

# Bull Escala

## PCI Expansion Drawer Service Guide

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86 A1 33PX 02



# Bull Escala

## PCI Expansion Drawer Service Guide

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Hardware

June 2000

**BULL ELECTRONICS ANGERS  
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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.

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# 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.

## Disconnect Device - Rack (Isolation from Primary Power)

To remove the primary power from the rack, unplug the PDU input plug from the power source.

## Disconnect Device - CPU and PCI Expansion Drawers (Isolation from Primary Power)

To remove the primary power from the CPU and PCI expansion drawers, unplug the "Appliance Coupler" from the relevant PDU outlet.

## 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.

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# About This Guide

## Audience

This guide is addressed to people trained to perform service tasks on the system.

**Note:** The procedures described in this guide must be performed by people trained to perform service tasks on the PCI expansion drawer and must be executed carefully following the instructions given in this guide. The system supplier will not be liable for any problems deriving from incorrect handling or wrong installation.

## Overview of the Contents

This guide provides the description of the PCI expansion drawer hardware components and the instructions for their installation and/or replacement. A section is dedicated to the SCSI cables. The spare part list is also included.

- Chapter 1, **PCI Expansion Drawer Hardware Components**, provides a presentation of the PCI expansion drawer with the name and a brief description of each system component. In addition, it gives detailed information about the location of all the PCI expansion drawer internal connectors.
- Chapter 2, **PCI Expansion Drawer Hardware Maintenance**, provides the procedures necessary to add, replace or remove the PCI expansion drawer components.
- Chapter 3, **SCSI Cables Description and Connection**, describes the SCSI cables connection rules for the PCI expansion drawer.
- Appendix A, **Spare Parts**, provides the hardware component part number cross-reference.

## Related Publications

- *PCI Expansion Drawer Quick Set Up* (86 A1 32PX), contains the step by step hardware procedures for the connection of the PCI expansion drawer to the CPU drawer.

Information which is also relevant to the PCI expansion drawer, can be found in the following documentation:

- *Site Preparation for Rack Systems* (86 A1 30PX), details the environmental and electrical characteristics of the site where the rack must be installed.
- *Rack Service Guide* (86 A1 20PX), includes the description of the supported drawers and the procedures to install and remove them.
- *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.

For any additional information you may need, please refer to the CPU drawer base documentation set.

## Adapters Related Publications

The adapters installed in the system are described in separate guides:

- *Ethernet 10 & 10/100 Mbps PCI Adapters Installation and Configuration Guide* (86 A1 18GX)
- *FDDI Adapters Installation and Configuration Guide* (86 A1 53GX)
- *PCI High-Resolution Graphics Adapter Installation and Configuration Guide* (86 A1 43HX)
- *Token Ring PCI Adapters Installation and Configuration Guide* (86 A1 31GX)

- *PCI Asynchronous Serial Communications Adapters Installation and Configuration Guide (86 A1 47AT)*
- *ISA Internal Modem Installation and Configuration Guide (86 A1 05HX)*
- *PCI 1Port & 4Port Multi-protocol Serial I/O Adapters Installation & Service Guide (86 A1 42HX)*
- *SCSI RAID Adapter Installation and Configuration Guide (86 A1 44HX)*
- *PCI Fibre Channel Adapters Installation and Configuration Guide (86 A1 95HX)*
- *PCI 155 Mbps ATM Adapter Installation and User's Guide (86 A1 86HX).*

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# Chapter 1. PCI Expansion Drawer Hardware Components

This section provides an overview of the PCI expansion drawer hardware components; it illustrates the location and gives a brief description of each component. In addition, it contains information about all the internal connectors.

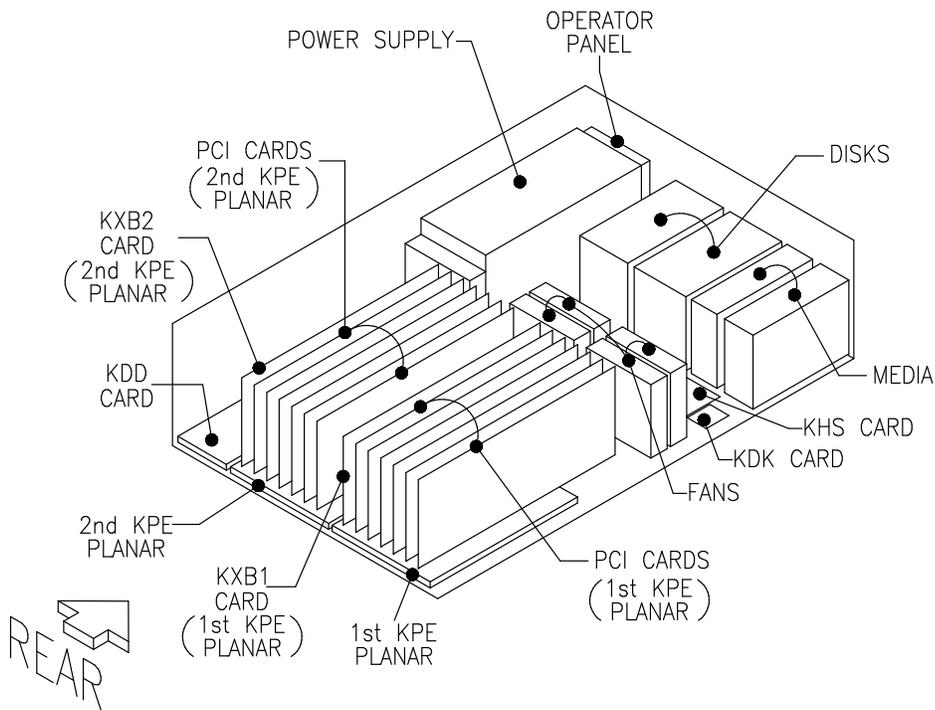
- **Overview of the PCI Expansion Drawer**, below
- **Description of the Hardware Components**, on page 1-2
- **Internal Connectors**, on page 1-8.

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## Overview of the PCI Expansion Drawer

The following figure shows the rear view of the PCI expansion drawer and the location of the hardware components.

### Rear View



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## Description of the Hardware Components

This section provides a brief description of the PCI expansion drawer hardware components. They are listed in alphabetical order.

- **Device Areas** below
- **Disk Cage** below
- **Disk Devices** on page 1-3
- **Fan Modules** on page 1-3
- **FD3 Back Plane** on page 1-4
- **KBR Card** on page 1-4
- **KDD Card** on page 1-4
- **KDK Complex** on page 1-5
- **KHS Card** on page 1-5
- **KP2 Back Plane** on page 1-5
- **KP3 Back Plane** on page 1-5
- **KPE Planar** on page 1-6
- **KXB Card** on page 1-6
- **Operator Panel** on page 1-7
- **PCI Cards** on page 1-7
- **Power Cable** on page 1-7
- **Power Supply** on page 1-7.

### Device Areas

The PCI expansion drawer has three device areas which are located horizontally, on the front side of the PCI expansion drawer itself.

Looking at the PCI expansion drawer front, device areas are identified as follows:

- Area 1, that is the leftmost area, can be used to install up to two media devices, such as a CD-ROM drive, 4 mm tape drive, 8 mm tape drive, or MLR tape drive
- Areas 2 and 3 may host a disk cage housing either up to two 1.6-inch hard disk devices or up to three 1-inch hard disk devices.

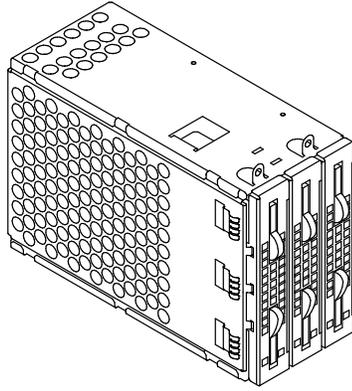
**Note:** The device configuration rules and upgrading and/or replacement procedures are described in the CPU drawer base documentation set, respectively in the **Configuring the System** and **Expanding the System Configuration** sections.

### Disk Cage

A disk cage is a metallic box used to install hard disk devices. Each disk cage occupies one device area. Different types of disk cage are supported:

- KP2 cage, to connect up to two 1.6-inch hard disk devices
- KP3 cage and FD3 cage, to connect up to three 1-inch hard disk devices.

The figure illustrates a disk cage hosting up to three 1-inch hard disk devices.



## Disk Devices

The disk cages can house different kinds of hard disk devices, with different characteristics, such as storage capacity, operation mode, transfer rate, etc.

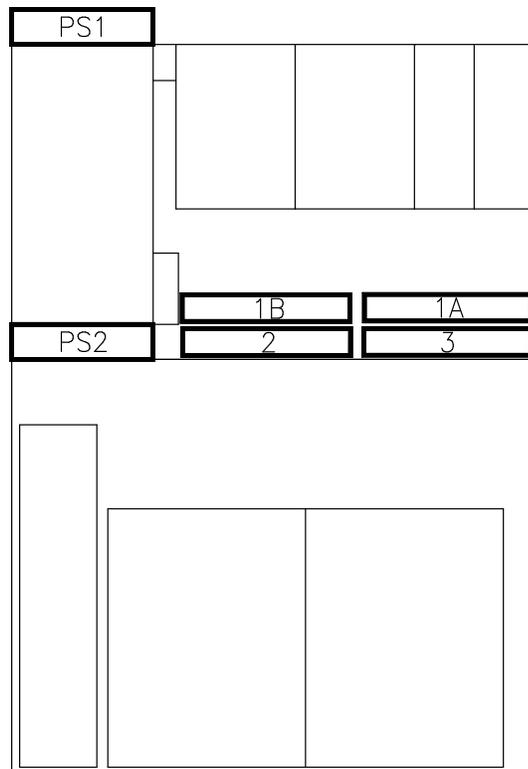
Disk devices can be either ULTRA-2/LVD or ULTRA/SE devices. The type of used disks depends on and is the same as the type of disks used in the CPU drawer.

**Note:** For further details about the device characteristics, refer to the *Disks and Tapes Configuration Information* guide.

## Fan Modules

The PCI expansion drawer houses four fan modules, which are placed between the device area and the PCI controller area. In addition, two other fans are included in the power supply module and are part of the power supply sub-assembly.

Fans are numbered as indicated in the following figure.



Note that the two fans next to the device area (1A and 1B) are logically seen as one fan (fan 1) by the system.

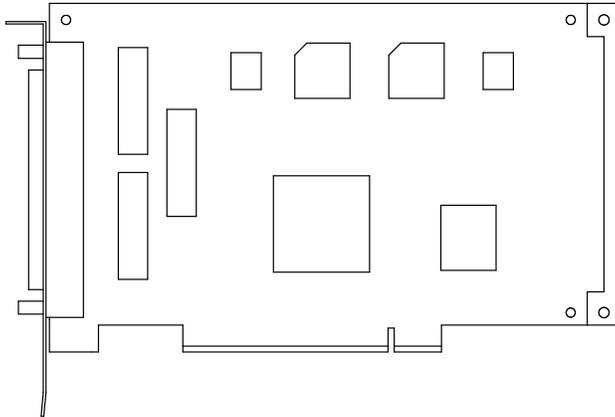
## FD3 Back Plane

The FD3 back plane is a card that is placed on the rear side of the disk cage. The FD3 back plane supports up to three 1-inch ULTRA-2/LVD disk devices. For further information, refer to **Disk Cage**, on page 1-2.

## KBR Card

One KBR card is required to be installed in the CPU drawer for each KPE planar installed in the PCI expansion drawer. KBR cards must be installed in fixed positions. For further details, refer to the *PCI Expansion Drawer Quick Set Up* leaflet.

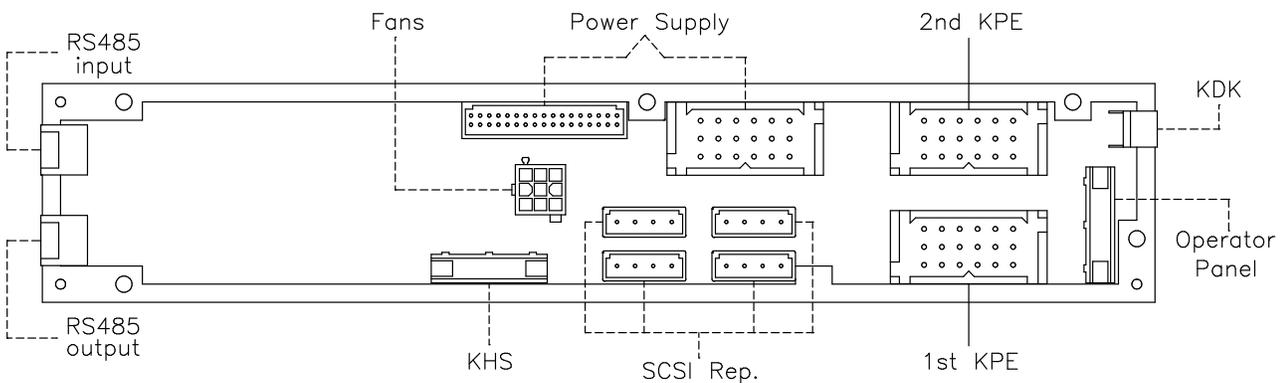
The KBR card provides the PCI bus expansion to the PCI expansion drawer. This is made by means of a dedicated cable that connects the KBR card installed in the CPU drawer to a corresponding KXB card installed in the PCI expansion drawer on the KPE planar.



## KDD Card

The KDD card provides the connectors which manage the power supply, the fan modules (FAN1A, FAN2, FAN3), the operator panel, the KDK card, the KPE planar(s) and the RS-485 interconnection. Moreover, it is equipped with a connector used to interconnect the KHS card, if this is installed in the PCI expansion drawer.

In addition, the KDD card provides four connectors dedicated to the SCSI repeaters.



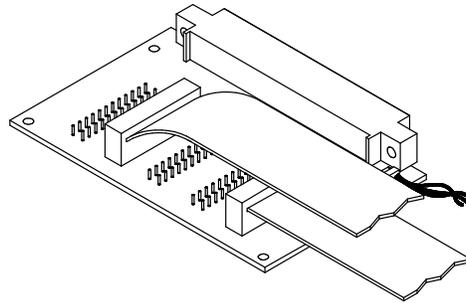
The KDD card also dialogues with the BUMP through the RS-485 interconnection.

## KDK Complex

The KDK complex is composed of the KDK card and two flat cables connected to it. The KDK card is placed at the bottom of the drawer behind the device areas.

The KDK complex main functionalities are the following:

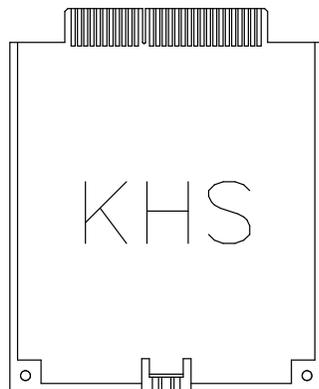
- Definition of the disk devices SCSI-ID
- Interface between the disk cages and the KHS card (if the latter is present).



## KHS Card

The KHS card is an optional card which is directly plugged in the dedicated connector of the KDK card only in presence of a RAID configuration, as it acts as RAID controller card interface.

It is also connected to the KDD card by means of a dedicated flat cable.



## KP2 Back Plane

The KP2 back plane is a card that is placed on the rear side of the disk cage. The KP2 back plane supports up to two 1.6-inch ULTRA/SE disk devices. For further information, refer to [Disk Cage](#), on page 1-2.

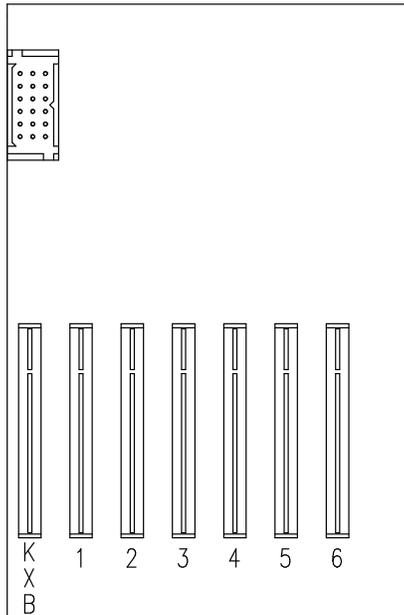
## KP3 Back Plane

The KP3 back plane is a card that is placed on the rear side of the disk cage. The KP3 back plane supports up to three 1-inch ULTRA/SE disk devices. For further information, refer to [Disk Cage](#), on page 1-2.

## KPE Planar

Up to two KPE planars can be installed in the PCI expansion drawer. Each KPE planar is provided with seven slots, as described below:

- The leftmost slot is dedicated for the KXB card installation
- The other slots can be used to connect up to six PCI controller cards, 32 bit, 33 MHz.



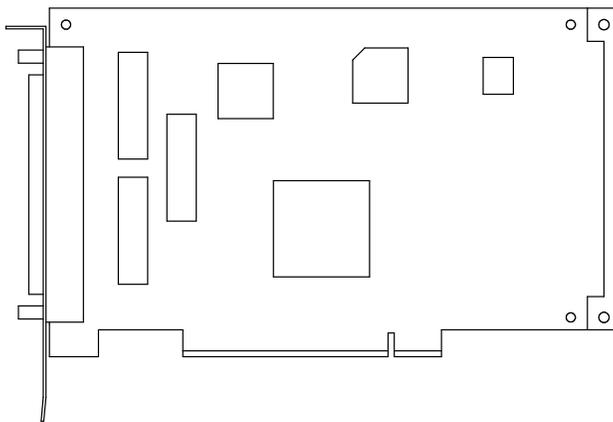
Each KPE planar is connected to the KDD card by means of a dedicated cable.

**Note:** The PCI configuration rules and upgrading and/or replacement procedures are described in the CPU drawer base documentation set, respectively in the **Configuring the System** and **Expanding the System Configuration** sections.

## KXB Card

The PCI expansion drawer hosts up to two KXB cards, one per KPE planar. The KXB card hosts the bridge for the expansion of the PCI bus.

Each KXB card is installed in the dedicated slot of the KPE planar and is connected to the corresponding KBR card installed in the CPU drawer by means of the dedicated cable.



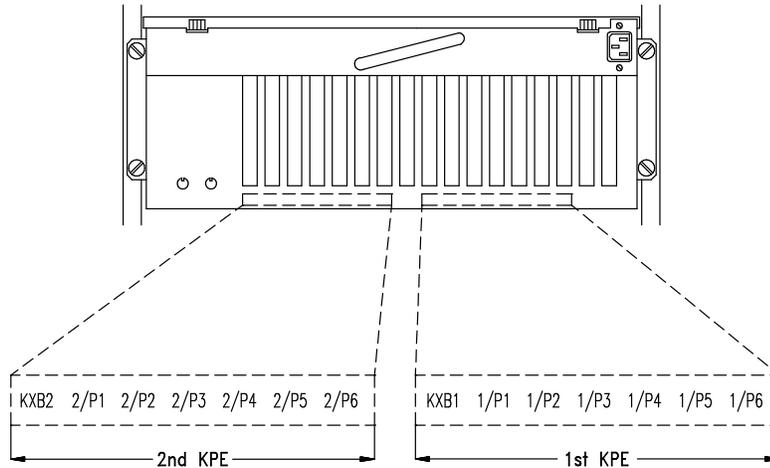
## Operator Panel

The operator panel houses one LED, indicating the power on state of the PCI expansion drawer. The operator panel is connected to the KDD card by means of a dedicated cable.

## PCI Cards

The PCI controller cards are directly plugged onto the KPE planar(s). The PCI expansion drawer can house:

- Either up to six PCI controllers if only one KPE planar is installed inside it, or
- Up to twelve PCI controllers if both KPE planars are present.



**Note:** The PCI configuration rules and upgrading and/or replacement procedures are described in the CPU drawer base documentation set, respectively in the **Configuring the System** and **Expanding the System Configuration** sections.

## Power Cable

The PCI expansion drawer is provided with a power cable for the drawer connection to the PDU outlet. For more details, refer to the **Power Cables** paragraph, in the *Site Preparation for Rack Systems* guide.

## Power Supply

The PCI expansion drawer is equipped with one redundant power supply module. The power supply module provides power and power regulation to all the PCI expansion drawer components.

The power supply module is composed of a mechanical box structure with an AC inlet receptacle, input AC filtering, a power converter card assembly and output cables. The mechanical box structure includes two internal cooling fans.

In addition, as it is a redundant power supply, it contains two cards that share among them the PCI expansion drawer power management. If one of these cards is faulty, the other one takes in charge the power management of the whole PCI expansion drawer, so the expansion drawer activity continues.

**Note:** Since part of the power supply logic is contained in the PDU (Power Distribution Unit), this power supply must always be connected to a PDU, to guarantee correct working.

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## Internal Connectors

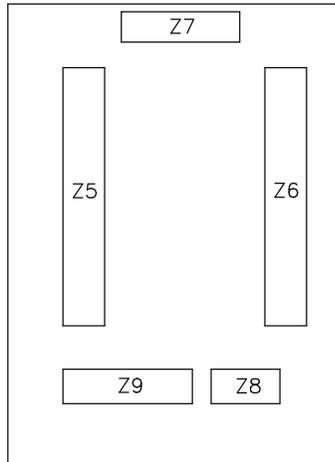
This section illustrates the internal connectors of the PCI expansion drawer cards, giving their location and a description of each of them, such as type of connector and function(s). The cards are listed in alphabetical order.

- **FD3 Back Plane** on page 1-9
- **KBR Card** on page 1-10
- **KDD Card** on page 1-11
- **KDK Card** on page 1-12
- **KHS Card** on page 1-12
- **KP2/KP3 Back Plane** on page 1-13
- **KPE Planar** on page 1-15
- **KXB Card** on page 1-16.

## FD3 Back Plane

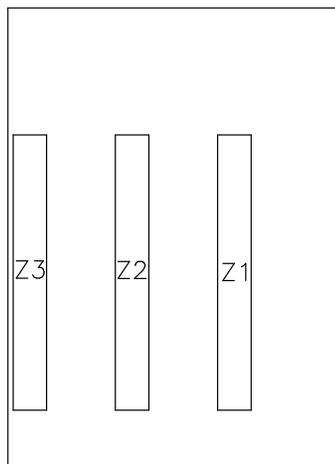
FD3 back plane houses connectors on both the external and the internal sides.

### FD3 External Side



Reference in the Figure	Type of Connector	Function
<b>Z5</b>	68 contacts, female	SCSI input connector
<b>Z6</b>	68 contacts, female	SCSI output connector
<b>Z7</b>	4 contacts, power, male	Disk cage power connector
<b>Z8</b>	10 contacts, male	Reserved for future use
<b>Z9</b>	20 contacts, male	KDK complex interconnection

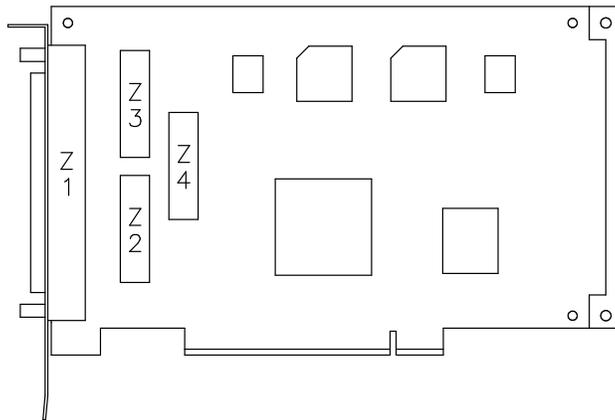
### FD3 Internal Side



Reference in the Figure	Type of Connector	Function
<b>Z1</b>	80 contacts, SCA, female	1-inch hard disk drive interconnection
<b>Z2</b>	80 contacts, SCA, female	1-inch hard disk drive interconnection
<b>Z3</b>	80 contacts, SCA, female	1-inch hard disk drive interconnection

# KBR Card

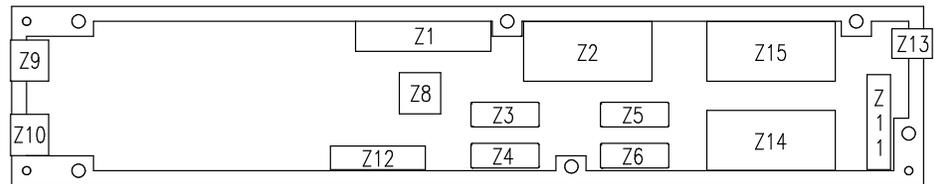
**Note:** The KBR card is a controller card installed in the CPU drawer into the dedicated connector.



KBR

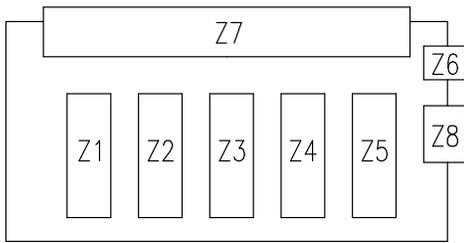
Reference in the Figure	Type of Connector	Function
<b>Z1</b>	100 contacts, female	Connection to the corresponding KXB card installed in the PCI expansion drawer by means of the appropriate cable
<b>Z2</b>	20 contacts, male	Manufacturing test connector
<b>Z3</b>	20 contacts, male	Manufacturing test connector
<b>Z4</b>	20 contacts, male	Manufacturing test connector

## KDD Card



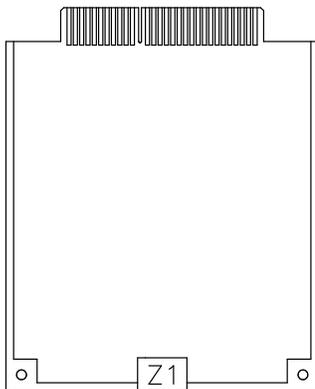
Reference in the Figure	Type of Connector	Function
<b>Z1</b>	34 contacts, male	Power supply interconnection
<b>Z2</b>	18 contacts, male, power	Power supply interconnection
<b>Z3</b>	4 contacts, male, power	SCSI repeater interconnection by means of the appropriate cable
<b>Z4</b>	4 contacts, male, power	SCSI repeater interconnection by means of the appropriate cable
<b>Z5</b>	4 contacts, male, power	SCSI repeater interconnection by means of the appropriate cable
<b>Z6</b>	4 contacts, male, power	SCSI repeater interconnection by means of the appropriate cable
<b>Z8</b>	3x3 contacts, male, power	Fan modules interconnection
<b>Z9</b>	6 contacts, PS/2 type, mini DIN, female	RS-485 input port for PCI expansion drawer interconnection
<b>Z10</b>	6 contacts, PS/2 type, mini DIN, female	RS-485 output port for PCI expansion drawer interconnection
<b>Z11</b>	10 contacts, male	Operator panel interconnection
<b>Z12</b>	10 contacts, male	KHS card interconnection by means of the appropriate cable
<b>Z13</b>	4 contacts, male	KDK complex interconnection by means of the appropriate cable
<b>Z14</b>	18 contacts, male, power	First KPE planar interconnection by means of the appropriate cable
<b>Z15</b>	18 contacts, male, power	Second KPE planar interconnection by means of the appropriate cable

## KDK Card



Reference in the Figure	Type of Connector	Function
<b>Z1</b>	20 contacts, male	Not used
<b>Z2</b>	20 contacts, male	Disk cage interconnection by means of the appropriate cable
<b>Z3</b>	20 contacts, male	Not used
<b>Z4</b>	20 contacts, male	Not used
<b>Z5</b>	20 contacts, male	Disk cage interconnection by means of the appropriate cable
<b>Z6</b>	3 contacts, male	KDD card interconnection by means of the appropriate cable
<b>Z7</b>	50 contacts, CARD EDGE, female	KHS card interconnection, if present
<b>Z8</b>	4 contacts, male	Not used

## KHS Card

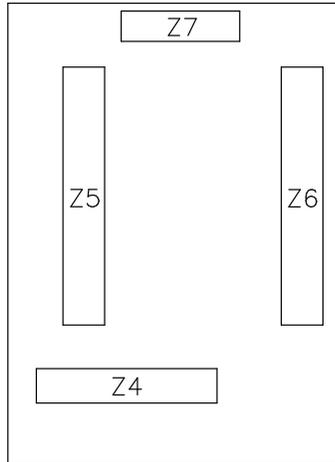


Reference in the Figure	Type of Connector	Function
<b>Z1</b>	10 contacts, male	KDD card interconnection by means of the appropriate cable

## KP2/KP3 Back Plane

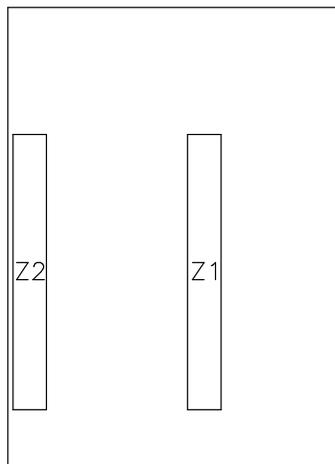
KP2/KP3 back plane houses connectors on both the external and the internal sides.

### KP2/KP3 External Side



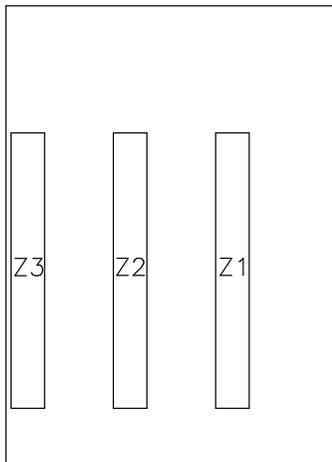
Reference in the Figure	Type of Connector	Function
<b>Z4</b>	20 contacts, male	<i>KDK complex interconnection</i>
<b>Z5</b>	68 contacts, female	<i>SCSI input connector</i>
<b>Z6</b>	68 contacts, female	<i>SCSI output connector</i>
<b>Z7</b>	4 contacts, power, male	<i>Disk cage power connector</i>

### KP2 Internal Side



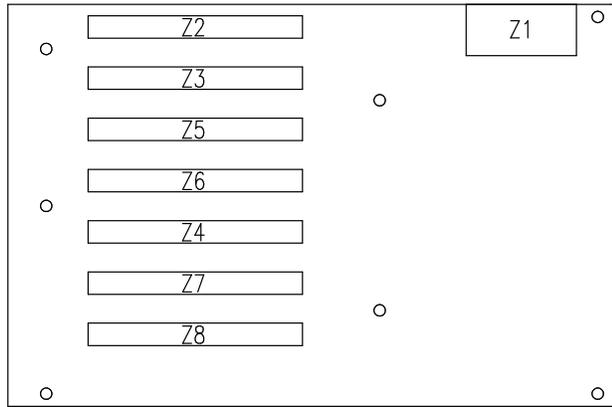
Reference in the Figure	Type of Connector	Function
<b>Z1</b>	80 contacts, SCA, female	<i>1.6-inch hard disk drive interconnection</i>
<b>Z2</b>	80 contacts, SCA, female	<i>1.6-inch hard disk drive interconnection</i>

## KP3 Internal Side



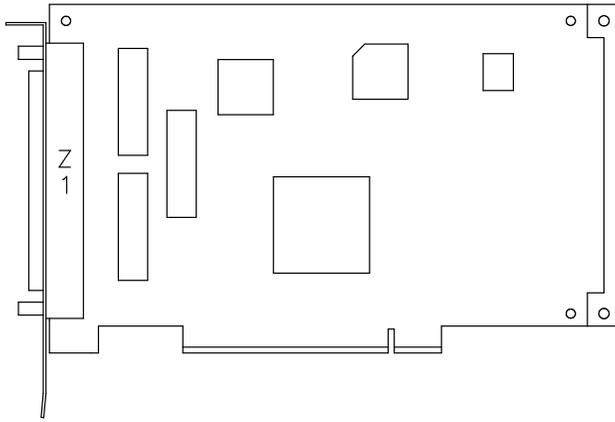
<b>Reference in the Figure</b>	<b>Type of Connector</b>	<b>Function</b>
<b>Z1</b>	<i>80 contacts, SCA, female</i>	<i>1-inch hard disk drive interconnection</i>
<b>Z2</b>	<i>80 contacts, SCA, female</i>	<i>1-inch hard disk drive interconnection</i>
<b>Z3</b>	<i>80 contacts, SCA, female</i>	<i>1-inch hard disk drive interconnection</i>

## KPE Planar



Reference in the Figure	Type of Connector	Function
<b>Z1</b>	<i>18 contacts, male</i>	<i>KDD interconnection by means of the appropriate cable.</i>
<b>Z2</b>	<i>120 contacts, CARD EDGE</i>	<i>KXB card interconnection</i>
<b>Z3</b>	<i>120 contacts, CARD EDGE</i>	<i>32 bit, 33 MHz PCI controller interconnection</i>
<b>Z4</b>	<i>120 contacts, CARD EDGE</i>	<i>32 bit, 33 MHz PCI controller interconnection</i>
<b>Z5</b>	<i>120 contacts, CARD EDGE</i>	<i>32 bit, 33 MHz PCI controller interconnection</i>
<b>Z6</b>	<i>120 contacts, CARD EDGE</i>	<i>32 bit, 33 MHz PCI controller interconnection</i>
<b>Z7</b>	<i>120 contacts, CARD EDGE</i>	<i>32 bit, 33 MHz PCI controller interconnection</i>
<b>Z8</b>	<i>120 contacts, CARD EDGE</i>	<i>32 bit, 33 MHz PCI controller interconnection</i>

# KXB Card



KXB

Reference in the Figure	Type of Connector	Function
Z1	100 contacts, female	Connection to the corresponding KBR card installed in the CPU drawer by means of the appropriate cable

---

## Chapter 2. PCI Expansion Drawer Hardware Maintenance

This section describes the procedures necessary to add, replace or remove the PCI expansion drawer hardware components, and that require the intervention of technicians or trained people.

These components are listed in **List of Hardware Components**, on page 2-9.

This section also describes what to do before handling any hardware component, how to power on/off the system, how to partially remove and re-install the drawer in the rack and how to remove and re-install the drawer front and top covers.

All these operations are detailed in **Preliminary and Restart Operations**, on page 2-2, while specific reference-marks to them are included in each procedure.

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## Preliminary and Restart Operations

- [How to Handle Hardware Components](#), below
- [Preliminary Operations](#), on page 2-3
- [Partial Removal/Installation of the PCI Expansion Drawer](#), on page 2-4
- [Top Cover](#), on page 2-6
- [Front Cover](#), on page 2-7
- [Restart Operations](#), on page 2-8.

## How to Handle Hardware Components

### Tools Needed

You should have the following tools available before starting installation and removal procedures on the PCI expansion drawer.

- A large flat blade screwdriver
- A hex pipe wrench M5 for taptite hex screws M3
- A hex pipe wrench M7 for taptite hex screws M4 (length of tube = 145mm)
- A torx screwdriver for torx screws Ø 2.5 mm
- A torx screwdriver for torx screws Ø 3 mm
- A torx screwdriver for torx screws Ø 4 mm
- A Phillips screwdriver size 1 for cross-slotted screws
- An antistatic envelope
- An antistatic wrist strap.

### How to Use the Antistatic Envelope

**Warning:** Controllers and devices are sensitive to electrostatic discharge. These components are shipped in antistatic envelopes to prevent this damage.

Take the following precautions when handling any of the above mentioned hardware components:

1. Do not remove the component from the antistatic envelope until you are ready to install it in the PCI expansion drawer.
2. Wear the antistatic wrist strap, refer to [How to Use the Antistatic Wrist Strap](#) below.
3. Grip hardware components by the edges. Hold drives by the frame. Avoid touching the soldered joints or pins.
4. If you need to lay the hardware component down, while it is out of the antistatic envelope, lay it on the antistatic envelope.
5. Handle the hardware components carefully in order to prevent permanent damage.

### How to Use the Antistatic Wrist Strap

The antistatic wrist strap must be used each time you need to handle a controller, memory or CPU card, a media device or a fixed hard disk, because these are sensitive to electrostatic discharge.

The antistatic wrist strap is a band of 1m length providing at one end an adhesive strap which is to be wrapped around your wrist, and at the opposite end a copper clip which is to be attached to a non-varnished metallic frame of the system in a position that does not block your working area or movements.

## Preliminary Operations

These preliminary operations must be performed whenever you are going to maintain the PCI expansion drawer.

1. Exit any applications that are running. Consult the application manuals for instructions.
2. Open the front door of the rack.
3. Check that the media drives, if any, do not contain any media.
4. If the system is running, perform a system shutdown.
5. Power off the system by turning the key mode switch of the CPU drawer to the Power Off position.
6. Open the rear door of the rack, if you need to access the PCI expansion drawer from the rear side.
7. Make sure the power switches for all the external devices and drawers connected to the CPU drawer, if any, are set to OFF.

**Note:** Do not power off any drawers and external devices included in High Availability configurations.

8. Switch off the circuit-breaker of the PDU outlet where the PCI expansion drawer is connected.
9. Unplug the power cord of the PCI expansion drawer from the dedicated receptacle at the PCI expansion drawer rear.

### **CAUTION:**

**To remove the primary power from the PCI expansion drawer, unplug the “Appliance Coupler” on the rear side.**

10. Disconnect the RS-485 cable and the KBR-KXB cable(s) from the PCI expansion drawer. Keep trace of these connection(s).

### **Notes:**

1. In case any other cables connected to the PCI expansion drawer make the drawer sliding operation difficult, record which connector attaches to which cable and disconnect the cables.
2. If you want to restart the CPU drawer without re-connecting the PCI expansion drawer, perform the following operations:
  - a. Disconnect the RS-485 cable and the KBR-KXB cable(s) from the CPU drawer.
  - b. Update the system configuration table de-configuring the PCI expansion drawer: if the BUMP console is present, through the Stand-By Menu, SET UNIT NUMBER option, or re-loading the system firmware, as described in the *Maintenance Guide*.

### **CAUTION:**

**Before proceeding, ensure that these preliminary operations have been performed correctly to prevent a possible hazard.**

### **DANGER**

**When adding or removing any additional devices to or from the PCI expansion drawer, ensure that the power cables for those devices are unplugged before the signal cables are connected. If possible, disconnect the PCI expansion drawer power cord before you add a device.**

**Use one hand, when possible, to connect or disconnect signal cables to prevent a possible shock from touching two surfaces with different electrical potentials.**

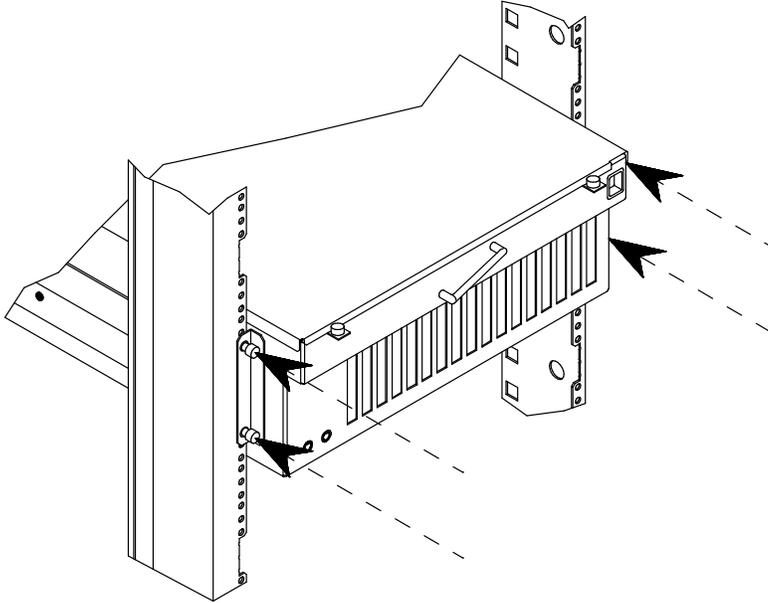
**During an electrical storm, do not connect cables for display stations, printers, telephones, or station protectors for communication lines.**

## Partial Removal/Installation of the PCI Expansion Drawer

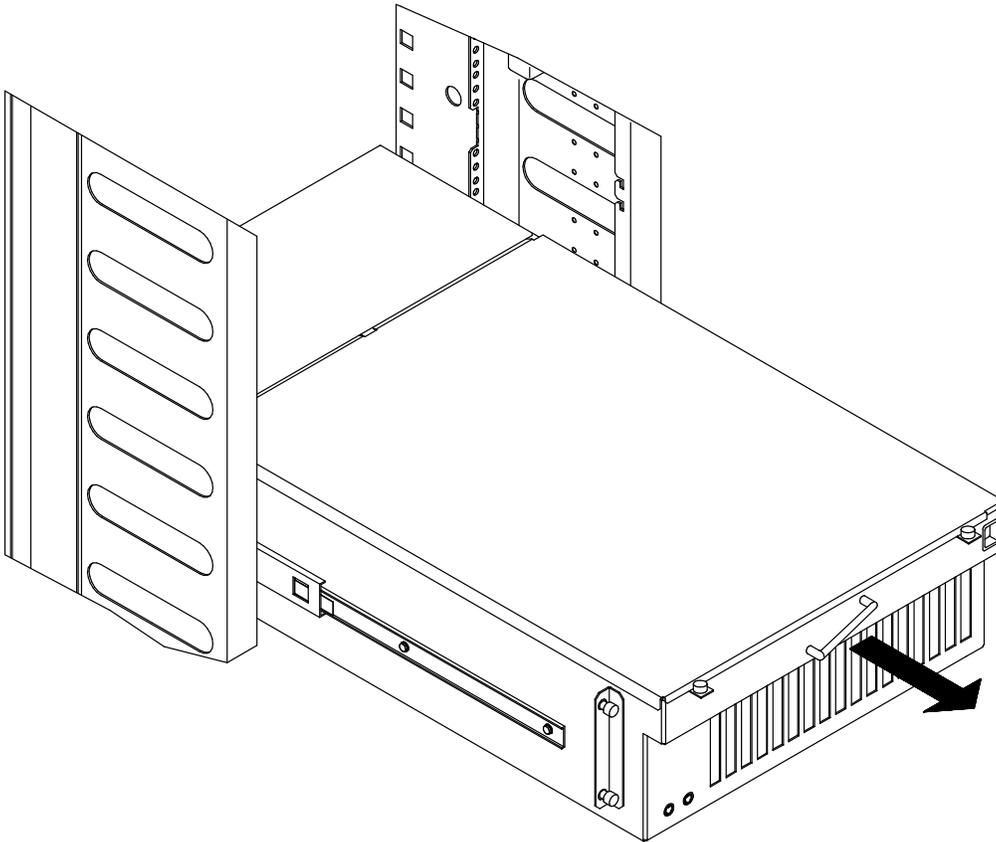
- **Removal**, below
- **Installation**, on page 2-5.

### Removal

1. Accessing the drawer from the rear, loosen the screws securing the drawer to the rack chassis.



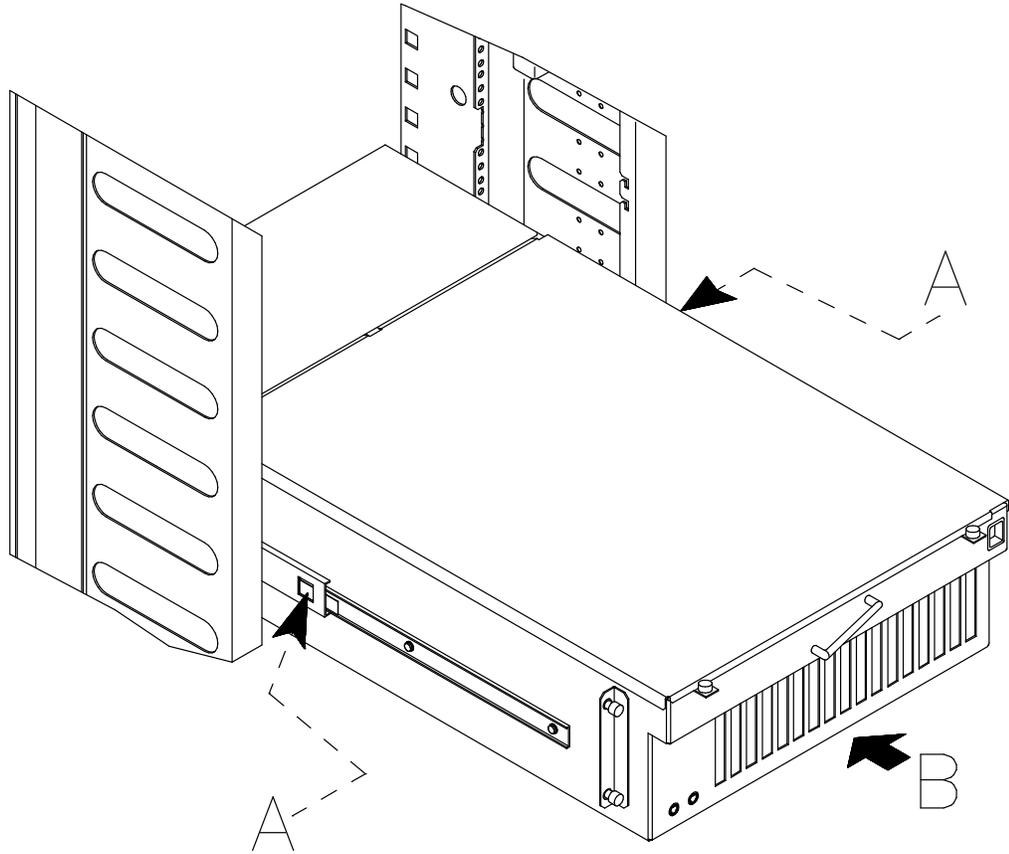
2. Using the handle at the rear of the drawer, slide the drawer out until it is well locked.



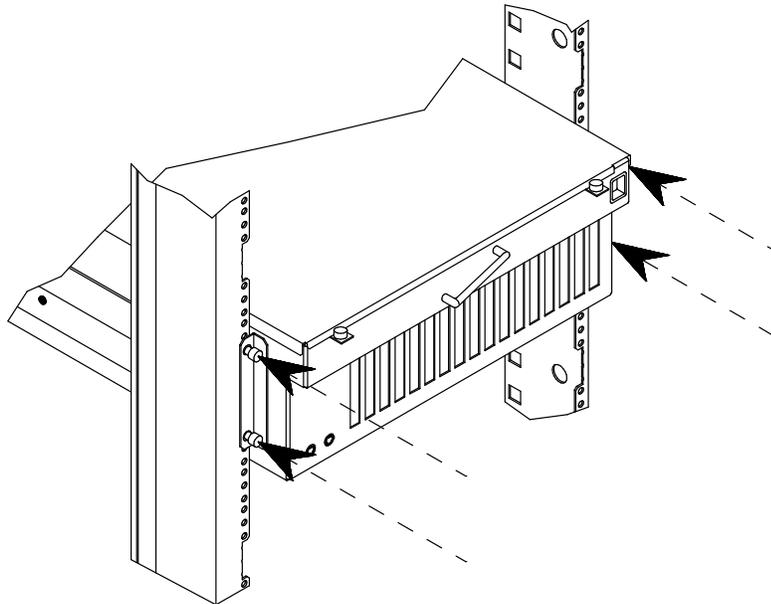
**Note:** In case the cables connected to the drawer make the drawer sliding operation difficult, record which connector attaches to which cable and disconnect the cables.

## Installation

1. Unlock the drawer telescopic rails, pushing simultaneously the metal tongues at sides of the drawer (as indicated by A) and firmly push the drawer inside the rack, using the handle, until it is well seated (as indicated by B).



2. Accessing the drawer from the rear, tighten the retaining screws, securing the drawer to the chassis.

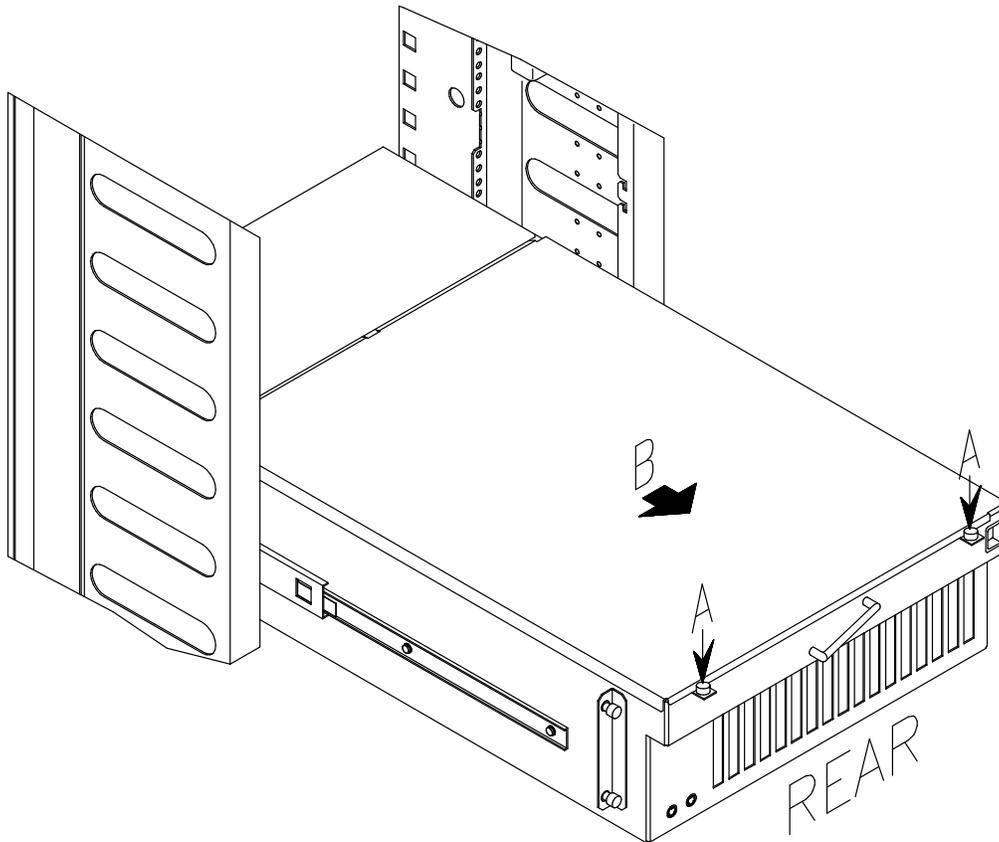


## Top Cover

- **Removal**, below
- **Installation**, below.

### Removal

1. Loosen the retaining screws located on the rear of the drawer top cover, as indicated by A in the figure.
2. Remove the drawer top cover sliding it towards you, as shown in B.



### Installation

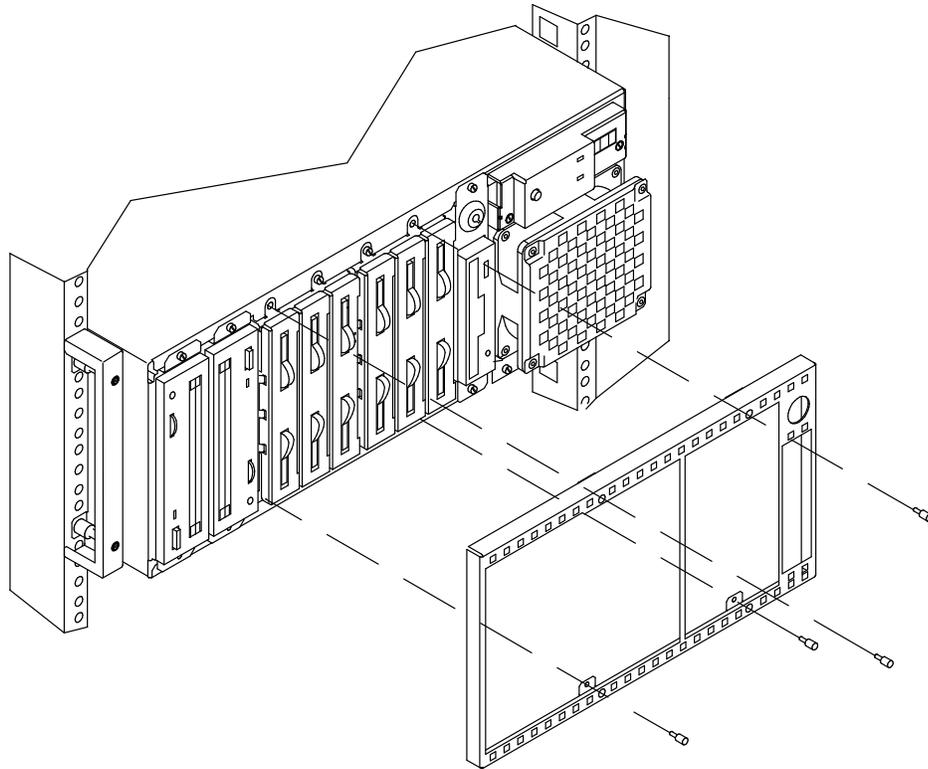
1. Accessing the drawer from the rear, hook the retaining bracket on the top cover with the corresponding retainer on the drawer chassis.
2. Secure the top cover to the drawer, tightening clockwise its retaining screws.

## Front Cover

- **Removal**, below
- **Installation**, below.

### Removal

1. Loosen the retaining screws of the front cover and remove it, as shown in the figure.



### Installation

1. Position the front cover on the drawer front.
2. Fix the front cover tightening the related screws.

## Restart Operations

The following operations must be performed after all maintenance operations on the PCI expansion drawer are concluded.

### **CAUTION:**

**For proper cooling and safe operation of the system, all the covers must be in place before powering up the system.**

1. Connect the KBR-KXB and RS-485 cables to the dedicated connectors at the PCI expansion drawer rear.
2. Connect any other external cables to the PCI expansion drawer rear.
3. Connect the power cord to the PCI expansion drawer “Appliance Coupler” on the rear side.

**Warning:** Do not connect the CPU drawer and the PCI expansion drawer to a power source other than the PDU.

4. Switch on the circuit-breaker of the PDU outlet where the PCI expansion drawer is connected.
5. Set the power switches of the external devices and drawers connected to the CPU drawer, if any, to ON.
6. Close the rear door of the rack, if opened.
7. Power on the system by turning the key mode switch of the CPU drawer to the Normal or Service position (use the Service position, if you want to enter the operating system diagnostic mode).
8. Close the front door of the rack.

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## List of Hardware Components

- Disk Cage on page 2-10
- Fan Modules on page 2-15
- KDD Card on page 2-20
- KDK Complex on page 2-21
- KHS Card on page 2-23
- First KPE Planar on page 2-25
- Second KPE Planar on page 2-29
- KXB Card on page 2-35
- Operator Panel on page 2-37
- Power Supply on page 2-39.

**Note:** The procedures related to the PCI controller cards and devices are not included in this guide. They are described in the CPU drawer base documentation set, in the **Expanding the System Configuration** section.

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## Disk Cage

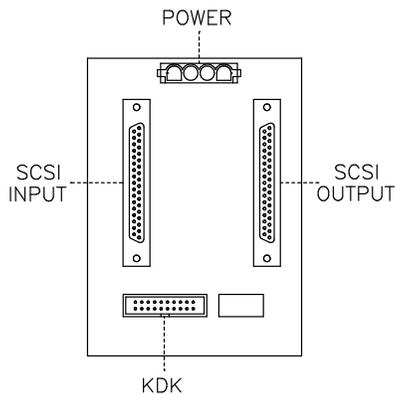
- **Removal**, below
- **Installation**, on page 2-12.

**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

**Note:** The figures illustrate a FD3 disk cage model complete of three disk carriers. The procedures apply to FD3, KP2 and KP3 disk cage models.

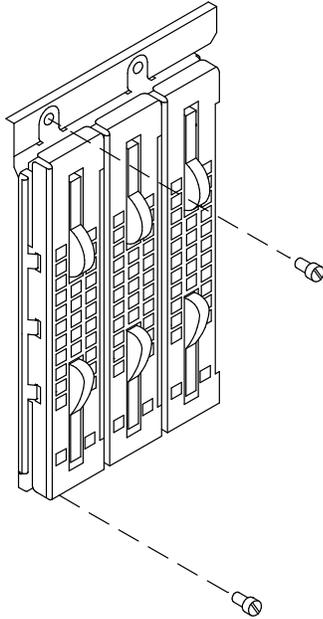
## Removal

1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
3. Accessing the drawer from the rear side, disconnect all cables from the disk cage rear connectors shown in the figure.



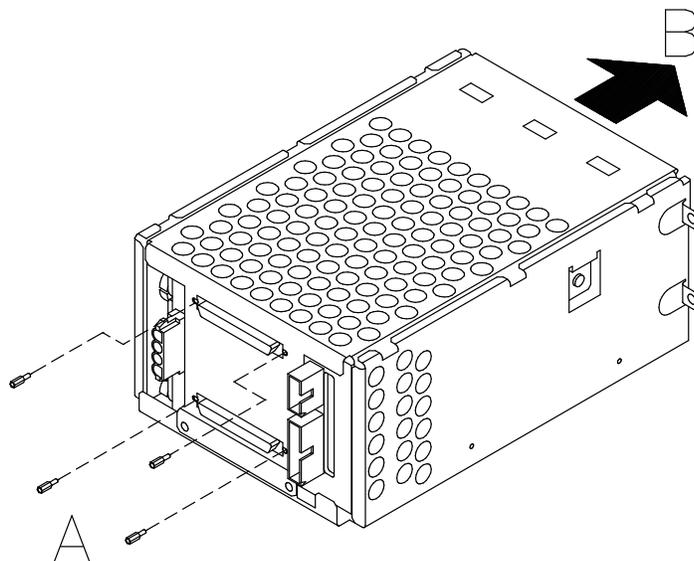
4. Slide the drawer inside the rack, but do not secure it. For details, please refer to **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
5. Open the front door of the rack.
6. Remove the drawer front cover, as described in **Front Cover, Removal** procedure, on page 2-7.

7. Accessing the drawer from the front side, loosen the retaining screws to unlock the disk cage from the chassis, then slide the disk cage out of the slot.



**Note:** If you have removed the disk cage because you do not need it any more, skip to **step 12** of this procedure, otherwise continue with the following steps.

8. Lay the disk cage just removed on a flat surface.
9. Remove the disk carriers, one at a time, from the disk cage. Record their positions to keep the original configuration. The removal and installation procedures of disk carriers are described in the CPU drawer base documentation set, in the **Expanding the System Configuration** section.
10. Remove the back plane from the disk cage, performing the following steps:
  - a. Loosen the retaining screws used to secure the back plane to the disk cage, as indicated by A in the figure.
  - b. Gently push the back plane towards the front side of the disk cage and slide it out, as indicated by B in the figure.



11. At this point skip to the disk cage **Installation** procedure, **step 4**, on page 2-13, and disregard the following steps.

12. Install the appropriate metal blank on the chassis in the corresponding free slot.

**CAUTION:**

**It is recommended to protect any free device slot with the appropriate metal blanks. This is important for your safety and for the proper functioning of the air cooling system.**

13. Slide the drawer out of the rack.

14. Accessing the drawer from the rear side, check and perform the connection of the SCSI cables. For exhaustive information, refer to [SCSI Cables Description and Connection](#), on page 3-1.

15. Store the removed disk cage in an antistatic envelope.

16. Install the drawer front cover, as described in **Front Cover, [Installation](#)** procedure, on page 2-7.

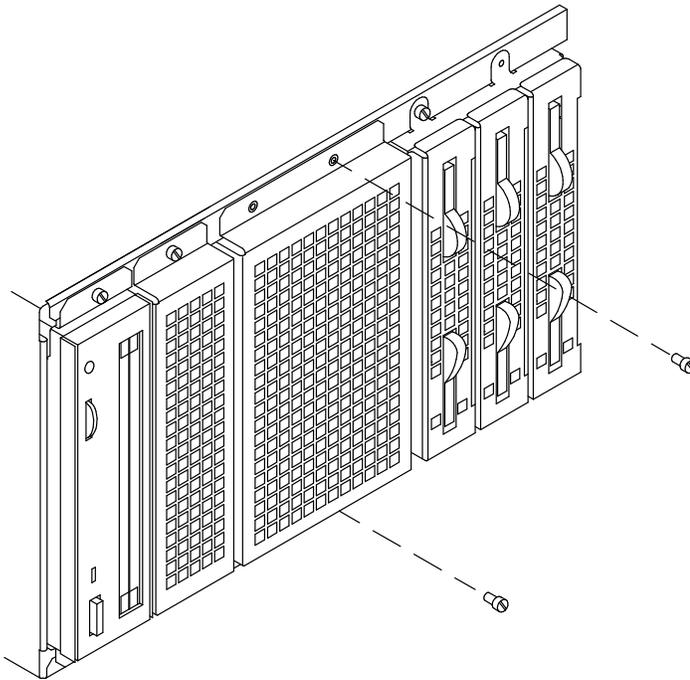
17. Install the drawer top cover, as described in **Top Cover, [Installation](#)** procedure, on page 2-6.

18. Carefully slide the drawer inside the rack, following the instructions given in **Partial Removal/Installation of the PCI Expansion Drawer, [Installation](#)** procedure, on page 2-5.

19. Perform **[Restart Operations](#)**, as described on page 2-8.

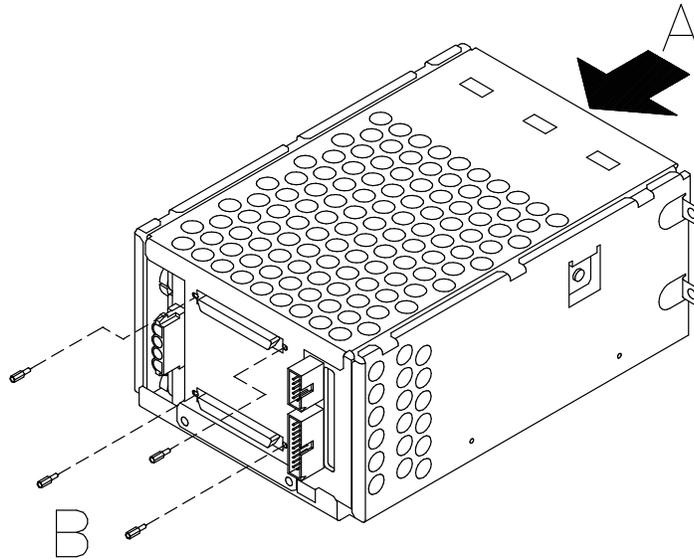
## Installation

1. Open the front door of the rack and access the PCI expansion drawer from the front side.
2. Remove the drawer front cover, as described in **Front Cover, [Removal](#)** procedure, on page 2-7.
3. Remove the metal blank of the designated slot, by loosening the screws that retain the blank to the drawer chassis.



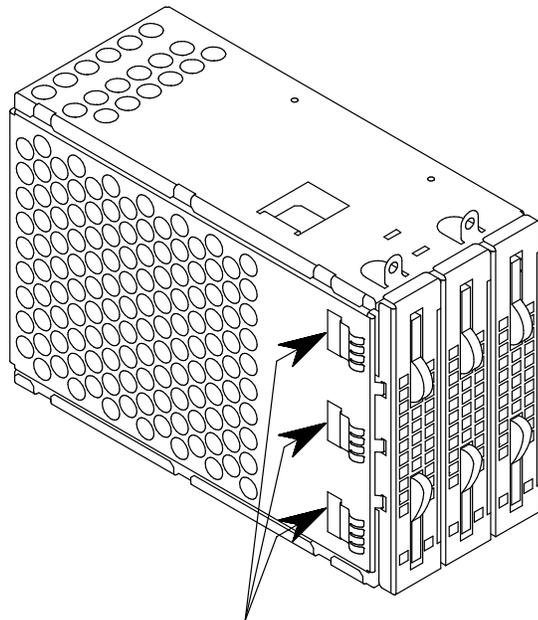
**Note:** It is recommended to store the metal blank and screws for possible future re-installation.

4. Assemble the back plane and the disk cage metallic box, performing the following steps:
  - a. Accessing the disk cage metallic box from the front, gently slide the back plane inside it keeping the disk carriers connectors towards the internal side of the disk cage. See A in the figure.
  - b. Secure the back plane to the disk cage metallic box, tightening clockwise the retaining screws indicated by B in the figure.

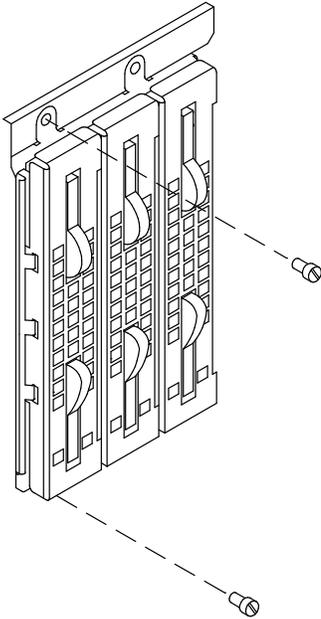


5. Install the required hard disks and disk carriers in the disk cage. For further details about this, refer to the CPU drawer base documentation set, in the **Expanding the System Configuration** section.
6. Before installing the disk cage in the drawer, remove the retaining clips, which are pointed out by the arrows in the figure.

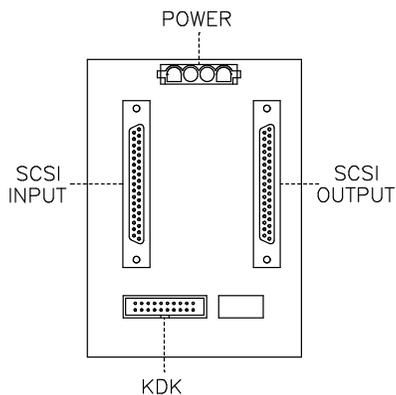
**Warning:** Inserting the disk cage with its retaining clips on, can cause physical damages to the disk cage itself and to the drawer chassis.



7. Grip the disk cage by the edges and slide it in the slot until it catches the drawer chassis.
8. Tighten the retaining screws to lock the disk cage to the chassis.



9. Install the front cover as described in **Front Cover, Installation** procedure, on page 2-7.
10. If not already done, slide the drawer out of the rack, performing the removal procedures described in **Partial Removal/Installation of the PCI expansion Drawer, Removal** procedure, on page 2-4.
11. If not already done, remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
12. Accessing the drawer from the rear side, connect the cables to the disk cage rear connectors shown in the figure. Check and perform the connection of the SCSI cables, following the rules described in **SCSI Cables Description and Connection**, on page 3-1.



**Note:** For details about the device area power cables and power distribution, refer to **Power Supply, Removal** procedure, **step 6**, on page 2-40.

13. Install the drawer top cover, as described in **Top Cover, Installation** procedure, on page 2-6.
14. Carefully slide the drawer inside the rack, following the instructions given in **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
15. Perform **Restart Operations**, as described on page 2-8.

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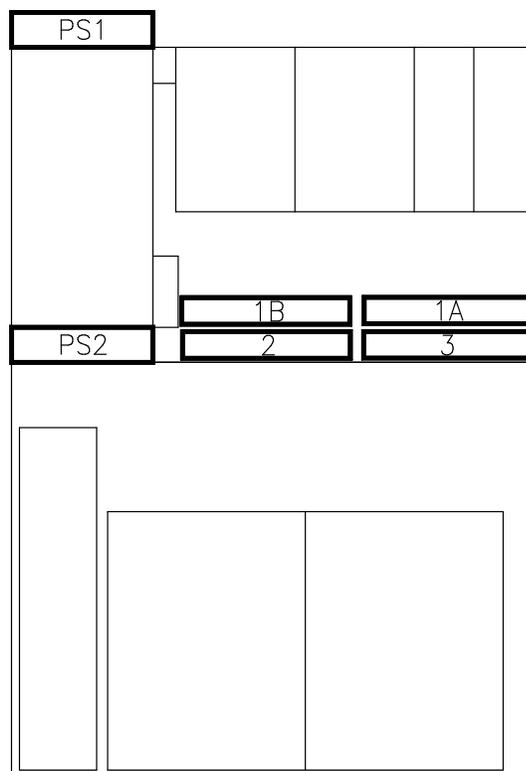
## Fan Modules

- **Removal**, below
- **Installation**, on page 2-18.

**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

### Removal

1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
3. Identify the faulty fan. Fans are numbered as indicated in the figure.

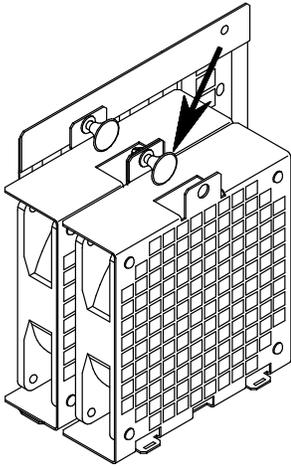


#### Notes:

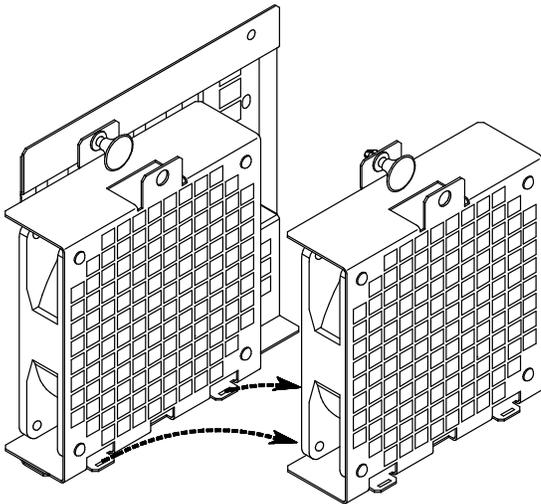
- a. PS1 and PS2 fans are part of the power supply sub-assembly. If one of them is faulty, the whole power supply must be replaced. For details, please refer to **Power Supply**, on page 2-39.
- b. The two fans next to the device area (1A and 1B) are logically seen as one fan (fan 1) by the system. If an error message indicates fan 1 as faulty, these two fans must be replaced.
- c. If you need to replace fan 2, first you must remove fan 1B.
- d. If you need to replace fan 3, first you must remove fan 1A.

## Fans 1A and 1B Removal

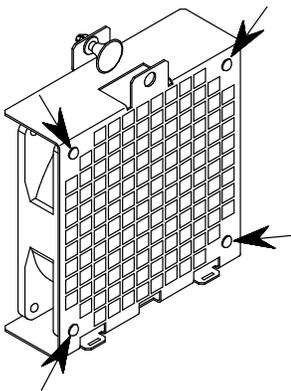
1. Unplug the fan module power connector.
2. Firmly pull the fan module retaining button out until it unlocks.



3. Remove the fan module sliding its lateral metal tongues out of the dedicated slits on the back fan module.

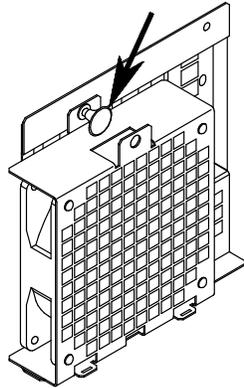


4. If you need to replace either fan 2 or fan 3, skip to **Fans 2 or 3 Removal**, on page 2-17, otherwise disregard it and continue with step 5, below.
5. Remove the four rubber fasteners, using pliers, to release the fan from its metallic grid.

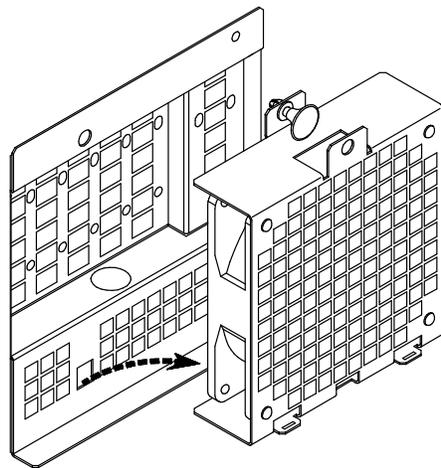


## Fans 2 or 3 Removal

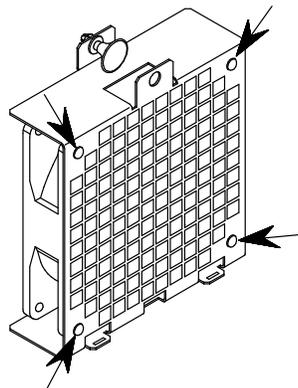
1. Unplug the fan module power connector.
2. Firmly pull the fan module retaining button out, until it unlocks.



3. Remove the fan module sliding its central metal tongue out of the dedicated slit on the drawer chassis.



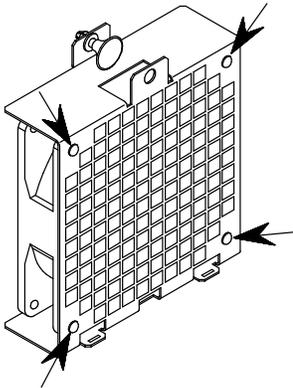
4. Remove the four rubber fasteners, using pliers, to release the fan from its metallic grid.



## Installation

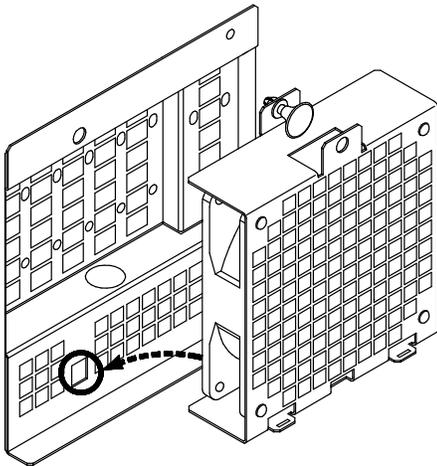
Perform the following steps for each fan you need to install.

1. Secure the fan to its metallic grid inserting the four rubber fasteners in the dedicated holes.

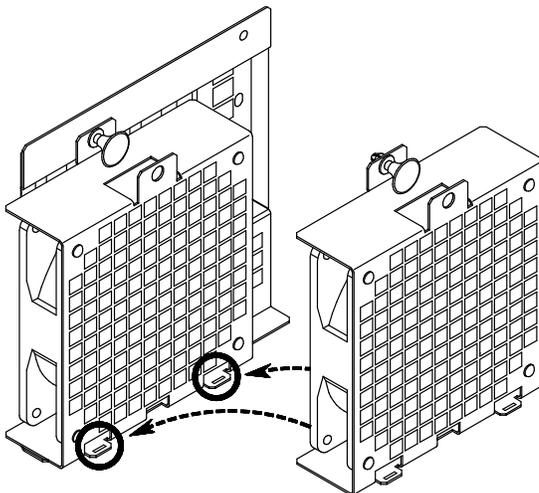


2. Locate the position for the fan module and:

- a. For fans 2 and 3, insert the central metal tongue into the drawer dedicated slit.



- b. For fans 1A and 1B, insert the lateral metal tongues into the corresponding slits on the back fan module.



3. Push the fan module retaining button to lock the fan inside the drawer.
4. Plug in the fan module power connector.

**Note:** Fan 1B is directly powered by the power supply, while the other three fans are powered by the KDD card. When plugging the fan power connector, read the fan number written on the label attached to the power cable connector, to avoid wrong connections.

5. Install the drawer top cover, as described in **Top Cover, Installation** procedure, on page 2-6.
6. Carefully slide the drawer inside the rack, following the instructions given in **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
7. Perform **Restart Operations**, as described on page 2-8.

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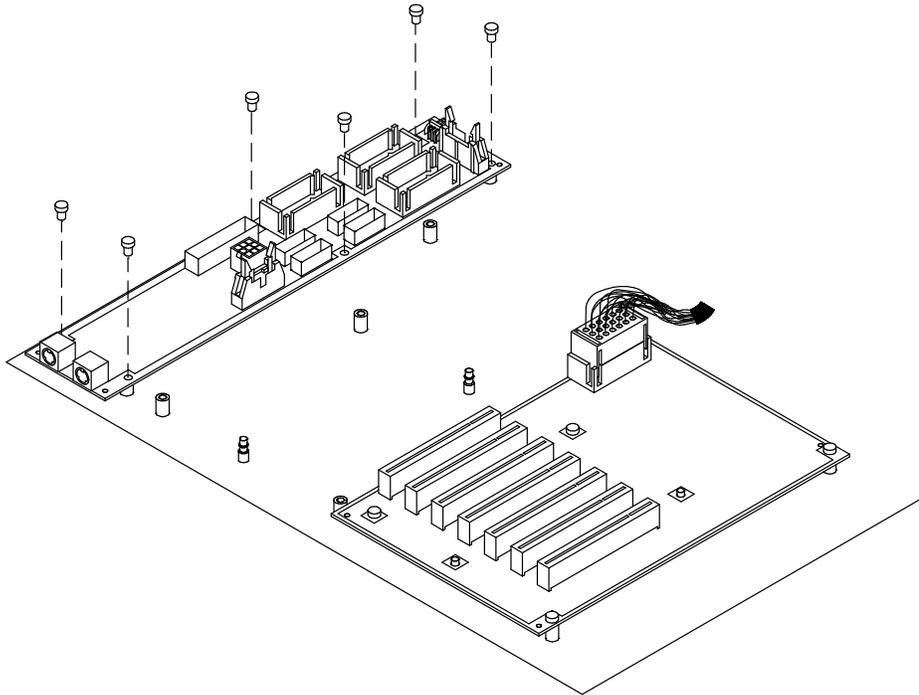
## KDD Card

- **Removal**, below
- **Installation**, on page 2-20.

**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

### Removal

1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
3. Accessing the drawer from the rear side, locate the KDD card.
4. Unplug any internal connector attached to the KDD card. Keep trace of these connections.
5. Loosen the retaining screws to unlock the KDD card from the drawer chassis.



6. Remove the KDD card from the drawer.

### Installation

1. Locate the position dedicated to the KDD card and perform the steps described in the **Removal** procedure, in the reverse order.
2. Install the drawer top cover, as described in **Top Cover, Installation** procedure, on page 2-6.
3. Carefully slide the drawer inside the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
4. Perform **Restart Operations**, as described on page 2-8.

---

## KDK Complex

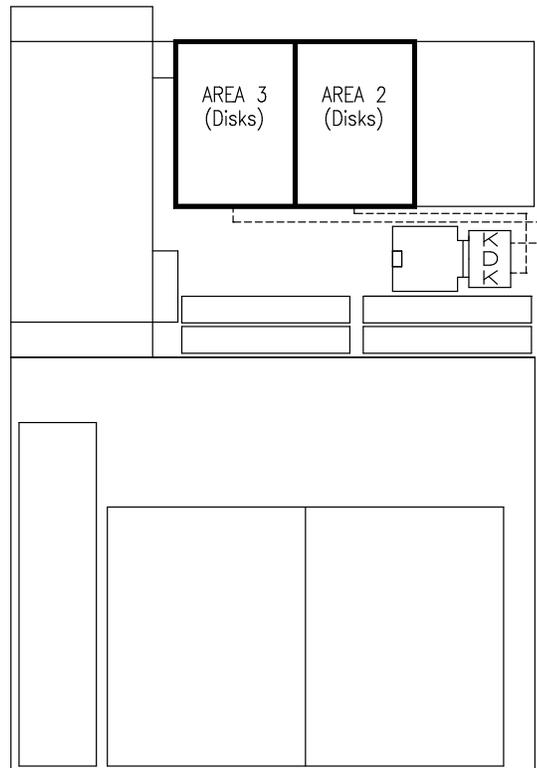
- **Removal**, below
- **Installation**, on page 2-22.

**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

**Note:** Further information about the KDK complex and the SCSI cables is given in **SCSI Cables Description and Connection**, on page 3-1.

## Removal

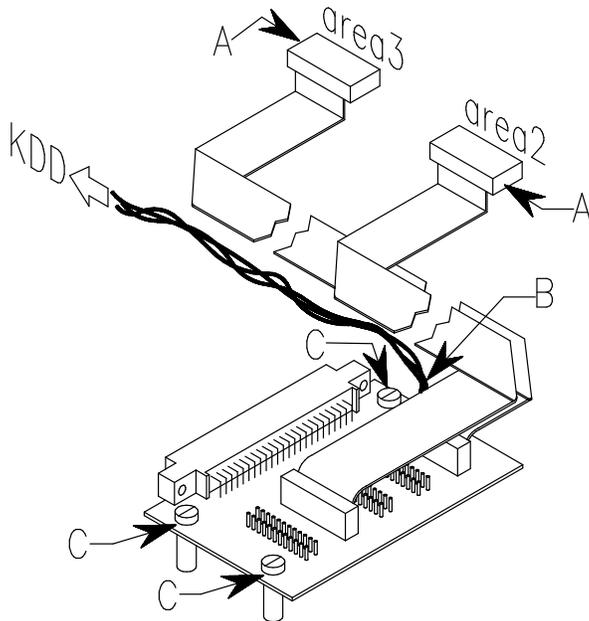
1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
3. Accessing the drawer from the rear side, locate the KDK complex behind the device areas.



4. Remove the KDK complex from the drawer, performing the following steps:
  - a. Disconnect all the KDK complex cables from the corresponding disk cages installed in the drawer, as indicated by A in the figure.

**Note:** It is strongly recommended to keep trace of these connections.

- b. Disconnect the KDK-KDD cable from the dedicated connector on the KDK card, as indicated by B.
  - c. Loosen the screws used to secure the KDK card to the drawer chassis, as shown in C.



**Warning:** Handle the KDK complex with care: the relevant cables connected to it could be damaged.

5. If the KHS is present, disconnect the KDK card from it.
6. Carefully remove the KDK complex from the drawer.

## Installation

1. To install the KDK complex, follow the steps described in the **Removal** procedure, in the reverse order.
2. Perform **Restart Operations**, as described on page 2-8.

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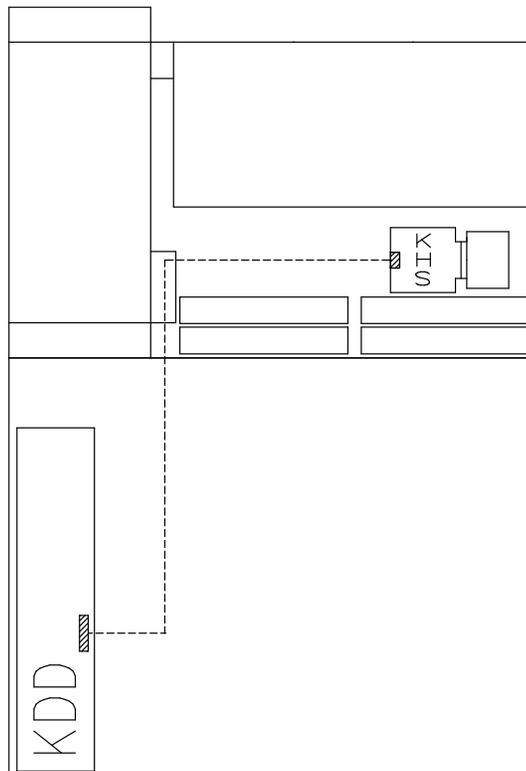
## KHS Card

- **Removal**, below
- **Installation**, on page 2-24.

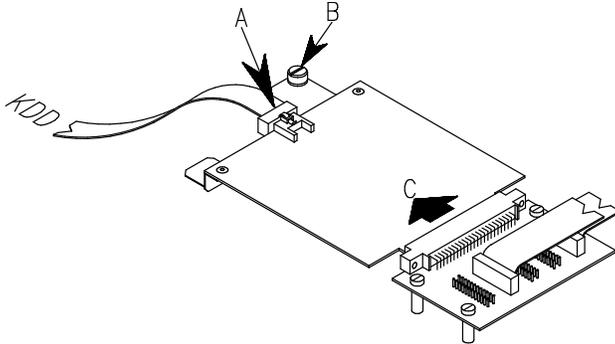
**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

### Removal

1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
3. Accessing the drawer from the rear side, identify the KHS card behind the device areas.

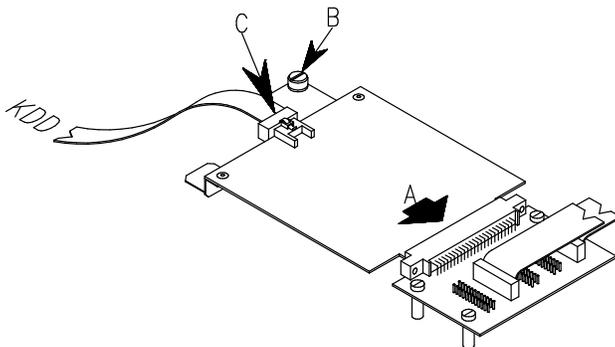


4. Remove the KHS card from the drawer, performing the following steps:
  - a. Disconnect the KHS-KDD cable from the dedicated connector on the KHS card, as indicated by A in the figure.
  - b. Loosen the screw used to secure the KHS card to the drawer chassis, as shown in B.
  - c. Carefully grip the KHS card by its edges and remove it from the KDK card dedicated connector. See C in the figure.



## Installation

1. If not already done, carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4, and remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
2. Accessing the drawer from the rear side, locate the position dedicated to the KHS card, behind the device areas.
3. Install the KHS card performing the following steps:
  - a. Align the KHS card with the dedicated connector on the KDK card and firmly push it until its connector is plugged in securely. See A in the figure.
  - b. Secure the KHS card to the drawer chassis, tightening its retaining screw, as shown in B.
  - c. Interconnect the KHS card to the KDD card by means of the KHS-KDD cable, as indicated by C.



4. Install the drawer top cover, as described in **Top Cover, Installation** procedure, on page 2-6.
5. Carefully slide the drawer inside the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
6. Perform **Restart Operations**, as described on page 2-8.

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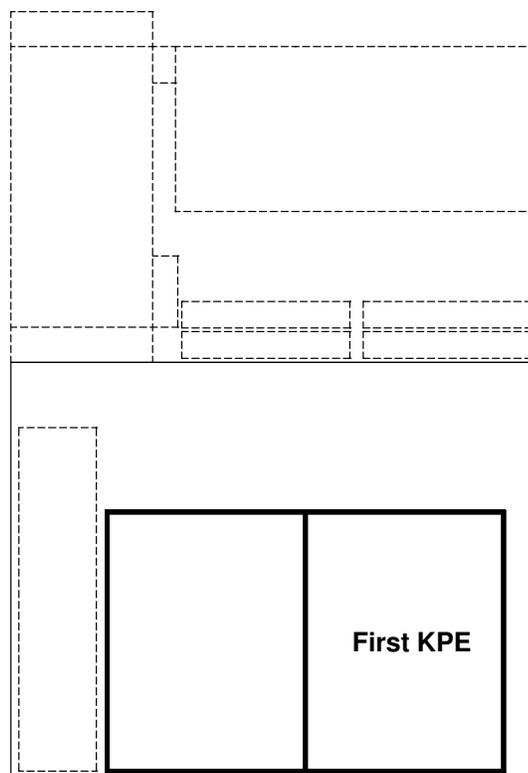
## First KPE Planar

- **Removal**, below
- **Installation**, on page 2-27.

**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

### Removal

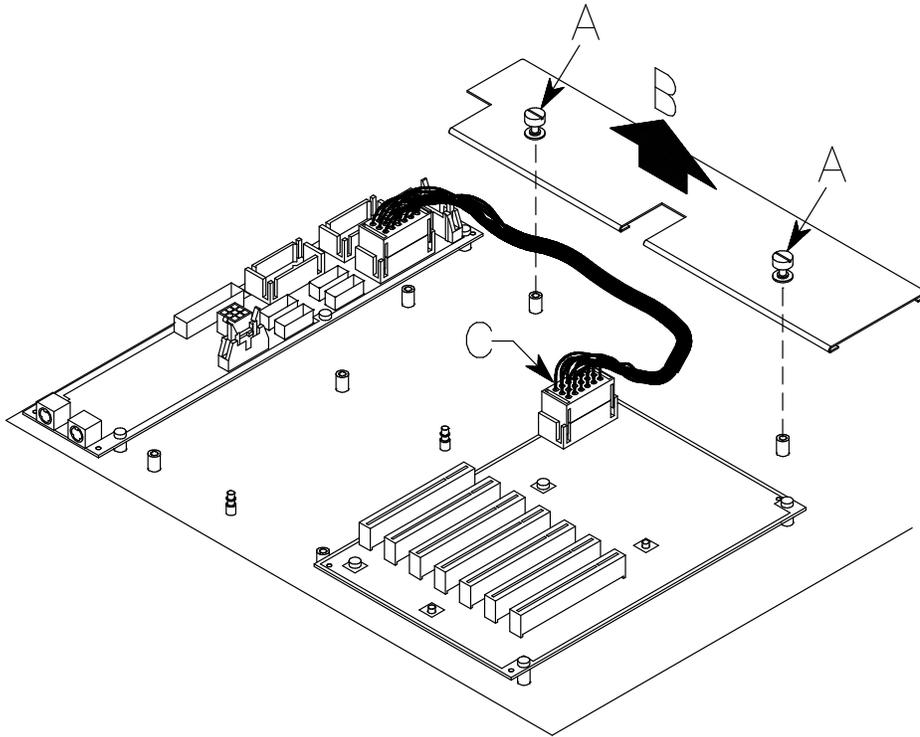
1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
3. Accessing the drawer from the rear side, identify the KPE planar.



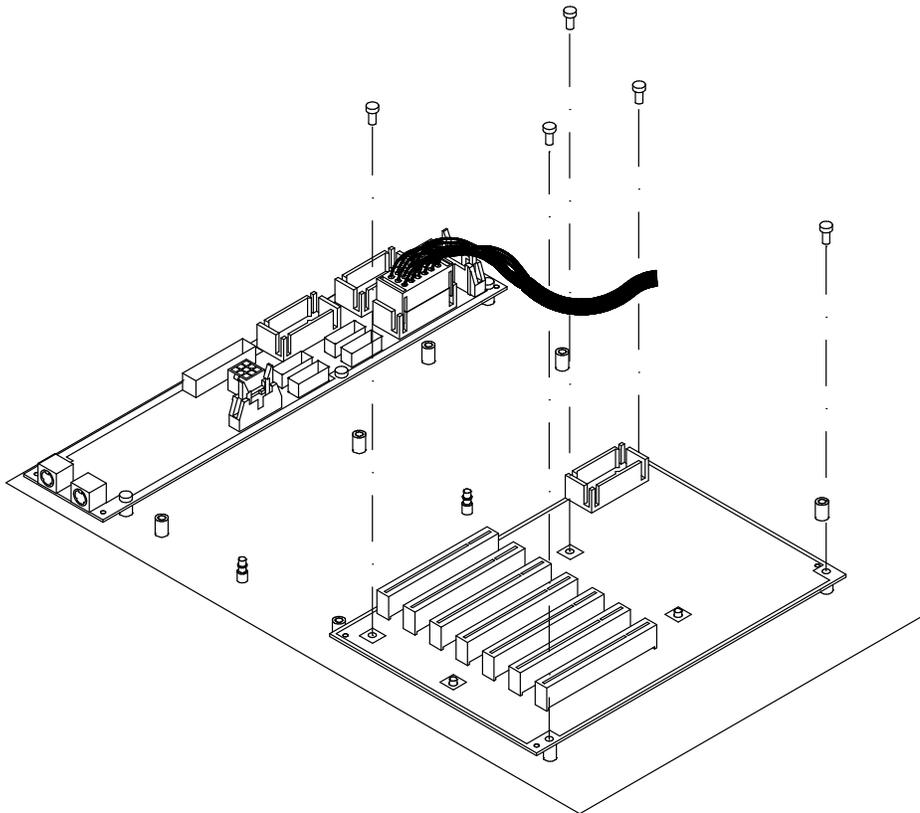
4. Disconnect the external cables from the controller cards installed on the KPE planar, recording which connector cable attaches to which controller card.
5. Remove each controller card installed on the KPE planar. Record their positions to restore the original configuration. For details, refer to the CPU drawer base documentation set, in the **Expanding the System Configuration** section, **Controller Removal** paragraph.

**Warning:** While removing any controller card, the relevant spring may shift. It must be re-installed.

6. Remove the KPE planar from the drawer, performing the following steps:
  - a. Loosen the screws of the metal cover, used to retain the internal cables at side of the PCI controller area, as indicated by A in the figure.
  - b. Remove the metal cover from the drawer chassis. See B in the figure.
  - c. Unplug the KPE-KDD interconnection cable from the dedicated connector on the KPE planar. See C in the figure.

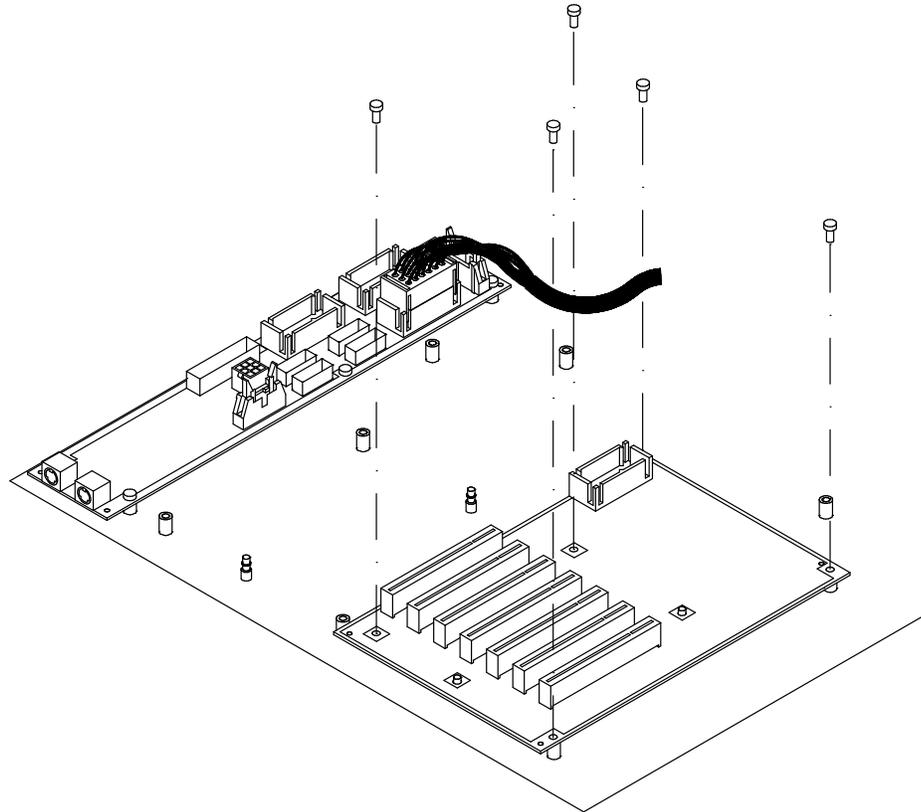


- d. Loosen the retaining screws to unlock the KPE planar from the drawer chassis and remove it.

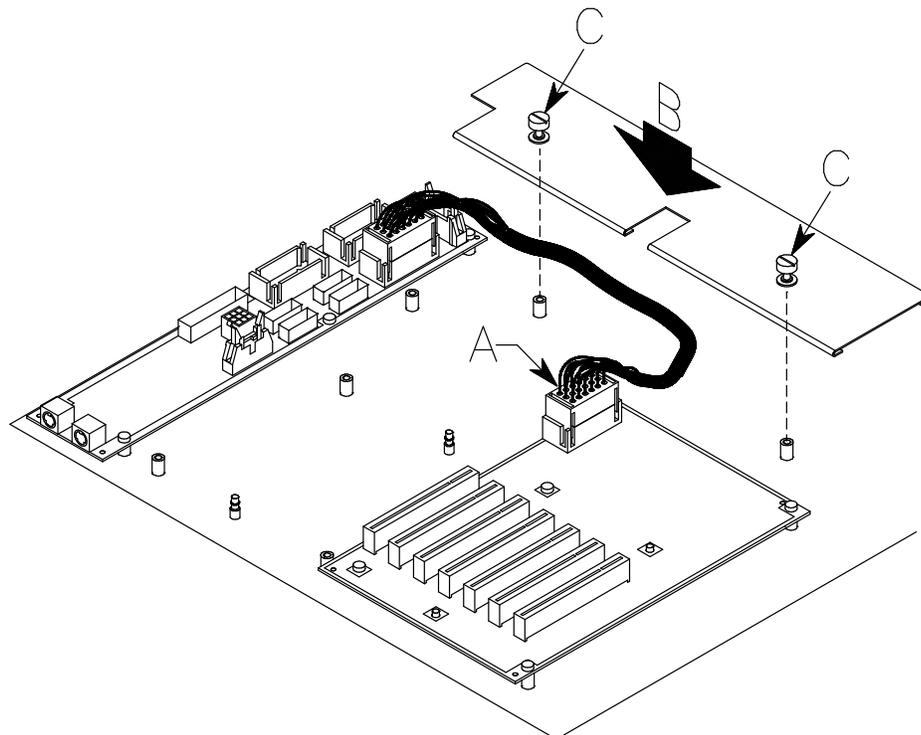


## Installation

1. To install the KPE planar, perform the following steps:
  - a. Place the KPE card on the drawer chassis, then tighten the retaining screws to lock it.



- b. Plug the KPE-KDD interconnection cable into the dedicated connector on the KPE planar. See A in the figure.
    - c. Place the metal cover on the drawer chassis. See B in the figure.
    - d. Tighten the screws of the metal cover, as indicated by C in the figure.



2. Install the drawer top cover, as described in **Top Cover, Installation** procedure, on page 2-6.
3. Carefully slide the drawer inside the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
4. Perform **Restart Operations**, as described on page 2-8.

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## Second KPE Planar

- **Installation**, below
- **Removal**, on page 2-32.

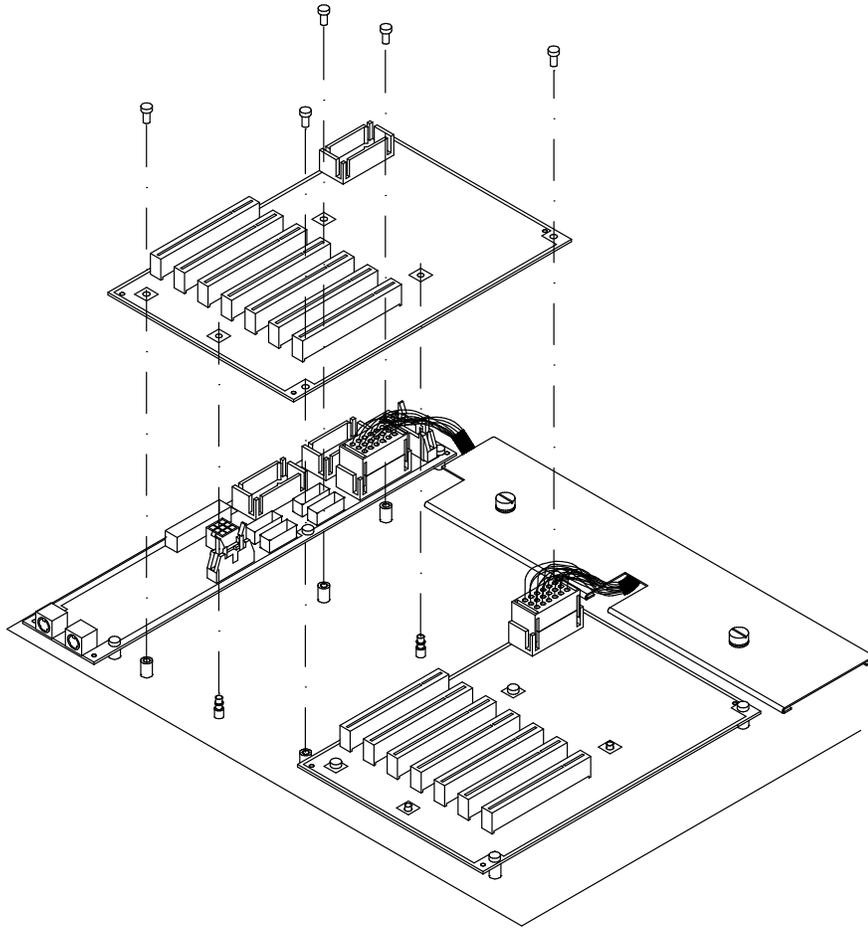
**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

### Installation

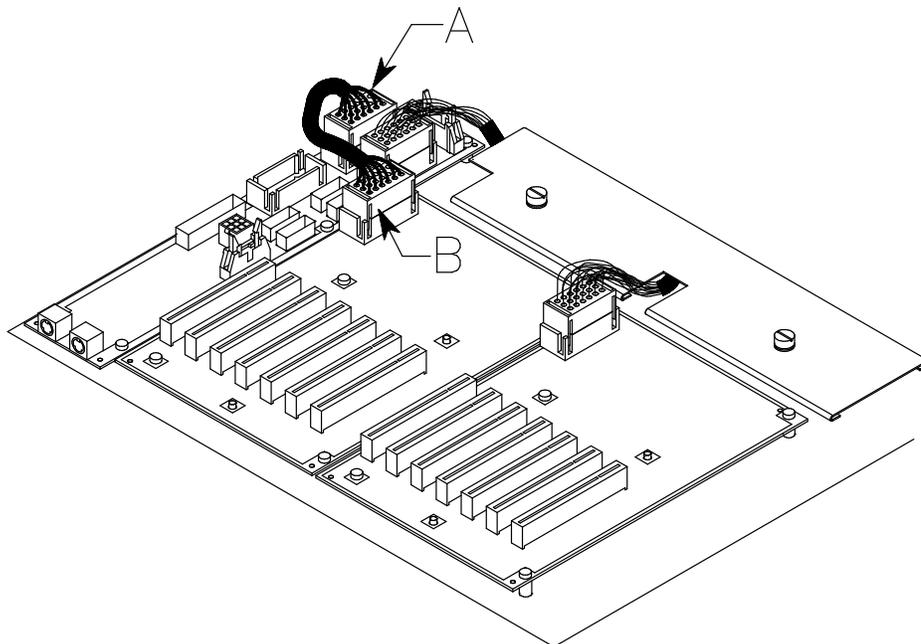
**Notes:**

1. If you are installing the second KPE planar for the first time, please refer to the CPU drawer base documentation set, in the **Configuring the System** section, for exhaustive information about the PCI controller configuration rules, and in the **Expanding the System Configuration** section, for the installation procedures of controller cards.
2. For exhaustive information about the PCI expansion drawer SCSI cables connection, refer to **SCSI Cables Description and Connection**, on page 3-1.
1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer**, **Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover**, **Removal** procedure, on page 2-6.
3. Accessing the drawer from the rear side, locate the position dedicated to the second KPE planar.

4. Firmly grip the second KPE planar and secure it to the drawer chassis tightening clockwise its retaining screws.



5. Connect the KPE-KDD interconnection cable to the dedicated connector on the KDD card, as indicated by A in the figure. Then, connect it to the second KPE planar, as indicated by B.



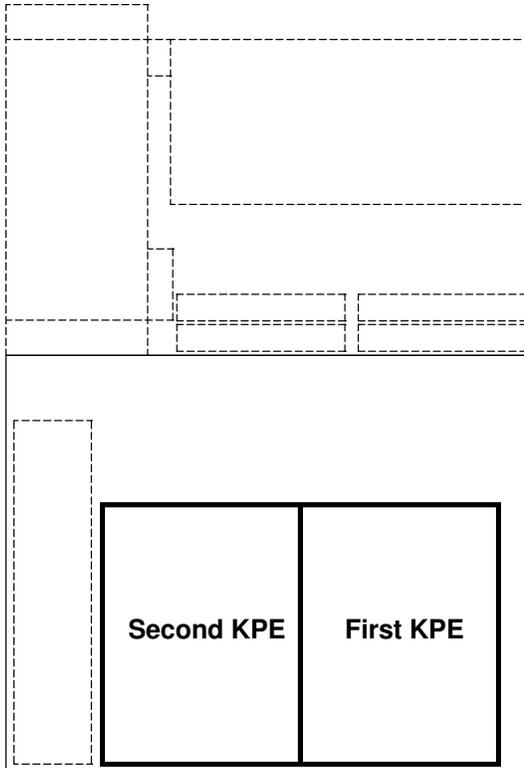
6. Perform the KXB card installation, as described in **KXB Card, Installation** procedure, on page 2-36.

**Note:** Each KPE planar requires a KXB card installed.

7. Install the required controller cards on the KPE planar. For the installation procedures of controller cards, refer to the CPU drawer base documentation set, in the **Expanding the System Configuration** section.
8. Install the drawer top cover, as described in **Top Cover, Installation** procedure, on page 2-6.
9. Carefully slide the drawer inside the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
10. Perform **Restart Operations**, as described on page 2-8.

## Removal

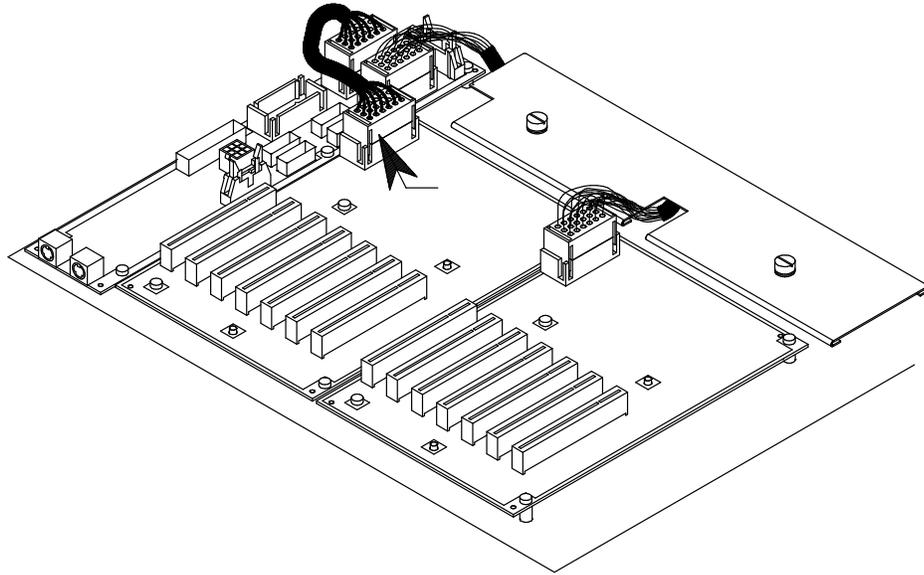
1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
3. Accessing the drawer from the rear side, identify the second KPE planar.



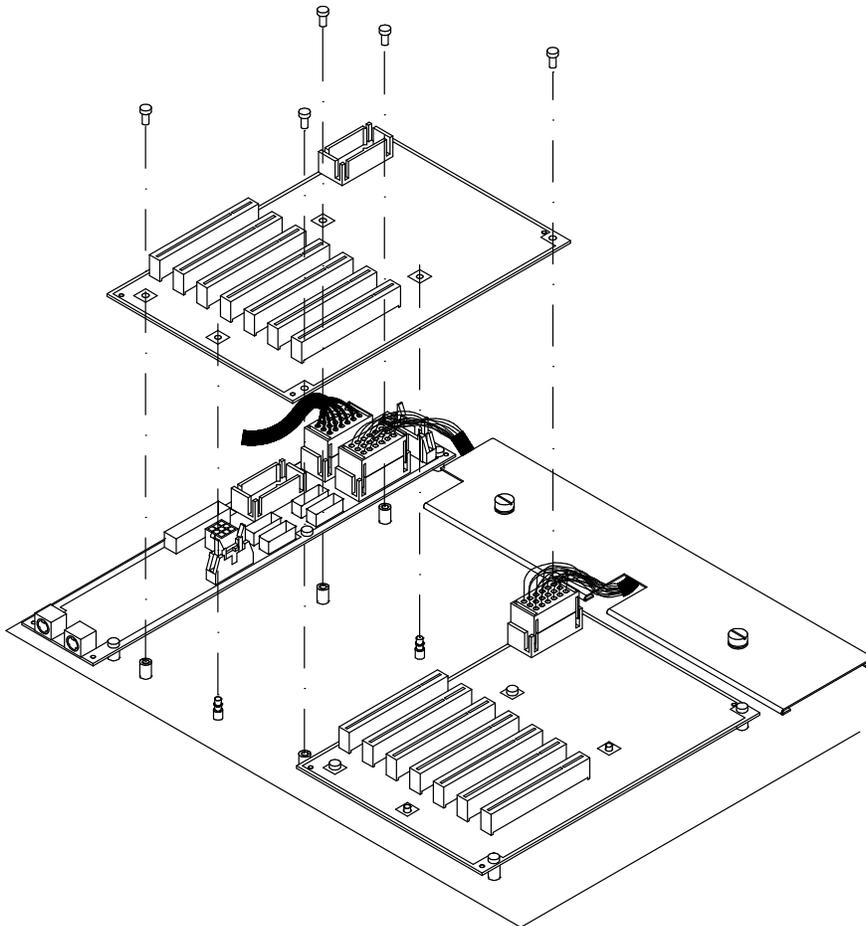
4. Disconnect the external cables from the controller cards installed on the KPE planar, recording which connector cable attaches to which controller card.
5. Remove each controller card installed on the KPE planar. Record their positions to restore the original configuration. For details, refer to the CPU drawer base documentation set, in the **Expanding the System Configuration** section, **Controller Removal** paragraph.

**Warning:** While removing any controller card, the relevant spring may shift. It must be re-installed.

6. Remove the KPE planar from the drawer, performing the following steps:
  - a. Unplug the KPE-KDD interconnection cable from dedicated connector on the KPE planar, as shown in the figure.



- b. Loosen the retaining screws to unlock the KPE planar from the drawer chassis and remove it.



7. If you need to re-install the second KPE card, go to the **Installation** steps of this procedure, otherwise perform the following operations:
  - a. Install the drawer top cover, as described in **Top Cover, Installation** procedure, on page 2-6.
  - b. Carefully slide the drawer inside the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
  - c. Perform **Restart Operations**, as described on page 2-8.

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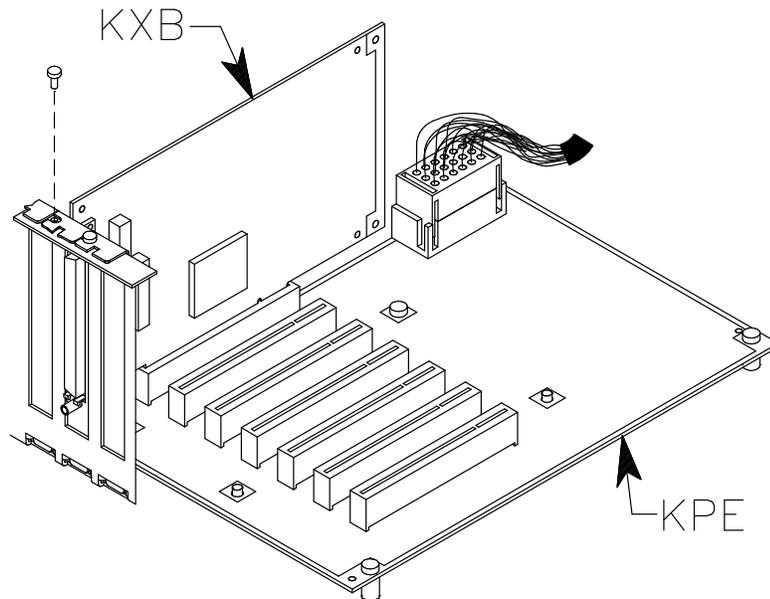
## KXB Card

- **Removal**, below
- **Installation**, on page 2-36.

**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

### Removal

1. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
2. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
3. Accessing the drawer from the rear side, identify the KXB card.
4. Make sure the KBR-KXB PCI external cable is disconnected from the external connector of the KXB card.
5. Loosen the retaining screw used to secure the KXB card to the drawer chassis.



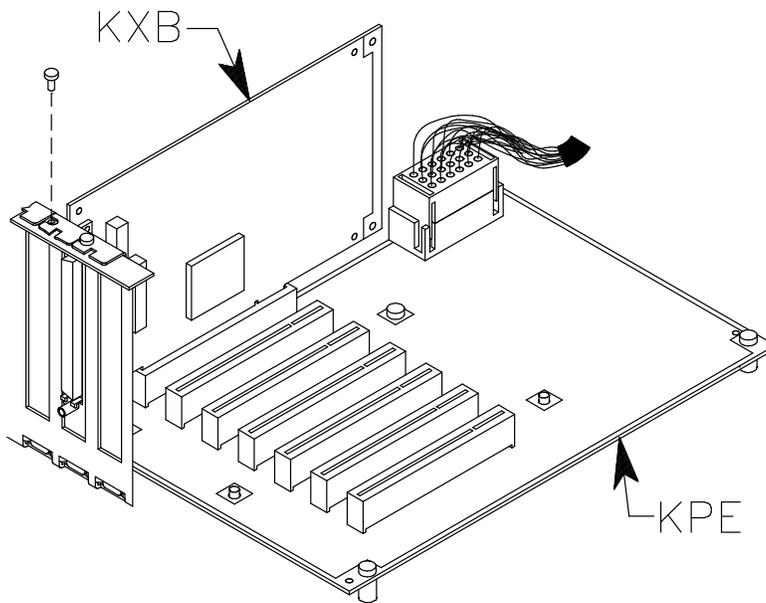
6. Firmly grip the KXB card by the edges and slide it out of the slot.

**Warning:** While removing the KXB card, the relevant spring may shift. It must be re-installed.

## Installation

**Warning:** The KXB card must be installed in the dedicated slot on the KPE planar. For more details, refer to **KPE Planar**, on page 1-6.

1. If not already done, carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4, and remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
2. Accessing the drawer from the rear side, identify the KXB card connector on the KPE planar.
3. If not already done, loosen the slot cover retaining screw of the designated KXB card connector and slide it out.
4. Grip the KXB card by the edges and firmly push it until its finger connector is plugged in securely.
5. Secure the KXB card to the drawer chassis by tightening clockwise its retaining screw.



**Warning:** While installing the KXB card, the relevant spring may shift. It must be re-installed.

6. Install the drawer top cover, as described in **Top Cover, Installation** procedure, on page 2-6.
7. Carefully slide the drawer inside the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Installation** procedure, on page 2-5.
8. Perform **Restart Operations**, as described on page 2-8.

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## Operator Panel

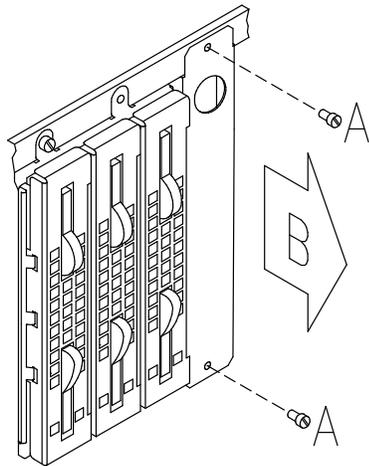
- **Removal**, below
- **Installation**, on page 2-38.

**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

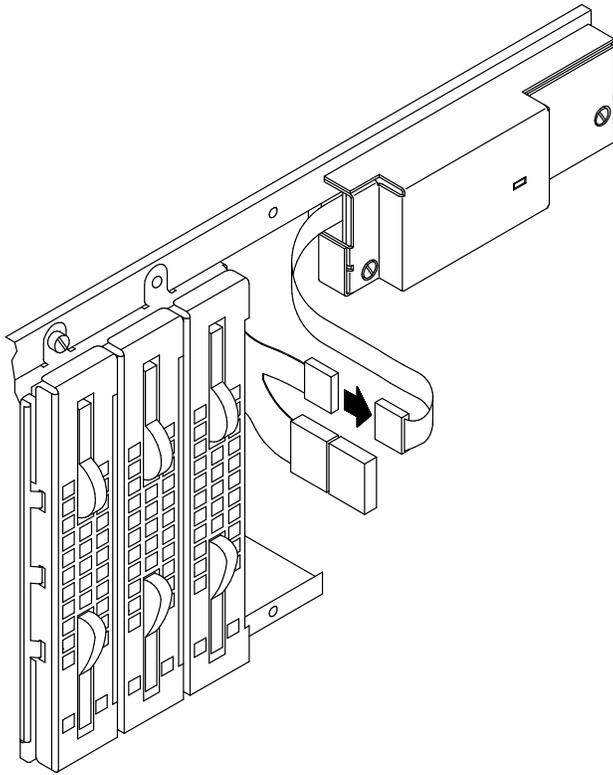
**Note:** The following procedures do not require the PCI expansion drawer to be slid out of the rack.

### Removal

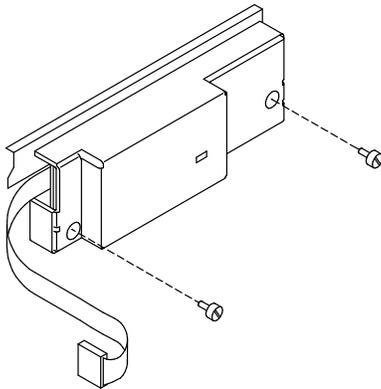
1. Open the front door of the rack and access the PCI expansion drawer from the front side.
2. Remove the drawer front cover, as described in **Front Cover, Removal** procedure, on page 2-7.
3. Unscrew the retaining screws needed to secure the metallic frame to the drawer chassis. These are indicated by A in the figure. Gently slide the metallic frame out of the drawer, as shown in B.



4. Unplug the cable connector from the operator panel, as shown in the figure.



5. Unscrew the retaining screws of the operator panel, to release it from the drawer chassis.



## Installation

1. To install the new operator panel, follow the steps detailed in the **Removal** procedure, in the reverse order.
2. Install the drawer front cover, as described in **Front Cover, Installation** procedure, on page 2-7.
3. Close the front door of the rack.
4. Perform **Restart Operations**, as described on page 2-8.

---

# Power Supply

- **Removal**, below
- **Installation**, on page 2-41.

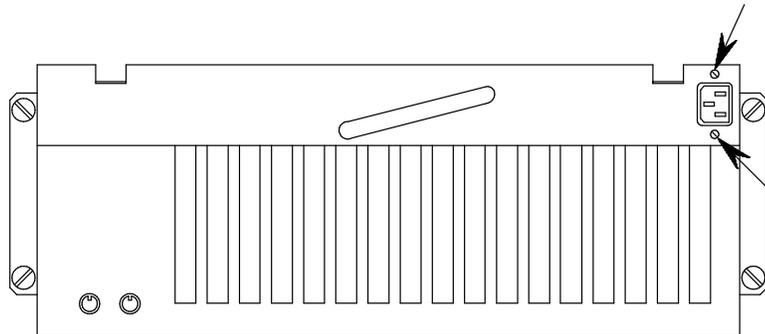
**Warning:** Before handling any hardware component, read and perform the procedure described in **How to Handle Hardware Components**, on page 2-2, and **Preliminary Operations**, on page 2-3.

## DANGER

**Do not attempt to open the covers of the power supply. Power supplies are not serviceable and are to be replaced as a unit.**

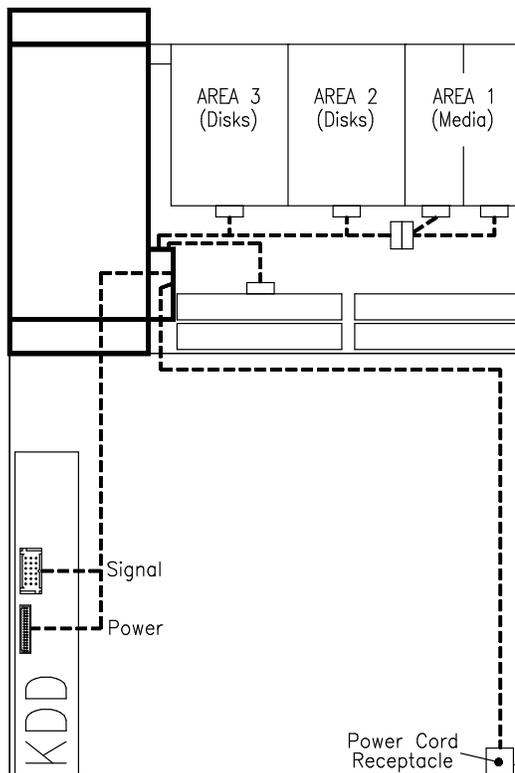
## Removal

1. Unplug the PCI expansion drawer power cord from both the PDU and the drawer rear side.
2. Carefully slide the PCI expansion drawer out of the rack, as described in **Partial Removal/Installation of the PCI Expansion Drawer, Removal** procedure, on page 2-4.
3. Remove the drawer front cover, as described in **Front Cover, Removal** procedure, on page 2-7.
4. Remove the drawer top cover, as described in **Top Cover, Removal** procedure, on page 2-6.
5. Accessing the drawer from the rear side, unscrew the retaining screws used to secure the power cord receptacle to the drawer chassis. Slide the power cord receptacle towards the internal side of the drawer.



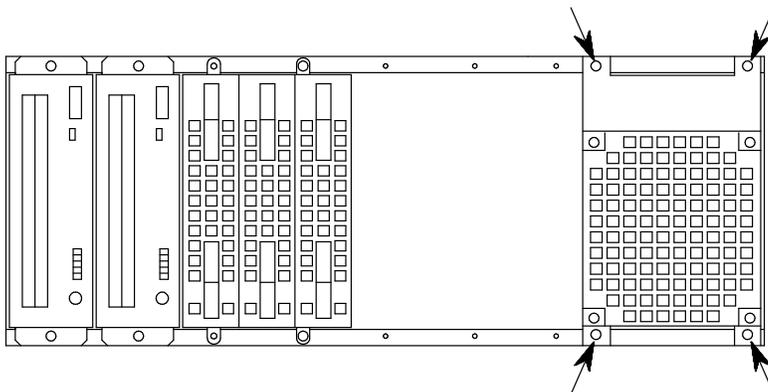
If the power cable ended with the power cord receptacle is retained, by means of fasteners inside the drawer, cut them to release the cable. Then, carefully bring it near the power supply.

- Unplug the power supply cable connectors located on the KDD card, the device power cable connector of each disk cage and media devices and the fan power cable connector. Then, carefully bring each cable near the power supply to facilitate the removal operations.



Please note that for the area housing one or more media devices, a split cable is connected to the power cable connector corresponding to that area.

- Insert the drawer inside the rack.
- Remove the operator panel, as described in **Operator Panel, Removal** procedure, on page 2-37.
- Remove the disk cage installed in Area 3 because it obstructs the removal of the power supply from the drawer. If you need details, please refer to **Disk Cage, Removal** procedure, on page 2-10.
- Unscrew the retaining screws of the power supply to release it from the drawer chassis.



11. Firmly grip the power supply and carefully slide it out of the drawer, towards the front side.

**Warning:** Be careful when removing the power supply from the drawer. Many cables come from the power supply; these could be damaged, or get entangled and damage something in the drawer.

## Installation

1. To install the new power supply, follow the steps described in the **Removal** procedure, in the reverse order.
2. Perform **Restart Operations**, as described on page 2-8.



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## Chapter 3. SCSI Cables Description and Connection

- **Overview**, below
- **SCSI Cables Description**, on page 3-2
- **SCSI Cables Connection**, on page 3-3.

---

### Overview

The connection rules of the SCSI cables for the PCI expansion drawer are described in the following paragraphs.

The connections of the various SCSI cables depend on the system configuration, i.e. which disk/media devices and how many of them are installed inside the PCI expansion drawer.

The PCI expansion drawer supports:

- Up to two media devices in Area 1
- Up to two disk cages in Areas 3 and 2:
  - KP2 or KP3 disk cages, with two 1.6-inch or three 1-inch ULTRA/SE disk devices, if these are the cages/devices used in the CPU drawer
  - FD3 disk cages, with three 1-inch ULTRA-2/LVD disk devices, if these are the cages/devices used in the CPU drawer.

**Note:** Examples of SCSI connections are given in the CPU drawer base documentation set, in the **Configuring the System** section.

---

## SCSI Cables Description

The following table includes all SCSI cables that can be used for the PCI expansion drawer SCSI connections. For each SCSI cable, a brief description is given.

The part number of any cable listed below is available in **Spare Parts**, on page A-1.

SCSI Cable	Cable Description
<b>Media Cable</b>	It is used to connect the SCSI controller installed in the first KPE planar to the media device(s) installed in Area 1.
<b>PCI SCSI Controller Internal Disk Cable</b>	It is used to connect the SCSI controller(s) installed on the first KPE planar to the disk cage(s).
<b>Cage to Cage Jumper Cable</b>	It is used to connect Area 3 disk cage to Area 2 disk cage.
<b>KDK Complex</b>	It is composed of the KDK card and two flat cables connected to the KDK card and to the disk cages.
<b>LVD/SE Terminating Plug</b>	It is plugged into the dedicated connector on the rear of the last disk cage of a ULTRA-2/LVD disk bus, to terminate it.
<b>SE Terminating Plug</b>	It is plugged into the dedicated connector after the last media device, to terminate the media bus. It is plugged into the dedicated connector on the rear of the last disk cage of a ULTRA/SE disk bus, to terminate it.
<b>Rear to Disk Cage SCSI-LVD Cable</b>	It is used to connect a disk cage to a SCSI plug on the rear of the drawer, so that an ULTRA2 SCSI RAID adapter installed in the CPU drawer, can manage the disks of the expansion drawer. (Additional external plug is included into the cable).

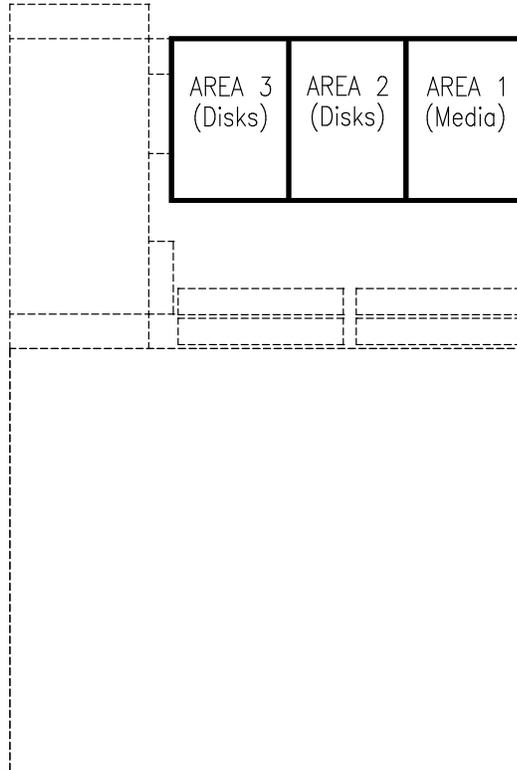
Some of these cables are pre-installed inside the PCI expansion drawer by the manufacturer, according to the required configuration.

# SCSI Cables Connection

Disk devices can be installed in Areas 3 and 2. Each of these areas, can hold either up to two 1.6-inch hard disk devices or up to three 1-inch hard disk devices.

Media devices can be installed in Area 1 for a maximum of two media devices.

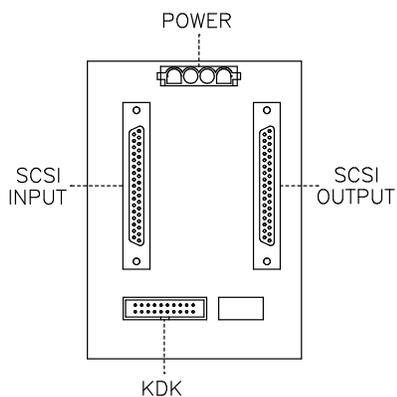
## PCI Expansion Drawer Front



**Note:** The device configuration rules and examples of connections, as well as examples of RAID configuration, are described in the CPU drawer base documentation set, in the **Configuring the System** section.

For the disk devices, the SCSI cables must be connected to the input/output device connectors located on the rear of the disk cage housing the specified disks; in addition, the KDK complex cables must be connected to the rear of the disk cage(s) installed in the PCI expansion drawer, as shown in the figure.

## Disk Cage Rear



For each media device, the SCSI cables must be connected to the dedicated input/output connectors placed on the rear of the device.

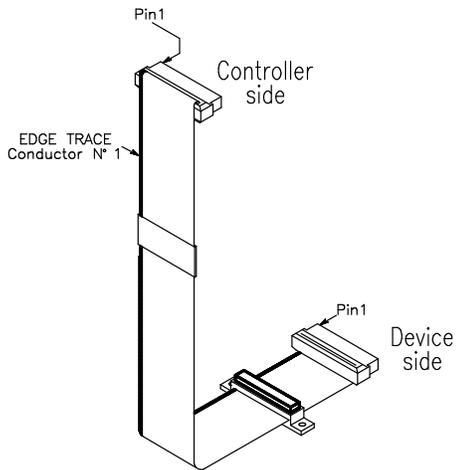
## PCI SCSI Controller Internal Disk Cable

The PCI SCSI controller internal disk cable is required whenever you need to connect a PCI controller to a disk cage.

It must be connected in different ways, according to the PCI controller type.

## SCSI PCI Controller

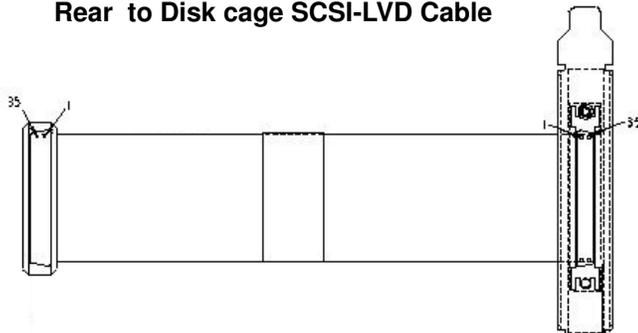
To install a standard SCSI PCI controller, connect the relevant cable as shown in the figure.



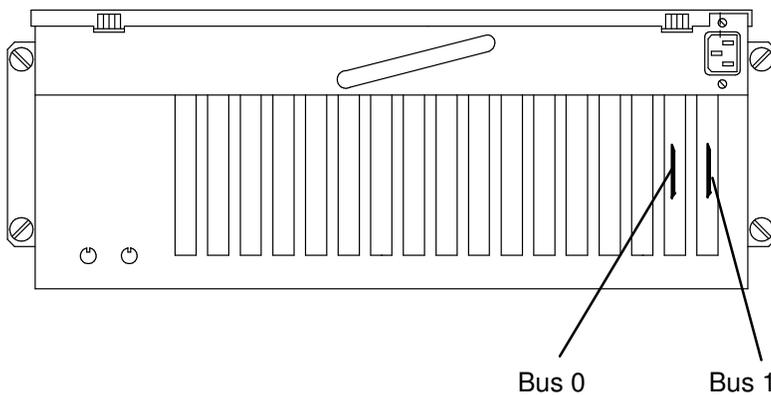
## Devices under RAID Configuration

To connect the PCI expansion drawer to the RAID controller which is installed in the CPU drawer, fold and connect the relevant cables as shown in the figures.

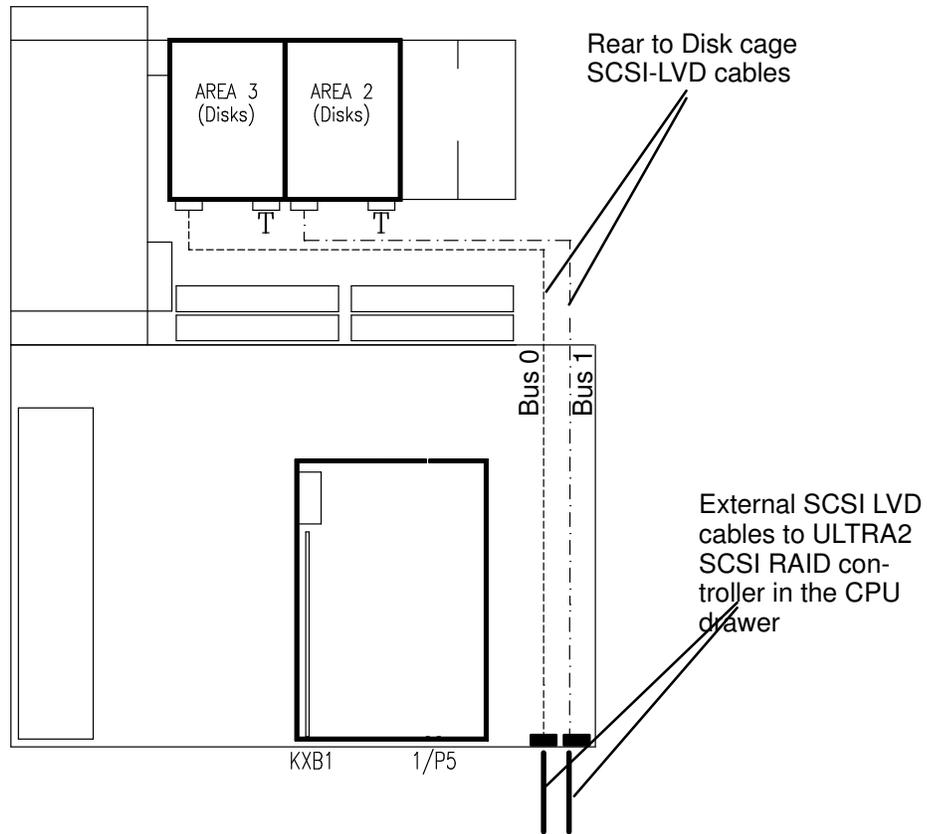
### Rear to Disk cage SCSI-LVD Cable



### PCI Expansion Drawer, Rear View



**Connection of Disk Devices on two RAID busses**  
**PCI Expansion Drawer, Top View**



**Legend:**  
T Terminating plug



# Appendix A. Spare Parts

## Component - Part Number Cross-Reference

Component	Part Number
AC cable (PCI expansion drawer to PDU)	90228002
Cage assembly for 2 disks (mechanical part only)	78 172 259
Cage assembly for 3 disks (mechanical part only)	78 172 258 (KP3) 78 174 491 (FD3)
Fan cable	78 173 632
Fan module	78 173 518
FD3 card	78 175 235
KBR card	78 172 994
KBR-KXB PCI external connection cable	91015001
KDD card	78 172 155
KDK complex	78 173 509
Key cable extension (KDD card to operator panel)	78 173 580
KHS card	78 171 615
KHS card to KDD card cable	78 172 798
KP2 card	78 172 467
KP3 card	78 172 470
Cage to cage jumper cable (0,14M)	90171002
Kit rack mount	78 173 558
KPE planar	78 172 253
KXB card	78 173 014
LED cable	78 173 594
Media cable	78 173 592
Media power cable	78 166 951
PCI SCSI controller internal disk cable	78 173 554
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**Note:** Media and disk devices supported by the PCI expansion drawer are those listed in the CPU drawer base documentation set.



---

# Glossary

---

## A

**A:** Ampere.

**AC:** Alternating Current.

**AIX:** IBM's implementation of UNIX operating system.

**ANSI:** American National Standards Institute.

**Appliance Coupler:** A standard IEC 320 male plug placed on the drawer rear side.

**ASCII:** American Standard Code for Information Interchange.

**AUI:** Attachment Unit Interface.

---

## B

**bank:** See memory bank.

**BUMP:** Bring-Up MicroProcessor. A low power microprocessor which monitors the system, especially during the various boot phases before the operating system is loaded.

---

## C

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

**chip:** Synonym for integrated circuit (IC).

**CHRP:** Common Hardware Reference Platform. System model architecture, implemented on multiple bus systems (PCI, ISA). Standard CHRP functions are provided to isolate the operating system from every specific hardware implementation.

**CPU:** Central Processing Unit.

---

## D

**DAS:** Disk Array Subsystem. A RAID disk drawer, available in different models.

**DC:** Direct Current generated by the power supply.

**DDS:** Digital Data Storage.

**device areas:** See media and disk device areas.

**DIMM:** Dual In-line Memory Module. It is the smallest component of the system memory. See also memory bank, riser.

**disk cage:** A metallic box which hosts up to 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.

**DPCI:** Dual Port PCI host bridge.

**DRAM:** Dynamic Random Access Memory.

**drawer:** Each system or subsystem installed in a rack is a drawer. There are several types of drawers, such as CPU drawers, PCI expansion drawers, DAS drawers.

**DUART:** Dual Universal Asynchronous Receiver Transmitter.

---

## E

**ECMA:** European Computer Manufacturers Association.

**EEPROM:** Electrically Erasable Programmable Read-Only Memory. An EPROM that can be reprogrammed while it is in the system.

**EIA:** Electronic Industries Association.

**EMI:** ElectroMagnetic Interference.

**EPROM:** Erasable Programmable Read-Only Memory.

**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 up to 40M bytes per second. It is also called ULTRA WIDE or ULTRA/SE.

**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.

**FEPROM:** Flash Erasable Programmable Read-Only Memory. An EPROM containing the system firmware.

**firmware:** The microcode in read-only memory (ROM). It consists of an ordered set of instructions and data stored in a way that is functionally independent of main storage.

**FPL:** See system planar.

**FSB:** It is a card housing the BUMP logic. Also, it holds two dedicated connectors which interconnect the FSB card to the KBB card and to the KHS card, if this is installed.

**FW:** See firmware.

---

## G

**GUI:** Graphical User Interface.

---

## H

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

---

## I

**I2C:** Inter Integrated Circuit.

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

**IEC:** International Electrotechnical Commission.

**I/O:** Input/Output.

**ISA:** Industry Standard Architecture (Bus).

---

## J

**JBOD:** Just a Bunch Of Disks.

---

## K

**KBB:** A card that provides three RS-232 lines and one parallel line. It is also connected to the KSB/FSB card by means of a dedicated flat cable.

**KBR:** A card dedicated to the connection of a PCI expansion drawer.

**KDD:** A card installed in the PCI expansion drawer and interconnecting all the expansion drawer resources. It manages also the input and output RS-485 connection between the CPU drawer and the PCI expansion drawer.

**KDK Complex:** It is composed by the KDK card and two flat cables connected to it. Its main functionality is to define the hard disk drive SCSI-ID.

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

**KHS:** An optional card to be installed in presence of a RAID configuration. It interfaces the RAID controller card.

**KP2:** The back plane of a disk cage that connects up to two 1.6-inch ULTRA/SE disk devices. See also disk cage, disk carrier.

**KP3:** The back plane of a disk cage that connects up to three 1-inch ULTRA/SE disk devices. See also disk cage, disk carrier.

**KPE:** The planar hosting the PCI controllers in the PCI expansion drawer. Up to two KPE planars can be installed in each PCI expansion drawer.

**KPL:** See system planar.

**KPS/KPSR:** See power supply.

**KSB:** A card housing the BUMP logic. Also, it holds two dedicated connectors which interconnect the KSB card to the KBB card and to the KHS card, if this is installed.

**KXB:** A card installed in the PCI expansion drawer, dedicated to the connection to the CPU drawer.

---

## L

**LAN:** Local Area Network.

**LED:** Light-Emitting Diode.

**LVD:** Low Voltage Differential.

---

## M

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

**memory bank:** The minimum quantity of memory used by the system. It physically consists of four memory DIMM's. See also DIMM and riser.

**MFG:** Manufacturing.

**MP:** MultiProcessor.

**multimedia:** Information presented through more than one type of media. On computer systems, this media includes sound, graphics, animation and text.

**multitasking:** The ability to perform several tasks simultaneously. Multitasking allows you to run multiple applications at the same time and exchange information among them.

---

## N

**NVRAM:** Non Volatile Random Access Memory.

---

## O

**OF:** See Open Firmware.

**OP:** See operator panel.

**Open Firmware:** An architecture for the firmware that controls a computer before the operating system execution. It also provides a user-interface.

**operator panel (KOP):** The CPU drawer panel where the 3-digit hexadecimal display, two LEDs and the reset button are located.

**operating system:** The software which manages the computer's resources and provides the operating environment for application programs.

---

## P

**PCI:** Peripheral Component Interconnect. A bus architecture that supports high-performance peripherals such as graphic boards, multimedia video cards and high-speed network adapters.

**PDU:** Power Distribution Unit. The rack power distribution system for the installed drawers.

**PowerPC:** A standard RISC microprocessor family.

**power supply (KPS):** The CPU drawer and the PCI expansion drawer are equipped with one power supply module, providing power and power regulation to all the system components. See also redundant power supply.

**PPI:** Parallel Port Interface.

---

## Q

No entries.

---

## R

**rack:** The metallic frame which houses the drawers and provides them power through its Power Distribution Unit (PDU).

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

**RAM:** Random Access Memory.

**redundant power supply (KPSR):** 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.

**riser:** A card used for memory configuration hosting memory DIMM connector(s).

**RMS:** Recovery Management Support.

**ROM:** Read Only Memory.

**RPM:** Revolutions Per Minute.

**RS-232:** An EIA interface standard that defines the physical, electronic and functional characteristics of an interface line.

**RS-422:** An EIA interface standard that defines the physical, electronic and functional characteristics of an interface line.

**RS-485:** A line for drawer interconnection. It is used for the connection of expansion drawers.

**RSF:** Remote Services Facilities.

**rspec:** PowerPc Reference Platform. System model architecture, implemented on multiple bus systems (PCI, ISA).

---

## 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.

**SCSI-ID:** See ID.

**SE:** Single Ended.

**SID:** System IDentifier.

**slot cover:** A metallic plate that covers free PCI/ISA controller card slots.

**SMIT:** System Management Interface Tool. It is an interactive screen-oriented command interface. It is provided with the operating system.

**Stand-By menu:** A menu which is available on the terminal connected to the COM1 port when the system is in standby state. It is used for system maintenance and testing activities.

**SYSID:** SYStem IDentification.

**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.

**system planar (KPL/FPL):** The CPU drawer planar which interconnects all the system resources.

**SVGA:** Super Video Graphics Array.

---

## T

**torx:** A special screw with a six-point starlike hollow.

---

## U

**U:** Unit. Racks and drawers are measured in Units. Each U corresponds to 44.45 mm (1.75 inches).

**UART:** Universal Asynchronous Receiver Transmitter.

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

**ULTRA/SE:** See Fast-20 WIDE-16.

**UPS:** Uninterruptible Power Supply. A device which provides continuous power and sustains the system it is connected to, in case of outages.

---

## V

**V:** Volt.

**VCC:** Voltage Continuous Current.

**VCCI:** Voluntary Control Council for Interference.

**VGA:** Video Graphics Array.

**VPD:** Vital Product Data.

---

## W

No entries.

---

## X

No entries.

---

## Y

No entries.

---

## Z

No entries.

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