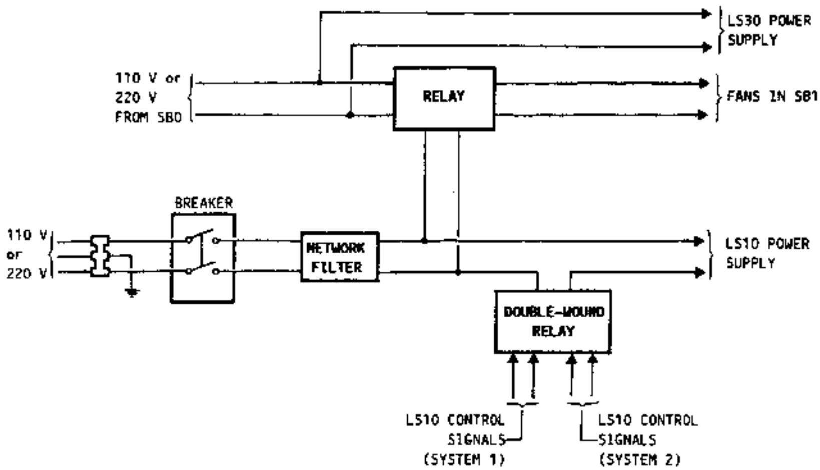


Fig. 3-3 Diagram of a.c. Distribution in the SB1 Cabinet for Shared HDU's

3.3 LB40 POWER SUPPLY FOR M64 AND M70 SYSTEMS

3.3.1 A.C. INPUT CHARACTERISTICS

The electrical input characteristics for the LB40 power supply are:

- Single phase alternating current at the following rated voltages: 100-120 Volts or 200-240 Volts (on the LB40, the power voltage is selected by way of jumpers which can be seen in the diagram of the power supply board).

- Permanent input voltage variations: +10% and -15%, giving the following operating voltage ranges, 85 - 132 Volts and 170 - 264 Volts respectively.

- Nominal frequency: 45 Hz to 65 Hz

- Frequency variations: +/- 5%

- Maximum input voltage 110% of the rated max. value (132 or 264 V). For voltages of 110% to 120% of the rated max. for a period of not more 5 seconds, there is no permanent damage to the power supply.

- Maximum mains impedance: 0.4 + J0.25 Ohm

- Input/output isolation: 1650 V

- Maximum inrush current: 25 A peak for first cycle

- Mains failures: the LB40 is unaffected by mains failures of 100% for 0.5 cycles and of 30% for 25 cycles at the minimum rated voltage.

3.3.2 LB40 OUTPUT CHARACTERISTICS

The LB40 is to be found in the lower part of the SB0 cabinet and consists of two power supplies:

- Auxiliary power supply

- Main power supply.

Auxiliary power supply

Used to power the console with an output voltage of +5 V; also provides a +16 V voltage for for the power supply internal needs and the expansion LB12.

The auxiliary power supply can be switched on only through the general system switch.

The +5 V voltage is regulated in the test phase through a potentiometer, which is accessed from the output connectors side (see figure of power supply board).

The table below gives the auxiliary power supply output characteristics:

VOLTAGE [V]	TOLERANCES	RIPPLE PP. [mV]	Imin [A]	Imax [A]	Pmax [W]
+ 5	± 5%	50	2.5	2.5	12.5
+16	± 6%	-	-	0.3	4.8

The +5 V voltage of the auxiliary power supply is protected against overvoltages by a crowbar SCR; following intervention of this mechanism, the power supply is restored to operation by switching on and off at the general system switch after the cause of the overvoltage is removed.

If there is an overload or a short circuit on any one of the output voltages, the power supply switches off automatically without suffering damage.
Operation is restored in the same way as described above following intervention of the overvoltage protection.

Main power supply

This power supply is switched on if the auxiliary power supply is on and the control signal "PONOFF" activated by the console is present so that, when the general system switch is closed, the auxiliary power supply is always operating but the main power supply only comes on after the "PONOFF" signal is received from the console. The +5 V voltage is regulated through a potentiometer close to the output connectors (see figure of power supply board) and the +/-12 V voltages are regulated in function of the +5 V.

3.3.2.1 Output Characteristics

The main power supply output characteristics are given in the table below:

Voltage [V]	Tolerances	Ripple p.p. max. [mV]	CURRENT			Power max. [W]
			min. [A]	max. [A]	peak [A]	
+ 5	- 1 % + 5 %	50	6.00	40.0	-	204.0
+ 12	± 5%	100	0.02	1.4	-	16.8
- 12	± 5%	100	0.02	1.4	-	16.8
+ 35	± 10%	300	0.00	4.1	6.0 5.0 4.5	145.0

Absorption peaks on the +35 have the following maximum duration:

6.0 A - 0.5 s. on power-on
5.0 A - 10.0 s. " " "
4.5 A - 0.5 s. random

Maximum continuous power raised is 350 W.

3.3.3 OUTPUT PROTECTIONS

Protections on the power supply outputs are:

- Overvoltage protection
- Overload and short circuit protection
- Delays in switch-on protection
- Ventilation and thermal protection.

3.3.3.1 Overvoltage Protection

The +5 V voltage is protected against overvoltages by intervention of a crowbar SCR.

The power supply is restored to operation by opening and closing the system general switch after the causes of the overvoltage have been removed.

3.3.3.2 Protection Against Overloads and Short Circuits

A short circuit or an overload on any of the output voltages results in the power supply switching off without any damage being caused.

Operation is restored in the same way as described for the overvoltage protection intervention.

3.3.3.3 Protection Against Delays in Wwitching-on

A switch-on delay, or the time elapsing from when the system general switch is closed and the control signal ALIUP is raised, must not exceed 1.5 s. (provided that "ton" <= 0.5 s, where "ton" is the time occurring between generation of signal PWUP, with voltage in tolerance, and activation of PONOFF by the console); otherwise, the power supply will be blocked.

3.3.3.4 Ventilation and Thermal Protection

The power supply requires forced ventilation in normal operation.

Under stand-by conditions, where only the auxiliary power supply is operating, forced ventilation is not required, irrespective of the amount of time in stand-by.

Thermal protection is guaranteed by a PTC thermistor on the low voltage dissipator.

When temperature reaches critical point, the control signal DATE is raised; this signal is then read by the console which takes the necessary steps to switch off the main power supply.

3.3.4 CONTROL SIGNALS

The control signals are all optically isolated.
All signals are considered active in the presence of light.

ALIUP: When active, this signal indicates that the main power supply voltages (+5, +12, -12) are all above the minimum tolerance level.

Absence of any one of the conditions above results in the signal being de-activated.

PWUP: This signal is activated when the mains voltage is in tolerance; the signal is not de-activated for mains failures which the power supply can withstand.

PONOFF: Signal controlled only by the console.
When this signal is activated, the main power supply operates. When the signal is de-activated (mains voltage present), the power supply is in stand-by.

DATE: The signal is activated when the working temperature is below the critical temperature.

3.3.5 OUTPUT CONNECTION

The +5 V main logic ground voltages are strapped so that three cables can be screwed for each connection.

The +35 V output connection is through a 90 degree 4-way MATE-N-LOK connector.

The group of +12, -12, 0 V and aux. +5 V control signals is connected through a 90 degree 20-way (10x2) MODU 2 connector.

The +12, -12 V connection is by way of a 90 degree 4-way MODU 2 connector.

Connection to the LB12 expansion is through a 90 degree 4-way MODU 2 connector.

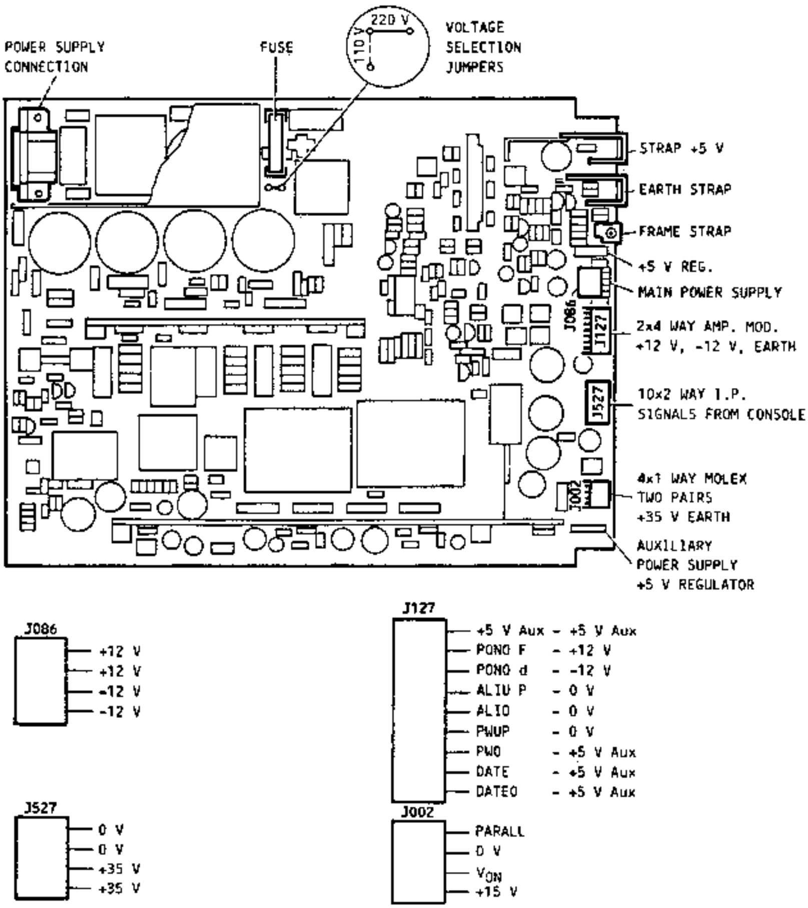


Fig. 3-4 LB40 Power Supply Board

3.4 POWER SUPPLY LB12 FOR M70 SYSTEMS

The LB12 power supply is a current generator used in parallel with the LB40 power supply to sustain the +5 V voltage when the latter is insufficient for the load in the system configuration used (systems with 16 board slots with back plane IN088).

The maximum current supplied by the LB12 to back up the +5V voltage is 25A.

For its internal functions, the LB12 uses the signals coming from the LB40 auxiliary power supply. The auxiliary power supply also handles the parallel signal between the LB40 and LB12 to control the amount of current supplied by the latter; for this reason, the LB12 power supply may not be used independently.

3.4.1 INPUT CHARACTERISTICS

The LB12 power supply input characteristics are:

- Single phase alternating current at the following rated voltages: 100-120 Volts or 200-240 Volts (on the LB40, the power voltage is selected by way of jumpers which can be seen in the diagram of the power supply board).

- Permanent input voltage variations: +10% and -15%, giving the following operating voltage ranges, 85 - 132 Volts and 170 - 264 Volts respectively.

- Nominal frequency: 45 Hz to 65 Hz

- Frequency variations: +/- 5%

- Maximum input voltage 110% of the rated max. value (132 or 264 V). For voltages of 110% to 120% of the rated max. for a period of not more 5 seconds, there is no permanent damage to the power supply.

- Maximum mains impedance: 0.4 + J0.25 Ohm

- Input/output isolation: 1650 V

- Maximum inrush current: 25 A peak for first cycle

- Mains failures: the LB40 is unaffected by mains failures of 100% for 0.5 cycles and of 30% for 25 cycles at the minimum rated voltage

- Switch-on time: after being switched on at the mains, the power supply outputs the voltage when the control signals coming from the LB40 are active

- Input protection: a fuse responding to the local safety regulations in series with the power supply.

3.4.2 OUTPUT CHARACTERISTICS

The LB12 power supply outputs the +5 V voltage regulated at 5.6 V so that when set in parallel with the LB40 power supply +5V, it acts as a current generator controlled by the LB40 itself.

The maximum current the LB12 can output is 25 A.

3.4.3 OUTPUT PROTECTIONS

The power supply output protections are:

- Protection against overloads and short circuits

- Overvoltage protection

- Thermal protection

- No load.

3.4.3.1 Protection Against Overloads and Short Circuits

The LB12 power supply is protected against overloads and short circuits. If a short circuit occurs, output current remains limited to a value of just over 25A; switching off is performed by the LB40.

3.4.3.2 Overvoltage Protection

The LB12 is protected against overvoltages; the protection is triggered for voltages in the 6.25V (+/-0.5V) range and causes the power supply block.

There is no crowbar SCR.

3.4.3.3 Thermal Protection

If working temperature reaches a critical point, the power supply switches off and remains blocked; a sensor on the output diodes dissipator is triggered at a temperature of 90 degress Celsius.

Operation is restored following intervention of the thermal or overvoltage protection by de-activating and re-activating the voltage signal (Von) by switching the LB40 on and off at the mains.

3.4.3.4 No Load

Absence of load does not result in damage to the LB12.

3.4.4 PHYSICAL DIMENSIONS AND VENTILATION

The power supply, mains filter included, is on a single board of dimensions 126.5x323 mm and maximum height of 80 mm. It is cooled by forced ventilation.

3.4.5 CONTROL SIGNALS COMING FROM THE POWER SUPPLY LB40

The LB40 and LB12 communicate on a master (LB40) - slave (LB12) basis by way of four signals generated by the LB40. These signals are:

- +15 V power: the auxiliary voltage, reference the output ground, used to power the internal circuits; always present, even with the power supplies blocked following an output voltage anomaly or when in stand-by
- Signal Von: reference the output ground; informs the LB12 power supply that the remote switch-on from the console is active and there are no anomalies
- Signals 0 and PARALL: indicate to the LB12 how much current it must raise.

These signals are all received through the AMP MOD 2, 4-way connector J002.

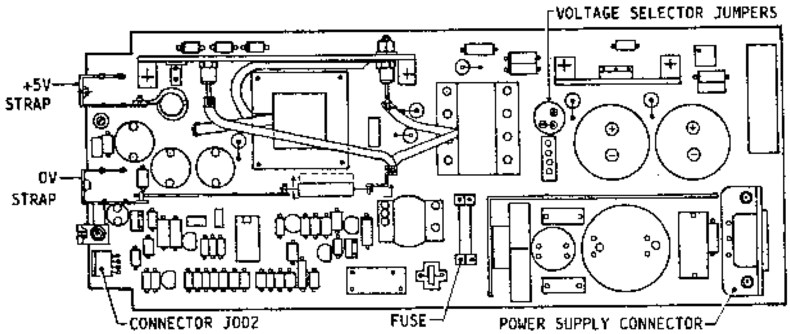


Fig. 3-5 Power Supply Board LB12

3.5 POWER SUPPLY LS10

The LS10 power supply provides a power of 106 W (peak power 180 W), and is used in the SB1 cabinet to power one or two HDU's with, in soma cases, the dual port board.

Note: The LS10 power supply may be used only on M64 and M70 systems in configuration with SB0 + SB1 cabinets (with one or two HDU's used as third and fourth non-shared ESDI disks or as first and second shared ESDI disks).

3.5.1 INPUT CHARACTERISTICS

The LS10 power supply input characteristics are as follows:

- Single phase, a.c. power with the following nominal voiltages: 100-120 Volts or 200-240 Volts. The LS10 power supply has jumpers for selection of the power supply voltage, their position being illustrated in the figure below of the power supply board below.

- Permanent shifts of input voltage: +10%, -15%. The operating voltages admit variations in the ranges of, respectively, 85 Volts to 132 Volts and 170 Volts to 264 Volts.

- Nominal frequency: from 45 Hz to 65 Hz.

- Frequency fluctuations: ± 5%.

- Maximum inrush voltage: 110% of the maximum nominal value (132 V or 264 V). For voltages of between 110% and 120% of the maximum nominal value of under 5 seconds duration, the power supply does not suffer permanent damage.

- Maximum network impedance: 0.4 + j0.25 Ohm.

- Insulation between input and output: 1650 V.

- Maximum inrush current: 10 A peak for the first cycle.

- Resistance to mains failures. The LS10 power supply is insensitive to 100% mains failures for 0.5 cycles and 30% failures for 25 cycles with reference to the minimum nominal voltage.

- Switch-on time (the time from when the general switch is closed to when the reset signal goes to 1). It is under 1 second in the worst mains and load conditions.

- Input protection. There is a fuse in series with the power supply input responding to the local safety regulations.

3.5.2 OUTPUT CHARACTERISTICS

Output characteristics of the LS10 power supply are resumed in the table below.

Voltage [V]	Tolerance	Ripple p.p. max. [mV]	CURRENT min. [A]	max. [A]	peak [A]	Power max. [W]
+ 5	- 3 % + 5 %	50	0.40	6.5	-	32.5
+ 12	- 3 % + 5 %	50	1.00	6.0	12 *	144.0

* Value supported for a maximum of 15 seconds.

The +5 V voltage is regulated to +5.1 V and the +12 V to +12.2 V in conditions of maximum load (5 V with 6.5 A and 12 V with 6 A); with different mains voltage values, the power supply is regulated by way of potentiometers (see the figure of the LS10 power supply below).

3.5.3 OUTPUT PROTECTIONS

The power supply output protections are:

- Overload and short circuit protection

- Overvoltage

- Ventilation and overheating

- No load.

Overloading and Short Circuit Protection

The LS10 power supply is protected against overloads and short circuits on both its voltages. If there is a short or an overload, power supply operation is interrupted automatically and no damage is caused the power supply.

Power supply operation is restored by opening and closing the system general switch after the causes of the interruption have been removed.

Overvoltage Protection

The LS10 power supply is protected against overvoltages. The protection is an SCR crowbar which intervenes for voltages of from 6.2 V to 6.8 V. If power supply is interrupted, operation can be recovered after opening and closing the system general switch.

Ventilation and Overheating

The power supply does not require forced ventilation during normal operation.

Heat protection is provided by a PTC thermistor connected to the heat dissipator of the power supply. When temperature reaches critical level, the SCR crowbar is activated and the power supply switches off. After an interruption, power is restored by opening and then closing the system general switch.

No load

The LS10 power supply is not damaged if there is no load.

3.5.4 PHYSICAL DIMENSIONS

The power supply, mains filter included, is mounted entirely on a single board of 157 mm x 260 mm dimensions, with a protective cover also acting as heat sink. The maximum height the cover reaches above board level is 50 mms.

3.5.5 LS10 POWER SUPPLY RESET SIGNAL

The reset signal controls all the power supply voltage outputs. On switching on, the reset signal goes to logic level 1 with a delay of about 100 ms after the +5 V and +12 V voltages rise above their minimum tolerance level. When switched off, the reset signal goes to logic level 0, preceding the voltage level by at least 1 ms. If there are problems, or if one of the voltages goes below tolerance value, the reset signal goes to zero logic.

There is a relay in the power supply powered by the +5 V voltage and contacts in parallel with the reset signal guaranteeing a total reset during the switch on and off transient phases.

Input and output connections

All the input and output connections are made through the connectors listed below:

- An input connector, MODU 1 6-way type

- Four output connectors, two MODU 1 4-way and two MATE-N-LOK 4-way connectors.

There is also a ground bracket securing the power supply to the system structure.

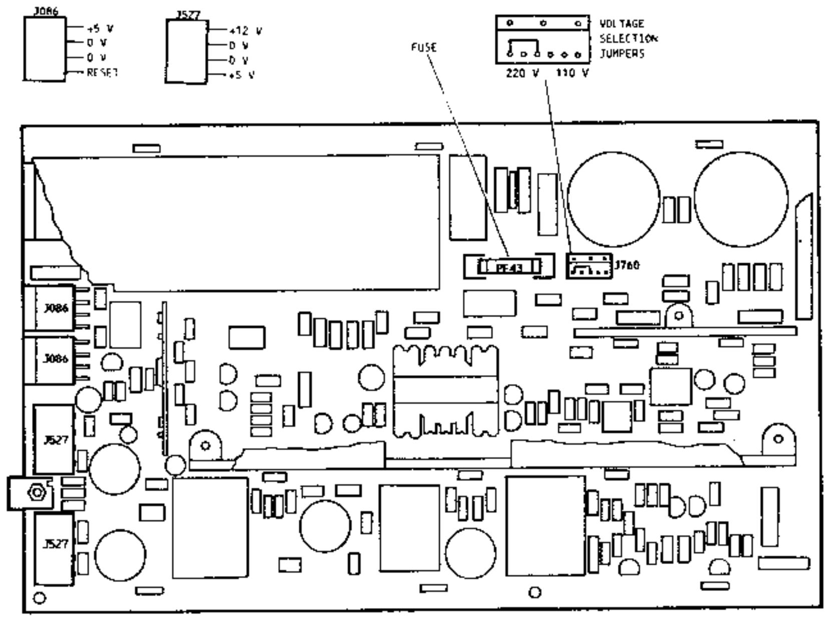


Fig. 3-6 Power Supply LS10

3.6 DC/DC CONVERTERS

The DCA 36/512 and DCA 36/524 type DC/DC converters used to power the magnetic peripherals have a secondary which is galvanically isolated from the primary and can raise peak power of 61W and continuous power of 35.3 W. On the M64, they power the 5 and 1/4" (DCA 36/512) and 8" (DCA 36/524) magnetic peripherals; they are used in association with the LB40 power supply.

3.6.1 INPUT CHARACTERISTICS

Both converters require a direct, input voltage of 35V +/-10%.

3.6.2 OUTPUT CHARACTERISTICS

The DCA 36/512 converter outputs voltages of +5V and +12V. Maximum, minimum and peak current values raised by the voltages, tolerances and maximum ripple permitted for the DCA 36/512 are given in the table below:

RATED VOLTAGE	TOLERANCE	Imin	Imax	Ipeak	RIPPLE pp
+ 5 V	+/- 5%	0.55 A	1.3 A	1.4 A	50 mV
+12 V	+/- 5%	1.25 A	2.4 A	4.5 A	100 mV

The DCA 36/524 converter outputs voltages of +5 V and +24 V. Maximum, minimum and peak current raised by the voltages, tolerances and maximum ripple permitted for the DCA 36/524 are given in the table below:

RATED VOLTAGE	TOLERANCE	Imin	Imax	Ipeak	RIPPLE pp
+ 5 V	+/- 5%	0.55 A	1.3 A	1.4 A	50 mV
+24 V	+/- 5%	0.60 A	1.2 A	2.3 A	100 mV

Regulation of voltages

The voltages are regulated by regulating the +5 V to +5.00 V at the maximum continuous output power of 35.3 W.

Switch-on time

The voltages are in tolerance within 100 ms of the input voltage going above 75% of its maximum value.

Output absorption peaks

Both converters support a power peak of 61 W at power-on for 10 s; voltages are guaranteed in tolerance.

3.6.3 PROTECTIONS

Protection against overloads and short circuits

The converters are protected against overloads by way of a power limiter which comes into action at 70 W approx. and against short circuits on all of the voltages. Intervention of the protections causes oscillations to cease and the LED on the front of the converter to come on indicating that an anomaly has occurred.

Extracurrent protection

Overvoltage protection is only for the +5 V voltage for values in the 6.25 V +/- 0.6 V range. Its intervention triggers a crowbar SCR, the power supply blocks and the relative LED comes on.

Recovery of converter following anomalies

Following intervention of one of the above protections, with interruption of oscillations, the power supply can be restored by pressing the button beside the LED. For a temporary fault, when the button is pressed, the LED goes off; if it remains on, the converter is restored to operation after the error is removed.

The button acts as block circuit reset and must not be kept pressed down to avoid internal converter damage where the anomaly persists.

No load

If there is no load at the output, the converter is not damaged.

Protection against internal short circuits in primary section

A fuse in series with the power supply is designed to prevent the LB40 power supply which powers the converter from blocking should a fault occur in the converter primary section (following short circuits of the +35 V).

3.6.4 MECHANICAL CHARACTERISTICS

THe converter is housed in a 150 x 129.5 x 35 mm metal container and is attached in four parts to the magnetic peripheral structures.

3.6.5 DCA 36/512 CONNECTORS

The input connector is a 4-way AMP MODU 1, of which only two pins are used. The output connector is a 6-way AMP MODU 1 where two pins are for the +12 V, three for ground and one for the +5 V. The figure below illustrates the position of the connectors, the trimmer for +5 V regulation, the LED and the reset button on the front of the converter.

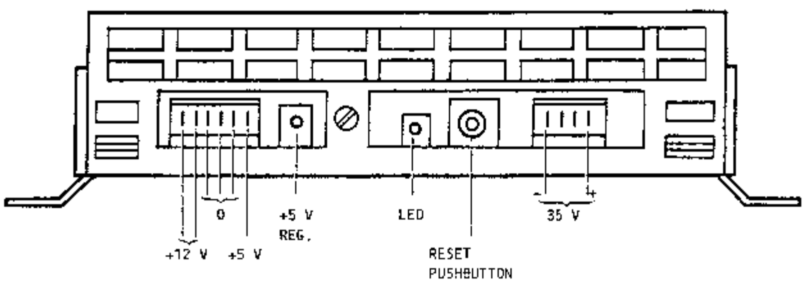


Fig. 3-7 Front of Converter DCA 36/512

3.6.6 DCA 36/524 CONNECTORS

The input connector is a 4-way AMP MODU 1, of which only two pins are used. The output connector is 6-way AMP MODU 1, where two pins are for the +24 V, three for the ground and one for the +5 V. The figure below illustrates the position of the connectors, the trimmer for +5V regulation, the LED and the reset button on the front of the converter.

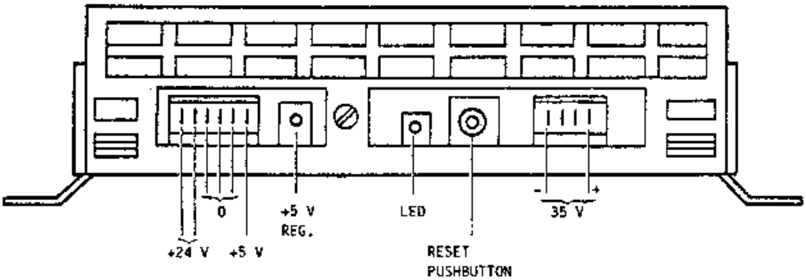


Fig. 3-8 Front of Converter DCA 36/524

3.7 ABSORPTION OF HARDWARE MODULES

The table below gives absorption of all the hardware modules used on the M64 system.

MODULE DESCRIPTION	ABSORPTION (in amperes) + 5V	+12V	-12V	+24V	POWER (watt)	NOTES
Central unit UC070	3.70	0.026	0.020		17.56	for M64
Central unit UC071	5.80	0.026	0.020		29.55	for M70
Timing Control Board	3.50				17.50	
Timing Control Memory 2 M	3.60 2.0				18.00 10.00	selected standby
Timing Control Memory 4 M	4.20 2.96				21.00 14.80	selected standby
512 KB memory RA57/E	1.85 1.38				9.25 6.9	selected standby
1.0 MB memory RA57/E	1.72 1.18				8.60 5.9	selected standby
1.5 MB memory RA57/B	1.86 1.33				9.25 6.65	selected standby
512 KB memory RA57/A	1.99 1.46				9.95 7.3	selected standby
1.0 MB memory RA57/A	2.50 1.20				12.50 6.0	selezion. standby
1.0 MB memory RA065B	2.50 1.20				12.50 6.0	selezion. standby
2.0 MB memory RA065	2.50 1.20				12.50 6.0	selected standby
2.0 MB memory RA80/B	2.50 1.40				12.50 7.0	selected standby
4.0 MB memory RA80/N	3.30 2.00				16.50 10.0	selected standby
G0302/A	3.50		0.32		21.34	= 37.10 W

>>>

>>>

MODULE DESCRIPTION	ABSORPTION (in amperes) + 5V	+12V	-12V	+24V	POWER (watt)	NOTES
Encryption Control G0257	1.85	0.10			10.45	
1 MB FDU/mFDU con. G0280/D	3.05	1.25			32.50	
ST506 int. control G0363	3.30				16.50	
HDU control (SMD) G0301/A G0302/A	2.60 3.50		0.23 0.32		15.76 21.34	Tot. power = 37.10 W
HDU control (ESDI) G0404 G0405	5.00 5.00	2.50 2.70			55.00 57.00	Tot. power =112 W
STC control (SLIM) G0417 G0418	3.20 1.40				16.00 7.00	Tot. power = 23 W
STC con. G0200/B-G0342	4.30				21.50	
40 MB MTU control G0278/B	2.85				14.25	
V24 line control G0300	1.80	0.060	0.060		10.44	
LION 9.6 control G0333	2.20				11.00	
X24 line control G0303	1.86				9.30	
Integrated modem MOIN 5.2	0.55	0.20	0.20		7.55	
V24+V24 line cont. G0236	2.74	0.12	0.1		16.34	
V24+LION line cont. G0256	2.79	0.17	0.05		16.59	
Ethernet control G0212/A	2.10	0.50			16.50	
Omninet control G0308	2.30				11.00	
Triv. display cont. G0252	2.30				11.50	
Graphic expansion G0255/A	3.70	0.04	0.05		23.90	
Multiplexer control G0322	2.32	0.15	0.05		14.00	

>>>

>>>

MODULE DESCRIPTION	ABSORPTION (in amperes) + 5V	+12V	-12V	+24V	POWER (watt)	NOTES
1 MB mFDU (drive)	0.55	1.25			17.75	
1 MB FDU (drive)	0.70			1.0	17.75	
20 MB STC (drive)	1.00			1.00	29.00	
45-60 MB STC (drive)	0.60 0.60	1.7 4.4			23.40 55.80	Operating Start
20 MB HDU (drive)	0.60 0.60	1.65 3.00			22.80 39.00	Operating Start
40-65-140 MB HDU (drive)	0.9 1.30	2.40 4.5			33.3 58.50	Operating Start
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	

Notes: - All current values have a tolerance of ±20 %.

- Power values given are for d.c. voltage.

4. SYSTEM HARDWARE AND SETTINGS

4.1 HARDWARE MODULES

The hardware modules discussed in this chapter are listed below:

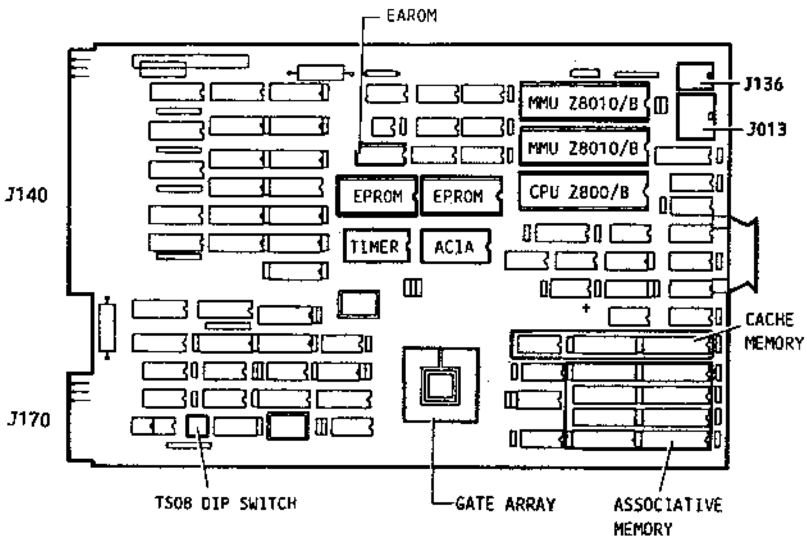
HARDWARE MODULE DESCRIPTION	MODULE NAME
Central unit for M64	UC070
Central unit for M70	UC071
TCB: Timing Control Board	TCB82/A (PER M70)
TCM: Timing Control Memory 2 Mbyte	TCM (for M70)
TCM: Timing Control Memory 4 Mbyte	TCM (for M70)
RAM storage - no ECC: 0.5 - 1.0 - 1.5 - 2.0 MByte .	RA57/E-C-B-A(PER M64)
RAM storage with ECC: 1.0 - 2.0 MByte	RA65B, RA65 (PER M64)
RAM storage with ECC 2.0 MByte	RA80/B (PER M70)
RAM storage with ECC 4.0 MByte	RA80/N (PER M70)
Encryption control and Real time clock	G0257-257/C
Keyboard/trivalent display control	G0252-252/A-252/B
Graphic display expansion module (with G0252)	G0255
Multiplexer control	G0322
mFDU/FDU control	G0280/B-D
ST506 interface control for 20/40/65 MB HDU	G0363
ESDI interface control for 140 MB HDU	G0404, G0405
SMD3 interface control (XU1700, XU1703 HDU 275) ...	G0301/A, G0302/A
20 MB SCT control (XU 1130)	G0200/B, G0342
45-60 MB SCT control	G0417, G0418
45-60 MB SCT control	G0437
40 MB MTU control	G0278/B
V24 remote internal/external line control	G0300
LION 9.6 internal line control	G0333
X21 external line control	G0303
V24 + V24 intelligent line control	G0331
V24 + LION 200/9.6 intelligent line control	G0340 - G0340/A
Omninet local network control	G0308
Ethernet internal line control	G0212/A
Starlan local network control	G0431
MOIN 5.2 integrated modem	IF192

Note: Unless specified otherwise, the following conventions are adopted for DIP-switch settings in the remainder of the manual:

O = OPEN = OFF   X = DON'T CARE

C = CLOSED = ON   - = NOT USED

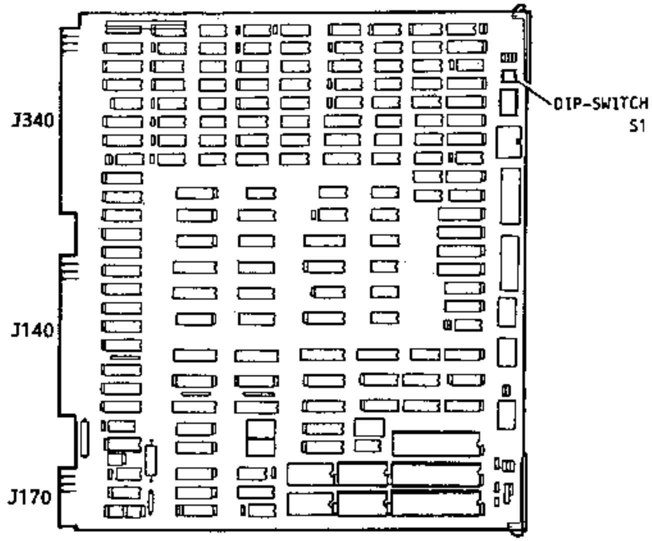
4.1.1 CENTRAL UNIT: UC070 FOR M64 ONLY



Characteristics:

- Z8001B microprocessor operating with a 10 MHz clock
- 2 Z8010B MMU to handle storage memory
- 2 EPROM (16 or 32 KB) containing autodiagnostic and IPL
- EAROM (64x4 or 256x4)
- ACIA MC 68B50 handling the RS 232 serial interface
- TIMER 8253 for the RS 232 serial interface and OLIBUS time-out timing
- Connector J013 for connection to extended console or with telediagnosis
- Connector J136 for connection to basic console
- Connector J170 for connection to RS 232 interface
- Connector J140 for connection to OLIBUS
- 4 KB cache memory.

4.1.2 CENTRAL UNIT: UC071 FOR M70 ONLY

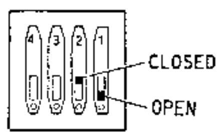


Note: 10 MHz CPU Z8001/B
2 Z8010/B MMU (128 SEGMENTS)
8 KBYTE CACHE MEMORY
8253 TIMER
2 16 KBYTE EPROM FOR AUTODIAGNOSTIC
1 32/128 BYTE EAROM FOR DATA STORAGE

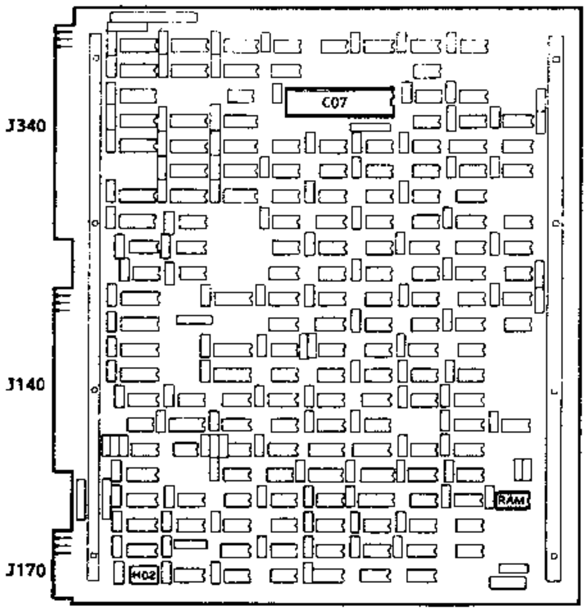
DIP SWITCH S1 in position C10

FUNCTION: Used by software to supply CPU name in multiprocessor system

SETTING				SIGNIFICANCE
1	2	3	4	
C	C	C	C	CPU 0 MASTER
C	A	C	C	CPU 1 SLAVE
A	C	C	C	CPU 2 SLAVE
C	A	C	A	CPU disabled



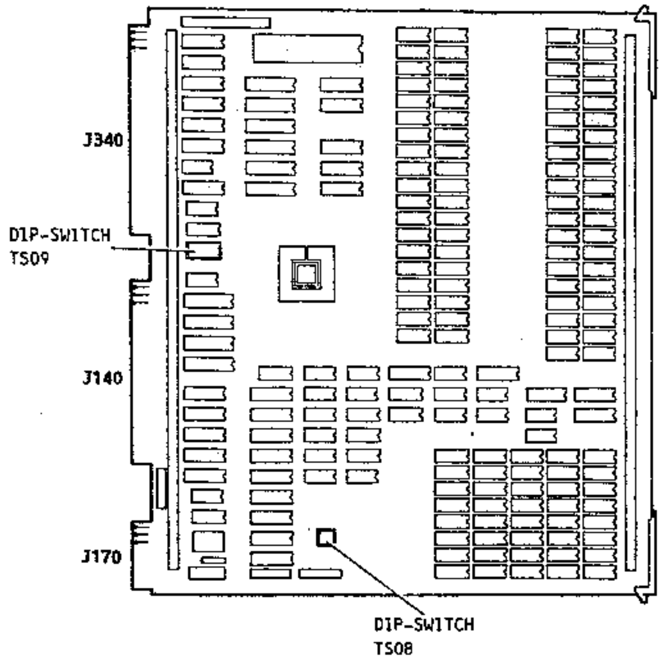
4.1.3 TIMING CONTROL BOARD: TCB82/A (M70 ONLY)



Notes: - Fast RAM 4096x1
- 32 MHz Clock generator (in position H02)
- Error Correction Code (ECC in position C07)

This board is the last of the logic section and is inserted to the right of the last control board. Can interface up to eight memory arrays.

4.1.4 2 MB TIMING CONTROL MEMORY: TCM (M70 ONLY)



Notes: - Fast RAM 256 x 1
- 32 MHz Clock generator
- Error Correction Code.

This board can work in a number of different modes, selected through the jumpers TS08 in board position J04L1.

CONFIGURATION JUMPERS TS08

JUMPER	POSITION	BOARD MODE OF OPERATION
JUMPER No. 1	ON	TCM performs SEQUENTIAL CYCLE
	OFF	TCM performs FAST SEQUENTIAL CYCLE
JUMPER No. 2	ON	TCM configured in SLAVE mode
	OFF	TCM configured in MASTER mode
JUMPER No. 3	ON	Board set in ARRAY mode
	OFF	Board set in TCM mode
JUMPER No. 4	ON	Position not used
	OFF	16 Mbyte addressing

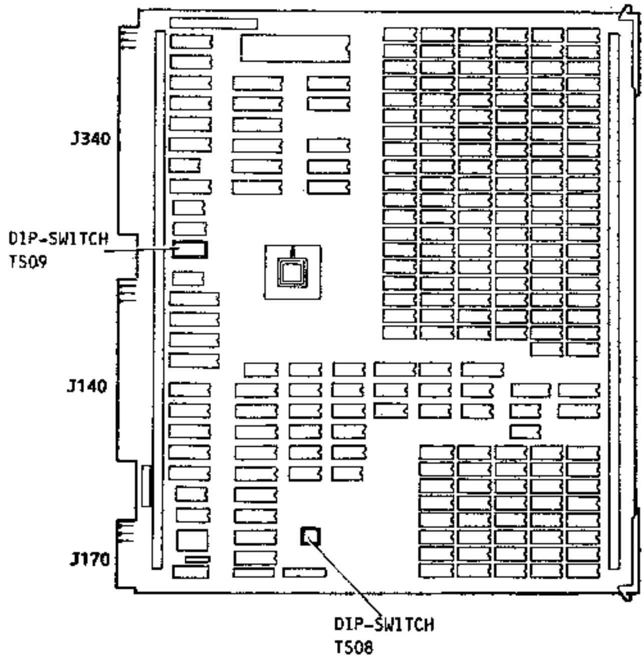
The table below supplies the configurations of jumpers TS09 setting the board memory start address within the addressing range.

STARTING ADDRESS CONFIGURATION JUMPERS TS09

START END ADDRESS	JUMPER							
	P7	P6	P5	P4	P3	P2	P1	P0
200000 - 3FFFFF	X	ON	ON	ON	ON	ON	ON	OFF
400000 - 5FFFFF	X	ON	ON	ON	ON	ON	OFF	ON
600000 - 7FFFFF	X	ON	ON	ON	ON	ON	OFF	OFF
800000 - 9FFFFF	X	ON	ON	ON	ON	OFF	ON	ON
A00000 - BFFFFF	X	ON	ON	ON	ON	OFF	ON	OFF
C00000 - DFFFFF	X	ON	ON	ON	ON	OFF	OFF	ON
E00000 - FFFFFF	X	ON	ON	ON	ON	OFF	OFF	OFF

X = not used

4.1.5 4 MB TIMING CONTROL MEMORY: TCM (M70 ONLY)



Notes: - Fast RAM 256 x 1
- 32 MHz Clock generator
- Error Correction Code.

This board can work in a number of different modes selected through jumpers TS08 in board position J04L1. Significance of the jumpers is illustrated in the table below.

TCM BOARD CONFIGURATION JUMPERS TS08

JUMPER	POSITION	BOARD MODE OF OPERATION
JUMPER No. 1	ON	TCM performs SEQUENTIAL CYCLE
	OFF	TCM performs FAST SEQUENTIAL CYCLE
JUMPER No. 2	ON	TCM configured in SLAVE mode
	OFF	TCM configured in MASTER mode
JUMPER No. 3	ON	Board set in ARRAY mode
	OFF	Board set in TCM mode
JUMPER No. 4	ON	Position not used
	OFF	16 Mbyte addressing

The table below supplies the configurations of the jumpers TS09 to set the board memory start address from within the address range possible.

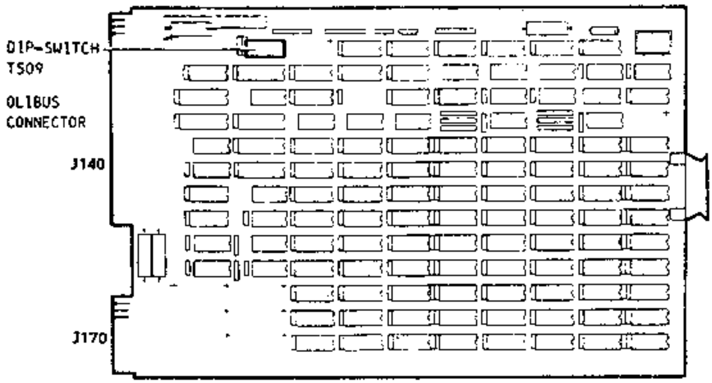
STARTING ADDRESS CONFIGURATION JUMPERS TS09

START END ADDRESS	JUMPER							
	P7	P6	P5	P4	P3	P2	P1	P0
200000 - 5FFFFF	X	ON	ON	ON	ON	ON	ON	OFF
400000 - 7FFFFF	X	ON	ON	ON	ON	ON	OFF	ON
600000 - 9FFFFF	X	ON	ON	ON	ON	ON	OFF	OFF
800000 - BFFFFF	X	ON	ON	ON	ON	OFF	ON	ON
A00000 - DFFFFF	X	ON	ON	ON	ON	OFF	ON	OFF
C00000 - FFFFFF	X	ON	ON	ON	ON	OFF	OFF	ON

X = not used

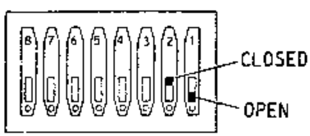
4.1.6 M64 ONLY RAM STORAGE BOARDS

512 Kbyte memory, 64 Kbit chips: RA57/E



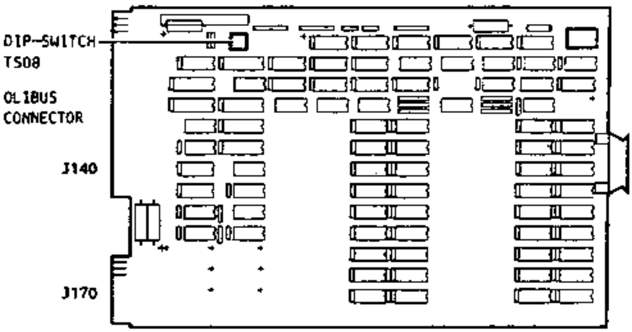
Position of DIP-switch TS09 on the board and addressing table:

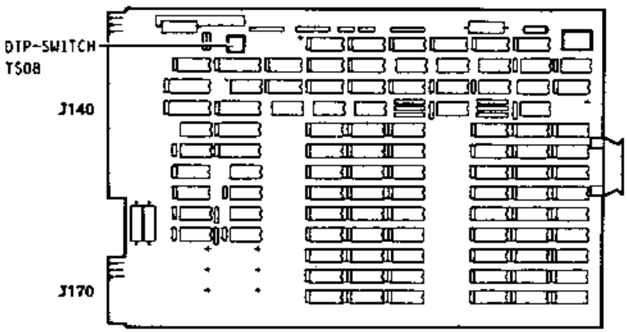
8	7	6	5	4	3	2	1	ADDRESSING FIELD BYTE (HEX)
C	C	C	C	O	O	O	O	08 00 00-0F FF FF
C	C	C	O	C	O	O	O	10 00 00-17 FF FF
C	C	C	O	O	O	O	O	18 00 00-1F FF FF
C	C	O	C	C	O	O	O	20 00 00-27 FF FF
C	C	O	C	O	O	O	O	28 00 00-2F FF FF
C	C	O	O	C	O	O	O	30 00 00-37 FF FF
C	C	O	O	O	O	O	O	38 00 00-3F FF FF
C	O	C	C	C	O	O	O	40 00 00-47 FF FF
C	O	C	C	C	O	O	O	48 00 00-4F FF FF
C	O	C	O	C	O	O	O	50 00 00-57 FF FF
C	O	C	O	O	O	O	O	58 00 00-5F FF FF
C	O	O	C	C	O	O	O	60 00 00-67 FF FF
C	O	O	C	O	O	O	O	68 00 00-6F FF FF
C	O	O	O	C	O	O	O	70 00 00-77 FF FF
C	O	O	O	O	O	O	O	78 00 00-7F FF FF
O	C	C	C	C	O	O	O	80 00 00-87 FF FF
O	C	C	C	O	O	O	O	88 00 00-8F FF FF
O	C	C	O	C	O	O	O	90 00 00-97 FF FF
O	C	C	O	O	O	O	O	98 00 00-9F FF FF
O	C	O	C	C	O	O	O	A0 00 00-A7 FF FF
O	C	O	C	O	O	O	O	A8 00 00-AF FF FF
O	C	O	O	C	O	O	O	B0 00 00-B7 FF FF
O	C	O	O	O	O	O	O	B8 00 00-BF FF FF
O	O	C	C	C	O	O	O	C0 00 00-C7 FF FF
O	O	C	C	O	O	O	O	C8 00 00-CF FF FF
O	O	C	O	C	O	O	O	D0 00 00-D7 FF FF
O	O	C	O	O	O	O	O	D8 00 00-DF FF FF
O	O	O	C	C	O	O	O	E0 00 00-E7 FF FF
O	O	O	C	O	O	O	O	E8 00 00-EF FF FF
O	O	O	O	C	O	O	O	F0 00 00-F7 FF FF
O	O	O	O	O	O	O	O	F8 00 00-FF FF FF



1.0 MByte memory, 256 Kbit chips: RA57/C

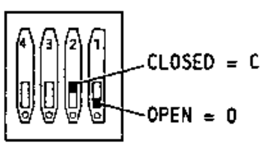
1.5 MByte memory, 256 Kbit chips: RA57/B



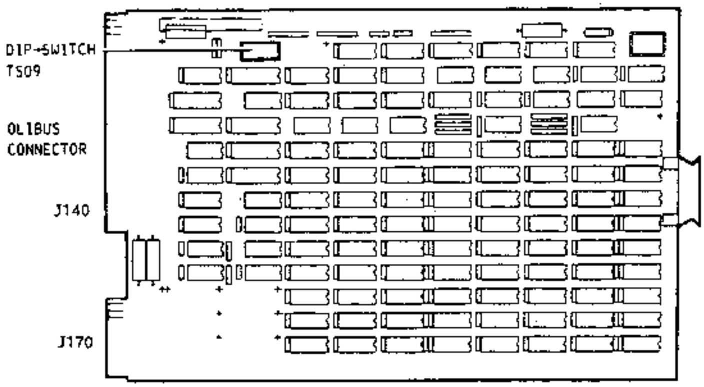


Position of DIP-switch TS08 on board and addressing table:

SETTING 4	3	2	1	ADDRESSING FIELD BYTE (HEX)
C	C	O	X	20 00 00 - 2F FF FF
C	O	C	X	40 00 00 - 4F FF FF
C	O	O	X	60 00 00 - 6F FF FF
O	C	C	X	80 00 00 - 8F FF FF
O	C	O	X	A0 00 00 - AF FF FF
O	O	C	X	C0 00 00 - CF FF FF
O	O	O	X	E0 00 00 - EF FF FF

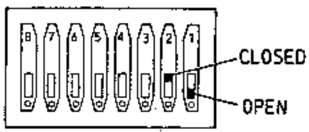


2.0 MByte memory, 256 Kbit chips: RA57/A

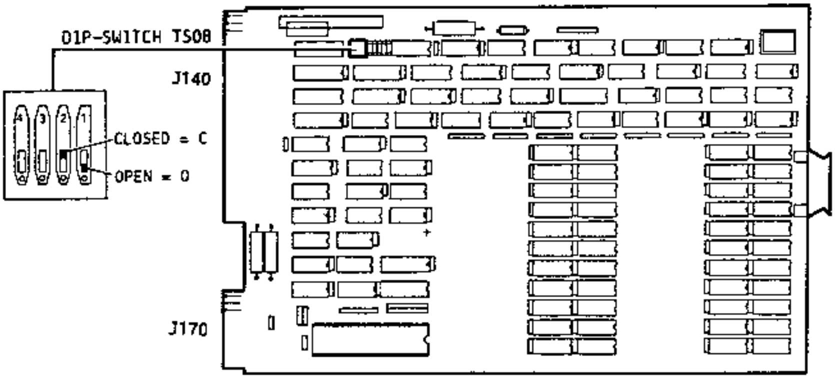


Position of DIP-switch TS09 on board and addressing table:

SETTING								ADDRESSING FIELD BYTE (HEX)
8	7	6	5	4	3	2	1	
C	C	0	0	0	0	0	0	20 00 00 - 3F FF FF
C	0	C	0	0	0	0	0	40 00 00 - 5F FF FF
C	0	0	0	0	0	0	0	60 00 00 - 7F FF FF
0	C	C	0	0	0	0	0	80 00 00 - 9F FF FF
0	C	0	0	0	0	0	0	A0 00 00 - BF FF FF
0	0	C	0	0	0	0	0	C0 00 00 - DF FF FF
0	0	0	0	0	0	0	0	E0 00 00 - FF FF FF

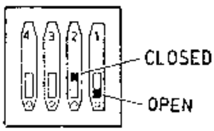


1.0 MByte memory, 256 Kbit chips: RA65B

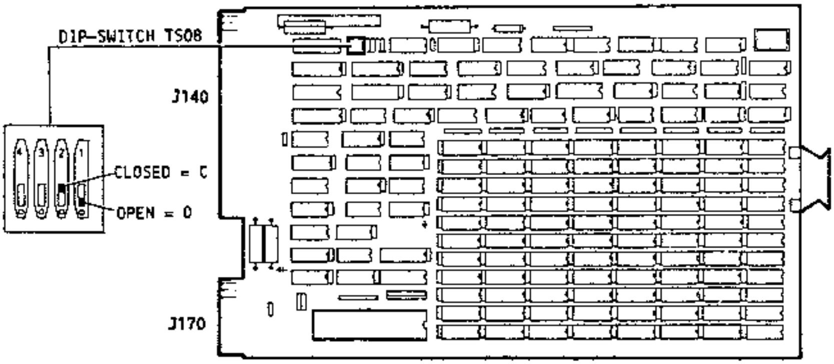


Position of DIP-switch TS08 on board and addresing table:

SETTING				ADDRESSING FIELD BYTE (HEX)
4	3	2	1	
C	C	C	C	00 00 00 - 0F FF FF
C	C	C	A	10 00 00 - 1F FF FF
C	C	A	C	20 00 00 - 2F FF FF
C	C	A	A	30 00 00 - 3F FF FF
C	A	C	C	40 00 00 - 4F FF FF
C	A	C	A	50 00 00 - 5F FF FF
C	A	A	C	60 00 00 - 6F FF FF
C	A	A	A	70 00 00 - 7F FF FF
A	C	C	C	80 00 00 - 8F FF FF
A	C	C	A	90 00 00 - 9F FF FF
A	C	A	C	A0 00 00 - AF FF FF
A	C	A	A	B0 00 00 - BF FF FF
A	A	C	C	C0 00 00 - CF FF FF
A	A	C	A	D0 00 00 - DF FF FF
A	A	A	C	E0 00 00 - EF FF FF

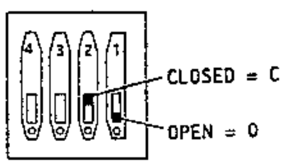


2.0 MByte memory, 256 Kbit chips: RA65



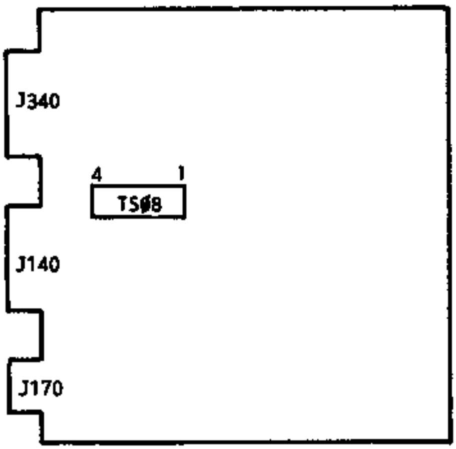
Position of DIP-switch TS08 on board and addressing table:

SETTING 4	3	2	1	ADDRESSING FIELD BYTE (HEX)
X	C	C	C	00 00 00 - 1F FF FF
X	C	C	A	20 00 00 - 3F FF FF
X	C	A	C	40 00 00 - 5F FF FF
X	C	A	A	60 00 00 - 7F FF FF
X	A	C	C	80 00 00 - 9F FF FF
X	A	C	A	A0 00 00 - BF FF FF
X	A	A	C	C0 00 00 - DF FF FF
X	A	A	A	E0 00 00 - FF FF FF



4.1.7 M70 ONLY RAM MEMORY BOARDS

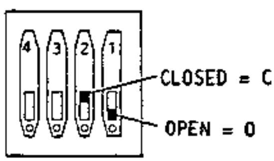
RA80/B: 2.0 MByte memory, 256 Kbit chips, 2 MByte boundary



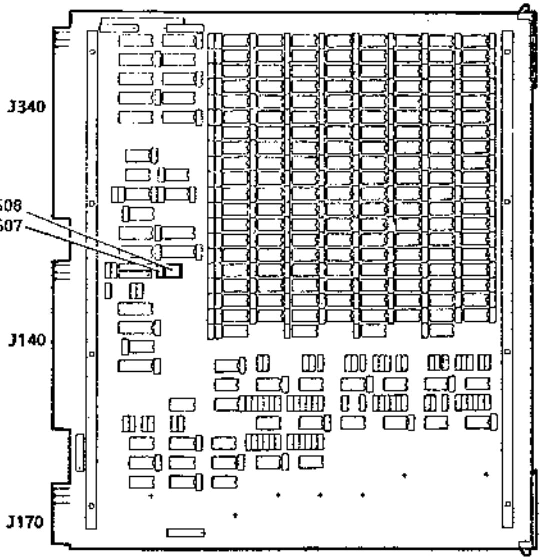
DIP-SWITCH TS08 in position R03

FUNCTION: Sets addresses

SETTING 4	3	2	1	RANGE OF ADDRESSES (HEX)
C	C	C	A	200000 - 3FFFFF
C	C	A	C	400000 - 5FFFFF
C	C	A	A	600000 - 7FFFFF
C	A	C	C	800000 - 9FFFFF
C	A	C	A	A00000 - BFFFFF
C	A	A	C	C00000 - DFFFFF



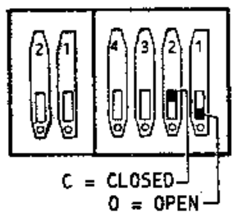
RA80/N: 4.0 MByte memory, 256 Kbit chips, 2 Mbyte boundary



DIP-SWITCH TS07 in position R02
DIP-SWITCH TS08 in position R03

FUNCTION: Set the addresses possible

SETTING TS07 2 1	SETTING TS08 4 3 2 1	RANGE OF ADDRESSES (HEX)
C A	C C C A	200000 - 5FFFFF
A A	C C A C	400000 - 7FFFFF
C C	A C A A	600000 - 9FFFFF
A C	A A C C	800000 - BFFFFF
C A	A A C A	A00000 - DFFFFF



Note: The RA80/N board can be replaced with the TCM board setted in array mode.

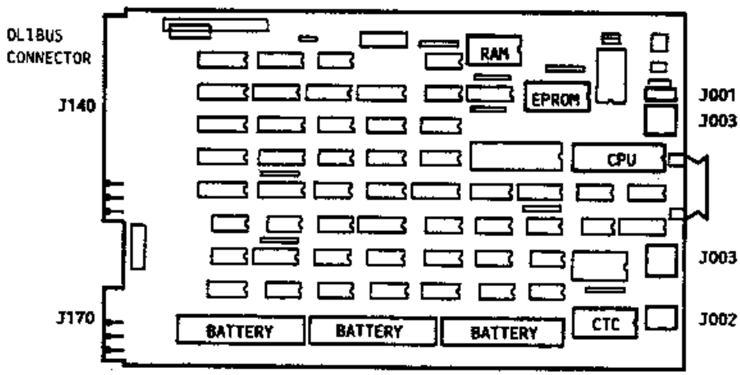
4.1.8 ENCRYPTION CONTROLLER

Encryption controller and real time clock: G0257

Encryption (pin check) controller + CAT algorithm: G0257/C

There are no major differences between the two versions of the board so the figure below illustrates only the more complete version.

G0257 board picture



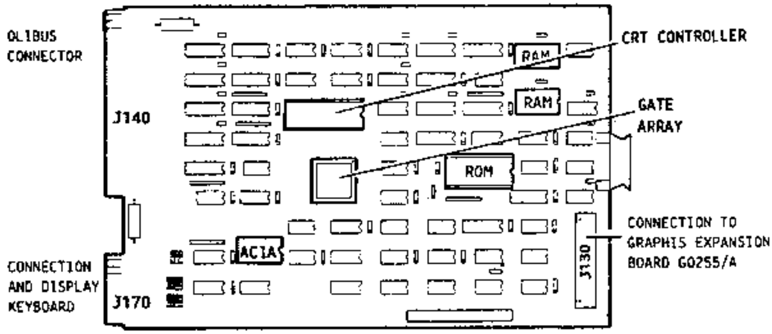
Note:
- J01: +5V power connector for ASD module
- J02: Customer privacy jumper
- J03: Connector for line and ASD module.

Characteristics:

- Z80/A microprocessor
- Z80/A Counter Timer Controller (CTC)
- 2K x 8 dual port RAM
- 2K x 8 battery backed up RAM
- 8K x 8 ROM.

4.1.9 KEYBOARD/DISPLAY CONTROLLERS

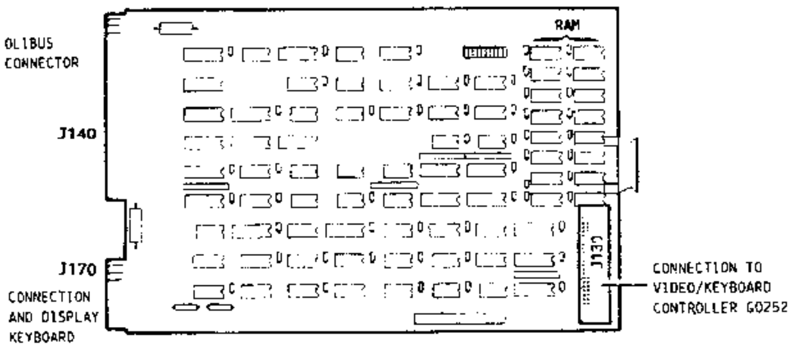
Trivalent video controller G0252



Characteristics:

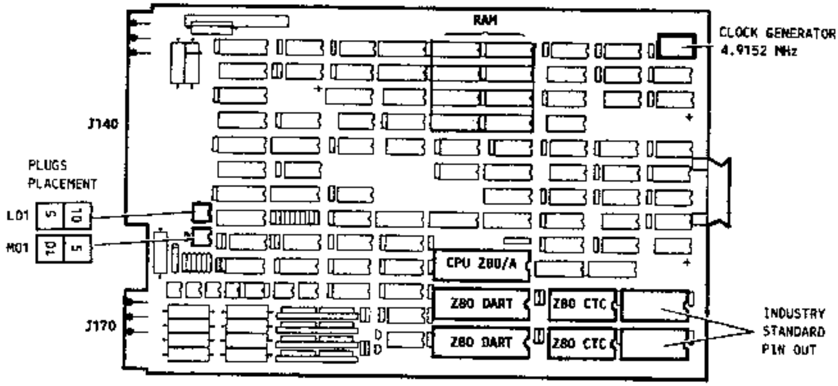
- 6845 CRT controller 6845 for 5", 9" and 15" videos
- 8 KB refresh RAM (data and attributes)
- 4 KB character generator ROM
- Asynchronous serial interface for exchanges for keyboard or ELB 1381/1382 (for workstations between 5 and 100 metres from system).
- Can be connected to monochrome graphic expansion
- Grid handling for G0252/A
- Conformity with UL/CSO regulations (for G0252/B).

Graphic video expansion module: G0255/A



4.1.10 MULTIPLEXER CONTROLLER: G0322

The G0322 is an intelligent controller, used as interface between the system and workstation, and based on the ELB 3683. The 4 board channels are not connected directly to the ELB but via a distribution box D-BOX.



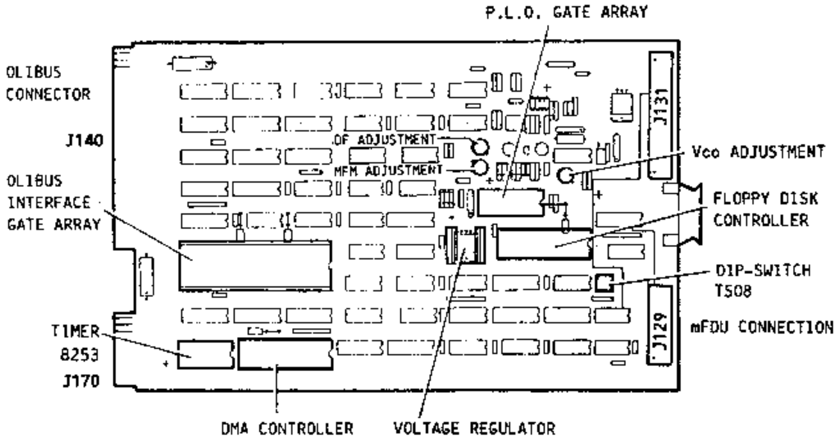
The GO 322 jumper connections made by way of 5|10 plugs and illustrated below must be taken into account in connecting peripherals or the ELB 3683 to the D-BOX:

```
Position 5      --   ----------      Position 10      --   ----------
for RS 232     | 5| |1|<----->|8|    for Current     |10| |1|       |8|
select         |--| |2|       |7|    Loop select     |--| |2|<----->|7|
               |0I| |3|<----->|6|                    | 5| |3|       |6|
                --  |4|       |5|                     --  |4|<----->|5|
                     ----------                            ----------
```

5 / 01 5 / 01	5 / 0I I0 / S	10 / S 5 / 0I	I0 / S 10 / S
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.

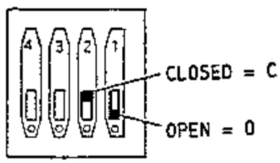
4.1.11 1 MB mFDU/FDU CONTROLLER: G0280/B-D

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).



DIP-switch TS08 jump connections

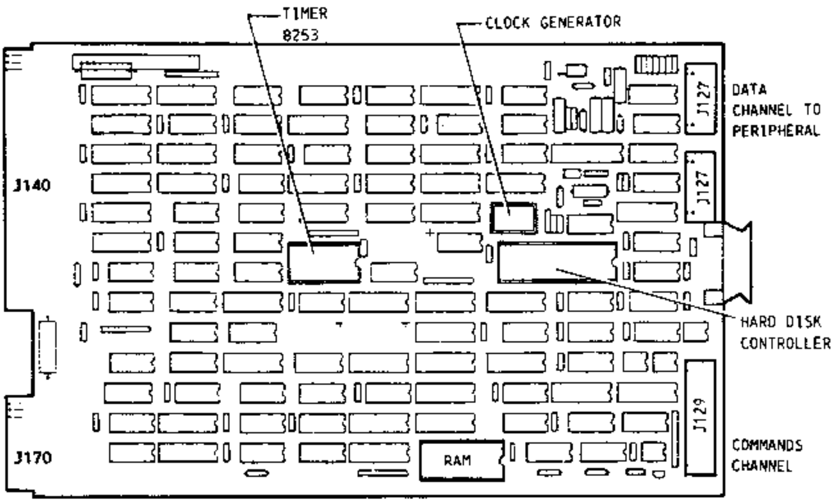
SETTING 4	3	2	1	SIGNIFICANCE
0	0	0	C	1 Mbyte Floppy
0	0	C	C	1 Mbyte Minifloppy



Note: The same controller cannot simultaneously support configurations with floppy and minifloppy units.

4.1.12 ST506 INTERFACE HDU CONTROLLER: 60363

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.



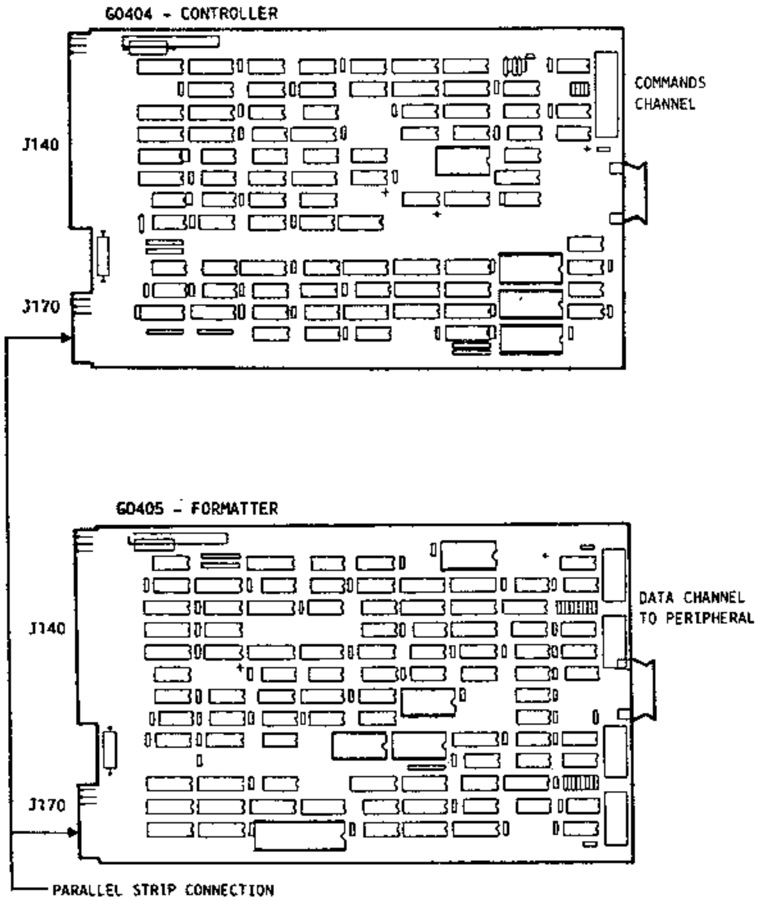
Characteristics

- Hard disk controller PD 7261
- Programmable timer 8253
- 8K x 8 C-MOS RAM
- Clock generator: 20 MHz clock.

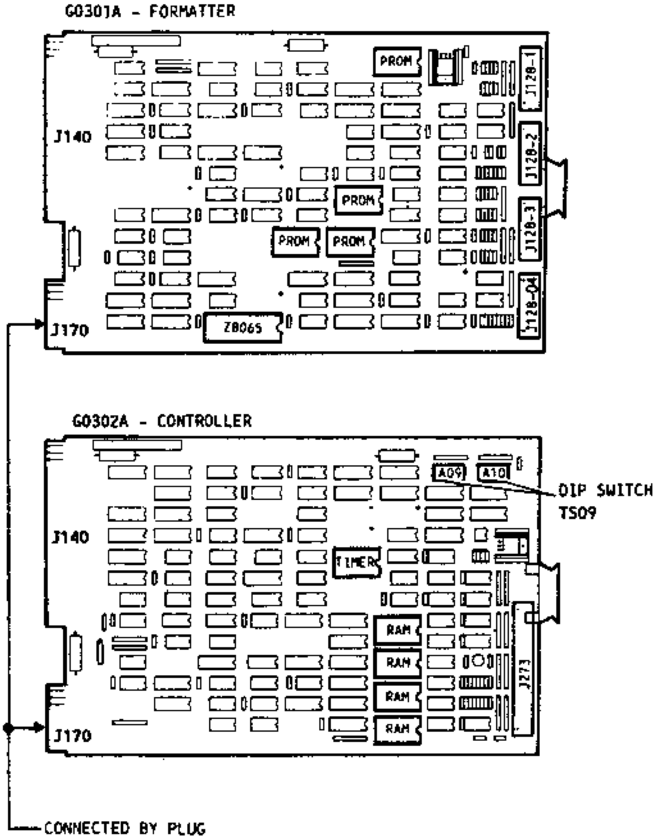
4.1.13 140 MB HDU CONTROLLER: ESDI INTERFACE G0404 - G0405

The ESDI interface controller requires no jumper settings; all that is required 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



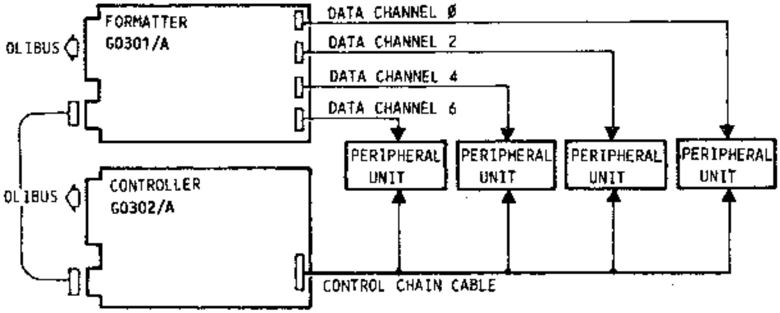
4.1.14 SMD INTERFACE HDU CONTROLLER: G0301/A - G0302/A



Characteristics:

- Z8065 component for ECC
- TIMER 8253 to determine length of DMA transfer
- 3 PROMs to handle the data channels and command channel to and from the peripheral
- 4 RAMs for DMA data exchanges with OLIBUS and with the peripheral unit.

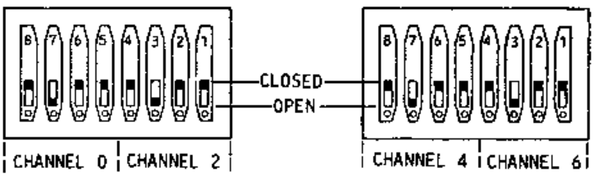
Interconnection of controller and XU 1700/1703 peripherals



Setting of DIP-switches A09 and A10 on board G0302/A

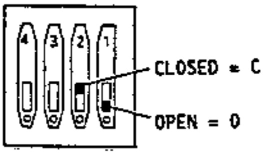
These two DIP-switches are used to identify the type of peripherals. For example, if 4 60 MB units were connected, the jump connections would be:

DIP-SWITCH A09 DIP-SWITCH A10



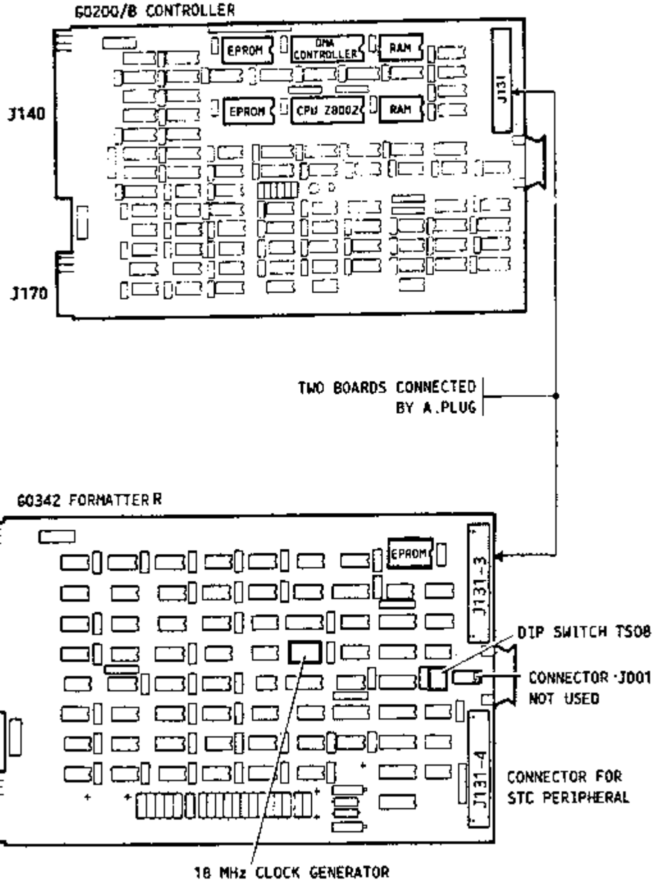
In general, though, settings possible **for each channel** are as follows:

SETTING				SIGNIFICANCE
8 4	7 3	6 2	5 1	
C	C	C	C	No peripheral connected
C	O	C	C	60 MB HDU without Dual-Port board
C	O	C	O	60 MB HDU with Dual-Port board
C	O	O	C	120 MB HDU without Dual-Port board
C	O	O	O	120 MB HDU with Dual-Port board
A	C	A	C	275 MB HDU without Dual-Port board
A	C	A	A	275 MB HDU with Dual-Port board



4.1.15 20 MB STC (CIPHER) CONTROLLER: G0200/B - G0342

Interconnection between controller and XU1130 peripherals

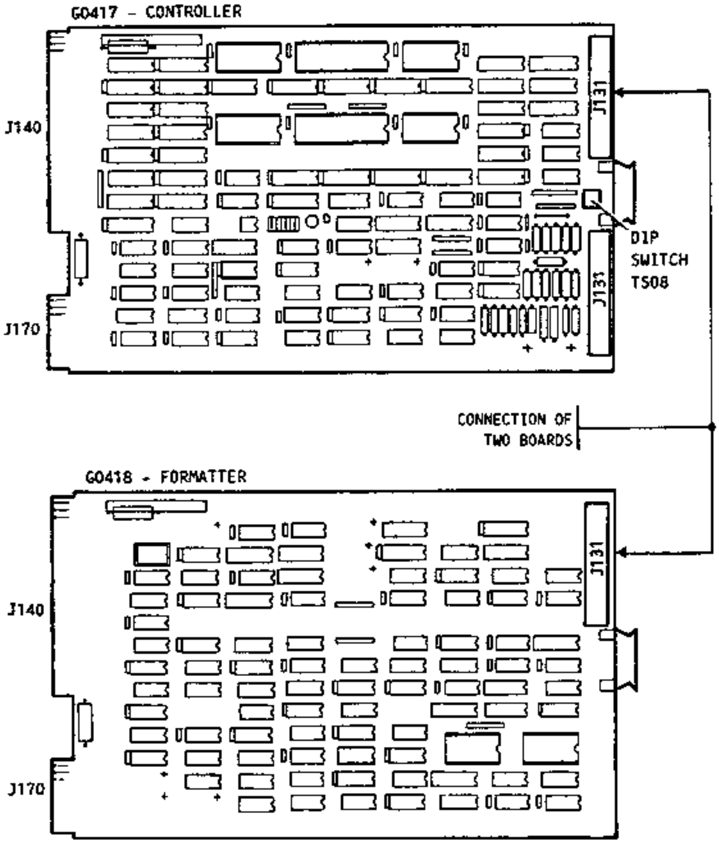


Characteristics:

- Z8002 microprocessor
- 4 KB RAM
- DMA controller 9517.

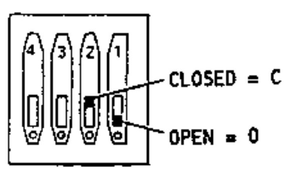
4.1.16 45-60 MB SCT CONTROLLER: G0417, G0418

Interconnection between controller and peripherals



Check the setting of the block of four DIP-switches in position G10 of board G0417; they should be set as follows:

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



4.1.17 45/60 MB SCT CONTROLLER: G0437

The G0437 board is an intelligent controller used for control of a 9-track streamer unit with QIC-214 formatting. The STC controller is implemented on a 3000 format board and is based on the formatter implemented on Gate array GA16.

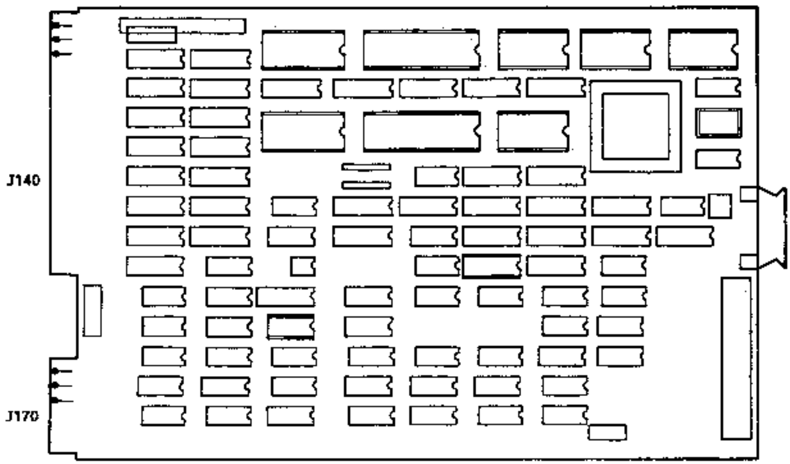
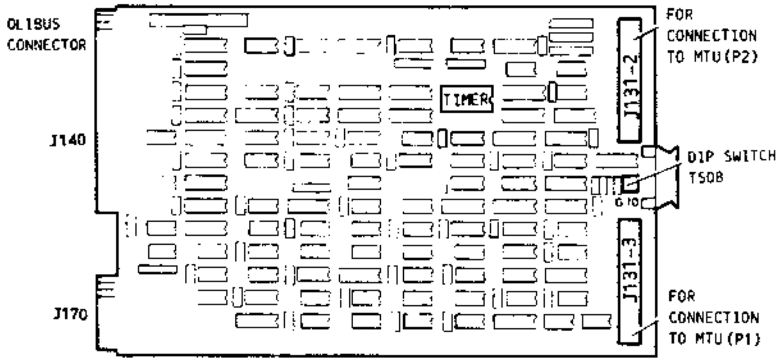


Fig. 4-1 View of STC 45/60 MB Control Board

4.1.18 40 MTU CONTROLLER: G0278/B

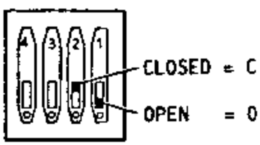


Characteristics:

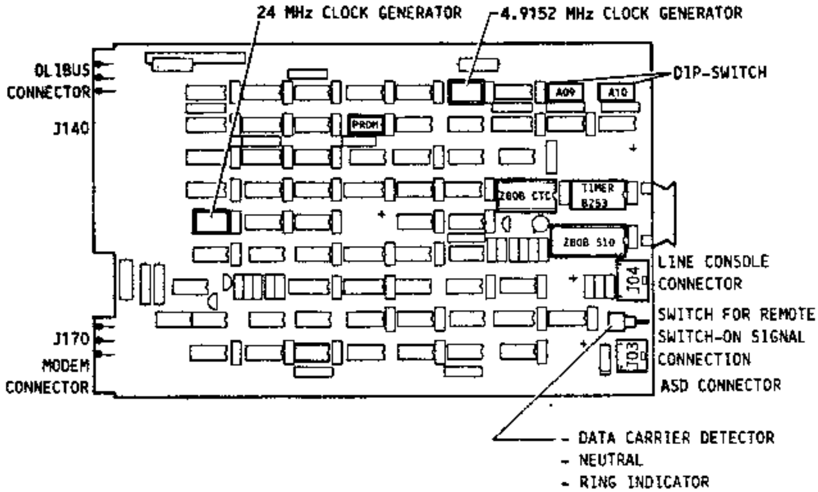
- 8253 TIMER to determine length of DMA transfer
- FIFO buffer for DMA data exchanges with OLIBUS and peripherals
- Pertec industry standard interface

A DIP-switch in position G10 is used to select the number of peripherals connected:

SETTING 4	3	2	1	SIGNIFICANCE
C	C	C	C	No peripheral connected
C	C	C	O	First peripheral connected
C	C	O	C	Second peripheral connected
C	C	O	O	First and second peripherals connected



4.1.19 V24 REMOTE INTERNAL/EXTERNAL LINE CONTROLLER: G0300



Jump connections for terminal name selection

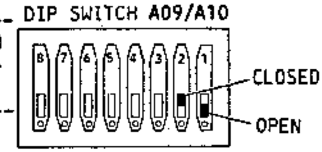
DIP-switch A09 = First character (POLLING)

DIP-switch A10 = Second character (SELECTING)

An example of terminal name selection is shown below; in the example, the characters "P" and "7" have been chosen for polling and selecting, respectively (see also table overleaf).

SELECTION	SYMBOL	HEX	PRESETTINGS 8 7 6 5	4 3 2 1
DIP-switch A09 for polling	P	50	0 1 0 1 (5)	0 0 0 0 (0)
DIP-switch A10 for selecting	7	37	0 0 1 1 (3)	0 1 1 1 (7)

DIP SWITCH A09/A10



Terminal name selection

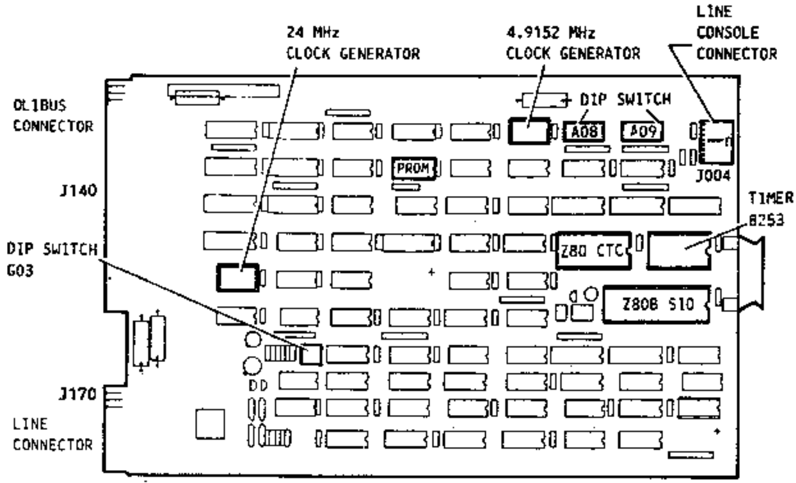
The table below is a decoder table showing the names of the terminals, using polling and selecting addresses.

SYSTEM No.	POLLING ADDRESS Master or Stand Alone				SELECTING ADDRESS Master or Stand Alone			
	EBCDIC symb.	hex	ISO ccitt 5 symb.	hex	EBCDIC symb.	hex	ISO ccitt 5 symb.	hex
0	SP	40	SP	20	-	60	-	20
1	A	C1	A	41	/	61	/	2F
2	B	C2	B	42	S	E2	S	53
3	C	C3	C	43	T	E3	T	54
4	D	C4	D	44	U	E4	U	55
5	E	C5	E	45	V	E5	V	56
6	F	C6	F	46	W	E6	W	57
7	G	C7	G	47	X	E7	X	58
8	H	C8	H	48	Y	E8	Y	59
9	I	C9	I	49	Z	E9	Z	5A
1		4A	[	5B (*)		6A ($)		7C (*)
1		4B ($)	.	2E	,	6B	,	2C
1	<	4C	<	3C	%	6C	%	25
1	(	4D	(	28	_	6D	_	5F
1	+	4E	+	2B	>	6E	>	3E
1	¦	4F	!	21	?	6F	?	3F
1	&	50	&	26	0	F0	0	30
1	J	D1	J	4A	1	F1	1	31
1	K	D2	K	4B	2	F2	2	32
1	L	D3	L	4C	3	F3	3	33
2	M	D4	M	4D	4	F4	4	34
2	N	D5	N	4E	5	F5	5	35
2	O	D6	O	4F	6	F6	6	36
2	P	D7	P	50	7	F7	7	37
2	Q	D8	Q	51	8	F8	8	38
2	R	D9	R	52	9	F9	9	39
2	!	5A	]	5D (*)	:	7A	:	3A
2	$	5B	$	24 (*)	#	7B		23 (*)
2	*	5C	*	2A	@	7C	@	40 (*)
2	)	5D	)	29	'	7D	'	27
3	;	5E	;	3B	=	7E	=	3D
3		5F	Ω	5E (*)	"	7F	"	22

(*) Specific national symbol

($) Non-existent symbol

4.1.20 LION 9.6 INTERNAL LINE CONTROLLER: G0333



Terminal name select jump connections

DIP-switch A08 = POLLING (most significant byte)

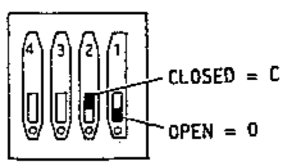
DIP-switch A09 = SELECTING (least significant byte)

These two DIP-switches are used in the same way as described earlier for the G0300 controller.

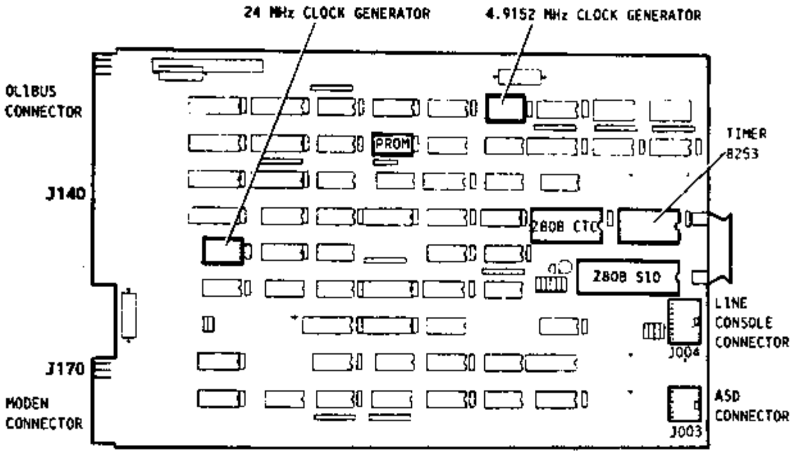
DIP-switch G03 for interval timing

The following table illustrates DIP-switch G03 settings relative to delays in releasing the line carrier.

SETTING				SIGNIFICANCE
4	3	2	1	
C	C	C	C	16 clock pulses
C	C	C	O	14 clock pulses
C	C	O	C	12 clock pulses
C	C	O	O	10 clock pulses
C	O	C	C	8 clock pulses
C	O	C	O	6 clock pulses
C	O	O	C	4 clock pulses
C	O	O	O	2 (not possible)



4.1.21 X21 EXTERNAL LINE CONTROLLER: G0303



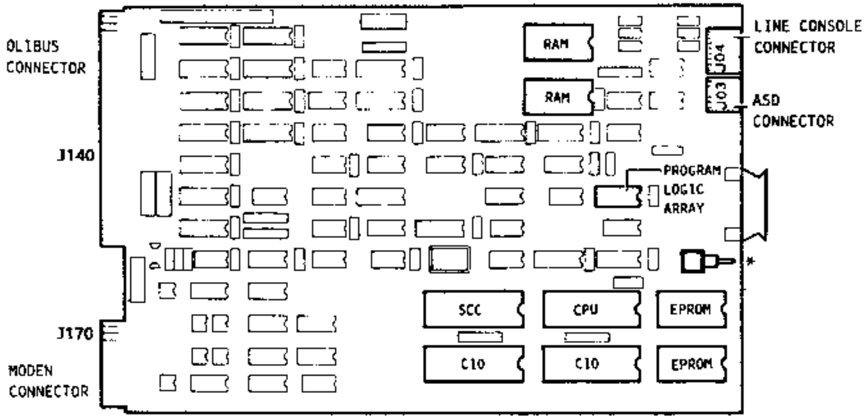
Terminal name select jump connections

DIP-switch A09 = POLLING (most signifiacnt byte)

DIP-switch A10 = SELECTING (least significant byte)

These two DIP-switches are used in the same way as for the G0300 board with the V24 line controller (see section 4.1.16).

4.1.22 V24 + V24 INTELLIGENT LINE CONTROLLER: 60331



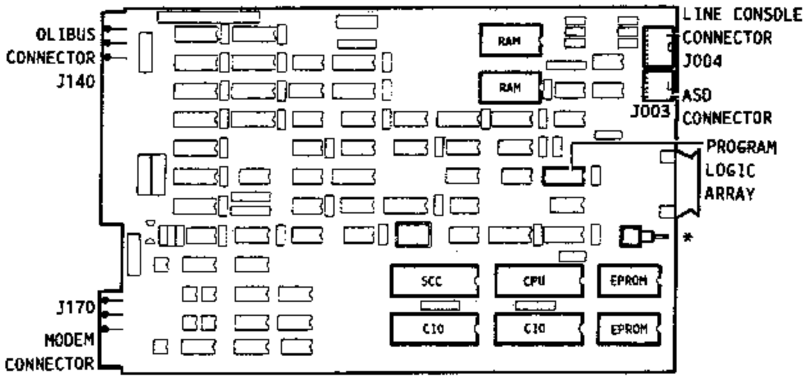
*Switch for selection of the remote switch-on signals:
- RING INDICATOR
- NEUTRAL
- DATA CARRIER DETECTOR

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

4.1.23 V24 + LION 200/9.6 INTELLIGENT LINE CONTROLLER: G0340/340/A



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

- RING INDICATOR
- NEUTRAL
- DATA CARRIER DETECTOR

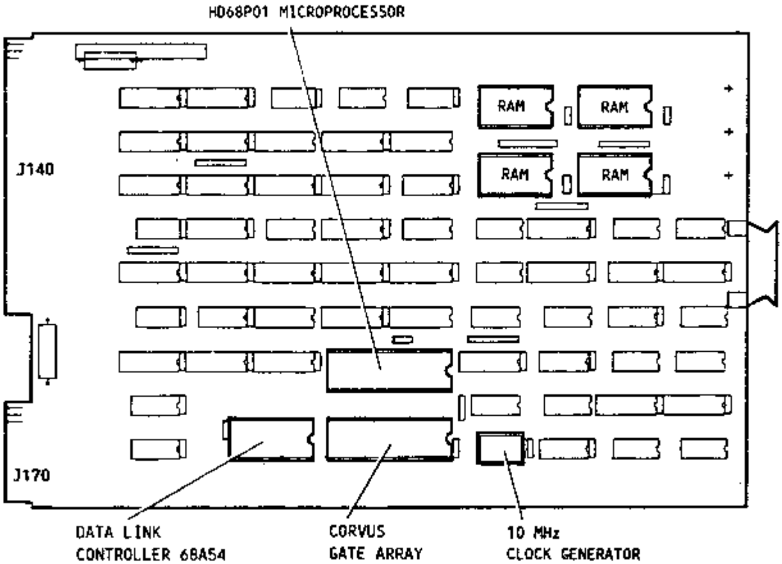
Connector J170 is connected to the modem.

Characteristics:

- Control for external (V24 channel) and internal (LION 200 channel) lines
- Z8002 microprocessor
- Self-diagnostic feature
- 32 KB ROM to handle the lines
- 16 KB RAM to exchange data and parameters
- Character oriented, SDLC and HDLC protocols.

Note: There are no major differences between the G0256 (V24 + LION 200) and G0340/A (V24 + LION 9.6) controllers to justify separate descriptions for both.

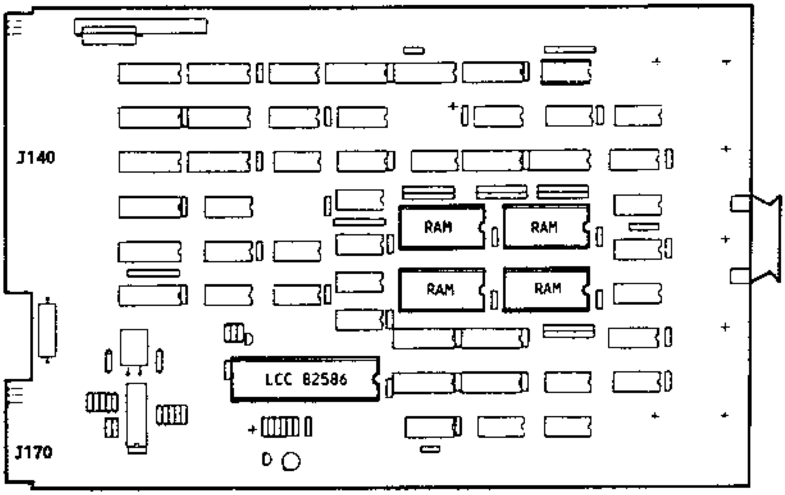
4.1.24 OMNINET LOCAL NETWORK CONTROLLER: 60388



Characteristics:

- CORVUS Omninet kit
- 8 KB Dual-Port memory
- Internal line protocol based on OMNINET specifications
- Transfer speed: 1 Mbps
- CSMA channel control
- NRZI code.

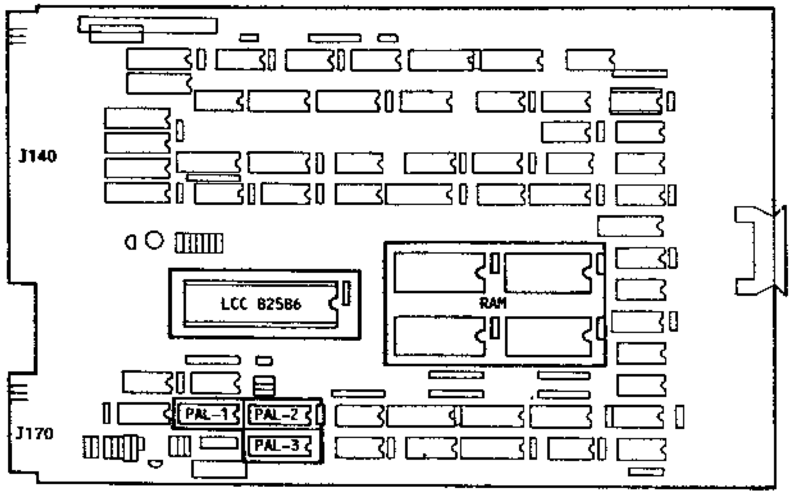
4.1.25 ETHERNET INTERNAL LINE CONTROLLER: G0212/A



Characteristics:

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

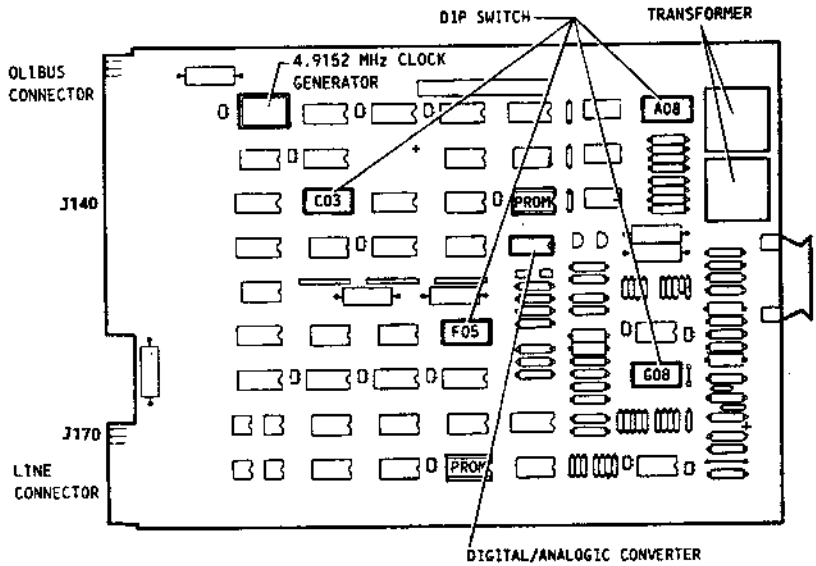
4.1.26 STARLAN LOCAL NETWORK CONTROLLER: 60431



Characteristics:

- 3000 format board
- Line Communication Controller - LCC 82586
- 32 KB Dual-Port memory
- Working frequency: 8 MHz
- CSMA/CD local networks transmission protocol
- Transfer speed: 1 Mbps.

4.1.27 INTEGRATED MODEM MOIN 5.2: IF192



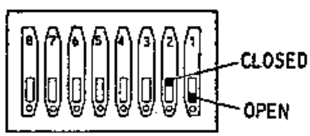
Characteristics:

- Synchronous transmission
- Differential and non-differential twin-phase modulation
- Half duplex or full duplex 4-wire operation
- Point-to-point, multi-point and ring configuration.

DIP-switch A08

Sets line impedance value:

SETTING 8 7 6 5 4 3 2 1	SIGNIFICANCE
C O C - - C C O	150 ohm point-to-point
O C C - - C O C	600 ohm point-to-point
C O O - - O C O	150 ohm multi-point
O C O - - O O C	600 ohm multi-point



Dip switch F05

Significance of the settings is shown below:

```
-----------------
|8|7|6|5|4|3|2|1|
 - - --- - - ---
 | | ||  | |  |                        C C = non-differential
 | | ||  | |  ----- Modulation:        C 0 = differential on 1's
 | | ||  | |                           0 0 = differential on 0's
 | | ||  | |
 | | ||  | -------- STX Predistortion: 0 = yes
 | | ||  |                             C = no
 | | ||  |
 | | ||  |  (6-4)
 | | -|------------ Carrier issue:     C C = continuous (*)
 | |  |     (6-5)
 | |  ------------- Request and Clear  C C = 32 clock pulses
 | |                To Send Interval:  C 0 = 64 clock pulses
 | |                                   0 C =  0 clock pulses
 | |
 | ---------------- Type of operation: 0 = 2 wire
 |                                     C = 4 wire
 |
 ------------------ Not used
```

Notes:

- TX predistortion (F05-3): sets distortion on the output signal and should be used on long lines with high attenuation.
- Carrier issue (F05-4/6): in normal operation, the DIP-switch (F05-4) is set at 1.
- Request To Send and Clear To Send Interval (F05-5/6): inversely proportional to velocity, i.e. at a rate of 9,600 baud, an interval of 32 clock pulses is required.
- (*) Setting valid only in conjunction with DIP-switch C03-6/7 setting.

Dip switch C03

Significance of the settings is illustrated below:

```
-----------------
|8|7|6|5|4|3|2|1|
 - --- - - -----                          0 C C = 1,200 baud
 |  |  | |   |                            0 C 0 = 2,400 baud
 |  |  | |   ------ Receive/send speed:   0 0 C = 4,800 baud
 |  |  | |                                0 0 0 = 9,600 baud
 |  |  | |                                C 0 0 = 19,200 baud
 |  |  | |
 |  |  | ---------- A11 enabled:          0 = no
 |  |  |                                 C = yes
 |  |  |
 |  |  ------------ Clock:                0 = clock from terminal
 |  |                                     C = internal clock
 |  |
 |  |                                     0 0 = continuous
 |  ---------------- Carrier issue:       C 0 = 105 fixed
 |                                        0 C = 108 fixed
 |                                        C C = real operation
 |
 ------------------ Not used
```

Notes:

- A111 enable (C03-4): used to modify terminal speed, normally set at 1.
- Carrier issue (C03-6/7): must be jumpered for real operation, as the other features are used only in diagnostics.
- Clock (C03-5): may be sent to the modem by the terminal, or generated on the board (internal clock); in connections to Olivetti equipment, must always be set for internal clock operation (C03-5=0).

DIP-switch G08

Significance of the settings is shown below:

```
-----------------
|8|7|6|5|4|3|2|1|
 - - - --- - - -
 | | |  |  | | |
 | | |  |  | | ---- RX equalization: 0 = no
 | | |  |  | |                       C = yes
 | | |  |  | |
 | | |  |  -------- Not used
 | | |  |
 | | |  ----------- Tx filter setting:
 | | |                     0 0 = for speeds of 1,200 and 2,400 baud
 | | |                     C C = for speeds of 1,800, 9,600 and 19,200 baud
 | | |
 | | -------------- Not used
 | |
 | ---------------- Emission level: 0 = 0  dBm at 600
 |                                  C = +6 dBm at 600
 |
 ------------------ Not used
```

Notes:

- RX equalization (G08-1): in which the incoming signal is equalized or made clearer; used on long lines with a lot of disturbance.
- TX filter setting (G08-4/5): depends on velocity selected
- Emission level (G08-7): increases the output level on lines with high disturbance.

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5. MAGNETIC PERIPHERALS

5.1 INTRODUCTION

This chapter describes all the peripheral units available for M64 and M70 systems and how they are connected in the systems; for more detailed information on the individual peripherals, see the relative documentation. The table below gives a complete picture of the peripherals that may be used on M64 and M70 systems.

P.U. TYPE	- MANUFACTURER	- NAME	- INTERF.	- CONTROL	- SIZE
mFDU 1 MB	- Toshiba (slim)	- ND08 DE	-	- G0280/D	- 5"
FDU 1 MB	- Ope	- XG 6030	-	- G0280/B-D	- 8"
STC 20 MB	- Archive 9020B	- XU 1130	-	- G0200/B G0342	- 8"
STC 45/60	- Archive 5945C	-	-	- G0417 G0418	- 5"
MTU 40 MB	- Cypher	- XU 1705	- PERTEC	- G0278/B	- 8"
HDU 20 MB	- Ope	- XM 5221/2	- ST506	- G0363	- 5"
HDU 40 MB	- Micropolis 1323/A	-	- "	- "	- 5"
HDU 40 MB	- CDC 94155/48	-	- "	- "	- 5"
HDU 65 MB	- CDC 94155 (Wren2)	- XU 1709	- "	- "	- 5"
HDU 65 MB	- Micropolis 1325	- XU 1709	- "	- "	- 5"
HDU 70 MB	- Micropolis 1353	-	- ESDI	- G0404 G0405	- 5"
HDU 70 MB	- Fujitsu 2244 # N	-	- ESDI	- " "	- 5"
HDU 140 MB	- CDC Wren 3	-	- ESDI	- " "	- 5"
HDU 140 MB	- Micropolis 1355	-	- ESDI	- " "	- 5"
HDU 140 MB	- Fujitsu 2246 # N	-	- ESDI	- " "	- 5"
HDU 300 MB	- Priam 638	-	- ESDI	- " "	- 5"
HDU 60 MB	- Fujitsu M2312	- XU 1700	- SMD3	- G0301/A G0302/A	- 8"
HDU 120 MB	- Fujitsu M2322	- XU 1703	- "	- G0301/A G0302/A	- 8"
HDU 275 MB	- CDC 9720 Patriot	-	- "	- G0301/A G0302/A	- 8"

5.2 MAGNETIC PERIPHERAL CONFIGURATIONS

The magnetic peripheral units which may be mounted in the different M64 and M70 system cabinets are as follows:

BASIC CABINET SB0

Max. four 5 and 1/4" peripherals:

- 1 - 2 HDU (20, 40, 65, 70, 140 or 300 MB) + STC (45/60 MB)
- 1 - 2 HDU (20, 40, 65, 70, 140 or 300 MB) + 1 - 2 MFD (1 MB)
- 1 - 2 HDU (20, 40, 65, 70, 140 or 300 MB) + 1 STC (45/60 MB) + 1 MFD (1 MB).

EXPANSION CABINET SB1

One 8" peripheral or one or two 5 and 1/4" HDU:

- 1 8" FDU (1 MB)
- 1 8" STC (20 MB)
- 1 - 2 HDU (70, 140 or 300 MB).

Note: In this SB1 cabinet, the different HDU (70, 140 or 300 MB) may be used as third or fourth hard disk in a system or may be shared with other systems using the Dual-Port option.

EXPANSION CABINET SB2

Two 8" peripherals:

One MTU peripheral (not obligatory)

- 1 - 2 HDU (60 or 120 MB) + 1 MTU (40 MB)
- 1 - 2 HDU (275 MB) + 1 MTU (40 MB).

Note: In this SB2 cabinet, the HDU (60, 120 and 275 MB) may be used as third and fourth hard disk of the system or as disk units shared with other systems by way of a DUAL-PORT.

5.2.1 RESTRICTIONS ON CONFIGURATIONS

The conditions and restrictions binding magnetic peripheral configurations are listed below:

- The SB0 cabinet can only house full and slim size 5 and 1/4" peripheral units
- The SB1 cabinet can only house one removable 8" peripheral unit
- The SB2 can house:
  - . Top: one only removable MTU
  - . Bottom: only 8" HDU.
- There can be no mixing of HDU with SMD, ST506 and ESDI interfaces
- Switching of HDU between two systems is allowed only:
  - . For a max. of two HDU
  - . For units mounted in the SB1 or SB2 cabinet
  - . For HDU with SMD or ESDI interface
  - . For 60 Mbyte HDU (XU 1700) and 120 Mbyte HDU (XU 1703) with SMD interface or for 70, 140 and 300 Mbyte HDU with an ESDI interface.

5.2.2 1MB MINI-FLOPPY DISK UNIT: ND08-DE

The mini-floppy unit is mounted vertically with the LED upwards together with the DC/DC converter in the top part at the front of the SB0 cabinet (for assembly, see chapter 2). The figure below illustrates the peripheral unit connectors.

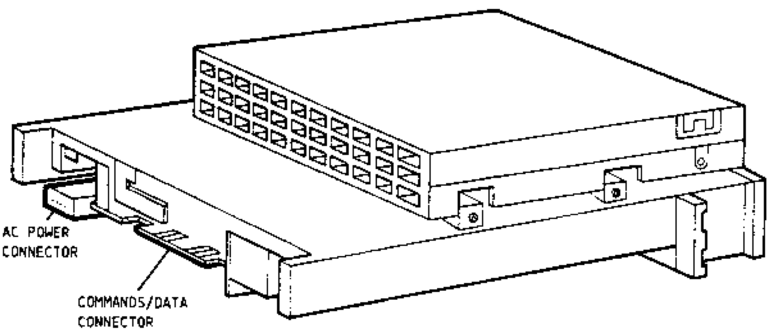


Fig. 5-1 1 MB Slim Minifloppy Disk Unit

Connection of the mini-floppy disk driver with the controller board GO280D and of the mini-floppy driver with the DC/DC converter DCA 36/512 is illustrated in the figure below.

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).

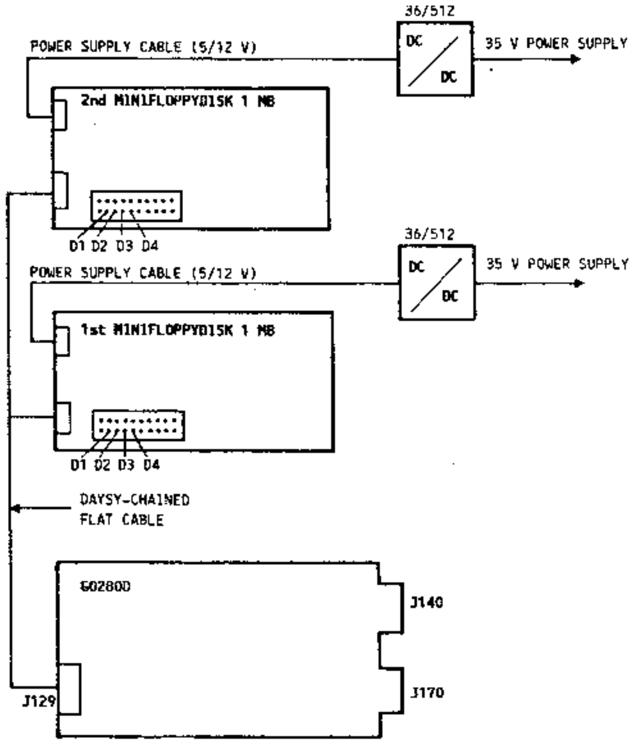


Fig. 5-2 1 MB Mini-Floppy Disk Unit Connection Diagram

5.2.3 1 MB FLOPPY DISK UNIT: XG 6030

The 8" floppy disk unit is mounted vertically in the expansion cabinet SB1 as described in chapter two.

The figure below illustrates the connectors used in drive XG 6030 connection

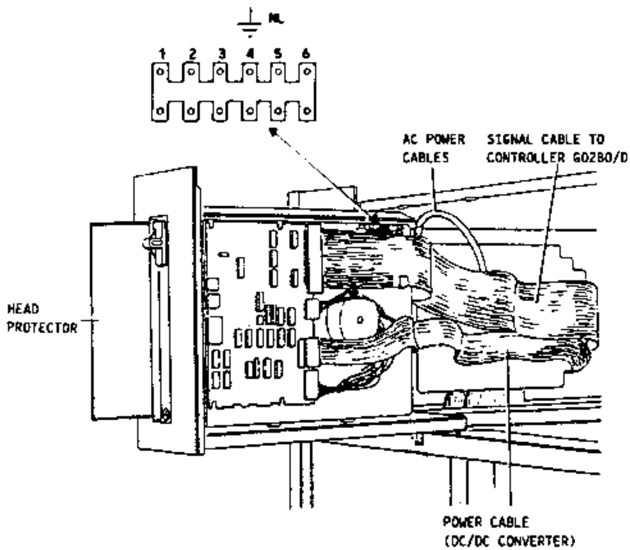


Fig. 5-3 1 MB Floppy Disk Unit

The diagram below illustrates connection of the floppy disk driver with the controller board GO280D, the DC/DC converter DCA 36/524 and the mains assembly (220 V).

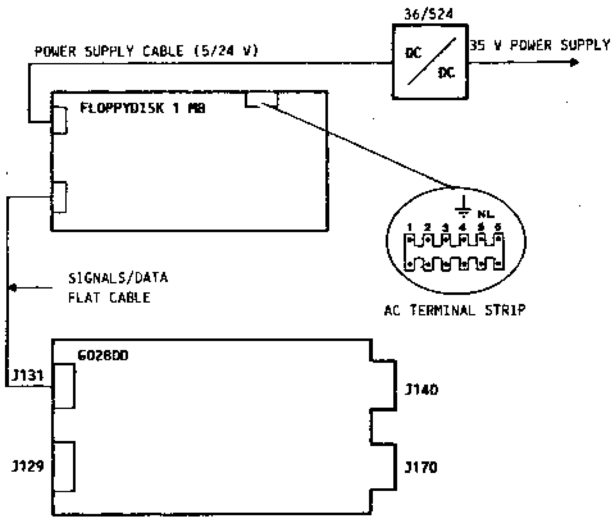


Fig. 5-4 Connection of 1 MB Floppy Disk Unit

5.2.4 20 MB STREAMING TAPE UNIT: XU 1130

The 8" STC unit is mounted vertically in the upper front part of the SB1 cabinet (for assembly, see chapter 2).

Note: Before switching peripheral on, remember to remove the metal plate protecting the heads.
The diagram below illustrates interconnection of the STC controller, the peripheral unit and the DC/DC converter.

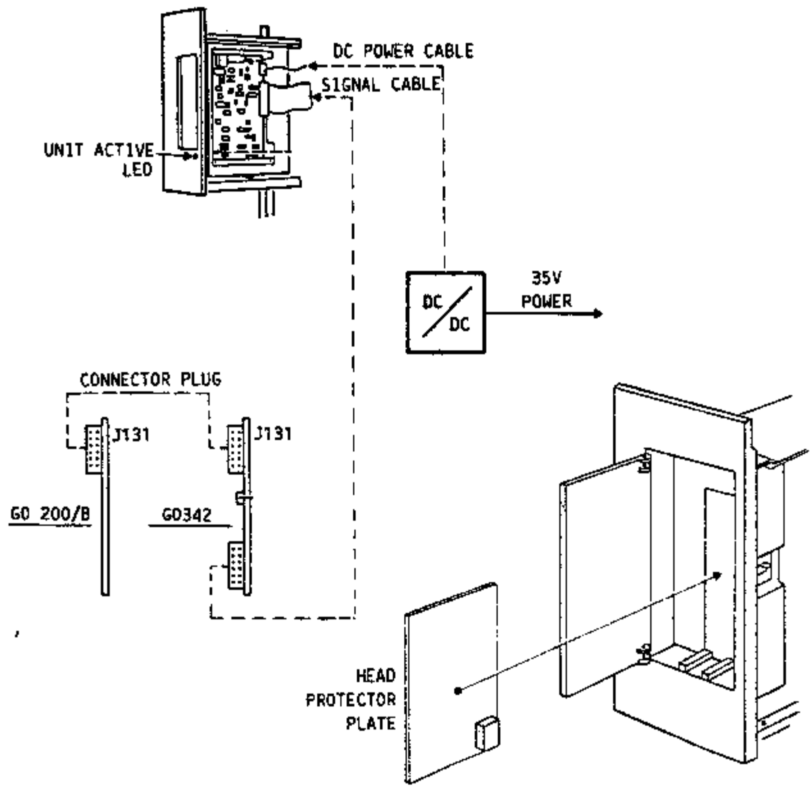


Fig. 5-5 Connection of STC Controller and Peripheral Unit

5.2.5 45-60 MB (SLIM) 5 AND 1/4 INCH STREAMING TAPE UNIT

The 5 and 1/4" STC unit is mounted vertically together with the DC/DC converter in the upper, front part of the SB0 cabinet (for assembly, see chapter 2).

The following two figures illustrate how to connect the peripheral to the system. In the first, through the G0417 (controller) and G0418 (formatter) boards; in the second using the G0437 board.

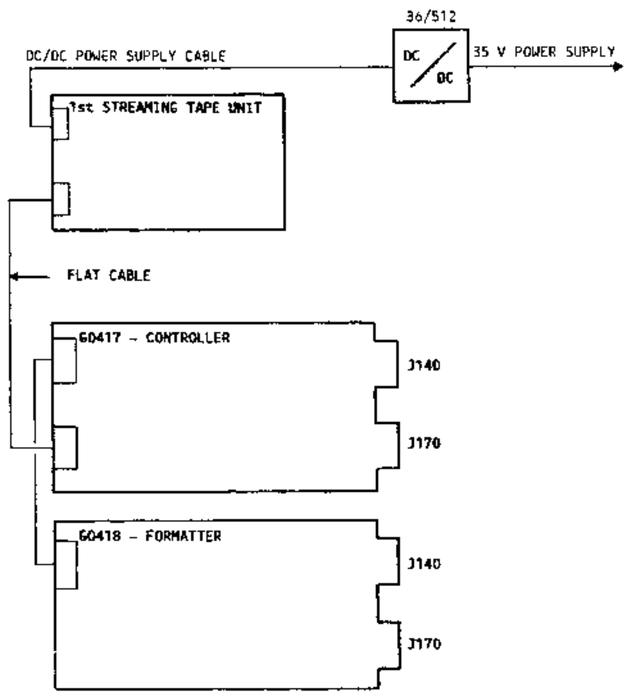


Fig. 5-6 Connection of STC to System Through the G0417-G0418 Boards

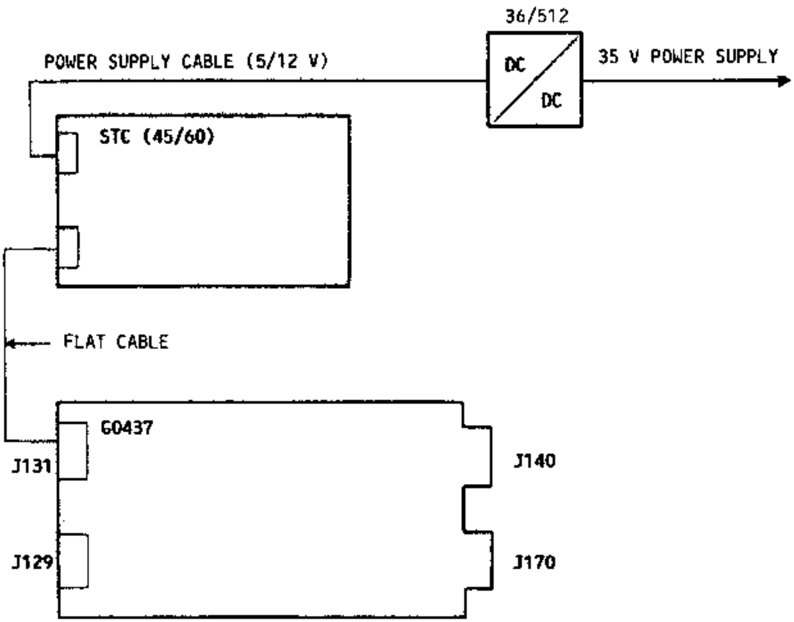


Fig. 5-7 Connection of STC to System Through the G0437 Board

5.2.6 40 MB MAGNETIC TAPE UNIT: XU 1705

Settings on peripheral

Remove spacers marked '1' in the figure.

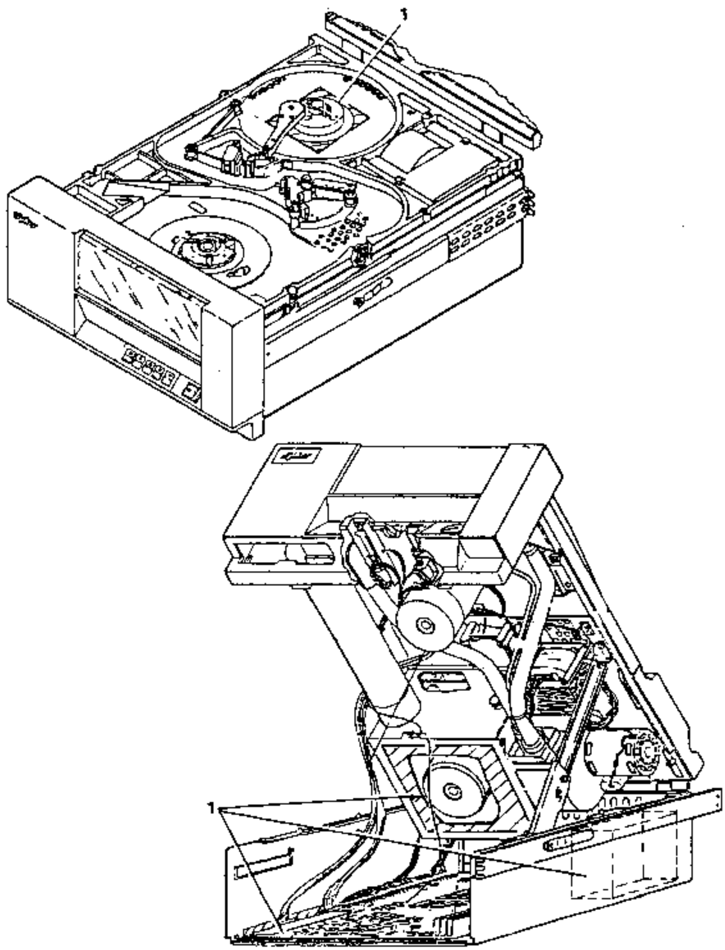


Fig. 5-8 Removing the Peripheral Protections

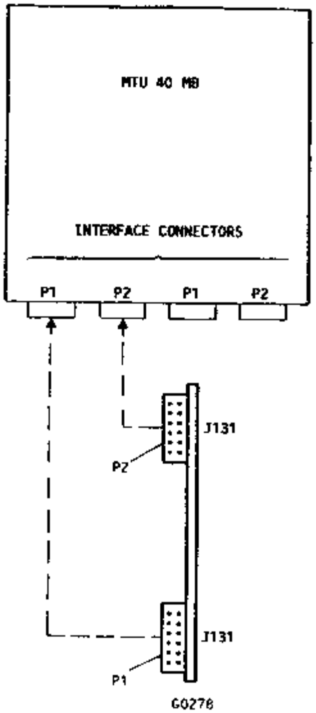
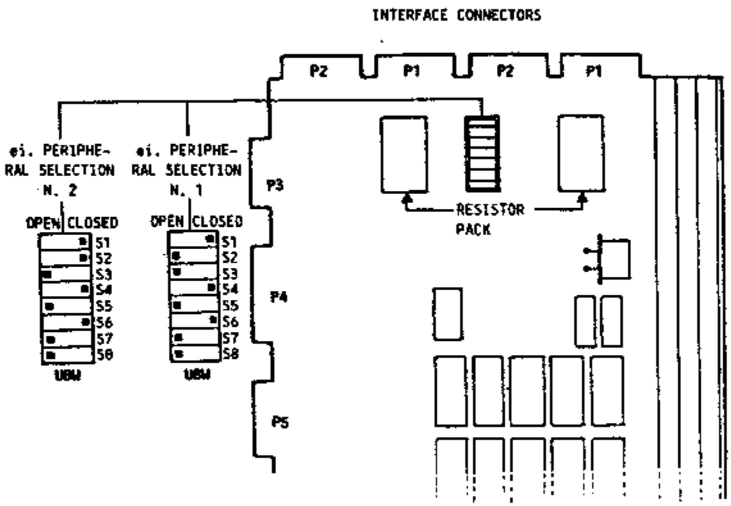


Fig. 5-9 Connection of Controller and MTU Peripheral



DIP-SWITCH U8W

POSITION	FUNCTION
S1	Formatter address (see table)
S2	Transport address (see table)
S3	GAP length reserved
S4	Transport address (see table)
S5	C = Selection of external parity
S6	C = Generation of internal parity
S7	Reserved
S8	Reserved

C = CLOSED

DECODE TABLE FOR LINE ADDRESSES

IFAD	ITAD 0	ITAD 1	S1	S2	S4	ADDRESS
0	0	0	1	1	1	0
0	1	0	1	0	1	2

0 = FALSE INTERFACE LEVEL   0 = OPEN
1 = TRUE INTERFACE LEVEL   1 = CLOSED

Fig. 5-10 Position of DIP-Switch U8W

5.3 5 AND 1/4 INCH HARD DISK UNITS WITH ST506 INTERFACE

The 5 and 1/4" ST506 interface hard disk unit is mounted vertically together with the DC/DC converter in the top part at the rear of the SB0 cabinet (for assembly, see chapter 2).

Possible hard disk units are:

- 20 MByte OPE HDU
- 40 MByte MICROPOLIS HDU
- 40 MByte CDC HDU (WREN2 REDUCED)
- 65 MByte CDC HDU (WREN2)
- 65 MByte MICROPOLIS HDU.

The following figures illustrate the connectors of the OPE, WREN and MICROPOLIS hard disk peripheral units, respectively.

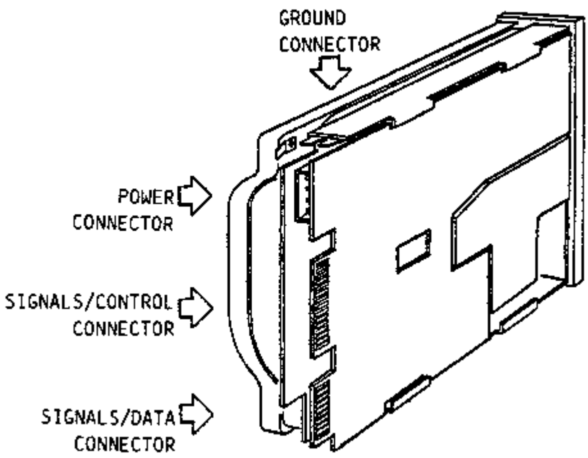


Fig. 5-11 20 MByte OPE Hard Disk Unit

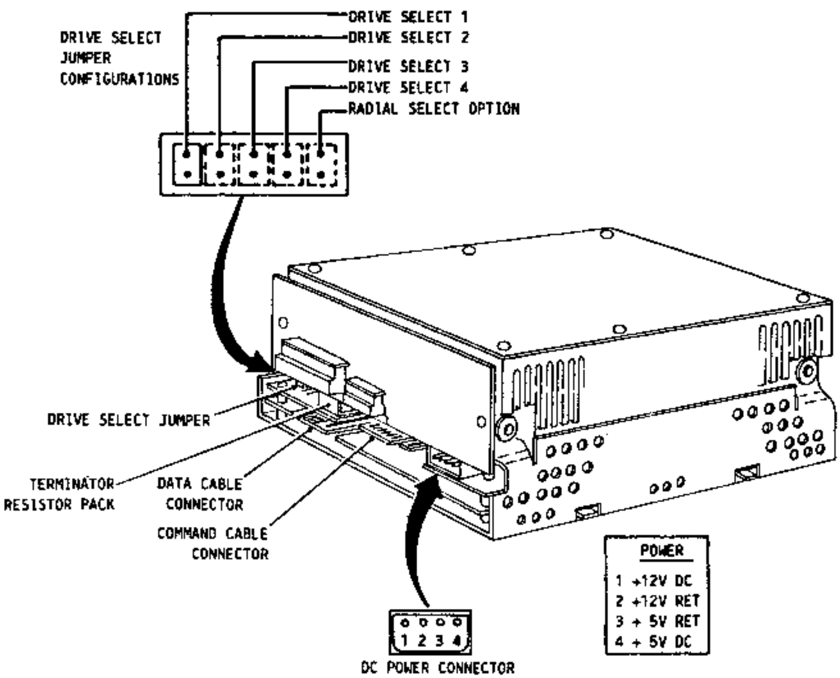


Fig. 5-12 40 and 65 MByte WREN Hard Disk Unit

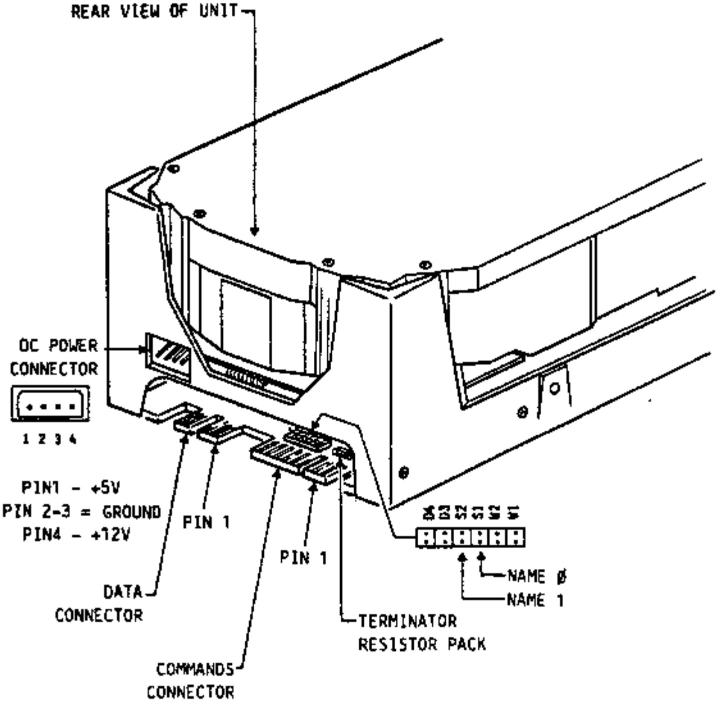


Fig. 5-13 40 and 65 MByte MICROPOLIS Hard Disk Unit

As far as their connectors are concerned, the five peripheral units are essentially similar; the diagram below, therefore, is a general diagram illustrating hard disk peripheral connection to the system through the ST506 interface.

Note: If the second peripheral is connected, the control signals flat cable must be a daisy-chain cable so that both peripherals can be connected; the terminator resistors must also be removed from the first peripheral (with the daisy-chain connector) and the second peripheral (where the signals connector is not daisy-chain) must be defined as second logic unit.

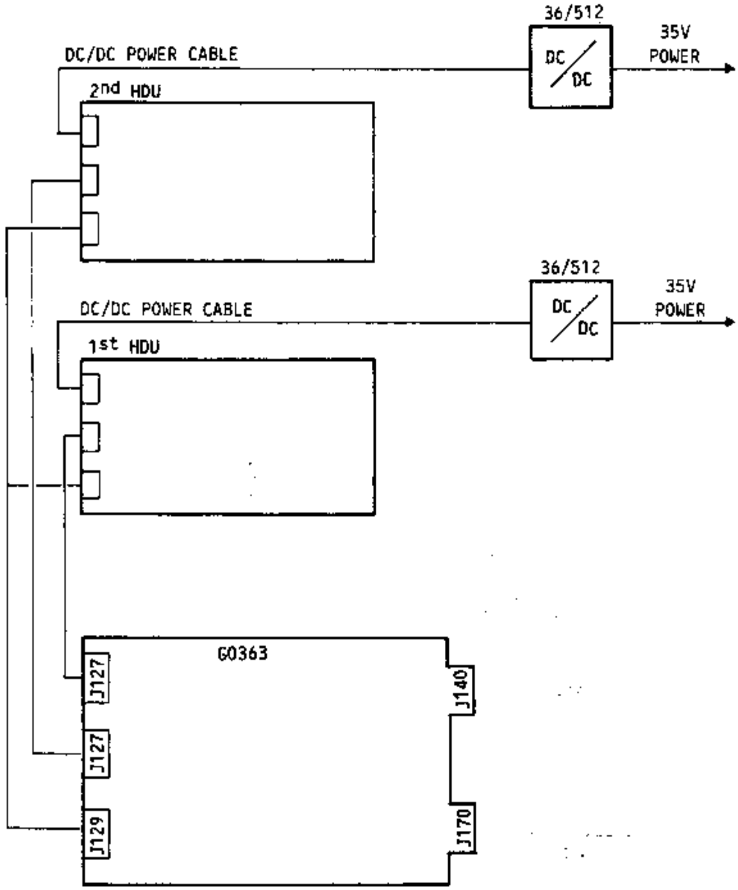


Fig. 5-14 Connection of Two Hard Disk Units With ST506 Interface

5.4 5 AND 1/4 INCH HARD DISK UNITS WITH ESDI INTERFACE

The 5 and 1/4", ESDI interface hard disk unit must be mounted vertically together with the DC/DC converter in the upper, rear part of the SB0 cabinet (for assembly, see chapter 2).

Hard disk units which may be mounted are:

- 140 MByte CDC HDU (WREN3)
- 70/140 MByte MICROPOLIS HDU
- 70/140/300 MByte FUJITSU HDU

The following figures illustrate the connectors of the WREN, MICROPOLIS and FUJITSU hard disk peripheral units, respectively.

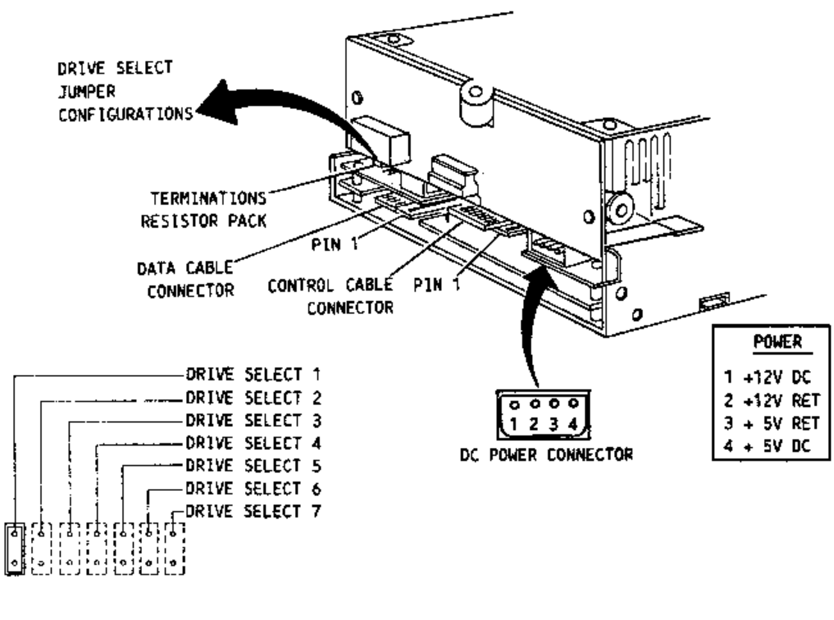


Fig. 5-15 CDC 140 MByte Hard Disk Unit (WREN III)

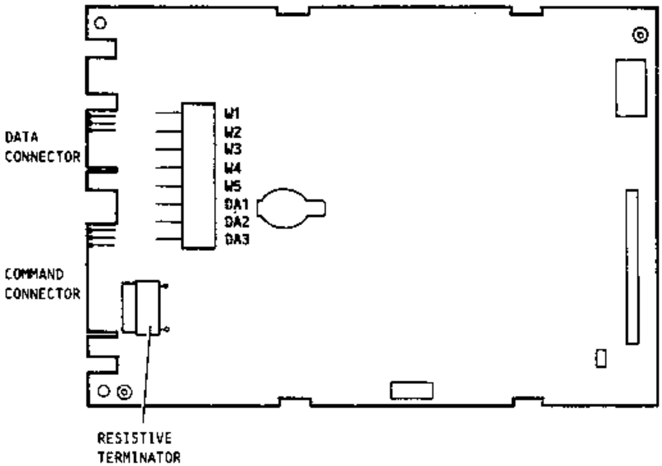


Fig. 5-16 MICROPOLIS 70/140 MByte Hard Disk Unit

Jumper settings of the MICROPOLIS 70/140 Mbyte hard disk unit are illustrated 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. Each peripheral must have the terminator resistor block installed.

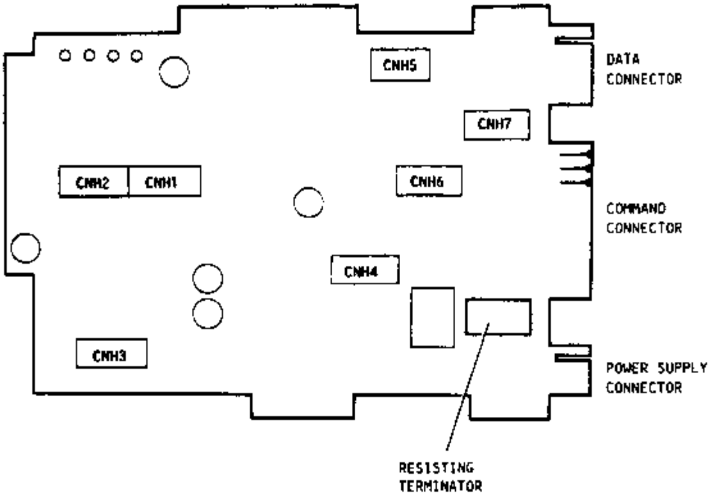


Fig. 5-17 FUJITSU 70/140 MByte Hard Disk Unit

Jumper settings of the FUJITSU 70/140 Mbyte Hard Disk unit are illustrated below.

LOGIC UNIT	JUMPERS CNH 6							
	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	JUMPERS CNH 7			
	P3	P4	P5	P6
M2244 (70 MB)	OFF	OFF	OFF	OFF
M2246 (140 MB)	ON	ON	OFF	OFF

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

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

Each peripheral must have the terminator resistor block installed.

As far as the connectors are concerned, there are no major differences between the two peripheral units so the diagram below is a general diagram of connection between the hard disk peripheral and the system with ESDI interface.

Note: If the second peripheral is connected, the control signals flat cable must be a daisy-chain cable so that both peripherals can be connected; the terminator resistors must also be removed from the first peripheral (with the daisy-chain connector) and the second peripheral (where the signals connector is not daisy-chain) must be defined as second logic unit.

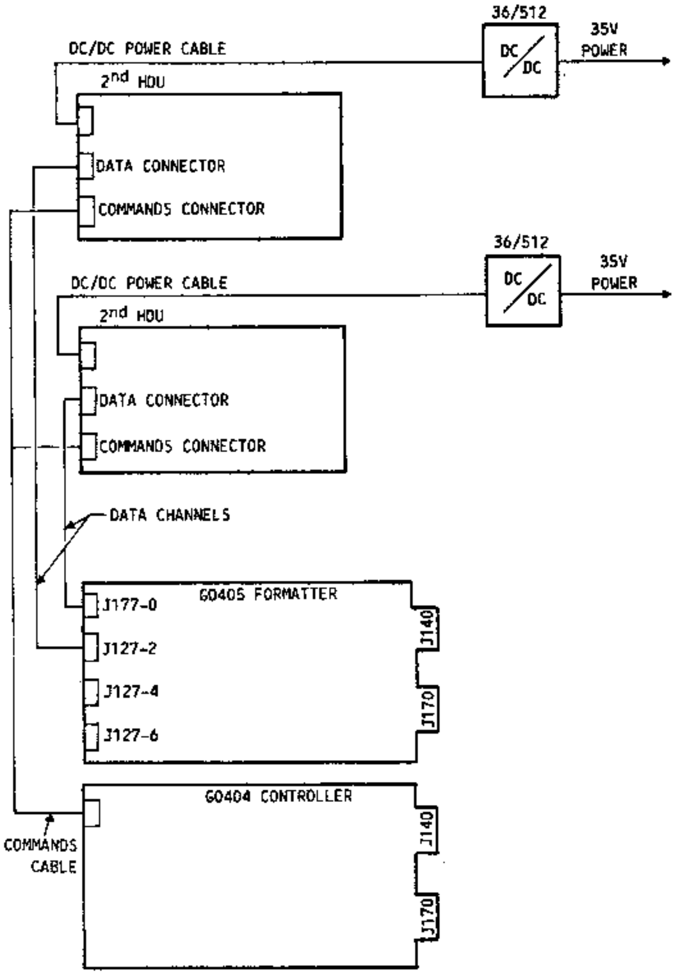


Fig. 5-18 Connection of Two Hard Disk Units With ESDI Interface

5.4.1 DUAL PORT BOARD: IF 206

This module allows Hard Disk units (70/140/300 MB) with ESDI interface to be shared between two systems. The Dual-port board is mounted together with the peripheral to be shared on the SB1 cabinet. A view of the IF 206 dual port board and a diagram of connection of a HDU shared between two systems are given below.

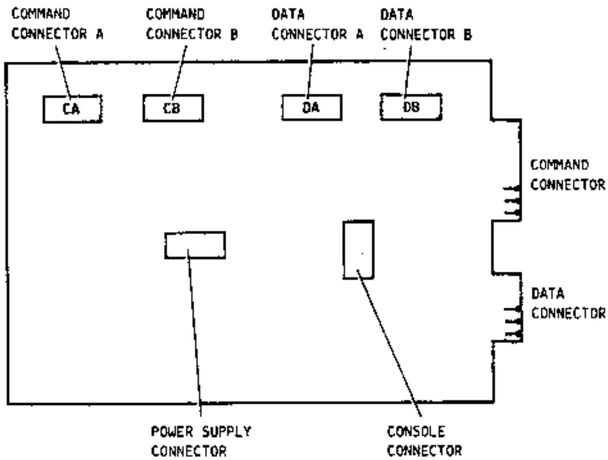


Fig. 5-19 Dual Port Board IF 206

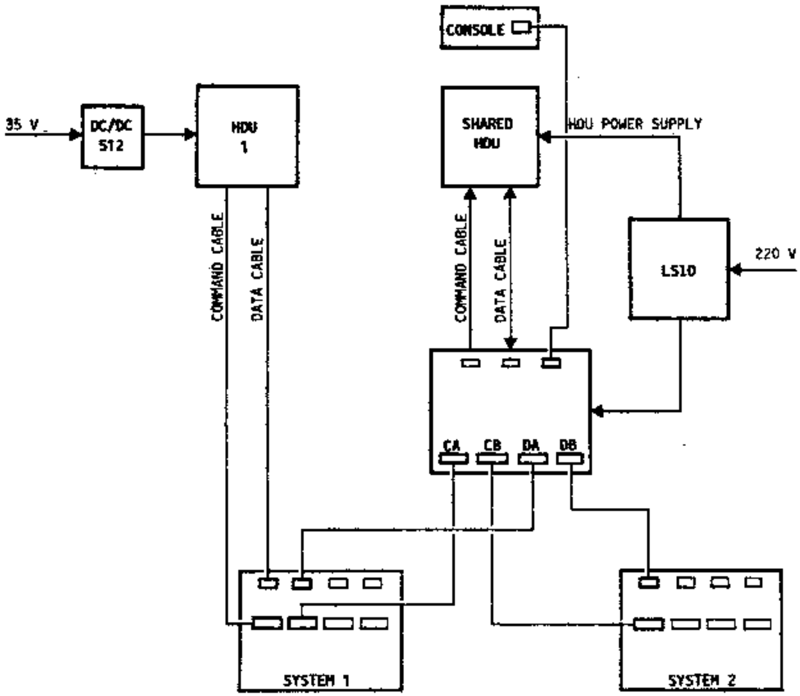


Fig. 5-20 Diagram of Connection of Two HDU (One Shared) Between Two Systems

5.4.2 60/120 MB (XU1700/1703) AND 275 MB PATRIOT HARD DISK UNITS

When installing the unit, unscrew the screws 'A, B and C' (see figure below), and remove the yellow brackets. Tighten three screws again.
On rear of unit, remove the yellow screws 'D'.
It should be remembered that this peripheral has its own power supply, the XU 1701.

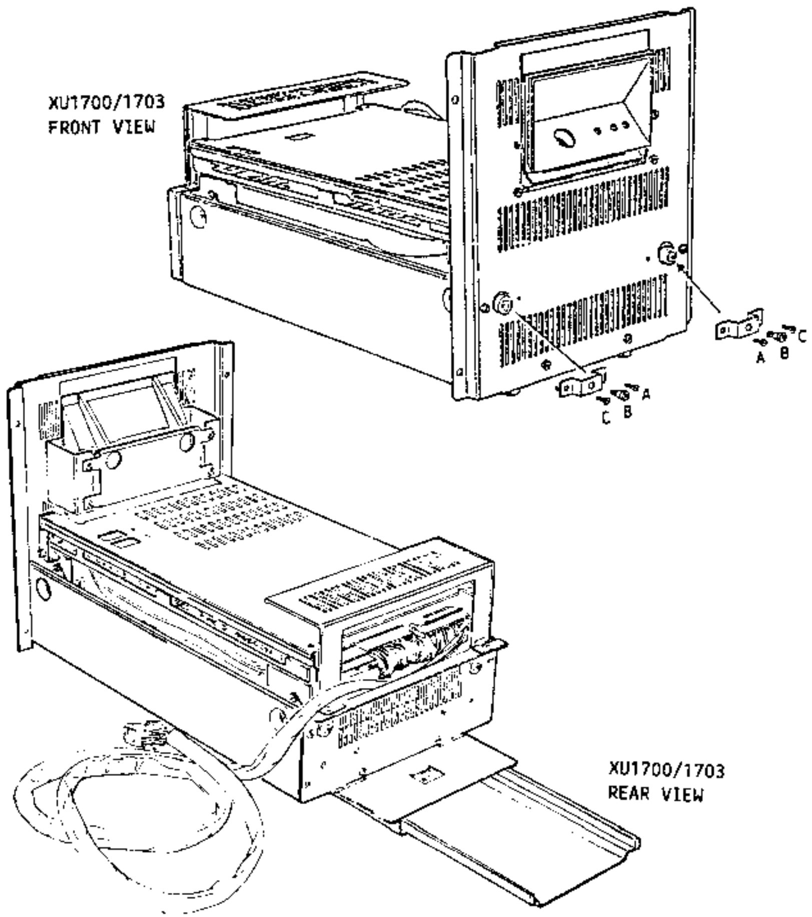


Fig. 5-21 Front and Rear of XU1700/1703

With the XU1700 (60 MB HDU), before the unit is inserted in position, the heads must be released by turning the knob clockwise with a screwdriver to the OFF position.

Note: It must be emphasised that, with the XU 1703 (120 MB HD), the heads are released automatically when the unit is powered.

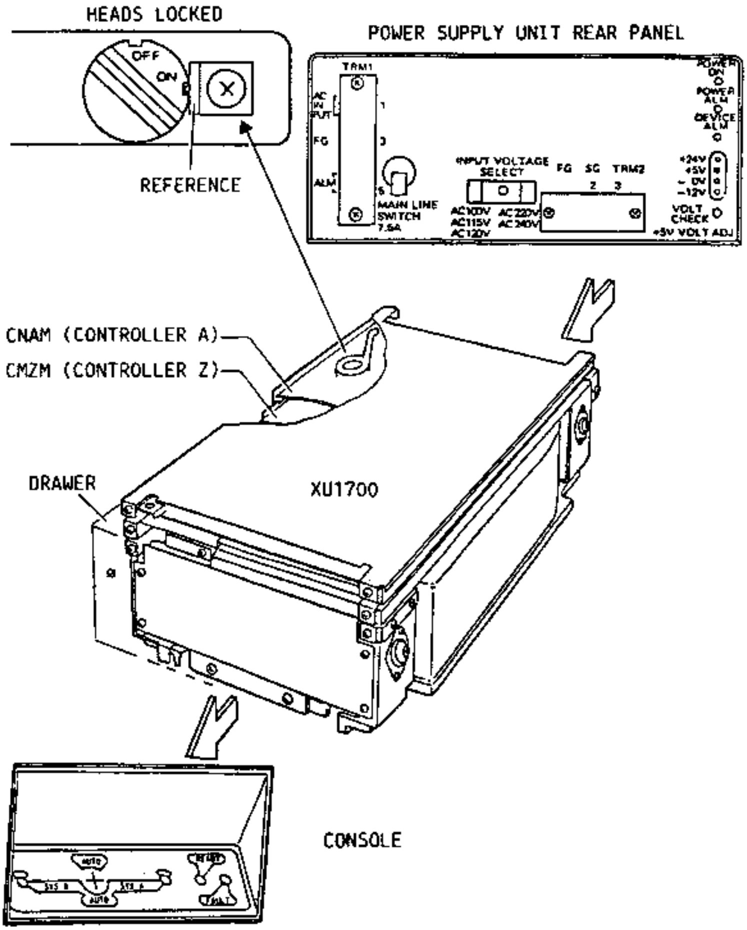


Fig. 5-22 XU 1700 and Head Block Mechanism

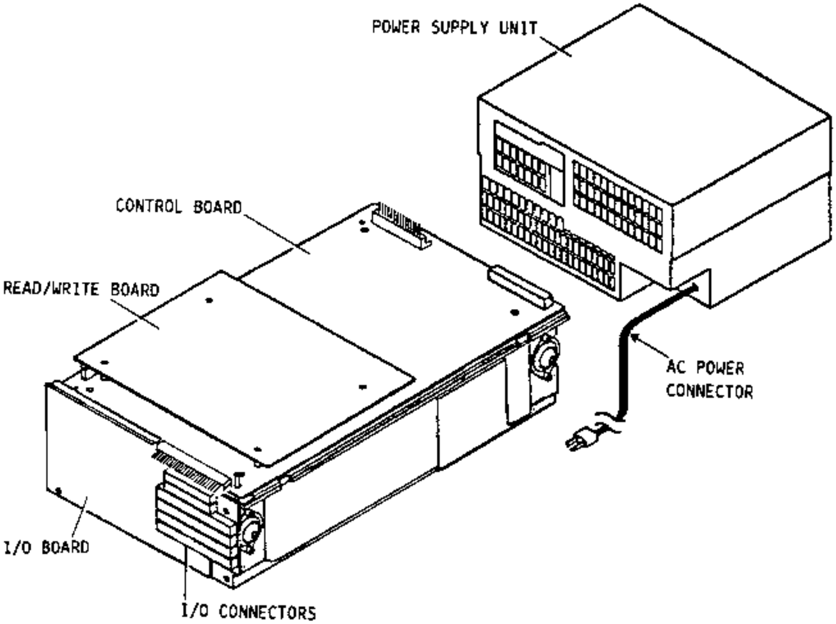


Fig. 5-23 PATRIOT 275 MB HDU

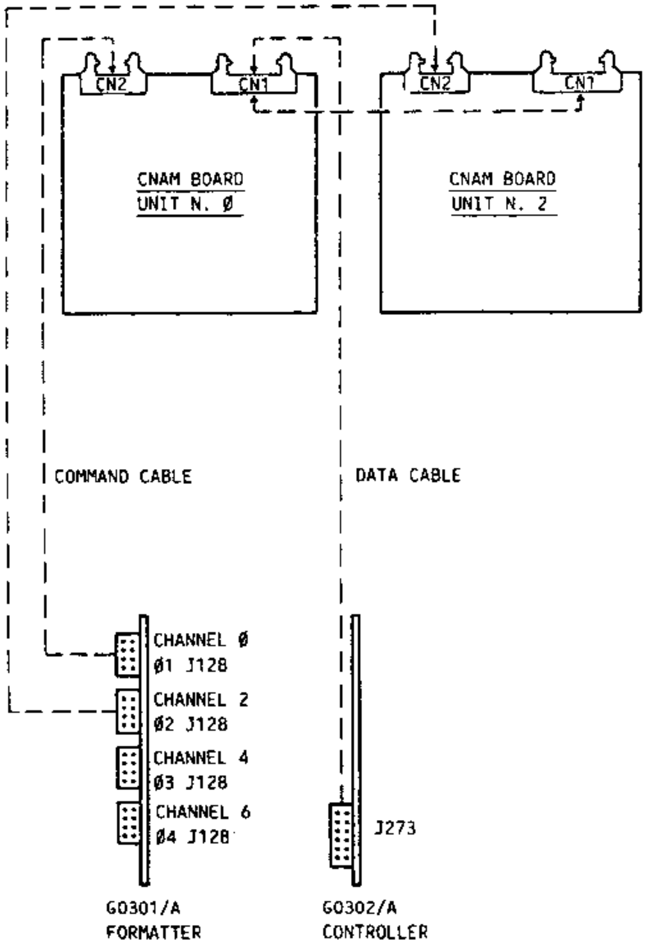


Fig. 5-24 Interconnection Between HD Controller and two XU1700 Units

CNAM board settings

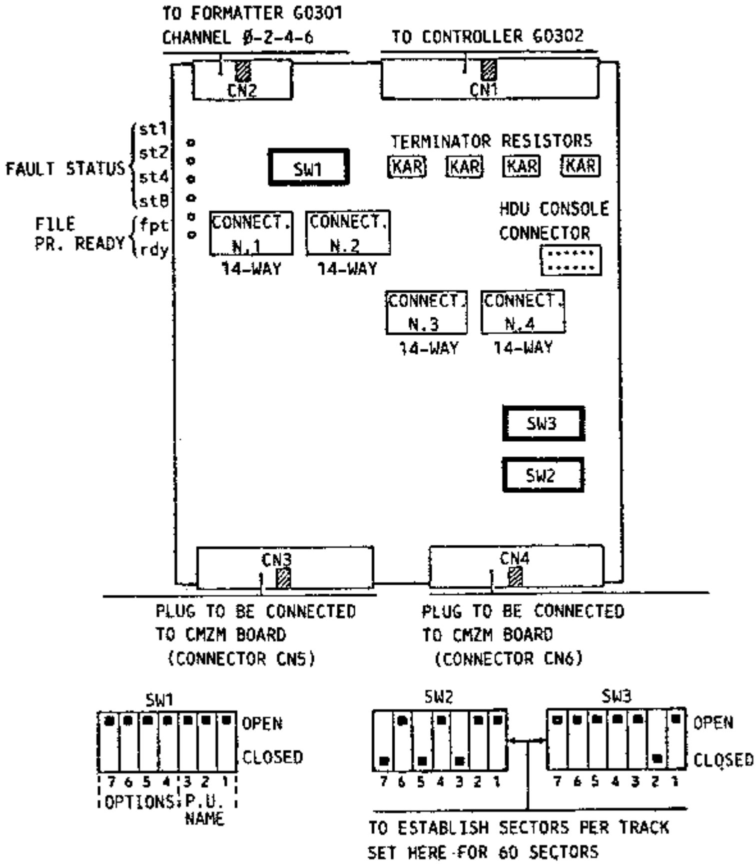


Fig. 5-25 CNAM Board and Settings

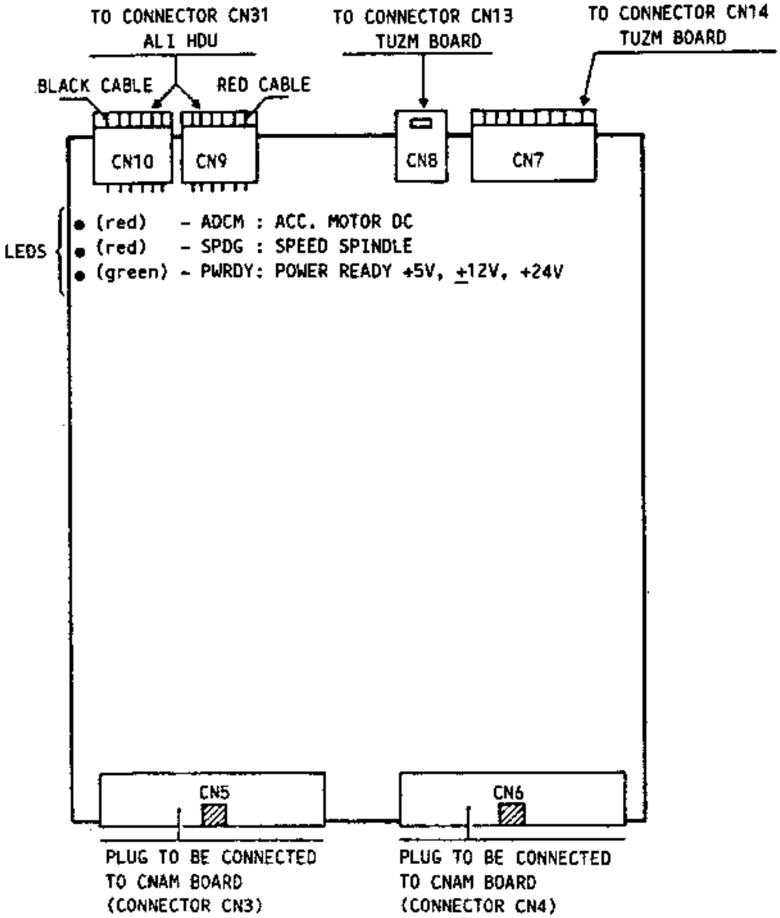
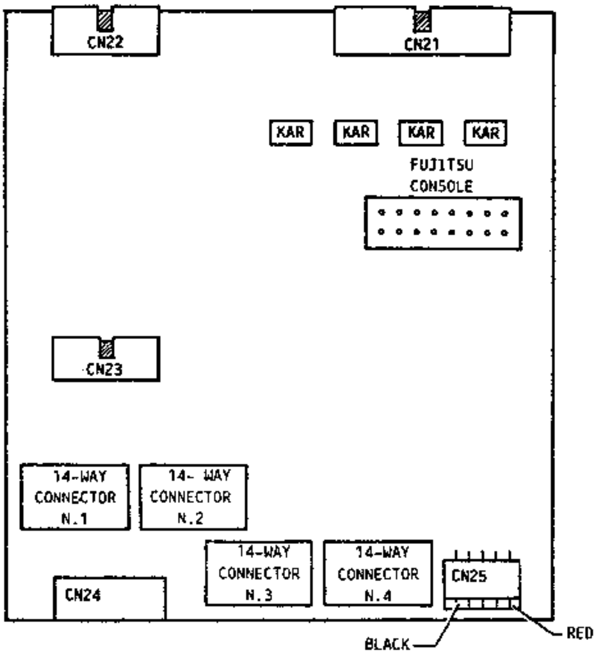


Fig. 5-26 CMZM Board and Settings

5.4.3 DUAL PORT BOARD: XU 1702

This module allows a 60/120 MB HDU to be shared between systems. A diagram is shown below:



KEY:

CN21 = System B command cable connector

CN22 = System B data cable connector

CN23 = System A data cable connector

CN24 = Connector to be connected to connector CN2 of board CNAM

CN25 = Power connector to be connected to connector CN33 of power supply unit XU 1701

14-way The 14-way connectors are connected to the respective connectors on the CNAM board

KAR = The name KAR denotes the terminator resistors

Fig. 5-27 Dual-Port Board

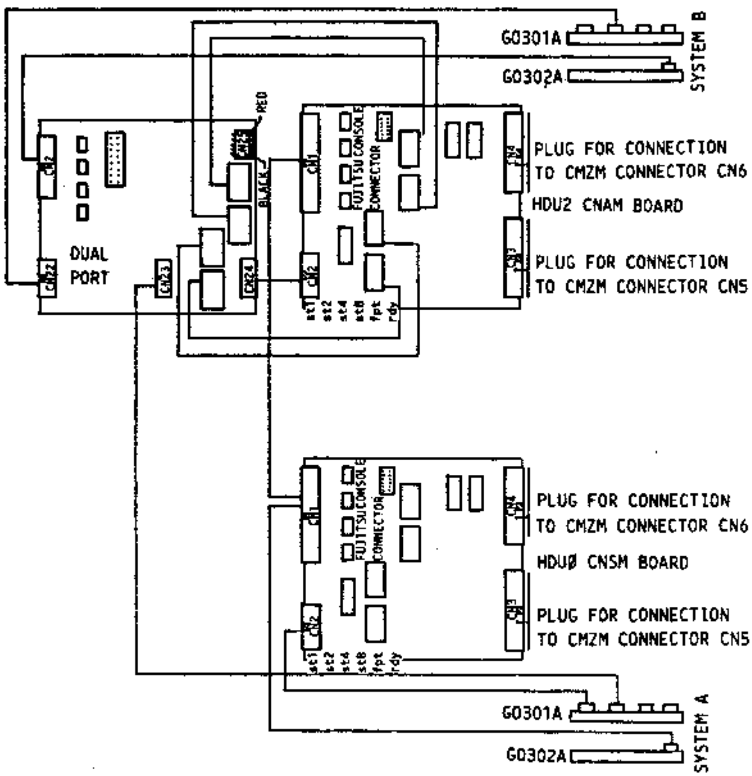


Fig. 5-28 Connection of Two HDU With Two Systems, one of Which is Shared

Note: The CNAM and DUAL PORT boards can be seen more clearly in the earlier figures.

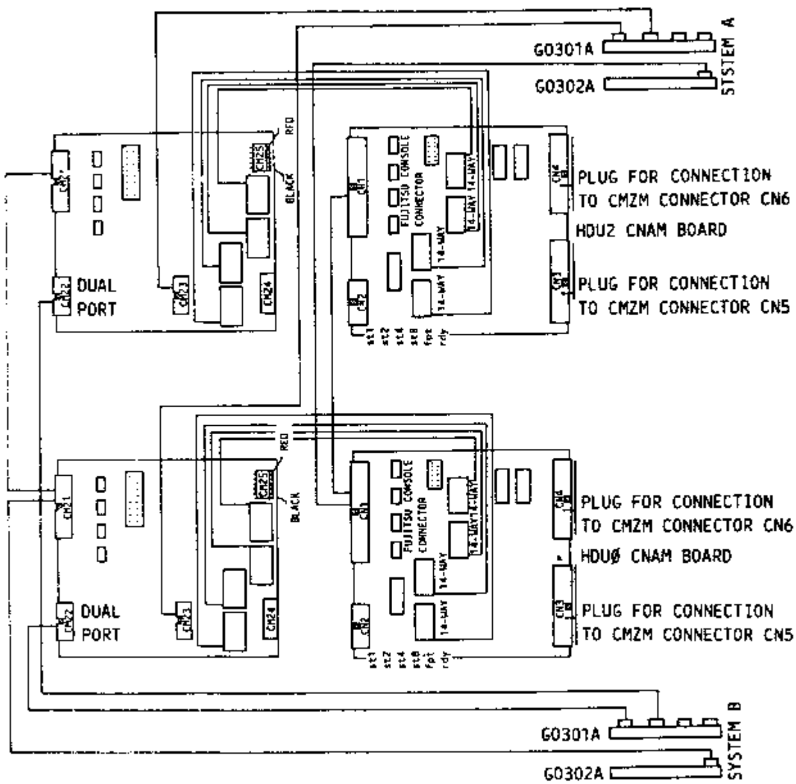


Fig. 5-29 Connection of Two HDU With Two Systems

Note: - The CNAM and DUAL PORT boards can be seen more clearly in earlier figures

- The KAR resistor packs must be removed from the DUAL PORT and CNAM boards of HDU 0.

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6. CONSOLES, AUTODIAGNOSTIC AND DIAGNOSTIC

A console to be chosen from among those listed below must be installed on the top part of M64 and M70 systems:

- Basic console (M64 only)
- Extended console based on REDAC board
- Console with telediagnostic based on SSM board.

The console grants interaction between operator and system.

6.1 BASIC CONSOLE (M64 ONLY)

Through the basic console, on 3000-type machines only, the operator can perform the minimum, essential functions in the exchange of information with the system.

The console has four sections:

- Interface with operator (input/output)
- Interface with central unit (input/output)
- Interface with power supply (input/output)
- Interface with system (output).

6.1.1 INTERFACE WITH OPERATOR

The interface with the operator consists of the following hardware elements on the front of the console (Front End Console = FEC)

1. A seven-segment display, green in colour, indicating system status and presence of the +5 V voltage supplied by the basic power supply.

2. A switch used to select one of the two IPL devices (primary device or secondary device).

3. A pushbutton for the system hardware reset (generates signal RESEA). The pushbutton has a mechanical protection to avoid accidental resets.

The figure below is of the basic console panel, illustrating the IPL device selector, the RESET button and the seven segment display.

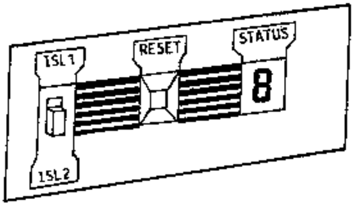

Fig. 6-1 Basic Console Panel

6.1.2 INTERFACE WITH CENTRAL UNIT

The interface with the central unit (C.U.) is by way of a cable with front connector. The signals exchanged with the C.U. are given in the table below. The first column gives the name of the signal, the second whether it is input to (I) or output from (O) the CPU and the third describes its function.

Signals exchanged between basic console and C.U.

SIGNAL	TYPE	DESCRIPTION
LED00	O	Display drive signal
LED10	O	Display drive signal
LED20	O	Display drive signal
LED40	O	Display drive signal
CARIC	I	Selects type of bootstrap peripheral
RESCA	I	Hardware reset through pushbutton

6.1.3 INTERFACE WITH POWER SUPPLY

Interface between console and power supply is by way of optic isolators (diode-transistor) powered on the console side and used for the exchange of power supply status signals, overheating signals and the basic power supply switch-on signals.

The console input signals from the power supply are:

- ALIUP: generated with Isink = 5 mA min. and indicates that the d.c. voltages +5 V, +12 V and -12 V are all above the minimum tolerance. When Isink = 0, one or more of the above voltages are below the minimum tolerance

- PWUP: generated with Isink = 5 mA min. and indicates that mains voltage is high enough to guarantee correct operation of power supply LB40. When Isink = 0, the mains voltage is not sufficient to guarantee correct power supply operation

- DATE: generated when Isink = 5 mA min. and indicates that power supply operating temperature is within safety limits. When Isink = 0, operating temperature is at danger level. If an overtemperature occurs, the Power Fail is activated; 3 ms later the Master Reset is activated and signal PONOFF is lowered

It should also be noted that for signal PWUP, there is a network to sense signal absence for a period of approx. 10 - 15 microseconds before the signal is considered the system Power Fail.

Signal PONOF is generated by the console and sent to the basic power supply to activate it one half second (0.5 s.) after the service power supply voltage is at rated. Signal PONOFF must be lowered within one millisecond (1 ms) of deactivation of ALIUP by the LB40 power supply.

6.1.4 INTERFACE WITH SYSTEM

The system is interfaced through a cable which connects to the OLIBUS and transfers the following signals:

RESEA : this signal (Master Reset) must be able to drive all the loads required for the OLIBUS shown in the table below:

Iol	Vol	Ioh	Voh
>= 100 mA	<= 0,4 V	>= 20 mA	>= 2,7 V

In the LB40 power supply switch-on phase, there must not be noise of width greater than 0.4V and the low logic level voltage must be lower than 0.3V with maximum load. No spikes of width and duration liable to be interpreted as real signals by any of the system components must occur.

The signal is active low, duration of the rising and trailing edges must be under 15 ns; if signal POWFA (power failure) is activated, it must be activated after three milliseconds (3ms) for a period of 50 ms as when it is activated manually through the reset button.

POWFA: This signal (power failure) lets the system components know that three milliseconds (3 ms) after it is activated, the reset signal will be activated. Active low, its rising and trailing edges must be under 15 ms, no spikes of width and duration liable to be interpreted as real signals must occur and, as with signal RESEA, it must be able to drive all the OLIBUS specification loads quoted in the table above.

6.1.5 BASIC CONSOLE ABSORPTION AND CONNECTORS

To guarantee correct power supply operation, console absorption must be a minimum of 0.5 A and a maximum of 2.5 A. The console connects to the system through the following connectors:

- 4x2 MODU 2 connector for Central Unit
- 4x2 MODU 2 connector for Back Panel
- 2-way MODU 2 connector for Mains box
- 10x2 isolated perforation connector for power supply

The functions of the pins of the connector for connection to the power supply are given in the table below. Through this connector, the console receives the power supply voltages and the anomaly detect signals and sends out the basic power supply on signal. All signals are received through optic couplers (diode-transistor) so that effects of external noise are reduced to a minimum.

PIN	FUNCTION
PIN01	Power supply ground
PIN02	Power supply ground
PIN03	Auxiliary +5V dc
PIN04	Auxiliary +5V dc
PIN05	PONOFF (Power ON/OFF, for anode diode)
PIN06	+12V dc coming from basic power supply
PIN07	PONOD (Power ON/OFF, for diode cathode)
PIN08	-12V dc coming from basic power supply
PIN09	AL1UP for transistor collector
PIN10	Power supply ground
PIN11	AL10 for transistor emitter
PIN12	Power supply ground
PIN13	PWUP for transistor collector
PIN14	Power supply ground
PIN15	PW0 for transistor emitter
PIN16	Auxiliary +5V dc
PIN17	DATE dangerous temperature signal for transistor collector
PIN18	Auxiliary +5V dc
PIN19	DATE0 dangerous temperature signal for transistor emitter
PIN20	Auxiliary +5V dc

The figure below is a rear view of the console, illustrating the position of the connectors used for connection to the system.

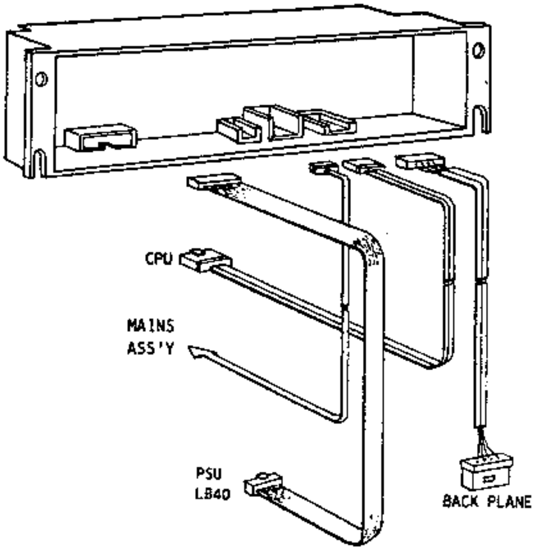

Fig. 6-2 Basic Console Connectors

6.2 M64 AND M70 EXTENDED CONSOLE

The extended console in its role as interface between operator and system handles the following:

- System activation
- Diagnostic tests

Its architecture can be divided into the following areas:

1. Interface with operator
2. Interface with system
3. Interface with services

The console requires a memory backed up, with the console off, for a minimum of 200 days (the back-up system will need to have a minimum, guaranteed operation time of 5 years and, where rechargeable batteries are used, these will need to be protected against polarity inversion). The memory will contain security information and the status of certain functions; it will also back up the section responsable for the calender and clock.

In the back-up RAM, 256 adjacent bytes must be reserved for future use as "System Hardware Identifier".

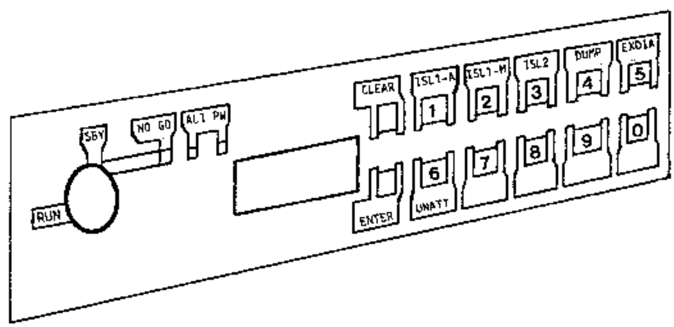

Fig. 6-3 Extended Console Front View

6.2.1 INTERFACE WITH OPERATOR

Interface with the operator is in two sections:

- Interface devices
- Interface functions.

6.2.1.1 Interface Devices

The interface devices control the entire system, including the switch on and off phases.

They consist of the following elements:

- Switch-on key
- Power-on LED
- Power supply status LED
- Diagnostic LED
- Buzzer
- Display
- Keyboard.

Switch-on key

The switch-on key has two positions, from both of which it may be removed: the positions are:

STAND-BY: System in stand-by. Operation on console only.

RUN: Whole system is powered.

The system is reset by the following sequence:

<<RUN-STBY-RUN>>

Note: The console is switched off at the general switch.

Power-on LED

A green LED informing the operator that the console is powered and that data can be entered through the console for the next RUN. It is activated through the general switch.
Its significance is as follows:

- On: console power present
- Off: console power absent.

Power supply status LED

A green LED indicating the status of the main power supply output voltages. Activated with key in RUN position.

Its significance is:

- On: system power present
- Off: system power absent.

Diagnostic LED

A yellow LED which will remain off if the switch-on key is put into the "RUN" position.

Its three states have the following significance:

Off	System has run ISL and no errors have been found.
On	System has not managed to run ISL and display shows code for ISL failed.
Blinking	Firmware has found non-blocking error.

Buzzer

Device used to call operator attention. Its action will be examined case by case below; it can also be activated by the system through specific ON and OFF commands.

Message display

A 6-character, alphanumeric display on which the following may be displayed:

- Outcome of resident autodiagnostic on the console in cases of error
- Error messages concerning system autodiagnostic, which have precedence over messages coming from the console and also cancel out an operation initiated by the operator through the console. The error messages will be encoded in Z8000 ROM loader, MOTOROLA 68020 ROM loader, MOS and OSLEM codes.
- Reply signals for function activated.

Keyboard

The keyboard consists of:

- Ten numeric keys
- Two special keys

The numeric keys are used to enter the code of the function to be performed and/or to enter parameters.

The special keys:

CLEAR_key Cancels incorrect entries; at whatever point the key is pressed, the operation is immediately aborted. The buzzer sounds to let the operator know the operation has been aborted.

ENTER_key Confirms the function selected or the data entered. The buzzer sounds to let the operator know the data has been accepted.

6.2.1.2 Interface Functions

The interface functions are:

- Mnemonic functions
- Encoded functions.

Mnemonic functions

The mnemonic functions are those which can be activated with a single function code digit; the numeric code keys also have a mnemonic code. They must all be protected, meaning that before they are accepted, the console will require the operator to repeat the password entered previously (TypPwd). The mnemonic functions programmed are:

NUM.CODE	FUNCTION_NAME	Function activated and activation method
1	ISL1-A	This function informs the system that loading of the environment active by default at power-on has been requested (System Standard #24).
2	ISL1-M	This function indicates that the environment to be activated should be selected from the environment activator menu.
3	ISL2	This function informs the system that ISL from the secondary removable device has been requested.
4	DUMP	This function informs the system that a Total Memory Dump has been requested; when the password is confirmed, a RESET sequence is carried out and the CPU ROM Loader then informed (on request by CPU) of the DUMP condition. This function is only run after password confirmation and with the key in RUN.
5	EXDIA	The system is informed that an extended diagnostic has been requested. As keypress is not sufficient to identify the operation, the password must first be confirmed and status of the function indicated as follows: "5"___ (the underlining is for the status, ON or OFF). Status is changed by activating key 5, status is confirmed through the ENTER key. After status confirmation, the password must be entered again for subsequent changes in function status.

6 UNATT — This function informs the system that it may be activated by switched line or dedicated line; AutOFF (02) will be activated by default. As activation of key *6* is not sufficient to identify the operation, the password must first be confirmed and the status of the function illustrated as follows: "6"___ (the underlining is for the status, ON or OFF). Status is changed by activating key 6; to confirm status, the ENTER key must be pressed. After status confirmation, the password must be entered again for subsequent changes in function status.

7-8-9-0 — Not assigned.

Note: All functions are accepted if console key is in STBY, except for the DUMP function which is accepted and carried out only if key is in RUN and the UNATT function must be accepted irrespective of whether the key is in STBY or in RUN.

Encoded functions

All those functions which do not have a mnemonic code; these function codes consist of two decimal figures. There are two categories:

- Protected encoded functions
- Non-protected encoded functions.

The protected encoded functions are those functions which require a password to be performed and are as listed below:

CODE FUNCTION NAME	Function activated and activation method
00 Error Logging Request	Command used to read the Error Logging registers. Access in register reading is selective and, after the password has been confirmed (TypPwd), a request is made to repeat the register to be read. The sequence of operations is:

1. Function "00" entered
2. Password requested (TypPwd)
3. Password entered
4. Err.Logg. register code (Rc) requested - left justified on display.

5. Err.Logg. register code entered - right justified on display.

6. Data displayed as follows:
   The first four characters indicate register name (Alup=AL1UP, Pwup=PWUP,Date=DATE,Fanfl=FANFL), the last two characters give the sum total of the events up to 99; events beyond this figure are ignored.

*01*_Error_Logging_Clear

This command clears the Error logging registers; when a request to perform the function is made, after the request for the password (the same as used for the Error Logging Request) has been made and satisfied, the function code of the register to be cleared will also be requested. The operation procedure is the same as for the Error Logging Request except that at point 6, the selected register is cleared.

*02*_Auto_OFF

This command is used to keep the system on even when the switch-on key is in STBY. The system must be switched off by way of a command (41 hex.) issued by the C.U. To cancel this setting, the relative command must be issued through the console. Both commands are executed with the same password. When the Auto_OFF function is accepted, the display should read immediately "AutOFF".

*03*_Auto_OFF_Clear

This command cancels the Auto OFF command.

*04*_N_M_I

Non maskable interupt. By way of this command, the NMI is activated through a 500 ms POWFA.

*05*_SET_DATA

Used to set the clock with the sequence given below. Data displayed or introduced is confirmed through the ENTER key:

a) Year; inserted numerically (on request).

b) Month; inserted numerically or alphabetically (in English) on request as follows:

   1. JAN (January 01)

   2. FEB (February 02)

3. MAR (March 03)

4. APR (April 04)

5. MAY (May 05)

6. JUN (June 06)

7. JUL (July 07)

8. AUG (August 08)

9. SEP (September 09)

10. OCT (October 10)

11. NOV (November 11)

12. DEC (December 12)

c) Day of the week, inserted numerically or alphabetically (in English) on request as follows:

1. MON (Monday 01)

2. TUE (Tuesday 02)

3. WEN (Wednesday 03)

4. THU (Thursday 04)

5. FRI (Friday 05)

6. SAT (Saturday 06)

7. SUN (Sunday 07)

d) Day of the month, inserted alphanumerically.

e) Hours/minutes, inserted numerically.

This operation can also be performed by way of a software command.

*06*_SET_SYS_ON	Sets in the week calender the time the system is switched on; the function can be activated each day by entering, beside the number corresponding to the day of the week, the hour and the minutes, followed by a "1". If the time data is followed by a "0", then the function is not activated that day. As calender programming does not necessarily imply it will be used, before starting programming and after the password has been accepted, status function must be displayed as follows: 06"___ (the underlining is the status ON or OFF). A change in the function is made by entering "1" for ON or "0" for OFF and pressing the ENTER key.

PAR.NUM._Description	
*10*_Reg._Err._Log._ALIUP	This register will count the ALIUP deactivations, not preceded by PWUP or PONOFF, short circuits or overvoltages on the LB40 output voltages.
*11*_Reg._Err._Log._DATE	This register will contain the sum of deactivations of DATE, LB40 power supply critical working temperature.
*12*_Reg._Err._log._FANFL	This register will contain the sum total of deactivations of FANFL (fan fail), not preceded by deactivation of the mains box; for ventilation system blocked.
*13*_Reg._Err._Log._PWUP	This register will contain the sum total of reactivations of PWUP before PONOFF is deactivated; for an anomalous transient of the mains power supply.

Non protected encoded functions

The non protected indirect functions are those which do not require a password to be entered and are:

CODE__FUNCTION_NAME	Function activated and activation method
*20*_Set_password	The Set_password function allows the operator to enter and modify the password in memory protecting the different functions. The password is a string of 6 numeric characters which will be used by the system in execution of the function requested. When the password is being entered, the characters entered should not be displayed. The operator will be guided in the course of the Set password operation as follows:

1. Code "20" entered

2. Request for function code "Fc" to be entered, left justified on display.

3. Function code entered, right justified on display.

If there is no previous password or if memory is erased:

1. Request for STBY-RUN-STBY switch-on key "Keycom" to be switched

2. STBY-RUN-STBY switched

3. Request for new password to be entered "TpNpwd"

4. New password entered

5. Request for new password to be repeated "RpNpwd"

6. New password entered.

If a previous password exists:

1. Request for old password to be entered "TpOpwd"

2. Old password entered

3. Request for new password to be entered "TpNpwd"

4. New password entered

5. Request for new password to be repeated "RpNpwd"

6. New password entered again

7. If a password consisting solely of "0's" is entered, the protection is cancelled.

8. If an error is made in the course of the procedure, the operation is interrupted and the operator informed by way of the buzzer.

*21*_Diagnostic_result — This command supplies the diagnostic information on the first board inserted in the board rack. Subsequent controllers are checked when the ENTER key is depressed. Board checking is one way only and of the wrap-around type. The output of the function will be automatic once a time of 10 s has elapsed from when the ENTER key was pressed for the last time.

The output messages will be laid out as follows:

* <A <A <B <: <C <C <

A A = Board type

B = Slot no. in hex

: = Spacing (:)

C C = Result OK/KO/WR

OK Autodiagnostic result positive

KO Controller blocked

WR Warning, controller not blocked but deteriorating.

*22*_SHOW_DATA — In automatic sequence and for three consecutive cycles, the date must be displayed in full and in the following order: Year/ Month/ Day of the Week and of the Month/ Hour/ Minutes; execution is continuous and cycle duration must be 4 seconds approx.

6.2.2 INTERFACE WITH SYSTEM

The system interfaces are:

- C.U. interface
- Back-panel interface.

6.2.2.1 C.U. Interface

The handshake between Console and CPU's must be the same as currently used on the M60.

The interface between console and C.U. must be TTL type and have both the signals used in the handshake between CPU and console and the open collector, TTL-level signals of a St.13 RS232C line. The pin-out of the connector for the 8000sv CU's and 68000 evolutions must be as follows:

Pin	Signal	Description
01	CARIC	Signal from Console to CPU- if at "1", data transmitted is a "1"; must be stabile at "1" until LED21 goes to "1".
02	GND	Logic ground.
03	DAC00	Signal from console to CPU; goes to "1" when CARIC is significant and goes back to "0" when LED21 goes to "1". Can go to "1" only if LED21 is at "0".
04	GND	Logic ground.
05	DAC10	Signal from CPU to Console; goes to "1" after LED11 is at "1" and the data is acquired; goes back to "0" after LED11 has gone to "0".
06	GND	Logic ground.
07	LED01	Signal from CPU to Console - if "1", data read is a "1"; must remain stable all the time LED11 is at "1".
08	GND	Logic ground.
09	LED11	Signal from CPU to Console; goes to "1" when LED01 is significant and goes back to "0" after DAC10 has gone to "1".
10	GND	Logic ground.
11	LED21	Signal from Console to CPU - if at "1", the data transmitted has been received and the CPU must set it "0" after DAC00 has gone back to "0". When at "1", the Console does not transmit data.

__12__GND   Logic ground.

__13__CT_103   Transmitted Data (Tx) (TTL level)

__14__CT_102   Signal ground

__15__CT_104   Received Data (Rx) (TTL level)

__16__CT_102   Signal ground

__17__CT_105   Request To Send (RTS) (TTL level)

__18__CT_102   Signal ground

__19__CT_106   Ready for Sending (TTL level)

__20__CT_102   Signal ground

__21__CT_107   Data Set Ready (DSR) (TTL level)

__22__CT_102   Signal ground

__23__CT_108/2   Data Terminal Ready (DTR) (TTL level)

__24__RESCA   Reset signal for central units, used for compatibility with the current C.U.

__25__CT_109   Data Channel Received (DCR) (TTL level)

__26__CT_102   Signal ground

For the CU 3000, the connector pin-out must be as follows:

pin_Nbr	Description
pin01	Z, not used
pin02	DAC10
pin03	Z, not used
pin04	Z, not used
pin05	CARIC
pin06	RESCA
pin07	GND, logic ground
pin08	Z, not used
pin09	Z, not used
pin10	LED20
pin11	LED10
pin12	LED00
pin13	Z, not used
pin14	Z, not used
pin15	DAC00
pin16	B000N

All interface signals to the C.U. must be connected to the power supply through 4.7 Kohm resistors.

Signals CT101/103/104/105/106/107/109/108-2 must be re-transmitted with the V24/100 electric interface to external environments since they can be used as standard interface for a TTY or other generic user through a MODU2 10*2 connector with the following pin-out:

pin_01	CT 101
pin_02	CT 103
pin_03	CT 104
pin_04	CT 105
pin_05	CT 106
pin_06	CT 107
pin_07	CT 108/2
pin_08	CT 109
pin_09	Not used
pin_10	Not used

6.2.2.2 Back-Panel Interface

The following signals are used:

1. Master reset (RESEA)

2. Power fail (POWFA).

Master reset (RESEA)

Active_level	This signal is active low with an Iol>=100 mA, Vol<=0.4V and with an Ioh>=25mA, Voh>=2.7V, during the LB40 switch-on phase, the low level voltage Vol must not exceed 0.5V and rise and decay times must be less than or equal to 150ns on the BUS. Noise with a width/duration ratio such as to be taken as signals by the system components is not allowed on the Bus.

Activation_cycle

This signal is activated at system power-on and is maintained active until the output voltages of the basic supply LB40 come into tolerance (ALIUP active). It must be activated for a period of 500 ms if a RUN-STBY-RUN switch-on key switching occurs within two seconds. In addition, it must be activated three milliseconds after the power fail (POWFA) is activated. If PWUP goes back active before PONOFF is lowered, POWFA must be de-activated, RESEA activated for approx 50ms and PONOFF de-activated.

Power fail (POWFA)

Active_level

This signal is active low with an Iol>=100 mA, Vol<=0.4 V and with an Ioh>=25 mA, Voh>=2.7 V, the rise and decay times must be less than or equal to 150 ns on the BUS.

Noise with a width/duration ratio such as to be taken as signals by the system components is not allowed on the Bus.

Significance_of_signal

Signals to system that power supply can no longer be guaranteed; activated as a result of the following events:

1- The mains power supply is below the minimum tolerance (PWUP de-activated)

2- The power supply internal temperature has exceeded safety limits

3- The ventilation system has become blocked

4- NMI Non-maskable interrupt (duration is of 500 ms)

6.2.3 INTERFACE WITH SERVICES

The services interfaces are as follows:

1. Power supply interface
2. Fans interface
3. Mains distribution interface

6.2.3.1 Power Supply Interface

This interface is made up of:

+5 Console power supply voltage taken from the auxiliary power supply.

ALI_UP The power supply outputs an opto-isolated signal with Isink=5 mA min, indicating that the voltages (+5 V, +12 V, -12 V) are above the minimum tolerance. When Isink=0, then the above voltages, or one of them is under the minimum tolerance.

PW_UP The power supply outputs an opto-isolated signal with Isink=5 mA min, indicating that the mains voltage is high enough to guarantee perfect power supply operation. When Isink=0, mains voltage is not sufficient to guarantee perfect power supply operation; if this condition lasts for three milliseconds, ALIUP will be de-activated.

P_ON_OFF The basic power supply LB40 is activated only through this opto-isolated signal where Isink=7.5 mA min (IF=37.5 mA min). If the ALIUP Isink=0 1.5 s after PONOFF is activated or during normal operation and not preceded by the PWUP Isink=0, then PONOFF must be de-activated immediately or within one msec. It may be re-activated by switching off the console; a time of 500 ms must elapse between de-activation and re-activation of PONOFF.

DA_TE The power supply outputs an opto-isolated signal with Isink=5 mA min to indicate that the power supply working temperature is inside safety limits. When the Isink=0, the temperature is at a dangerous level. Under these conditions, POWFA is first activated, three msec later RESEA is activated and, another msec later, PONOFF is de-activated.

The power supply interface circuits must be opto-isolated and powered on the console side.

6.2.3.2 Mains Distribution

The solid state relay in the mains distribution box has a drive circuit which reflects exactly signal PONOFF; characteristics of the drive circuit are:

Voltage	12 Vdc
Current	50 mAdc

The connector has the following pin-out:

pin_Nbr	Description
pin01	PISCA, mains box drive
pin01	PIU12, +12 Vdc power
Note:	The protector diode is mounted on the console.

6.2.3.3 Extended Console Autodiagnostic

The console firmware must include a resident autodiagnostic to be used in testing and repair of faulty boards and selected by way of a hardware switch.

When the console is switched on, all the LEDs, display included, on the Front End Console must be activated for a period of roughly three seconds.

So that the system may be correctly diagnosed, an error log must be kept of all anomalies:

1. De-activation of ALIUP, not preceded by de-activation of PWUP or de-activation of PONOFF

2. De-activation of DATE

3. Fans break down FANFL (fan fail)

4. Reactivation of PWUP before de-activation of PONOFF

6.2.3.4 Power Supply

The console is powered by the LB40 main power supply, offering power of 2.5A on the +5 V with a minimum of 0.5 A, tolerances +/-5%. Current available for the console is 2 A because 0.5 A is needed by the controllers when the system is in Stand By.

The auxiliary power supply does not supply other voltages or signals, so that these, if needed, must be generated internally.

A 6.3 mm faston is needed to reinforce ground connection.

The power supply connector is 20-way (10x2), isolating perforation connector with the following pin-out:

Pin	Description
pin01	Power supply ground
pin02	Power supply ground
pin03	+5 Vdc Aux.
pin04	+5 Vdc Aux.
pin05	PONOF (Power ON/OFF, anode of diode)
pin06	+12 Vdc
pin07	PONOD (Power ON/OFF, cathode of diode)
pin08	-12 Vdc
pin09	ALIUP (Ali Up, transistor collector)
pin10	Power supply ground
pin11	ALIO (Ali Up, transistor emitter)
pin12	Power supply ground
pin13	PWUP (Power Up, transistor collector)
pin14	Power supply ground
pin15	PWO (Power Up, transistor emitter)
pin16	+5 Vdc Aux
pin17	DATE (Dangerous Temperature, transistor collector)

pin18	+5 Vdc Aux

pin19	DATEO (Dangerous Temperature, transistor emitter)

pin20	+5 Vdc Aux

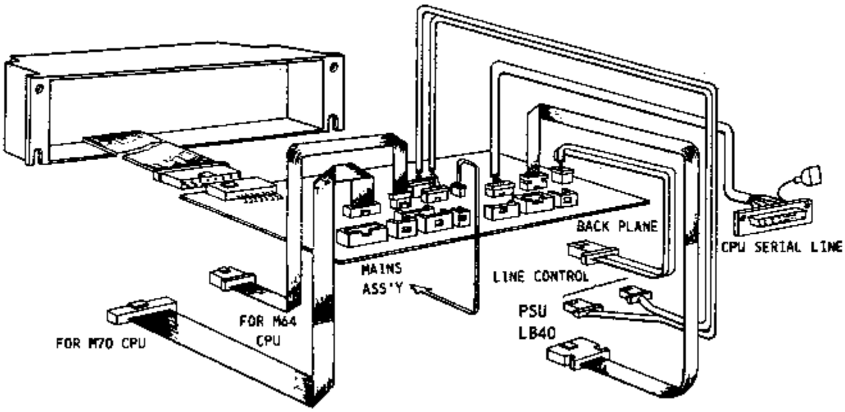

Fig. 6-4 Extended Console Connectors

6.2.4 SSM CONSOLE WITH TELEDIAGNOSTIC FOR M64 AND M70 SYSTEMS

The console with telediagnostic based on the SSM board is a device responsible for implementation of the following activity:

- Determining and handling system functional states: off, on, unattended, telediagnostic enabled or disabled
- Control of power supplies and handling of the power on and off sequences and mains power failures
- Direct connection to CPU, through pseudo-serial dedicated line
- Direct connection to "TTY system" (PC or VT100 type terminal), on RS232 line
- Telediagnostic and handling of the connection with the technical service centre
- Signaling of anomalies discovered during system autodiagnostic or the telediagnostic session
- System personalization and protection through use of passwords
- Handling of clock and calender

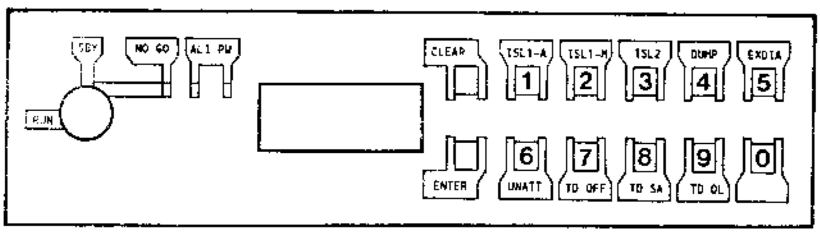

Fig. 6-5 Console Front Panel

6.2.5 SYSTEM - OPERATOR INTERFACE

The interface between console and operator is comprised mainly of the devices on the console front panel. The operator enters the code of the function required, followed by "ENTER", (plus any passwords) through the keyboard. During entry of the code, the console mirrors on the display all keys entered. In the current cases, the response is also displayed. Certain commands require parameters and, in this case, it will be the console to guide the operator in entry of the parameters.

Console/system exchanges take place on a pseudo-serial, dedicated line and not on the system bus. Some of the commands the console sends the system imply an answer for the exclusive use of the system; in this case, transmission is transparent. With other commands, messages are displayed on the screen; in this way, the system can supply the operator with the information required.

6.2.6 TELEDIAGNOSTIC

Telediagnostic is a means by way of which system diagnostic can be performed from a remote technical service centre, under the control of highly qualified personnel.

The remote centre and local system can be several kilometres apart and are connected, via modem, by an ordinary, switched telephone line.

The console cannot simultaneously handle a telediagnostic centre connection and a TTY system connection; thus, when telediagnostic is enabled, the PC terminal connection is disabled.

6.2.7 LIST OF FUNCTIONS AND COMMANDS POSSIBLE

The console can perform functions and commands sent by the operator, by the system CPU and the telediagnostic centre and respond to these commands.

Functions available to operator

Practically all the functions available to the operator are protected by a password. The functions are as follows:

- ISL (Initial System Loading) from the primary device, automatic or manual, or from a secondary device
- System memory dump
- Extended system diagnostic
- Unattended condition, disabling the key and allowing the system to be switched on or off only on command from the timer, CPU or sent on line
- Enable and disable connection with the remote telediagnostic centre or setting the system under exclusive control of the telediagnostic centre
- Read and clear the Error Logging registers
- Activate and deactivate the "Auto off" state, enabling the key and allows the system to be switched on and off automatically only
- Generate a non-maskable interrupt
- Display and update the calendar and the times of daily, automatic switch-on
- Enter and modify passwords
- Supply diagnostic information on the boards in the rack
- Display cyclically the status of the main console functions.

Commands sent out by the system CPU

The commands the CPU sends the system are used to:

- Request console configuration, release and the autodiagnostic result
- Request the switch-on means, position of the key, the ISL device and the autodiagnostic method
- Perform memory dump, system reset and switch-off
- Send console the result of the CPU autodiagnostic
- Display a character string (in hex or ASCII) or the time in hours and minutes
- Activate and deactivate the buzzer, switch diagnostic LED on, off or blinking
- Program or read calendar and daily automatic switch-on schedules
- Program, activate and deactivate the automatic switch-on/switch-off timer
- Enable and disable the "unattended" function
- Read and write the reserved RAM zone
- Read and clear the Error Logging registers.

Commands sent out by the telediagnostic centre

From the remote centre, a series of commands can be sent out to:

- Switch on or off and initialize the local system
- Read the local system and console configuration
- Run a diagnostic cycle, extended or shortened, and check execution step-by-step
- Perform ISL from a selected console device or from the remote diagnostic centre
- Transfer and start execution of diagnostic programs
- Display a character string on the console display
- Start and complete a "remote login" session, during which the telediagnostic centre becomes a remote terminal of the local system.

6.2.8 DESCRIPTION OF FRONT PANEL

The interface devices on the console panel control the whole system including the switching on and off phases. Elements on the console front panel are listed below:

- Switch-on key
- Power on LED
- Power supply status LED
- Diagnostic LED
- Buzzer
- Display
- Keyboard.

Switch-on key

There are two positions for the switch-on key: "RUN" and "SBY" (stand-by), from both of which it can be removed. The two positions signify:

- SBY position: switches system off (after two seconds) and sets it in stand-by. Operation can proceed only on the console
- RUN position: the system is powered and fully active.

Note:

- Switch the console off at the main ON/OFF switch
- The "RUN --> SBY --> RUN" transition, if carried out in two seconds, re-initializes the system without switching it off.

POWER ON LED

This is a green-coloured LED marked PW driven directly by mains voltage and indicating presence or absence of mains voltage on the power supply input. Its two states are:

- ON: mains power present
- OFF: mains power missing.

Power supply status LED

This is the green-coloured LED marked ALI and is commanded by the signals output by the power supply unit and refers to the status of the system power supply voltages. Active when the key is in the RUN position. Its two states are:

- ON: system power supply present
- OFF: system power supply absent.

Diagnostic LED

This is the yellow LED marked NO GO. It is off when the switch-on key is in RUN. Can assume the following three states:

- OFF: the system has executed ISL and there are no anomalies.
- ON: the system was not able to perform ISL and the code indicating ISL not performed is displayed.
- FLASHING: the firmware has found a non-blocking error (warning condition).

Buzzer

This device is used to attract operator attention.
It is controlled by the system through the "on" and "off" commands.

Display

This is a 6-character, alphanumeric display used to display the result of the console and system autodiagnostic and the reply messages to functions activated.

Keyboard

The keyboard consists of ten number keys and two special keys.

- Number keys: used to input function codes, parameters and passwords
- CLEAR key: cancels any incorrect entries and interrupts the operation in progress
- ENTER key: confirms the function selected or the data input.

6.2.9 FUNCTIONS AVAILABLE TO OPERATOR

The commands that the operator can enter via the keyboard can be either mnemonic or coded functions.

The mnemonic functions are those with codes of only one digit; the coded functions, however, have a code with two digits. Almost all functions are protected by a password, as will be seen in detail later.

All the functions are activated by entering the code; if the function selected is protected by password, the password must also be entered. Certain functions require parameters which must be entered in the order proposed by the console.

All data entered, whether code, password or parameter, must be confirmed by way of the ENTER key. Incorrect data is not accepted, the buzzer is activated and the display is cleared.

The CLEAR key aborts the operation in progress, whatever it may be, cancelling all data already entered during the operation (even if confirmed by ENTER), clearing the display and switching off the buzzer.

Mnemonic functions

All the menemonic functions are protected by a different password, with the exception of the ISL (Initial System Loading) selection functions, for which there is one password only.

All these functions can be called up only with the' key in SBY (system off, console powered) except for the "dump", for which the key must be in RUN, and "unattended" functions, for which the key can be in either SBY or RUN.

MNEMONIC FUNCTION CODES

CODE	FUNCTION AND DESCRIPTION
1	**ISL1-A.** Performs ISL from the primary device, automatically.
2	**ISL2-M.** Performs ISL from the primary device, manually.
3	**ISL2.** Performs ISL from the secondary device.
4	**DUMP.** Performs the system memory dump. Performed automatically on reset.
5	**EXDIA.** Performs extended diagnostic cycle.
6	**UNATT.** Activates "unattended" status, by deactivating all key functions. The system therefore maintains its status (on/off) even if the key position is switched and the following message is displayed. ***UNAT*.** In this state, the system can only be switched on or off via a command sent from the timer, the CPU or on line.
7	**TD OFF.** Sets the system under the exclusive control of the operator and blocks any connection with the remote diagnostic centre.
8	**TD SA** (stand alone). Deactivates the key functions and sets the system in diagnostic under exclusive control of the remote diagnostic centre.
9	**TD OL** (on line). The system remains under the control of the operator, but it is possible it to connect it to the remote diagnostic centre. The set of commands available to the remote operator will be reduced.
0	Code not used.

Coded functions

Some of the coded functions are protected by password, as will be explained in detail below.

All these functions can be called up with the key in either SBY or RUN, with the exception of the "Auto off" functions, for which the key must be in RUN, and that of "Set password", for which the key must be in the SBY position.

CODED FUNCTION CODES

CODE	FUNCTION AND DESCRIPTION
00	**Error Logging Registers read.** Reads the Error Logging registers, i.e. the registers containing the number of power supply control signal transitions. This function is protected by password. After the function code and password have been entered, the following message appears on display **Rc.** At this point the code of the register to be read must be entered. Valid codes are: 10 = register detailing deactivations of the ALIUP signal not preceded by a PWUP or PONOF activation 11 = register of deactivations of the DATE signal (DAngerous TEmperature) 12 = register of deactivations of the FANFAIL signal 13 = register of re-activations of the PWUP signal before de-activation of the PONOF signal.
01	**Error Logging Registers clear.** Cancels the Error Logging registers. The protective password is the same as that of the previous function. The function is identical to the previous function, with the difference that the register selected is cleared and not read.
02	**Auto off.** Prevents the system from being switched off even if the key is moved to SBY. This function is protected by password.
03	**Auto off clear.** Cancels the "Auto off" command. Protected by the same password as that of the previous function.
04	**Non maskable interrupt.** Activates the POWFA signal for half a second, thus generating a non maskable interrupt.

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CODE	FUNCTION AND DESCRIPTION
05	**Set data.** Displays and updates the date and time. Year, month, day, hours and minutes must be entered in order.
06	**Set system on.** Displays and updates the times of daily, automatic switch-on. Status for the function (0=off, 1=on) is requested. If the function is set "on", switch-on times for all the days of the week, starting from Saturday, are displayed and requested in order. If automatic switch-on is not required for one or more days, the value 99 must be input for the hour or minutes. A sequence of 4 hypens instead of the time indicates that no automatic switch-on has been programmed for that day.
07	**Set firmware mode.** Sets a flag that indicates the input requests in Forth diagnostic environment. This flag is set "off" by entering 0, and "on" by entering 1.
20	**Set password.** Input or modification of the passwords. After the function code is entered, the display shows: **Fc.** At this point, the code of the function for which the password is to be input or modified must be entered. If there is no password, switch the key as follows in a 10 second interval: "SBY --> RUN --> SBY". The password is entered or modified as follows: The display reads: **TpNpwd.** The new password (which should be of 6 characters) must be keyed in (an "X" will appear on the display for each keystroke) . The display should now read: **RtNpwd.** The operator must key in the new password again.

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CODE	FUNCTION AND DESCRIPTION
21	**Diagnostic result.** Provides diagnostic information on the boards present in the board rack. A message with the following format is given for each slot: **XXN:YY,** where: XX is the control board code N is the number of slots (in hexadecimal) YY is the result of the diagnostic, and can be: OK: board operational KO: board not operational WR: board partially operational An empty slot is represented by: **FFn:**.** At the end, memory status is indicated with one of the following messages: **RAM OK** = RAM board operational **RAM KO** = RAM board not operational **RAM fr** = RAM board partially operational
22	**Show data.** The date and time are displayed in cycles three times. The message has the following format: **YY MMM WWW DD, TT hh:mm,** where: YY = last two figures of the year MMM = month WWW = day of the week DD = day of the month TT = hour type (AM or PM) hh:mm = time
99	**Console status.** The states of the main functions of the console are displayed in cycles. The message has the following format: **Olivetti console, STATUS: IPL by X1, DUMP = X2, EXDIA = X2, UNATTENDED = X2, AUTO-OFF = X2, FW MODE = X2, the SYSTEM is X3,** where: X1 = **ISL1-A** or **ISL1-M** or **ISL2** X2 = **OFF** or **ON** X3 = **OFF** or **ON for key/timer/unattended 1 or 2**

6.2.10 CPU - CONSOLE EXCHANGES

Dialogue between the CPU and the console is activated exclusively by the CPU and involves issue of a command, followed by a delay during which the reply should arrive. This implies that the CPU does not issue two consecutive commands but must wait for the reply (where given) to the first before issuing a second command.

The commands sent out by the CPU are made up of a code, followed, in some cases, by certain parameters.
The console, in the present cases, initially responds by repeating the code of the command and then sends out the relative reply data.

Pseudo-serial line

The CPU and console communicate on a pseudo-serial, dedicated line, and not via the system bus.

Each character has 8 bits, transmission starting from the least significant bit. Bit transmission involves use of three signals, connected as shown below:

Tx		Rx
DATA OUT	---->	DATA IN
SYNC OUT	---->	SYNC IN
REPLY IN	<----	REPLY OUT

Transmission protocol

Transmission protocol is as follows:

1. The trasmitter loads the first bit to be transmitted on the DATA OUT and sets SYNC OUT to 1

2. The receiver senses SYNC IN at 1, reads DATA IN and sets REPLY OUT to 1

3. The transmitter senses REPLY IN at 1 and sets SYNC OUT to 0

4. The receiver senses SYNC IN at 0 and sets REPLY OUT at 0

5. The transmitter senses REPLY IN at 0 and then transmits the next bit, repeating the above sequence

Commands from CPU to console

CODES AND PARAMETERS	COMMAND AND DESCRIPTION
00	Request for console configuration
01	Request for console firmware release
02	Request for telediagnostic firmware release
03	Request for result of the console autodiagnostic
04 XX	XX characters displayed
05	Buzzer on
06	Buzzer off
10 NN XX .. XX	Display presents in hexadecimal; NN = number of bytes in message (from 1 to 16) XX..XX = message (two digits per byte) If the message is of more than 3 bytes, it will be displayed in "wrap-around"
11 NN XX .. XX	Display presents in ASCII; NN = number of bytes in message (from 1 to 32) XX..XX = message (one character per byte) If the message is of more than 6 bytes, it will be displayed in "wrap-around"
13 XX	Handling of diagnostic LED; XX = 00 LED off XX = 01 LED on XX = 02 LED flashing
14	Display of hours and minutes (the refresh occurs once a minute)
15	Cancellation of display
16	Display "booked" for write
17	Display "booking" cancelled

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CODES AND PARAMETERS:	COMMAND AND DESCRIPTION
19 NN XX YZ .. XX YZ RR	CPU autodiagnostic result sent to console; NN = number of bytes to follow, and, for each slot: XX = board code Y = 0 board operational Y = 1 board not operational Y = 2 board partially operational Y = 3 slot empty Z = digit reserved for future expansions at end: RR = 01 RAM board operational RR = 02 RAM board non operational RR = 03 RAM board partially operational
20 XX YY MM DD hh mm ss	Programming of calendar; XX : bit 7-4 = reserved for future expansions bit 3 = 0 Gregorian calendar " = 1 Showa " bit 2-0 = day of the week (0=Sat, 1=Sun ... 6=Fri) YY MM DD = year, month, day of the month hh : bit 7-6 = 00 time AM " = 01 " PM " = 10 " 0/23 bit 5-0 = hour mm ss = minutes and seconds
22	Request for year, month, day of the month, day of the week, hour, minutes and seconds
23	Request for hour, minutes and seconds
24 YY MM DD hh mm ss	Programming of auto switch-on timer; for parameters, see calendar programming
25	Activation of the auto switch-on timer
26 YY MM DD hh mm ss	Programming of the auto switch-off timer; for parameters, see calendar programming
27	Activation of the auto switch-off timer
28	Deactivation of auto switch-on timer
29	Deactivation of auto switch-off timer
30	Request for switch-on reason

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CODES AND PARAMETERS	COMMAND AND DESCRIPTION
31	Request for key position
32	Request for ISL device
33	Request for system memory dump
34	Request for autodiagnostic means
35 XX	Handling of the "unattended" function; XX = 00 unattended deactivated XX = 01 " activated
36 XX HH MM .. HH MM	Programming of the weekly automatic switch-ons; XX = 00 auto switch on deactivated XX = 01 " " " activated HH MM .. HH MM = 14 byte sequence, of which each pair represents hour and minute of auto switch-on for each day (from Saturday to Friday) the time 99:99 indicates auto switch on deactivated
37	Request for times of weekly auto switch-ons
40	Execution of a system "reset"
41	Request for system switch-off; the system only switches off if in "Auto off" and with key in SBY position
42 HH NN XX .. XX	Write in the reserved area of the RAM; HH = offset NN = number of bytes to be written less one XX..XX = bytes to be written
43 HH NN	Reading of the reserved RAM area; HH = offset NN = number of bytes to be read less one
44 XX	Error Logging registers reset: XX = 10 register of ALIUP deactivations before activation of PWUP or PONOF XX = 11 register of DATE deactivations XX = 12 register of FANFAIL deactivations XX = 13 register PWUP re-activations before deactivation of PONOF
45 XX	Reading of the Error Logging registers; the parameter XX has the same coding as above for register resetting
46	Reading of the "Firmware mode" Flag

Replies from console to CPU

CODES AND PARAMETERS	COMMAND AND DESCRIPTION
00 XX	Console configuration; XX = 0 only console functions
01 XY	Console firmware release; X = compatibility level Y = functional level
02 XY	Telediagnostic Firmware release; X = compatibility level Y = functional level for console without telediagnostic XY will be = 00
03 XX YY	Result of the console autodiagnostic; XX: bit 7 = 0/1 RAM operational/faulty " 4 = 0/1 EPROM operational/faulty " 0 = 0/1 RTC operational/faulty YY = byte reserved for future expansions
04 XX	Repeat of XX character
22 XX YY MM DD hh mm ss	Reply to the year, month, day, day of the week, hour, minutes and seconds request; for the parameters, see the calendar programming command described in the previous section
23 hh mm ss	Reply to the hour, minutes and seconds request; for the parameters, see the calendar programming command, described in the previous section
24	Reply to the auto switch-on timer programming request
25 YY MM DD hh mm ss	Reply to the auto switch-on timer request; for the parameters, see the calendar programming command, described in the previous section
26	Reply to the auto switch-off timer programming request
27 YY MM DD hh mm ss	Reply to the auto switch-off timer activation; for the parameters, see the calendar programming command, described in the previous section

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CODES AND PARAMETERS	COMMAND AND DESCRIPTION
30 XX	Means of switch-on; XX = 00 key XX = 01 unattended line 1 XX = 02 timer XX = 03 telediagnostic XX = 04 unattended line 2
31 XX	Key position; XX = 01 RUN XX = 03 SBY
32 XX	Request for ISL device XX = 01 primary device with automatic selection (ISL1-A) XX = 02 secondary device (ISL2) XX = 03 primary " with manual selection (ISL1-M)
33 XX	Reply to request for memory dump; XX = 00 dump not executed XX = 01 dump executed
34 XX	Resident autodiagnostic procedure; XX = 00 extended autodiagnostic XX = 01 shortened " "
35 XX	Handling of the "unattended" function; XX = 00 unattended deactivated XX = 01 " activated
37 XX HH MM .. HH MM	Reply to the request for times of weekly auto switch-ons; for parameters, see the programming command of the weekly auto switch-ons, described in the previous section
43 XX .. XX	Reply to the reading of the RAM reserved area; XX..XX = bytes read
45 XX	Reply to the reading of the Error Logging registers; XX = contents of the register selected (in BCD)
46 XX	Status of "Firmware mode" flag; XX = 00 flag deactivated XX = 01 " activated

6.2.11 TELEDIAGNOSTIC

Telediagnostic is a means of performing system diagnostic from a remote technical service centre connected to the console of the system and run by highly qualified personnel.

In the text below, the term **remote** refers to the service centre and the term **local** to the system being tested.

A series of commands can be issued from the remote centre for the following:

- Switch on, switch off and initialize the local system
- Read the local system and console configuration
- Run the diagnostics, extended or shortened, and check execution step by step
- Perform ISL from a selected console device or from the telediagnostic centre
- Transfer and execute certain diagnostic programs
- Display a character string on console display
- Initialize and complete a "remote login" session, during which the telediagnostic centre becomes a remote terminal of the local system

Connection between remote centre and console

The remote centre and the local system can be several kilometres apart and are connected via modem on an ordinary, switched telephone line.

Transmission protocol

The transmission protocol used is the BSC2. The line is configured as follows:

PARAMETER	VALUE
Speed	1200 Bauds
Bits/Character	7
Stop bits	1
Parity	Odd
Type of link	Half duplex

Message format

All the messages on the connection line between console and remote centre have the following format:

FIELD	LENGTH	POSSIBLE VALUES AND DESCRIPTION
RECEIVER	2 Bytes	2F 4A = console 2F 4B = remote centre 2F 4C = local system
SENDER	2 "	as per the RECEIVER field
CODE	1 "	see below
TYPE	1 "	30 = request for command 31 = reply to command
STATUS	1 "	if TYPE = 30 30 = sender does not require reply 31 = sender requires reply
		if TYPE = 31 30 = command correctly executed other = anomaly verified
LENGTH	4 "	number of bytes in PARAMETER field
PARAMETERS	variable	all those provided by the command
CLOSURE	1 Byte	0A

Commands from remote centre to local system

The commands that the remote centre sends the local system console can be divided into two groups:

1. Commands that can be executed directly by the console.

2. Commands that can be executed by the local system CPU.

The following pages detail the commands that can be issued from the remote centre.

Commands executed by the console.

CODES	COMMAND AND DESCRIPTION
2E	**READ CONSOLE STATUS.** Request for transmission of the console description. (position of key, data entered through keyboard and contents of display)
2B	**SYSTEM ON.** Local system switch-on command.
2C	**SYSTEM OFF.** Local system switch-off command.
2D	**SYSTEM RESET.** Local system hardware reset command.
32	**READ SYSTEM STATUS.** Request for transmission of local system description.
35	**READ SOFTWARE RELEASE.** Request for transmission of the software release of the environment loaded on the local system.
36	**READ SSM SOFTWARE RELEASE.** Request for transmission of the software release of the console.
38	**WRITE DISPLAY.** Write console display command.
39	**TERM ON.** Start of the "remote login" session.
3A	**TERM OFF.** End of the "remote login" session.
3B	**LINE UP.** Non-significant code, used to keep the BSC2 line active when there are no messages.

Commands executed by the local system CPU.

CODES	COMMAND AND DESCRIPTION
20	**AUTODIAGNOSTIC RESTART.** Local system software reset command (restart of resident autodiagnostic).
21	**EXTENDED DIAGNOSTIC 2.** Command to execute the second step of the resident autodiagnostic, extended version.
22	**INFORMATION.** Request for transmission of information collected during diagnostic.
23	**SPECIAL ISL.** Command to perform ISL from a local system device, selected specifically (slot and unit).
24	**ISL CONSOLE.** Command to perform ISL from a selected console device.
25	**REMOTE ISL.** Command to perform ISL from a remote diagnostic centre device.
26	**GO TO.** Command to execute the code of the program loaded previously.
27	**REDUCED DIAGNOSTIC 2.** Command to execute the second step of the resident autodiagnostic, shortened version.
2F	**DOES NOT FUNCTION.** Command to check CPU activity.
30	**CALL PROGRAM.** Command to call up the code of the program loaded previously.
73	**OPEN.** Beginning of the file transfer session.
74	**SEND.** Transmission of a program code block.
75	**CLOSE.** End of file transfer session.

6.2.12 CONSOLE CONNECTIONS

The names of the connectors ensuring connection between the system and the console are given in the tables below.

Connectors common to both M64 and M70 systems

CONNECTOR	DESTINATION
J690	Front panel
J052	Telediagnostic line
J040/1	Channel 1 line connector
J040/2	Channel 2 line connector
J037	SB0 mains group relay
J121/1	SB0 power supply
J038/1	SB0 back plane
J042	RS232 serial line (PC/VT100)

M64 specific connectors

CONNECTOR	DESTINATIONE
J049	UC070 board (pseudo-serial line)
J253	UC070 board (RS232 serial line)

M70 specific connectors

CONNECTOR	DESTINATION
J122	UC071 board

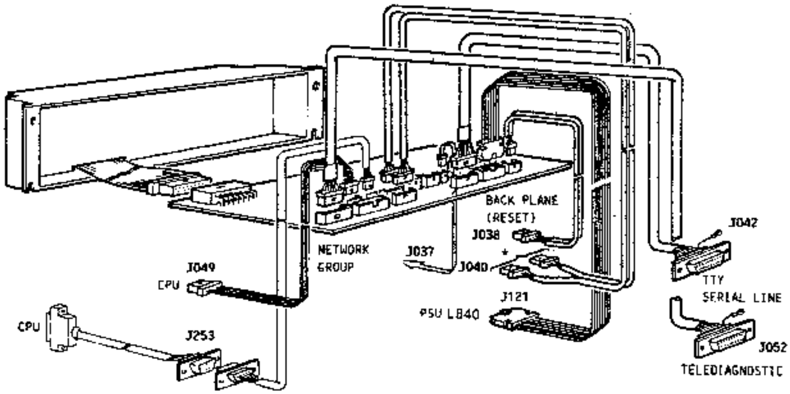
6.2.13 DESCRIPTION OF BOARD CONNECTORS

The connectors connecting the console board to the rest of the system are described below.

For each connector the following are shown:

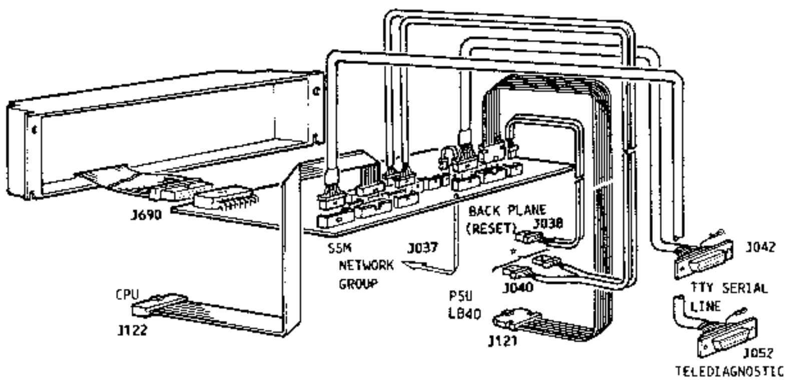
- Point of arrival and destination of the connection cable
- Pin layout
- Names of signals.

The following two figures indicate position of the connectors on the SSM board for M64 and M70 systems, respectively.



* LINE CONTROLLER (UNATTENDED)

Fig. 6-6 Position of Connectors for M64 Systems



* LINE CONTROLLER (UNATTENDED)

Fig. 6-7 Position of Connectors for M70 Systems

Front panel connector - J690

A 30-way (15x2) connector connecting the console board to the front panel of the console.

PIN	SIGNAL	PIN	SIGNAL
1	LNOGA	16	TASR3
2	M	17	DIIN5
3	LALIA	18	TAC41
4	M	19	DIVFL
5	LPWON	20	DIIN6
6	KEYON	21	DIDSP
7	HISHA	22	DIDIN
8	Z	23	DIIN0
9	Z	24	DICLK
10	Z	25	DIIN1
11	TAC11	26	DIRST
12	TASR1	27	DIIN4
13	TASR2	28	+5 V
14	TAC21	29	DIIN3
15	TAC31	30	DIIN2

Telediagnostic connector - J052

A 24-way (12x2) connector connecting the console board to the RS232 line used for telediagnostic.

PIN	SIGNAL	PIN	SIGNAL
1	A1010	13	M
2	Z	14	A1080
3	A1030	15	A1090
4	A1140	16	A1400
5	A1040	17	Z
6	Z	18	A1250
7	A1050	19	Z
8	A1150	20	A1110
9	A1060	21	Z
10	A1410	22	A1130
11	A1070	23	Z
12	Z	24	A1420

Line 1 controller connector - J040/1

This connector connects the console to the channel 1 unattended line.

PIN	SIGNAL
1	T1TTL
2	M
3	R1UNT
4	Z
5	COF1A
6	TEL1N
7	CON1A
8	+5 V

Line 2 controller connector - J040/2

This connector connects the console to the channel 2 unattended line.

PIN	SIGNAL
1	T2TTL
2	M
3	R2UNT
4	Z
5	COF2A
6	TEL2N
7	CON2A
8	+5 V

Relay connector - J037

A 2-way connector connecting the console to the mains group relay.

PIN	SIGNAL
1	PISCA
2	PIU12

Power supply connector - J121/1

A 20-way (10x2) connector connecting the console to the power supply.

PIN	SIGNAL	PIN	SIGNAL
1	M	11	M
2	M	12	M
3	+5 V	13	PWSB1
4	+5 V	14	M
5	PONOF	15	M
6	P1U12	16	+5 V
7	PONOD	17	DTSB1
8	MEN12	18	+5 V
9	AUSB1	19	M
10	M	20	+5 V

Back plane connector - J038/1

A 4-way connector connecting the console to the Back Plane.

PIN	SIGNAL
1	RESEA
2	M
3	M
4	POWFA

TTY system connector - J042

The TTY system connector is a 10-way connector with the following pin layout:

PIN	SIGNAL
1	M
2	CD103
3	CD104
4	CD105
5	CD106
6	CD107
7	CD108
8	CD109
9	Z
10	Z

M64 central unit connector - J049

A 16-way (8x2) connector connecting the console to the M64 CPU board through a pseudo-serial line:

PIN	SIGNAL	PIN	SIGNAL
1	P1U12	9	Z
2	DAC10	10	LED21
3	Z	11	LED11
4	Z	12	LED01
5	CARIC	13	MEN12
6	RESCA	14	Z
7	M	15	DAC00
8	PSSYS	16	8000N

M64 central unit connector - J253

An 8-way (4x2) connector connecting the console to the M64 CPU board using an RS232 serial line.

PIN	SIGNAL	PIN	SIGNAL
1	B1030	5	B1040
2	B1050	6	B1060
3	B1080	7	B1070
4	M	8	B1090

M70 central unit connector - J122

A 26-way (13x2) connector connecting the console to the M70 CPU board (UC071) using a pseudo-serial line.

PIN	SIGNAL	PIN	SIGNAL
1	CARIC	14	M
2	M	15	CT104
3	DAC00	16	M
4	M	17	CT105
5	DAC10	18	M
6	M	19	CT106
7	LED0A	20	M
8	M	21	CT107
9	LED1A	22	M
10	M	23	CT108
11	LED2A	24	RESCA
12	M	25	CT109
13	CT103	26	Z

6.2.14 AUTODIAGNOSTIC FROM CONSOLE

When the console is switched on, a diagnostic designed to reveal memory (RAM and EPROM) and Real Time Clock faults which could jeopardise correct operation of the console is executed automatically.

In the first step of the autodiagnostic, the front panel LEDs will go on for approximately 3 seconds, the addressable latches will be reset and the EPROM CRC test will be performed. This checks that the back up batteries powering the RAM are operating and that the data in memory is correct. If there data losses, a test is made to check RAM hardware efficiency. Finally the Real Time Clock is tested to prove it is working correctly.

If errors are found, the following error message will be displayed on the console display: **CON XX.** Byte XX represents the faulty devices, as shown in the table below:

BYTES	FAULTY DEVICES
10	RTC
20	EPROM
30	EPROM + RTC
40	RAM
50	RAM + RTC
60	RAM + EPROM
70	RAM + EPROM + RTC

If RAM and EPROM errors are found, the console processor will stop after displaying an error message and initialization will not be performed.

6.2.15 INITIALIZATION

The initialization procedure switches off the front panel LEDs, clears the display, keeps the system off and initializes the memory areas and all buffers that will be used subsequently.

Furthermore, if a RAM data error was found in the diagnostic cycle executed previously, all passwords will be cancelled and the following message will appear on display **NO PWD,** informing the operator that all protections have been cancelled.

6.2.16 CONSOLE HANDLING

The console display is used during the autodiagnostic to indicate which test is in progress and to display diagnostic messages, if errors occur.

Activity status display

The display is a 6 figure display; the normal format to indicate test in progress, from left to right, is as follows:

First figure : always a dot
Second figure: always a space
Third figure : always a space
Fourth figure: number of the diagnostic step in the test
Fifth figure : always a space (except where there is a bus error)
Sixth figure : current test number.

GO/NOGO LED

All through the autodiagnostic, this LED remains on. Its status is modified before bootstrapper activation, as shown below:

off : no errors in autodiagnostic
blinking : non-blocking errors found
on : blocking error found

The bootstrapper can, obviously, be activated only in the first two cases.

6.3 RESIDENT AUTODIAGNOSTIC

The ROM resident autodiagnostic analyses only the area involved in program loading. It starts up automatically when the machine is powered on and is performed in a number of steps.

6.3.1 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.

6.3.2 LOADING CHANNEL

Operating system and diagnostic monitor (for stand alone diagnostics) loading channel selection (IPL) occurs in an order established by the position of the ISL switch on the console.

Primary sequence (switch in position 1)

In this case, the operating system or diagnostic monitor (DCOS) Initial Program Loading occurs from one of the system fixed peripherals. The search starts from the peripheral with lowest logic number, proceeding in order through all the peripherals, if necessary, to find the channel.

Secondary sequence (switch in position 2)

In this case, the operating system or diagnostic monitor (DCOS) Initial Program Loading occurs from one of the system removable peripherals. The search starts from the peripheral with lowest logic number, proceeding in order through all the peripherals, if necessary, to find the channel.

6.3.3 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 - "blinking" and "non blinking".
A list of **non blinking messages** with a 1-figure 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	Vector obtained in interrupt time not as expected	Replace all the boards one by one, issuing the autodiagnostic each time until the faulty controller is discovered
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
6	Segment trap after bootstrap activation	
7	Non-maskable interrupt after bootstrap activation	
9	Instruction not implemented after bootstrap activation	
A	Privileged instruction after bootstrap activation	
B	System Call after bootstrap activation	
C	Non-vectored interrupt after bootstrap activation	
D	Delay before IPL switch switches (approx. 3 secs.) when operator wants to activate the Total Memory Dump procedure	If the IPL switch does not switch or the module responsible for the Total Memory Dump (resident in RAM) is not accessible, normal IPL activity starts up again.

Blinking 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:

```
 -------------- Sync symbol for error code interpretation
 |
 |
 |   ---------- 1 step error code
 |   |
 |   |   ------- Slot name for controller error is on: codes here are from
 |   |   |       0 to E
 |   |   |
 |   |   |   --- Unit error has occurred on: codes are from 0 to 7
 |   |   |   |
--- --- --- ---
"." "X" "Y" "Z"
--- --- --- ---
```

The **blinking 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/minifloppy, 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

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.
B	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. 7.2
-  -  -      --------
|  |  |         |
|  |  |         --------- 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 8.4.2 is given below.

1. MONIT L1 Diagnostic Monitor
2. UTILY8 Utility program
3. LDHSE2 HDU Environment Activator (WS connected via KDC)
4. LDHMU7 HDU Environment Activator (WS connected via MUX)
5. LDH533 HDU Environment Activator (WS ETS 20xx type)
6. SYSIN8 Transfer of Programs from MTU/SCT/FDU to HDU
7. HDSCT9 Transfer of Programs from HDU to SCT
8. HDMTU7 Transfer of Programs from HDU to MTU
9. HDUFD7 Transfer of Programs from HDU to FDU
10. UC3003 CU Test (UC036 without gate array) for M30/M40
11. UCG304 CU Test (UC042 with gate array) for M30/M40
12. UCV305 UC048 for M34/M44 and UC070 for M54/M64 test
13. UCY805 UC071 for M70 test
14. 51CAC1 UC070 Cache with XU 5010 test
15. FJCAC1 UC070 Cache with XU 1700/1703 test
16. WRCAC1 UC070 Cache with XU 1707/1709 test
17. MEM813 RAM Boards test
18. EARUT3 Line Parameters on EAROM Installation
19. CHY100 UC071 cache test
20. TCM801 M70 TCM board test
21. PRGEN1 Printer test
22. PINBDG Pinpad/Badge Reader test

23. PINELB Pinpad/Badge Reader test via ELB 1381/1382

24. CA2TS1 CA2000 Test via twin

25. FEEDER Printer Front Feeder test

26. SOVRA7 Overlapping Program

27. ENCDE5 Encryption/Real Time Clock Controller test

28. ENCSE2 Encryption Module (shared segment) test

29. PINCK3 Encryption Module (pin check) test

30. COENC2 RTC+Encryption+Pin Check shared segment test

31. CESTE0 Extended Console for M64/M70 test

32. SSM000 Extended Console with telediagnostic (SSM) test

33. PCA100 CA2000 via TWIN/ELBB1382/CU test

34. PCA200 CA2000 via MUX/ELB*3684/WS685M test

35. UCM805 M60-2/3 CPU test (UC040)

36. CACH84 Cache Memory test (UC041)

37. TCB805 TCB Board test

38. MEM813 RAM Boards test

39. MREDA3 REDAC Board test

40. CAC603 60 MB HDU Cache test

41. CAC123 120 MB HDU Cache test

42. RAMVID Display RAM test

43. CRTAN5 Alphanumeric Monochrome Display test

44. CRTGR2 Graphic Monochrome Display test

45. KEYTE1 Keyboard test

46. GRAPH3 Graphic/Colour Display Controller test

47. T31103 Graphic/Colour Display test

48. TKEY04 Keyboard connected to Graphic/Colour Controller test

49. MULT13 Multiplexer Controller Serial Channel test

50. MULT22 Multiplexer Controller test

51. WSVID6 Display for WS connected via ELB 3683 test

52. WSKEY6 Keyboard for WS connected via ELB 3683 test

53. WSPCR3 Pinpad/Badge Reader connected via ELB 3683 test

54. WSLIN3 WS in Multiplexer/D-BOX/ELB 3683 test

55. GLAV28 LCU V24 test

56. LCUX26 LCU X24 test

57. LCUTT4 LCU TTL test

58. LCUMO4 MOIN.5 Line Controller test

59. MOINV2 Modem MOIN 5.2 connected to G0300 or G0156 test

60. TWIN05 Twin Controller (G0327 or G0151) test

61. TW1005 RS 422 Twin Controller test (for ETS 20xx)

62. LIONV4 LION 9.6 LCU test

63. 96ERM6 LION 9.6 Master Error Rate

64. 96ERS6 LION 9.6 Slave Error Rate

65. STARLO Starlan-Dumb Controller G0431 Error Rate

66. SLANCA Starlan-Dumb Controller G0431 test

67. ER2005 LION 200 (dedicated segment) Error Rate

68. ERS204 LION 200 (shared segment) Error Rate

69. L2V248 LION 200 + V24 (dedicated segment) LPU test

70. V24L27 LION 200 + V24 (shared segment) LPU test

71. W24D08 V24 + V24 (dedicated segment) LPU test

72. W24S07 V24 + V24 (shared segment) LPU test

73. L9V244 LION 9.6 + V24 LPU test

74. MOW240 MOIN 5.2 + LPU V24 + V24 test

75. ETHER2 Ethernet Controller Error Rate

76. OMNIN4 Omninet Controller (dedicated segment) test

77. OMNSH1 Omninet Controller (shared segment) test

78. REPTR0 Omninet Repeater (shared segment) test

79. REPTD0 Omninet Repeater test

80. ETCOL4 Ethernet Controller G0212/A test

81. 7032E5 MFDU and FDU Error Rate

82. MFDMA1 MFDU Alignment and Eccentricity test

83. FDUMA2 FDU Alignment and Eccentricity test

84. 4301T4 320 KB MFDU test

85. 4305T6 1 MB MFDU test

86. 6030T6 1 MB FDU test

87. 505CT9 Save-Restore from STC to XU 5010

88. HDSCPH Dump-Restore from XU5010 to SCT (on ETS 20xx)

89. SCT303 G0200/B + G0201/B Controller with 20 MB STC (XU 1120) test

90. STC404 G0200/B + G0342 Controller with 20 MB STC (XU 1130) test

91. SCTER7 20 MB STC Error Rate

92. EPCOV3 20 MB STC Error Rate (XU 1120: FW Rel. 7.0 and subseq.)

93. CPCOV1 20 MB STC Error Rate (XU 1130: FW Rel. 8.0 and subseq.)

94. STC5E2 40/65 MB STC Error-Rate

95. STC5T3 45/60 MB STC Controller G0417 + G0418 test

96. MTUER7 40 MB MTU Error Rate

97. MTC304 40 MB MTU Controller (G0278) test

98. FJMTU5 60 MB MTU/HDU Dump-Restore

99. 120FC3 120 MB MTU/HDU Dump-Restore

100. TS50I6 18 MB HDU Subsystem XU 5010 test

101. S24I51 Cylinder 0 Initialization for XU 5010

102. DI5011 XU 5010 Registration

103. ER50I3 XU 5010 Error Rate

104. VC50I2 XU 5010 Verify and Correction

105. 50ITM1 XU 5010 Rotation Time Measurement

106. SASIT5 14 MB HDU Test (SASI3 interface): XU 5006

107. C50062 XU 5006 Certification

108. 5006F3 XU 5006 Formatting

109. ES3564 XU 5006 Error Rate

110. SAS243 Std 24 Write on XU 5006

111. DRSMF4 1 MB MFDU/XU5006 Dump-Restore

112. 5006V1 XU 5006 Verify and Correction

113. S24X62 Std 24 Installation on XU 5006 (ST506 interface, G0363)

114. SM23F6 60 MB HDU Disk Formatting: XU 1700 (SMD interface)

115. ST24S5 Track 0 Initialization on XU 1700 (Std 24)

116. 2312E8 XU 1700 Error Rate

117. 23SCT3 Save-Restore between XU 1700 and STC

118. SMD611 SMD Controller for XU 1700 Test

119. F60TM3 XU 1700 Rotation Time Measurement

120. SM12V4 XU 1700 Verify & Correction

121. 2322F5 120 MB HDU Disk Formatting: XU 1703 (SMD interface)

122. 120ST1 Track 0 Initialization on XU 1703 (Std 24)

123. 2322E3 XU 1703 Error Rate

124. FJSCT3 Save-Restore between XU 1703 and STC

125. SM1211 SMD Controller for XU 1703 Test

126. F12TM3 XU 1703 Rotation Time Measurement

127. SM22V2 XU 1703 Verify & Correction

128. HDC5F5 27/65 MB HDU Disk Formatting: XU 1707/09 (Wren1/Wren2)

129. HDC5E9 Wren1/Wren2 Error Rate

130. HD5ST3 Save Restore between Wren1/Wren2 and STC

131. HDC5V6 Verify & Correction for Wren1/Wren2

132. HDC505 ST506 Interface Controller test (G0363)

133. HDC5X3 HDU ERMAP Read/Write Program ST506 interface

134. S24W16 Std 24 Installation on Wren1 (27 MB HDU)

135. S24W25 Std 24 Installation on Wren2 (65 MB HDU)

136. S24M54 Std 24 Installation on Micropolis 1325 (65 MB HDU)

137. S24X11 Std 24 Installation on on XM 5221 (20 MB HDU)

138. S24WD0 Std 24 Installation on Wren2 (40 MB HDU Depopulated)

139. S24MA1 Std 24 Installation on Micropolis 1325/A (40 MB HDU)

140. S24N60 Std 24 Installation on Nec 5126H

141. ESDIF3 140 MB HDU Disk Formatting, ESDI interface

142. ESDIE1 140 MB HDU Error Rate

143. ESDIV2 HDU Verify & Correction program, ESDI interface

144. ESDIT1 ESDI test program (provisional)

145. EIW3S3 Std 24 Installation on 140 MB HDU: CDC Wren3

146. EIM5S3 Std 24 Installation on 140 MB: Micropolis 1355

147. EIF6S3 Std 24 Installation on 140 MB HDU: Fujitsu M2246E

148. EIM3S0 Std 24 Installation on 70 MB HDU: Micropolis 1353

149. S3PTF2 275 MB HDU disk formatting (Patriot, SMD interface)

150. S3PTS0 Std 24 Installation on 275 MB HDU

151. S3PTE0 275 MB HDU Error Rate

152. S3PSD0 275 MB HDU and STC Save-restore

153. S3PTC0 275 MB HDU SMD Controller test

154. S3PTT0 275 MB HDU Rotation Time Measurement

155. S3PTV0 275 MB HDU Verify & Correction.

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7. SYSTEM UPGRADING

7.1 FOREWORD

This chapter describes the upgrading of L1 systems M64 and M70/2/3 to, respectively, M64 SP and LSX 3020 systems.

Note: Hardware transformation of L1 systems to LSX systems is to be considered only with respect to the MOS operating system.

7.1.1 UPGRADING FROM M64 TO M64 SP

From an operational viewpoint, upgrading from M64 to M64 SP is performed by replacing the CPU board UCO70 with CPU board UCO3068.

The UCO3068 board mounts a 4 Mbyte memory. If necessary, system memory can be expanded beyond the 4 Mbytes by using the memory boards already existing on the M64.

It should be remembered that, for full compatibility with the diagnostic environment, the system should be equipped with the extended console based on the REDAC board, with or without telediagnostic, or the new console based on the SSM board.
Therefore, if your M64 system has the basic console, it must be replaced.

7.1.2 UPGRADING FROM M70/2/3 TO LSX 3020

For upgrading of these systems, there are two different cases:

- M70 system with 11-board slot cabinet

- M70 system with 16-board slot cabinet.

Applications are different because of problems connected with power supply. The fact that the system is mono or multiprocessor is irrelevant.

Upgrading in all cases involves replacement of CPU board UCO71 with the UC068 (or CPU boards, for multiprocessor systems) and of the M70 system hardware modules not compatible with the new CPU.

A table of M70 system modules compatible with the LSX 3020 systems is given below.

M70 MODULES	COMPATIBLE
Central unit (UC071)	NO
TCM system memory	YES
System memory (TCB + memory array)	YES
Extended console with REDAC board	YES
System support module SSM	YES
Floppy and minifloppy subsystem	
1 Mbyte 5 and 1/4"	YES
1 Mbyte 8"	YES
Magnetic tape peripherals	
SCT 1/4" 45/60 MB capacity	YES
MTU 1/2" 20/40 MB capacity	YES
Hard disk subsystem	
5.25", ESDI interface, non-intelligent	YES
5.25", ST506 interface	YES
8", SMD interface, 60/120 Mbyte	NO
8", SMD interface, 275 Mbyte	NO
Communication subsystem	
KDC B/W + graphics expansion	NO
MUX asynchronous, 4-way	YES
LPU synchronous for V24	YES
LION 9.6/200 + V24 synchronous	NO
Ethernet (non-intelligent controller)	YES
Starlan (non-intelligent controller)	YES
LCU Omninet	NO
Encryption + Pin Check	YES

Minimum upgrading level comprises replacement of the CPU boards and the non-compatible modules; such a system has the configurability and features of an M70 system, apart from the benefits derived from having a faster CPU.
This is possible thanks to the fact that compatibility has been maintained between the different memories.

The first 11-board slot M70 models cannot house the LC12 expansion power supply for use in connection with the LSX 3020 system. When upgrading, therefore, ensure that the total power output of the M70 basic power supply (LB40) is not exceeded.

As a general rule, it may be said that replacement of the CPU board (or CPU boards for multiprocessor systems) and compatible modules never presents any power supply problems; such problems may arise when replacing other modules, such as memory boards, non-intelligent ESDI controllers, line controllers, etc.

There are no power supply problems with the 16-board slot M70 models as these models have supplementary power supply LB12 in expansion cabinet SB1.
The two power supplies LB40 and LB12 together meet all upgrading power needs.

With there being no restrictions at power supply level and the only limit being expenditure, the following order of priority for module replacement may be drawn up:

- TCB board and relative memory boards with TCM boards

- Non-intelligent, ESDI interface, HDU control boards with intelligent, ESDI interface boards

- Line boards and M70 typical networks with LSX 3020 typical networks.

Note that upgrading from M70 to LSX 3020, in addition to the benefits in terms of processing, entails other advantages such as system configurability, fewer boards required, etc.

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A. APPENDIX

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

A.1.1 TABLE OF MODULES FOR M64

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
M64 BASIC MODULE - NO CONSOLE	SB0 Basic cabinet with: .11-slot board rack IN080 .CPU UC070 .LB40 Power supply .Mains and fans assembly .Cables	BU 6401
BASIC CONSOLE	Board with: . 1-digit display . ISL switch Cables	CDS 6411
EXTENDED CONSOLE	Device with: . REDAC board . Power-on key . Buzzer . 6-digit display . Maintenance keyboard . Three LEDs . Unattended feature . Real time clock Cables	CDS 7099
CONSOLE WITH TELEDIAGNOSTIC	Device with: . SSM board . Power-on key . Buzzer . 6-digit display . Maintenance keyboard . Three LEDs . Unattended feature . Real time clock . Synchronous line cable . Telediagnostic feature Cables	CDS 8077

DATA ENCRYPTION MODULE WITH REAL TIME CLOCK FOR LINE/DISKS	Board with lock G0257	DEM 3330
DATA ENCRYPTION MODULE FOR PIN CHECK WITH ALGORITHM FOR CAT	Board with lock G0257/C	DEM 3477
512 KB STORAGE MEMORY - NO ECC	RA57/E board	MEM 3374
1.0 MB STORAGE MEMORY - NO ECC	RA57/C board	MEM 3361
1.5 MB STORAGE MEMORY - NO ECC	RA57/B board	MEM 3362
2.0 MB STORAGE MEMORY - NO ECC	RA57/A board	MEM 3363
1.0 MB STORAGE MEMORY WITH ECC	RA65/B board	MEM 7022
2.0 MB STORAGE MEMORY WITH ECC	RA65 board	MEM 7024

A.1.2 TABLE OF M70 MODULES

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
LICENCE TO USE BASIC SOFTWARE	Operating System MOS RUN-TIME	SWB 6061
M70 BASIC UNIT, 11 BOARD SLOTS, MONOPROCESSOR, TCB, NO CONSOLE	SB0 basic cabinet with: .11-slot board rack IN087 .CPU UC071 .TCB82/A board .LB40 Power supply .Mains and fans assembly .Cables	BU 7011
M70 BASIC UNIT, 16 BOARD SLOTS, MONOPROCESSOR, TCB, NO CONSOLE	SB0 basic cabinet with: .16-slot board rack IN088 .CPU UC071 .TCB82/A board .LB40 & LB12 Power supply .Mains and fans assembly .Cables	BU 7012
M70 BASIC UNIT, 11 BOARD SLOTS, MONOPROCESSOR, NO TCB, NO CONSOLE	SB0 basic cabinet with: .11-slot board rack IN087 .CPU UC071 .Power supply LB40 .Mains and fan assembly .Cables	BU 7115
M70 BASIC UNIT, 16 BOARD SLOT, MONOPROCESSOR, NO TCB, NO CONSOLE	SB0 basic cabinet with: .16-slot board rack IN088 .CPU UC071 .Power supply LB40 & LB12 .Mains and fan assembly .Cables	BU 7116
AUXILIARY PROCESSING UNIT (to upgrade to bi/triprocessor)	CPU UC071 Flat cable System name plate	APU 7070

EXTENDED CONSOLE	Device with: . REDAC board . Power-on key . Buzzer . 6-digit display . Maintenance keyboard . Three LEDs . Unattended feature . Real time clock Cables	CDS 7099
CONSOLE WITH TELEDIAGNOSTIC	Device with: . SSM board . Power-on key . Buzzer . 6-digit display . Maintenance keyboard . Three LEDs . Unattended feature . Real time clock . Synchronous line cable . Telediagnostic feature Cables	CDS 8077
DATA ENCRYPTION MODULE FOR PIN CHECK WITH REAL TIME CLOCK AND ALGORITHM FOR CAT	Board with lock G0257/C	DEM 3477
DATA ENCRYPTION MODULE WITH PIN CHECK AND REAL TIME CLOCK		DEM 8038
2.0 MB STORAGE MEMORY WITH ECC	1 Board with 256 KB chips	MEM 6032
4.0 MB STORAGE MEMORY WITH ECC	1 Board with 256 KB chips	MEM 6034
2.0 MB STORAGE MEMORY WITH ECC (TCB functions included)	1 Board with 256 KB chips	TCM 8046
4.0 MB STORAGE MEMORY WITH ECC (TCB functions included)	1 board with 256 KB chips	TCM 8047

A.1.3 MAGNETIC PERIPHERALS FOR M64 AND M70 MOUNTED IN BASIC UNIT

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
1 MB SLIM 5 AND 1/4" MFD SUBSYSTEM FIRST DRIVE	mFD Control G0280/D 1 ND08 DE drive DC/DC converter DCA 512/36 Signals cable Power cable	MFS 7031
1 MB SLIM 5 AND 1/4" MFD, SECOND DRIVE	1 ND08 DE drive DC/DC converter DCA 512/36 Signals cable Power cable	MFS 7032
45/60 MB STREAMING TAPE SUBSYSTEM	Boards G0417 & G0418 1 STC drive (QIC 24) DC/DC converter DCA 512/36 Signals cable Power cables	STS 7037
45/60 MB STREAMING TAPE CONTROL	1 G0437 board for 45/60 MB STC	STC 8062
45/60 MB STREAMING TAPE	1 STC drive (QIC 24) DC/DC converter DCA 512/36 Signals cable Power cables	STU 8061
ST506 INTERFACE CONTROL	1 G0363 board	HDC 3544
ST506 INTERFACE COMMANDS CABLE FOR 1-2 HDU	Cable	CBL 7049
20 MB SLIM HARD DISK ST506 INTERFACE	1 XM 5221/2 drive DC/DC converter DCA 512/36 Signals cable Power cables	HDU 7041
40 MB FULL SIZE HARD DISK ST506 INTERFACE	1 MICROPOLIS HDU drive DC/DC converter DCA 512/36 Signals cable Power cables	HDU 7042
65 MB FULL SIZE HARD DISK ST506 INTERFACE	1 XU 1709 drive DC/DC converter DCA 512/36 Signals cable Power cables	HDU 7043

CONTROL FOR ESDI INTERFACE	2 Boards G0404 & G0405	HDC 7050
ESDI INTERFACE COMMANDS CABLE FOR 1-2 HDU	Cable	CBL 7059
70 MB HARD DISK, ESDI INTERFACE INTEGRATED IN BASIC CABINET	1 5.25" drive DC/DC converter DCA 512/36 Signals cable Power cables	HDU 8066
140 MB HARD DISK, ESDI INTERFACE INTEGRATED IN BASIC CABINET	1 5.25" drive DC/DC converter DCA 512/36 Signals cable Power cables	HDU 7051
300 MB HARD DISK, ESDI INTERFACE INTEGRATED IN BASIC CABINET	1 5.25" drive DC/DC converter DCA 512/36 Signals cable Power cables	HDU 8067

A.1.4 MAGNETIC PERIPHERALS FOR M64 AND M70 MOUNTED IN SB1 UNITS

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
EXPANSION CABINET	Expansion cabinet	CAB 7019
1 MB 8" FLOPPY DISK SUBSYSTEM	FDU Control G0280/D 1 XG 6030 drive DC/DC converter DCA 524/36 Signals cable Power cable	FDS 7033
20 MB STREAMING TAPE SUBSYSTEM	Boards G0200/B & G0342 1 XU 1130 drive DC/DC converter DCA 524/36 Signals cable Power cable	STS 6420
SET OF PARTS FOR THIRD AND FOURTH HDU AND FIRST AND SECOND SHARED HDU WITH ESDI INTERFACE MOUNTED IN SB1 IN SB1 (CAB 8093)	Set composed of: .Rear panel .Disk platter .Grill .LS 10 power supply .Remote powered mains box	SET 8051
70 MB HDU WITH ESDI INTERFACE INTEGRATED IN SB1 (CAB 8093)	.5.25" drive .Power cable .Data cable	HDU 8072
140 MB HDU WITH ESDI INTERFACE INTEGRATED IN SB1 (CAB 8093)	.5.25" drive .Power cable .Data cable	HDU 8071
300 MB HDU WITH ESDI INTERFACE INTEGRATED IN SB1 (CAB 8093)	.5.25" drive .Power cable .Data cable	HDU 8073
DUAL PORT KIT FOR SHARED, ESDI INTERFACE HDU IN SB1 (CAB 8093)	Dual port board	KIT 8039
CONSOLE FOR DUAL PORT (CAB 8093)	Console Cables	CDP 8068

A.1.5 PERIPHERAL UNITS FOR M64 AND M70 MOUNTED IN SB2 UNITS

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
EXPANSION CABINET FOR LARGE SIZE PERIPHERALS	Cabinet with remote switch-on device A.C. mains power distribution	CAB 7018
SMD CONTROL FOR 60/120 MB HARD DISK	2 Boards G0301/A G0302/A	HDC 3527
60 MB HARD DISK FIRST DRIVE	XU 1700 drive Power supply Cables Cassette	HDU 7061
60 MB HARD DISK SECOND DRIVE	XU 1700 drive Power supply Cables	HDU 7062
120 MB HARD DISK FIRST DRIVE	XU 1703 drive Power supply Cables Cassette	HDU 7063
120 MB HARD DISK SECOND DRIVE	XU 1703 drive Power supply Cables	HDU 7064
DUAL PORT FOR 60/120 MB HDU	Casing Electronic board Keys Signals cables	SET 7069
SMD CONTROL FOR 275 MB HARD DISK	2 Boards G0301/A G0302/A	HDC 7075
275 MB HARD DISK FIRST DRIVE	275 MB drive Power supply Cables Cassette	HDU 7065
275 MB HARD DISK SECOND DRIVE	275 MB drive Power supply	HDU 7066
CABLES FOR DUAL PORT FOR 275 MB HDU	Cables	CBL 7093
7040 MB MTU CONTROL	GO 278/B board	MTC 3543
40 MB MAGNETIC TAPE UNIT	XU 1705 tape unit Power supply Signals cable	MTU 7040

A.1.6 MODULES FOR WORKSTATIONS FOR M64 AND M70

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
KEYBOARD/DISPLAY CONTROL mono/trivalent for DSM 3605/19/15/16 display	GO 252 board Cable	KDC 3341
GRAPHIC EXPANSION MODULE	GO 255/A board	MEG 3354
9" DISPLAY, alphanumeric trivalent	Display - Filter Tilting base	DSM 3619
15" DISPLAY, alphanum., B/W, tiltable	Display with tilting base - Filter	DSM 3615
15" DISPLAY, alphanum. and graphic green monochrome, tiltable	Display with tilting base Non-glare screen	DSM 3616
SECURING/SPACER RING for 15" display	Ring	SET 1245
ADAPTER UNIT (connects display & keyb.)	Adapter box with: - IF141 board - Power supply	ELB 1381
ADAPTER UNIT (can connect: display, keyboard, badge reader, pin pad, two serial peripherals)	Adapter box with: - GO 269 board - Power supply	ELB 1382
CONNECTION CABLE between Adapter Unit and Central Unit	15 m. cable 25 m. cable 50 m. cable 100 m. cable	CBL 2614 CBL 2624 CBL 2649 CBL 2698

MODULE DESCRIPTION	**COMPOSITION**	**'PROGETTO GESTIONE'**
MULTIPLEXER CONTROL 4-way	GO 322 board Signals distribution box Cable	MUX 7089
MULTIPLEXER CONTROL for remote workstations	GO 322/R board Signals distribution box Cable	MUX 7091
WORKSTATION alphanumeric, mono-chrome, can connect: display, multi-function keyboard, two serial peripherals, options board for pin pad and badge reader	Box BA 126 board Power supply Keyboard-display cable ELB mains cable Display mains cable	ELB 3683
WORKSTATION alphanumeric, mono-chrome, remote if required, with setting for virtual displays. Can connect: display, multifunction keyboard, two serial peripherals, options board for pin pad and badge reader	Box BA 126 board Power supply Keyboard-display cable ELB mains cable Display mains cable	ELB 3684
OPTIONS BOARD for pin pad and badge reader (fitted on ELB 3683/3684)	GO 329 board	EXF 3686
C.L. BRANCH CABLE FOR ELB 3683	10 m. cable	CBL 7090
SERIAL INTERFACE CABLE for connect-ion of modems/peripherals to MUX 7089/7091 with female connector on peripheral side	Cable	CBL 3378
SERIAL INTERFACE CABLE with male connector on peripheral side to be connected to D-BOX	3 m. cable	CBL 3379

A.1.7 M64 SPECIFIC LINE CONTROLLERS

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
V24 REMOTE INTERNAL/EXTERNAL LINE CONTROL	GO 300 board 3 m. modem cable	LPU 3376
MOIN 5.2 INTEGRATED MODEM FOR LPU 3376	IF192 board Cable	LTU 3339
LION 9.6 INTERNAL LINE CONTROL	GO 333 board Cables	LCU 3397
X21 EXTERNAL LINE CONTROL	GO 303 board Cable	LCU 3326

A.1.8 SPECIFIC M64 AND M70 LINE CONTROLLERS

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
REMOTE V24 + V24 LINE PROCESSOR UNIT	GO 331 board Cables	LPU 3348
INTEGRATED MODEM MOIN 5.2 FOR LPU 3348	IF192 board Cable	LTU 3395
V24 + LION 200 LINE PROCESSOR UNIT	GO 340 board Cables	LCU 3390
V24 + LION 9.6 LINE PROCESSOR UNIT	GO 340/A board Cables	LCU 3398
CABLE FOR UNATTENDED OPERATION	Cable	CBL 7094
OMNINET LOCAL NETWORK CONTROL	GO 308 board 2.5 m. cable ETS 2040 label ETS 2060 label	LCU 3345
ETHERNET INTERNAL LINE CONTROL	GO 212/A board	LCU 3323
DROP CABLE (Ethernet line)	5 m. cable 10 m. cable 20 m. cable 30 m. extension cable	CBL 3391 CBL 3392 CBL 3393 CBL 3394
STARLAN LOCAL NETWORK CONTROL	GO431 board	NCU 9115
INTEGRATED CONNECTIVITY BOX	C-Box with cable	C-BOX9129

KEYBOARDS DESCRIPTION	**'PROGETTO GESTIONE'**
Alphanumeric + functions (S.T. with BASIC verbs)	ANK 1426
Alphanumeric + functions (a/c., business, data entry, D.P.)	ANK 1427
Alphanumeric + functions + 3 keys (D.P. terminals)	ANK 1428
Numeric + functions (D.P. terminals)	NKB 1435
Numeric + functions + 3 keys (D.P. terminals)	NKB 1436
Alphanumeric + functions, unified multifunction	ANK 1401
Alphanumeric + functions + unified multifunction keys	ANK 1402
Numeric + functions, unified multifunction	NKB 1405
Numeric + functions + unified multifunction keys	NKB 1406
Pin Pad (with 1.5 m cable)	PIN 1440

A.1.9 CABLES FOR AUXILIARY PERIPHERAL UNITS

CABLE DESCRIPTION	**'PROGETTO GESTIONE'**
CABLE, single channel, RS232, female connector on periph. side	CBL 2657
CABLE, twin channel, RS232, female connector on periph. side	CBL 2658
CABLE, adapter for PR3300/3600 and read/write modules (cm. 50)	CBL 2661
CABLE, single channel, with male connector on periph. side	CBL 3657
CABLE, twin channel, RS232 with male connector on periph. side	CBL 3658
CABLE, adapter for non-STD 13 peripherals (10 cm.)	CBL 3349
CABLE, MODEM extension	CBL 3558
CABLE, single channel, TTL	CBL 2659
CABLE, twin channel, TTL	CBL 2660
RS 232 C interface static switch	MSW 3369

A.1.10 MODULES AVAILABLE ONLY FOR UPGRADING

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
KIT FOR UPGRADING FROM M64 TO LSX 3000 AT 16 MHZ	.CPU board UC03068 with 4 MB .Cable for TTY/DEBUGGER	KIT 6480
FLOATING POINT 16 MHZ	Floating point coprocessor	FAU 8096
KIT FOR UPGRADING FROM M70 TO LSX 3000 AT 16 MHZ	.CPU board UC068 .2 MB TCM board	KIT 7080
CABLE FOR M64 CPU AND SSM BOARD CONNECTION	2 Cables	CBL 6418
NO-GLARE FILTER FOR 9" MONOCHROME DISPLAY	Packs of 10 units	FIL 3659
NO-GLARE FILTER FOR 15" MONOCHROME DISPLAY	Packs of 10 units	FIL 3665
NO-GLARE FILTER FOR 9" MONOCHROME DISPLAY	Packs of 10 units	FIL 3659
NO-GLARE FILTER FOR 15" DISPLAY	Packs of 10 units	RET 3617

A.1.11 EXTRACT FROM 'PROGETTO DI GESTIONE' RELATING TO SYSTEM INSTALLATION MODULES

MODULE DESCRIPTION	COMPOSITION	'PROGETTO GESTIONE'
CONNECTORS FOR CURRENT LOOP CONNECTION M64 AND M70	For connection of peripherals/products other than ELB 3683/3684 (packs of 50 units)	SET 9019
JUNCTION-BOX FOR CURRENT LOOP	Pack of 8 units	TBX 9020
JUNCTION-BOX FOR LION/OMNINET NETWORKS		TAP 1070
LINE DISCHARGER FOR LION/OMNINET NETWORKS		LSS 9021
OMNINET REPEATER		RPT 9022
TRANSCEIVER BOX FOR ETHERNET LINE		SET 3364

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L1 - L2

ELB 3684

General Service Manual

olivetti

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L1 - L2

ELB 3684

General Service Manual

olivetti

PREFACE

This manual is intended for technicians who service the ELB 3684 work station in field.

SECTOR/RANGE: B1

PRODUCTS: M54, M64

SECTOR/RANGE: B2

PRODUCTS: M70, M80

SUMMARY

The manual is divided into five chapters as follows:

Chapter one sets out the peripherals which can be connected to the ELB 3684 work station.

Chapter two describes the work station based on the ELB 3684.

Chapter three describes the ELB 3684 diagnostics and set-up.

Chapter four describes the installation, assembly and disassembly of the parts making up the ELB 3684.

Chapter five contains the mechanical spare parts catalogue.

REFERENCES:

M34-M44-M54: Service Manual	Code 4105740 T (0)
M64-M70/2/3: Service Manual	Code 4111190 Q (0)
M80: Service Manual	Code 4114030 N (0)
L1: Hardware Architecture	Code 4102210 Z (0)

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1. INTRODUCTION

1.1 OVERVIEW

Work stations based on the electronic box ELB 3684, comprising display, keyboard and options (pin pad, badge reader, printer, etc.) have been defined for L1 and L2 systems with MOS operating system. The following figure shows a work station based on the ELB 3684.

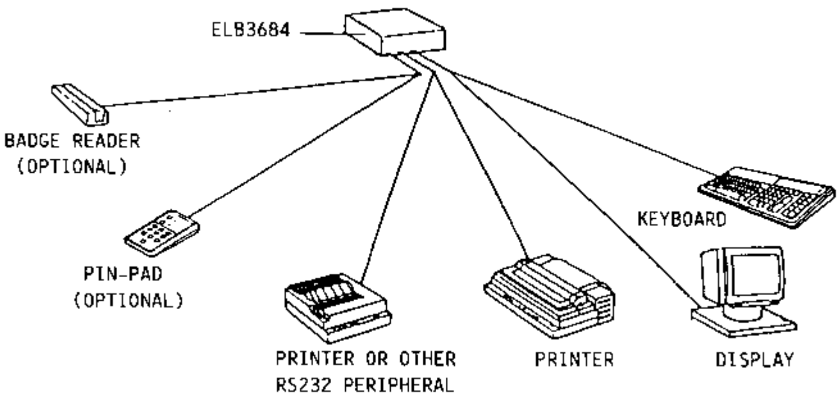


Fig. 1-1 Work Station Based on ELB 3684

The WS based on the ELB 3684 conforms to the interface requirements of L1 and L2 systems (in MOS environment only).

This manual describes the various modules making up the ELB 3684 and the system set-up and also contains the procedures for installing the work station in accordance with its distance from the host system.

The work station is housed in a self-standing box (dimensions 364x100x284), and contains a power supply, control circuits on a multilayer board and an optional expansion board for optional banking peripherals.

The following figure shows a front view of the ELB 3684 electronic box.

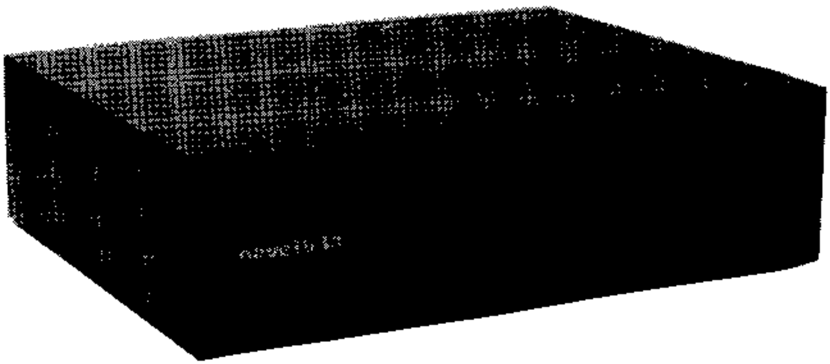


Fig. 1-2 ELB 3684 Electronic Box

The box has the following structure:

- A sheet metal base, with a back panel and two side panels to support the motherboard and the power supply

- The power supply box in sheet metal with cover

- A front panel in resin which is secured to the cover

- Metal cover over the whole system

The ELB 3684 circuitry consists of a motherboard and an optional peripherals expansion board. The motherboard is a multilayer printed circuit board of 770 cmq (22.86 by 33.655) with the following features:

- **PROCESSOR** : Uses an 8-bit Z80A CPU with an operating frequency of 3.6864 MHz (machine cycle 271 ns)

- **MEMORY** : The memory is made up of ROM, NOVRAM and RAM and contains the WS control programs and display data

- **MAIN LINE:** WS/host computer asynchronous serial communication line (V24 - RS232C for remote connections via modem and Current Loop for 4-wire direct connection for distances of up to 1 Km)

- **AUX1/AUX2 LINES:** Two identical auxiliary RS232C asynchronous serial lines for connection with peripherals such as printers, endorsers, etc.

- **KEYBOARD INTERFACE:** The keyboard interface is of the asynchronous serial type and is handled by the other channel of the main line.
  The electrical interface is TTL and the connection is full duplex with a fixed frequency of 1200 baud.
  The output is on the same terminal strip as the display.

- **DISPLAY CONTROLLER:** Only handles alphanumeric monochrome monitors.

The functions implemented are the same as for a standard TTY (VT 100) extended to handle the connection of peripherals.

1.2 PERIPHERALS WHICH CAN BE CONNECTED TO THE ELB 3684

This section lists the peripherals which can be connected to the work station based on the ELB 3684; refer to the specific manuals for information on the technical characteristics of the individual peripherals.

1.2.1 KEYBOARDS

The following unified multifunctional keyboards are compatible with the WS based on the ELB 3684:

- ANK 1401 alphanumeric + functions
- ANK 1402 alphanumeric + functions + switch keys
- NBK 1405 numeric + functions
- NBK 1406 alphanumeric + functions + switch keys

1.2.2 DISPLAYS

The following displays are compatible with the work station:

- DSM 3605 5" alphanumeric monochrome
- DSM 3619 9" alphanumeric monochrome
- DSM 3605 15" alphanumeric monochrome

1.2.3 PERIPHERALS

The following peripherals can be used with the work station:

- ML 700
- CA 2000
- Other peripherals with RS232 interface conforming to the work station specifications

2. WORK STATION BASED ON THE ELB 3684

Work stations with the following components have been defined for L1 systems:

- Multiplexer (MUX) controller
- D-BOX distribution box
- ELB 3684 electronic box
- Current loop/RS232 connection line
- T-BOX galvanic isolation box (TBX 9020)

This chapter contains a description of the work stations based on the ELB 3684 as a function of their distance from the host system. Particular attention will be paid to the cables used to connect the ELB with the host and with the peripherals supported.

2.1 SYSTEM/ELB 3684 CONNECTING CABLES

The WS (ELB 3684) is connected to the system controller (MUX) by a series of cables which depend on the system and type of connection used. The following figure shows the various ways of connecting a MUX controller and a work station via ELB.

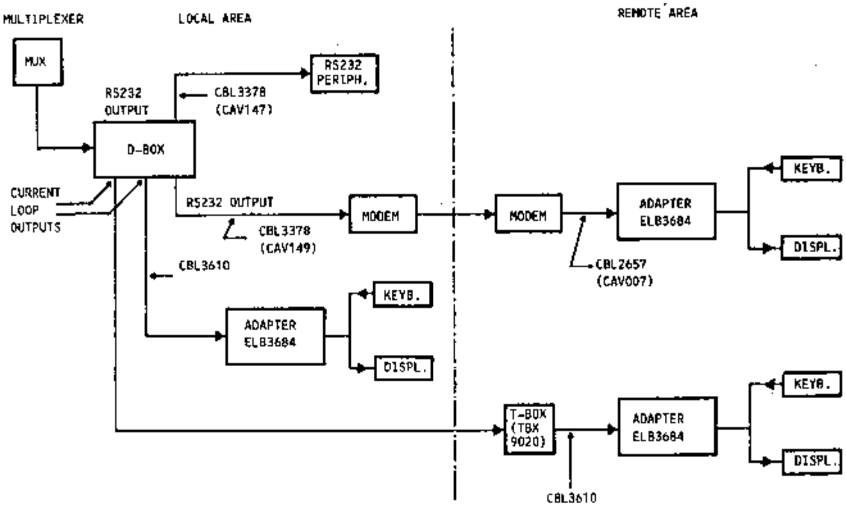


Fig. 2-1 Ways of Connecting MUX Controller and ELB

2.1.1 D-BOX FOR L1 SYSTEMS

The D-BOX is used to connect four L1 system I/O channels numbered from 1 to 4 in the following way:

- 2 and 4 always used for Current Loop type connections
- 1 and 3 can be configured on the MUX board for Current Loop or RS232 operation

There are two versions of the D-BOX for L1 systems:

- D-BOX (Code no. DBX3389) for M54 systems and old lines (M30/34, M40/44 and M60)
- New D-box for M64 and M70 systems

The two versions of the D-BOX are shown in the following figure.

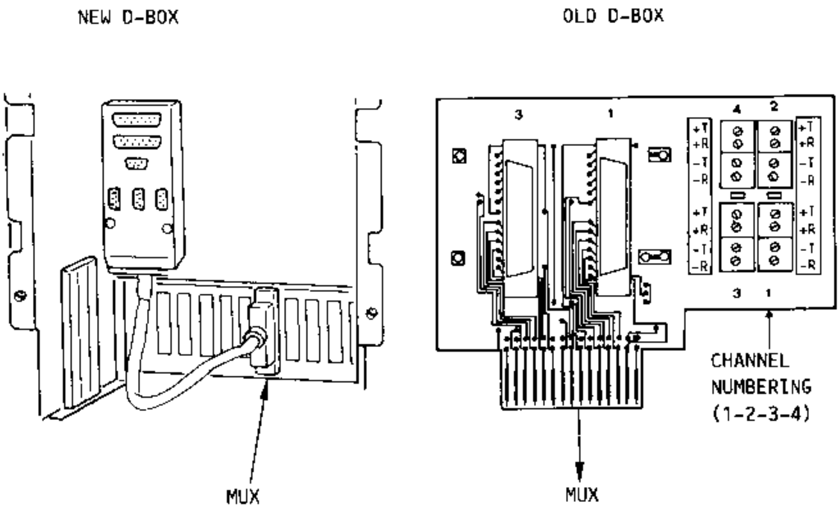
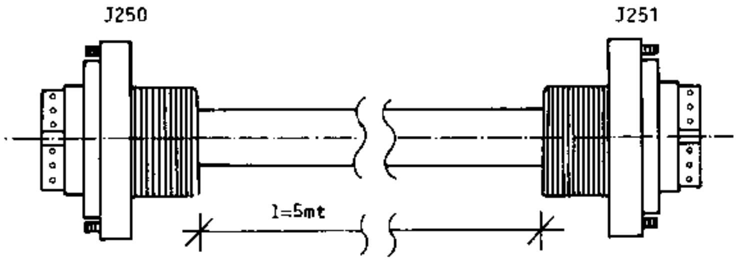


Fig. 2-2 View of the Two D-BOXes Used in L1 Systems

2.1.2 MUX BOARD AND D-BOX CONNECTION FOR M54 SYSTEMS

The MUX is connected to the D-BOX for M54 systems and systems with old lines via a Y-cable (max. length 5 m) code no. 963225 Y, and two TWIN LEAF connectors. The cable is attached symmetrically to the two connectors; the following figure shows the MUX signals connection, the cable and the way it is inserted in the connector.



(CABLE WITH SYMMETRICAL SIGNALS)

Ⓐ REFERENCE

2	RXD1B	VE/AZ	BI/NE	RXD1A	1
4	COM10	GI	VI/RS	TXD1A	3
6	RTS12	GR	BI/BL	RXR11	5
8	DSR13	NE	MA	CTS13	7
10	DCD13	RS/MA	AZ	DTR12	9
12	RXD2B	GI/NE	GI/BL	RXD2A	11
14	TXD2B	GR/NE	RS/BL	TXD2A	13
16	M	VE/NE RS/NE	GR/BL GI/RS	M	15
18	RXD3B	BI/VE	BL/NE	RXD3A	17
20	COM20	RA	VE/RS	TXD3A	19
22	RTS32	RS	BI/VI	RXR31	21
24	DSR33	BL	VE	CTS33	23
26	DCD33	BI	AR	DTR32	25
28	RXD4B	BI/RS	AR/NE	RXD4A	27
30	TXD4B	VI	GI/VE	TXD4A	29

LOWER PLATE

J250-J251 TWIN LEAF CONNECTORS (CONNECTION TO BOARD)

Fig. 2-3 MUX Board/D-BOX Connection for M54 System

2.1.3 MUX BOARD AND D-BOX CONNECTION FOR M64 AND M70 SYSTEMS

The MUX is connected to the D-BOX by a cable approx. 30 cm long which is prepared with the D-BOX. It is connected in the same way as the D-BOX for M54.

2.1.4 D-BOX AND ELB 3684 CONNECTION

To connect the D-BOX and ELB via current loop at a distance of less than 10 m using the cable CBL 3610, code no. 111176 R, the following conditions must be respected:

```
 -------         CABLE CBL 3610          -------
| D-BOX |<------------------------>|  ELB  |
 -------                                 -------
```

D-BOX	ELB	COLOUR OF WIRE
+T	R+	WHITE/BROWN
+R	T+	WHITE
-T	R-	RED/WHITE
-R	T-	BLACK/WHITE

The following figure shows the cable and the connections to be performed on the TWIN LEAF connector (ELB side).

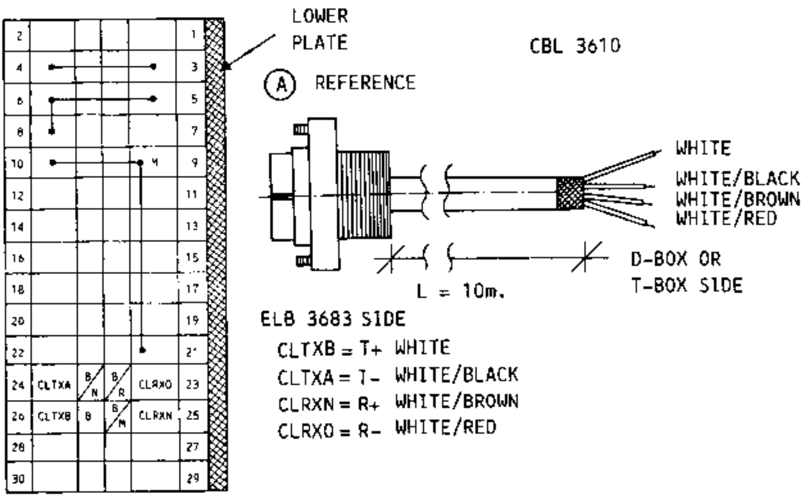


Fig. 2-4 Cable and Connector for Current Loop Connection

On the D-BOX side, the connection is performed according to the system used, as explained below.

For M54 systems and systems with old lines (M30/34, M40/44 and M60), the D-BOX cable wires are connected directly to the D-BOX terminal strip (in the relevant channel of the four present), using the previous table as reference.

For M64 and M70 systems, the D-BOX cable is connected via the 9-way D-shell connector according to the procedures shown in the following figure, and inserted in one of the four Current Loop connectors present on the D-BOX depending on the channel concerned.

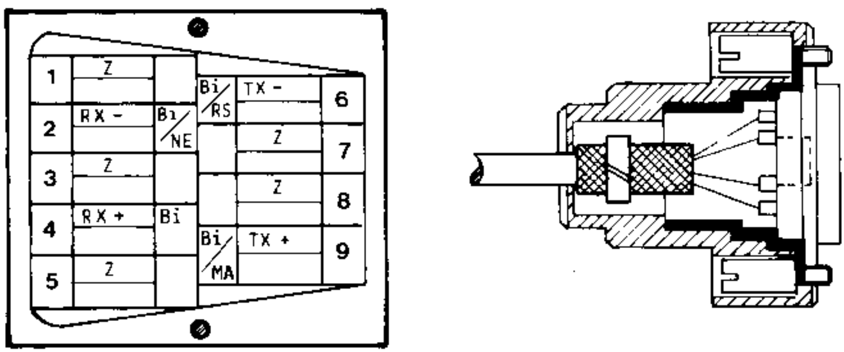


Fig. 2-5 9-way D-shell Connector and Relative Cable Connections

2.1.5 CURRENT LOOP CONNECTION BETWEEN D-BOX AND ELB VIA T-BOX

A T-BOX is inserted in remote connections of more than 10 m and in places where there is no potential difference between the ELB 3684 and the D-BOX grounds.
The T-BOX has the double function of galvanic isolator of the grounds of the two devices and of line junction between cable CBL 3610 (code no. 111176 R) and the 4-pole shielded cable AWG 24 (code no. 5731315 Q), for connection with the D-BOX.
The cable used to connect the D-BOX and the T-BOX can be up to 1 Km long, and is available from 'Gestione ricambi' in 500 m coils.
The interconnections of the four wires from the ELB 3684 to the T-BOX are shown in the following table.

T-BOX TERMINAL	CABLE CBL 3610
+T	R+ WHITE/BROWN
+R	T+ WHITE
-T	R- WHITE/RED
-R	T- WHITE/BLACK

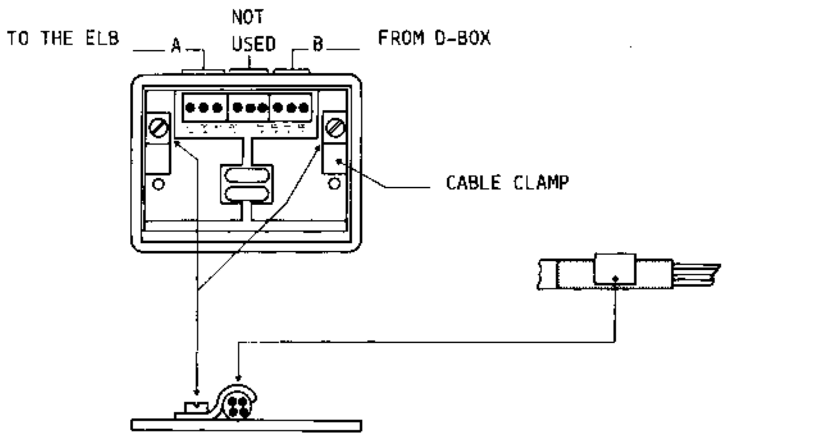


Fig. 2-6 Mounting the T-BOX

It should be noted that the T-BOX has two groups of four terminals each, for connection to ELB and D-BOX: the choice of group is irrelevant, as the T-BOX is perfectly symmetrical.
The interconnection between D-BOX and T-BOX requires the same conditions as with the ELB, which are summed up in the figure overleaf.

```
---------                                 ---------
|       |      current loop line cable    |       |
| D-BOX |<------------------------------->| T-BOX |
|       |                                 |       |
---------                                 ---------
```

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

2.1.6 RS232C CONNECTION BETWEEN D-BOX AND ELB VIA MODEM

For connections greater than 1 Km, the system MUX is connected to the ELB 3684 via RS232 with modem. The following figure shows the connection between D-BOX and ELB 3684 via modem.

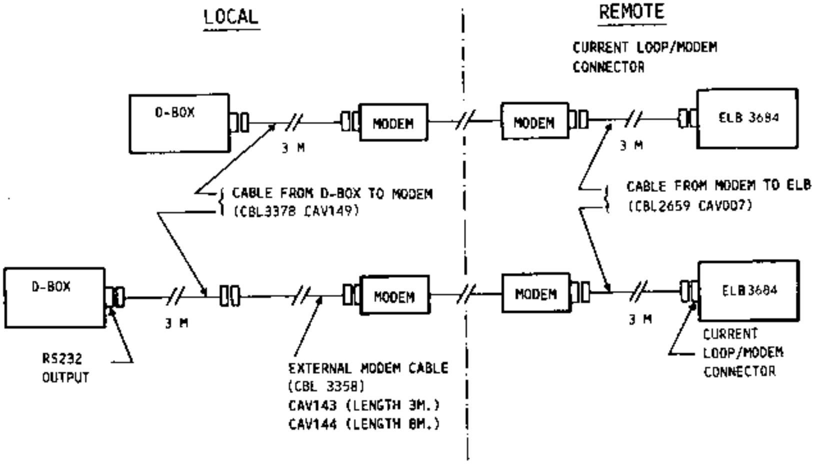


Fig. 2-7 D-BOX and ELB 3684 Connection via Modem

The cable connecting the local modem to the D-BOX is the CBL 3378 cav 149 (code no. 337011 R), which is 3 m long. The distance between D-BOX and modem can be increased by means of cable extensions available in two lengths: the CBL 3358 cav 143 (code no. 336520 X) which is 3 m long and the CBL 3358 cav 144 (code no. 336520 X) which is 8 m long. It should be remembered that the maximum distance between the modem and modules handling the RS232C interface, in this case the MUX board G0322 and the ELB 3684, is 15 m.

The connecting cable from the ELB 3684 to the remote modem is the CBL 2659 cav 007 (code no. 335132 M) which is 3 m long.

Connections with the RS232C interface are effected in conformity with the EIA standard with the following signals:

Description	EIA symbol	CCITT symbol	Signal name	Direction
Protective ground	AA	101	-	-
Transmitted Data Tx	BA	103	LITXD	OUTPUT
Received Data Rx	BB	104	LIRXD	INPUT
Request to send RTS	CA	105	RTS1N	OUTPUT
Clear to sent CTS	CB	106	CTS1N	INPUT
Data set ready DSR	CC	107	RI11N	OUTPUT
Signal ground	AB	102	M	-
Rec.line sign. detec. DCD	CF	109	DCD1N	INPUT
Data terminal ready DTR	CD	108	DTR1N	OUTPUT

2.2 INSTALLATION OF SIGNAL CABLES FOR WORK STATION

The signal cables must not be installed near to high voltage electrical equipment which may cause damage.

The most common sources of interference are:

- Lighting installations
- Power and distribution generators such as transformers, alternators and motors (air conditioners, lifts, fans)
- Radio and TV transmitters
- Signal generators, intercommunication and alarm devices

Interference on the cables can also be caused by the length of the lines which run parallel to the source of interference.

The following table shows the minimum distance between the cable and the source of interference.

MAINS DISTRIBUTION	MINIMUM DISTANCE BETWEEN CABLE AND SOURCE OF INTERFERENCE
Less than 2KVA	0.10 m
From 2KVA to 5KVA	0.30 m
More than 5KVA	0.50 m

When the cross-over is 90^{o}, the minimum distance must not exceed 0.10 m, and the cable must be protected from mechanical stress. If the cable is installed vertically, it must be anchored to supports, at a maximum of 1 m apart.

Important Notes:

1. In order to make servicing easier, one work station must be installed within sight of the box or cabinet. This work station is used as system console; information on the operation of the entire system will be sent to it during the diagnostic phase.

2. If a work station without ELB is connected, the alternating power is supplied to the display directly by the box or cabinet. In other cases it is supplied by the ELB.

2.2.1 EXTERNAL STRETCHES OF CABLE BETWEEN BUILDINGS

The ELB line is only internal. There is no provision for external cables, but some installations may require small stretches of cable outside the building. If this is the case, the following measures must be taken to protect the cables from atmospheric discharges.

1. Cable ducts at least 30 cm underground.

2. Overhead lines in shielded metal tubes connected to ground at both ends.

   The metallic section of the tube must be at least 50 mmq (tube with diameter greater than or equal to 19 mm) and it should be connected to ground with a cable of diameter 35 mm (as for lightning rods).
   This ensures good ohmic continuity at low impedance for all sections of the tube.

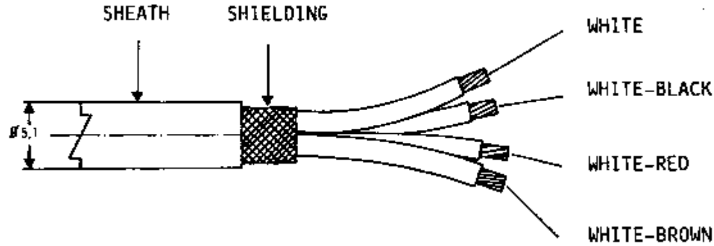
The normal procedures for waterproof electrical installations should be carried out for both underground and overhead lines.

2.2.2 CURRENT LOOP CABLE

This is a 4-pole flexible shielded cable, composed of four wires in electrolytic tinned annealed copper, insulated and inserted in copper shielding and covered in a grey insulating sheath.

CHARACTERISTICS

Electrolytic copper	: Cu - ETP UNI 5649
Resistance	: 0.017094 ohm x mm /m
Style	: 2448
Approval	: UL



Impedance 20 KHz	110 Ω
Attenuation 20 KHz	0,5 dB/100m
Capacity 20 KHz	95 pF/m
Resistance	84Ω/Km
Percenting of shielding	≥80%

Fig. 2-8 Current Loop Cable AGW 24

If the Current Loop cable is to have junctions, use of 4-way shielded male-female cylindrical connectors of the AMPHENOLDI type (code no.: Female 141857 S - Male 5783212 N) is recommended.

The cable wires should be soldered to the respective pins of the connector and the ground shield connected to the shielding.

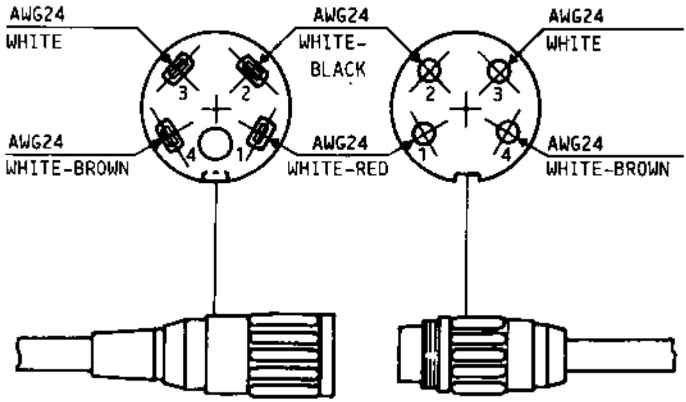


Fig. 2-9 Current Loop Cable AGW 24 Junction

Note: The Current Loop cable can have a maximum of 10 junctions.

2.3 ASSEMBLY AND DISASSEMBLY OF THE D-BOX

For M64 and M70 systems the D-BOX is mounted with two screws on the specific frame at the back of the basic system cabinet.

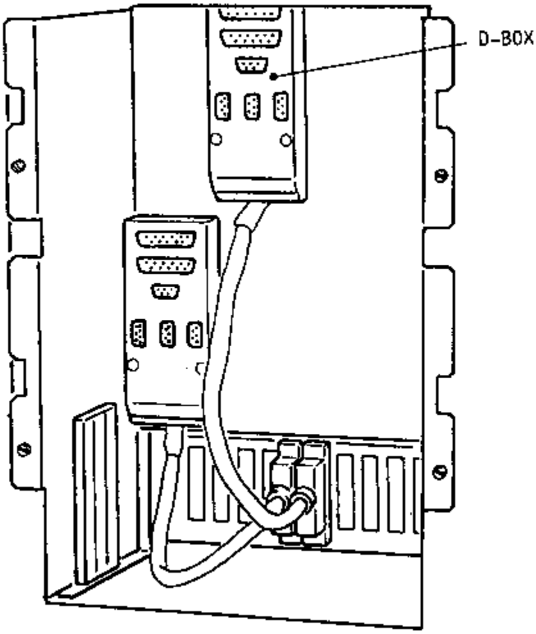


Fig. 2-10 D-BOX Frame on M64 and M70 Systems Basic Cabinet

For M54 M30/34, M40/44 and M60 systems, the D-BOX must be placed near the L1 system and should be secured to a wall or the floor at a maximum of 4 m.
Two slots are accessed by lifting the D-BOX cover, which is held in place by interlocking tabs. It is not necessary to remove the interference shielding, but the connector covers protecting the male Cannon connectors must be removed.

To secure the D-BOX, make two holes with 102 mm between centres and a diameter appropriate to the type of washer used. The diameter of the mounting screws should be 3.2 mm.

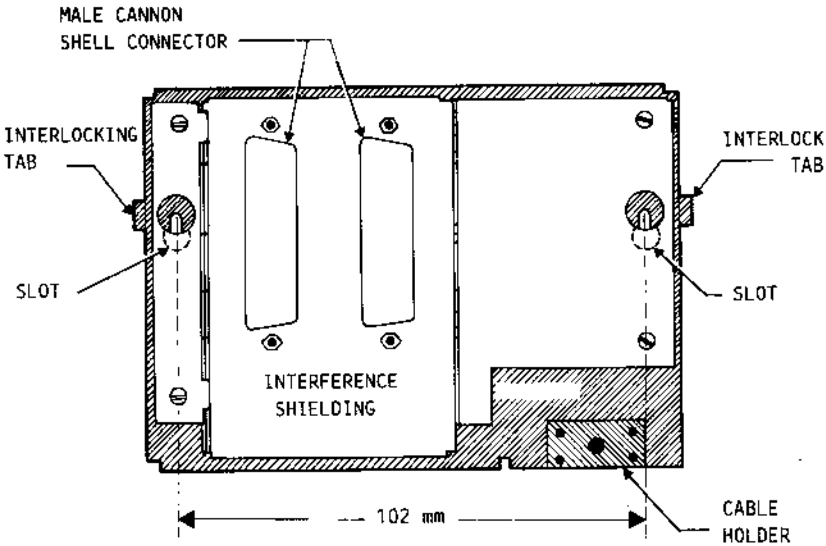


Fig. 2-11 D-BOX for M54, M30/34 M40/44 and M60

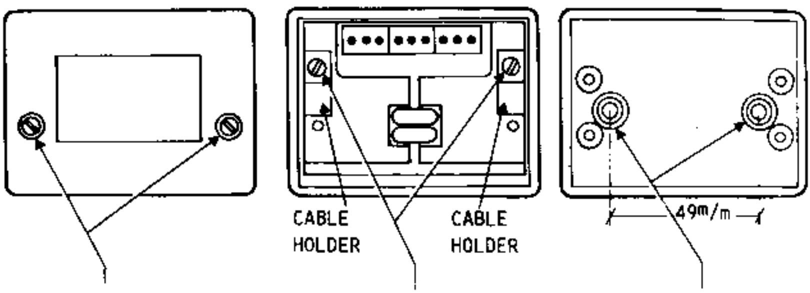
2.3.1 ASSEMBLY AND DISASSEMBLY OF THE T-BOX

The T-BOX should be placed at a maximum of 10 m from the ELB 3684 and secured to the wall or floor with twist-lock screws.
The diameter of the holes for the screws is 4.5 mm and the distance between the centres is 49 mm.
The T-BOX can only be secured by removing the cover and then removing the printed circuit as shown in the following figures.

T-BOX WITH COVER

T-BOX BASE WITH PRINTED CIRCUIT

T-BOX BASE



SCREWS TO UNDO TO REMOVE THE COVER

SCREWS TO UNDO TO REMOVE PRINTED CIRCUIT AND CABLE HOLDERS

T-BOX MOUNTING SCREWS

Fig. 2-12 Disassembling the T-BOX

2.4 REMOTE ELB 3684 WITH ERROR CONTROLLERS OR STATIC MULTIPLEXERS

Due to the high number of errors on the connection lines between the L1 system and ELB 3684 WS connected asynchronously via MUX-MODEM, it has been necessary to introduce devices to check and recover these errors.

These devices, the ERROR CONTROLLERS and STATIC MULTIPLEXERS, greatly reduce the number of errors by using the appropriate line protocols.

It should be noted that the introduction of these devices to the line does not create any restrictions on the type of line or modems for remote L1 work stations, as shown in the following table:

TYPE OF LINE	NO. OF WIRES	TYPE OF MODEM	BAUD RATE (bps)
LEASED/PRIVATE	4	V 23	600/1200
LEAS/SWTCH/PRIV	2	V 22	1200
LEAS/SWTCH/PRIV	2	V 26 bis	2400
LEAS/SWTCH/PRIV	2	V 26 ter	2400
PRIVATE	4	B. BASE	UP TO 19200

Note: The modems used must be of the controlled carrier type so that the system can be switched off and on via the remote device or remote DCE line.

The following Olivetti products allow "error free" connection:

MUX: MUX 3688 (for old type L1 systems and M54) with new firmware
MUX 7089 (for new type L1/L2 systems) with new firmware

ELB 3684: for L1 and L2 systems.

The introduction of the new firmware on the MUX controller has created the following limitations on lines 0 and 2:

1. The WS cannot support Current Loop connection as this feature has been eliminated to make space in EPROM for the relative coding of the modifications required for connection in remote mode;

2. The WS cannot be connected in remote mode via the MODEM alone.

The modifications on the new MUX controller boards allow the following connections:

	NEW MUX BOARD	EXISTING MUX BOARD
LINE 0	Local WS via RS232 C Remote WS controlled	Local WS via RS232 C Local WS in Current Loop
LINE 1	Local WS in Current Loop	Local WS in Current Loop
LINE 2	Local WS via RS232 C Remote controlled WS	Local WS via RS232 C Local WS in Current Loop
LINE 1	Local WS in Current Loop	Local WS in Current Loop

In order to connect the WS and the MUX, the WS should be set via SET-UP (MPLEX YY) as remote in controlled mode. The WS and MUX can be connected in direct mode, i.e., local without MODEM, or in remote controlled mode.

2.4.1 DIRECT MODE CONNECTION

Direct mode connection between MUX and WS is effected by using preformed cable CBL 339 as shown below:

```
      CONNECTOR J217                CONNECTOR J218
      (25-way female)               (25-way female)

           ----                          ----
Prot.Gr.  | 1  |--------------------| 1  |  Prot.Gr.
          |----|                    |----|
      TX  | 2  |--------------------| 3  |  RX
          |----|                    |----|
      RX  | 3  |--------------------| 2  |  TX
          |----|                    |----|
          |    |                 ---| 6  |  DSR
     RTS  | 4  |----------------|   |----|
          |    |                 ---| 8  |  DCD
          |----|                    |----|
     CTS  | 5  |--------------------| 20 |  DTR
          |----|                    |----|
Sig. Gr.  | 7  |                    | 7  |  Sig.Gr.
          |----|                    |----|
     DSR  | 6  |--------------------|    |
          |----|                    | 4  |  RTS
     DCB  | 8  |--------------------|    |
          |----|                    |----|
     DTR  | 20 |                    | 5  |  CTS
           ----                          ----
```

- J127 is connected to the D-BOX

- J128 is connected directly to the WS cable connector

The cable used to connect the WS to the adapter (CBL 3349) is CBL 2657 cav 007.

2.4.2 REMOTE CONTROLLED MODE CONNECTION

The MUX/WS connection in remote mode using an error controller or static multiplexer is shown below:

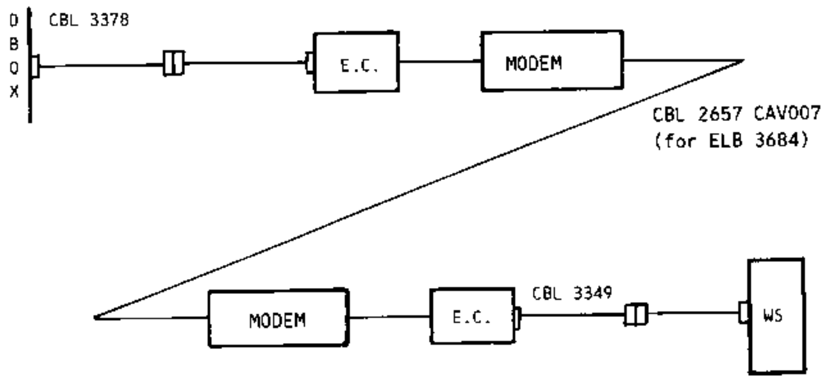


Fig. 2-13 MUX/WS Connection Diagram

2.4.2.1 Characteristics Required by the Static Multiplexers and Error Controllers

The devices selected to connect the WS in remote mode via MUX with error controllers must satisfy the following characteristics:

Data Flow Control

Data Flow Control is handled by signals CTS/DTR, where:

- Signal CTS controls the state of the device receive buffer.
  CTS OFF (logic level 0) signifies request to stop DTE data transmission.
  CTS ON (logic level 1) signifies request to restart DTE data transmission.

- Signal DTR controls the state of the DTE receive buffer.
  DTR OFF (logic level 0) signifies request to stop local device data transmission.
  DTR ON (logic level 1) signifies request to restart local device data transmission.

Signal DTR Handling

Signal DTR OFF/ON is driven by the local DTE, and the signal status is sent by the devices on channel CTS of the remote DTE, so that as well as stopping/starting local device transmission, transmission of the remote DTE to the remote device can also be stopped/started.

Signal RTS Handling

The status of signal RTS is driven by the local DTE, and sent via the line carrier signal DCD of the remote DTE.

This causes the following:

- DCD off (logic level 0) signifies DCEs on, devices on and remote DTE on.
  If one of the two DTEs, devices or DCEs is switched off, the data buffers of both devices must be cleared.

- DCD ON (logic level 1) signifies DCEs on, devices on and remote DTE on.
  The devices must only transmit the data received from when the DTEs/devices/DCEs are switched on again.

Signal DSR Handling

Signal DSR carries information on the condition of the device, as follows:

- DSR OFF (logic level 0), signifies local device off.

- DSR ON (logic level 1), signifies local device on.

BREAK Status Handling

The status of BREAKs, if present on the data line, following specific handling by the protocol between the two DTEs (MUX and WS), must be completely transparent to the devices in question.

Character Format

The character must be made up of 8 bits plus one parity bit.

NOTE: If the error controller or static multiplexer device satisfies the interface characteristics described, the connection can be effected without the adapter cable CBL 3349.

3. DIAGNOSTICS AND SET-UP

This chapter describes the operations of the WS ELB 3684: at power on (autodiagnostics), or on request by the user in LOCAL mode, the ELB 3684 tests the following:

- Correct operation of the WS itself
- Correct operation of the peripheral devices connected. It also defines the operating parameters (SET UP).

This chapter also describes how the diagnostic results are indicated, on the display and keyboard (LEDs)

3.1 OPERATING MODES

The WS has a switch (see figure 3-1) at the back of the box, which the operator can use to select the operating state:

1. LOCAL: the operator can access LOCAL TEST and SET UP procedures
2. ON LINE: once the autodiagnostics tests have completed, the WS is available for communication with the host.

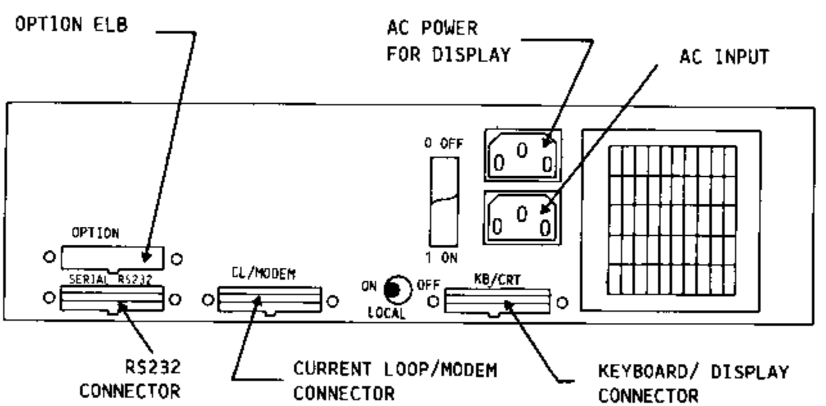


Fig. 3-1 Back View of the ELB 3684

3.1.1 LOCAL MODE

When the ELB 3684 is powered up, the status of the switch is sampled. If it is in LOCAL, the operator can select the following from the menu:

- To execute local tests of the peripherals connected, to test internal operation (diagnostic loopback on serial lines) and to display the contents of the memories. The results are displayed on the screen or indicated on the keyboard LEDs.

- To execute the SET UP procedures. A menu is provided, and the user can modify the variable parameters (such as the serial line parameters) previously set and stored in NOVRAM. This operation may be followed by a STORE in NOVRAM if required. In this case, the new parameters are stored in non-volatile memory and are valid each time the WS is powered up. If the operation is not stored, the parameters are only valid for the current session.

At the end of these operations, the user can then turn the switch to ON LINE. The machine carries out the necessary modifications, reinitializes the channels, recompiles the diagnostic string and is then ready ON LINE.

3.1.2 ON LINE MODE

When in ON LINE mode, the system executes the autodiagnostics off line, initializes the channels according to the contents of the NOVRAM, compiles the diagnostic string and then connects to the line and is ready for communication.

The WS cannot pass from this state to LOCAL unless it is switched off and then on again.

3.2 AUTODIAGNOSTICS

When the WS is switched on, an autodiagnostic program is started up. The following tests are executed:

- ROM test

- RAM test

- NOVRAM read in RAM area

- Diagnostic string initialization

- Keyboard serial controller test

- CTC timer_counter test

- NOVRAM RAM test

- Display RAM test

- Display logic test
- SIO serial controllers test, with local loopback for pairs of lines
- Keyboard and PIN PAD initialization and diagnostic results
- End of diagnostic string compilation

A red LED can be seen on the front of the WS box. This LED comes on at power up and goes off when the autodiagnostics have completed successfully, otherwise it remains lit.

As the display remains off during test execution, the sequence of tests is indicated by the keyboard LEDs, which follow a pattern starting with all LEDs on.

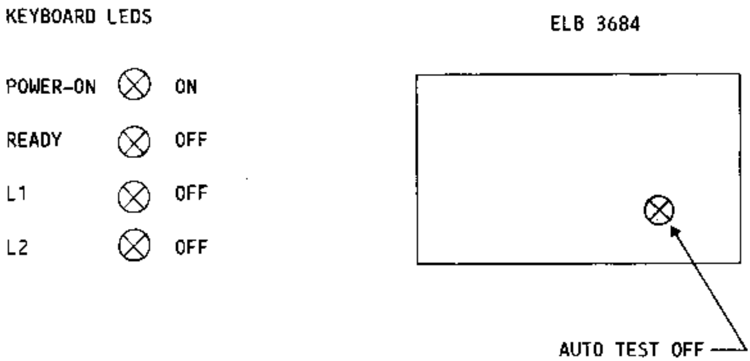


Fig. 3-2 LEDs Indicating State of Autodiagnostics

The table below shows the status of the LEDs according to the diagnostic test being executed.

TEST NO.	TYPE OF TEST	LEDS READY	L1	L2
1	ROM test	1	1	1
2	RAM test	1	1	0
3	Keyboard serial line test	1	0	1
4	Timer-counter CTC test	1	0	0
5	NOVRAM RAM test	0	1	1
6	Video RAM test	0	1	0
7	Video logic test	0	0	1
8	Serial lines test	0	0	0

The end of the test is indicated by a beep, and one of the following situations is then verified:

- The result of the test is positive, thus the diagnostic string is compiled; the Host can request this with a specific command to service channel #0 or it can be displayed in local mode.

- The result of the WS diagnostic tests go automatically into a loop and the error is indicated on an available output device.

- The result of the test gives a non-blocking error, thus the machine can either work ON_LINE or in LOCAL mode, and the error is reported in the diagnostic string.

In all cases, the sequence of the tests is scanned by the keyboard LEDs with rotating configurations until the first error is detected: from this point the configuration of the LEDs remains the same even if there is an automatic recycle due to a blocking error.

In this case a beep is emitted at the end of each test cycle.

If the WS is in LOCAL, the results, positive or negative, are summed up on the display in the following way:

The result is: OK

If the test completes successfully, the LEDs must all be off and the following message is displayed at the end of the test:

```
-----------------------------------------
|                                        |
| ELB3684 ROM X/Y      LOCAL             |
|                                        |
| SET UP               <                 |
|                                        |
| LOCAL TEST                             |
|                                        |
| WS AUTO TEST = OK                      |
|                                        |
|                                        |
-----------------------------------------
```

The message "WS AUTO TEST = OK" is displayed in reverse video.

After this test it is possible to go on directly to SET UP or to LOCAL TEST by pressing the SKIP key. The selected environment is activated by pressing the ENTER key.

The result is :FAULT

If an error is detected during the test, one of the following situations occur:

If the error is of the blocking type, the test remains in the diagnostic phase, recycling indefinitely with the emission of a BEEP at the end of each cycle: the configuration of the keyboard LEDs (if present) remains the same.

If an error is detected in the display sync logic, which compromises monitor operation, the display signal is not enabled and thus the system cannot function in LOCAL mode; the switch must be turned to ON LINE in order to use the system, but the display cannot be used. The configuration of the keyboard LEDs informs the operator of this.

If the tests continue and the WS functions normally:

- The first error detected is indicated by the keyboard LEDs, the configuration of these LEDs shows which test has generated the error
- The test continues and terminates with the message FAULT on the display and the list of errors:

```
 ----------------------------------------
|                                        |
| ELB3683 ROM X/Y      LOCAL             |
|                                        |
| SET UP              <                  |
|                                        |
| LOCAL TEST                             |
|                                        |
| WS AUTO TEST = FAULT                   |
|                                        |
| XX  XX  XX  XX  XX  XX  XX  XX  XX  XX |
|                                        |
|                                        |
 ----------------------------------------
```

Row 5 contains the data on 10 bytes on the status of the autodiagnostics. Bytes 2 to 11 are released to the host on channel zero after the autodiagnostics, by means of the relevant command.

The following information is contained in each byte:

BYTE	TEST
1	GO-NO-GO
2	ROM
3	System RAM
4	Display RAM
5	Not assigned
6	NOVRAM
7	Display and type of display
8	CTC
9	Serial I/O controller and options present
10	Keyboard and presence of serial devices

Note: The bytes which contain an error are displayed blinking.

3.3 SET UP

The SET UP operation is performed in LOCAL mode, and is used to define the WS operating parameters.

It is an interactive operation whereby the operator uses a menu to introduce the new parameters via the keyboard. The operation is in two phases:

1. Introduction of new parameters

2. Validation of parameters

The SET UP operation writes the information provided by the operator into a non-volatile memory device (electrically modifiable). This component, known as NOVRAM, is composed of two memory planes, the first non-volatile, the second made up of the normal RAM. At power_on, the non-volatile part is automatically transferred onto the RAM part which can be read and written to by the WS program. The contents of the RAM can be transferred into the non-volatile NOVRAM by a STORE command. The NOVRAM is typically used instead of the traditional hardware jumpers due to its greater flexibility.

The NOVRAM has a capacity of 64 nibbles, equal to 256 bits.

NOTE: Particular attention should be paid to the STORE procedure, as the number of writes that can be made in the non-volatile part of the NOVRAM is limited to 1000.

3.3.1 STORE

The STORE operation is used to make modifications permanent. It is made up of two distinct phases (see SET UP operating procedures):

- STORE request

- Execution

If the NOVRAM is OK, the store request gives a Warning on the display with the number of STOREs which can still be executed. The request is refused if STORE NUMBER = 000.

Execution of the STORE procedure writes the modification permanently; the STORE NUMBER is decreased and the SET UP session is closed.

When a STORE is executed on a virgin NOVRAM, it has the following characteristics:

- It can be effected at the end of the autodiagnostic test in production (before packing), or in field when the NOVRAM is replaced.
- All the parameters are programmed (some by the program itself).
- It always terminates with an unconditional STORE.

The WS program must be able to tell that the NOVRAM is virgin, thus two bytes of the NOVRAM are reserved for a non-accessible signature. By probing this signature, the program can sense if the NOVRAM is to be written to for the first time, and can thus present a SET UP menu complete with the static information to be written.

3.3.2 NOVRAM CONTENTS

The following is a definition of the information/parameters contained in the NOVRAM.

byte 0 = NOVRAM STORE NUMBER (least significant digit in BCD)

byte 1 = NOVRAM STORE NUMBER (most significant digit in BCD)

byte 2 = identifies type of WS (in Hex)
ELB 3683 = 01H
ELB 3684 = 02H

byte 3 = WS hardware release number (in Hex)

The next 10 bytes are relative to the SET UP of the serial lines:

- HOST serial line
- AUX A serial line
- AUX B serial line
- AUX C serial line (the two bytes 10 and 11 are only significant if the option is present)
- AUX D serial line (as for AUX C)

byte 4 ::= byte 6 ::= byte 8 ::= byte 10 ::= byte 12

The format of a byte is shown below:

```
                                                  |7. . . | . . .0|
                                                  ----------------
                                                   | | | | | | | |
                                                   | | | | | | | |
                                                   ------- | | | |
                                                      |    --- | |
<baud rate>-------------------------------------------'     |  ---
<number of bits>--------------------------------------------'   |
<parity>--------------------------------------------------------'
```

<baud rate>	0000 = synchronous mode
	0001 = 50 bps
	0010 = 75
	0011 = 110
	0100 = 134.5
	0101 = 150
	0110 = 200
	0111 = 300
	1000 = 600
	1001 = 1200
	1010 = 1800
	1011 = 2400
	1100 = 4800
	1101 = 9600
	1110 = 19200
<number of bits>	00 = 5 bits
	01 = 6
	10 = 7
	11 = 8
<parity>	00 = no parity
	01 = odd parity
	10 = no parity
	11 = even parity

byte 5 ::= byte 7 ::= byte 9 ::= byte 11 ::= byte 13

The format of a byte is shown below:

```
                                    |7. . . | . . .0|
                                    ----------------
                                     | | | | | | | |
                                     --- | | | | | |
                                      |  | | | | | |
<number of stop bits> ----------------'  | | | | | |
hard copy printer = OLIVETTI ------------' | | | | |
hard copy printer present ----------------' -------
                                                |
                                                |
don't care -------------------------------------'
```

```
<number of stop bits>    00 = synchronous mode
                         01 = 1 stop bit
                         10 = 1.5
                         11 = 2
```

The next byte contains information on the type of character generator mounted in the WS and the programming of the visual attributes at screen level, selected by the SET UP.

byte 14 ::= <contents displayed>

The format of the byte is:

```
        byte 14             |7. . . | . . .0|
                            ----------------
                             | | | | | | | |
                             ------- | | | |
                                |     --- | |
<Type of character generator ROM>---'    |  | |
<Cursor type>----------------------------'  | |
Reverse screen -----------------------------' |
Enable hide char. ----------------------------'
```

```
<Type of character generator ROM> ::= 0000 PK3Z (multifunctional)
                                      0001 PK3Y (multif. extended)
```

```
<Cursor type> ::= 00 = underscore not blinking
                  01 = underscore blinking (default)
                  10 = reverse display block not blinking
                  11 = reverse display block blinking
```

The next byte is expressed in BCD and is used to program (in minutes) the display switch-off time, after which the display is automatically switched off when not in use.

This time can be programmed from 00 to 99 minutes. The default is zero minutes, i.e., the option is not selected.

This timer is reset at the next operation displayed.

byte 15 ::= display OFF time code (in BCD)

byte 16 ::= type of keyboard and national version

```
byte 16 ::= 7 6 5 4 3 2 1 0
            | | | | | | | |
            ----- | | | | |
              |   ---------
<type >-------'       |
                      |
<national version>----'
```

```
<type> ::= 000  ANK 1401, ANK 1402, ANK 1405, ANK 1406
                unified multifunctional (default)
           001  All other types

<national version> ::= 00000  Germany
                       00001  Portugal
                       00010  Spain
                       00011  Denmark
                       00100  France
                       00101  Italy
                       00110  Norway
                       00111  Sweden Finland
                       01000  Great Britain
                       01001  USA ASCII (default)
                       01010  Swiss German
                       01011  Swiss French
```

Bytes 17 to 29 are reserved for future use.

bytes 17 - 29 ::= (reserved for future use)

The final two bytes contain the NOVRAM signature.

byte 30 ::= NOVRAM signature lower byte (C3H)

byte 31 ::= NOVRAM signature upper byte (A5H)

3.3.3 SET UP OPERATING PROCEDURES

As described previously, the SET UP feature used in LOCAL mode allows the variable WS operating parameters to be initialized/modified.

Interactive use of the WS in LOCAL mode only concerns a portion of the display equal to 7 rows of 40 characters (the first 40 characters of rows 1 to 7 for the 15" display; the odd rows for the 5" and 9" displays) and to the "numeric + functions" section of the keyboard, which is assumed to always present.

The part of the keyboard to use is shown in the following figure.

```
-------------------------------------------------------
| F9  | F10 | F11 | F12 | F13 | F14 | F15 | F16 | F18 |
|     |     |     |     |     |     |     |     |     |
| F1  | F2  | F3  | F4  | F5  | F6  | F7  | F8  | F9  |
|=====|=====|=====|=====|=====|=====|=====|=====|=====|
|     |     |     |     |HALT |     | F20 | IL  | DL  |
|  /  |  *  |  -  |  +  |     |EXIT |     |     |     |
|     |     |     |     |PGM  |     | F19 | IC  | DC  |
|=====|=====|=====|=====|-----|=====|=====|=====|=====|
|     |     |     |     |     |     | F22 |     |     |
|CLEAR|  7  |  8  |  9  |     |     |     ||<-- | -->||
|     |     |     |     |     |     | F21 |     |     |
|=====|=====|=====|=====|     |SKIP |=====|=====|=====|
|     |     |     |     |     |     | F24 |  ^  |  |  |
|  ,  |  4  |  5  |  6  |     |     |     |  |  |  |  |
|     |     |     |     |     |     | F23 |  |  |  v  |
|=====|=====|=====|=====|     |=====|=====|=====|=====|
|     |     |     |     |     |     | F26 |     |     |
|  .  |  1  |  2  |  3  |     |     |     |<--- | --->|
|     |     |     |     |     |     | F25 |     |     |
|===========|=====|=====|     |ENTER|=====|=====|=====|
|           |     |     |     |     | F28 |HD CP|     |
|     0     | 00  | 000 |     |     |     |     |HOME |
|           |     |     |     |     | F27 |CH WN|     |
-------------------------     -------------------------
```

Layout of the Part of Keyboard to be Used

The STORE procedure differs according to whether the NOVRAM has been written to at least once, or whether it is virgin (the program knows the NOVRAM is virgin when there is no signature).

3.3.4 STORE PROCEDURE ON VIRGIN NOVRAM

If the program detects that there is no signature, the NOVRAM must be completely and unconditionally written at the end of the SET_UP operations.

The contents which can be written by the operator are displayed on the screen in two phases; the first presents the static or private WS information, the second provides information relative to the variable parameters which affect physical operation of the channels.

Phase 1

The menu of phase 1 is accessed in the following way:

- Turn the LOCAL operating mode selection switch to ON
- Turn the power switch to ON
- Wait for the results of the autodiagnostics (the following step can only be performed if the auto test gives the OK result)
- Press the ENTER key to select the SET UP (from the autodiagnostics menu)
- Wait for the phase 1 menu to be displayed

The phase 1 menu has the following format:

```
column  1234567890123456789012345678901234567890
        ----------------------------------------
       |                                        |
       | ELB 3684 ROM X/Y   LOCAL     SET UP A  |
       |                                        |
       | 02 XXXXXXXX        <                   |
       |                                        |
       | 03 XXXXXXXX                            |
       |                                        |
       | 16 XXXXXXXX                            |
       |                                        |
       | 17 XXXXXXXX                            |
       |                                        |
       | 18 XXXXXXXX                            |
       |                                        |
       | 19 XXXXXXXX                            |
       |                                        |
        ----------------------------------------
```

The menu is interpreted as follows:

- Columns 1 and 2 show the number of the NOVRAM byte to be initialized (refer to the section "CONTENTS OF THE NOVRAM" for the function of the byte)
- Columns 4 to 11 show the field to be initialized, with reference to the bytes indicated in columns 1 and 2, decoded into bits (refer to the section "CONTENTS OF THE NOVRAM" for the interpretation of the contents)

Press the SKIP key to go from one field to the next

At the end of phase 1, the menu to compile the functional parameters is then displayed (phase 2).

Phase 2

The display has the following format:

```
column 1234567890123456789012345678901234567890
        ----------------------------------------
        |                                      |
    1   | SERIAL H A B       LOCAL     SET UP B | 1
        |                                      |
    2   | SPEED = XXXXX      <                 | 3
        |                                      |
    3   | BIT   = X                            | 5
        |                                      |
    4   | PAR   = X                            | 7
        |                                      |
    5   | STOP  = X.X                          | 9
        |                                      |
    6   | MPLEX = XX                           | 11
        |                                      |
    7   | VIDEO = XXXXX XX                     | 13
        |                                      |
        ----------------------------------------
```

The menu is interpreted as follows:

- Row 1 shows the list of the RS232 serial lines to be programmed (H = common line for host)
- The selected line is shown in reverse video
- Lines C and D only appear in the menu if the double RS232 option (not currently available) is present
- Fields SPEED, BIT, PAR, STOP and MPLEX are shown with their default values if the NOVRAM is virgin, or with the current NOVRAM values
- When the up cursor key (Ω) is pressed, the values are incremented. Once the required value has been selected, press the SKIP key to go on to the next parameter of the same line
- When the selected line has been programmed, the right cursor key (-->) selects the next serial line to be programmed (the index in row 1 is shown in reverse video) and the cycle is repeated
- Once the lines have been programmed, when the SKIP key is next pressed the cursor goes to row 7, where the display parameters and the display switch-off time are programmed
- Another SKIP causes a return to the start of phase 1
- Pressing the EXIT key completes programming, recalls an unconditional STORE and displays the start menu (LOCAL) again.

NOTE: The recall of an unconditional STORE causes bytes 0 and 1 of the NOVRAM to be compiled with value 999 (decimal); these bytes indicate the residual number of STOREs which can be effected on the NOVRAM. The first time the NOVRAM is used, the signature is compiled by the two bytes 30 and 31 with values A5 and C3 (hex).

The current NOVRAM parameters are shown below as they are presented in the menus of the two phases; in phase 1 they are defined as private WS parameters and in phase 2 as variable parameters.

Private WS Parameters

3 fixed parameters are currently defined:

1. byte 02 = Identifies type of WS (02H for the ELB 3684)

2. byte 03 = WS hardware release number (binary)

3. byte 16 = type of keyboard and national version (binary)

```
byte 16 = 7 6 5 4 3 2 1 0
          |   | |       |
          ----- ---------
            |       |
<type>------'       |
                    |
<national version>--'
```

```
<type> ::= 000  ANK 1401, ANK 1402, ANK 1405, ANK 1406
                unified multifunctional (default)
           001  All others types
```

```
<national version>::= 00000  Germany
                      00001  Portugal
                      00010  Spain
                      00011  Denmark
                      00100  France
                      00101  Italy
                      00110  Norway
                      00111  Sweden Finland
                      01000  Great Britain
                      01001  USA ASCII (default)
                      01010  Swiss German
                      01011  Swiss French
```

The parameters of bytes 17, 18 and 19 are not assigned, but are available for other information which will then be included in the diagnostic string.

WS Variable Parameters

```
1  SPEED = XXXXX   baud rate (in decimal) from 50 to 19200 baud

2  BIT   = X       number of character bits (in decimal)
                   from 5 to 8

3  PAR   = X       parity bit (in ASCII)
                   N = no, E = even parity, O = odd parity

4  STOP  = X.X     number of stop bits (in decimal)
                   1.0, 1.5, 2.0

5  MPLEX = XX      type of connection with or without controllers

                   XX = NN Current Loop or RS232 connection
                   XX = YY connection with error controllers or
                           static multiplexers

6  VIDEO = XXXXX XX display attributes (in 5 bit binary) and
                    display switch-off time (in two digit BCD)
```

```
 display attributes and cursor format       XXXXX  00100 default
                                            |||||
<type of character generator ROM>-----------'||||
 0 = PK3Z (multifunctional)                  ||||
 1 = PK3Y (multif. extended)                 ||||
                                             ||||
<type of cursor>-----------------------------'|||
 1= reverse video block                       |||
 0= underscore                                |||
                                              |||
<Blinking Cursor>-----------------------------'||
                                               ||
<Reverse screen>-------------------------------'|
                                                |
<Enable hide char>------------------------------'
```

Number in BCD of minutes for display switch-off time XX default 00

3.3.5 NORMAL SET UP

This is the normal operation to modify parameters when the NOVRAM has already been initialized. It can be terminated with a STORE operation, that is, the parameters are made permanent and are valid each time the WS is power up, or with a NON STORE; in this case the parameters are only valid for the current session.

The menus and operation are identical to those described in the previous section (STORE PROCEDURE ON VIRGIN NOVRAM) except that in phase 2 of SET UP B, the store request is displayed on the screen.

```
 ------------------------------------------
|                                          |
| SERIAL H A B C D   LOCAL     SET UP B    |
|                                          |
| SPEED = XXXXX      <                     |
|                                          |
| BIT   = X                                |
|                                          |
| PAR   = X                                |
|                                          |
| STOP  = X.X                              |
|                                          |
| PRINT = XX                               |
|                                          |
| VIDEO = XXXXX XX       STORE?(1/0) XXX   |
|                                          |
 ------------------------------------------
```

- At the end of programming, the EXIT key activates the store request
- The message STORE is displayed blinking when the request is activated
- Pressing 1 executes the STORE, pressing 0 means the STORE is not executed
- The operation is followed by a numeric field indicating how many STOREs can still be performed
- If the number is 000 the store request is refused
- Pressing SKIP recycles SET UP B, EXIT returns to the start menu LOCAL

3.4 LOCAL TEST

If the WS is accessed in LOCAL, the operator has a set of keyboard commands with which to test the internal functions, in recycling mode if necessary, and also tests the operation of the main peripherals connected:

- Keyboard_display
- PIN PAD
- Card reader
- Auxiliary Devices

It is assumed that the results of all the tests have been displayed on the screen. The menu in LOCAL is shown below.

```
   ------------------------------------------------
  |                                                |
1 | ELB3683 ROM X/Y     LOCAL                      | 1
  |                                                |
2 | SET UP                                         | 3
  |                                                |
3 | LOCAL TEST         <                           | 5
  |                                                |
4 | WS AUTO TEST = OK                              | 7
  |                                                |
5 |                                                | 9
  |                                                |
6 |                                                | 11
  |                                                |
7 |                                                | 13
  |                                                |
   ------------------------------------------------
```

Press the SKIP key to move the cursor from the SET UP line to the LOCAL TEST line.

Press the ENTER key to go on to the LOCAL TEST, and thus to the following menu:

```
   ------------------------------------------------
  |                                                |
  | ELB3683 ROM X/Y     LOCAL     TEST             |
  |                                                |
  | EXTL               <                           |
  |                                                |
  | LOOP                                           |
  |                                                |
  | DVCS                                           |
  |                                                |
  | INFO                                           |
  |                                                |
  |                                                |
   ------------------------------------------------
```

A test (and thus the subsequent menu) is normally selected by using the SKIP key to move the cursor and the ENTER key to select the required test. As can be seen from the menu, the following tests can be executed:

- **EXTL**: The tests are accessed and recycled indefinitely with serial line loopback via loopback plugs on the external connectors
- **LOOP**: The same tests as EXTL with internal serial line loopback
- **DVCS**: Tests the connected peripherals
- **INFO**: The operator can request the contents of areas of the system memory to be displayed on the screen

3.4.1 EXTL

Once the test is selected, the following menu is displayed:

```
-------------------------------------------
|                                         |
| ELB3683 ROM X/Y     LOCAL    TEST  EXTL |
|                                         |
|                                         |
|                                         |
| TEST = X                                |
|                                         |
|                                         |
|                                         |
-------------------------------------------
```

- the message EXTL is displayed in reverse video
- the cursor appears on the field X to be compiled
- the number of tests to be run is entered
- the CLEAR key returns to the previous step
- the ENTER key starts test execution, and the test recycles indefinitely
- the HALT PGM key stops the test and recalls the LOCAL TEST EXTL menu
- the EXIT key returns to the previous menu (LOCAL TEST)

The list of tests which can be executed in recycling mode is shown below:

```
 X = 0 :  ROM test
     1 :  RAM test
     2 :  NOVRAM test
     3 :  Display RAM test
     4 :  Timer_counter CTC test
     5 :  Test of serial  line  dedicated  to  the  Host  (with  external
          loopback)
     6 :  Test of RS 232 serial line (with external loopback)
     7 :  Test of serial line dedicated to the PIN PAD TTL (with external
          loopback)
     8 :  Test of serial line dedicated to the CARD READER (with external
          loopback)
     9 :  All the tests (from test 0 to test 8 with return to test 0)
```

Tests 5, 6, 7 and 8 require an external loopback plug. The loopback plugs used in the tests are shown in the following tables.

LOOPBACK CONNECTOR FOR HOST IN CURRENT LOOP

The loopback plug is prepared by performing the following connections:

```
              CONNECTOR        CONNECTIONS
               -------
              |       |          from| to
              |-------|          ---------
              | 1   A |           1  | A
              | 2   B |           2  | B
              | 3   C |           3  | C
              | 4   D |           4  | C
              | 5   E |           5  | E
              | 6   F |           6  | F
              | 7   H |           7  | H
              | 8   J |           8  | J
              | 9   K |           9  | J
              |10   L |          10  | L
     Key -->  |-------|              |
              |11   M |              |
              |12   N |              |
              |13   P |              |
              |14   R |              |
              |15   S |              |
              |-------|          ---------
              |_______|
```

NOTE: The following components are required for the loopback connector:

- AAMP TWIN 15 x 2 connector (1)
  Olivetti code no. 5784851 Y

- Contacts (14), Olivetti code no. 5784860 Y

- AWG 24/28 cable
  Length: 8 connections (0.4 m)

- Key (1), code no. 334267 B

The cable must be cut with the relevant tool
AMP code no. 90277-1

LOOPBACK CONNECTOR CHANNELS A AND B IN RS232

The loopback plug is prepared by performing the following connections:

```
                 CONNECTOR        CONNECTIONS
                  -------
                 |       |         from| to
                 |-------|         ---------
                 | 1   A |          1  | A
                 | 2   B |          2  | B
                 | 3   C |          3  | C
                 | 4   D |          4  | C
                 | 5   E |          5  | E
                 | 6   F |          6  | F
                 | 7   H |          7  | H
                 | 8   J |          8  | J
                 | 9   K |          9  | J
                 |10   L |         10  | L
         Key --> |-------|             |
                 |11   M |             |
                 |12   N |             |
                 |13   P |             |
                 |14   R |             |
                 |15   S |             |
                 |-------|         ---------
                 |_______|
```

Note: The following components are required for the loopback connector:

- AAMP TWIN 15 x 2 connector (1)
  Olivetti code no. 5784851 Y

- Contacts (18), Olivetti code no. 5784860 Y

- AWG 24/28 stranded cable
  Length: 8 connections (0.4 m)

- Key (1), code no. 334267 B

The cable must be cut with the relevant tool
AMP, code no. 90277-1

LOOPBACK CONNECTOR FOR PIN PAD AND BADGE READER

The loopback plug is prepared by performing the following connections:

```
              CONNECTOR        CONNECTIONS
               -------
              |       |         from| to
              |-------|         ---------
              | 1   A |          3  | C
              | 2   B |          4  | H
              | 3   C |          5  | B
              | 4   D |          6  | S
              | 5   E |         10  | K
              | 6   F |          D  | E
              | 7   H |          F  | S
              | 8   J |          J  | L
              | 9   K |             |
              |10   L |             |
     key -->  |-------|             |
              |11   M |             |
              |12   N |             |
              |13   P |             |
              |14   R |             |
              |15   S |             |
              |-------|         ---------
              |       |
              |_______|
```

Note: The following components are required for the loopback connector:

- AAMP TWIN 15 x 2 connector (1)
  Olivetti code no. 5784851 Y

- Contacts (18), Olivetti code no. 5784860 Y

- AWG 24/28 stranded cable
  Length: 8 connections (0.4 m)

- Key (1), code no. 334267 B

The cable must be cut with the relevant tool.
AMP code no. 90277-1.

The following message is displayed on the screen during the test:

```
 ----------------------------------------
|                                        |
|                                        |
|                                        |
|                                        |
| WS AUTO TEST = OK                      |
|                                        |
|                                        |
|                                        |
|                                        |
|                                        |
|                                        |
 ----------------------------------------
```

The message WS AUTO TEST is in highlight and is displayed in a square. The message OK is in reverse video. The space between the 'T' and the '=' contains the character '?' with the hide attribute; as hide is enabled at screen level, this character is not visible.

This message appears on the screen at the end of each test loop selected by the operator and remains for a fraction of a second before being cancelled at the beginning of the next loop.

If an error is detected during the test, the following message is displayed:

```
 ----------------------------------------
|                                        |
|                                        |
|                                        |
|                                        |
| WS AUTO TEST = FAULT                   |
|                                        |
| XX XX XX XX XX XX XX XX XX XX          |
|                                        |
|                                        |
|                                        |
 ----------------------------------------
```

where the sequence XX represents the display of the 10 bytes indicating the result of the diagnostic tests; the tests that have failed are displayed blinking.

3.4.2 LOOP

The following menu is displayed:

```
 -------------------------------------------
|                                           |
| ELB3684 ROM X/Y     LOCAL     TEST  LOOP  | 1
|                                           |
|                                           | 3
|                                           |
| TEST = X                                  | 5
|                                           |
|                                           | 7
|                                           |
|                                           | 9
|                                           |
 -------------------------------------------
```

Operator intervention and the messages are the same as for the EXTL tests.

The tests are also the same as EXTL, with the difference that the serial lines are looped back internally. The lines can thus be tested with the cables connected.

3.4.3 DVCS

This environment activates the tests of the peripheral devices connected. The tests are of the simple type and are not repetitive.
The following menu is displayed with the message DVCS in reverse video:

```
 -------------------------------------------
|                                           |
| ELB3684 ROM X/Y     LOCAL     TEST  DVCS  |
|                                           |
|                                           |
|                                           |
|                                           |
|                                           |
|                                           |
|                                           |
|                                           |
|                                           |
 -------------------------------------------
```

Function keys F1, F2, F3 and F4 select on which peripheral channel to send the string of characters entered via the keyboard, as follows: (F1 -> AUX_A), (F2 -> AUX_B), (F3 -> AUX_C/BADGE), (F4 -> AUX_D/PIN_PAD).

The SKIP key handles the ASCII string as a channel command, while the ENTER key handles the string as DATA for the peripheral.

A control operation is performed on the maximum length of the data string introduced (displayed on the screen except for the function key which selects the target channel): commands longer than 10 are refused, and data strings longer than 64 are truncated.

Data strings received from the peripherals are displayed in full, including the part of the MUX/WS protocol, without any control of length, and so are the responses to commands received in loop from the channel handling driver to which the peripheral is connected.

As the coding of commands of the MUX/WS protocol requires codes greater than '9', the WS requires a full keyboard (not reduced) in order to be able to use all the features of the DVCS option.

The keyboard can be used to test the display, by sending sequences of data or commands according to the specifications of commands for the keyboard/display terminal.

The EXIT key causes the end of the test and the return to LOCAL TEST DVCS.

3.4.4 INFO

Press ENTER to activate the following menu:

```
-------------------------------------------
|                                         |
|                    LOCAL     TEST  INFO |
|                                         |
| NOVRAM             <                    |
|                                         |
| DIAG STR                                |
|                                         |
| CHAR GEN                                |
|                                         |
|                                         |
|                                         |
|                                         |
|                                         |
-------------------------------------------
```

This test allows specific memory contents to be displayed.

The SKIP key selects the option, and the ENTER key activates the option.

- NOVRAM: the whole contents of the NOVRAM (32 bytes) are displayed.

  The EXIT key recalls the LOCAL TEST INFO menu.

- DIAG STR: the whole diagnostic string is displayed as it was compiled when the WS was powered up or after modifications using the SET UP procedure.

  The EXIT key recalls the LOCAL TEST INFO menu.

- CHAR GEN: the contents of the character generator ROM are displayed. There can be two types of ROM: with 256 or 512 characters. With 256 characters, the single page is displayed on the whole of the available screen, and pressing key WN repeats the same page. With extended ROM, the key WN causes the ALTERNATIVE SET of characters to be displayed.

  The EXIT key recalls the LOCAL TEST INFO menu.

- A further EXIT returns to LOCAL TEST. A third EXIT causes a return to LOCAL.

To exit from local environment, the external switch must be turned to the ON LINE position.

4. INSTALLATION, ASSEMBLY AND DISASSEMBLY OF THE ELB 3684

This chapter is subdivided into four sections, each dedicated to a specific aspect of installation of the work station.

The first part consists in a brief introduction to preparing the site for system installation.

The second part deals with assembling and disassembling the ELB 3684.

The third section deals with the ELB 3684 power supply, while the last part is dedicated to the installation of the optional modules.

4.1 SITE PREPARATION

The conditions set out below should be followed to prepare the site for the WS and its peripherals.

Main Power Supply

Cables and switches must be of suitable dimensions to support the expected work load.
The ohmic resistance of the ground device must meet the requirements of the National Standard. A value of 50 Ohms is sufficient to protect from interference. The Italian standard ENPI requires not more than 20 Ohms for the protection of the operator.

Electrical Noise

The work station should be isolated from sourced of electrical noise and from equipment which may cause excessive variations in the voltage levels or which introduce heavy inductive or capacitive loads into the circuit.

However, some of the normal small office machines are allowed on the same line as an L1/L2 system work station, and it is also possible to connect several work stations to the same power mains, as long as each work station is plugged in separately.

Dust

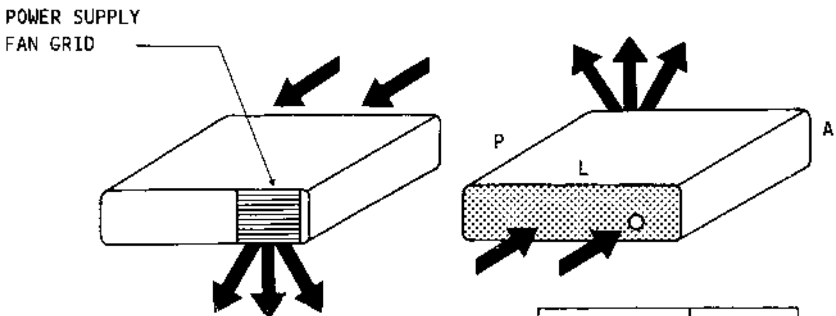
Work stations based on the ELB 3684 can be installed in a normal office with a maximum of 0.25 mg/mc of dust.
A high percentage of dust affects above all the badge reader, by reducing the useful life of the head.

Air Flow and Temperature

The ELB 3684 can be mounted on a table or on any surface which allows free circulation of air for the power supply. If there are limitations in air circulation due to the proximity of other units, the air flow through the ELB 3684 must not be less than 8 litres per minute, and the temperature must be within 10° C and 40° C.

Operating Area

All parts of the work station must be accessible for servicing and when several work stations are installed, the slots must not be obstructed or facing each other. The following figure shows the air flow slots on the ELB 3684.



HEIGHT	100 mm
LENGTH	364 mm
DEPTH	284 mm
WEIGHT	5.3 Kg

Fig. 4-1 ELB 3684 Ventilation

4.2 ASSEMBLY AND DISASSEMBLY

4.2.1 REMOVING AND REMOUNTING THE ELB 3684 COVER

The cover of the ELB 3684 is removed in the following way (refer to figure 4-2):

- Switch the system off
- Undo the two screws of the cover (ELB connector panel) and leave them in the panel
- Remove the cover by pulling it in the direction indicated by arrow A and then lift it up as shown by arrow B.

Replacing the Cover

- Insert the tabs on both sides of the ELB 3684 (front) in the corresponding grooves on the cover and push the cover into place
- Replace and tighten the cover screws

Note: Before replacing the cover, ensure that the cover and chassis grounds are in place.

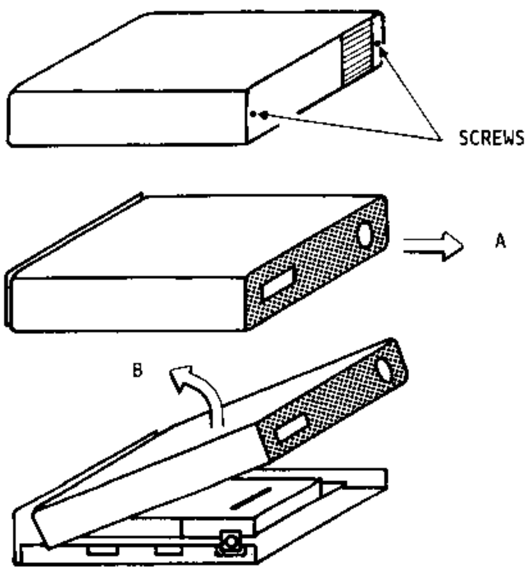


Fig. 4-2 Removing the ELB 3684 Cover

4.2.2 REPLACING THE FUSE

There is a current limiting fuse mounted in the power supply at the AC current input of the ELB 3684. This section describes the procedure to replace this fuse.

- Switch the system off.

- Remove the cover of the ELB 3684 (see section 4.2.1).

- Remove the cover of the power supply; figure 4-3 shows how it is secured

- Remove the fuse (see figure 4-4) and replace it with a new fuse (1.6 A for the 220 Volt version and 2.5 A for the 110 Volt version).

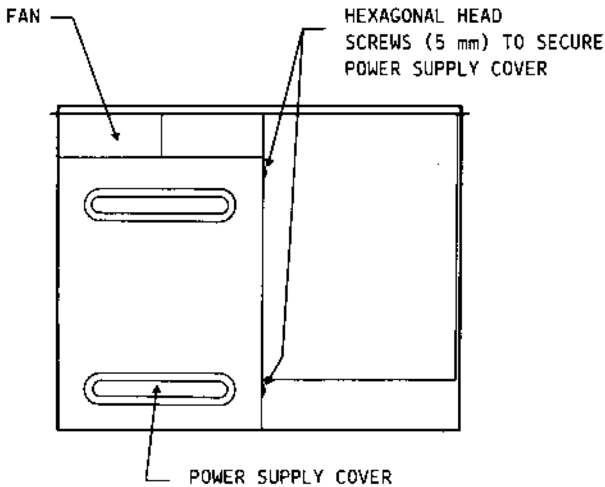


Fig. 4-3 Internal View of the ELB 3684

4.3 ELB 3684 POWER SUPPLY

The power supply group is made up of a metal structure containing the electronic board (power supply-mains filter) and the AC mains distribution.

The power supply is of the switching type, and is known as the ALI LG03 (see figure 4.5). It is available in the following versions:

1. With power voltage 110 V: in this case the power supply must have a 2.5 A slow fuse (6 x 32 mm), jumper A should be open, jumper B closed and the cooling fan operating at 110 V

2. With power voltage 220 V: in this case the power supply must have a 1.6 A slow fuse (5 x 20 mm), jumper A should be closed, jumper B open and the cooling fan operating at 220 V

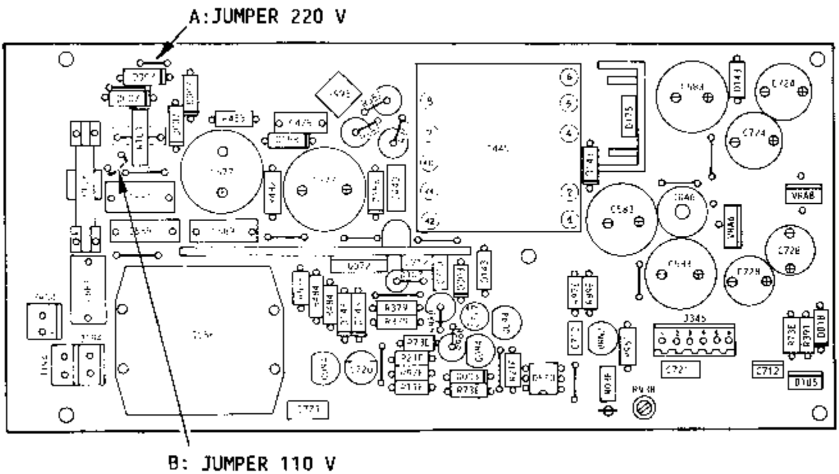


Fig. 4-4 Power Supply Board ALI LG03

4.3.1 ALI LG03 INPUT CHARACTERISTICS

The electrical input characteristics for the LG03 power supply for the work station based on the ELB 3684 are listed below:

110 V Version: AC input 100 V nominal (+10%, -15%); 110 V nominal (+10%, -15%); 115 V nominal (+10%, -15%); or 120 V nominal (+10%, -15%).
The voltage variability field is thus 85 -132 V, and its insensitivity to mains failures is 100% for 0.5 cycles and 30% for 25 cycles with reference to the minimum nominal voltage.
Frequency 50/60 Hz normal (from 47.5 to 63 Hz).

220 V Version: AC input 220 V nominal (+10%, -15%) or 240 V nominal (+10%, -15%).
The voltage variability field is thus 187 -264 V, and its insensitivity to mains failures is 100% for 0.5 cycles and 30% for 25 cycles with reference to the minimum nominal voltage.
Frequency 50/60 Hz normal (from 47.5 to 63 Hz).

Power absorbed by the mains in the two versions is 50 VA.

4.3.2 ALI LG03 OUTPUT CHARACTERISTICS

The electrical output characteristics of the LG03 power supply are shown below with the load limits:

VOLTAGE [V]	TOLERANCE	Imin. [A]	Imax [A]
+ 5	+/- 2.5	3.0	4.5
+12	+/-10.0	0.085	0.3
-12	+/-10.0	0.0	0.3

4.3.3 CONTROL OF POWER VOLTAGES

The following figure shows the points at which to measure the output voltage (+5 V, +12 V and -12 V).

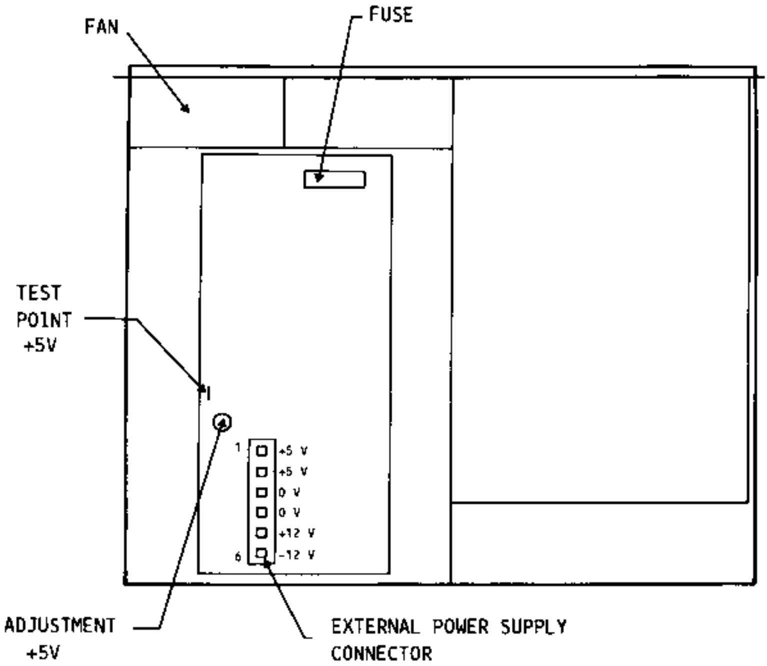


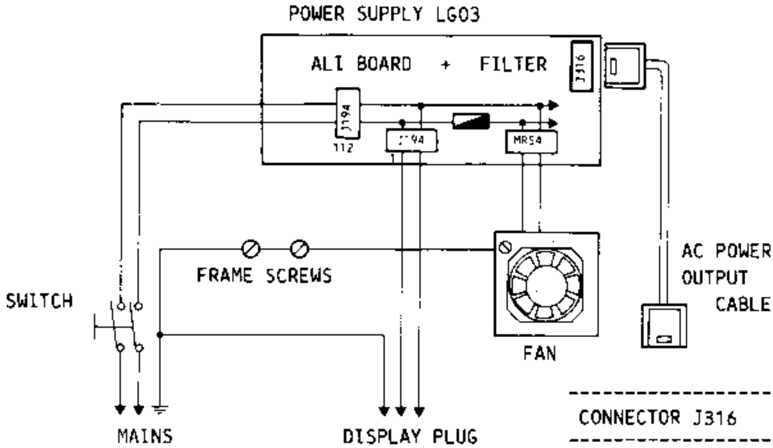
Fig. 4-5 Power Supply LG03 - Output Voltage Test Points

The output voltages are regulated in production and thus should not need to be adjusted. However, if the voltage values are out of tolerance, they should be adjusted using the potentiometer shown in the previous figure (figure 4-5).

4.3.4 MAINS GROUP

The following figure shows the AC distribution for the work station based on the ELB 3684.

Note: The mains distribution requires an input plug, a switch and an output socket for display power supply.



CONNECTOR J316

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

Fig. 4-6 AC Distribution for the ELB 3684

4.4 OPTION INSTALLATION

An optional board (GO 329) can be mounted to handle banking peripherals of the bichannel type (one for the pin-pad and one for the badge).

The board is supported by the motherboard with columns and connection to the Z80 bus is via a cable with insulating perforations.

The two electrical interfaces for pin-pad and badge are both of the TTL type, the output to the two units is on the same terminal strip.

Communication of the pin-pad is of the asynchronous serial half duplex type at 2400 bauds, and the following model can be connected: the PIN 1440

Communication with the badge unit is of the synchronous type with peripheral clock, and the following models can be connected:

- Badge reader/writer MRW 1810
- Badge reader MBR 1932

4.4.1 OPTIONAL BOARD INSTALLATION PROCEDURE

The optional board for Pin Pad and Badge Reader is installed in the following way (refer to figure 4-7):

- Switch the work station off
- Remove the cover of the ELB (see section 4.2.1)
- Remove the plastic cover from the options connector, located on the back panel of the ELB
- Place the two plastic spacers on the ELB logic board (they must both be facing upwards)
- Place the optional board on the two plastic spacers
- Secure the optional board with 5 mm hexagonal screws
- Insert the optional cable, ensuring that the connectors on the optional board and on the ELB logic board are paired correctly
- Replace the cover of the ELB
- Insert the cable in the pin pad or badge reader and in the WS adapter (connector labelled "OPTION" located on the back panel of the ELB) and secure the relative connectors
- Switch the work station on and run the DVCS tests (local operating mode), described in section 3.4.3 to control that the pin pad or badge reader and the work station are operating correctly

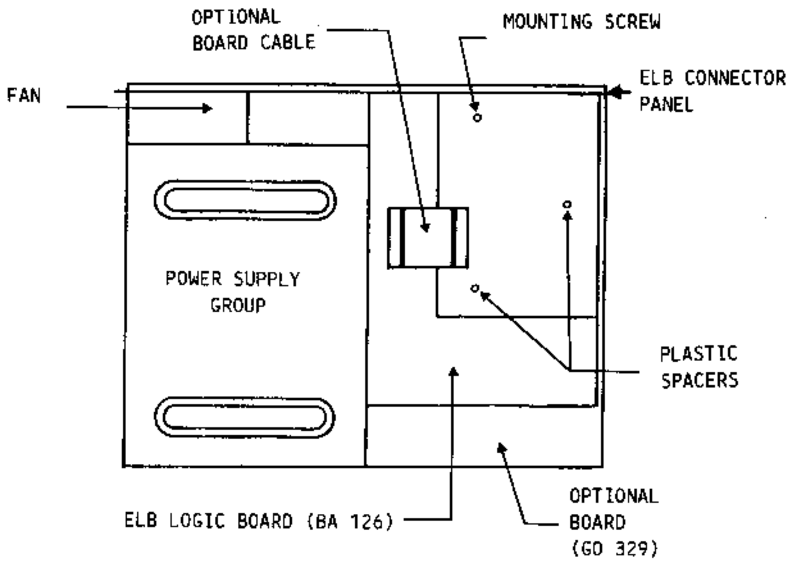


Fig. 4-7 Installing the Optional Board for Pin Pad and Badge Reader

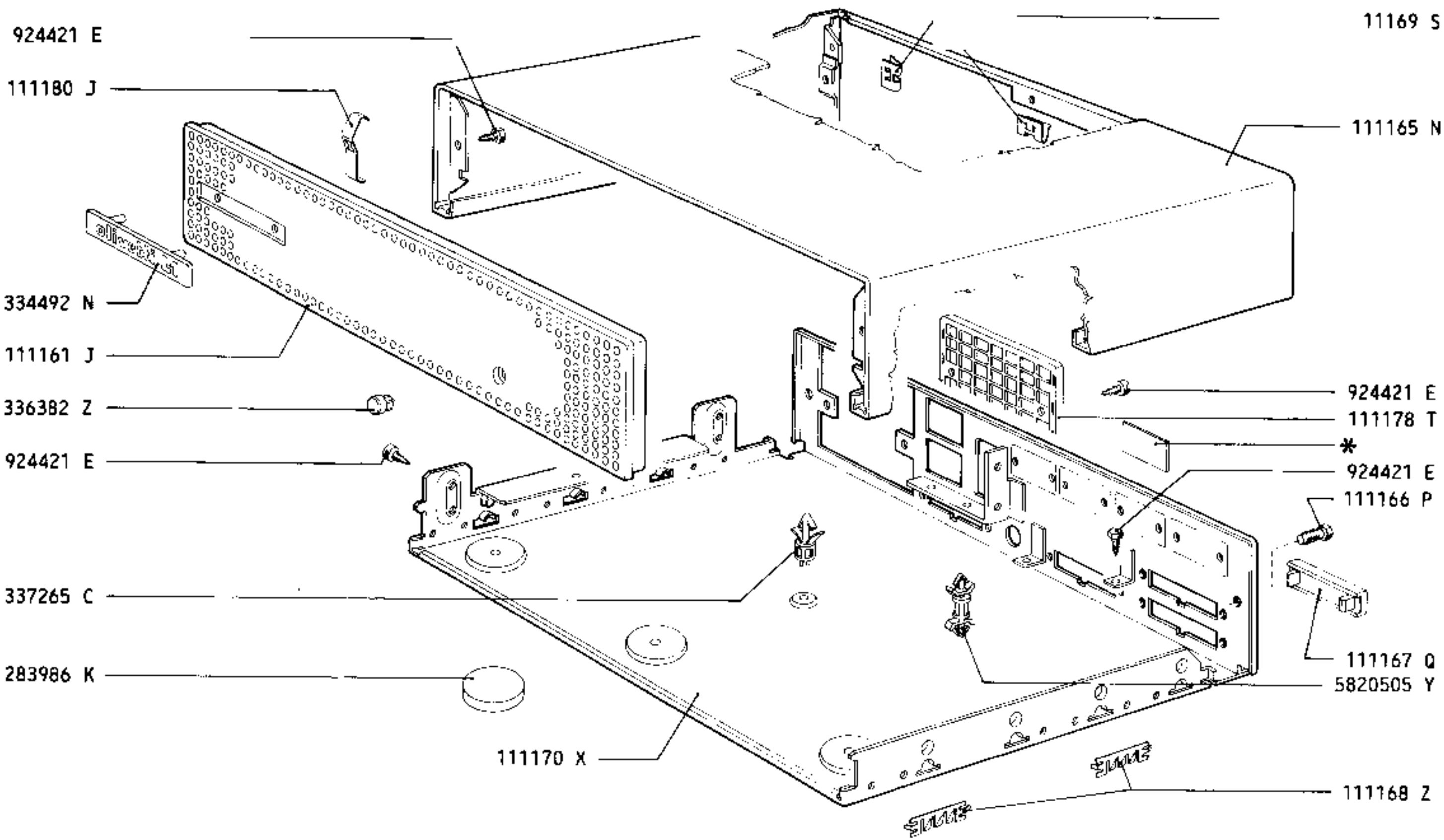
NOTA
Il CATALOGO PARTI DI RICAMBIO é l'unico documento al quale fare riferimento per ordinare le parti alla GESTIONE RICAMBI.
Codici indicati su altre documentazioni non sono fornibili.

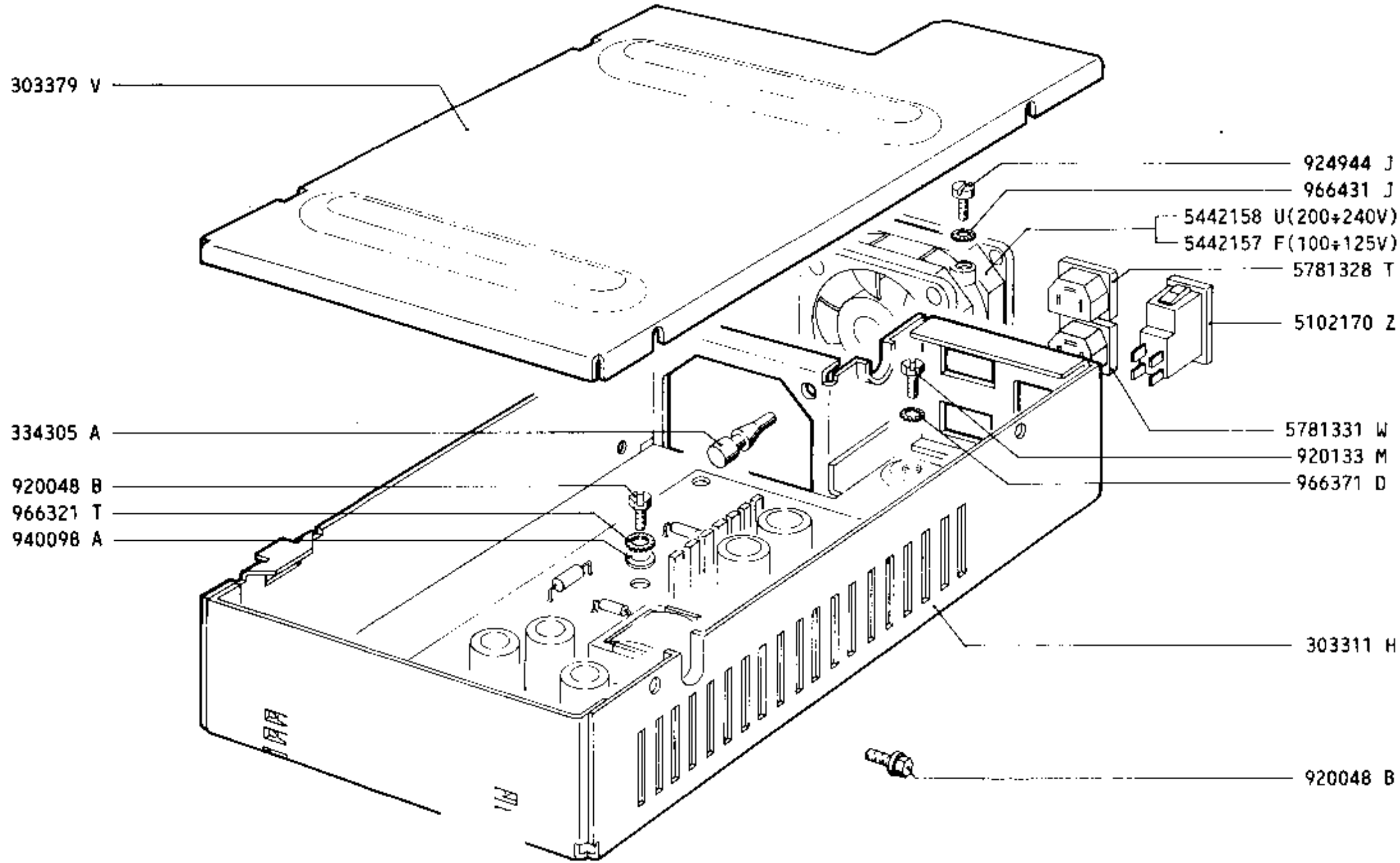
NOTE
The SPARE PARTS CATALOGUE is the sole reference document for ordering the spare parts from GESTIONE RICAMBI.
Other part numbers reported in different documentation are not delivered.

ELB 3684

*

TARGHETTE TENSIONI Voltage Labels	
CODICE Code	NOME TARGHETTA Label Name
026538 J	120V 50W 50Hz
026540 Y	120V 50W 50Hz
026537 H	220V 50W 50Hz
026535 F	240V 50W 50Hz
026539 K	100V 50W 60Hz
125131 A	115V 50W 60Hz
125032 A	220V 50W 60Hz

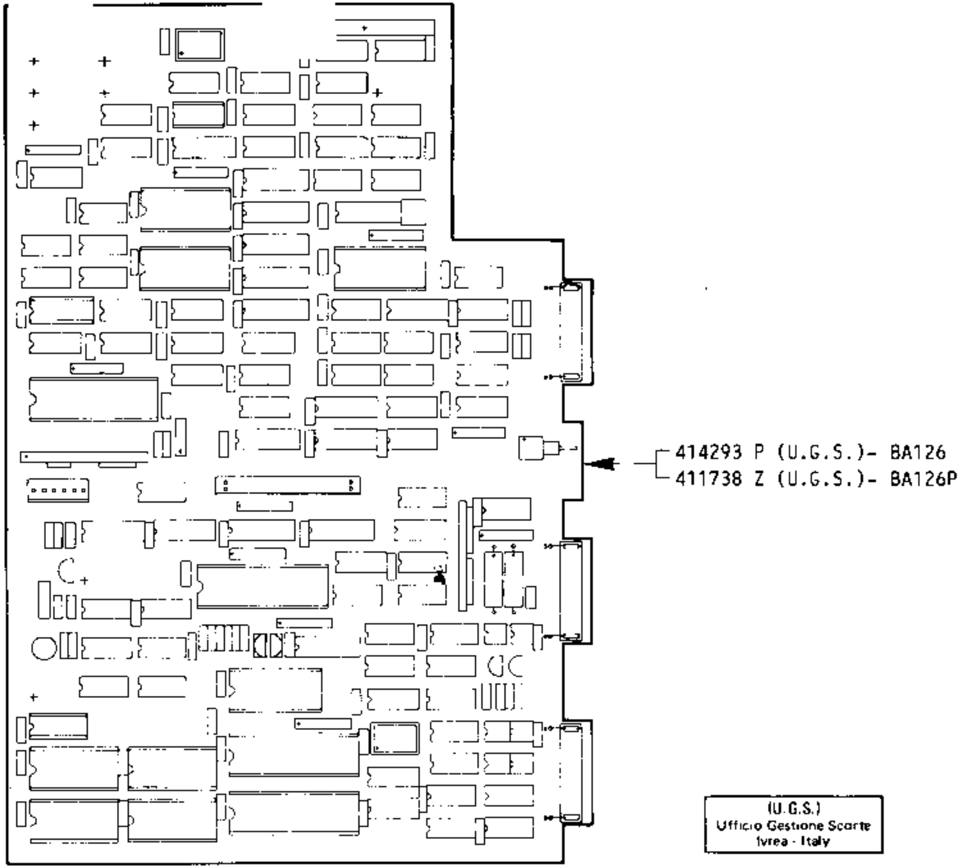

924421 E
111180 J
334492 N
111161 J
336382 Z
924421 E
337265 C
283986 K
111170 X
11169 S
111165 N
924421 E
111178 T
*
924421 E
111166 P
111167 Q
5820505 Y
111168 Z


303379 V
334305 A
920048 B
966321 T
940098 A
924944 J
966431 J
5442158 U(200÷240V)
5442157 F(100÷125V)
5781328 T
5102170 Z
5781331 W
920133 M
966371 D
303311 H
920048 B

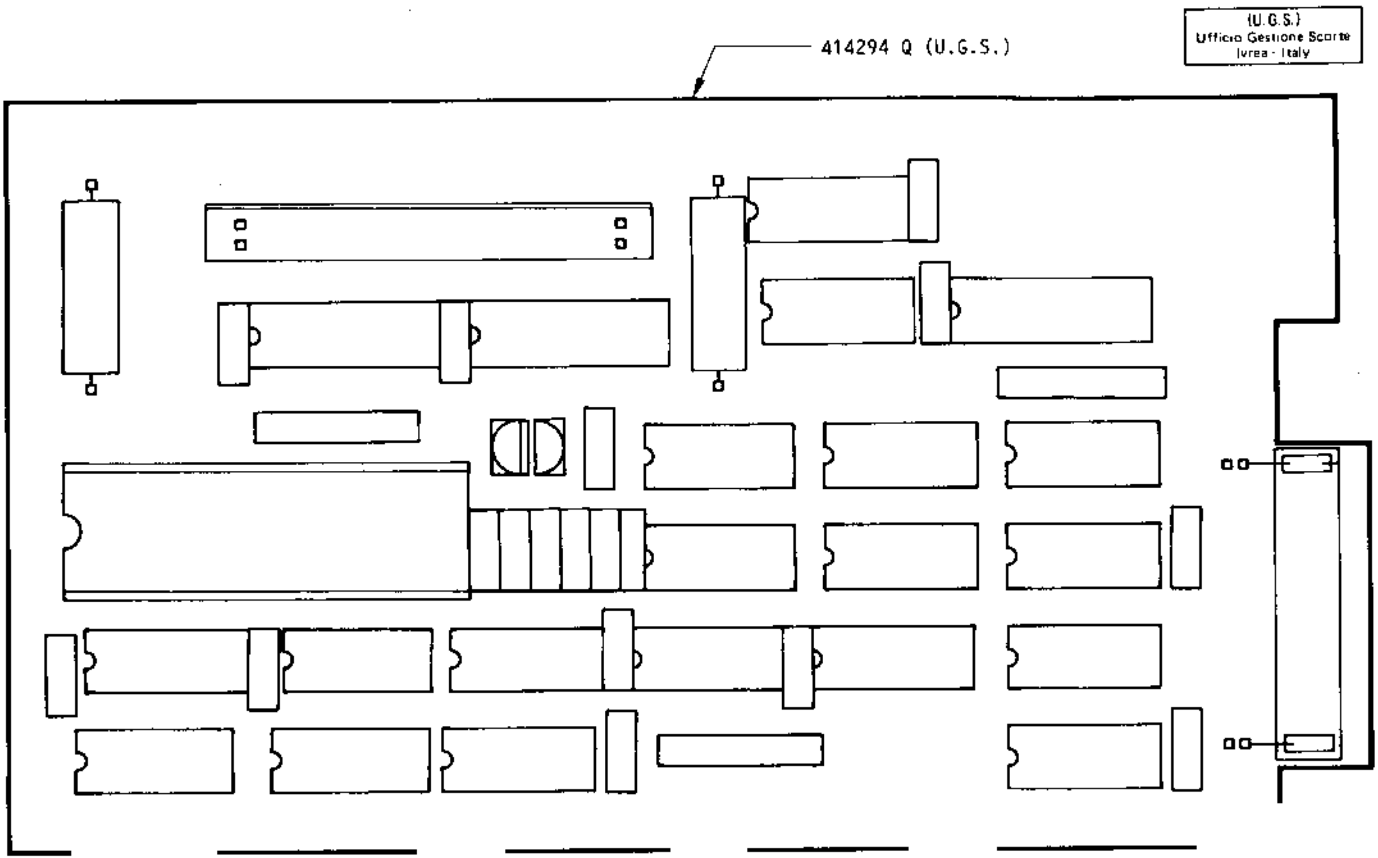
PIASTRE

BOARDS

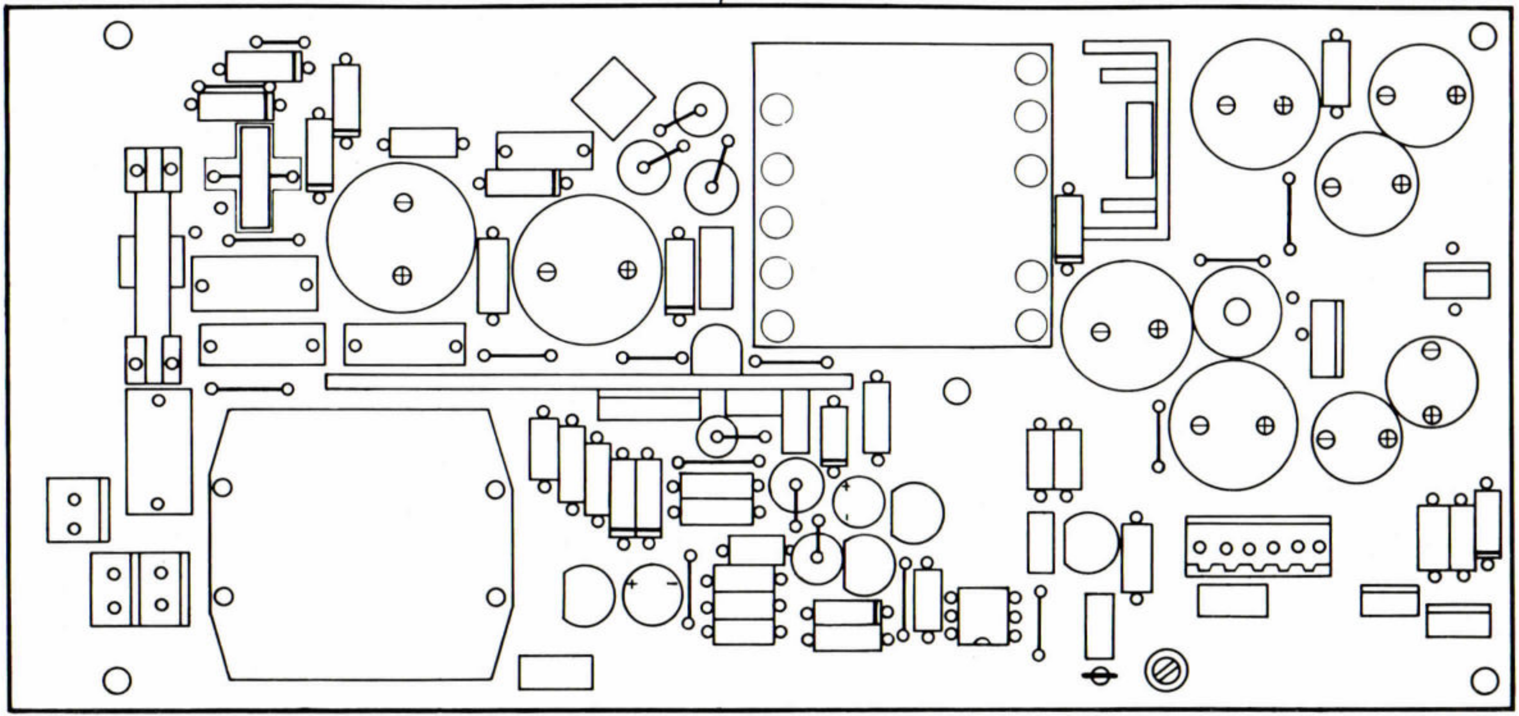
CODICE CODE	NOME FUNZIONE NAME FUNCTION	DESCRIZIONE DESCRIPTION	
963921 J	PK3G	EPROM 4K8	SPEC. PER GRECIA E JUGOSLAVIA GREECE AND JUGOSLAVIA SPECIFIC
4873533 G	MK3Z	ROM 4K x 8	CARATTERI LATINO CON FINCATURE LATIN CHARACTERS WITH MARGINS
965386 U	PBPW	EPROM 16 x 8	FIRMWARE WSTO.S. WSTO.S. FIRMWARE
965387 V	PBPX	EPROM 16 x 8	FIRMWARE WSTO.S. WSTO.S. FIRMWARE
963986 L	PK3S	ROM 4K x 8	SPEC. PER SPAGNA 2 SPAIN 2 SPECIFIC



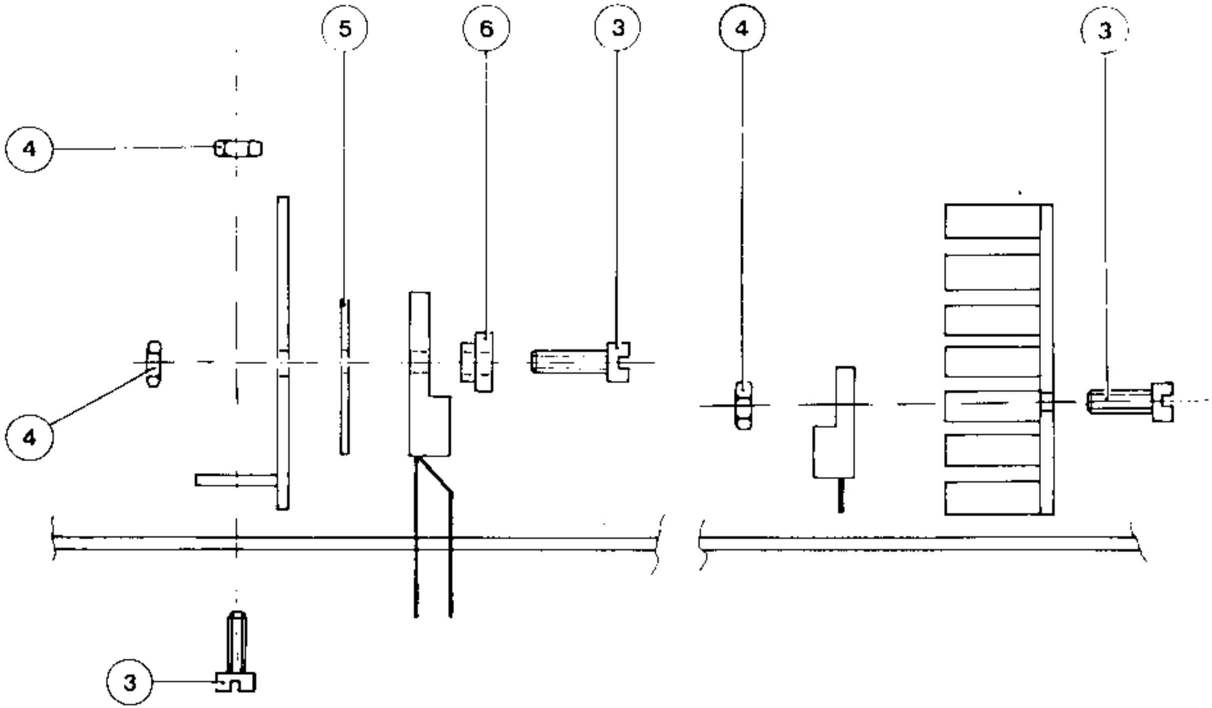
(U.G.S.)
Ufficio Gestione Scorte
Ivrea - Italy


414294 Q (U.G.S.)
(U.G.S.)
Ufficio Gestione Scorte
Ivrea - Italy

- 414295 R (U.G



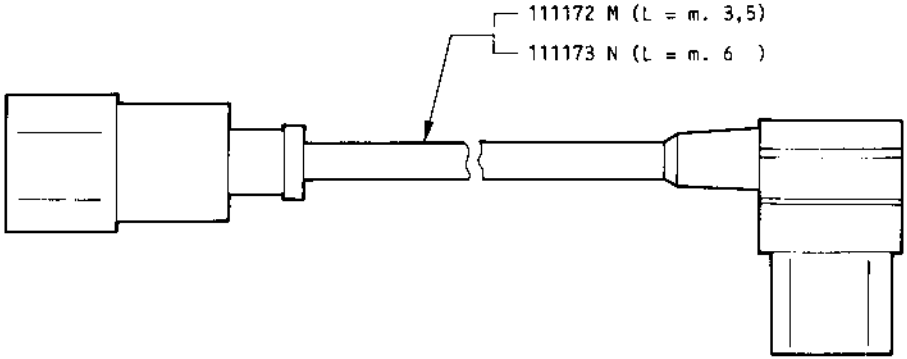
Codice *Code number*	Rifer. *Ref.*	Descrizione *Description*
126569 5	6	BOCCOLA ISOLANTE PER TO220
126850 Y	5	ISOLANTE
938210 C	4	DADO M2,5
920025 L	3	VITE M2,5 x 8



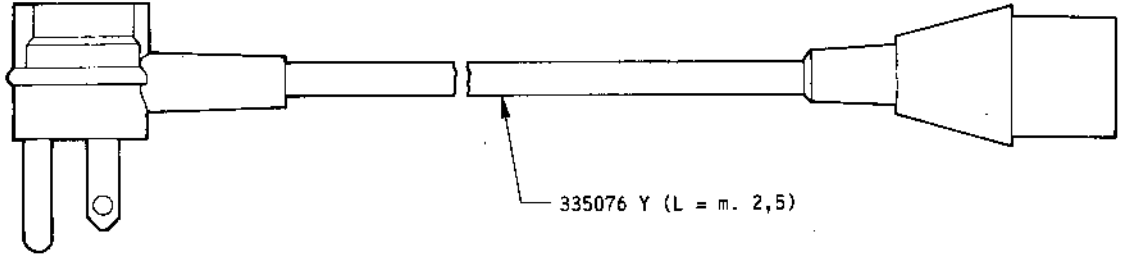
5
6
3
4
3
4
4
3

CAVI

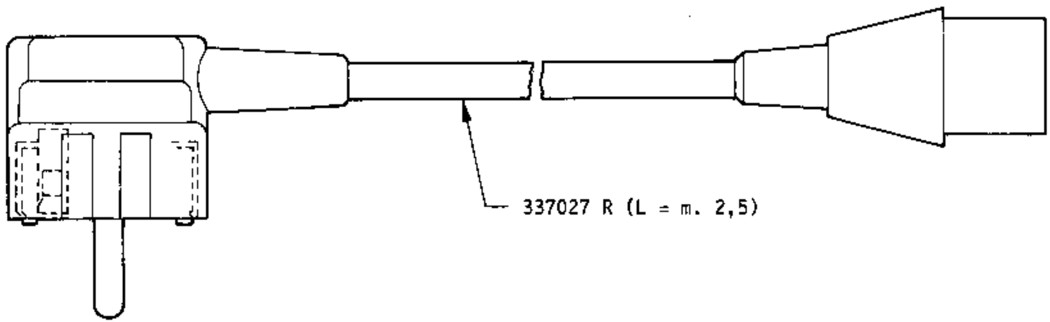
CABLES


111172 M (L = m. 3,5)
111173 N (L = m. 6)

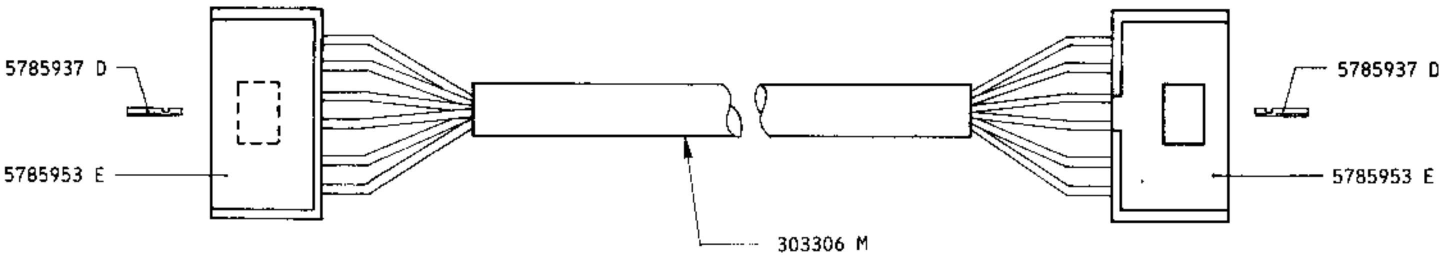
SPINA AMERICA



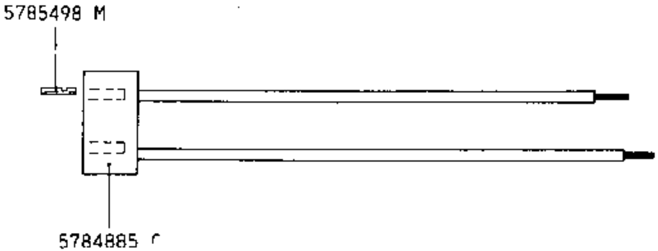
SPINA EUROPA



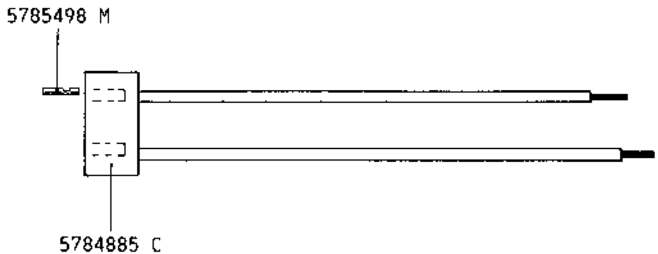
CAVO USCITA CONTINUE

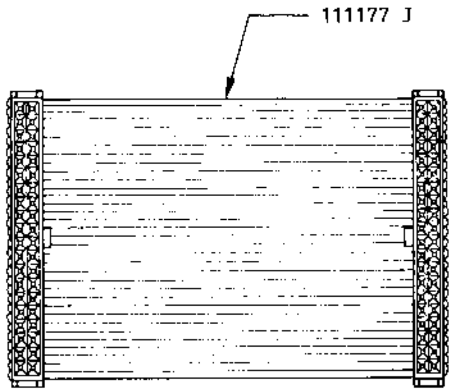


CAVO PIASTRA INTERRUTTORE



CAVO PIASTRA PRESA




111177 J

INDICE GENERALE DEI CODICI
GENERAL CODES INDEX

CODICE CODE	PAGINA PAGE	CODICE CODE	PAGINA PAGE	CODICE CODE	PAGINA PAGE	CODICE CODE	PAGINA PAGE
026535F	2	337265C	3				
026537H	2	411738Z	7				
026538J	2	414293P	7				
026539K	2	414294Q	8				
026540Y	2	414295R	9				
111161J	3	920025L	10				
111165N	3	920048B	4				
111166P	3	920133M	4				
111167Q	3	924421E	3				
111168Z	3	924944J	4				
111169S	3	938210C	10				
111170X	3	940098A	4				
111172M	14	963921J	6				
111173N	14	963986L	6				
111177J	17	965386U	6				
111178T	3	965387V	6				
111180J	3	966321T	4				
125032A	2	966371D	4				
125131A	2	966431J	4				
126569S	10	4873533G	6				
126850Y	10	5102170Z	4				
283986K	3	5442157F	4				
303306M	16	5442158U	4				
303311H	4	5781328T	4				
303379V	4	5781331W	4				
334305A	4	5784885C	16				
334492N	3	5785498M	16				
335076Y	15	5785937D	16				
336382Z	3	5785953E	16				
337027R	15	5820505Y	3				

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L1

Run Time Diagnostic

User Guide

olivetti

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L1

Run Time Diagnostic

User Guide

olivetti

FOREWORD

This manual provides information on how the serial peripheral devices of an L1 system with MOS operating system may be tested without interrupting the activity of other users on the system.

SUMMARY

The manual will describe all operations performed in connection with the Run Time diagnostic monitor.
This monitor permits progress of the test programs run to be followed closely.

Chapter 1 describes the procedure involved in starting execution of a test program.

Chapter 2 describes the keyboard, badge reader and display tests.

Chapter 3 deals with the tests performed on the printers.

The complete list of the programs described is given below:

FILE NAME	PERIPHERAL BEING TESTED
PR2845	PRINTER PR 2845
PR2890	PRINTER PR 2890
PR1470	PRINTER PR 1470
PR1480	PRINTER PR 1480
PR1482	PRINTER PR 1482
PR1490	PRINTER PR 1490
PR15	PRINTER PR 15
PR1580	PRINTER PR 1580
PR17	PRINTER PR 17
PR19	PRINTER PR 19
PR2835	PRINTER PR 2835
PR2880	PRINTER PR 2880
PR3300	PRINTER PR 3300
PR340	PRINTER PR 340
PR3600	PRINTER PR 3600
PR37	PRINTER PR 37
PR38	PRINTER PR 38
PR40	PRINTER PR40
BDG	BADGE READER
VID	DISPLAY
KEY	KEYBOARD

RELATED PUBLICATIONS

- L1 Functional Checks Manual code no. 4111930 B

- PMM and Drive Primitives code no. 4004670 F

DISTRIBUTION: Internal (Z)

FIRST EDITION: February 1987

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1. THE DIAGNOSTIC MONITOR

1.1 GENERAL

The monitor is designed for use in loading a diagnostic program chosen from those available in the diagnostic library.

This chapter will describe the system and diagnostic monitor operations involved in the selection and execution of a diagnostic program.

1.2 SYSTEM AND DIAGNOSTIC MONITOR OPERATIONS

To select a diagnostic program and start execution, the diagnostic monitor must first be activated and the file name of the program called up.

For diagnostic monitor activation, there are two possibilities:

1. The configuration file GRANDPA contains the instructions needed to activate the diagnostic monitor so that when system process GRANDPA is implemented, a menu including the diagnostic environment identifier name (RTDIAG) is displayed.

   After the menu is displayed by GRANDPA, the user need only type in the number of the identifier name RTDIAG and hit CR.

2. The configuration file GRANDPA does not have the instructions needed to activate the diagnostic monitor - in this case, the diagnostic monitor is activated in SHELL.

   The operator must activate the SHELL environment (prompt MCL), type in RTDIAG and hit the CR key.

1.2.1 CALLING UP A DIAGNOSTIC FILE

When the diagnostic monitor is activated, a list of diagnostic programs is displayed.

The complete list of diagnostic programs available is given below:

LISTING OF TEST PROGRAMS AVAILABLE

VIDEO	BDG	KEY	PR15
PR17	PR19	PR37	PR38
PR40	PR340	PR1470	PR1480
PR1482	PR1490	PR1580	PR2835
PR2845	PR2880	PR2890	PR3300
PR3600			

If there are over 20 programs, the monitor will display them 20 at a time with the following message:

DO YOU WANT CONTINUE LISTING ?

IF YES PRESS Y IF NO PRESS ANOTHER KEY

The operator may continue or suspend display of the list by responding as indicated above.

After the list of programs is displayed, the monitor prepares for execution of a diagnostic program from the list by displaying the following message:

SELECT ONE TEST PROGRAM TYPING THE RELATIVE NAME

The operator must type in the name of the program required and hit the CR key.

When the program has been selected, the monitor asks the operator if another diagnostic program is to be run by displaying the message:

DO YOU WANT CONTINUE TEST ?

PRESS Y FOR YES ANOTHER KEY FOR NO

If the answer is "yes", the monitor asks for the name of the next test.

If the answer is "no", the environment switches back to the GRANDPA menu.

2. I/O DEVICE TESTING

2.1 SCREEN

2.1.1 GENERAL

The main aim of this program is to check and test the quality of the hardware of a display connected to a workstation.

2.1.2 DESCRIPTION

The characteristics of the display are checked using the operating system resources at the user's disposal.

The test is designed to check all the functions of the screen and is in four different parts, each for a particular function.

No specific user action is required for execution of the test; however, the user does have to ensure the single test stages are executed perfectly. The program will allow a suitable interval for a sight check to be carried out at the end of each stage.

2.1.3 PART 1

In this part, the display characteristics (size, operations, etc.) are combined to form a display containing all the display and format mode information (row numbers, column numbers, total screen dimensions), as these are the parameters used in display programming.

The display data has the following significance:

- 00 = 15 inch graphic black & white
- 01 = alphanumeric trivalent
- 02 = 9/5 inch graphic black & white
- 03 = 15 inch alphanumeric, trivalent, black & white
- 04 = 14 inch graphic colour
- 06 = 9 inch alphanumeric colour
- 07 = 14 inch alphanumeric, colour

The entire character set for the particular display unit is now displayed. As trivalent displays have three modes of operation, the character set in this case is repeated three times, after due formatting. There is also a particular display after each new setting.

2.1.4 PART 2

This part checks that the pixels comprising the characters are set correctly for all screen positions.
This is done by filling the entire screen with "H" characters.

2.1.5 PART 3

This stage checks that the cursor behaves correctly in all screen positions.
It should be noted that this test is also performed by the program itself. For a simple check of the cursor position, the letter "0" is displayed.

2.1.6 PART 4

This stage is designed to test all the attributes of the characters extended to the complete screen.
The test is 10 consecutive steps, each on the whole screen. A single video page will contain on the first line the description of the current attribute. An improved display is had by completely filling the screen with "0" characters.

The steps are:

- high frame
- low frame
- left frame
- right frame
- blinking screen
- highlight
- reverse screen
- entire frame + blinking screen
- entire frame + highlight
- entire frame + reverse screen.

2.2 BADGE READER

This program checks the badge by reading and writing specific magnetic medium bytes.

Each time the badge is to be inserted, the system console will display a message which always ends as follows:

RUN THE BADGE

after which the program waits for the badge to be inserted in its slot by the operator.
The badge must always be the same for the entire duration of the test.

At the start, the original tracks 2 and 3 are read, their contents are stored and displayed on the system console.
Three tests are then run in order to ascertain device quality. Each consists of:

- one part in which specific comparison models are written and compared;

- another part in which the models read are written again.

These models are then repeated until the original length of track 3 has been covered.

Samples patterns included are:

- the entire character set for the first test.

- values 55 and 33 in the second and third tests, respectively (these samples will have an incremented number of consecutive on and off bits to give the head different magnetic densities).

  At the end, the program will write the original patterns on track 3, leaving them unchanged; a subsequent read and display pattern will show the strip contents have not been changed.

2.3 KEYBOARD

This test is designed to check that the firmware and the hardware of a keyboard connected to a specific workstation are in correct working order.
As the OLIVETTI L1 range has a wide number of different national character sets, the user will be prompted as follows:

ENTER KEYBOARD VERSION

Depending on the answer given, the system will set itself for the relative identifier.

The identifier is usually the numeric key on the bottom of the keyboard panel, preceded by the three letters **TAS**

The program is now running and displays a drawing of the keyboard on the workstation screen.
The user must now press the keys and check that the relative cell of keyboard drawing is coloured in. The program will also automatically check that the right key has been pressed.

With the control keys, the test is carried out in the following steps:

- **FUNCTIONAL KEYBOARD**

  the operator presses the functional parts of the keyboard

- **NORMAL**

  the operator presses all the keys in lower case in the alphanumeric part of the keyboard

- **SHIFT**

  the operator presses all keys with the "shift" key held down

- **LOCK**

  the operator presses all keys with the "lock" key held down

- **CONTROL**

  the operator presses all keys with the "control" key held down

- **REPEAT**

  the operator presses all keys with the "repeat" held down.

The program carries out these steps automatically checking the number of characters pressed, depending on the type of keyboard.

If a key is found to be faulty, the program is interrupted and the operator will have to eliminate the fault.

3. TESTS FOR PRINTERS

3.1 GENERAL

The procedures to test the printers, badge reader, keyboard and screen will be described in this chapter.

Correct test execution requires implementation of the following features:

- Olivetti Controlled Mode for data transmission protocol

- 8 bits per character

- Automatic Line-Feed on CR disabled.

When an error occurs, the program is interrupted and a message is displayed. For significance of the messages, see the "PMM REFERENCES MANUAL", code no. 4004670F.

Note: if a diagnostic program requires a particular DIP-switch or jumper configuration, the service technician should be called.

Some examples of tests made will be given below.

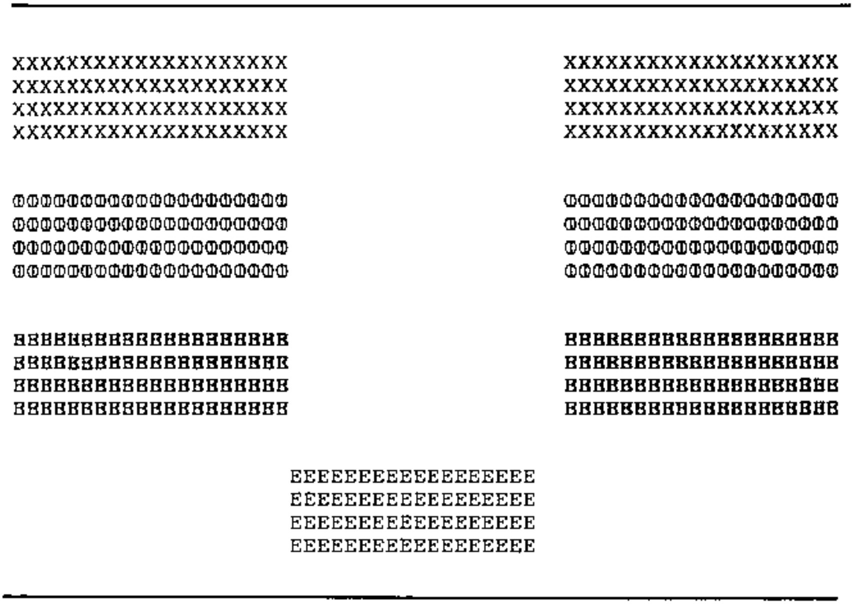

Fig. 3-1 Graphic features test

```
!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345
!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345

!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345
!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345

!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345
!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345

!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345
!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345

!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345
!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345

!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345
!"#¤%&'()*+,-./01234                    !"#¤%&'()*+,-./012345

!"#$%&'()*+,-./01234                    ! #$%&'()*+,-./01234
!"#$%&'()*+,-./01234                    !"#$%&'()*+,-./ 1234
!"#$%&'()*+,-./01234                    !"#$%&'()*+,-./01234
!"#$%&'()*+,-./01234                    !"#$%&'()*+,-./01234

HHHHHHHH  HHHHHHHH  HHHHHHHH  HHHHHHHH  HHHHHHHH
HHHHHHHH  HHHHHHHH  HHHHHHHH  HHHHHHHH  HHHHHHHH

HHHHHHHHHHHHHHHHHHHH    HHHHHHHHHHHHHHHHHHHH    HHHHHHHHHHHHHHHHHHHH

XXXXXXXXXX                                      XXXXXXXXXX
XXXXXXXXXX                                      XXXXXXXXXX
XXXXXXXXXX                                      XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXX                                      XXXXXXXXXX
XXXXXXXXXX                                      XXXXXXXXXX
XXXXXXXXXX                                      XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXX                                      XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXX                                      XXXXXXXXXX
```

Fig. 3-2 Graphic features test

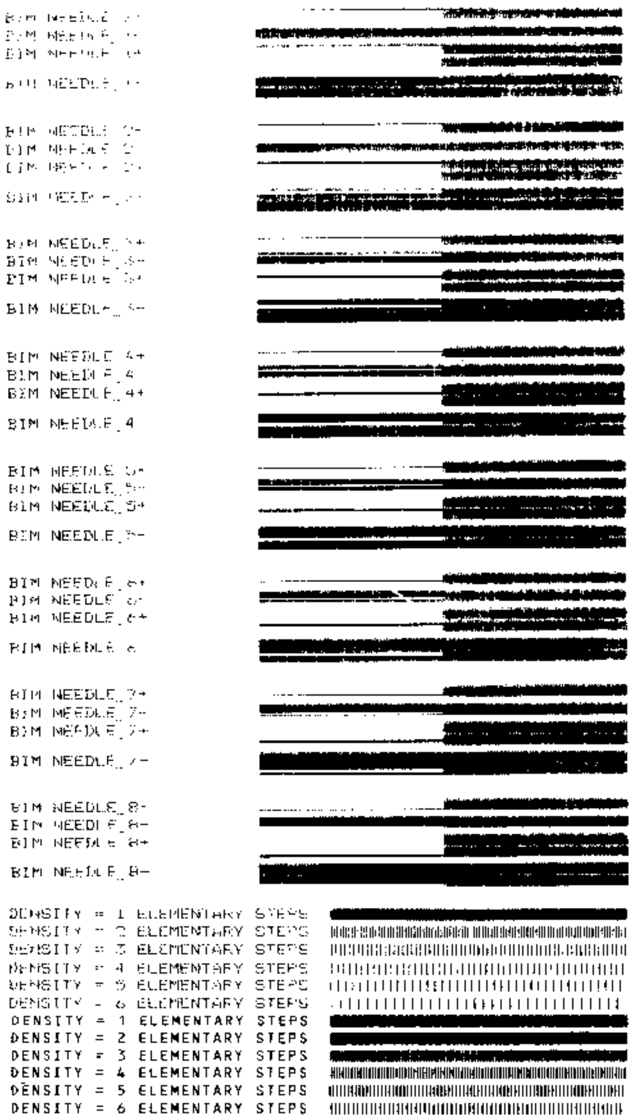

Fig. 3-3 Bit IMage test

```
DEFAULT SET        !"#¤%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
DEFAULT SET       PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

INTERNAT.          !"#¤%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
INTERNAT.         PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}

GERMANY            !"#$%&'()*+,-./0123456789:;<=>?§ABCDEFGHIJKLMNO
GERMANY           PQRSTUVWXYZÄÖÜ^_`abcdefghijklmnopqrstuvwxyzäöüß

PORTUGAL           !"#$%&'()*+,-./0123456789:;<=>?§ABCDEFGHIJKLMNO
PORTUGAL          PQRSTUVWXYZÃÇÕ^_`abcdefghijklmnopqrstuvwxyzãçõ°

SPAIN              !"£$%&'()*+,-./0123456789:;<=>?§ABCDEFGHIJKLMNO
SPAIN             PQRSTUVWXYZ¡Ñ¿^_`abcdefghijklmnopqrstuvwxyz°ñç~

DENMARK_NORWAY     !"£$%&'()*+,-./0123456789:;<=>?'ABCDEFGHIJKLMNO
DENMARK_NORWAY    PQRSTUVWXYZÆØÅ^_`abcdefghijklmnopqrstuvwxyzæøå~

FRANCE             !"£$%&'()*+,-./0123456789:;<=>?àABCDEFGHIJKLMNO
FRANCE            PQRSTUVWXYZ°ç§^_`abcdefghijklmnopqrstuvwxyzéùè¨

ITALY              !"£$%&'()*+,-./0123456789:;<=>?§ABCDEFGHIJKLMNO
ITALY             PQRSTUVWXYZ°çé^_ùabcdefghijklmnopqrstuvwxyzàòèì

SWEDEN_FINLAND     !"#¤%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
SWEDEN_FINLAND    PQRSTUVWXYZÄÖÅ^_`abcdefghijklmnopqrstuvwxyzäöå~

SWITZERLAND        !"£$%&'()*+,-./0123456789:;<=>?§ABCDEFGHIJKLMNO
SWITZERLAND       PQRSTUVWXYZàçê^_`abcdefghijklmnopqrstuvwxyzäöüé

GREAT BRITAIN      !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
GREAT BRITAIN     PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

USA_ASCII          !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
USA_ASCII         PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~

GREEK              !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
GREEK             PQRSTUVWXYZ[\]^_`ΑΒΨΔΕΦΓΗΙΞΚΛΜΝΟΠ ΡΣΤΘΩ΄ΧΥΖ{|}~

ISRAEL             !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
ISRAEL            PQRSTUVWXYZ[\]^_אבגדהוזחטיךכלםמןנסעףפץצקרשת{|}~

DEFAULT SET        !"#¤%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
DEFAULT SET       PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
```

Fig. 3-4 National character sets test

3.2 PR 15

Before the test starts, the operator is asked for the printer (system or workstation) configuration status.

The prompt displayed is:

IS PR 15 PRINTER SYSTEM ? (Y/N)

If the printer is the system printer, the operator is asked to give its identity number as follows:

ENTER PRINTER ENTRY(1..3)

The test is in three separate parts.

Before each part, the operator is prompted:

DO YOU WANT MAKE PHASE n ? (Y/N)

where n is 1, 2 or 3.

The characteristics to be checked are:

1. **Three possible print pitches: 10 char/inch, 12.5 char/inch, 16.6 char/inch; double height printing; double printing.**

In the course of the test, a number of character strings will be printed on a form as described below:

- two lines printed in each print format (normal, double height and correspondence quality in the three different steps);
- 10 lines of "X" characters printed, alternating line feed and half-line feed
- 5 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;
- 5 lines of "O" characters overlaid with "I" characters to test print character centering;
- 5 lines of "E" characters overlaid with "H" characters to ensure correct justification;
- 5 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.

Vertical positioning before each step is handled by a vertical tabulation program.

2. **Printing of all national graphic character sets.**

In this test, all the national character sets available are printed twice.

The default character set is printed at the start and at the end.

Before this part of the test starts, the operator is asked if the default character set is the Greek set:

IS DEFAULT SET GREEK ? (Y/N)

Each character set is accompanied by the relative country name.

The printing order is:

- DEFAULT SET
- INTERNATIONAL
- GERMANY
- PORTUGAL
- SPAIN
- DENMARK_NORWAY
- FRANCE
- ITALY
- SWEDEN_FINLAND
- SWITZERLAND
- GREAT BRITAIN
- USA_ASCII
- GREEK
- ISRAEL
- DEFAULT SET

3. **Bit Image (BIM) graphic features.**

In this test, 10 lines are printed on a form for each of the six BIM components, positive and negative.

The operation is repeated for all densities (84, 72, 63, 56, 50 dots/inch).

NOTE: Forms must be a minimum of 70 lines long and 12" wide.

3.3 PR 17

Before the test starts, the operator is asked for the printer (system or workstation) configuration status.

The prompt displayed is:

IS PR 17 PRINTER SYSTEM ? (Y/N)

If the printer is the system printer, the operator is asked to give its identity number as follows:

ENTER PRINTER ENTRY(1..3)

The test is in three separate parts.

Before each part, the operator is prompted:

DO YOU WANT MAKE PHASE n ? (Y/N)

where n is 1, 2 or 3.

The features to be checked are:

1. **Three possible print pitches: 10 char/inch, 12.5 char/inch, 16.6 char/inch; double height printing; double printing.**

In the course of the test, a number of character strings will be printed on a form as described below:

- two lines printed in each print format (normal, double height and correspondence quality in the three different steps);
- 10 lines of "X" characters printed, alternating line feed and half-line feed
- 5 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;
- 5 lines of "O" characters overlaid with "I" characters to test print character centering;
- 5 lines of "E" characters overlaid with "H" characters to ensure correct justification;
- 5 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.

Vertical positioning before each step is handled through a vertical tabulation program.

2. **Printing of all national graphic character sets.**

In this test, all the national character sets available are printed twice.

The default character set will be printed at the start and at the end.

Before this part of the test starts, the operator is asked if the default character set is the Greek set:

IS DEFAULT SET GREEK ? (Y/N)

Each character set is accompanied by the relative country name.

The printing order is:

- DEFAULT SET
- INTERNATIONAL
- GERMANY
- PORTUGAL
- SPAIN
- DENMARK_NORWAY
- FRANCE
- ITALY
- SWEDEN_FINLAND
- SWITZERLAND
- GREAT BRITAIN
- USA_ASCII
- GREEK
- ISRAEL
- DEFAULT SET

3. **Bit Image (BIM) graphic features.**

In this test, 10 lines are printed on a form for each of the six BIM components, positive and negative.

The operation is repeated for all densities (84, 72, 63, 56, 50 dots/inch).

NOTE: Forms must be a minimum of 70 lines long and 12" wide.

3.4 PR 19

Before the test starts, the operator is asked for information on the printer status.

The first question relates to the configuration (system or workstation printer) while the second is on the firmware level.
The prompts are:

- **IS PR 19 PRINTER SYSTEM ? (Y/N)**

  If the printer is the system printer, the operator is asked to specify its identity number:

  ENTER PRINTER ENTRY(1..2)

- **ENTER FW EXTENSION LEVEL**
  1 : Basic FW
  2 : Basic FW + APL
  3 : Basic FW + TEXT COMM
  4 : Basic FW + BIM

The test is in two separate parts.

3.4.1 TEST DESCRIPTION

The program tests both the hardware and the firmware characteristics of the printer.

The two parts are:

1. A number of pre-defined characters are printed thus testing the mechanical parts and the control firmware through the controlled activation of the head and the paper feed motor

2. Depending on the printer configuration, the default character set is printed and the extended firmware features are checked.

3.4.2 PART 1

In this part, character sets are printed on a form.

The test in this part is also in two parts:

1. **Head motor activation and paper feed tests**

Character strings are printed on half a form to test when absolute displacements are made when the left margin is re-defined.

Before the test starts, the printer goes through an initialization phase (non-operative commands, such as format definition, module selection etc.)

In each test, five 20-character lines are printed where two tests are performed on each line in the following order:

- double-size characters
- 16.6 char/inch write pitch
  The two tests are related in that they print characters of maximum and minimum width
- underline
- back-space printing
  this step is linked to the previous one and prints the character set with a backspace and an underscore to highlight differences with the previous step
- printing of two overlapping lines of "X" characters
  to highlight alignment between the diagonal lines and the characters themselves
- a line of "E" characters overlaid with "H" characters
  to highlight character alignment
- a line of "O" characters overlaid with "I" characters
  to highlight character centering
- printing with a 12 char/inch pitch
- printing of "E" characters in different positions
  progressively reducing time between printing of one character and the next.

2. **Print tests with relative horizontal displacements and horizontal and vertical tabulation programs.**

   The other half of the form used for the tests above is used with reverse horizontal order.
   The form is inverted to allow any operational differences in the print path to be checked.

3.4.3 PART 2

In the test, 16 lines are printed with a constantly increasing line spacing (from 1 to 8 lines) so as to test the paper feed motor.

The irregular head movements are commanded by way of the relative vertical and horizontal positioning functions.

The data requested at the start of the test will also be required during testing.

The course the test takes depends on the equipment installed:

1. **basic equipment**

   the characters of the default set are printed

2. **basic equipment + APL**

   the characters of the default set and those of the APL set are printed alternatively.
   As the entire APL set is of 127 characters, they are printed on several lines.

3. **basic equipment + TEXTCOMMUNICATION**

   Character strings are printed in the following order:

   - 2 lines with the default characters
   - 12 lines with the national characters
   - 2 lines with the textcommunication characters.

   With the national character sets, the name of the country they belong to is printed out afterwards.

   The national character sets available are:

   - INTERNATIONAL (RUSSIA 1)
   - GERMANY (RUSSIA 2)
   - PORTUGAL
   - SPAIN
   - DENMARK-NORWAY
   - FRANCE
   - ITALY
   - SWEDEN-FINLAND
   - SWITZERLAND
   - GREAT BRITAIN
   - USA-ASCII (GREECE)
   - JAPAN

If a certain country is missing, the corresponding line will be skipped.

4. **basic equipment + BIM firmware**

   the following are printed in order:

   - 1 line with the default characters,
   - 14 lines with the BIM characters,
   - 1 line with the default characters.

   For each BIM line, information on the needle and its position in negative and positive mode will also be given.

3.5 PR 37

Before the test starts, the operator is asked to enter the printer status (system printer or workstation printer).

The prompt displayed is:

IS PR 37 PRINTER SYSTEM ? (Y/N)

In the course of the test, a number of character strings will be printed on a form as described below:

- 3 lines in normal print
- 3 lines in highlight
- 4 lines underscored. This is performed by alternately selecting the print option on one line and then on the next by underlaying each character printed with the "_" character
- strings of 8 "H" characters are printed with a progressively increasing line feed and using reverse line feeds (line feeds are: 1/6, 3/12, 1/3, 5/12, 1/2);
- character strings with half line feeds forwards and backwards are printed
- 4 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;
- 4 lines of "O" characters overlaid with "I" characters to test print character centering;
- 4 lines of "E" characters overlaid with "H" characters to ensure correct justification;
- 4 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.
- all the characters on the daisy wheel are printed twice. The operator will respond to the following prompt:

  TELETEXT SET ? (Y/N)

  by specifying the type of daisy wheel.

NOTE: Forms must be at least 72 lines long and 13.2 inches wide.

3.6 PR 38

Before the test starts, the operator is asked to enter the printer status (system printer or workstation printer).

The prompt displayed is:

IS PR 38 PRINTER SYSTEM ? (Y/N)

If the printer is the system printer, the opertor must now specify its identity number as follows:

ENTER PRINTER ENTRY(1..3)

The test is in three separate parts.

Before each part, the program prompts:

DO YOU WANT MAKE PHASE n ? (Y/N)

where n is 1, 2 or 3.

The features to be checked are:

1. **Printing possibilities:**

   In this test, a form is required on which to print a number of character strings as outlined below:

   - 4 groups of lines are printed, one for each of the 4 pitches (10 char/inch, 12 char/inch, 15 char/inch, proportional spacing). Each set consists of:
     - a line printed in draft form
     - a line printed in bold face
     - a line printed in a mode similar to letter quality
     - a line printed in letter quality
     - a line printed in double thickness.
   - 4 underscored lines. The underscore is performed by alternating on consecutive lines between the underscore option and use of the "_" character under each character printed;

- strings of 8 "H" characters are printed with a progressively increasing line feed and using reverse line feeds (line feeds are: 1/6, 3/12, 1/3, 5/12, 1/2);

- character strings with half line feeds forwards and backwards are printed

- 4 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;

- 4 lines of "O" characters overlaid with "I" characters to test print character centering;

- 4 lines of "E" characters overlaid with "H" characters to ensure correct justification;

- 4 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.

2. **All national graphic character sets printed.**

This test requires a form on which to print the character sets available. The first set to be printed is the default character set.

Each character set is accompanied with the name of the country.

The sets, in order, are:

- DEFAULT SET
- GERMANY
- PORTUGAL
- SPAIN
- DENMARK_NORWAY
- FRANCE
- ITALY
- SWEDEN_FINLAND
- SWITZERLAND
- GREAT BRITAIN
- USA_ASCII
- JAPAN
- TEXTCOMMUNICATION SET
- SEMIGRAPHIC SET

- OCRB SET

3. **Bit image (BIM) graphic features.**

In this test, a form on which to print the operations outlined below is required.

- 4 lines are printed for each of the 8 BIM components in which the bit in question is set.
  Printing is in positive and in negative both in normal and zoom mode.

- 6 lines are printed in which all the BIM bits are set, constantly increasing the distance in elementary steps between the horizontal dots.

- The previous step is repeated in high resolution.

NOTE: Forms must be at least 72 lines long and 13.2 inches wide.

3.7 PR 40/1/2/3/4/5

Before the test starts, the operator is asked for the printer (system or workstation) configuration status.

The prompt displayed is:

IS PR 40 PRINTER SYSTEM ? (Y/N)

If the printer is the system printer, the operator is asked to give its identity number as follows:

ENTER PRINTER ENTRY(1..4)

The test is in four separate parts.

It is run on a form inserted in the front feeder.
When the program wants to print with this device, it starts a dialogue with the operator.
The following message is first displayed on the screen:

INSERT DOCUMENT

after which, the procedure is as follows:

a) At the start, the LED "STATION 1" lights to show that the program is ready to be run; the LED "TURN PAGE" then comes on, indicating that a new form should be inserted.

b) Each time a form or bank passbook is entered, the operator should press the "STATION 1" key to inform the system that the program can continue.

The test is in three separate parts, performed only if the operator replies affermatively to the program prompt:

In the first two cases, the prompt is:

DO YOU WANT MAKE PHASE n ? (Y/N)

where n is 1 or 2. For the third part, the following messages are displayed:

DO YOU WANT TEST ON MAGNETIC STRIP ? (Y/N)

DO YOU WANT TEST ON OPTICAL READER ? (Y/N)

The features to be checked are:

1. **Three posible write pitches - 10 char/inch, 12 char/inch, 16.6 char/inch; double printing; double height printing; character set selection (default and OCRB), line feed selection.**

   Before the procedures start, an initialization is performed in which the program informs the user which part of the automatic feeder is active (left or right side), for insertion of the forms or bank passbooks.

In this stage, the operator will be asked to specify which type of optional device is present, if any:

- two lines printed in each format (normal print, double height, double width in the three print pitches);
- a column consisting of two rows with 10 "X" characters using the double line spacing forward and single line spacing back is printed;
- a column of two rows of ten "X" characters obtained by proportionally altering the line spacing;
- 5 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;
- 5 lines of "O" characters overlaid with "I" characters to test print character centering;
- 5 lines of "E" characters overlaid with "H" characters to ensure correct justification;
- 5 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.

BIM graphic features.

The character sets printed are the default set and the OCR B set.

This test cannot be run on the PR40/1.

The features to be checked are:

- printing of sixteen lines by setting the BIM elements one by one in positive and negative
- a number of bands are printed where all the BIM bits are set, to check the different print densities
- user graphic font loading (DDL) is tested by loading and printing a rectangular shape character.

2. **Optional devices.**

In initialization, the user is asked to specify the type of optional device present.

The request is:

WHAT OPTION IS PRESENT ?

1> MAGNETIC STRIPE

2> OPTICAL READER

ENTER CHOICE (1 ..2)

Depending on the answer, the procedure is as follows:

- If the device is a magnetic stripe reader, the program first saves what it reads from the bank passbook inserted, then sequences of characters with an increasing number of significant bits (1, 3, 7) are written and read thus giving the head different magnetic densities.

- If the device is an optic reader, the check is made by first writing and then reading all legible characters.
  A check is then made to ensure that what is read is the same as what was written.

The test can be run on PR40/3, PR40/4 (magnetic stripe) and PR40/5 (optic reader).

NOTE: The form used must be UNI A4 format.

3.8 PR 340

Before the test starts, the operator is asked to enter the printer status (system printer or workstation printer).

The prompt is:

IS PR 340 PRINTER SYSTEM ? (Y/N)

In the test, a form is required on which to print a number of character strings as outlined below:

- 3 lines printed in normal mode
- 3 lines printed in highlight mode
- 4 underscored lines. The underscore is performed by alternating on consecutive lines between the underscore option and use of the "_" character under each character printed;
- strings of 8 "H" characters are printed with a progressively increasing line feed and using reverse line feeds (line feeds are: 1/6, 3/12, 1/3, 5/12, 1/2);
- character strings with half line feeds forwards and backwards are printed
- 4 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;
- 4 lines of "O" characters overlaid with "I" characters to test print character centering;
- 4 lines of "E" characters overlaid with "H" characters to ensure correct justification;
- 4 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.
- the set of characters on the daisy-wheel is printed twice. In this step, the user must answer the following prompt:

  TELETEXT SET ? (Y/N)

  in which the type of daisy-wheel must be specified.

NOTE: Forms must be at least 72 lines long and 13.2 inches wide.

3.9 PR 1470

Before the test starts, the operator is asked for printer status information.

The first question is on the printer configuration (system printer or workstation printer) and the second is on the firmware extension level. The prompts are as follows:

- **IS PR 1470 PRINTER SYSTEM ? (Y/N)**

  If the printer is the system printer, the operator must enter its identity number as follows:

  ENTER PRINTER ENTRY(1 o 2)

- **ENTER FW EXTENSION LEVEL**
  1 : Basic FW
  2 : Basic FW + APL
  3 : Basic FW + TEXT COMM
  4 : Basic FW + BIM

The test is in two separate parts.

3.9.1 TEST DESCRIPTION

The program checks the printer hardware and firmware characteristics.

The two test stages are:

1. A number of pre-defined characters are printed thus testing the mechanical parts and the control firmware through the controlled activation of the head and the paper feed motor

2. Depending on the printer configuration, the default character set is printed and the extended firmware features are checked.

3.9.2 PART 1

In this part, character sets are printed on a form.

The test in this part is also in two parts:

1. **Head motor activation and paper feed tests**

Character strings are printed on half a form to test when absolute displacements are made when the left margin is re-defined.

Before the test starts, the printer goes through an initialization phase (non-operative commands, such as format definition, module selection etc.)

In each test, five 20-character lines are printed where two tests are performed on each line in the following order:

- double-size characters

- 16.6 char/inch write pitch
  The two tests are related in that they print characters of maximum and minimum width

- underline

- back-space printing
  this step is linked to the previous one and prints the character set with a backspace and an underscore to highlight differences with the previous step

- printing of two overlapping lines of "X" characters
  to highlight alignment between the diagonal lines and the characters themselves

- a line of "E" characters overlaid with "H" characters
  to highlight character alignment

- a line of "O" characters overlaid with "I" characters
  to highlight character centering

- printing with a 12 char/inch pitch

- printing of "E" characters in different positions
  progressively reducing time between printing of one character and the next.

2. **Print tests with relative horizontal displacements and horizontal and vertical tabulation programs.**

   The other half of the form used for the tests above is used with reverse horizontal order.
   The form is inverted to allow any operational differences in the print path to be checked.

3.9.3 PART 2

In the test, 16 lines are printed with a constantly increasing line spacing (from 1 to 8 lines) so as to test the paper feed motor.

The irregular head movements are commanded by way of the relative vertical and horizontal positioning functions.

The data requested at the start of the test will also be used in the course of the test.

The course the test takes depends on the equipment installed:

1. **basic equipment**

   the characters of the default set are printed

2. **basic equipment + APL**

   the characters of the default set and those of the APL set are printed alternatively.
   As the entire APL set is of 127 characters, they are printed on several lines.

3. **basic equipment + TEXTCOMMUNICATION**

   Character strings are printed in the following order:

   - 2 lines with the default characters
   - 12 lines with the national characters
   - 2 lines with the textcommunication characters.

   With the national character sets, the name of the country they belong to is printed out afterwards.

   The national character sets available are:

   - INTERNATIONAL (RUSSIA 1)
   - GERMANY (RUSSIA 2)
   - PORTUGAL
   - SPAIN
   - DENMARK-NORWAY
   - FRANCE
   - ITALY
   - SWEDEN-FINLAND
   - SWITZERLAND
   - GREAT BRITAIN
   - USA-ASCII (GREECE)
   - JAPAN

   If a country is missing, the corresponding line will be skipped.

4. **basic equipment + BIM firmware**

the following are printed in order:

- 1 line with the default characters,
- 14 lines with the BIM characters,
- 1 line with the default characters.

For each BIM line, information on the needle and its position in negative and positive mode will also be given.

3.10 PR 1480

Before the test starts, the operator is asked to specify if the printer status (system or workstation printer).

The prompt is:

IS PR 1480 PRINTER SYSTEM ? (Y/N)

If the printer is the system printer, the operator is asked to give its identity number:

ENTER PRINTER ENTRY(1..4)

The test is in four separate parts.

The features to be tested are:

1. **Three possible print pitches: 10 char/inch, 12 char/inch, 16.6 char/inch; double printing; underline; four-colour and two-colour printing.**

In the test, the character strings listed below are printed on a form for sprockets of more than 13" wide:

- two lines printed in all the colours for each format (normal printing, double printing, three print pitches);
- two sets of five lines each are printed, first with a line feed of 6 lines/inch and then 8 lines/inch;

2. **Print graphics.**

In the test, the character strings listed below are printed on a form for sprockets of more than 13" wide:

- 5 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;
- 5 lines of "O" characters overlaid with "I" characters to test print character centering;
- 5 lines of "E" characters overlaid with "H" characters to ensure correct justification;
- 5 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.
- 5 lines from the graphic font available selected through DIP-switches are printed.

3. **BIM graphics**

A line is printed for each needle in the print head both in positive and in negative and in the four different colours.

4. **Automatic feeder.**

A UNI A4 form, inserted in the automatic feeder, is used in this test.

Before the program prompts are answered affermatively, the form must be inserted in the feeder, which will position it automatically.
The check will be made by printing a number of strips consisting of "H" characters at a decreasing vertical distance while absolute and relative settings both forwards and backwards are made.

Following the test, the form is ejected.

NOTE: Forms used must be UNI A4 format.

3.11 PR 1482

Before the test starts, the operator is asked to specify the status of the printer (system or workstation printer).

The prompt is:

IS PR 1482 PRINTER SYSTEM ? (Y/N)

If the printer is the system printer, the operator is asked to specify its identity number:

ENTER PRINTER ENTRY(1..3)

The test is in three separate parts.

In the first two parts, the prompt used is:

DO YOU WANT PHASE n ? (Y/N)

where n is 1 or 2.
In the third part, the message displayed is:

DO YOU WANT MAKE TEST ON OPTICAL READER ? (Y/N)

The features to be checked are:

1. **Three possible print pitches - 10 char/inch, 12 char/inch, 16.6 char/inch; double printing; underline; two colour printing.**

In the test, character strings are printed on special forms for sprockets more than 13" wide.

- Three lines printed per format (normal print, double printing, in two colours in the three print pitches).

- Two groups of five lines printed, the first with a 6 lines/inch spacing and the second with 8 lines/inch.

2. **Print graphics.**

Here again, character strings are printed on special forms for sprockets more than 13" wide.

- 5 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;

- 5 lines of "O" characters overlaid with "I" characters to test print character centering;

- 5 lines of "E" characters overlaid with "H" characters to ensure correct justification;

- 5 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.

- 5 lines from the graphic font available selected through DIP-switches are printed.

Vertical positioning before each step is handled by a vertical tabulation program.

3. **Optic reader**

The form required should be 23 lines long and print pitch 6 lines/inch.

The form is inserted in the form feeder.

Before this, the operator is prompted as follows:

INSERT SHEET

The form is read only if the response to the following question is affermative:

DO YOU WANT READ ? (Y/N)

All the characters legible will then be printed.
These characters are then read and compared with those written.

After they are compared, the form is sent under a cutter which cuts it when in line with the notch on the feeder.

3.12 PR 1490

Before the test starts, the operator is asked for printer status information.

The first question is on the printer configuration (system printer or workstation printer) and the second is on the firmware extension level. The prompts are as follows:

- **IS PR 1490 PRINTER SYSTEM ? (Y/N)**

  If the printer is the system printer, the operator must enter its identity number as follows:

  ENTER PRINTER ENTRY(1 o 2)

- **ENTER FW EXTENSION LEVEL**
  1 : Basic FW
  2 : Basic FW + APL
  3 : Basic FW + TEXT COMM
  4 : Basic FW + BIM

The test is in two separate parts.

3.12.1 TEST DESCRIPTION

The program checks the printer hardware and firmware characteristics.

The two test stages are:

1. A number of pre-defined characters are printed thus testing the mechanical parts and the control firmware through the controlled activation of the head and the paper feed motor

2. Depending on the printer configuration, the default character set is printed and the extended firmware features are checked.

3.12.2 PART 1

In this part, character sets are printed on a form.

The test in this part is also in two parts:

1. **Head motor activation and paper feed tests**

Character strings are printed on half a form to test when absolute displacements are made when the left margin is re-defined.

Before the test starts, the printer goes through an initialization phase (non-operative commands, such as format definition, module selection etc.)

In each test, five 20-character lines are printed where two tests are performed on each line in the following order:

- double-size characters

- 16.6 char/inch write pitch
  The two tests are related in that they print characters of maximum and minimum width

- underline

- back-space printing
  this step is linked to the previous one and prints the character set with a backspace and an underscore to highlight differences with the previous step

- printing of two overlapping lines of "X" characters
  to highlight alignment between the diagonal lines and the characters themselves

- a line of "E" characters overlaid with "H" characters
  to highlight character alignment

- a line of "O" characters overlaid with "I" characters
  to highlight character centering

- printing with a 12 char/inch pitch

- printing of "E" characters in different positions
  progressively reducing time between printing of one character and the next.

2. **Print tests with relative horizontal displacements and horizontal and vertical tabulation programs.**

   The other half of the form used for the tests above is used with reverse horizontal order.
   The form is inverted to allow any operational differences in the print path to be checked.

3.12.3 PART 2

In the test, 16 lines are printed with a constantly increasing line spacing (from 1 to 8 lines) so as to test the paper feed motor.

The irregular head movements are commanded by way of the relative vertical and horizontal positioning functions.

The data requested at the start of the test will also be used in the course of the test.

The course the test takes depends on the equipment installed:

1. **basic equipment**

   the characters of the default set are printed

2. **basic equipment + APL**

   the characters of the default set and those of the APL set are printed alternatively.
   As the entire APL set is of 127 characters, they are printed on several lines.

3. **basic equipment + TEXTCOMMUNICATION**

   Character strings are printed in the following order:

   - 2 lines with the default characters

   - 12 lines with the national characters

   - 2 lines with the textcommunication characters.

   With the national character sets, the name of the country they belong to is printed out afterwards.

   The national character sets available are:

   - INTERNATIONAL (RUSSIA 1)

   - GERMANY (RUSSIA 2)

   - PORTUGAL

   - SPAIN

   - DENMARK-NORWAY

   - FRANCE

   - ITALY

   - SWEDEN-FINLAND

   - SWITZERLAND

   - GREAT BRITAIN

   - USA-ASCII (GREECE)

   - JAPAN

   If a country is missing, the corresponding line will be skipped.

4. **basic equipment + BIM firmware**

the following are printed in order:

- 1 line with the default characters,
- 14 lines with the BIM characters,
- 1 line with the default characters.

For each BIM line, information on the needle and its position in negative and positive mode will also be given.

3.13 PR 1580

Before the test starts, the operator is asked to supply information on printer status (system printer or workstation printer).

The prompt displayed is:

IS PR 1580 PRINTER SYSTEM ? (Y/N)

If the printer is the system printer, the operator must now enter its identity number as follows:

ENTER PRINTER ENTRY(1..3)

The test is in three separate parts.

Before each, the program prompts:

DO YOU WANT MAKE PHASE n ? (Y/N)

where n is 1, 2 or 3.

The features to be checked are:

1. **Printing:**

   In the test, some character strings will be printed on a form as follows:

   - 4 groups of lines are printed, one for each pitch (10 char/inch, 12 char/inch, 15 char/inc, proportional spacing). Each group consists of:

     - a line printed in high definition
     - a line printed in low definition
     - a line printed in bold face
     - a double height line
     - a double print line.

     For the 15 char/inch spacing, only two lines are printed, one in high definition, the other in bold face as the other print modes are not compatibile.

   - 6 underscored lines. The underscore is performed by alternating on consecutive lines between the underscore option and use of the "_" character under each character printed;

- strings of 8 "H" characters are printed with a progressively increasing line feed and using reverse line feeds (line feeds are: 1/12, 1/8, 1/6, 3/12, 1/3, 5/12, 1/2);

- character strings with half line feeds forwards and backwards are printed

- 4 lines of "X" characters overlaid with other "X" characters to check horizontal and vertical alignment in two-way printing;

- 4 lines of "O" characters overlaid with "I" characters to test print character centering;

- 4 lines of "E" characters overlaid with "H" characters to ensure correct justification;

- 4 lines of "E" characters printed at decreasing distances so as to check head response to varying accelerations.

2. **All national graphic character sets printed.**

This test requires a form on which to print the character sets available. The first set to be printed is the default character set.

Each character set is accompanied with the name of the country.

The sets, in order, are:

- DEFAULT SET
- GERMANY
- PORTUGAL
- SPAIN
- DENMARK_NORWAY
- FRANCE
- ITALY
- SWEDEN_FINLAND
- SWITZERLAND
- GREAT BRITAIN
- USA_ASCII
- TEXTCOMMUNICATION SET
- SEMIGRAPHIC SET

3. **Bit image (BIM) graphic features.**

In this test, a form on which to print the operations outlined below is required.

- 4 lines are printed for each of the 8 BIM components in which the bit in question is set.
  Printing is in positive and in negative both in normal and zoom mode.

- 6 lines are printed in which all the BIM bits are set, constantly increasing the distance in elementary steps between the horizontal dots.

- The previous step is repeated in high resolution.

NOTE: Forms must be at least 72 lines long and 13.2 inches wide.

3.14 PR 2835

The PR 2835 test program is in two parts, each performed only if the operator gives an affermative answer to the program prompts.

The prompt displayed is:

DO YOU WANT MAKE PHASE n ? (Y/N)

where n is 1 or 2.

Two forms are required if the test is to be performed in full, one for each part.

The two parts are:

1. Printing of specific character patterns on a form

2. Printing of all the national graphic character sets.

When an error occurs, the program is suspended and a message displayed on the system console.

Forms must be at least 72 lines long.

3.14.1 PART 1

Character patterns in all the different print formats available are printed on the form. First, however, the operator must specify the type of printer being tested by responding as appropriate to the following prompt:

WHAT RELEASE ?

1) NORMAL
2) SPA 517
3) SPA 518

The patterns are:

1. Sets of 3 lines in normal print and 3 in double size. These sets are repeated for each print pitch incorporated on the machine. The print pitches incorporated depend on the printer release and are as shown below:

   - For normal release, pitches of 10, 12, 16 and 6 characters per inch;

   - For SPA 517, pitches of 10 and 12 characters per inch;

   - For SPA 518, pitches of 10, 16 and 6 characters per inch.

2. Three sets of 8 lines:

   - In the first, "X" characters are overlaid with other "X" characters to horizontal and vertical alignment in two-way printing;

   - In the second, "O" characters are overlaid with "I" characters to check print character centering;

   - In the third, "E" and "H" characters are overlaid to check lateral alignment.

3.14.2 PART 2

All the national character sets are printed on another form in this part. Each set bears the relative country name and is printed on two lines.

They are printed in the following order:

- DEFAULT SET
- INTERNATIONAL SET
- GERMANY SET
- PORTUGAL SET
- SPAIN SET
- DENMARK_NORWAY SET
- FRANCE SET
- ITALY SET
- SWEDEN_FINLAND SET
- SWITZERLAND SET
- GREAT BRITAIN SET
- USA_ASCII SET
- GREEK SET
- ISRAEL SET
- DEFAULT SET

3.15 PR 2845

Before the test starts, the operator is asked for the status of the printer (system printer or workstation printer).

The prompt is:

IS PR 2845 PRINTER SYSTEM ? (Y/N).

If the printer is the system printer, the operator must then specify its identity number as follows:

ENTER PRINTER ENTRY (1..4)

The test is in four separate parts.

This test program consists of printing certain character strings on the different virtual printers of the unit. The method of testing differs depending on the options mounted. The SCR 2871 and CTR 2848, however, are not considered because the computer does not have the required commands for these options.

When the program wishes to print on the automatic feeder, an exchange is initiated with an operator:

- First, the STATION 1 LED on the printer console comes on; afterwards, the TURN PAGE LED is used.

- At each point, the operator must insert a form or bank passbook and press the lit pushbutton to inform the operating system that the program can continue.

  Printing is with a spacing of 10 char/inch, and normal except where otherwise specified.

  Where an error occurs, the test is interrupted and a message displayed by the system console program.

  At the start of each new part, a certain number of messages are displayed.

3.15.1 PART 1

This part is designed to check text justification and reveal print irregularities on the virtual printers, one at a time.

Before the first part, there is an initialization phase in which the program informs the user which side, left or right, of the automatic feeder is to be used for insertion of the forms or passbook.

For the left platen (or the sprocket indicator when present) and the automatic feeder, the steps are performed twice, once on the left margin and once on the right margin.

When the five steps have been carried out on each virtual printer, they are repeated with the 12 char/inch spacing. The 10 char/inch spacing is then restored at the end of the test.

Horizontal tabulation is used to move the printer head horizontally.

Steps are separated from each other by vertical tabulation spacing.

Before each step is performed on the front feeder, the operator must insert a new form in the automatic feeder, as indicated by the TURN PAGE LED, and then press the TURN PAGE pushbutton.

The steps are:

- 5 lines of "X" characters are printed to check horizontal and vertical alignment of the print characters. These characters are then overlaid in the head return phase with another series of "X" characters to test for anomalies in the two print modes;
- 5 lines of "X" characters are printed in double thickness to illustrate differences with the previous test.
  In this step, the number of characters printed is reduced by half;
- five lines of "0" characters overlaid with "I" characters are printed to check character centering;
- 5 lines of "E" characters overlaid with "H" characters are printed to check character justification;
- 5 lines of "X" characters separated by a decreasing number of spaces are printed to test printer behaviour when subjected to sudden accelerations.

3.15.2 PART 2

Movement of the head is tested by consecutively selecting the different virtual printers of the unit, thus making it move from one printer to another.

In the test, a line of "X" characters is printed on the left platen and then a line on the front feeder, following head return from the left platen, the cycle is repeated 5 times, and 5 lines are printed for each virtual printer.

This cycle of 5 lines is repeated, varying the printer order, first the front feeder, then the right platen and then the left platen.

3.15.3 PART 3

In this part, 5 lines will be printed on the left platen of the virtual printer.
These lines will contain all of the national set characters selected when the printer is switched on.

3.15.4 PART 4

If the VMF 2874 option is present, the operator will be asked to insert a bank passbook with magnetic strip on the front feeder. The magnetic strip must be on the same side as magnetic head mounted on the printer head. The strip code is first read and displayed on the system console in hex.

If the strip is blank, the program displays a warning message and goes ahead. This type of error may also occur when the printer is unable to read the strip, either because it is on the wrong side or because it is not present.

Then three character strings with the same length in bytes as the characters read previously and an incrementing number on/off bits are printed, thus offering different densities to the magnetic head.

The hex codes are 5555 in the first step, 3333 in the second and 0F0F in the third.

At the end, the program writes on the magnetic strip the code read originally, leaving the strip inaltered, even if it was not blank.

3.16 PR 2880

The PR 2880 test program is in three parts, each part being performed only if the operator responds affirmatively to a program prompt. This is the only operator action required.

The prompt dispalyed is:

DO YOU WANT MAKE PHASE n ? (Y/N)

where n may be 1, 2 or 3.

The three parts are:

1. Printing of specific character patterns;

2. Printing of all the national graphic character sets;

3. Operation of the form endorser is checked in the third part.

When an error occurs, the program is suspended and an appropriate message displayed by the program on the system console.

3.16.1 PART 1

The following character patterns are displayed:

1. Four groups of 10 lines each, one group for each of the print pitches, 10 and 12 characters per inch, in both normal and double print;

2. Twenty lines of "X" characters, each line with a decreasing number of characters. This is to test how the print head reacts to a varying rate of accelaration.

3.16.2 PART 2

All the national character sets are printed.

The sets are:

1. DEFAULT

2. INTERNATIONAL

3. GERMANY

4. PORTUGAL

5. SPAIN

6. DENMARK_NORWAY

7. FRANCE

8. ITALY

9. SWEDEN_FINLAND

10. SWITZERLAND

11. GREAT BRITAIN

12. USA_ASCII

13. JAPAN

14. SPECIAL SIMBOL

3.16.3 PART 3

This part of the test checks the form endorser module. The operator will be asked to insert the appropriate form when the following prompt is displayed:

PRESS BUTTON STATION 1
INSERT SHEET
REPRESS BUTTON STATION 1

If the form is inserted correctly, the mention "O K" will be printed on it 10 times.

3.17 PR 2890

Before the test starts, the operator is asked to enter the printer status (system printer or workstation status).

The prompt is:

IS PR 2890 PRINTER SYSTEM ? (Y/N).

If the printer is the system printer, the operator must now enter its identity number as follows:

ENTER PRINTER ENTRY (1..4)

The test is in 4 parts.

A form is required for each part.

Forms will be cut singly if the "Automatic cut" is enabled; they are cut every two forms if it is disabled (DIP-switch # 6 on/off)

The different parts are as follows:

3.17.1 PART 1

Three sets of 4 lines, each containing a number of character sequences are printed. The sequences are identical for all 3 sets and consist of:

- 20 "X" characters to check horizontal and vertical alignment
- 20 "O" characters, overlaid with "I" characters to check centering
- 20 "E" characters overlaid with "H" characters to check justification.

Separation between one step and the next is had by printing a number of spaces; between the three sets, it is had through vertical tabulation.

3.17.2 PART 2

The same character sequences as above are printed again, this time, however, in double print.
In this way, the results of the two parts may be compared, the different print density highlighting any anomalies.

In this part, the steps are all 10 characters long so that the text remains perfectly justified. Vertical spacing between the two formats is handled by the firmware "advance n lines" feature.

3.17.3 PART 3

In this part, with a 10 char/inch format, 15 lines are printed with a decreasing number of "X" characters so that the final result looks like a "V". This check is designed to test the printer with sharp accelerations; the different dot density on each line also constitutes a serious test for the print needle circuits.

3.17.4 PART 4

With a 10 char/inch spacing, the national character sets available on the printer are printed. If a certain character set is not available, the LED on the front panel lights and printing continues with the remaining sets.

At the end, the character sets return to their original position when the printer was switched on.

Character sets available are:

- INTERNATIONAL
- GERMANY
- PORTUGAL
- SPAIN
- DENMARK - NORWAY
- FRANCE
- ITALY
- SWEDEN - FINLAND
- SWITZERLAND
- U.K.
- USA ASCII
- LATIN - GREEK
- LATIN - HEBREW

3.18 PR 3300

Before starting the PR 3300 test program, the operator must set the FLS 3304 format length selector, if present, to position VFU.

The operator is then asked to specify the number of characters available on the character belt.

The prompt is as follows:

INSERT NUMBER OF CHARS AVAILABLE (64 or 96)

When an error occurs, the program is suspended and a message displayed by the program on the system console.

All forms must be at least 13.2 inches wide.

The test starts by loading a vertical tab program from the line and skipping on the first tab stop loaded.

The test continues by printing all the characters available on a line 132 characters long and then repeating the line 10 times.

In the final part of the test, after 10 line feeds have been given, a line 132 characters long is printed for each of the characters available.

3.19 PR 3600

Before starting the PR 3600 test program, the operator must set the FLS 3304 format length selector, if present, to position VFU.

The operator is then asked to specify the number of characters available on the character belt.

The prompt is as follows:

INSERT NUMBER OF CHARS AVAILABLE (64 or 96)

When an error occurs, the program is suspended and a message displayed by the program on the system console.

All forms must be at least 13.2 inches wide.

The test starts by loading a vertical tab program from the line and skipping on the first tab stop loaded.

The test continues by printing all the characters available on a line 132 characters long and then repeating the line 10 times.

In the final part of the test, after 10 line feeds have been given, a line 132 characters long is printed for each of the characters available.

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