Installation Guide

English

EXP RAID

653-00697B-EN
Internal 731-00114B-EN

www.creo.com

EXP RAID

Installation Guide

creo™

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RE37,376	5,325,217	5,532,728	5,742,743	5,996,499	6,158,345	6,353,216
4,558,302	5,339,176	5,561,691	5,764,374	5,998,067	6,159,659	6,366,339
4,743,091	5,343,059	5,568,595	5,764,381	6,003,442	6,164,637	6,371,026
4,992,864	5,355,446	5,576,754	5,771,794	6,014,471	6,180,325	6,377,739
5,049,901	5,359,451	5,579,115	5,785,309	6,016,752	6,181,362	6,387,597
5,079,721	5,359,458	5,592,309	5,813,346	6,031,932	6,181,439	6,396,422
5,103,407	5,367,360	5,594,556	5,818,498	6,043,865	6,186,068	6,396,618
5,111,308	5,384,648	5,600,448	5,854,883	6,060,208	6,189,452	6,407,849
5,113,249	5,384,899	5,608,822	5,861,904	6,063,528	6,191,882	6,414,755
5,122,871	5,412,491	5,615,282	5,861,992	6,063,546	6,204,874	6,422,801
5,124,547	5,412,737	5,625,766	5,875,288	6,072,518	6,208,369	6,435,091
5,132,723	5,420,702	5,636,330	5,894,342	6,090,529	6,214,276	6,441,914
5,150,225	5,420,722	5,649,220	5,900,981	6,096,461	6,217,965	6,450,092
5,153,769	5,459,505	5,650,076	5,934,196	6,098,544	6,260,482	6,456,396
5,155,782	5,473,733	5,652,804	5,942,137	6,107,011	6,266,080	6,476,931
5,157,516	5,481,379	5,680,129	5,946,426	6,112,663	6,266,134	6,477,955
5,208,818	5,488,906	5,691,823	5,947,028	6,115,056	6,267,054	6,509,903
5,208,888	5,497,252	5,691,828	5,958,647	6,121,996	6,268,948	6,541,181
5,247,174	5,508,828	5,696,393	5,966,504	6,130,702	6,283,589	6,545,772
5,249,067	5,509,561	5,699,174	5,969,872	6,134,393	6,295,076	6,564,018
5,283,140	5,517,359	5,699,740	5,973,801	6,136,509	6,299,572	
5,291,273	5,519,852	5,708,736	5,986,819	6,137,580	6,318,266	
5,323,248	5,526,143	5,713,287	5,995,475	6,147,789	6,352,816	

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Who Should Use This Guide

This guide describes how to install and configure the EXP RAID desk side SCSI disk enclosure, which includes an IBM 4 Channel Ultra3 SCSI RAID PCI Adapter located in either Brisque or Brisque Serve machines, and connects to a dual channel external tower.



Important: This guide applies to EXP 300 RAID and EXP 320 RAID. Information that is applicable to only one model, is stated as such.

This guide is intended for Brisque/Brisque Serve support engineers.

To use this manual, you should have a thorough knowledge of:

- Brisque/Brisque Serve
- IBM AIX operating system

Symbols Used in This Guide

This section describes the symbols used in this manual.



Important: This symbol indicates things that may cause process delays or reduce functionality, reliability, or quality.



Note: A note provides additional information that you may need to consider.

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1.1 Prerequisites

- Brisque or Brisque Serve 4.0 and later
- Brisque or Brisque Serve platforms 7025-6F1, 7044P-170, 7043P-150, 7025-F50, or 7029-6E3, 7028-6E4 (the IBM new platforms)

1.2 PCI RAID Adapter Specifications

The PCI 4-Channel Ultra3 SCSI RAID Adapter is a 33-MHz 64-bit board with updatable microcode levels. It enables you to connect SCSI hard disk drives in RAID 0, 1, 5 and 5E configurations to system units with a Peripheral Component Interconnect (PCI) bus.

The EXP RAID uses the RAID-5 configuration.

The PCI 4-Channel Ultra3 SCSI RAID Adapter has four channels: 1, 2, 3 and 4. Channels 1 and 2 have both an internal and external connector. Only one internal or external connector can be used on each channel.

The EXP RAID uses only two channels: 1 and 2 (external connectors).

You can create, control and manage a RAID configuration using support host software. The PCI 4-Channel Ultra3 SCSI RAID Adapter supports fast and wide SCSI synchronous data rates from 20 MB per second (16-bit) up to 160 MB per second (16-bit) on four independent SCSI-2 channels. Other SCSI devices cannot be connected to the PCI 4-Channel Ultra3 SCSI RAID Adapter.

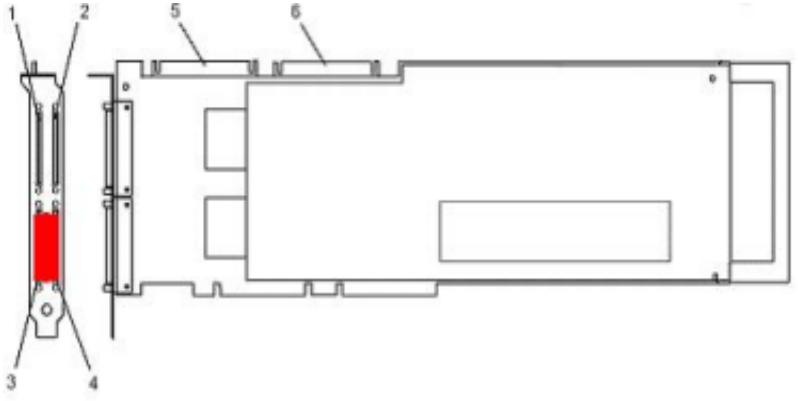


Figure 1: PCI 4-Channel Ultra3 SCSI RAID Adapter

In the above figure, numbers 1 through 4 represent the external very high density 68-pin SCSI connectors (channels 1, 2, 3 and 4). Numbers 5 and 6 represent the internal high density 68-pin connectors.

Note: The EXP RAID uses only external connectors 1 and 2. Other connectors are blocked. Do not remove the cover that is attached to channels 3 and 4.

1.3 EXP Unit

1.3.1 Parts

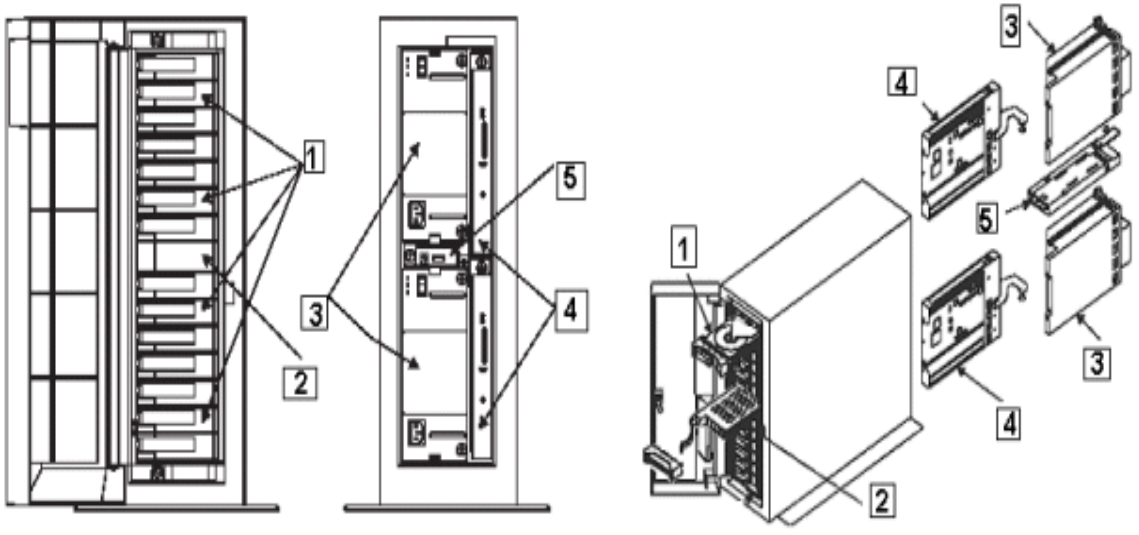


Figure 2: EXP RAID parts location

The EXP RAID unit includes the following components:

Device slots [1] At the front of the unit are 14 device slots, which are divided into two groups of seven slots. When the unit is configured for full configuration, a SCSI disk drive module occupies each device slot. When the unit is configured for half capacity configuration, it contains seven disk drives and seven dummy modules. Each slot that is not occupied by a SCSI disk drive module must contain a dummy module.
Each disk drive module connects to a backplane that is vertically mounted halfway between the front and the back of the EXP RAID unit.

SCSI bus bridge card [2] Assigns the disk drive modules to a SCSI bus according to the SCSI bus split switch setting on the switches. The SCSI bus bridge card is located between the two groups of device slots.

Fan and power supply assemblies [3] Two hot-swap power supplies with built-in fans. The fan and power supply assemblies are located at the back of the unit.

SCSI interface cards [4] Connect the RAID adapter in the host machines to the EXP RAID unit. The SCSI interface cards are located at the back of the unit.

Switch card [5] **only for EXP 300**.
(in EXP 320, these switches are located on the SCSI interface cards)
Contains switches that control:

- The SCSI bus mode selection.
- The power with which the EXP RAID unit is supplied.
- The enclosure services that are enabled.

The switch card, located at the back of the unit, also contains a rotary switch that is used to set the ID of the EXP RAID unit.

1.3.2 Hot-swap Power Supply/Fan Bays

The expansion unit is factory-equipped with two 500-watt hot-swap power supplies with built-in fans. The power supplies are redundant, meaning that a single power supply can provide adequate power and cooling for the entire expansion unit. A single power supply can support up to 14 disk drives. However, both power supplies must be installed, even if one power supply is not operational.

Important: The power supply units should always be ON. The brisque turns the unit on and off. Never turn off the power supply.

1.3.3 Switch Card Configuration - Only for EXP 300

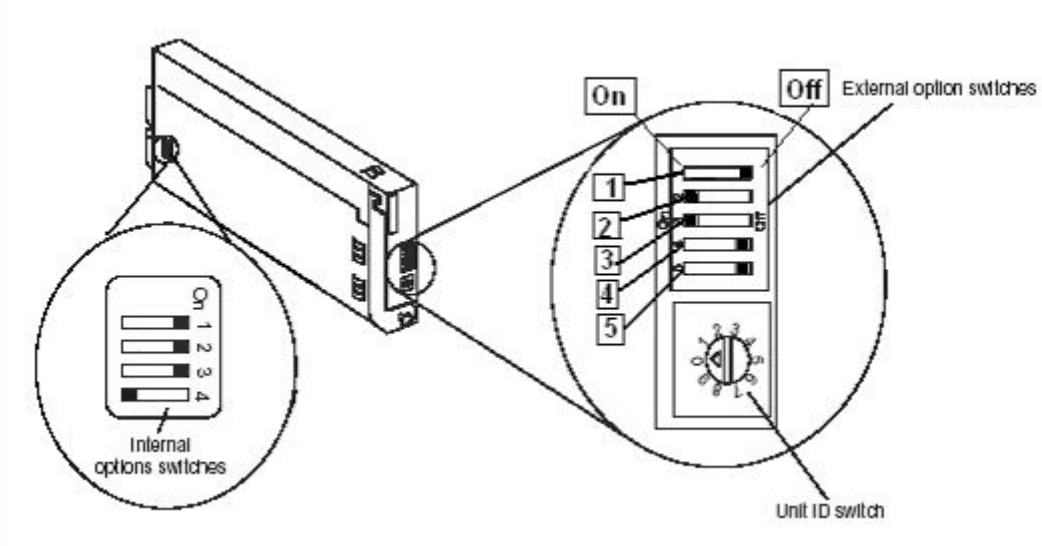


Figure 3: Switch card configuration for EXP 300

External Option Switches

There are five option switches on the exterior of the switch card:

- Option switch 1 controls the power supply to the expansion unit.
- Option switches 2 through 5 are reserved. Leave these switches in their default positions.

Creo Setting:

- Option switch 1 (Power Control switch) position = **Off**
- Option switches 2 through 5 (Reserved)
  - ❒ Option switch 2 position = **On**
  - ❒ Option switch 3 position = **On**
  - ❒ Option switch 4 position = **Off**
  - ❒ Option switch 5 position = **Off**

Unit ID Dial Switch:

ID dial switch position = **0**

Internal Option Switches:

There are four option switches on the inside of the switch card:

- Option switch 1 (SCSI-address switch) position = **On**
- Option switch 2 (Rack/tower LED switch) position = **On**
- Option switch 3 (SCSI bus split switch) position = **On**
- Option switch 4 (Reserved) position = **Off**

1.3.4 SCSI Interface Card Configuration - Only for EXP 320

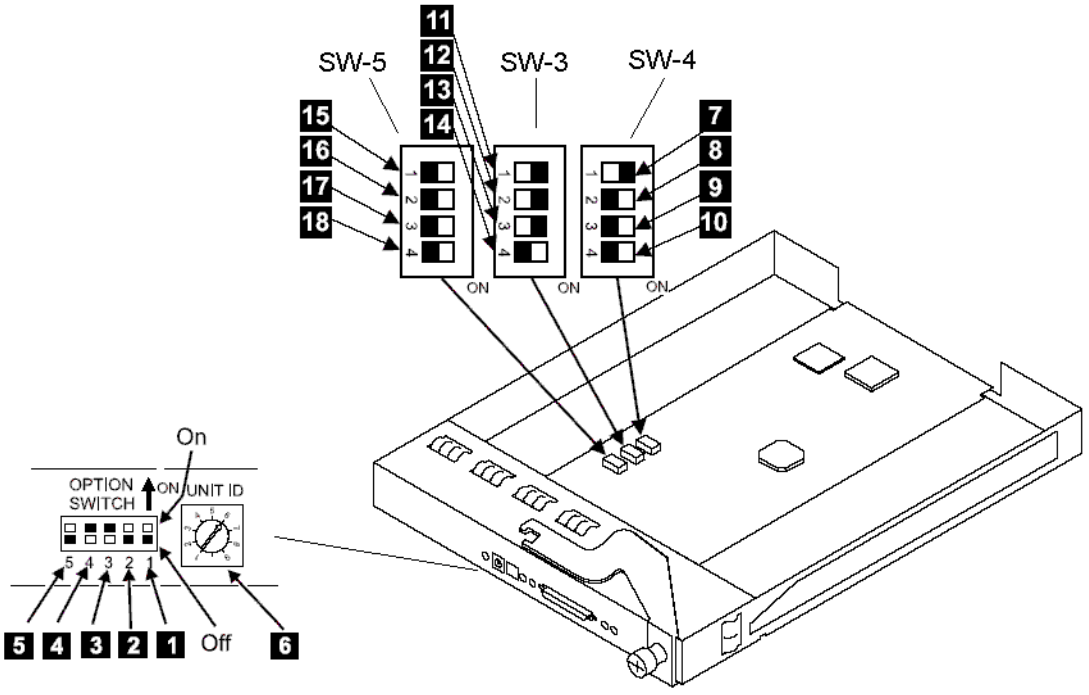


Figure 4: SCSI interface card configuration for EXP 320

External Option Switches

Creo Setting:

- Option switch 1 position = **Off**
- Option switch 2 position = **Off**
- Option switch 3 position = **On**
- Option switch 4 position = **On**
- Option switch 5 position = **Off**

Unit ID Dial Switch:

ID dial switch 6 position = **0**

Internal Option Switches

There are three sets of option switches on the inside of the switch card:

- SW 4:
  - Option switch 7 (SCSI bus split control switch) position = **On**
  - Option switch 8 (Drawer/Tower LED switch) position = **Off**
  - Option switch 9 (Enable fail over function switch) position = **Off**
  - Option switch 10 (Disable SCSI ID=6 switch) position = **Off**
- SW 3:
  - Option switch 11 position = **On**
  - Option switch 12 position = **On**
  - Option switch 13 position = **On**
  - Option switch 14 position = **Off**
- SW 5:
  - Option switch 15 position = **Off**
  - Option switch 16 position = **Off**
  - Option switch 17 position = **Off**
  - Option switch 18 position = **Off**

1.3.5 Enclosure Specifications

Electrical Input

- Sine-wave input (50-60 Hz)

Input Voltage

- Low range:
  - Minimum: 90 V ac
  - Maximum: 127 V ac
- High range:
  - Minimum: 198 V ac
  - Maximum: 257 V ac
- Input kilovolt-amperes (kVA):
  - Minimum configuration: 0.06 kVA
  - Maximum configuration: 0.45 kVA

Environment

- Air temperature:
  - Expansion unit on 10° to 35° C (50° to 95° F)
    Altitude: 0 to 914 m (3000 ft.)
  - Expansion unit on 10° to 32° C (50° to 90° F)
    Altitude: 914 m (3000 ft.) to 2133 m (700 ft.)
- Humidity: Between 8% and 80%

Size

The size relates to the unit including the front panel, but without the mounting rails.

- Depth: 57 cm (22.5 inches)
- Height: 54 cm (21.3 inches)
- Width: 28 cm (11 inches)

Weight

- Standard expansion unit (factory-shipped): 22.5 kg (49.5 lbs.)
- Typical expansion unit fully loaded: 36.1 kg (79.4 lbs.)

Acoustical Noise Emission Values

The acoustical noise emission levels are measured in controlled acoustical environments according to ISO 7779, and are reported in accordance with ISO 9296. The declared sound power levels indicate an upper limit, below which a large portion of machines operate. Sound pressure levels in your location might exceed the average 1-meter values stated because of room reflections and other nearby noise.

The following values are for open bay (no drives installed) and maximum system configurations (14 hard disk drives installed):

- Sound power (idling)
  - 5.6 bels (open bay)
  - 5.7 bels (typical)
- Sound power (operating)
  - 5.6 bels (open bay)
  - 6.5 bels (typical)
- Sound pressure (idling):
  - –44 dBA (open bay)
  - –47 dBA (typical)
- Sound pressure (operating)
  - –44 dBA (open bay)
  - –54 dBA (typical)

1.3.6 Unit Lights and Switches

The unit's power light and check light are on the backplane assembly. They are visible by lightened pipes that pass through the bezel at the front of the unit.

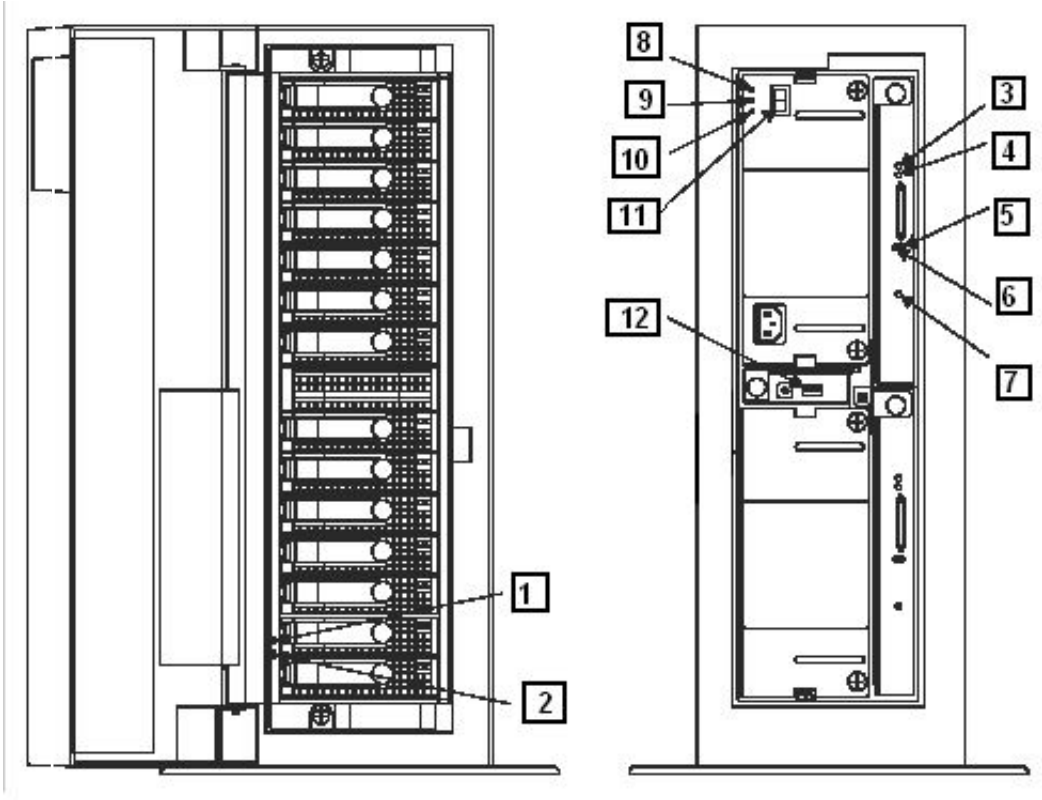


Figure 5: Unit lights and switches

Power-on LED (green) [1] Indicates that the unit has good DC power.

General-system-error LED (amber) [2] When lit, indicates that the unit has a fault, such as in a power supply, ESM board or hard disk drive.

Termination-power LED (green) [3]	When lit, indicates that termination power is present. Each external bus has a separate termination-power LED. **Note:** When a termination-power LED is lit, it indicates that the other end of the cable is connected to a powered-on controller.
LVD/SE LED (green) [4]	When lit, indicates that the external host bus is in low voltage differential (LVD) mode. When this LED is off, the external host bus is in single-ended (SE) mode. Each external bus has a separate LVD/SE LED. Only LVD host bus controllers are supported.
Activity LED (green) [5]	When lit, indicates there is activity of the external SCSI bus. Each external bus has a separate activity LED.
SCSI reset LED (green) [6]	When lit, indicates a SCSI bus reset.
ESM Fault LED (amber) [7]	When completely lit, indicates a power supply failure or that a redundant power supply is not on. When lit, indicates an ESM board failure. When flashing, indicates that the built-in fan fails.
AC power LED (green) [8]	When lit, indicates that the expansion unit is receiving AC power.
DC power LED (green) [9]	When lit, indicates that the expansion unit is turned on and is supplying both 5 V and 12 V DC power.
Fault LED (amber) [10}	When lit, indicates a drive failure. When flashing, indicates that a drive Identify or Rebuild is in progress.

DC on/Standby switch [11]

This switch turns off the DC power to the disk drive modules and other unit components. The switch must be set to **On** for the power supply and the fan unit to start. When the DC On/ Standby switch is set to On on either of the fan and power supply assemblies (if two are present), DC power to the unit is turned on automatically if all the following conditions exist:

- Mainline power is present in the unit.
- At least one fan and power supply assembly is correctly installed.
- Either the Power Control switch on the Switch card is set to On or the terminator power is active in an external SCSI connection.

Switch card [12]
only for EXP 300

The Switch card determines the EXP ID and configuration.

1.4 EXP RAID Configurations and Upgrade Options

1.4.1 Available Configurations

Creo Part Number	Description
015-00302A	EXP Unit 7x73 GB Configured as one hdisk: 6x73 GB (usable 350 GB) + 1x73 GB Hot Spare
015-00303A	EXP Unit 7x146 GB Configured as one hdisk: 6x146 GB (usable 700 GB) + 1x146 GB Hot Spare
015-00304A	EXP Unit 14x146 GB Configured as two hdisks: • One hdisk – 6x146 GB (usable 700 GB) + 1x146 GB Hot Spare • Second hdisk – 7x146 GB (usable 840 GB)

EXP 300 - upgrade options:

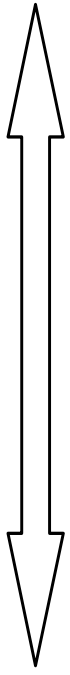
015-00305A	EXP300 RAID U/G 7x73 GB to 14x73 GB
015-00306A	EXP300 RAID U/G 7x146 GB to 14x146 GB

EXP 320 - upgrade options:

015-00467A	EXP320 RAID U/G 7x73 GB to 14x73 GB
015-00468A	EXP320 RAID U/G 7x146 GB to 14x146 GB

1.5 Drive Identification

	Channel	Bay No.	Disk NO.
Up	2	0	20
	2	1	21
	2	2	22
	2	3	23
	2	4	24
	2	5	25
	2	6	26
	1	8	18
	1	9	19
	1	10 (A)	1A
	1	11 (B)	1B
	1	12 (C)	1C
	1	13 (D)	1D
Down	1	14 (E)	1E



LUN #1 drives: 18, 19, 1A, 1B, 1C, 1D

LUN #2 drives: 20, 21, 22, 23, 24, 25, 26

Hot Spare drive: 1E

2

Installation and Configuration Procedures

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This chapter describes the procedures that you need to perform to install and configure the EXP RAID unit and takes into consideration factory pre-formatting.

2.1 Unpacking and Installation Preparation

Expansion units are factory-shipped with or without a full set of 14 drives. The unit contains filler panels in the unused drive bays. Before installing new drives, remove the filler panels from the relevant slots and save them (for possible future use). Each bay must always contain either a filler panel or a drive.

To unpack and prepare the EXP unit for installation:

1. Unpack the EXP unit carton. Check for any physical damage that may have occurred during shipment.
2. Ensure that the carton contains all the parts needed to complete the installation:

Part	Quantity
PCI 4-Channel Ultra3 SCSI RAID Adapter	1
Driver Installation CD	1
EXP RAID SCRIPTS Diskette	1
2M VHDCI SCSI Cables	2
EXP Unit	1
Disks In EXP 320, the disks are already installed in the EXP unit)	7 or 14 (depending on the configuration ordered)

3. Position the EXP unit near the Brisque system.
4. **Only for EXP300:** Insert the disks into the Expansion unit according to the labels on the disks.



Note: Only for EXP300: The disks must be inserted into the Expansion unit according to their factory labels. If they are positioned incorrectly, the RAID must be reconstructed.

2.2 Installing RAID Software



Note: For AIX 5.2.x: In AIX 5.2.x, the device software is included in AIX. Proceed to *Installing the EXP RAID SCRIPTS Diskette* on page 21.
For AIX 4.x: Proceed to the following sections.

2.2.1 Installing Additional Device Software

To install additional device software:

1. If your system is running, log off all applications. If your system is off, turn it on.
2. At the command line, log in as **root**.
3. Insert the device software media (CD-ROM) into the appropriate media device.
4. At the command line, type `smitty devinst`
   The **INPUT device/directory for software** option is highlighted in the Install Additional Device Software window.
5. Press **F4** to display the Input Device list. From the Input Device list, select the name of the input device that you are using `/dev/cd0` (for CD-ROM) or enter it manually and press **ENTER**.
   The **SOFTWARE to install** option is highlighted in the Install Additional Device Software panel.
6. Press **F4** to display a list of the device software that is available for you to install.
7. To find the software, do the following:
   - At the command line, type `/`
   - Type `devices.pci.14102e00`
   - Press **ENTER**. The system finds and highlights the device software and displays output similar to the following example:
     `devices.pci.14102e00 All`
8. Press **F7** to select the device software.
9. Press **ENTER**. The INSTALL ADDITIONAL DEVICE SOFTWARE window in which entry data fields are automatically updated appears.
10. Press **ENTER** to accept the data. The ARE YOU SURE window appears.

11. Press **ENTER** to accept the data. The COMMAND STATUS window appears in which the word **RUNNING** is highlighted, indicating that the install and configure command is in progress. When RUNNING changes to **OK**, scroll down to the installation summary at the bottom of the page. After a successful installation, the word **SUCCESS** appears in the **Result** column of the summary.
12. Remove the installation media from the drive.
13. Press **F10** to quit SMIT.

2.2.2 Verifying the Device Software Installation

To verify that the device software for the PCI 4-channel Ultra3 SCSI RAID Adapter is installed, do the following:

1. If necessary, log in as **root.**
2. At the command line, type: `lslpp -l |grep 14102e00` and press **ENTER.**

   If the PCI 4-Channel Ultra3 SCSI RAID Adapter device software is installed, data similar to the following appears on your screen:

   - `#devices.pci.14102e00.diag`
   - `devices.pci.14102e00.rte 4.3.3.25 COMMITTED IBM PCI SCSI RAID Adapter`
   - `devices.pci.14102e00.vsmit`
   - `devices.pci.14102e00.rte 4.3.3.25 COMMITTED IBM PCI SCSI RAID Adapter`
3. At the command line, type `shutdown` to shut down the machine for the installation of the RAID Adapter card.

2.3 Installing the EXP RAID SCRIPTS Diskette

To install the EXP RAID SCRIPTS diskette:

1. Insert the EXP RAID SCRIPTS diskette into the floppy drive.
2. At the command line, type: `#tar xvf /dev/fd0`
   The following two files are extracted to the path **/scitex/version/scripts**:
   - **# check-redundancy.sh**
   - **# raid**
3. To run the script, type `check-redundancy.sh`



Note: For information on scripts, see Chapter 9.6 of the EXP PSP documentation.

2.4 Installing the RAID Adapter Board and Connecting to the EXP Unit

This section provides instructions for installing the PCI 4-Channel Ultra3 SCSI RAID Adapter and connecting it to the EXP unit.

To install the RAID adapter board:

1. Turn off the machine and disconnect the power cord.

2. Open the cover of the machine and install the PCI 4-Channel card according to the following Slot Configuration table:

Platform	Brisque	Brisque Serve
7025-6F1	Slot-3	Slot-3
7044P-170	Slot-2	Slot-2
7043P-150	Slot-2	Slot-1
7025-F50	Slot-9	Slot-1
7029-6E3	Slot-6	-
7028-6E4	Slot-4	-



Note: For the **7043P-150**, replace the PCI board bracket with the supplied bracket in the box. For more information, see *Appendix B, 43P Bracket*.

3. Close the machine cover and connect the two cables between the PCI card and the EXP unit, as follows:
   - Channel-1 on the RAID adapter to Channel-1 on the EXP unit
   - Channel-2 on the RAID adapter to Channel-2 on the EXP unit



Note: Make sure that you have connected the cables correctly. If not, the RAID must be reconstructed.

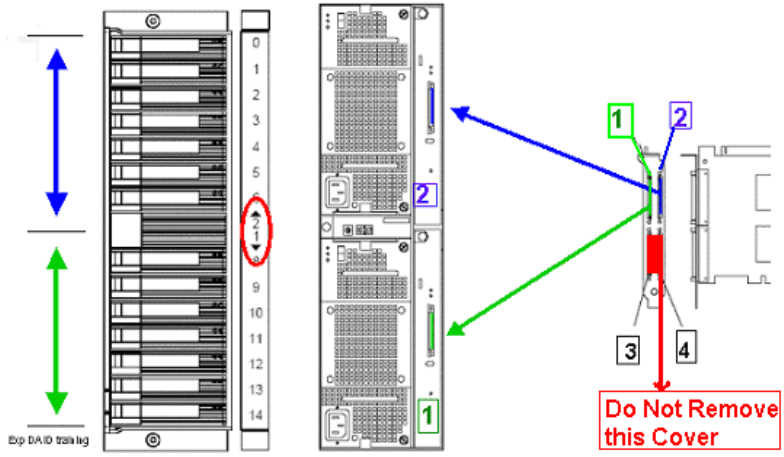


Figure 6: Cable connection

4. Connect the power cord to both the EXP unit and the machine.

Note: To prevent data loss or damage to the RAID, it is recommended to connect the RAID and the machine to a UPS.

2.5 Verifying the Hardware Installation

To verify the hardware installation:

1. Ensure that all the disks and cables are correctly connected and that the units are connected to the UPS.
2. On the back of the EXP unit, turn on both power supplies.

Note: The two power-on switches must always be ON in order to allow the Brisque to turn the unit on and off.

3. Turn on the Brisque workstation.

4. To verify that your system unit recognizes the PCI 4-Channel Ultra3 SCSI RAID Adapter, do the following:
   a. If necessary, log in as **root**.
   b. At the command line, type `lsdev -Cs pci | grep scraid`
   c. Press **ENTER**.
   d. If the PCI 4-Channel Ultra3 SCSI RAID Adapter is installed correctly, data similar to the following example appears on your screen: `# scraid0 Available 04-05 PCI 4-Channel Ultra3 SCSI RAID Adapter`
5. If the message on your screen indicates that your adapter is **Defined** instead of Available, shut down your machine and check the PCI 4-Channel Ultra3 SCSI RAID Adapter to ensure that it is installed correctly.
6. If you still encounter problems, go to *Installing RAID Software* on page 19 and repeat the entire procedure. Afterwards, return to this section and repeat this procedure.



Note: The examples in this guide refer to a machine with two existing defined hdisks: hdisk1 and hdisk2. On other machines, the hdisk number might be different. We received the following after configuring the RAID:

- hdisk3 for half configuration
- hdisk3 + hdisk4 for full configuration

2.6 Verifying RAID Adapter Parameters

Both the PCI RAID Adapter and Tower are pre-configured during factory production. You can manage the PCI 4-channel Ultra3 SCSI RAID Adapter using the System Management Interface Tool (SMIT) and the PCI SCSI Disk Array Manager (PDAM).

2.6.1 Verifying PCI SCSI Adapter Parameters

To verify PCI SCSI Adapter parameters:

1. Run **smit**.
2. Select **Devices > Disk Array > IBM PCI SCSI Disk Array > Change/Show PCI SCSI RAID Adapter.**

3. Select `scraid0 Available 1A-08 PCI 4-Channel Ultra3 SCSI RAID Adapter`
   The following output is displayed. If not, change the parameters to match these:

```
PCI SCSI RAID Adapter          scraid0:
Battery Backup Enabled          yes
Stripe Size (KBytes)            64
Reconstruction Rate             med
Data Scrubbing Enabled          yes
```



Note: The following configuration is for your battery backup:

`Battery Backup Enabled =  yes`

You should change this to yes only if the system is equipped with an
Uninterrupted Power Supply (UPS). This parameter may be changed at anytime, but will not take effect until the next system reboot.

If `Battery Backup Enabled = no`, and when changing the value to **yes** the following error message appears, export/delete the RAID disk and change the value.

```
                        COMMAND STATUS
Command: failed          stdout: yes           stderr: no

Before command completion, additional instructions may
appear below.

Method error (/usr/lib/methods/chgscraid):
0514-029 Cannot perform the requested function
because a child device of the specified
device is not in a correct state.
                  System call for RAID hdisk has failed
```

2.7 Verifying Drive Identification

To verify drive identification:

1. Select **smit pdam > Change/Show PCI SCSI RAID Drive Status > List all PCI SCSI RAID Drives** and press **ENTER** twice.
2. Select **scraid0 Available 1A-08 PCI 4-Channel Ultra3 SCSI RAID Adapter.**



Note: If the configuration details that you receive for verifying and identifying the PCI SCSI card and the EXP unit disks are not the same as shown in sections, 2.7.1, 2.7.2 and 2.7.3, you must reconstruct the RAID. For more information on reconstructing the RAID, see *Chapter 5, Troubleshooting*.

2.7.1 7x73GB-Drive Configuration

A 7x 73GB-drive configuration configured as one hdisk (6 x 73 GB + 1 x 73 GB Hot Spare) shows the following:

```
Hdisk-3  Available Raid  5 1A-08-000,0 350033 MB Status
Optimal
   hdisk3  18 Channel 1 ID 8  ONLINE - 70007Meg
   hdisk3  19 Channel 1 ID 9  ONLINE - 70007Meg
   hdisk3  1A Channel 1 ID A  ONLINE - 70007Meg
   hdisk3  1B Channel 1 ID B  ONLINE - 70007Meg
   hdisk3  1C Channel 1 ID C  ONLINE - 70007Meg
   hdisk3  1D Channel 1 ID D  ONLINE - 70007Meg
1E  HOT SPARE  on Channel  1  ID E - 70007Meg
```

2.7.2 7x146GB-Drive Configuration

A 7x146GB-drive configuration configured as one hdisk (6 x 146 GB + 1 x 146 GB Hot Spare) shows the following:

```
Hdisk3  Available Raid  5 1A-08-00-0,0 700067 MB Status
OPTIMAL
   hdisk3  18 Channel 1 ID 8  ONLINE - 140014Meg
   hdisk3  19 Channel 1 ID 9  ONLINE - 140014Meg
   hdisk3  1A Channel 1 ID A  ONLINE - 140014Meg
   hdisk3  1B Channel 1 ID B  ONLINE - 140014Meg
```

```
   hdisk3  1C Channel 1 ID C  ONLINE - 140014Meg
   hdisk3  1D Channel 1 ID D  ONLINE - 140014Meg

   1E  HOT SPARE  on  Channel  1  ID E - 140014Meg
```

2.7.3 14x146GB-Drive Configuration

A 14x146 GB-drive configuration configured as one 6x146GB-hdisk (data 5 x 146 GB + 1 x 146 GB Hot Spare) and a second 7x146GB-hdisk (data 6 x 146 GB) shows the following:

```
hdisk3  Available Raid  5 1A-08-00-0,0 700067 MB Status
OPTIMAL
   hdisk3  18 Channel 1 ID 8  ONLINE - 140014Meg
   hdisk3  19 Channel 1 ID 9  ONLINE - 140014Meg
   hdisk3  1A Channel 1 ID A  ONLINE - 140014Meg
   hdisk3  1B Channel 1 ID B  ONLINE - 140014Meg
   hdisk3  1C Channel 1 ID C  ONLINE - 140014Meg
   hdisk3  1D Channel 1 ID D  ONLINE - 140014Meg


hdisk4  Available Raid  5 1A-08-00-1,0 840079MB Status
OPTIMAL
   hdisk4  20 Channel 2 ID 0  ONLINE - 140014Meg
   hdisk4  21 Channel 2 ID 1  ONLINE - 140014Meg
   hdisk4  22 Channel 2 ID 2  ONLINE - 140014Meg
   hdisk4  23 Channel 2 ID 3  ONLINE - 140014Meg
   hdisk4  24 Channel 2 ID 4  ONLINE - 140014Meg
   hdisk4  25 Channel 2 ID 5  ONLINE - 140014Meg
   hdisk4  26 Channel 2 ID 6  ONLINE - 140014Meg

1E HOT SPARE on Channel 1 ID E - 140014Meg
```

2.8 Creating Disks

To create disks:

1. At the command line, type `lsdev -Cc disk` to see the disks that were created in the RAID.



Note: You cannot view the disks using the regular command `# lsdev -Cs scsi` because the EXP unit is connected to the RAID Adapter.

The following appears:

- **hdisk3 Available 1A-08-00-0,0 SCSI disk Array RAID 5**
- **hdisk4 Available 1A-08-00-1,0 SCSI disk Array RAID 5**



Note: Half configuration uses only one hdisk while full configuration uses two hdisks.

2. Type `scismit` and select **Devices > Fixed Disks > Configure New disk**. The following appears on your Brisque screen:

```
Volume Size (GB)                    Max     +
List of Fixed Disks / Shuttles      hdisk3  +
```

The following appears on your Brisque Serve screen:

```
Volume Size (GB)                    128  +
List of Fixed Disks / Shuttles      hdisk3  +
```

3. Select **List of Fixed Disks / Shuttles** and press **F4**.
4. Press **F7** to select the relevant RAID disks. For half configuration, select only one disk; for full configuration select two disks.
5. Press **ENTER** twice to confirm your selection(s). The disk starts being created and the following message appears:

```
Configure hdisk3
Creating Volume Group for hdisk3...
svg3
Creating Logical Volume(s) and File System(s) for
svg3...
```

When the disk has finished being created, the following output appears:

```
Command: OK       stdout: yes       stderr: no
```

6. Ensure that the disk was created without errors.

   To check the disk output in the RAID, use one of the following commands:

   - Type `df`

     The details for the first hdisk in 73 GB-half configuration are shown:

```
/dev/slv3.0 298844160 296483664 1%  17   1% /dataVolumes/rdev5.3.0
/dev/slv3.1 298844160 296483664 1%  17   1% /dataVolumes/rdev5.3.1
/dev/slv3.2 117440512 116512824 1%  17   1% /dataVolumes/rdev5.3.2
```

     The details for the second hdisk in 73 GB-full configuration:

```
/dev/slv4.0 298844160 296483664 1%  17   1% /dataVolumes/rdev5.4.0
/dev/slv4.1 298844160 296483664 1%  17   1% /dataVolumes/rdev5.4.1
/dev/slv4.2 261095424 259033080 1%  17   1% /dataVolumes/rdev5.4.2
```

   - Type `lspv`

     The details for the first hdisk in half configuration are shown:

```
hdisk3          005561aa6f73c1ff    svg3
```

     The details for the second hdisk in full configuration:

```
hdisk3          005561aa6f73c1ff    svg3
hdisk4          005561aa6f759b7a    svg4
```

3

Upgrading the EXP from Half Capacity to Full Capacity

Installing the Disks 32

You can upgrade from half capacity to full capacity with both the RAID and application running.

Note: Upgrade drives are not factory-formatted.

EXP 300 upgrade kits:

Creo Part Number	Description
015-00305A	EXP300 RAID U/G 7x73 GB to 14x73 GB
015-00306A	EXP300 RAID U/G 7x146 GB to 14x146 GB

Important: The Upgrade drives must have the same capacity as the existing ones.

EXP 320 upgrade kits:

Creo Part Number	Description
015-00467A	EXP320 RAID U/G 7x73 GB to 14x73 GB
015-00468A	EXP320 RAID U/G 7x146 GB to 14x146 GB

Important: The Upgrade drives must have the same capacity as the existing ones.

3.1 Installing the Disks

To install disks:

1. Unpack the disks and check that there are seven disks with the same capacity.
2. Remove the dummy disks from the Tower and set them aside. Keep several of the dummy disks for possible future use.

   Note: To prevent the Tower from overheating, make sure that it is always loaded with either usable or dummy disks!

3. Insert the disks into the EXP unit according to their labels and the labels on the Tower (**20, 21, 22, 23, 24, 25, 26**).
4. Attach the labels that you received to each disk, according to the numbers.
5. Define the new disks as **SPARE** disks:
   a. Select **smit pdam > Change/Show PCI SCSI RAID Drive Status > Add a Spare Drive**.
   b. Select disk **20** and press **ENTER** to confirm.
   c. Repeat step **b** for the rest of the disks: **21, 22, 23, 24, 25, 26**.
6. Select **List all PCI SCSI RAID Drives** and confirm that all the new disks are configured as spare disks, as shown:

```
20 SPARE on Channel 2 ID 0 - 70007Meg
21 SPARE on Channel 2 ID 1 - 70007Meg
22 SPARE on Channel 2 ID 2 - 70007Meg
23 SPARE on Channel 2 ID 3 - 70007Meg
24 SPARE on Channel 2 ID 4 - 70007Meg
25 SPARE on Channel 2 ID 5 - 70007Meg
26 SPARE on Channel 2 ID 6 - 70007Meg
```



Note: The 146-GB disk configuration has a different capacity.

7. Press **F3** to return to the previous screen and select **Create a PCI SCSI Disk Array**.
8. Select **scirad0** (SCSI RAID card) and press **ENTER**.
9. In the RAID Level window, select **RAID LEVEL 5** and press **ENTER**, as shown:

```
RAID LEVEL
    0
    1
    5
    5E
```

10. In the Select Drives window, select the relevant disks using the **F7** key, as shown:

```
                PCI SCSI Disk Array Manager


       Select Drives: Channel -SCSI ID...
Move cursor to desired item and press F7.
   ONE OR MORE items can be selected.
Press Enter AFTER making all selections.
[TOP]
>20 SPARE on Channel 1 ID 20 - 70007Meg
>21 SPARE on Channel 1 ID 21 - 70007Meg
>22 SPARE on Channel 1 ID 22 - 70007Meg
>23 SPARE on Channel 1 ID 23 - 70007Meg
>24 SPARE on Channel 1 ID 24 - 70007Meg
>25 SPARE on Channel 1 ID 25 - 70007Meg
>26 SPARE on Channel 1 ID 26 - 70007Meg
```



Note: You select the disks for the 146-GB configuration in the same manner as described above. The capacity of the disks, however, will be 140014 MB and not 70007 MB.

11. Press **ENTER** to confirm disk selection. Ensure that your output matches the following:

```
        Create a PCI SCSI Disk Array

                                    [Entry Fields]
PCI SCSI RAID Adapter               scraid0
RAID Level                          5
Stripe Size (KBytes)                64
Size of Array (MBytes)              420039
*Select Drives: Channel-SCSI ID …20 21 22 23 24 25 26
Command Queue Depth                 16
Read Ahead Enabled                  yes
Initialize Parity                   yes
```

If your output is different than the above, change the details to match the above output. If the drives are different than those indicated above, press **F3** to return to the previous screen and ensure that the correct disks are selected.



Note: The size of the array indicated above is the total capacity of the selected disks. This capacity changes according to the configuration of the RAID (73 GB or 146 GB).

12. Press **ENTER** to confirm the details. The following message appears:

```
                                COMMAND STATUS

Command: OK            stdout: yes           stderr: no

Before command completion, additional instructions may appear below.

hdisk3 Available

Background Consistency Check with Automatic Repair initiated -
```

Figure 7: Details confirmation message

13. Press **F10** to quit smit.
14. To monitor the LUN creation process, run the following command:
    - `# raid`

3.2 Creating Disks

To create disks:

1. At the command line, type `lsdev -Cc disk` to see the disks that were created in the RAID..



Note: You cannot see the disks using the regular command `# lsdev -Cs scsi` because the EXP unit is connected to the RAID Adapter.

The following output appears:

- `hdisk3 Available 1A-08-00-0,0 SCSI disk Array RAID 5`
- `hdisk4 Available 1A-08-00-1,0 SCSI disk Array RAID 5`

2. Type `scismit` and select **Devices > Fixed Disks > Configure New disk**. The following appears on your Brisque screen:

```
Volume Size (GB)                    Max     +
List of Fixed Disks / Shuttles      hdisk4 +
```

The following appears on your Brisque Serve screen:

```
Volume Size (GB)                    128  +
List of Fixed Disks / Shuttles      hdisk4 +
```

3. Select **List of Fixed Disks/Shuttles** and press **F4**.
4. Press **F7** to select the relevant RAID disks.
5. Press **ENTER** twice to confirm your selection(s). The disk starts being created and the following message appears:

```
Configure hdisk4
Creating Volume Group for hdisk4...
svg4
Creating Logical Volume(s) and File System(s) for
svg4...
```

When the disk has finished being created, the following output appears:

```
Command: OK       stdout: yes       stderr: no
```

6. Ensure that the disk was created without errors.

7. To check the disk output to the RAID, use one of the following commands:

   - Type `df`

     The details for the first hdisk in 73 GB are shown:

```
/dev/slv3.0 298844160 296483664 1%  17   1% /dataVolumes/rdev5.3.0
/dev/slv3.1 298844160 296483664 1%  17   1% /dataVolumes/rdev5.3.1
/dev/slv3.2 117440512 116512824 1%  17   1% /dataVolumes/rdev5.3.2
```

     The details for the second hdisk in 73 GB:

```
/dev/slv4.0 298844160 296483664 1%  17   1% /dataVolumes/rdev5.4.0
/dev/slv4.1 298844160 296483664 1%  17   1% /dataVolumes/rdev5.4.1
/dev/slv4.2 261095424 259033080 1%  17   1% /dataVolumes/rdev5.4.2
```

   - Type `lspv`

     The details of both hdisks in full configuration:

```
hdisk3          005561aa6f73c1ff    svg3
hdisk4          005561aa6f759b7a    svg4
```

4 LUN Creation

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When creating a RAID, you must perform the following:

- Create a LUN on six disks in Channel-1 (18, 19, 1A, 1B, 1C, 1D).
- Create a Hot Spare drive in Channel-1 (1E)
- Wait until the first LUN finishes before initializing the second LUN
- Create a LUN on seven disks in Channel-2 (20, 21, 22, 23, 24, 25, 26)



Note: You create seven disks in Channel-2 only on a full capacity (14 disks) configuration.



Important: Creating a new RAID erases all data stored in the RAID. If you are creating a new RAID/LUN, see *Creating a LUN* on page 42. If you want to recreate an existing LUN, see the following section, *Deleting a Logical Drive (LUN)*.

4.1 Deleting a Logical Drive (LUN)

Before you create a new LUN, you must export the existing disks.

To delete a LUN:

1. Log in as **root.**
2. At the command line, type: `lsdev -Cc disk` and press **ENTER.**



Note: If you use the regular `lsdev -Cs scsi` command, you will not be able to see the existing disks.

The following output appears:

```
Hdisk3 Available 1A-08-00-0,0 SCSI Disk Array RAID 5
Hdisk4 Available 1A-08-00-1,0 SCSI Disk Array RAID 5
```



Note: For half configuration only one hdisk is used, while full configuration uses two hdisks.

3. Log off from all and export the disk or disks using **scismit**, as shown:
   a. Select **scismit > Devices > Fixed Disks > Export a Disk**
   b. In the Export a Disk window, press **F4** to display the list of existing disks.
   c. Select the relevant hdisks and press **ENTER**.
4. At the command line, type `lsdev -Cc disk` and press **ENTER** to ensure that the disks were exported.
5. Type `cfgmgr` and press **ENTER**.
6. Type `smit pdam` and press **ENTER**.
7. Select **Delete a PCI SCSI Disk Array**.
8. In the Delete a PCI SCSI Disk Array window, select the relevant hdisk, as shown in the following example:

   ```
   hdisk3  Available Raid  5 1A-08-00-0,0 350033 MB
   Status OPTIMAL
   ```

   Press **ENTER** to confirm its removal. The following message appears:

   ```
   hdisk3 changed
   hdisk3  deleted
   ```

   Note: If you are performing an EXP full configuration, you must also delete the second disk. To delete the second disk, press **F3**, repeat step **8** and select the **second** disk.

9. Select **Recovery Options > Clear PCI SCSI RAID Adapter Configuration** and press **ENTER** to confirm .

4.2 Creating a LUN

To create a LUN:

1. Run the **smit** command.
2. **For AIX 4.x:** Select **Devices > Disk Array > Change/Show PCI SCSI RAID Adapter.**
   For AIX 5.2.x: Select **Devices > IBM PCI SCSI Disk Array > Disk Array > Change/Show PCI SCSI RAID Adapter.**
   The following output appears:

```
   PCI SCSI RAID Adapter      scraid1


Battery Backup Enabled    yes
Stripe Size (in KBytes    64
Reconstruction Rate       med
Data Scrubbing Enabled    yes
```

3. Use the arrow keys to select the relevant parameter, change its value and press **ENTER** to confirm:

   - **Stripe Size:** Specifies the amount of data that is accessed (striped) across a single physical disk in a disk array before data on the next disk in the disk array is accessed. Supported stripe sizes are: **16 KB**, **32 KB**, and **64 KB**.



Note: In Creo environments, the strip size is **64 KB**.

   - **Battery Backup:** Specifies whether to use a battery backup. Select yes only if the system is equipped with an uninterrupted power supply (UPS). You can change this parameter at any time, but it will take effect only on the next system restart.

4. **For AIX 4.x:** Select **Create a PCI SCSI Disk Array.**
   For AIX 5.2.x: Press F3 to return to previous screen and select **PCI SCSI Disk Array Manager**.
5. Select **scirad0** (SCSI RAID card) and press **ENTER.**

6. In the RAID LEVEL window, select **RAID LEVEL 5** as shown, and press **ENTER**:

```
RAID LEVEL
0
1
5
5E
```

7. In the Select Drives window, use the **F7** key to select the relevant disks: 18 through 1D, as shown:



Note: Do not select disk `1E SPARE on Channel 1 ID E - 70007Meg`. This disk will be configured as a spare disk.

```
                PCI SCSI Disk Array Manager


          Select Drives: Channel -SCSI ID...
Move cursor to desired item and press F7.
     ONE OR MORE items can be selected.
Press Enter AFTER making all selections.
[TOP]
>18 SPARE on Channel 1 ID 8 - 70007Meg
>19 SPARE on Channel 1 ID 9 - 70007Meg
>1A SPARE on Channel 1 ID A - 70007Meg
>1B SPARE on Channel 1 ID B - 70007Meg
>1C SPARE on Channel 1 ID C - 70007Meg
>1D SPARE on Channel 1 ID D - 70007Meg
 1E SPARE on Channel 1 ID E - 70007Meg
```



Note: You select the disks for the 146-GB configuration in the same manner as described above. The capacity of the disks, however, will be 140014 MB and not 70007 MB.

8. Press **ENTER** to confirm disk selection. Ensure that your output matches the following:

```
      Create a PCI SCSI Disk Array

                                    [Entry Fields]
PCI SCSI RAID Adapter                scraid0
RAID Level                           5
Stripe Size (KBytes)                 64
Size of Array (MBytes)               350033
*Select Drives: Channel-SCSI ID …18 19 1A 1B 1C 1D
Command Queue Depth                  16
Read Ahead Enabled                   yes
Initialize Parity                    yes
```

   The above output represents the selected drives for the first disk (18, 19, 1A, 1B, 1C, 1D). When you select the second disk, drives 20, 21, 22, 23, 25 and 26 appear in the output.

   If your output for the first disk is different than the above, change the details to match the above output. If the drives are different than those indicated above, press **F3** to return to the previous screen and ensure that the correct disks are selected.



   Note: The size of the array indicated above is the total capacity of the selected disks. This capacity changes according to the configuration of the RAID (73 GB or 146 GB).

9. Press **ENTER** to confirm the details. The following message appears:

```
                              COMMAND STATUS

Command: OK            stdout: yes           stderr: no

Before command completion, additional instructions may appear below.

hdisk3 Available

Background Consistency Check with Automatic Repair initiated -
```

   Figure 8: Details confirmation message

10. To monitor the LUN creation process, run the following command:

   - `# raid`

11. On full configuration you must wait until the first LUN has been created, then repeat steps 3 through 10 for the second LUN by selecting drives 20 through 26.



Important: If you do not wait until the first LUN has been created, the process of creating the first LUN is interrupted and you will have to recreate the first LUN.

4.3 Assigning Hot Spare Drives

Hot spare drives automatically replace failed drives with drives of equivalent capacity in a redundant RAID environment.



Note: Skip this section if you are performing an upgrade or the hot spare disk already exists.

To assign hot spare drives:

1. At the command line, type `smit pdam`.
2. Select **Change/Show PCI SCSI RAID Drive Status > Add a Hot Spare Drive.**
3. Select the PCI 4-Channel Ultra3 SCSI RAID Adapter with which you want to work, as shown, and press **ENTER.**

```
1E SPARE on Channel 1 ID E - 70007Meg
```



Note: The capacity of the hot spare drive is 140014 MB for a 146 GB-disk configuration. The drive state changes to hot spare. On subsequent drive failures, reconstruction of the failed drives occurs automatically on redundant disk arrays.

```
PCI SCSI RAID Adapter      scraid0
Channel ID                   1E
```

4.4 Creating Disks

To create disks:

1. At the command line, type `lsdev -Cc disk` to see the disks that were created in the RAID.



Note: You cannot see the disks using the regular command `# lsdev -Cs scsi` because the EXP unit is connected to the RAID Adapter.

The following output appears:

- `hdisk3 Available 1A-08-00-0,0 SCSI disk Array RAID 5`
- `hdisk4 Available 1A-08-00-1,0 SCSI disk Array RAID 5`



Note: Half configuration uses only one hdisk while full configuration uses two hdisks.

2. Type `scismit` and select **Devices > Fixed Disks > Configure New disk**. The following appears on your Brisque screen:

```
Volume Size (GB)                    Max     +
List of Fixed Disks / Shuttles      hdisk3  +
```

The following appears on your Brisque Serve screen:

```
Volume Size (GB)                    128  +
List of Fixed Disks / Shuttles      hdisk3  +
```

3. Select **List of Fixed Disks/Shuttles** and press **F4.**
4. Press **F7** to select the relevant RAID disks. For half configuration, select only one disk; for full configuration select two disks.

5. Press **ENTER** twice to confirm your selection(s). The disk starts being created and the following message appears:

```
Configure hdisk3
Creating Volume Group for hdisk3...
svg3
Creating Logical Volume(s) and File System(s) for
svg3...
```

When the disk has finished being created, the following output appears:

```
Command: OK       stdout: yes       stderr: no
```

6. Ensure that the disk was created without errors.
7. To check the disk output to the RAID, use one of the following commands:
   - Type `df`

     The details for the first hdisk in 73 GB-half configuration are shown:

```
/dev/slv3.0 298844160 296483664 1%  17   1% /dataVolumes/rdev5.3.0
/dev/slv3.1 298844160 296483664 1%  17   1% /dataVolumes/rdev5.3.1
/dev/slv3.2 117440512 116512824 1%  17   1% /dataVolumes/rdev5.3.2
```

     The details for the second hdisk in 73 GB-full configuration:

```
/dev/slv4.0 298844160 296483664 1%  17   1% /dataVolumes/rdev5.4.0
/dev/slv4.1 298844160 296483664 1%  17   1% /dataVolumes/rdev5.4.1
/dev/slv4.2 261095424 259033080 1%  17   1% /dataVolumes/rdev5.4.2
```

   - Type `lspv`

     The details of the first hdisk in half configuration are shown:

```
hdisk3          005561aa6f73c1ff    svg3
```

     The details of both hdisks in full configuration:

```
hdisk3          005561aa6f73c1ff    svg3
hdisk4          005561aa6f759b7a    svg4
```

5

Troubleshooting

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5.1 Disk Failures

5.1.1 One Disk Failure

A script that checks errpt for RAID errors runs once every hour. The name of the script is **check -redundancy.sh**. When an error is detected, a yellow notification message appears on the customer's screen with instructions to call support. An example is shown below.



Note: An errpt error can only be cleared manually, after the faulty disk has been replaced and the errlog cleared.

```
16:28:48

#######    #      ###   #       #     # ######  #######          ###     ###
#          # #     #    #       #     # #     # #                ###     ###
#        #   #     #    #       #     # #     # #                ###     ###
#####    #     #   #    #       #     # ######  #####             #       #
#        #######   #    #       #     # #   #   #
#        #     #   #    #       #     # #    #  #                ###     ###
#        #     #   ###  #######  #####  #     # #######          ###     ###


The 73 GB disk located at position 18 in the EXP RAID has
failed !

Please order a new disk (the Creo Part number is 609-00160)

Replace the faulty one, and call Creo support !!

------------------------------------------------------------
```



Note: Refer to the spare part list in *EXP RAID Components and Spare Parts* on page 65.

Solution

The customer orders and replaces the faulty disk. The new disk is automatically defined as a HOT-SPARE.

After replacing the disk, the customer calls Remote Support. Remote Supports logs on and performs the following actions to bring the system to its original state:

- Fails disk **1E**. This action initializes the immediate reconstruction of the newly replaced disk.

)**# smit pdam > Fail a Drive in a PCI SCSI Disk Array**
  Select disk **1E** and press ENTER.
  Press **F3** to return to the previous menu.

- Defines disk "1E" as a **SPARE** disk.

  Select **Change/Show PCI SCSI RAID Drive Status > Add a Spare Drive**
  Select the disk **1E** and press ENTER.
  Press **F3** to return to the previous menu.

- Defines disk "1E" as a **HOTSPARE** disk.

  Select **Add a Hot Spare Drive**
  Select the disk **1E** and press ENTER.
  Press **F3** to return to the previous menu.

- Clears the identification LED on the "1E" disk.

  Select **Identify a Drive > Normal**
  Select the disk **1E** and press ENTER.
  Press **F3** to return to the previous menu.

- To check that disk 1E is configured as the Hot Spare:

  Select **List all PCI SCSI RAID Drives**.



Note: You can log out from the machine. When the reconstruction finishes, it will automatically be in optimal state.

Single-drive failures

Whenever a single drive in a RAID level 5 disk array transitions to the Failed state, the disk array status changes to Degraded. The disk array continues to function because the data on the Failed drive can be reconstructed using parity and data on the remaining drives.

Whenever a drive is marked as Failed, you should replace it as soon as possible. If a Hot-spare drive was defined, the adapter may reconstruct the data on the drive automatically. If a Hot-spare reconstruct was not initiated by the adapter, initiate a reconstruct on the failed drive following replacement using PDAM. If you cannot replace the drive immediately, back up the files on all logical volumes and file systems on the disk array and replace the drive as soon possible.

5.1.2 More than One Disk Failure

A script that checks errpt for RAID errors runs once every hour. When an error is detected, a yellow notification message appears on the customer's screen with instructions to call support, as shown.



Note: An errpt error can only be cleared manually, after the faulty disk has been replaced and the errlog cleared.

```
16:28:48
#######    #      ###   #       #     # ######  #######          ###     ###
#          # #     #    #       #     # #     # #                ###     ###
#        #   #     #    #       #     # #     # #                ###     ###
#####   #     #    #    #       #     # ######  #####            #       #
#       ########   #    #       #     # #   #   #
#       #     #    #    #       #     # #    #  #                ###     ###
#       #     #   ###   ######## #####  #     # #######          ###     ###

More then one Disk in the EXP RAID has failed !
Please call Creo support !!
------------------------------------------------------------
```

Solution

The customer calls Creo Support.

Multiple-drive failures If a second drive in a RAID level 5 disk array experiences read or write errors, the adapter takes the following actions:

- If the error is a recoverable read error, the drive status remains Degraded and an entry is posted in the error log.
- If the errors are unrecoverable, the drive status changes to Failed and the disk array status changes to Dead.

If the disk array status is Degraded, you will be able to reconstruct the data on the disk array by replacing the Failed drive and reconstructing the data on the drive. If the disk array status is Dead, you must replace the Failed drives and then delete and recreate the disk array (after deleting the logical volumes and file systems on the disk array and removing the disk array from the volume group). You must then add the disk array back to a volume group, recreate the logical volumes and file systems on it, and copy data back to the restored disk array from your backup media.

5.1.3 All Disks are in FAILED Status

This can happen when the customer turns the AIX machine on before turning on the Tower. When this happens, the customer should call Remote Support to first revive the drives (one after the other) and then the RAID.



```
More then one Disk in the EXP RAID has failed !
Please call Creo support !!
------------------------------------------------------------
```

Solution

The customer calls Creo Support.

5.1.4 All RAID Information Is Lost After the Controller Replacement

Solution

The customer replaces the controller after which the engineer recovers the RAID configuration from the disks using **smit pdam**.

5.1.5 Rebuild

Solution

The messages are disabled during rebuild.

5.2 EXP Unit Problems

5.2.1 LEDs

Problem Indicator	FRU/Action
Amber LED on Drive CRU	1. **Failed drive.** See *Replacing Hot-swap Drives* on page 61.
Amber LED on ESM board	1. **Failed ESM board.** See Figure 10 on page 57.
Amber LED on, Green LED off	1. **Turn on all power supplies**. 2. Check the power supply.
Amber and green LEDs on	1. **Failed power supply**.
All green LEDs off	1. **Check that all expansion unit power cables are plugged in and the power is on. If applicable, check that the main circuit breakers for the rack are turned on.** 2. Check the main circuit breaker and AC outlet. If the external switch 1 is set to Off, the SCSI controller must be cabled to the EXP300 and turned on. 3. Check the power supply. 4. Check the mid-plane board.
Amber LED flashing on Drive CRU	1. **Drive rebuild or identity is in process**.
Amber LED flashing on power supply	1. **Check power supply.**

Problem Indicator	FRU/Action
Amber LED on and green AC power LED off on power supply	1. **Turn on power switch.** 2. Check power supply.
Amber LED on and green AC power LED off on power supply	1. **Make sure the AC power at the source is good.** 2. Check the power cord. 3. Check the power supply.
Green LED on Drive CRU ID=6	1. **If the unit is not currently cluster-configured, power cycle the EXP300 to re-enable ID=6.**
One or more green LEDs off on one or two drive CRUs	**No activity to the drive. No action is required.**
One or more green LEDs off on all drive CRUs or on one bus	No activity to the drive. No action is required. 1. **Check SCSI-bus cables and connections.** 2. Use RAID management software to check the SCSI-bus status. 3. Check the ESM board.
One or more green LEDs off on front panel	1. **Make sure the cables are plugged in and that the power supplies are turned on.** 2. Check the power supply.
Intermittent or sporadic power loss to the expansion unit	1. **Check the AC power source.** 2. Re-secure all installed power cables and power supplies. 3. Check the power supply.

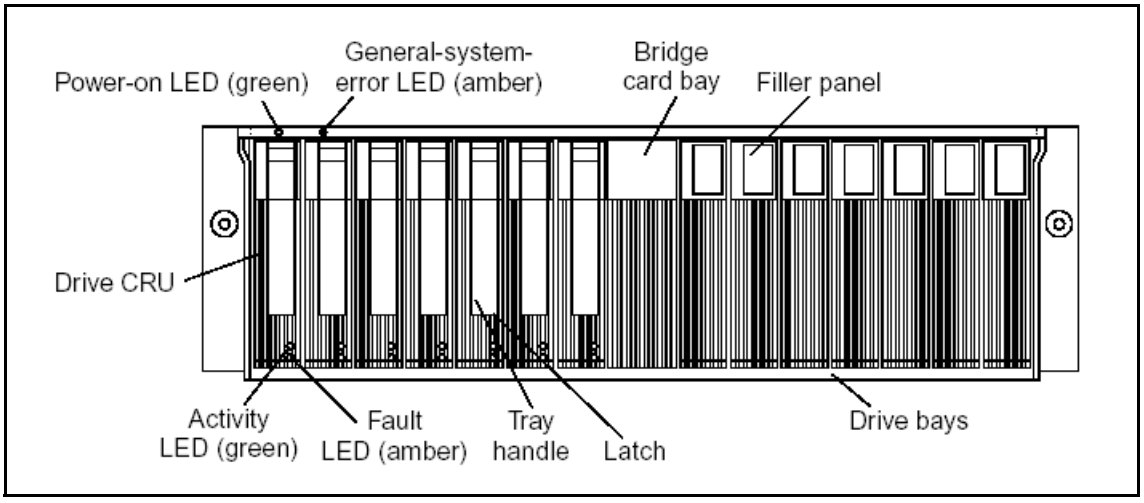


Figure 9: Front panel LEDs

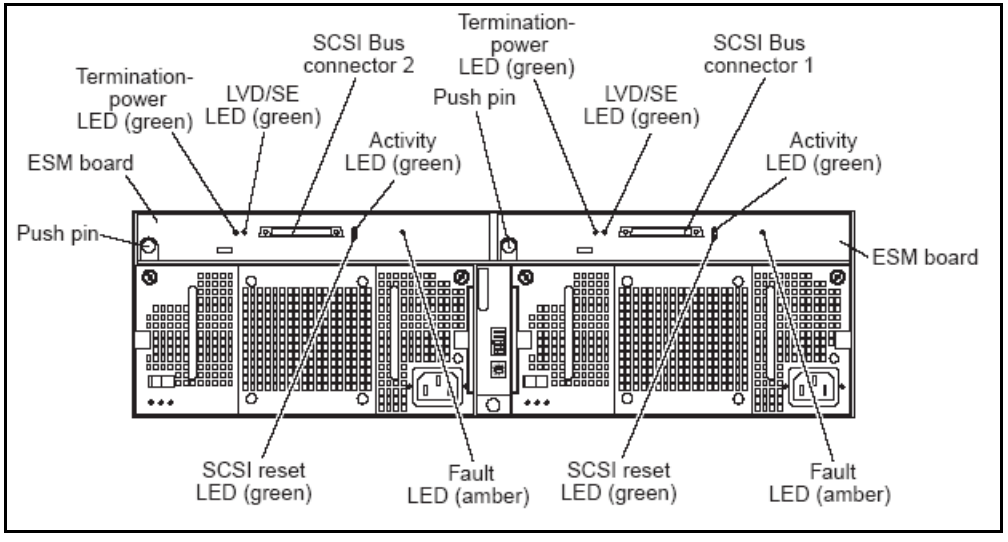


Figure 10: Back panel LEDs

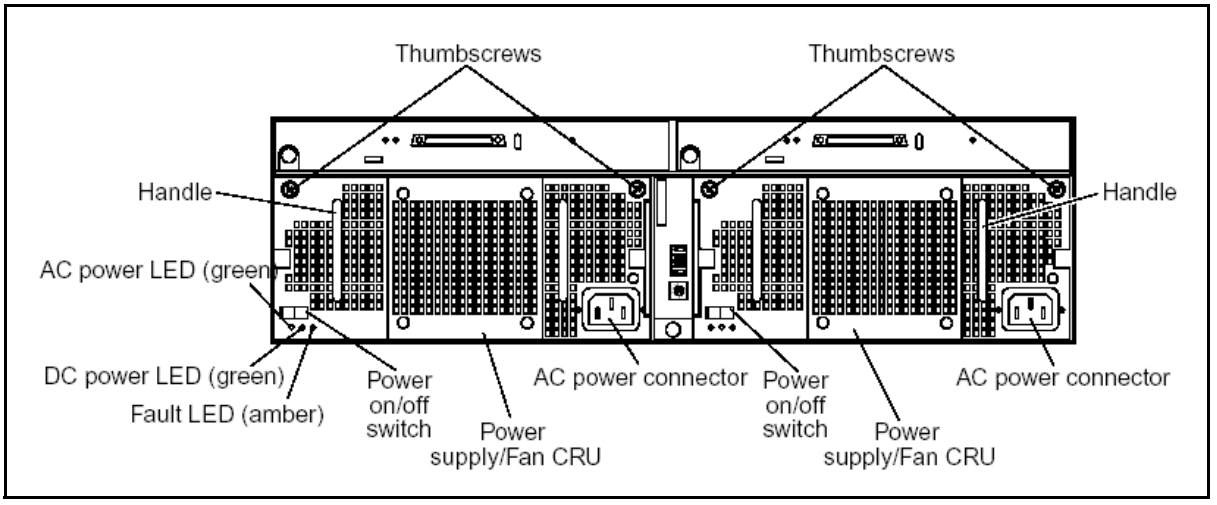


Figure 11: Back panel LEDs including power connections

5.2.2 Other Problems

Problem Indicator	FRU/Action
Unable to access drives on one or both SCSI buses	1. **Make sure SCSI cables are undamaged and properly connected.** 2. Check the drive SCSI ID settings. Ensure that options switches 1 and 3 (inside the switch cared) are set to the appropriate positions. **CAUTION:** Change switch positions only when your host server and expansion unit are turned off. 3. Check the ESM board. 4. Check the Bridge card. (All high-address or all low-address hdisk drives failed.)
Random errors	1. **Check the mid-plane.**

5.3 RAID Status Overview

5.3.1 Drive Status

There are seven possible values that may be displayed for the status of a physical drive and five possible values that may be displayed for the status of a disk array inside the `smit pdam` utility.

5.3.2 RAID Status

The state of a disk array is uniquely determined by the states of the physical drives that make up the disk array. Depending on the number of failed physical drives, replacing a failed drive with a good drive may change the state of the disk array from “dead” to “degraded”, or to “optimal” after data rebuild. When a failed physical drive is replaced in a degraded disk array, the data is rebuilt onto the replaced drive before the disk array state transitions to optimal state.

Optimal	The disk array is in good functional state.
Compressing	This is a special state for RAID level **5E** disk arrays only. This state indicates that one physical drive in the array is in “failed” state. The data from the failed drive is compressed onto the hot-spare by being distributed across the spare space of the remaining drives. When compression is complete, the disk array indicates “optimal” state.
Degraded	One of the physical drives that is part of a disk array is in “failed” state.
Dead	This state (for non-redundant disk arrays) indicates that one or more physical drives are in the “failed” state. A “dead” disk array is not accessible.

5.4 Working with Hot-swap Drives

Before you install or remove drive CRUs, review the following:

- Hot-swap hardware
- Drive CRUs
- Filler panel

5.4.1 Hot-swap Hardware

You can replace a failed hard disk drive without turning off the expansion unit. Therefore, you can continue to operate your system while a hard disk drive is removed or installed. These drives are known as hot-swap drives.

5.4.2 Drives

Your expansion unit supports IBM Ultra160 and IBM Ultra2 SCSI hard disk drives. These IBM drives come pre-installed in a drive tray, ready for installation. (Do not detach the drive from the tray.) The drive and tray assembly is called a drive customer replaceable unit (CRU). You can install the drive CRUs directly into the 14 drive bays on the front of the expansion unit.

Make sure to record the location information for each drive before you remove it. Ensure that you keep track of the drives and their corresponding bays.



Important: If you re-install a drive in the wrong bay, you might lose data.

LED	LED State	Description
Activity LED	Green/flashing	Flashes during read/write or inquiry operations to the drive.

LED	LED State	Description
Fault LED	Amber/flashing	Flashes to indicate a drive rebuild is under way, or that a drive has been identified by software.
Fault LED	Amber on	Indicates a drive failure.

5.4.3 Filler Panels

Expansion units are shipped without a full set of 14 drives. They contain filler panels in the unused drive bays. Before installing new drives, you must remove the filler panels, set them aside and save them for possible future use. Each of the 14 bays must always contain either a filler panel or a drive CRU.

5.5 Replacing Hot-swap Drives

Drive problems include any malfunctions that delay, interrupt, or prevent successful I/O activity between the hosts and the hard disk drives in the expansion unit. This includes transmission problems between the host controllers, the ESM boards, and the drives.

This section describes how to replace a failed drive.



Important: Failure to replace the drives in their correct bays might cause loss of data. If you are replacing a drive that is part of RAID level 5 logical drive, ensure that you install the replacement drive in the correct bay.

To replace a hot-swap drive:

1. Determine the location of the drive that you want to remove.



Important: Hot swap a drive CRU only when its amber fault LED is lit (not flashing) or when the drive is inactive (the activity LED is off). Never hot swap a drive CRU when its green activity LED is flashing.

2. Remove the drive CRU:
    a. Press the inside of the bottom of the tray handle to release the blue latch.
    b. Pull the handle on the tray out into the open position.
    c. Lift the drive tray partially out of the bay.
    d. To avoid possible damage to the drive, wait at least 20 seconds before fully removing the drive CRU from the expansion unit to allow the drive to spin down.
    e. Verify that there is proper identification on the drive CRU (such as a label), and then slide it completely out of the expansion unit.
3. Install the new drive CRU.

5.6 Working with Hot-swap Power

The power supplies are customer replaceable units (CRUs) and do not require preventive maintenance.

- The power supplies must always be installed in the proper place to maintain proper cooling of the expansion unit.
- Use only the supported power supplies for your specific expansion unit.

To remove a hot-swap power supply unit:

1. Turn off the power supply.
2. Unplug the power supply cord from the electrical outlet.
3. Disconnect the power cord form the power supply.
4. Loosen the power supply thumbscrews.
5. Grasp the handles on each side of the power supply unit and pull it out of the expansion unit.

To install a hot-swap power supply unit:

1. Ensure that the power supply you are installing is turned off.
2. Grasp the handles of the power supply unit and slide it into the expansion unit.

3. Tighten the power supply thumbscrews.
4. Connect the power cord to the power supply.
5. Plug the power supply cord into a properly grounded electrical outlet. If you just installed a second (redundant) power supply, the amber fault LED will light since its power switch is turned off.
6. Turn on the power supply. If you just installed a second (redundant) power supply, after you turn on the power, the amber fault LED will turn off and the green AC and DC power LEDs will turn on.

A

EXP RAID Components and Spare Parts

Components and Spare Parts for EXP RAID Configuration 66

This chapter provides you with a list of components that are necessary for the EXP RAID configuration, and for spare parts replacement.

A.1 Components and Spare Parts for EXP RAID Configuration

The following table lists the components that you need to configure an EXP RAID.

Image	Creo Part Number	Description	Vendor Part Number
	609-00157	IBM EXP300 Storage Expansion Unit	19K1157
	609-00160	IBM 73GB 10K Ultra160 Disk for EXP300	06P5756 06P5760
	603-00297	IBM 73GB 10K Ultra320 Disk for EXP320	4073 55P4124
	609-00161	IBM 146GB 10K Ultra160 Disk for EXP300	32P0750 32P0760
	603-00298	IBM 146GB 10K Ultra320 Disk for EXP320	4146 55P4128
	609-00163	2M SCSI cable for EXP300 (VHDCI 68x2)	09N7276
	609-00299	2M SCSI cable for EXP320 (VHDCI 68x2)	5303 09L3301

Image	Creo Part Number	Description	Vendor Part Number
	609-00162	IBM EXP rack to Tower Conversion kit (EXP300 & EXP320)	09N7296
	609-00165	IBM EXP300 Switch card Assembly On EXP320 there is no Switch card	19K1173
	609-00166	IBM EXP300 ESM Card Assembly	19K1171
	603-00300	IBM EXP320 ESM Card Assembly	2642 97P1508
	609-00167	IBM EXP300 Power Supply Unit	07K5985
	603-00301	IBM EXP320 Power Supply Unit	3430 97P1515

Image	Creo Part Number	Description	Vendor Part Number
	609-00168	IBM EXP300 Bridge Card Assembly	19K1172
	603-00302	IBM EXP320 Bridge Card Assembly	97P1511
	603-00292	IBM EXP300 Chassis with midplane	19K1170
	603-00303	IBM EXP320 Chassis with midplane	97P1501
	609-00164	PCI 4-Channel Ultra3 SCSI RAID Adapter (EXP300 & EXP320)	2498
	includes: 609-00235 609-00237	Base card 128MB cache + battery	 37L6892 37L6902
	609-00236	Battery for PCI 4-Channel RAID adapter	37L6903

B

43P Bracket

B.1 43P Bracket

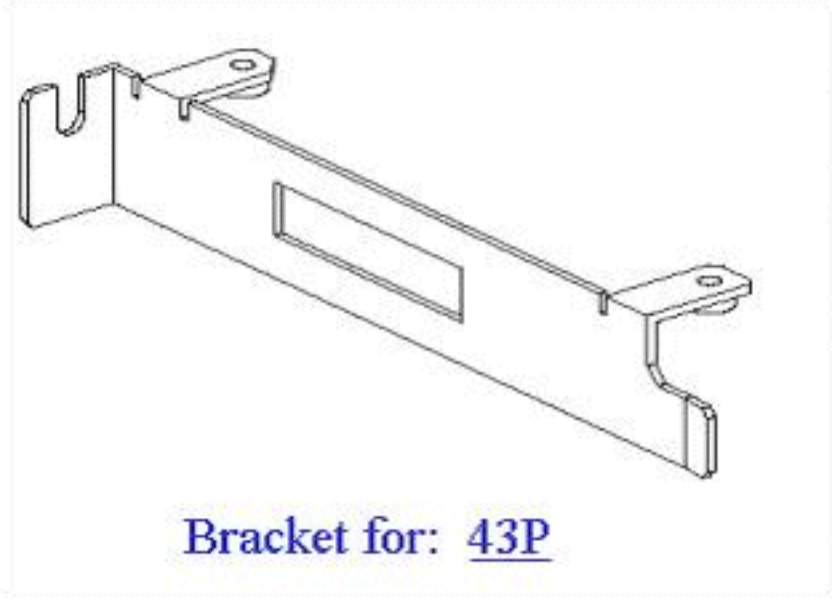


Figure 12: Bracket for 43P

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