

Bull ESCALA

Using the Disk Expansion Unit

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Bull ESCALA

Using the Disk Expansion Unit

Hardware

February 2000

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Communication Statements

The following statements apply to this product. The statements for other products intended for use with this product appears in their accompanying manuals.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Neither the provider or the manufacturer are responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

EC Council Directive

This product is in conformity with the protection requirements of the following EC Council Directives:

- 89/336/EEC and 92/31/EEC (for the electromagnetic compatibility)
- 73/23/EEC (for the low voltage)
- 93/68/EEC (for CE marking).

Neither the provider nor the manufacturer can accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of option cards not supplied by the manufacturer.

International Electrotechnical Commission (IEC) Statement

This product has been designed and built to comply with IEC Standard 950.

Avis de conformité aux normes du ministère des Communications du Canada

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Canadian Department of Communications Compliance Statement

This Class A digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations.

VCCI Statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

The following is the translation of the VCCI Japanese statement in the box above.

This is a Class A product based on the standard of the Voluntary Control Council for Interferences by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Safety Notices

Definitions of Safety Notices

A *danger* notice indicates the presence of a hazard that has the potential of causing death or serious personal injury.

A *caution* notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury.

A *warning* notice indicates an action that could cause damage to a program, device, system, or data.

Placement of Safety Notices Inside This Guide

System safety notices which do not refer to a specific situation are included in these pages. Any specific safety notices are mentioned inside this guide whenever these must be observed during system operating or handling.

IT Power Systems

This equipment has been designed also for connection to IT Power Systems.

Device Disconnection

To remove the primary power from the unit, unplug the “Appliance Coupler” on the rear side.

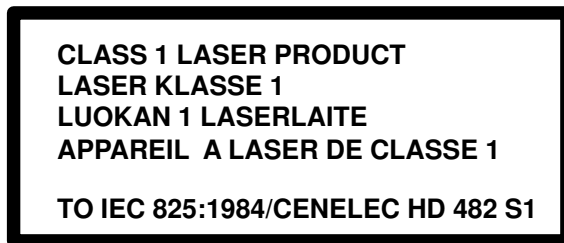
Laser Safety Information

Note: The Optical Link Card (OLC) referred to in this information is part of the Serial Optic Channel Converter assembly.

This system may contain a laser product called the Optical Link Card (OLC). In the U.S., the OLC is certified as a Class 1 laser product that conforms to the requirements contained in the Department of Health and Human Services (DHHS) regulation 21 CFR Subchapter J. Internationally, the OLC is certified as a Class 1 laser product that conforms to the requirements contained in the International Electrotechnical Commission (IEC) standard 825 (1984), the Verband Deutscher Elektrotechniker (VDE) standard 0837 (1986), and the CENELEC (European Committee for Electrotechnical Standardization) Harmonization Document HD 482 S1 (1988). The German testing institute VDE assigned a certificate of conformity to DIN IEC 825/VDE 0837/02.86 and CENELEC HD 482 S1/03.88; the certificate registration number is 3642.

In addition, Statens Provningsanstalt (Swedish National Testing Institute) tested and approved the OLC for use in Sweden as a Class 1 laser product and assigned the approval number SP LA 89:184. The CDRH certification label and the VDE certificate of conformity mark are located on the plastic retainer of the OLC product. The figure shows the system Class 1 information label required by IEC 825.

Class 1 laser products are not considered to be hazardous. The OLC internally contains a gallium aluminum arsenide (GaAlAs) semiconductor laser diode emitting in the wavelength range of 770 to 800 nanometers. This laser diode is a Class 3B laser that is rated at 5.0 milliwatts. The design of the OLC is such that access to laser radiation above a Class 1 level during operation, user maintenance, or service conditions is prevented.



The Optical Link Card (OLC) must only be connected to another OLC or a compatible laser product. Any compatible laser product must contain the open fiber link detection and laser control safety system used in OLC. This is a requirement for correct operation of the optical link. In addition, the OLC product is designed and certified for use in applications with point-to-point optical links only. Using this product in any other type of optical link configuration (for example, links containing optical splitters or star couplers) is considered as not using the product correctly and may require that the user certify the laser product again for conformance to the laser safety regulations.

About This Guide

Audience

This guide is addressed to disk expansion unit users. It describes the disk expansion unit features, operator controls and device configuration.

Overview of the Contents

- Chapter 1, **Disk Expansion Unit Description**, gives a description of the disk expansion unit features and operator panel functions.
- Chapter 2, **Starting and Stopping Procedures**, gives a description of the starting and stopping operations.
- Chapter 3, **Disk Expansion Unit Configuration**, describes the configuration of the device areas. Also, some configuration examples are included.

Related Publications

- *Disk Expansion Unit Quick Set Up* (86 A1 12PX), contains the step by step hardware procedures for a quick set up of the disk expansion unit.
- *Disk Expansion Unit Service Guide* (86 A1 13PX), provides the description of the expansion unit hardware components, instructions for their installation and/or replacement and information about the SCSI cables. This guide is addressed to people trained to perform service tasks on the system.

For any additional information you may need, please refer the base unit documentation set.

Information which is also relevant to the disk expansion unit, can be found in the following documentation.

- *Disks and Tapes Configuration Information* (86 A1 88GX), describes the setting of addresses and switches for both disk and tape drives. It also includes information on CD-ROM drive settings.
- *Bull ESCALA PowerCluster & HA Solutions Setup Guide* (86 A2 79HX), describes how to set up PowerCluster and High Availability solutions; it discusses both the hardware and software aspects.

Chapter 1. Disk Expansion Unit Description

Knowing the Disk Expansion Unit

This section provides a brief description of the disk expansion unit and helps you become familiar with its components.

Up to two disk expansion units can be connected to the base unit (one for each side).

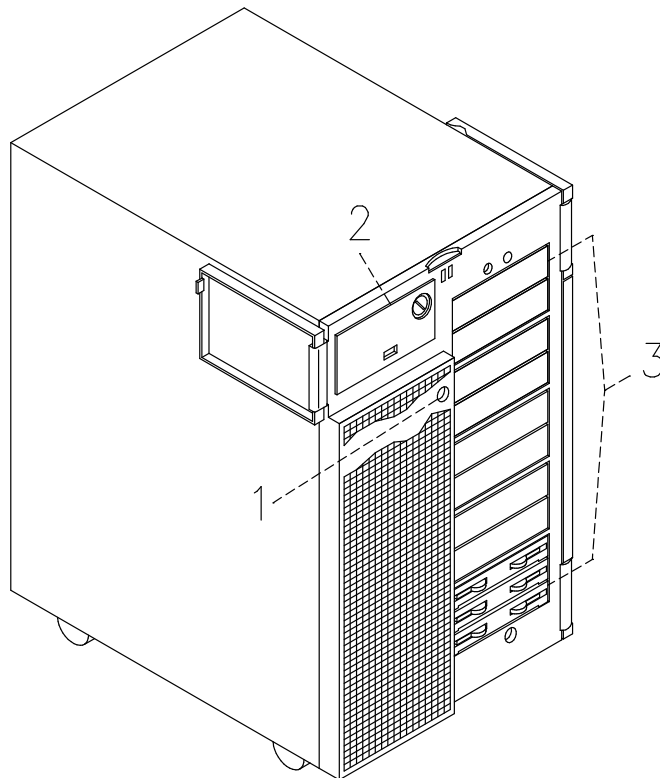
The disk expansion unit can host:

- Up to two media drives, such as CD-ROM, 4 mm/8mm tape, MLR tape
- Up to eight x 1.6-inch hard disk drives or up to twelve x 1-inch hard disk drives.

The type of used disks depends on and is the same as the type of disks used in the base unit.

Disk Expansion Unit Front View

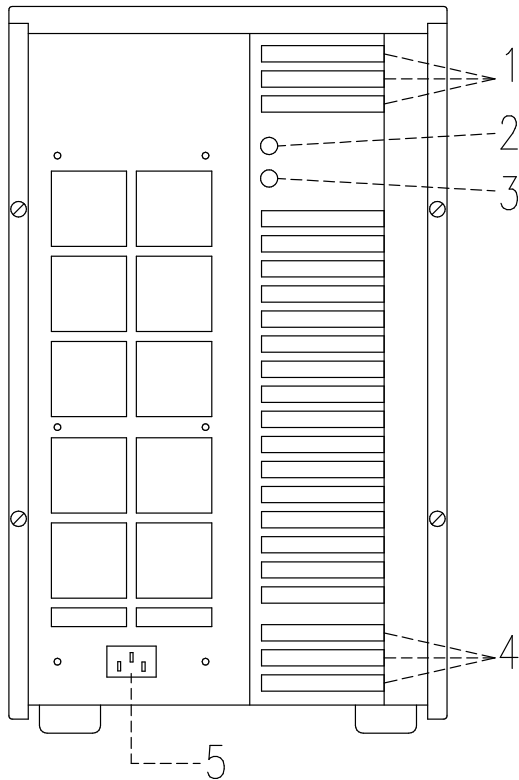
From the front of the unit, you can access to the following features and components:



- 1 Device shutter key lock
- 2 Operator panel
- 3 Media and disk devices area

Disk Expansion Unit Rear View

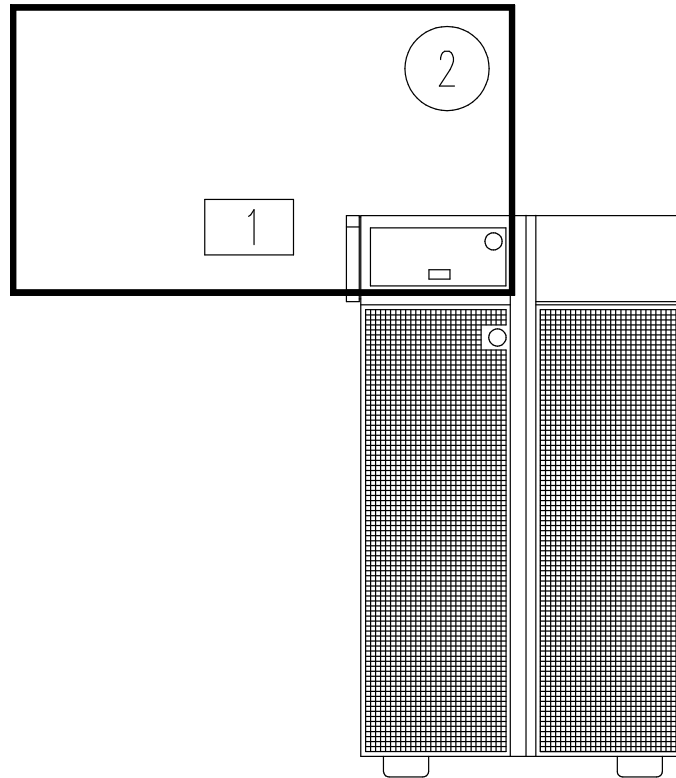
From the rear of the unit, you can identify the following connectors:



- | | | |
|----------|------------------------|---|
| 1 | SCSI input receptacles | Used for SCSI connection to the base unit |
| 2 | RS-485 input port | Used for unit interconnection |
| 3 | RS-485 output port | Used for unit interconnection |
| 4 | SCSI input receptacles | Used for SCSI connection to the base unit |
| 5 | Power cord receptacle | Used to connect power cord |

Disk Expansion Unit Operator Panel

The disk expansion unit operator panel is installed in the front of the unit.



- 1 LED
- 2 Key mode switch

The LED and the key mode switch are enabled only when AC power is present in the disk expansion unit.

LED

It indicates the power on state of the disk expansion unit:

- When the **green** light is **on**, all voltages in the power supply are present and within specified limits
- When the light is **off**, the disk expansion unit is in standby state (that is, connected to AC power but not powered on).

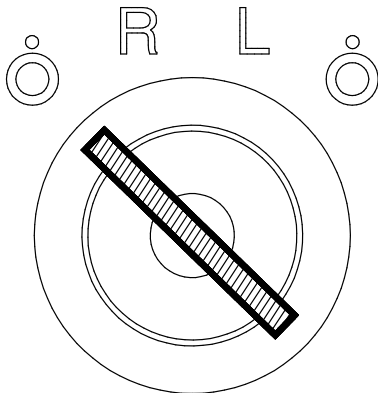
Key Mode Switch

The power on of the disk expansion unit can be managed:

- By the base unit, through a RS-485 interconnection (Remote Control)
- or
- By the disk expansion unit itself (Local Control).

The way power is managed is determined by the position of the disk expansion unit key mode switch, when the disk expansion unit power cord is connected to the AC outlet.

The key mode switch provides three logical functions, spread on four physical positions, as described below.



- **O** (Local Standby)

This function is spread on two physical positions which can be used without distinction in Local Control only.

When the key mode switch is in one of these positions, the disk expansion unit is in standby state waiting for a power on command (shift of the key mode switch to **L** position).

Turning from the **L** position to one of these positions, powers off the disk expansion unit and puts it in the standby state.

- **R** (Remote Control)

This is the position of the Remote Control to be used for standard configurations. The disk expansion unit can be powered on/off only by the base unit, through the RS-485 connection.

Once the disk expansion unit is powered on with the key set to **R** position, moving the key mode switch to any other position does not have any effect.

- **L** (Local Control)

This is the position of the Local Control. The disk expansion unit is powered on overriding the RS-485 power control. Once the disk expansion unit is powered on with the key set to the **L** position, moving the key mode switch to any other position powers off the unit.

Note: The disk expansion unit must be powered off (power cord disconnected) to change from Remote to Local Control and viceversa.

The key can be removed only in the **O** positions.

Physical Dimensions

The table below lists the dimension of the disk expansion unit.

Height	24.8 inches	630 mm
Width	13.9 inches	353 mm
Depth	19.7 inches	500 mm
Weight	100 lbs	45 kg*

* This value corresponds to a maximum disk expansion unit configuration (i.e. including a maximum number of devices).

Standards

The disk expansion unit complies with the following standards:

Hardware

- EMC-CISPR 22 Class A
- VDE871-2 Class A (ESCALA E and T only)
- CSA C108.8 Class A
- CISPR 22
- EN 55022 Class A
- FCC CFR-47 Class A
- VCCI Class A
- Safety:
 - European: EN 60950
 - USA: UL 1950
 - Canada: CSA C22.2 No. 950
 - Rest of the World: IEC950.

The disk expansion unit is also compliant with the following European directives:

- 73/23/EEC
- 89/336/EEC and 92/31/EEC
- 93/68/EEC.

Firmware

- IEEE1275CSA C108.8-1994 (Open Firmware).

Operating Specifications ESCALA E and T Series

The disk expansion unit operates correctly with the following working conditions.

Environment Specifications

Relative Humidity

	System Running	System On Standby
Relative Humidity:	from 20% to 80% without condensation	from 5% to 95% without condensation
Gradient:	10%/h	30%/h
Max. Wet Bulb Temperature:	+24°C (+75.2°F)	+28°C (+82.4°F)
Moisture Content:	0.019kg water/kg dry air	0.024kg water/kg dry air

Environment Temperature

	System Running	System On Standby
Dry Bulb Temperature:	from +10°C to +40°C (from +50°F to +104°F)	from +5°C to +50°C (from +41°F to +122°F)
Gradient:	10°C/h (50°F/h)	25°C/h (77°F/h)

Barometric Pressure

Min:	747 hPa (altitude 2500 m)
Max:	1020 hPa (altitude -150 m)

Electrical Specifications

Power International Standard

IEC 555-2 (IEC 1000-3-2)

Unit Power

950 VA

Operating Voltage

Voltage:	100 Vac to 127 Vac	Nominal, Auto ranging	+6%, -10%
	200 Vac to 240 Vac	Nominal, Auto ranging	+6%, -10%

Frequency range: 50 to 60 Hz ±3%

Current:	Max 9.5 A	at 100 Vac
	Max 4.5 A	at 200 Vac

Operating Specifications ESCALA E230, T430, E250 and T450

The disk expansion unit operates correctly with the following working conditions.

Environment Specifications

Relative Humidity

	System Running	System On Standby
Relative Humidity:	from 20% to 80% without condensation	from 5% to 95% without condensation
Gradient:	10%/h	30%/h
Max. Wet Bulb Temperature:	+24°C (+75.2°F)	+28°C (+82.4°F)
Moisture Content:	0.019kg water/kg dry air	0.024kg water/kg dry air

Environment Temperature

	System Running	System On Standby
Dry Bulb Temperature:	from +10°C to +38°C (from +50°F to +100.4°F)	from +5°C to +50°C (from +41°F to +122°F)
Gradient:	10°C/h (50°F/h)	25°C/h (77°F/h)

Barometric Pressure

Min:	747 hPa (altitude 2500 m)
Max:	1020 hPa (altitude -150 m)

Electrical Specifications

Power International Standard

IEC 61000-4-2-3 - EN 61000-4-2-3

Unit Power

950 VA

Operating Voltage

Voltage:	100 Vac to 127 Vac	Nominal, Auto ranging	+6%, -10%
	200 Vac to 240 Vac	Nominal, Auto ranging	+6%, -10%

Frequency range: 50 to 60 Hz ±3%

Current:	Max 9.5 A	at 100 Vac
	Max 4.5 A	at 200 Vac

Chapter 2. Starting and Stopping Procedures

The starting and stopping procedures of the system are determined by the way the power of the disk expansion unit is controlled:

- Remote Control, power is controlled by the base unit through the RS-485 interconnection, key in **R** position
- Locat Control, power is controlled by the disk expansion unit itself, key in **L** position.

These paragraphs describe, step by step, the starting and stopping procedures for daily operation of your system.

Note: The procedures below, foresee starting and stopping of base and expansion units. For maintenance purposes, it is also possible to start or stop the expansion unit(s) separately from the base one, provided that the expansion unit(s) power is not remotely controlled by the base unit. Please, refer to the *Disk Expansion Unit Service Guide*, **Preliminary and Restart Operations** paragraphs, for details.

Starting Operations

CAUTION:

For proper cooling and safe operation of the computer, all the covers must be in place before you power up the system units.

Remote Control

1. Make sure that the RS-485 cable(s) from unit to unit is properly connected.
2. Make sure that the key mode switch of the base unit is set to the Power Off position.
3. Make sure that the disk expansion unit key mode switch is set to the **R** position (Remote Control).


Note: The disk expansion unit key position is sensed when the disk expansion unit power cord is connected to its outlet. Make sure you set the key position, before connecting the disk expansion unit power cord.

4. Make sure that the power cord of the external devices, if any, are connected to the power outlets.
5. Make sure that the power cord of the disk expansion unit is connected to the power outlet.
6. Make sure that the power cord of the base unit is connected to the power outlet.
7. Switch on the external devices, if connected.
8. Switch on the system console.
9. Set the base unit key mode switch to the Normal position to power on the entire system.

Note: Powering on the system by setting the key mode switch of the base unit to the Service position, you enter the operating system diagnostic mode.

The system begins its normal startup routine and is ready for use.

Local Control

1. Make sure that the disk expansion unit(s) key mode switch is set to the  position (Local Standby).

Note: The disk expansion unit key position is sensed when the disk expansion unit power cord is connected to its outlet. Make sure you set the key position, before connecting the disk expansion unit power cord.

2. Make sure that the power cord of the disk expansion unit is connected to the power outlet.
3. Make sure that the power cord of the base unit is connected to the power outlet.
4. Switch on the external devices, if connected.
5. Switch on the system console.
6. Power on the disk expansion unit(s) by setting the key mode switch to the **L** Position (Local Control).
7. Power on the base unit by setting its key mode switch to the Normal position.

The system begins its normal startup routine and is ready for use.

Stopping Operations


Remote Control

Perform the following actions:

1. Exit any applications that are running. Consult the application manuals for instructions.
2. Check that the media drives, if any, do not contain any media.
3. Exit the operating system using the appropriate **shutdown** command. Refer to the operating system documentation.
4. Set the key mode switch of the base unit to the Power Off position.

Local Control

Perform the following actions:

1. Exit any applications that are running. Consult the application manuals for instructions.
2. Check that the media drives, if any, do not contain any media.
3. Exit the operating system using the appropriate **shutdown** command. Refer to the operating system documentation.
4. Set the key mode switch of the disk expansion unit to the  position (Local Standby).
5. Set the key mode switch of the base unit to the Power Off position.

Chapter 3. Disk Expansion Unit Configuration

This section provides information about the device configuration supported by the disk expansion unit.

Hard disk drives and/or media drives, installed in the disk expansion unit, must be managed by additional SCSI controllers installed in the base unit according to the recommended installation sequence described in the base unit documentation set.

Each base unit SCSI controller can manage up to two disk expansion unit areas. Three base unit SCSI controllers are necessary to manage a fully configured disk expansion unit.

Note: The disk expansion unit houses the same type of disks of the base unit it is connected to.

Some configuration examples are provided in the *Disk Expansion Unit Service Guide*.

Disk Expansion Unit Device Configuration for ESCALA E and T Series

The disk expansion unit has five device areas. These are located vertically, on the right of the front side of the unit.

Front Side	Area 1
	Area 2
	Area 3
	Area 4
	Area 5

A description of the use of the device areas is given below:

- Area 1 hosts up to two 1.6-inch media drives
- Areas 2, 3, 4 and 5 may host each either up to two 1.6-inch ULTRA/SE disk drives or up to three 1-inch ULTRA/SE disk drives.

A disk cage is required to install hard disk drives. Each disk cage occupies one area. There are two types of disk cage:

- KP2 disk cage, to connect up to two 1.6-inch hard disk drives
- KP3 disk cage, to connect up to three 1-inch hard disk drives.

The connection to the SCSI bus is done through the disk cage back planes.

Each SCSI bus supports the connection of up to two disk cages.

No disk cage is required to install media drives. They are installed on the unit chassis and directly connected to the SCSI bus.

When devices are not present, plugs are mounted in front of the empty slots.

Configuration Rules

Specific rules are given to make the installation and management of SCSI devices easier, and obtain the best performances.

- Install devices beginning always from the upper free slot inside the area
- A mix of KP2 and KP3 disk cages is allowed
- A mix of media drives and hard disk drives inside the same area is not allowed.

Refer to **SCSI-ID Configuration**, on page 3-5, for details about the SCSI-ID identification that the device will acquire once it is installed and for some suggestions about the device installation sequence.

Refer to the documentation delivered with the device for characteristics and configuration requirements, if any.

Disk Expansion Unit Device Configuration for ESCALA E230, T430, E250 and T450

The disk expansion unit has five device areas. These are located vertically, on the right of the front side of the unit.

Front Side	Area 1
	Area 2
	Area 3
	Area 4
	Area 5

A description of the use of the device areas is given below:

- Area 1 hosts up to two 1.6-inch media drives
- Areas 2, 3, 4 and 5 host up to three 1-inch ULTRA-2/LVD disk drives.

A FD3 disk cage is required to install hard disk drives. Each disk cage occupies one area.

The connection to the SCSI bus is done through the disk cage back planes.

Each SCSI bus supports the connection of up to two disk cages.

No disk cage is required to install media drives. They are installed on the unit chassis and directly connected to the SCSI bus.

When devices are not present, plugs are mounted in front of the empty slots.

Configuration Rules

Specific rules are given to make the installation and management of SCSI devices easier, and obtain the best performances.

- Install devices beginning always from the upper free slot inside the area
- A mix of media drives and hard disk drives inside the same area is not allowed.

Refer to **SCSI-ID Configuration**, on page 3-5, for details about the SCSI-ID identification that the device will acquire once it is installed and for some suggestions about the device installation sequence.

Refer to the documentation delivered with the device for characteristics and configuration requirements, if any.

Disk Hot Swapping

If a hard disk drive is faulty, it can be removed and replaced without interrupting the system activity through the hot swapping feature implemented on your system. The detailed description of actions to be taken is given in the base unit documentation set.

Disk Expansion Unit RAID Configuration

The disk expansion unit devices can be included in a RAID configuration.

A maximum of two SCSI busses can be managed in RAID configurations. These are the busses managing Area 5 (and Area 4 if managed by the same bus) and Area 3 (and Area 2 if managed by the same bus).

Notes:

1. **Devices in Area 1, if present, can never be included in a RAID configuration.**
2. **High Availability configurations are not supported by RAID controllers.**

Disk Expansion Unit High Availability Configuration

The disk expansion unit can be included in High Availability configurations. A typical High Availability configuration could include two base units and one disk expansion unit, connected in such a way that a complete redundancy is guaranteed.

Native High Availability configuration works only in SE mode.

For more detailed information on the possible configurations and how to perform the connections from unit to unit, refer to the *Disk Expansion Unit Service Guide*, **SCSI Cables Description and Connection** section.

SCSI-ID Configuration

Each SCSI device must be identified on the SCSI bus by a logical address, called SCSI-ID.

Media Drive SCSI-ID

Before installing a media drive, it is necessary to define its SCSI-ID. This is normally done through switches or jumpers placed at the rear of the device. See the documentation delivered with the device for the details on setting.

Note: If you purchased the media drive from a supplier other than your system supplier, be sure that the device itself has no SCSI terminator. Refer to the documentation delivered with the device.

The SCSI-ID to be set for a given media drive depends on the physical position of this device.

The following table shows the correspondence between physical position and SCSI-ID for media drives installed on your system. It also gives the suggested installation sequence. Notice that there is not a direct link between the installation sequence and the SCSI-ID. Even if the installation sequence is not the one reported here, you must keep the correspondence between physical position and SCSI-ID.

DISK EXPANSION UNIT - MEDIA DRIVE CONFIGURATION TABLE

Area	Physical Position	SCSI-ID
1	M1 M2	6 5
2	— —	— —
3	— —	— —
4	— —	— —
5	— —	— —

Legend:

Mn = M media drive

n number giving the installation sequence of the devices inside the expansion unit.

Hard Disk Drive SCSI-ID

Hard disk drives are identified by a SCSI-ID which is automatically defined as the hard disk drive is installed in a given position. No manual intervention is required.

Note: If you purchased the hard disk drive from a supplier other than your system supplier, be sure that:

- The ULTRA/SE disk drive itself has no SCSI-ID, no SCSI terminator and no motor delay jumper set
- The ULTRA-2/LVD disk drive itself has no SCSI-ID set, but the motor delay jumper set.

For further details, please refer to the documentation delivered with the device.

The following table details the correspondence between physical position and SCSI-ID for hard disk drives installed on the disk expansion unit.

Notice that there is not a direct link between the installation sequence and the SCSI-ID. Even if the installation sequence is not the one reported here, the correspondence between physical position and SCSI-ID remains unchanged.

**DISK EXPANSION UNIT - HARD DISK DRIVE CONFIGURATION TABLE
(KP2 disk cages)**

Area	Physical Position	SCSI-ID
1	– –	– –
2	D7 D8	8 9
3	D5 D6	0 1
4	D3 D4	8 9
5	D1 D2	0 1

**DISK EXPANSION UNIT - HARD DISK DRIVE CONFIGURATION TABLE
(KP3 or FD3 disk cages)**

Area	Physical Position	SCSI-ID
1	– – –	– – –
2	D10 D11 D12	8 9 A
3	D7 D8 D9	0 1 2
4	D4 D5 D6	8 9 A
5	D1 D2 D3	0 1 2

Legend:

Dn = D hard disk drive

n number giving the installation sequence of the devices inside the expansion unit.

Disk Expansion Unit Configuration Examples

These tables give some device configuration examples. They include some standard configuration examples, one RAID configuration example and one High Availability configuration example.

For more detailed information on other possible configurations, including the information on the physical connections of SCSI cables and jumpers, necessary to implement these configurations, please refer to the *Disk Expansion Unit Service Guide*, **SCSI Cables Description and Connection** section.

1st STANDARD CONFIGURATION EXAMPLE

This example shows a disk expansion unit reduced configuration; it includes only disk devices in Areas 5 and 4 and, therefore, only one base unit SCSI controller. In this example, the disk expansion unit is equipped with KP3 or FD3 disk cages.

SCSI Connection	Area	Physical Position	SCSI-ID
	1	– –	– –
	2	– – –	– – –
	3	– – –	– – –
Base Unit Additional SCSI Controller (#1)	4	D4 D5 D6	8 9 A
Base Unit Additional SCSI Controller (#1)	5	D1 D2 D3	0 1 2

Legend:

Dn = D hard disk drive

n number giving the installation sequence of devices inside the expansion unit.

2nd STANDARD CONFIGURATION EXAMPLE

This example shows a disk expansion unit full configuration with two media devices; it includes disk devices in Areas 5, 4, 3 and 2, media devices in Area 1 and three base unit SCSI controllers. In this example, the disk expansion unit is equipped with both KP2 and KP3 disk cages.

SCSI Connection	Area	Physical Position	SCSI-ID
Base Unit Additional SCSI Controller (#3)	1	M1	6
		M2	5
Base Unit Additional SCSI Controller (#2)	2	D9	8
		D10	9
Base Unit Additional SCSI Controller (#2)	3	D7	0
		D8	1
Base Unit Additional SCSI Controller (#1)	4	D4	8
		D5	9
		D6	A
Base Unit Additional SCSI Controller (#1)	5	D1	0
		D2	1
		D3	2

Legend:

M = media drive

D = hard disk drive

n = number giving the installation sequence of the devices inside the expansion unit.

RAID CONFIGURATION EXAMPLE

This example shows a disk expansion unit full RAID configuration (Areas 5, 4, 3 and 2), plus media devices in Area 1. In this example, the disk unit is equipped with KP3 or FD3 disk cages and one RAID controller uses two SCSI busses (RAID Bus #0 and RAID Bus #1).

SCSI Connection	Area	Physical Position	SCSI-ID
Base Unit Additional SCSI Controller (#1)	1	M1	6
		M2	5
Base Unit RAID Controller (RAID Bus #0)	2	D10	8
		D11	9
		D12	A
Base Unit RAID Controller (RAID Bus #0)	3	D7	0
		D8	1
		D9	2
Base Unit RAID Controller (RAID Bus #1)	4	D4	8
		D5	9
		D6	A
Base Unit RAID Controller (RAID Bus #1)	5	D1	0
		D2	1
		D3	2

Legend:

M = media drive

D = hard disk drive

n = number giving the installation sequence of the devices inside the expansion unit.

HIGH AVAILABILITY CONFIGURATION EXAMPLE

This example shows the connection of a disk expansion unit with two base units (A, B) in a High Availability configuration.

In this configuration, the hard disk devices installed in Areas 3 and 2 of each base unit are mirrored with the hard disk devices installed in the disk expansion unit. The disk unit is equipped with both KP2 and KP3 disk cages. In addition, the media devices installed in Area 1 of the disk expansion unit are shared between the two base units connected to it. Notice that the controllers are not RAID controllers, as High Availability configurations are not supported by RAID controllers.

SCSI Connection	Area	Physical Position	SCSI-ID
Base Unit A SCSI Controller (#3) and-Base Unit B SCSI Controller (#3)	1	M1	6
		M2	5
Base Unit A SCSI Controller (#2) and Base Unit B SCSI Controller (#2)	2	D9	8
		D10	9
Base Unit A SCSI Controller (#2) and Base Unit B SCSI Controller (#2)	3	D7	0
		D8	1
Base Unit A SCSI Controller (#1) and Base Unit B SCSI Controller (#1)	4	D4	8
		D5	9
		D6	A
Base Unit A SCSI Controller (#1) and Base Unit B SCSI Controller (#1)	5	D1	0
		D2	1
		D3	2

Legend:

M = media drive

D = hard disk drive

n = number giving the installation sequence of the devices inside the expansion unit.

Upgrading the Disk Expansion Unit

- Adding Media and Hard Disk Drives**

Refer to the base documentation set.

- Adding a Disk Cage**

Refer to the *Disk Expansion Unit Service Guide*, **Disk Expansion Unit Hardware Maintenance** section.

Glossary

A

A: Ampere.

AC: Alternating Current.

AIX: IBM's implementation of UNIX operating system.

ANSI: American National Standards Institute.

ASCII: American Standard Code for Information Interchange.

ASIC: Application Specific Integrated Circuit.

AUI: Attachment Unit Interface.

B

No entries.

C

CD-ROM: Compact Disc Read-Only Memory. High-capacity read-only memory in the form of an optically readable compact disc.

D

DC: Direct Current generated by the power supply.

DDS: Digital Data Storage.

device areas: See media and disk device areas.

device shutter: The shutter which protects media and disk device areas. This shutter should be kept closed during system operations.

disk cage: A metallic box which can host two or three disk carriers. See also FD3, KP2, KP3.

disk carrier: A sled used to install hard disk drives into the system. See also disk cage.

E

ECMA: European Computer Manufacturers Association.

EIA: Electronic Industries Association.

EMI: ElectroMagnetic Interference.

EOT: End Of Tape marker.

ESD: Electrostatic Discharge. An undesirable discharge of static electricity that can damage equipment and degrade electrical circuitry.

F

FAST-10 WIDE-16: A standard SCSI interface, 16 bits, providing synchronous transfer rate of up to 10 MHz, with a data transfer speed of 20M bytes per second.

FAST-20 WIDE-16: An enhanced standard SCSI interface, 16 bits, providing synchronous transfer rate of up to 20 MHz, with a data transfer speed of 40M bytes per second. It is also called ULTRA WIDE.

FAST-40 WIDE-16: An enhanced standard SCSI interface, 16 bits, providing synchronous transfer rate of up to 40 MHz, with a data transfer speed of up to 80M bytes per second. It is also called ULTRA-2/LVD.

FD3: The back plane of a disk cage that connects up to three 1-inch ULTRA-2/LVD disk devices. See also disk cage, disk carrier.

G

GUI: Graphical User Interface.

H

High Availability: Continuous availability of system resources due to their redundant configuration.

hot swapping: The operation of removing a faulty hard disk drive and replacing it with a good one without interrupting the system activity.

HVD: High Voltage Differential.

I

ID: A number which uniquely identifies a device on a bus.

IEC: International Electrotechnical Commission.

I/O: Input /Output.

J

JBOD: Just a Bunch Of Disks.

K

KDD: A card installed in the disk expansion unit and interconnecting all the disk expansion unit resources. It manages also the input and output RS-485 connection between the base unit and the disk expansion unit(s).

key mode switch: Key controlled switch which controls the system operation mode.

KP2: The back plane of a disk cage that connects two hard disk drives with 1.6-inch form factor. See also disk cage, disk carrier.

KP3: The back plane of a disk cage that connects three hard disk drives with 1-inch form factor. See also disk cage, disk carrier.

KPS: See power supply.

L

LAN: Local Area Network.

LED: Light-Emitting Diode. On the expansion unit operator panel, it indicates the power on status.

LVD: Low Voltage Differential.

M

media and disk device areas: Areas which house the media drives and the hard disk drives.

MLR: Multichannel Linear Recording.

N

No entries.

O

operator panel: The panel where the key mode switch and the LED are located.

P

PowerPC: A standard RISC microprocessor family.

power supply (KPS): The disk expansion unit is equipped with one power supply module, providing power and power regulation to all the unit components. Optionally the redundancy features can be provided. See also redundant power supply.

Q

QIC: Quarter-Inch Cartridge.

R

RAID: Redundant Array of Inexpensive Disks. A method of combining hard disk drives into one logical storage unit which offers disk-fault tolerance.

redundant power supply (KPS): The power supply composed by two modules in redundant configuration. They are the same and work in parallel. In case of a power supply fault, the second module takes over automatically providing the needed power.

RPM: Revolutions Per Minute.

RS-485: A line for unit interconnection. This connection allows the remote control of the disk expansion unit power on/off.

S

SCSI: Small Computer System Interface. An input and output bus that provides a standard interface used to connect peripherals such as disks or tape drives in a daisy chain.

SE: Single Ended.

system console: A console, usually equipped with a keyboard and display screen, that is used by an operator to control and communicate with a system.

T

TSOPII: Tin Small Outline Package II.

U

ULTRA-2/LVD: See Fast-40 WIDE-16.

ULTRA/SE: See FAST-20 WIDE-16.

V

V: Volt.

VCC: Voltage Continuous Current.

VCCI: Voluntary Control Council for Interference.

W

No entries.

X

No entries.

Y

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No entries.

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