Premium PA-4800 & PA-4811

Ultra 160 SCSI to ATA

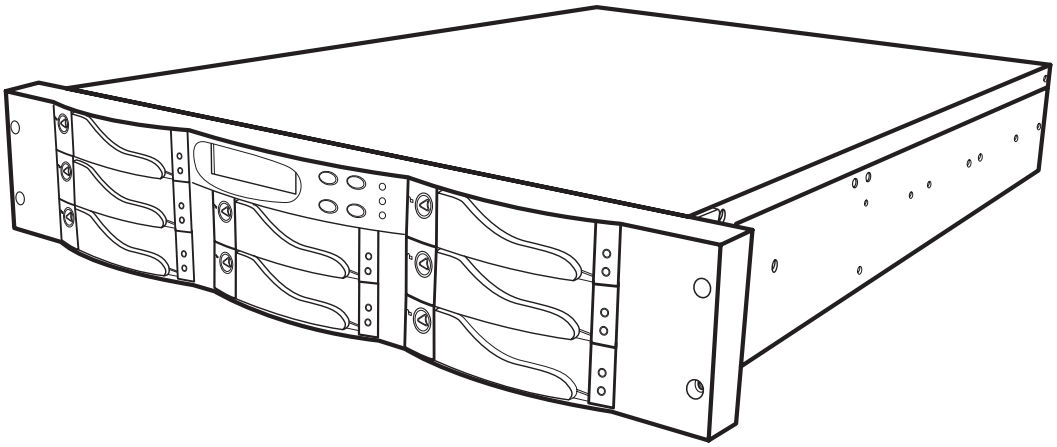
&

Fibre Channel to ATA

Disk Array System

User Manual

Version 1.7



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Preface

About this Manual

This manual is designed to make the disk array system as easy to use as possible. Information contained in this document has been checked for accuracy, but no guarantee is given that the contents are correct. Information and specifications are subject to change without notice.

Copyright Notice

Conventions

Caution

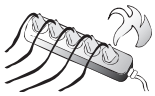
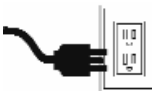
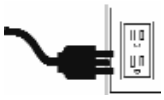
This symbol is used to remind users to pay attention to important descriptions regarding usage and maintenance (repair), or additional important information related to this disk array system.

Note

This symbol is used to remind users of useful information that can make procedures such as configuration easier to accomplish.

Important Safety Instructions, Care and Handling

	Before starting, take a few minutes to read this manual. Read all of these instructions and save this manual for later reference.
	Protect the disk array system from extremely high or low temperatures. Let the disk array system warm (or cool) to room temperature before using it.
	Protect the disk array system from being bumped or dropped. Do not place the disk array system on an unstable cart, stand, or table. It may fall, causing serious damage to the product.
	Keep the disk array system away from magnetic forces.
	Do not use the disk array system near water.
	Keep the disk array system away from dust, sand, or dirt.
	Gaps and openings in the cabinet and the back are provided for ventilation. Never block or cover these openings, because the disk array system may overheat and become unreliable. Don't place the disk array system on a bed, sofa, rug, or other similar surface.
	Do not place the disk array system near or over a radiator or heat source.
	Refer to the rating plate for the correct voltage and ensure that the appliance voltage corresponds to the supply voltage.

	The appliance must be grounded. The disk array system is equipped with a grounded 3-wire power cord. This power cord will only fit into a grounded type of power outlet.
	If an extension cord or a power center is used with the disk array system, make sure that the total current consumption of all products plugged into the wall outlet does not exceed the ampere rating.
	Do not place the disk array system where the cord will be stepped on.
	Never push any kind of object into the disk array system through cabinet gaps and openings, since they may touch dangerous voltage points and cause a risk of fire or electric shock.
	Unplug the power cord from the wall outlet before cleaning. Keep the disk array system dry. Do not use liquid cleaners, aerosol cleaners, or a wet cloth. Use a damp cloth for cleaning.
	Except as specifically explained in this User Manual, do not attempt to service the disk array system by yourself. Opening or removing the covers may expose you to dangerous voltages.
	Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions. • If the disk array system has been exposed to water or any liquid. • If the disk array system has been dropped or the cabinet damaged.

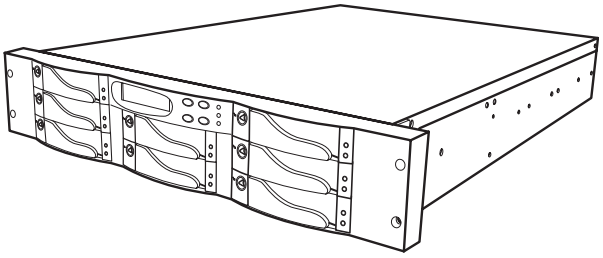
Placement Notes

- The disk array system LCD panel can be damaged by exposure to direct sunlight. Only allow subdued or indirect sunlight to shine on the disk array system.
- The disk array system should be used only in clean environments that are free from airborne contaminants such as dust, dirt, and smoke. Excessive moisture or oil particles in the air can also hinder disk array system performance.
- To reduce the possibility of data errors caused by electromagnetic interference, locate the disk array system at least five feet away from electrical appliances and equipment that generates magnetic fields.

Power Supply Safety Notes

- To avoid electric shocks, do not use an extended power cord or an outlet that does not match the disk array system plug or leaves the plug exposed.
- The disk array system has a grounded 3-wire plug. The third pin connects to ground; do not remove it.
- If the power cord or plug is damaged or worn, unplug it immediately and contact a qualified service technician for maintenance.
- To avoid fire or electric shocks, do not overload electric power outlets.

1 Overview



The disk array system uses groups of inexpensive disks to provide flexibility when balancing data availability, access rate, and capacity management needs.

High data availability is achieved by using the fault tolerance features of RAID (Redundant Array of Inexpensive Disks); hot spare disks with automatic on-line rebuild; hot swap disks, and power supplies; independent ATA disk controllers; and dual host controllers. Our confidence in the disk array system is backed by a 3 year warranty.

A high data access rate is achieved by combining the individual data rates of ATA disks in a RAID configuration. ATA disks lack some of the features of SCSI disks but are just as fast when used with a high performance RAID controller. In the disk array system, RAID is controlled by a high performance CPU, which transfers data through dual host interfaces at the maximum possible rate.

Flexible data capacity management is achieved with on-line RAID expansion, RAID capacity division into slices, and multiple logical RAIDs. Management is performed through front panel, RS-232, host, or Web browser interfaces.

This chapter includes an overview of RAID concepts, a summary of disk array system features, a packing list, and an overview of disk array system components.

Features

The main features of the disk array system are listed as follows. Refer to the specifications table on page 85 for more detailed information.

- Operating system independent
- Up to four JBOD, RAID 0, 1, 3, 5, 0+1, 3+0, or 5+0 disk groups
- On-line expansion
- Allows division of disk groups into slices, each mapped to a LUN
- Hot spare disk and automatic on-line rebuild
- Up to 8 hot swap ATA disks for a total capacity of 1.5 TB (terabytes)
- Two hot swap power supplies – if one fails, the other takes over without interruption
- Two fans with intelligent speed and temperature management
- Eight 100 MB/s ATA channels
- Fast 64-bit RISC CPU based RAID controller with up to 512MB of cache in an SO-DIMM
- Dual Ultra SCSI (PA-4800) or fibre channel (PA-4811) host interfaces
- Audible alarm, disk tray LED, and LCD panel failure indicators
- Configuration via the front panel, RS-232 interface (VT100 terminal), host interface (Global-Eyes), or Ethernet interface (Global-Net)

Understanding RAID

Read this section to understand how to balance data availability, access rate, and capacity management needs.

JBOD

Just a Bunch Of Disks (JBOD) consists of two or more disks that can be different sizes. Disk 1 is completely filled, then disk 2, disk 3, and so on until the final disk is full.

The total capacity of JBOD is the sum of the capacities of the disks. Disks are added until the desired total capacity is reached.

JBOD is used in the following situations.

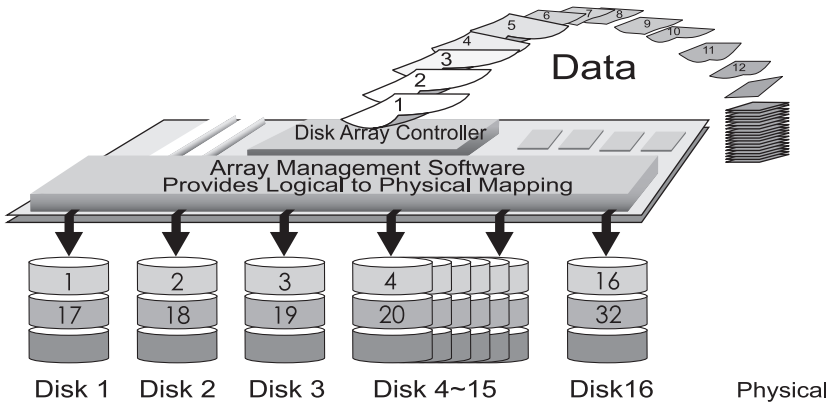
- Building useful capacity from disks that are too small to be individually useful
- Making capacity management easier, since the user only sees one logical disk

JBOD doesn't improve data availability or access rate when compared with a single disk.

RAID Levels

The overall arrangement of disks in RAID is called the RAID level. Read this section to understand RAID levels.

RAID 0



In RAID 0, data is divided into pieces and written to all disks in parallel. This process is called striping because the pieces of data form a stripe across multiple disks. This improves the access rate, but makes availability lower, since there are more disks and failure of a single disk causes failure of the array. A RAID 0 array is unsuitable for data that can not easily be reproduced, or for data that must be available for critical system operation.

RAID 0 consists of two or more disks of equal capacity. The total capacity of RAID 0 is the sum of the capacities of the disks. Disks are added until the desired total capacity is reached.

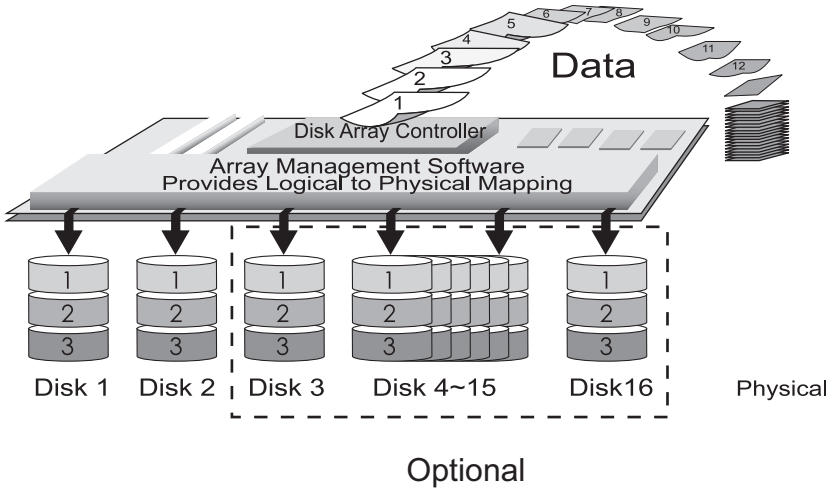
A RAID 0 array is useful in the following situations.

- Storing program image libraries or run-time libraries for rapid loading. A backup exists because these libraries are usually supplied on read-only media.
- Storing large tables or other structures of read-only data for rapid application access. This data should be backed up so that it can be recreated in the event of a failure.
- Capturing data from external sources at very high data transfer rates.

A RAID 0 array is not useful in the following situations.

- Applications that make sequential requests for small amounts of data. These applications spend most of their I/O time waiting for disks to spin, whether or not they use striped arrays.
- Applications that make synchronous random requests for small amounts of data.

RAID 1

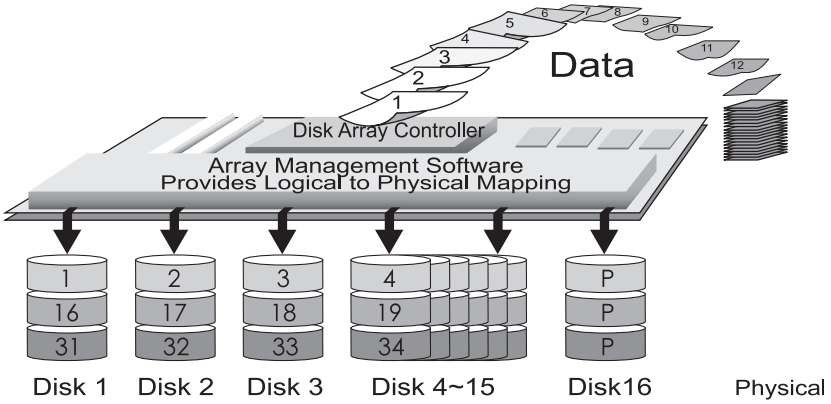


In RAID 1, data is duplicated on two or more disks to provide high access rate and very high data availability. This process is called mirroring. If a disk fails, the RAID controller directs all requests to the surviving members.

A RAID 1 array is useful in the following situations.

- Availability requirements are very high
- High access rate is required
- Cost of storage is a secondary issue

RAID 3



In RAID 3, data is divided into pieces; the parity of these pieces is calculated; and the pieces are written to separate disks in parallel, with the writing of the parity to a dedicated disk. This process is called striping with parity. The parity disk stores redundant information about the data on other disks. If a single disk fails, then the data on the other disks is used to regenerate the data on the failed disk. Striping delivers a high access rate and parity delivers good data availability. The single parity disk is a bottleneck on sequential writes, since parity must always be written to the single parity disk.

RAID 3 consists of two or more disks used for data and one disk used for fault tolerant data. The total capacity of RAID 3 is the sum of the capacities of the data disks. Add disks until the desired capacity is reached, then add one more disk for fault tolerance.

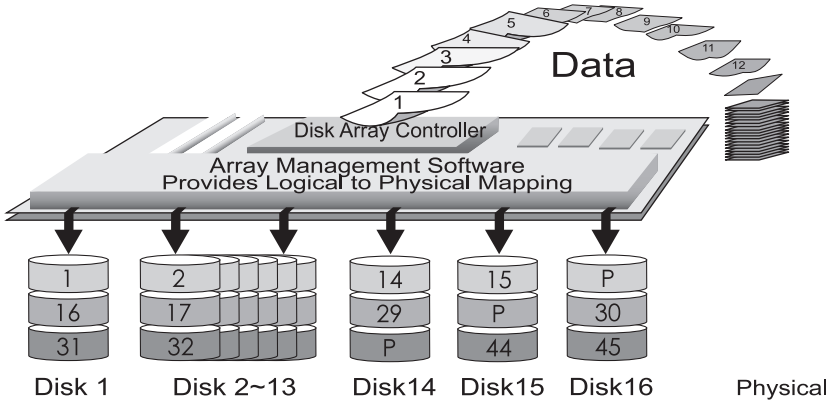
RAID 3 is used by the following applications that request large amounts of data sequentially.

- Processing of graphical or video images
- Processing of CAD/CAM files

RAID 3 has the following distinctive features.

- Excellent performance for data transfer intensive applications
- Not well suited for transaction processing or other I/O request intensive applications

RAID 5



In RAID 5, data is divided into pieces; the parity of these pieces is calculated; and the pieces and parity are written to separate disks in parallel. The parity is written to a different disk each time. Parity provides redundant information about the data on other disks. If a single disk fails, then the data on the other disks is used to regenerate the data on the failed disk. Striping delivers a high access rate and parity delivers good data availability. The bottleneck caused by the single parity disk of RAID 3 is not present in RAID 5, since parity is stored on all disks.

RAID 5 consists of two or more disks used for data and one additional disk used for fault tolerence. The total capacity of RAID 5 is the sum of the capacities of the data disks. Add disks until the desired capacity is reached, then add one more disk for fault tolerance.

RAID 5 is best used with applications whose data has the following characteristics.

- The data is worth protecting, but not as much as RAID 1
- High read data rates
- Small proportion of writes to reads

Hot Spare Disks

A hot spare disk is a standby disk that is not used for data storage unless a RAID member fails. If a disk failure occurs, the failed RAID member is replaced by the hot spare disk without user intervention. This improves data availability, since the RAID is able tolerate more disk failures with a hot spare disk.

RAID Combinations

RAID levels may be combined in the following hierarchies.

- RAID 0+1 is a RAID 1 consisting of RAID 0 members
- RAID 3+0 is a RAID 0 consisting of RAID 3 members
- RAID 5+0 is a RAID 0 consisting of RAID 5 members

Summary of RAID Levels

The following table summarizes the performance characteristics of each RAID level. A high availability or access rate number indicates high availability or quick access rate.

Disk Group	Availability	Access Rate	Capacity Utilization	Description
JBOD	1	1	100%	Data is distributed by filling each disk in turn.
RAID 0	1	5	100%	Data is divided into pieces and written to all disks in parallel.
RAID 1	5	2	50%	Data is duplicated on both disks.
RAID 3	3	3	Between 67% for 3 disks to 94% for 16 disks	Data is divided into pieces; the parity of these pieces is calculated; and the pieces are written to separate disks in parallel with the writing of the parity to a dedicated disk.
RAID 5	3	3.5	Between 67% for 3 disks to 94% for 16 disks	Data is divided into pieces; the parity of these pieces is calculated; and the pieces and parity are written to separate disks in parallel. The parity is written to a different disk each time.
RAID 0+1	4.5	5	50%	RAID 0+1 is a RAID 1 consisting of RAID 0 members.
RAID 3+0	4	4	Between 67% for 6 disks to 88% for 16 disks	RAID 3+0 is a RAID 0 consisting of RAID 3 members.
RAID 5+0	4	4.5	Between 67% for 6 disks to 88% for 16 disks	RAID 5+0 is a RAID 0 consisting of RAID 5 members.

System Requirements

Ensure that the following requirements are met before installing the disk array system.

Operating Environment

- 15 cm (6 inches) of space around the disk array system for proper ventilation
- ambient temperature of 5°C to 40°C (40°F to 104°F). 20°C to 25°C (68°F to 77°F) is recommended
- ambient non-condensing relative humidity of 10% to 85%
- dust, smoke, and oil free environment
- no large magnetic fields, such as those generated by a high voltage power cables and motors, etc.
- keep away from direct sunlight
- a flat, stable surface capable of supporting the disk array system plus the weight of your chosen disks

VT100 Terminal Settings

Refer to the following table for a summary of VT100 terminal settings required to communicate with the disk array system via the RS-232 interface. Refer to your system manual for instructions on setting up the VT100 terminal settings.

Item	Required Setting
Connection	Serial Port (COM1 or COM2)
Protocol	RS232 (Asynchronous)
Cabling	Null Modem cable
Baud Rate	115, 200
Data Bits	8
Stop Bit	1
Parity	None

Host Interface

The disk array system has either dual SCSI interfaces or dual fibre channel interfaces. Refer to the following sections to understand host interface system requirements.

Small Computer Systems Interface

The PA-4800 has dual Ultra160 SCSI interfaces that are compatible with previous SCSI standards. Refer to the following table to understand SCSI bus requirements.

Note

Subtract the internal cable length (60 cm) from the maximum SCSI bus length to calculate the maximum external SCSI cable length.

SCSI Standard	Maximum SCSI Bus Length in Meters	Data Rate in Megabytes per Second	Maximum Number of Devices
Ultra160	12	160	15
Ultra2	12	80	15
Ultra Wide	1.5	40	7
Fast Wide	3	20	15
Ultra	1.5	20	7

Fibre Channel Interface

The PA-4811 has dual 2Gb fibre channel interfaces with SFP connectors for linkage to a fibre channel switch or host computer interface card. With the correct SFP transceiver and optical cable, the following transmission distances can be achieved.

Component	Optical	
SFP Transceiver	LC Optical	
Cable	Short Wave	Long Wave
Maximum Cable Length	50m	10 Km

Hard Disks

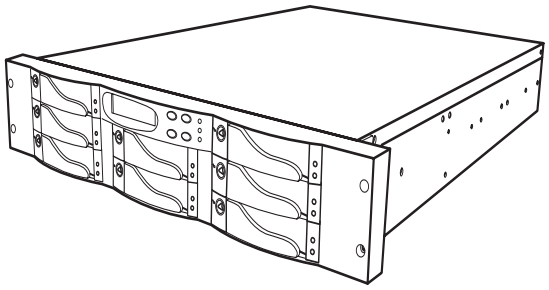
Supply the number of ATA disks needed for your application. Refer to “Understanding RAID” on page 3 to determine the number of disks needed.

Unpacking

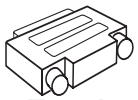
Contact your supplier if any of the following items are missing or damaged.

Caution

The disk array system is heavy. Be careful when lifting and moving it.

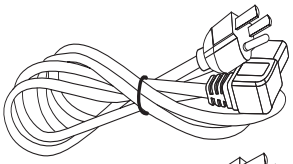


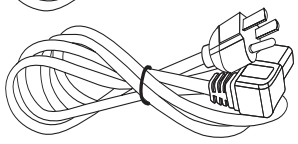
Disk Array System



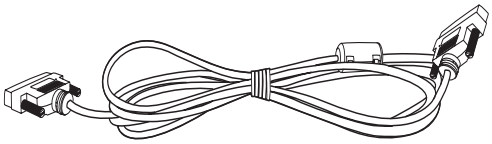
***Active Terminator (PA-4800 Only)**

Disk Tray Keys

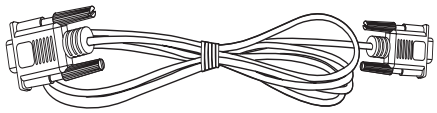




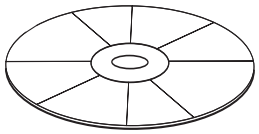
Power Cables



***Ultra160 SCSI Cable (PA-4800 Only)**



RS-232 Cable



Global-Eyes Installation CD-ROM

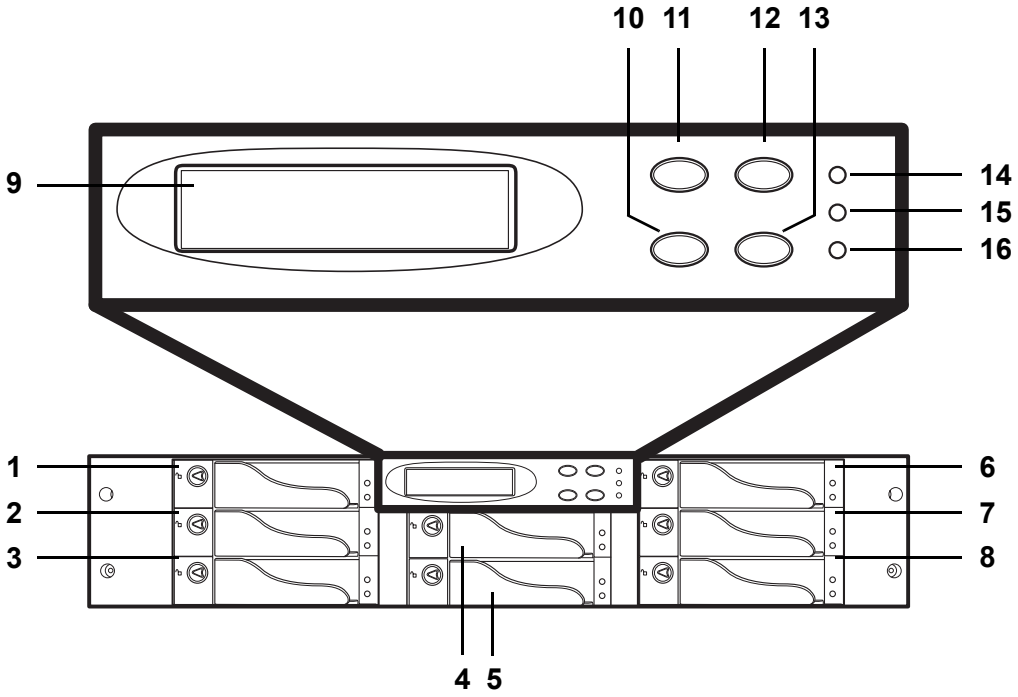
User Manual

***Note**

Only the PA-4800 comes with Ultra160 SCSI cables and a terminator.

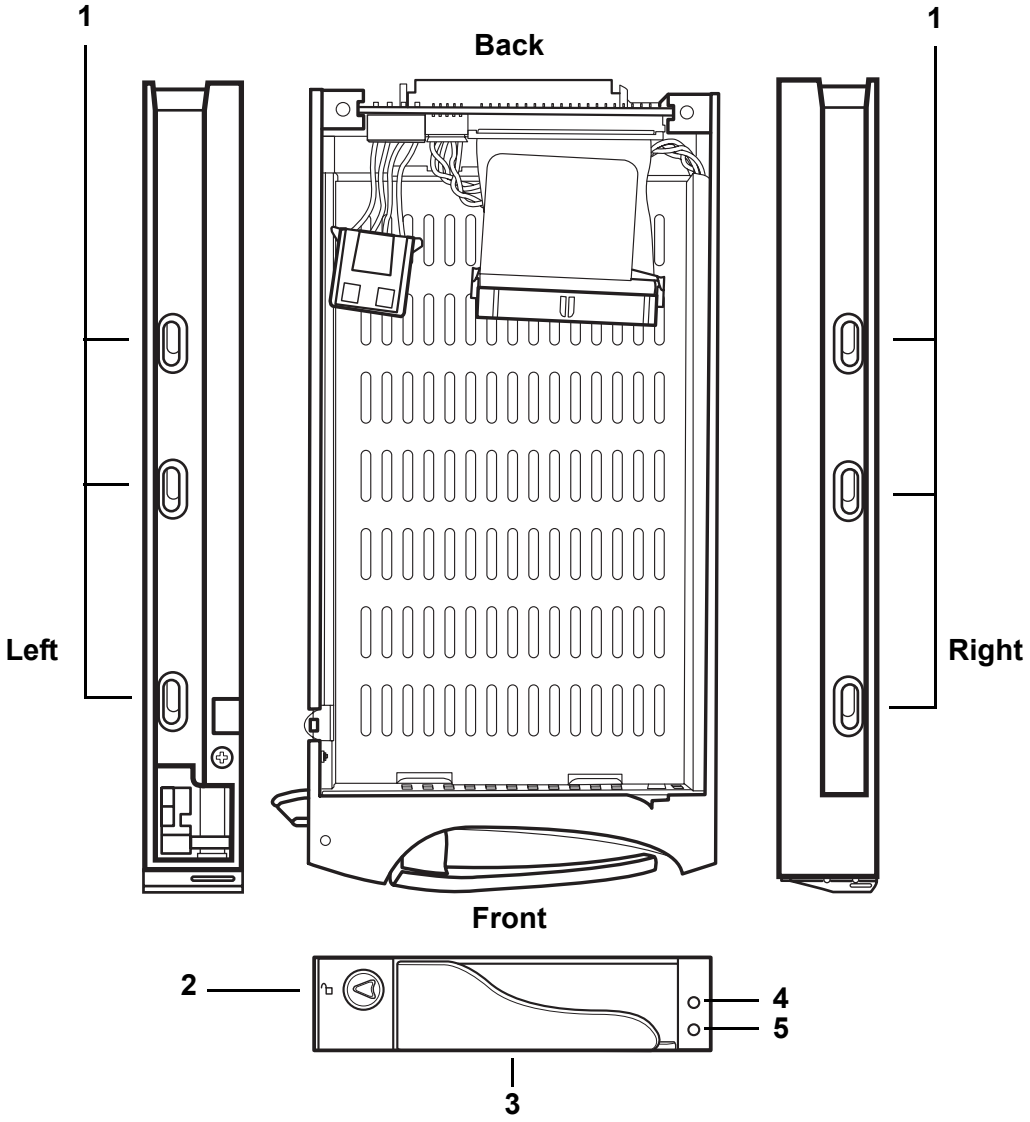
Components

Front View



No.	Name	Description
1-8	Disk trays 1 to 8	Removable hot swap disk trays.
9	LCD panel	Displays warning, operating, and configuration information.
10	Down function button	Moves down in the LCD menus.
11	Up function button	Moves up in the LCD menus.
12	Escape function button	Returns to the previous LCD menu without making changes.
13	Enter function button	Selects a menu item or confirms a choice or entry.
14	Power-on indicator (green)	Indicates the disk array system power is on.
15	Power supply fail indicator (red)	Indicates a failed power supply.
16	Host computer access indicator	Indicates data transfer between the disk array system and the host computer.

Disk Tray



No.	Name	Description
1	Disk mounting holes	Allows the disk be mounted on the disk tray with the screws included with the disk.
2	Tray lock	Prevents unauthorized removal of a disk tray. Opened with the included disk tray lock key.
3	Tray handle	Releases the disk tray.
4	Power/Error indicator LED	Indicates normal operation of the disk when green, or an error or failure of the disk when red.
5	Access indicator LED	Indicates that the disk is being accessed when orange.

LCD Panel

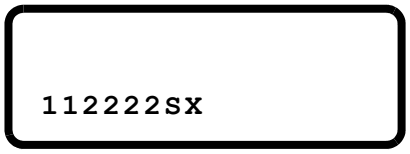
The LCD panel shows an overview of disk array system status. Configuration changes made through RS-232, host, or Ethernet interfaces are also shown on the LCD panel.

The following table explains the meaning of the symbols that appear on the LCD panel.

Symbol	Meaning
R	The disk has an error or a fault.
I	The disk is being identified by the disk array system.
S	The disk is spare. This disk can be used as a hot spare or to expand a disk group.
X	There is no disk installed in this disk tray.
W	The disk has too many bad sectors. This is a warning.
A	The disk is being added to a disk group during on-line expansion.
J	The disk is part of a JBOD.
1	The disk is a member of RAID group 1.
2	The disk is a member of RAID group 2.
3	The disk is a member of RAID group 3.
4	The disk is a member of RAID group 4.

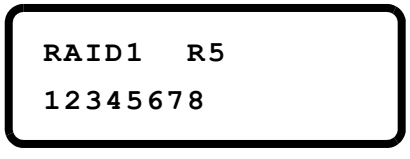
The following examples describe LCD status display information.

Example 1



- Disks 1 to 2 are members of RAID group 1.
- Disks 3 to 6 are members of RAID group 2.
- Disk 7 is spare.
- Disk 8 is not installed.

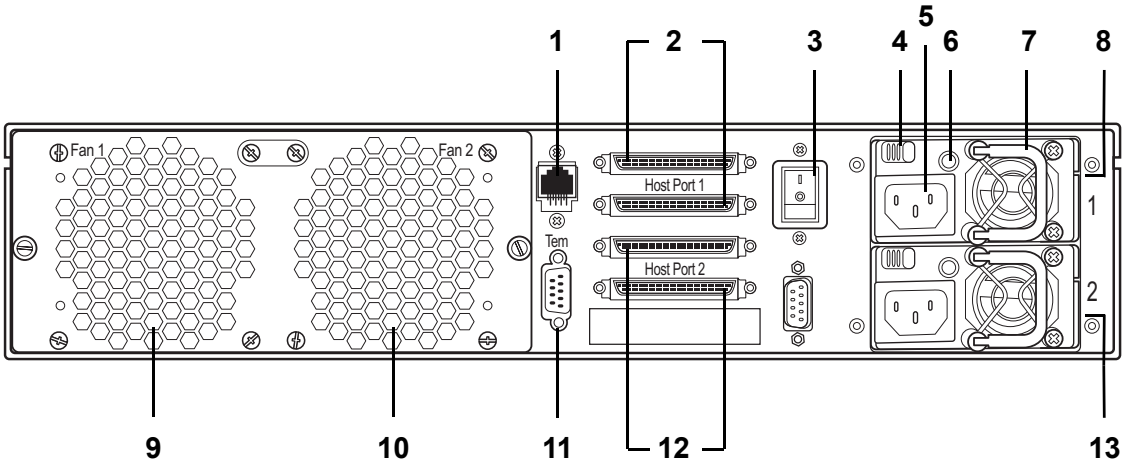
Example 2



- The configuration of RAID group 1 is shown.
- RAID group 1 is configured at RAID level 5.
- Disks 1 to 8 are RAID group 1 members.

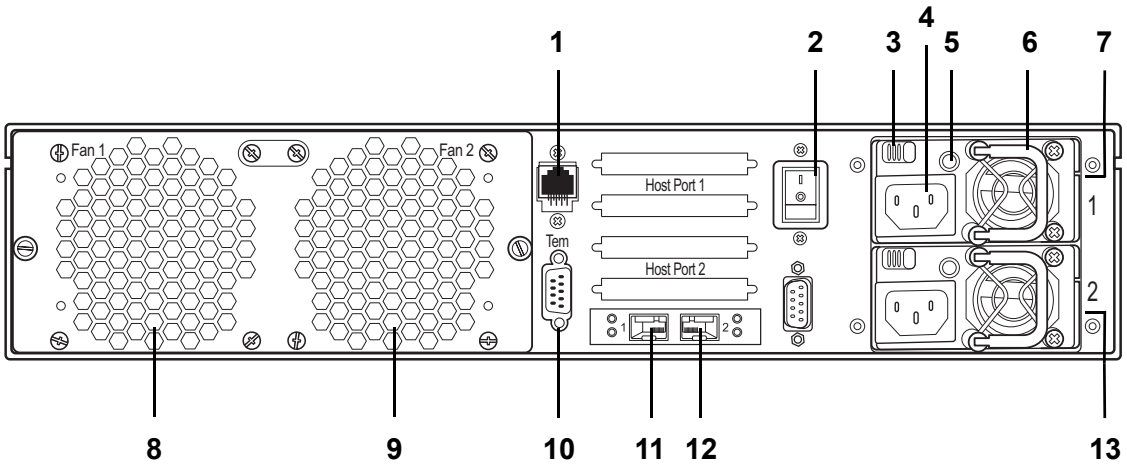
Rear View

PA-4800



No.	Name	Description
1	Ethernet Port	Used for browser-based configuration.
2	Host Port 1 (Primary SCSI channel)	Connects to the host server.
3	Main Power Switch	Turns the main power on or off.
4	Hot Swap Power Supply Release	Allows the power supplies to be removed.
5	AC Power In	Connects to a 110-240 VAC power source.
6	Power Supply On Indicator	Indicates normal operation of the power supply when green, or standby when red.
7	Power Supply Handle	Allows the power supply to be pulled out.
8	Power Supply 1	Removable redundant power supply 1.
9	Fan 1	Fan 1
10	Fan 2	Fan 2
11	RS-232 Port	Connects to a VT100 terminal or equivalent.
12	Host Port 2 (Secondary SCSI channel)	Connects to the host server.
13	Power Supply 2	Removable redundant power supply 2.

PA-4811



No.	Name	Description
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5	Power Supply On Indicator	Indicates normal operation of the power supply when green, or standby when red.
6	Power Supply Handle	Allows the power supply to be pulled out.
7	Power Supply 1	Removable redundant power supply 1.
8	Fan 1	Fan 1
9	Fan 2	Fan 2
10	RS-232 Port	Connects to a VT100 terminal or equivalent.
11	Host Port 1 (Primary Fibre channel)	Connects to the host server.
12	Host Port 2 (Secondary Fibre channel)	Connects to the host server.
13	Power Supply 2	Removable redundant power supply 2.

2 Getting Started

After completing the hardware installation, the disk array system must be configured before it is ready to use. This is accomplished with any of the following user interfaces.

- Front panel function keys and the LCD display.
- VT100 terminal (or equivalent) connected through the RS-232 port.
- Global-Eyes Windows software connected through the host interface. Refer to the Global-Eyes Installation CD-ROM for details.
- Web browser based Global-Net software connected through the Ethernet interface. Refer to the Global-Eyes Installation CD-ROM for details.

Note

The front panel and a VT100 terminal cannot be used at the same time.

This chapter describes how to set up the disk array system for the first time using the front panel.

The setup program is a menu-driven utility that enables you to make changes to the configuration and tailor the disk array system to meet your individual needs.

The setup program is a ROM-based configuration utility that displays the disk array system status and allows you to set operating parameters. The parameters are stored in non-volatile battery backed-up CMOS RAM that saves the information even when the power is off.

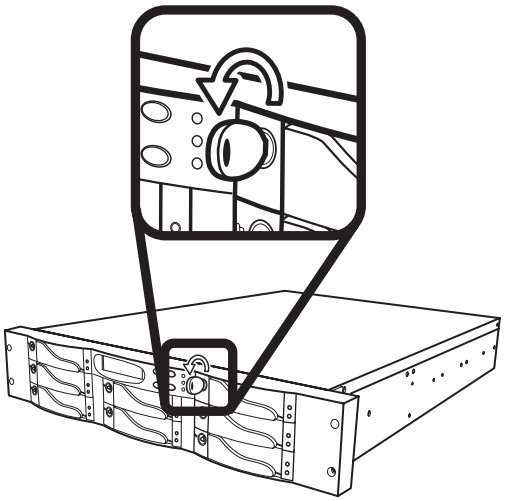
Using the simple user interface, the following items can be easily configured:

- RAID level
- Hot spare disk
- Host interface ID
- Password (for protection from unauthorized use)

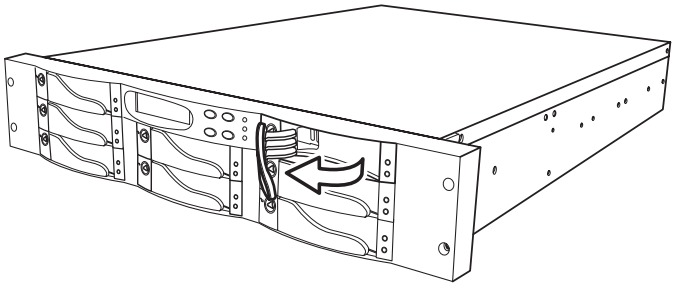
Installing Disks

This section describes how to install disks in the disk array system. Read "Understanding RAID" on page 3 to decide how many disks are required.

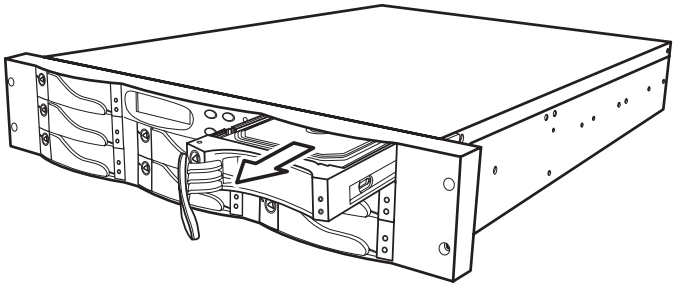
1 Unlock the disk tray with an included disk tray key.



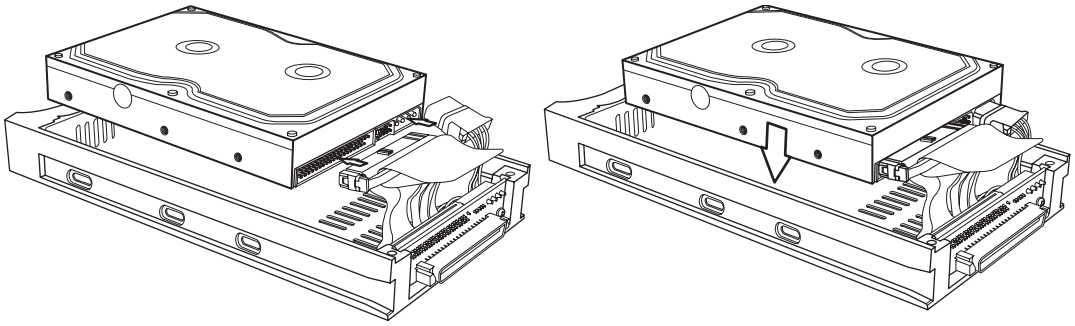
2 Gently pull the disk tray handle to the opened position.



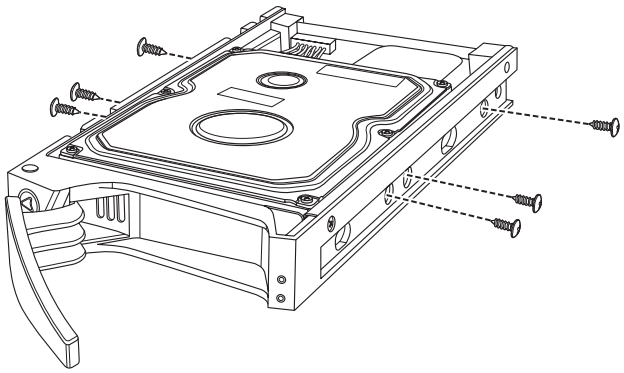
3 Remove the disk tray.



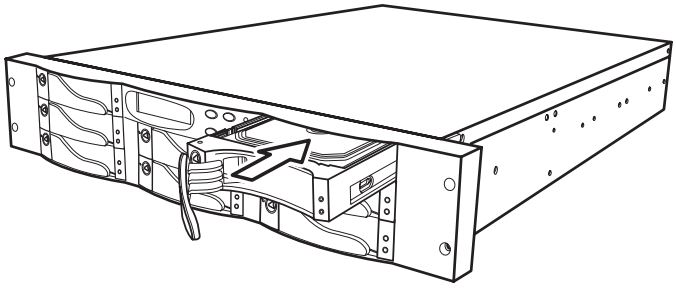
4 Insert the disk tray connectors into the disk then insert the disk into the disk tray.



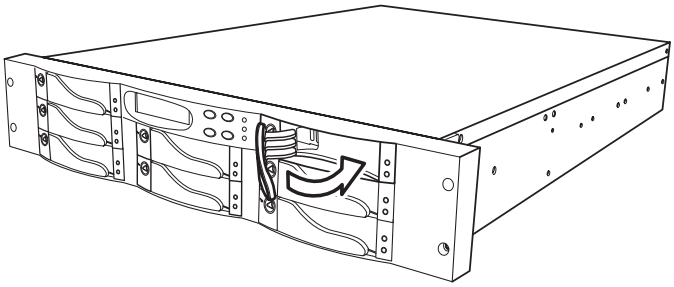
5 Attach the disk to the disk tray with the screws supplied by the disk vendor.



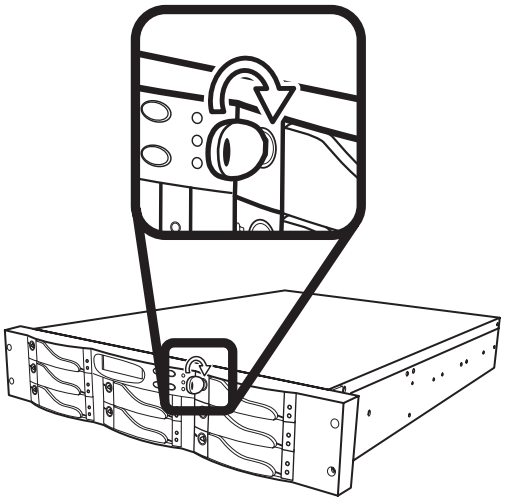
6 Slide the disk tray back into the empty slot.



7 Slowly push the disk tray handle closed.



8 Lock the disk tray with the key.



9 Repeat steps 1 to 8 until all of the required disks have been installed.

Making Connections

After the required number of disks have been installed, external connections to the disk array system must be made. This section describes how to make all of the necessary connections.

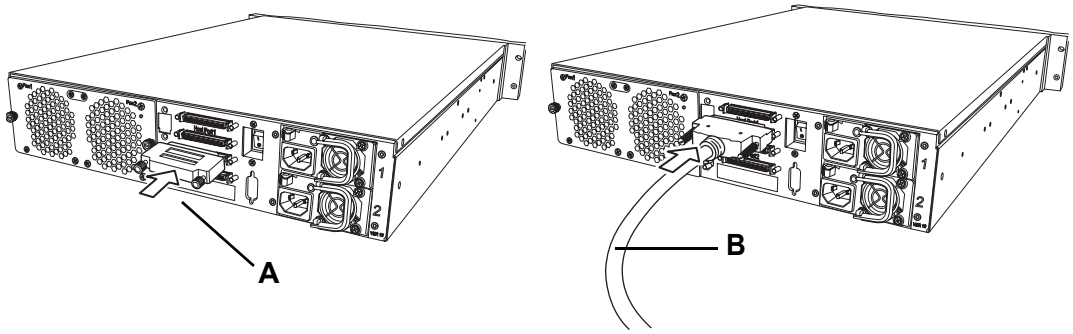
Connecting the Host Interface

The disk array system has either dual SCSI interfaces or dual fibre channel interfaces. Refer to the following sections to make host interface connections.

Small Computer Systems Interface

The PA-4800 has dual Ultra160 SCSI interfaces. Follow these instructions to make connections.

1. Connect the active SCSI terminator (A) to the bottom connector of the PA-4800 host port 1 (primary SCSI channel) at the rear of the disk array system.

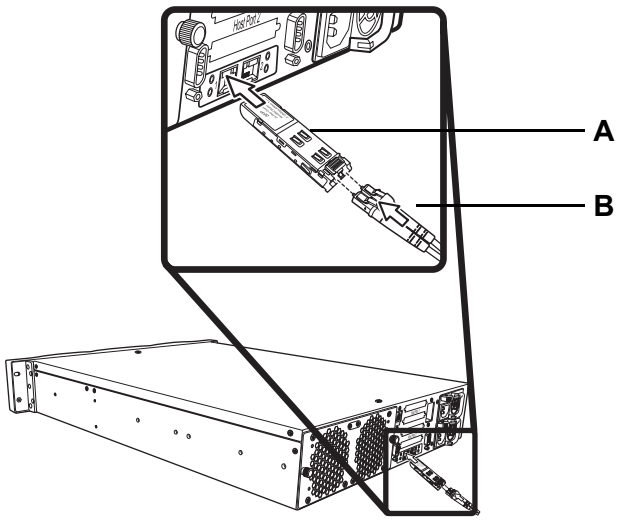


2. Connect the Ultra 160 SCSI cable (B) to the top connector of the PA-4800 host port 1 (primary SCSI channel) at the rear of the disk array system.

Fibre Channel Interface

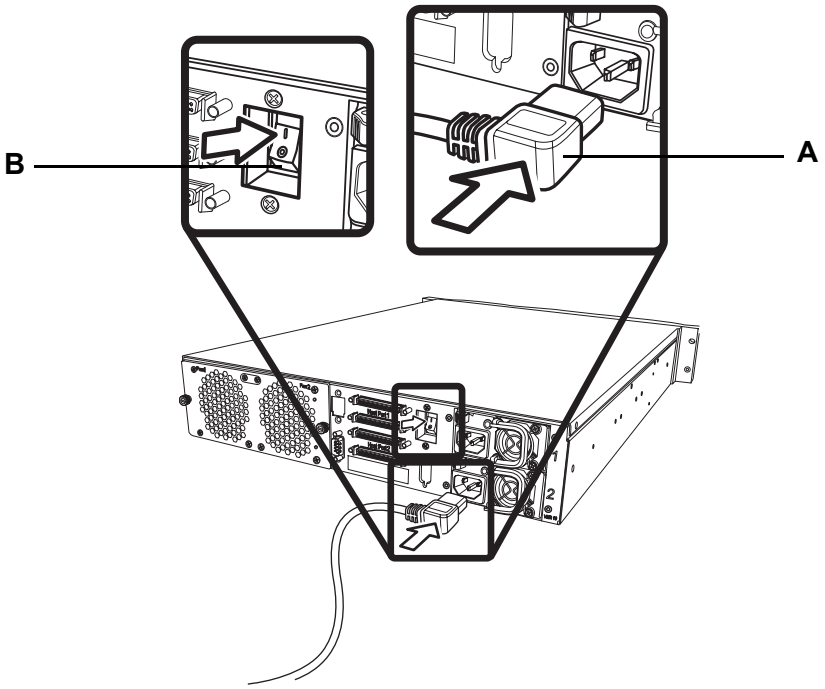
The PA-4811 has dual 2Gb fibre channel interfaces. Each interface can be used with optical or copper transceivers and cables. Follow these instructions to make optical connections.

1. Insert the LC Optical SFP transceiver (A) in to the PA-4811 host port 1 (primary fibre channel) at the rear of the disk array system.
2. Connect the optical cable (B) to the LC Optical SFP transceiver (A).



Connecting and Turning on the Power

1 Connect a power cable (A) to a power supply connector at the rear of the unit. The power supply on indicator LED glows red.



2 Connect the second power cable to the remaining power supply connector at the rear of the unit. The power supply on indicator LED glows red when the power supply is connected.

Note

The system is equipped with auto switching power supplies that can run on 100 to 240 VAC.

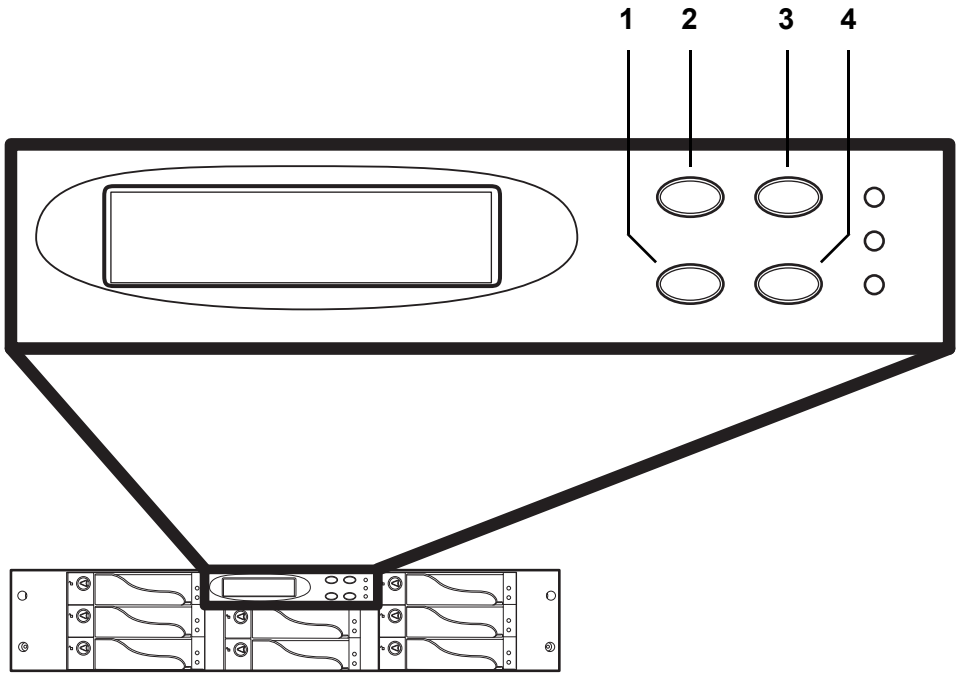
3 Press the disk array system main power switch (B) to the ON position. All power supply on indicator LEDs glow green and the disk array system automatically begins the self-test sequence.

Using Front Panel Quick Setup

The disk array system can be configured using the front panel, RS-232, host, or Ethernet interfaces. This section describes how to use the front panel to quickly establish a RAID group that uses all disks.

Front Panel Function Buttons

The disk array system can be configured with the four function buttons on the front panel.



No.	Name	Description
1	Down function button	Moves down in the LCD menus
2	Up function button	Moves up in the LCD menus
3	Escape function button	Returns to previous LCD menu without making changes
4	Enter function button	Selects a menu item or confirms a choice or entry

Front Panel Information Entry

Sometimes you will be prompted to enter information such as a password or disk capacity. Use the Up ↑ and Down ↓ function buttons to scroll through the numbers, symbols, and characters that appear on the LCD panel. Press **Enter** to select the character and move to the next position. Press **Esc** to delete the current character and move to the previous position.

Quick Setup Procedure

The front panel interface guides you through the creation of a RAID group by prompting for each configuration parameter in sequence. Follow these instructions to establish a RAID group quickly.

1. Switch on the disk array system. After the automatic power on self test, the disk array setup utility configures all disks as one JBOD disk group by default.

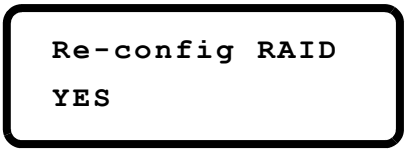
2. Press **Enter** to access the disk array setup utility. The *Enter Password* prompt appears on the LCD panel.

3. Press ↑ or ↓ to select each character. Press **Enter** to confirm the selected character, or press **ESC** to go back to the previous character.

Note

The default password is 0000 (four zeros).

4. The *Re-config RAID* prompt appears. Press ↑ to select *YES*, then press **Enter** to confirm the selection.



5 The *RAID Level* prompt appears. Press ▲ or ▼ to select RAID 0, 1, 3, 5, 0+1, 3+0, 5+0, or NONE (JBOD), then press **Enter** to confirm the selected RAID level.

```
RAID Level
NONE
```

Caution

All data will be lost when the RAID level is changed.

6 If RAID 3 or 5 is selected, the *Hot Spare Disk* prompt appears. Press ▲ or ▼ to select *YES* or *NO*, then press **Enter** to confirm the selection.

```
Hot Spare Disk
NO
```

7 If the PA-4800 is being configured, then the *Set SCSI ID* prompt appears on the LCD Panel. Press ▲ or ▼ to select 0, 1, 2…14 to set the SCSI ID, then press **Enter** to confirm the selected SCSI ID.

```
Set SCSI ID
0
```

Note

You must assign a different SCSI ID to each SCSI device on the SCSI bus. The default SCSI ID is 0 (zero).

8 The *Set Password* prompt appears. Press ▲ or ▼ to select each character, then press **Enter** to confirm the selected character, or press **ESC** to go back to the previous character.

```
Set Password
0■■■
```

9 The *Save & Restart* prompt appears. Press ↑ to select *YES*, then press **Enter** to confirm the selection. The disk array system restarts and the disk array setup utility configures all disks according to your selections.

```
Save & Restart
NO
```

Caution

Saving configuration changes causes the disk controller's working parameters to change, which may result in unpredictable data transfer if the change occurs during input/output operations. All activity between the disk array system and the host(s) should be stopped before saving configuration changes.

10 After the disk array system restarts, *Init RAID1 DONE* appears on the LCD Panel. The disk group is now ready to use.

```
INIT OK !
InitRAID1  DONE
```

Notes

- Disks inserted after the disk group is built will automatically be used as spares for disk group expansion or as potential hot spares for RAID 3 or 5.
- If the disk array already has a RAID level setting and you want to change to a different RAID level, you must first set the RAID level to "NONE" and complete the setup procedure again to establish the new RAID level.
- If the total capacity of the installed disks exceeds 2 TB (terabytes), the disk array will automatically partition the slice capacity and assign LUNs. After the system is restarted, it will appear on the host with 2 LUNs (default LUN 0 = 2 TB, the remaining capacity is assigned to LUN 1). Refer to "Slice and LUN Mapping" on page 51 for information on modifying the capacities.

Audible Alert Cancellation

The disk array system emits a loud beeping sound when an error or failure occurs. This alert can be turned off by simultaneously pressing both the Up ↑ and Down ↓ buttons twice.

3 Basic Configuration

After completing the hardware installation, the disk array system must be configured before it is ready to use. This is accomplished with any of the following user interfaces.

- Front panel function keys and the LCD display.
- VT100 terminal (or equivalent) connected through the RS-232 port.
- Global-Eyes Windows software connected through the host interface. Refer to the Global-Eyes Installation CD-ROM for details.
- Web browser based Global-Net software connected through the Ethernet interface. Refer to the Global-Eyes Installation CD-ROM for details.

Note

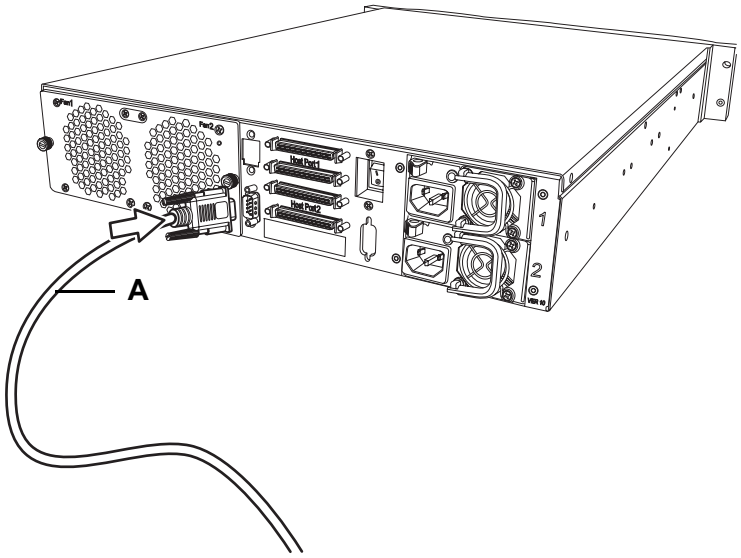
The front panel and a VT100 terminal can not be used at the same time.

This chapter describes how to set up the disk array system for the first time using a VT100 terminal interface.

Basic configuration procedures are used to set up the disk array system for the first time. Basic configuration consists of setting up a single RAID group that uses all installed disks. Read this chapter to set RAID level, Hot spare disk, Host interface ID; expand an existing RAID group; or set a disk array system password.

Connecting the RS-232 Cable

Connect the supplied RS-232 cable (A) to the RS-232 port at the rear of the unit.



Setting up the Terminal

This section describes how to use the HyperTerminal utility to set up the disk array system disk array.

Note

Before continuing, make sure your computer is properly connected to the disk array system with the included RS-232 cable as described in "Connecting the RS-232 Cable" on page 27.

The disk array setup utility is accessed through a standard VT100 session. The following section describes how to configure the HyperTerminal Windows utility as a VT100 terminal. Once the configuration is saved, the disk array setup utility can be easily started in future.

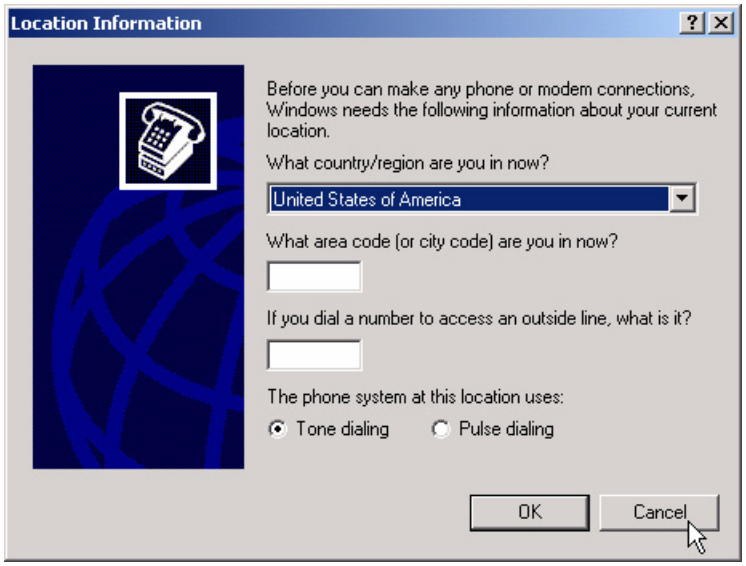
Setting up HyperTerminal in Windows 2000

The instructions that follow describe how to set up a VT100 terminal session using the HyperTerminal terminal emulation utility included with Windows 2000.

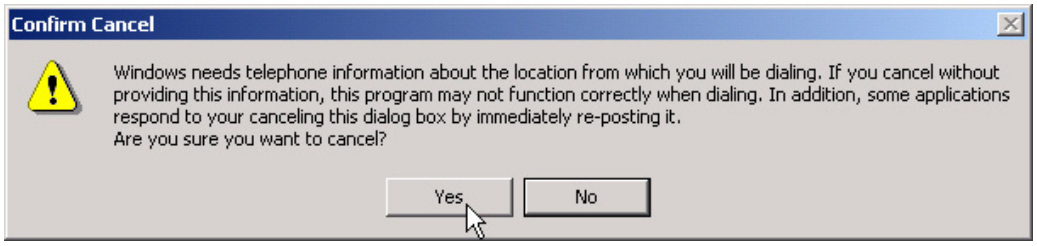
Note

HyperTerminal is a VT100 terminal emulation program that is installed with most Windows XP/ME/2000/98 installations. If the program has not been installed on your computer, refer to Windows help.

1. Click **Start**, **Programs**, **Accessories**, **Communications**, and click **HyperTerminal** to start the terminal emulation program.
2. The Location Information window appears. Because HyperTerminal communicates with the disk array system directly through an RS-232 cable, this information is not necessary. Click **Cancel**.

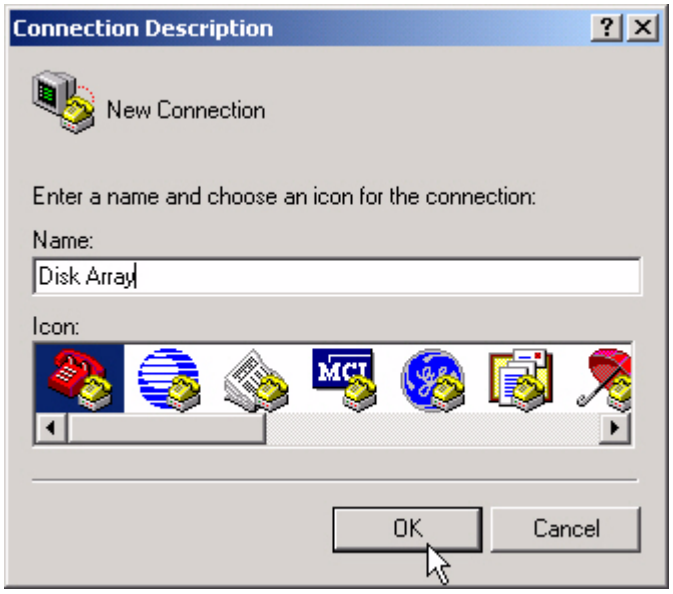


3 The Confirm Cancel dialog box appears. Click **Yes**.



4 Click **OK** when the HyperTerminal information dialog box shown below appears.

5 The Connection Description dialog box appears. Enter a suitable name, such as "Disk Array", in the *Name* field, then click **OK**. This is the name which the configuration will be saved as.

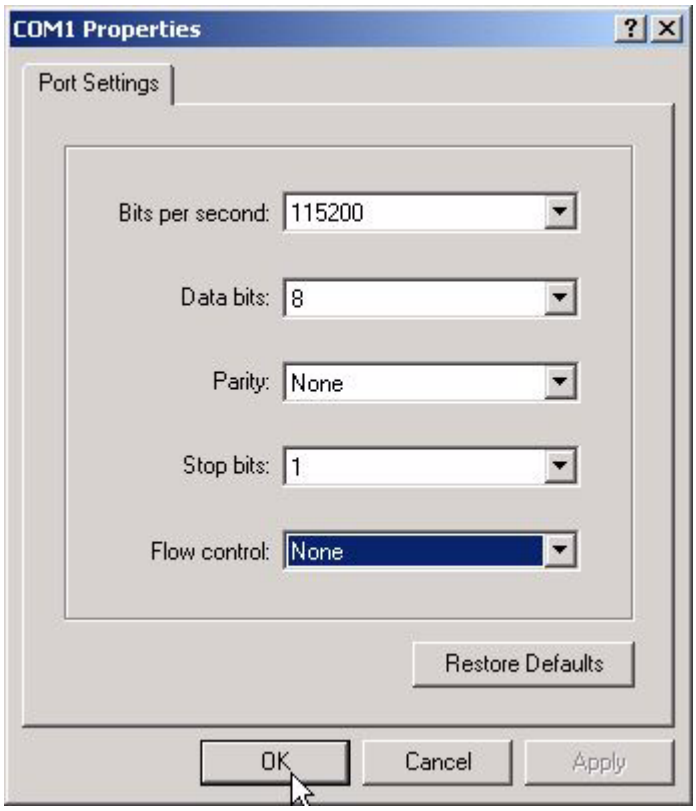


6 Select the COM port that the disk array system is connected to in the *Connect using* list, then click **OK**.

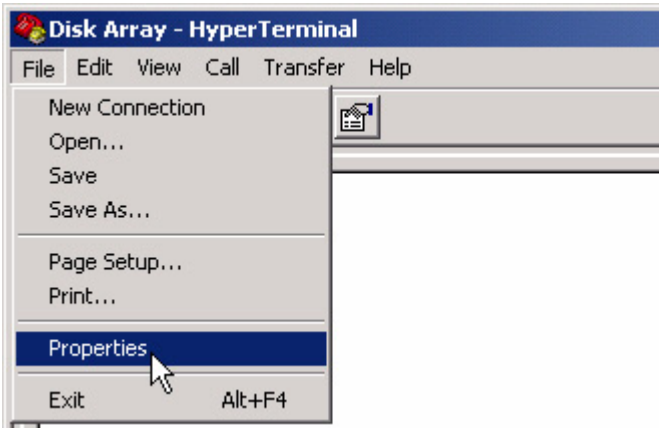
Note

Refer to your computer's documentation for information on the COM port assigned to your computer's serial port. If you are unsure of the COM port, try COM1 and follow the rest of this procedure. If the connection is not made successfully, return to this step and try a different COM port.

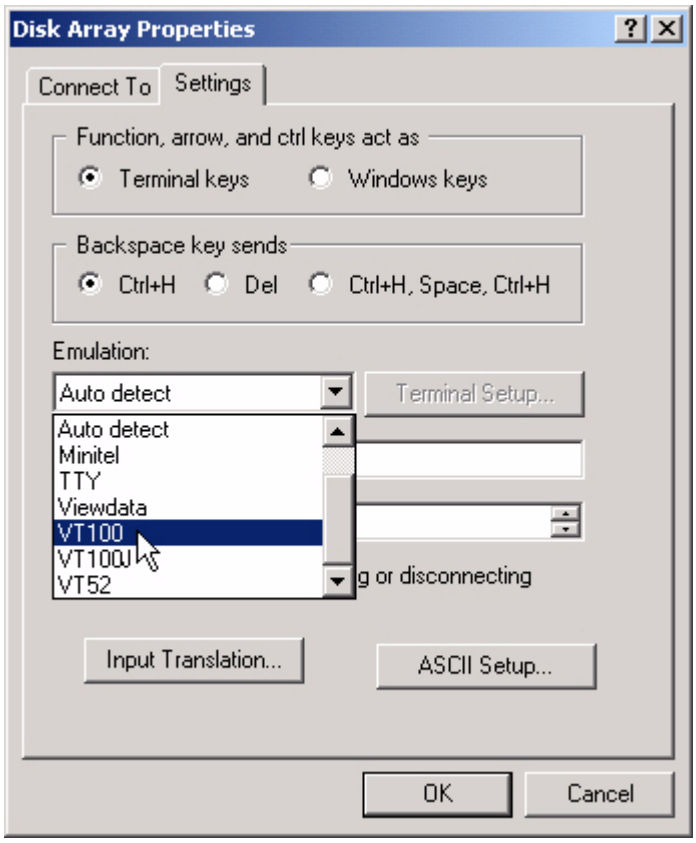
7 Select **115200** in the *Bits per second* list, **8** in the *Data bits* list, **None** in the *Parity* list, **1** in the *Stop bits* list, and **None** in the *Flow control* list. Then click **OK**.



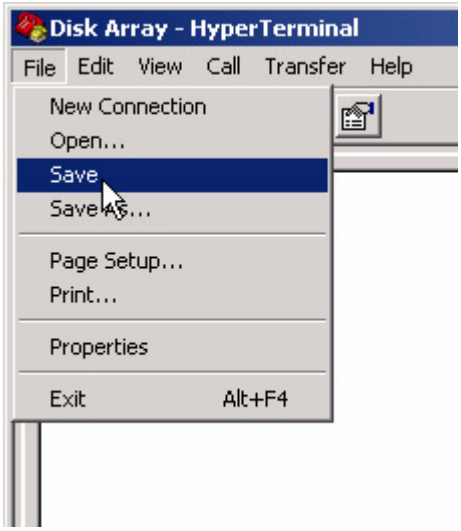
8 Click **File** and select **Properties** to open the Disk Array Properties dialog box.



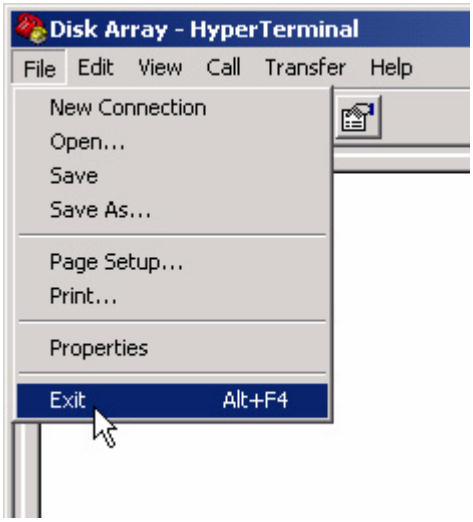
9 Click the **Settings** tab, select **VT100** from the *Emulation* drop-down list, then click **OK**.



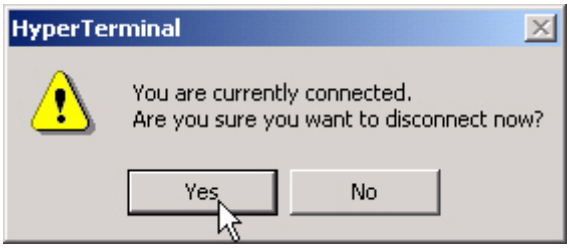
10 Click **File** and select **Save**.



11 Click **File**, **Exit**.



12 Click **Yes** in the HyperTerminal disconnection dialog box to close the connection and exit the HyperTerminal program.



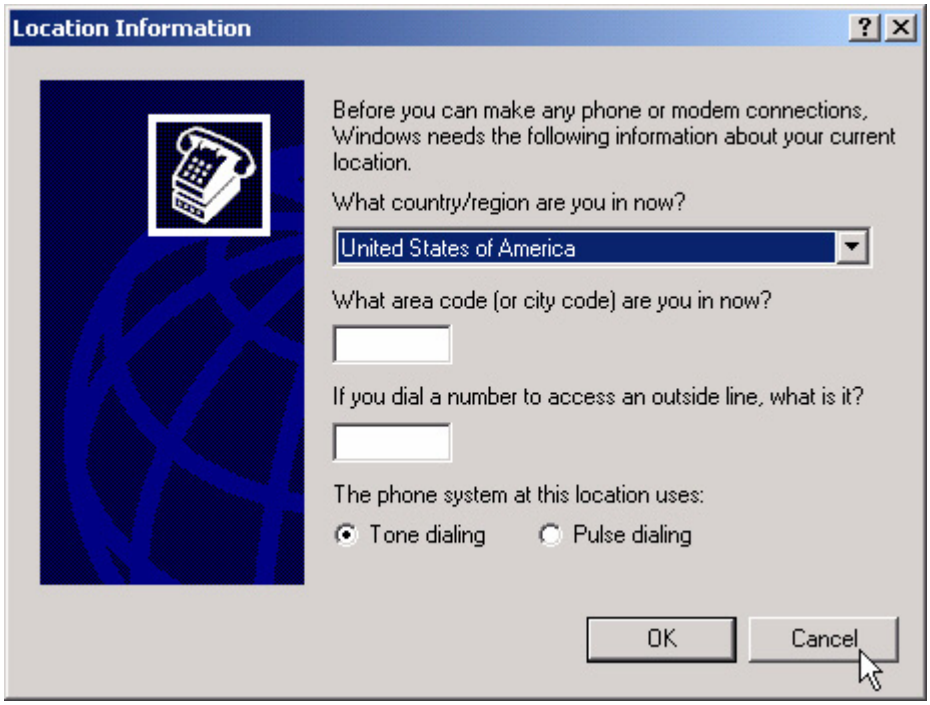
Note

It is not necessary to configure HyperTerminal again once the configuration has been saved. The saved configuration is available in Start, Programs, Accessories, Communications, HyperTerminal.

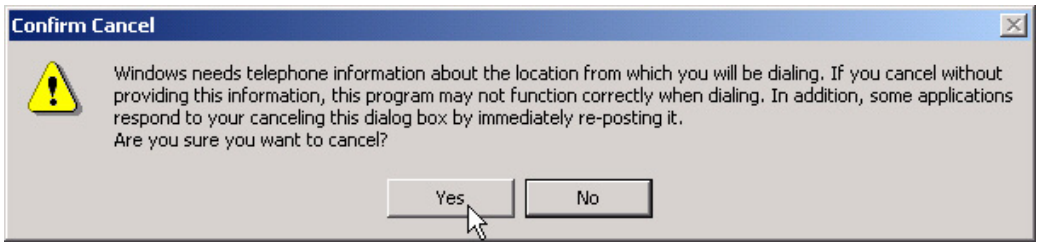
Starting the Disk Array Setup Utility

Follow these instructions to begin using the disk array setup utility through a HyperTerminal VT100 session.

1. Set up a VT100 terminal emulation session as described in "Setting up HyperTerminal in Windows 2000" on page 28.
2. Click **Start**, **Programs**, **Accessories**, **Communications**, **HyperTerminal**, and click **Disk Array** (or the name you assigned to the configuration) to start a VT100 session.
3. Click **Cancel** when the Local Information dialog box appears.

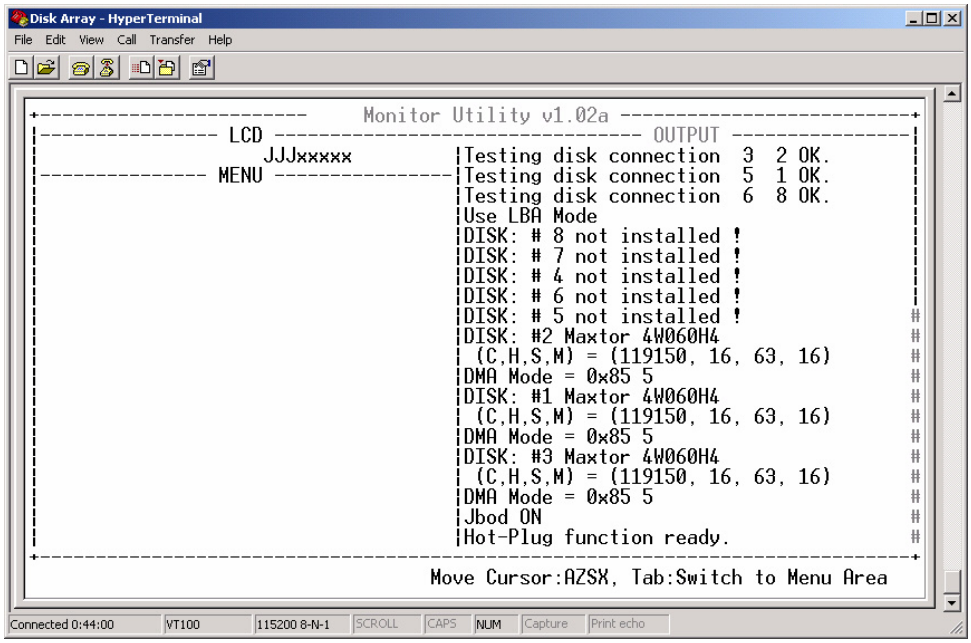


4. Click **Yes** when the Confirm Cancel dialog box appears.



5. Click **OK** to exit the HyperTerminal information dialog box.

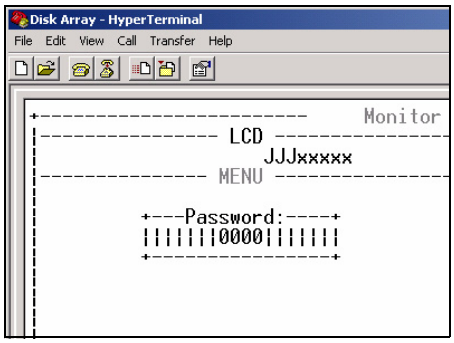
6 Press <CTRL>+<D> to display the disk array setup utility main screen.



7 Press <Tab> to switch to the menu area. The MENU heading on the left of the disk array setup utility main screen is highlighted.

8 Press <Enter>. The Password prompt appears.

9 Type the password and press <Enter>. The main menu appears.



Note

The default password is 0000 (four zeros). Refer to “Setting the Password” on page 43 for information on changing the password.

Using the Basic VT100 Menus

The disk array setup utility is built-in to the disk array system. Follow these instructions to begin using the basic menus of the disk array setup utility, or refer to the remainder of this chapter for detailed instructions.

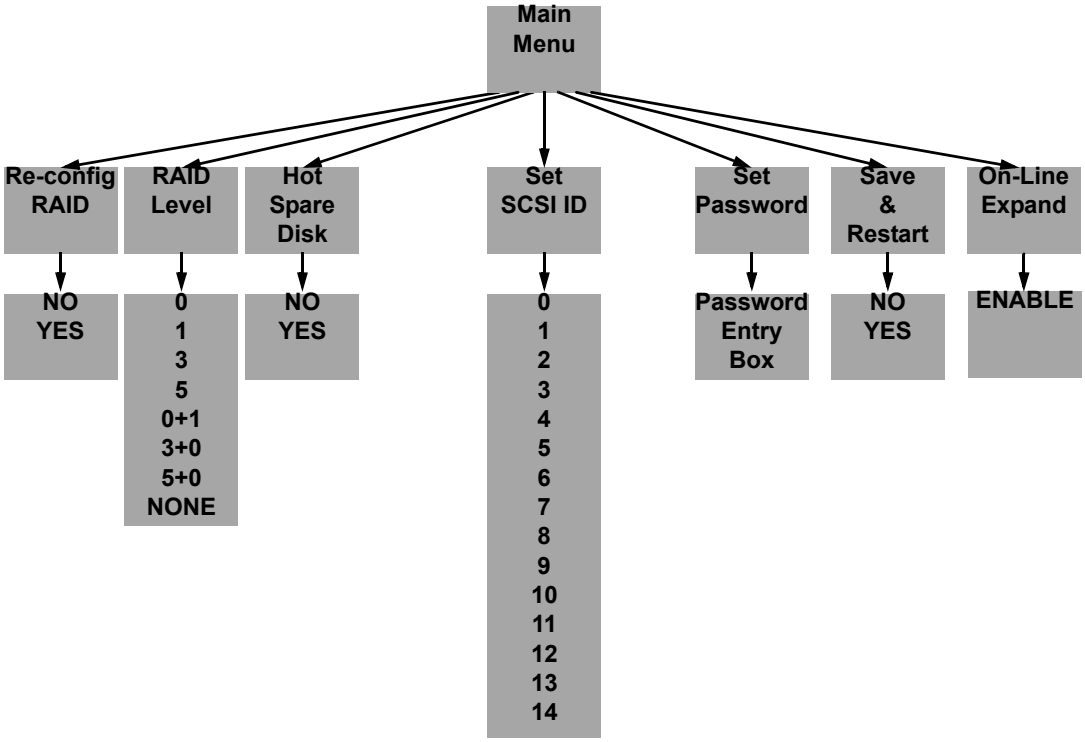
1. Start your VT100 terminal interface.
2. Press <CTRL>+<D> to display the disk array setup utility. The disk array setup utility starts with the output area active.
3. Press <Tab> to highlight the menu area.
4. Press <Enter>, type a password (default 0000, four zeros), then press <Enter>. The main menu is displayed.
5. Press the up or down arrow keys to highlight a menu item, then press <Enter> to select it.
6. Press the <Escape> key to exit a menu item.

Notes

- To set a RAID level, set Re-config RAID to yes, set the RAID level, then save and restart.
- To change RAID levels, set the RAID level to NONE (JBOD), then set the new level. Note that all data will be lost when RAID levels are changed.
- Spare disks are automatically used as hot spares.

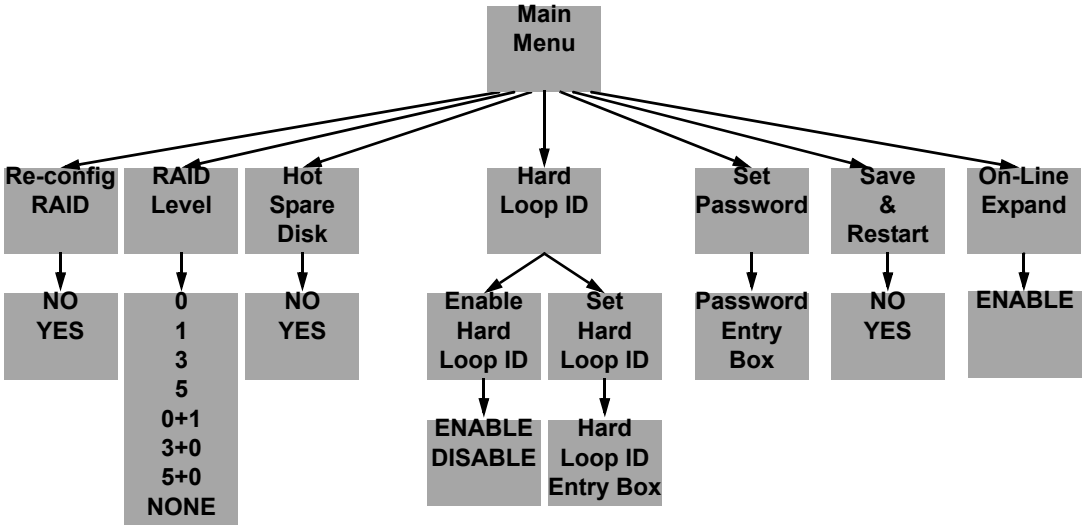
PA-4800 Menus

Refer to this diagram for the PA-4800 basic configuration menus.



PA-4811 Menus

Refer to this diagram for the PA-4811 basic configuration menus.



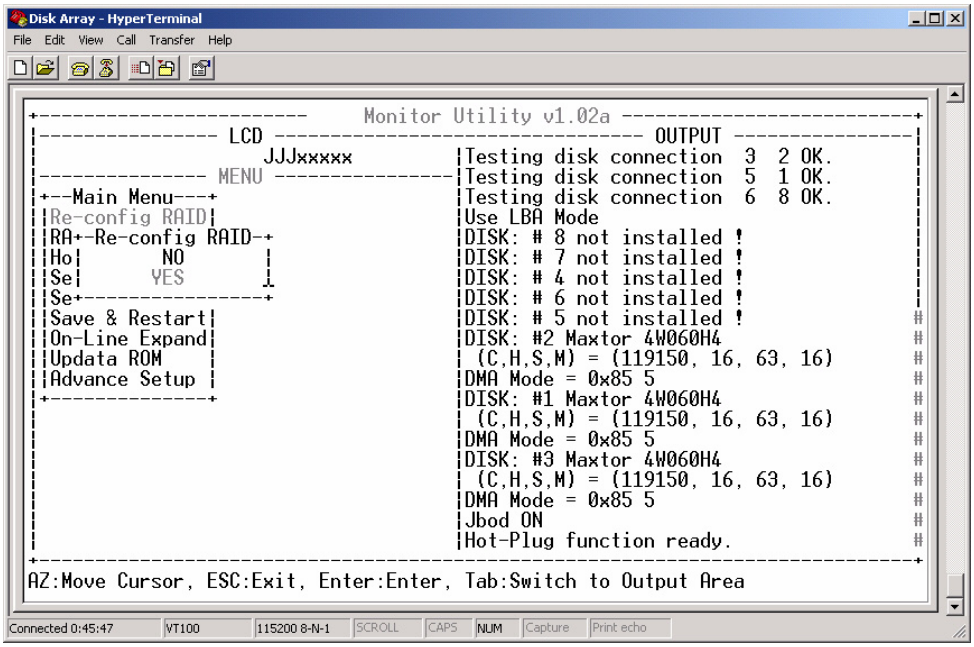
Creating a Single Disk Group

The disk array system is easily configured as a single RAID group that uses all installed disks. This section describes how to assign a RAID level to a single disk group, how to expand the disk group, and how to set the disk group SCSI ID. The section assumes use of a VT100 terminal to control the built-in disk array setup utility.

Setting the RAID Level

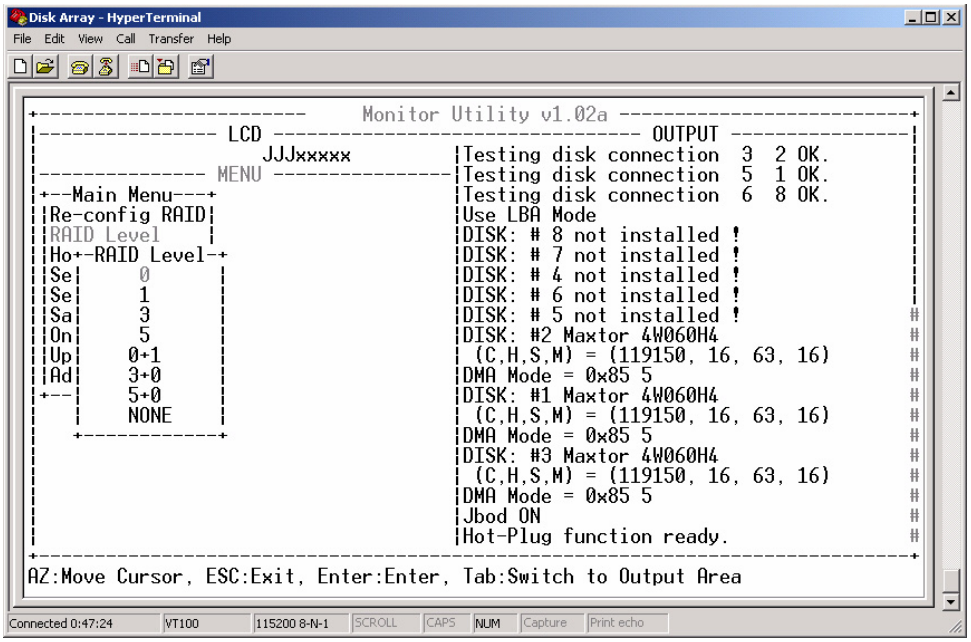
Follow these instructions to create a single disk group that uses all available disks.

1. Start the disk array setup utility as described on page 34.
2. Use the cursor keys to select *Re-config RAID* in the main menu, then select *YES*.

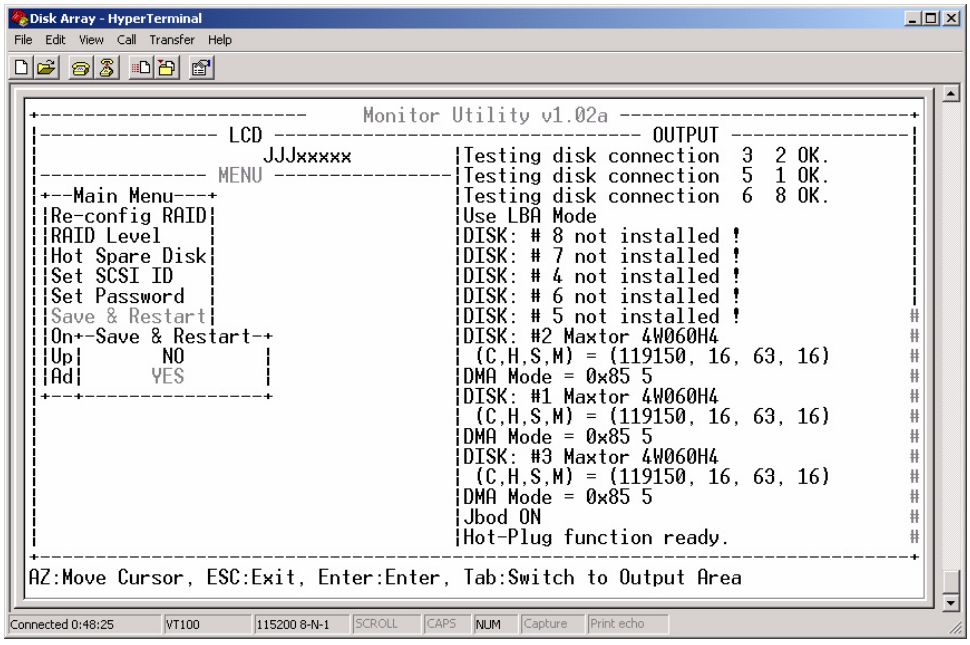


3 Select *RAID Level*. The RAID Level menu appears.

4 Select the RAID level required: *0, 1, 3, 5, 0+1, 3+0, 5+0, or NONE* (JBOD).



5 Select *Save & Restart*, then select *YES*. The disk array restarts and builds the disk group.



The disk group is now ready to use with the default host interface ID (0). To change the host interface ID, refer to "Setting the Host Interface ID" on page 41.

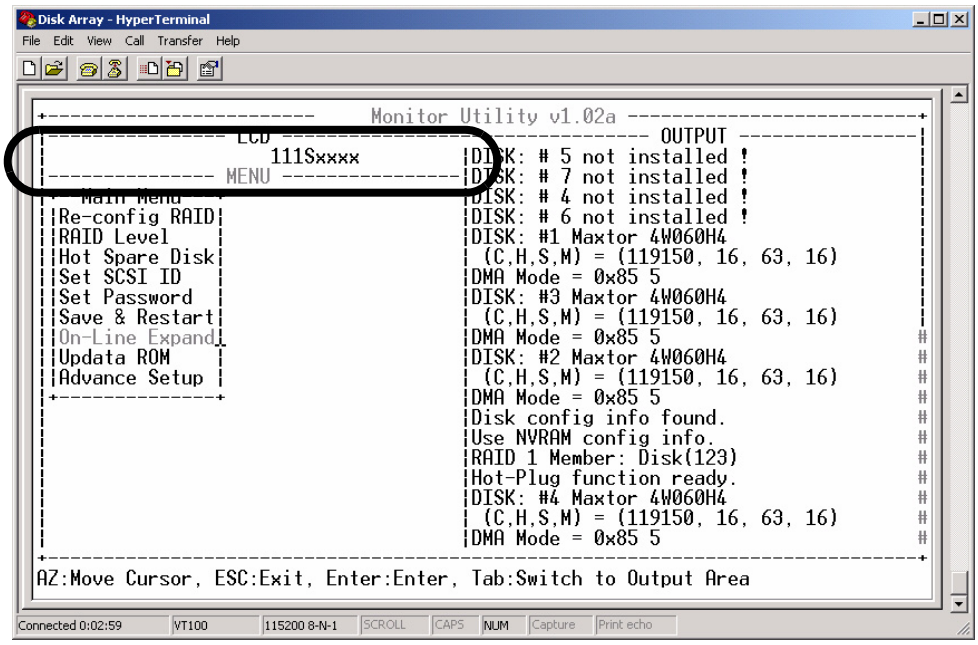
Note

Any new disks inserted after the disk group is built will automatically be used as spares for disk group expansion or as potential hot spares for RAID 3 or 5.

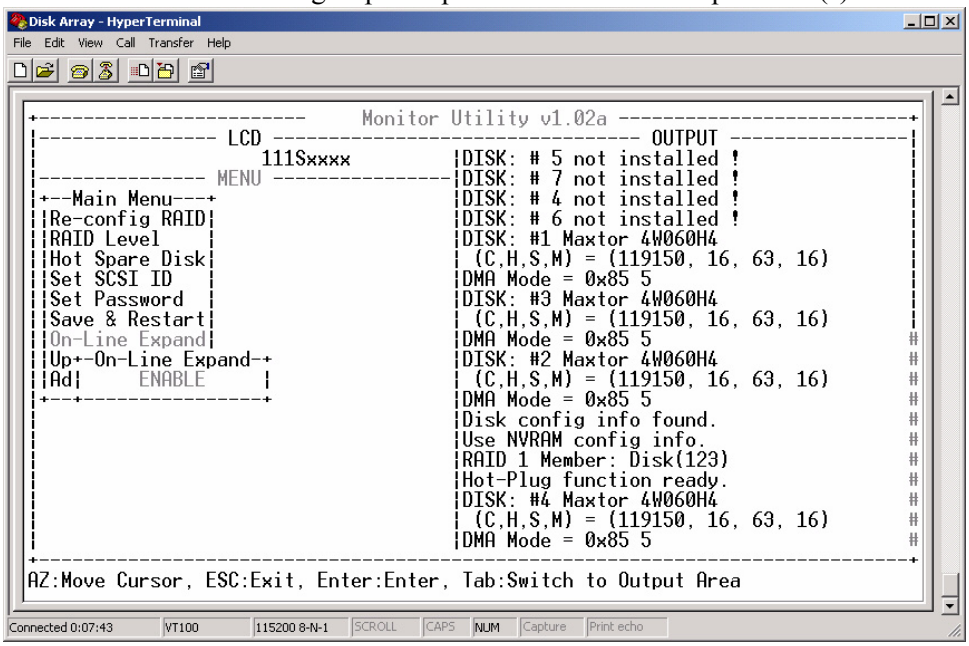
Expanding a Disk Group

Expanding a disk group increases the storage capacity of the group. An existing disk group can be expanded by adding disks to it as described in the following steps.

1. Start the disk array setup utility as described on page 34.
2. Install the new disk(s) as described in “Installing Disks” on page 18. The new disk(s) appears on the LCD panel and the disk array setup utility screen with the “S” symbol to label it as a spare disk.



3. Select *On-Line Expand* in the disk array setup utility main menu.
4. Select *ENABLE*. The disk group is expanded to include the spare disk(s).



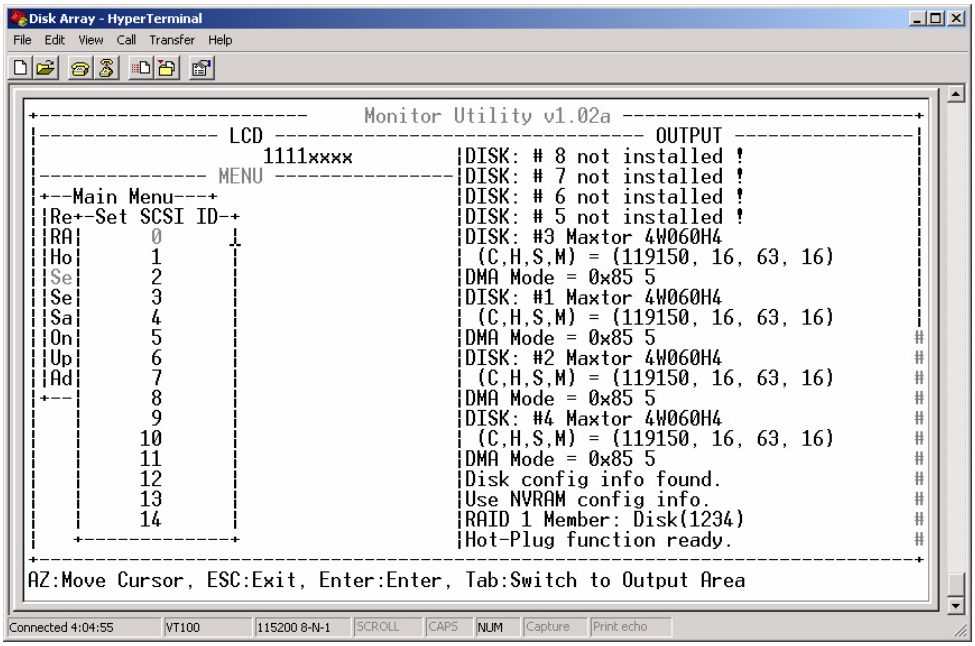
Setting the Host Interface ID

The disk array system has either dual SCSI host interfaces or dual fibre channel host interfaces.

Small Computer Systems Interface ID

The PA-4800 default SCSI ID is 0 (zero). Change the default SCSI ID if there are other devices on the SCSI bus with a SCSI ID of 0.

1. Start the disk array setup utility as described on page 34.
2. Select *Set SCSI ID* in the disk array setup utility main menu. The Set SCSI ID menu appears.



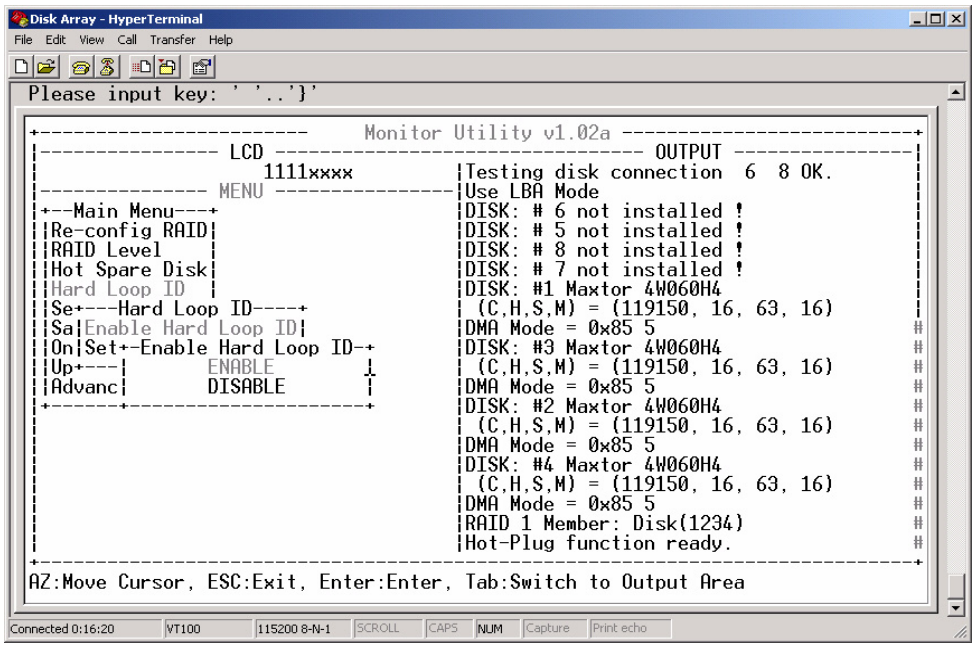
3. Select *0, 1, 2, 3… or 14* to set the SCSI ID number.
4. Select *Save & Restart* from the main menu, then select *YES*. The disk array system restarts with the disk group on the primary SCSI channel set to the new SCSI ID.

Fibre Channel Interface Hard Loop ID

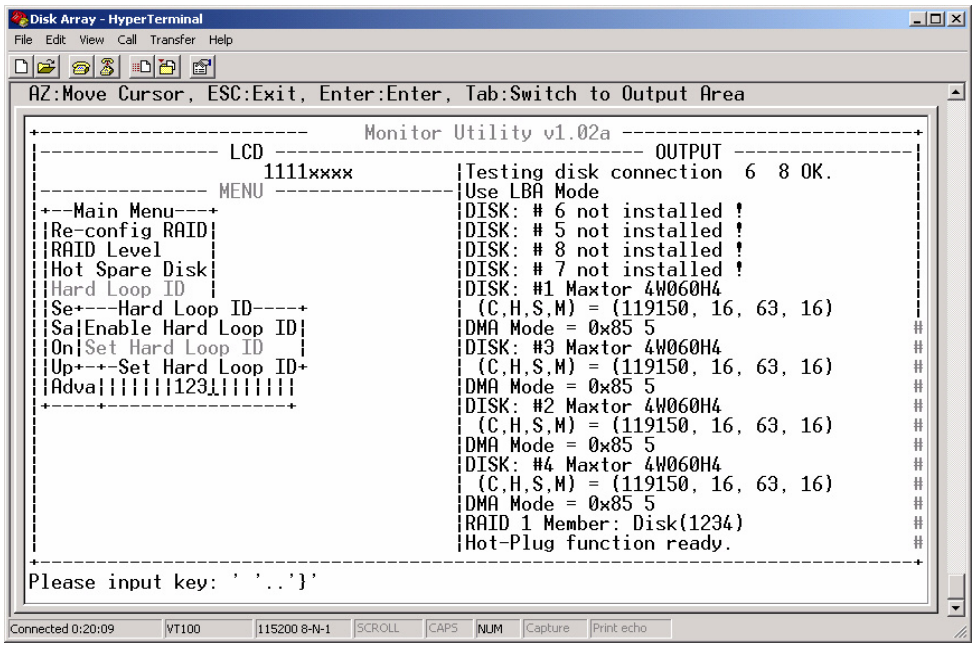
The PA-4811 default hard loop ID is 0 (zero). Change the default hard loop ID if there are other devices with a hard loop ID of 0.

1. Start the disk array setup utility as described on page 34.
2. Select *Hard Loop ID* in the disk array setup utility main menu. The Hard Loop ID menu appears.

3 Select Enable *Hard Loop ID*, then select *ENABLE*.



4 Select *Set Hard Loop ID*, then type a hard loop ID number of 0 to 125.

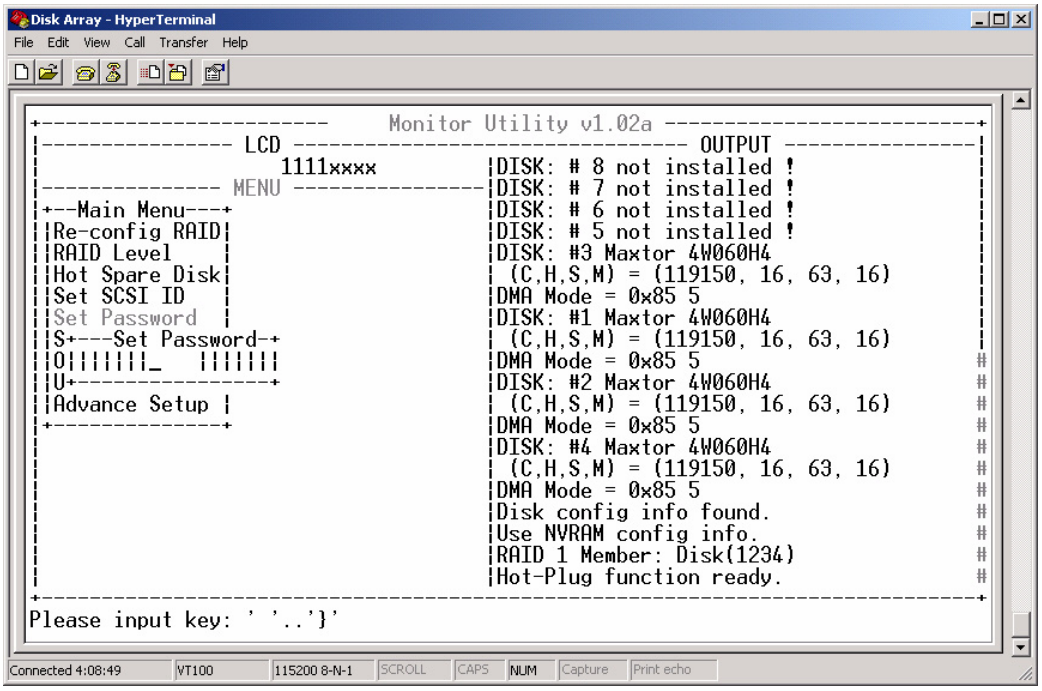


5 Select *Save & Restart* from the main menu, then select *YES*. The disk array restarts with the disk group on the primary fibre channel host interface set to the new hard loop ID.

Setting the Password

For security purposes, it is important to change the disk array system setup utility password on a regular basis. The default password is 0000 (four zeros).

1. Start the disk array setup utility as described on page 34.
2. Select *Set Password* from the main menu. The Set Password menu appears.



3. Enter a secure password, then press <Enter> to set the new password.

Notes

- Press the <ESC> key to exit the password menu without changing the password.
- Record the new password in a secure place for future reference.
- Passwords must consist of four characters. The most secure passwords consist of a mix of letters, numbers, and characters.

4. Select *Save & Restart*, then select *YES*. The disk array restarts. The new password is now required to gain access to the disk array setup utility.

4 Advanced Configuration

This chapter includes instructions for the following operations:

- creating multiple disk groups (page 48)
- creating slices and mapping LUNs (page 51)
- changing slice capacity (page 55)
- expanding multiple disk groups (page 58)

The instructions given in the following sections assume use of a VT100 type terminal to access the built-in disk array setup utility.

Using Advanced VT100 Menus

The disk array setup utility is built-in to the disk array system. Follow these instructions to begin using the advanced menus of the disk array setup utility, or refer to the remainder of this chapter for detailed instructions.

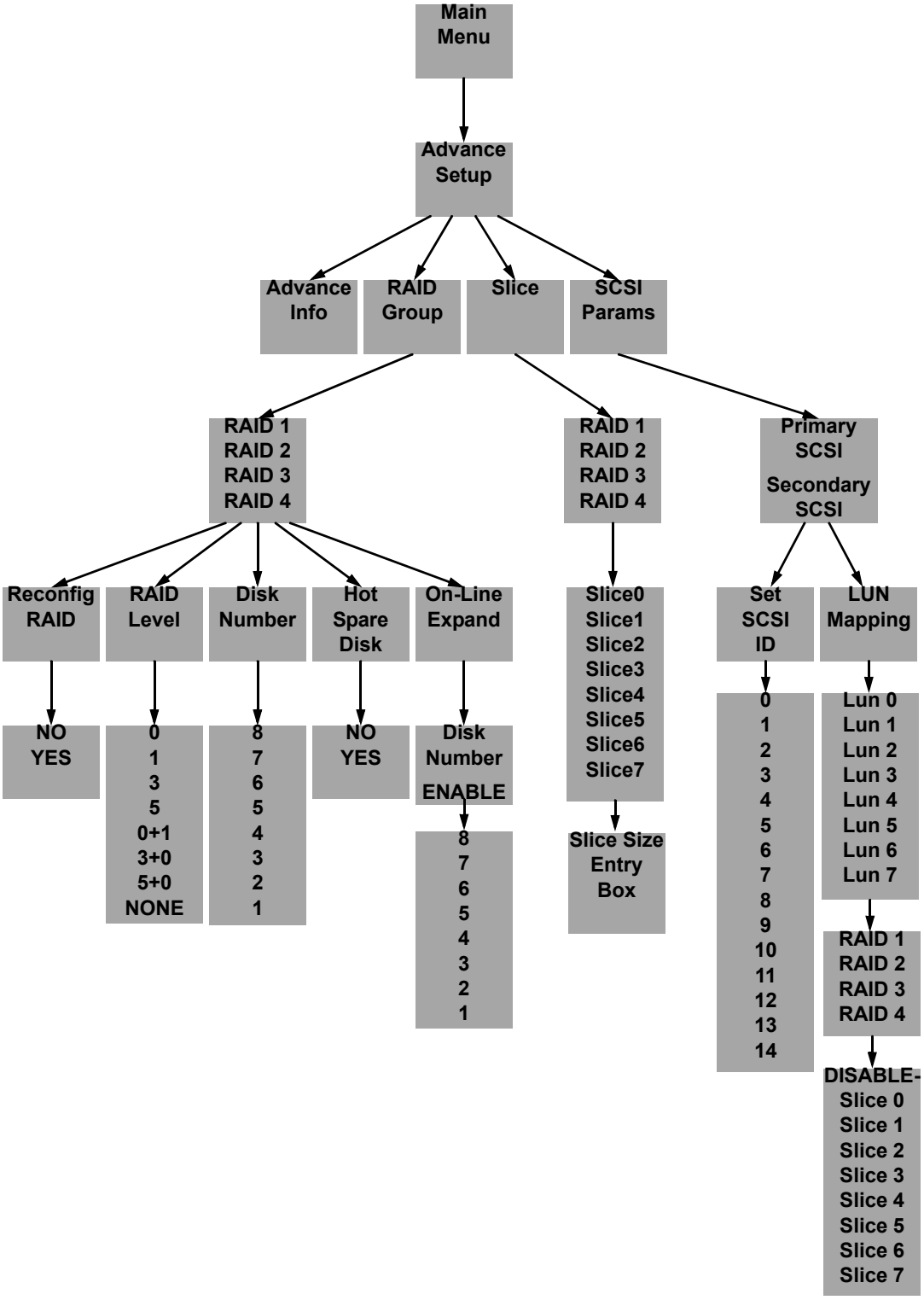
1. Start your VT100 terminal interface.
2. Press <CTRL>+<D> to display the disk array setup utility.
   The disk array setup utility starts with the output area active.
3. Press <Tab> to highlight the menu area.
4. Press <Enter>, type the password (default 0000, four zeros), then press <Enter> again.
   The main menu is displayed.
5. Press the up and down arrow keys to highlight a menu item, then press <Enter> to select it.
6. Press the <Escape> key to exit a menu item.

Notes

- To set a RAID level, set Re-config RAID to YES, set the RAID Level, set the Disk Number, and then save and restart.
- To change the RAID level, set the RAID Level to NONE (JBOD), then set the new level.
- Spare disks are automatically used as hot spares.

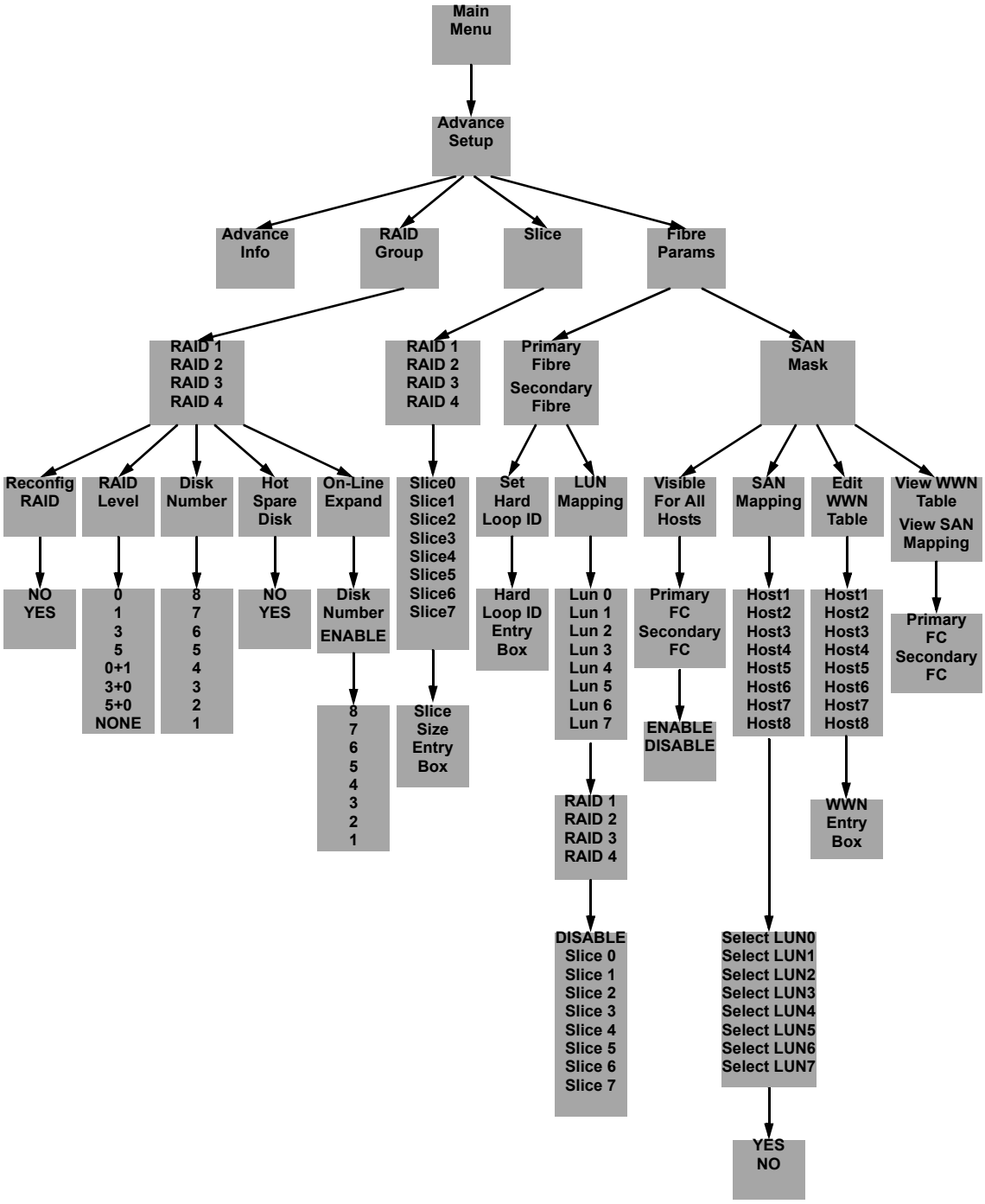
PA-4800 Menus

Refer to this diagram for the PA-4800 advanced configuration menus.



PA-4811 Menus

Refer to this diagram for the PA-4811 advanced configuration menus.



Creating Multiple Disk Groups

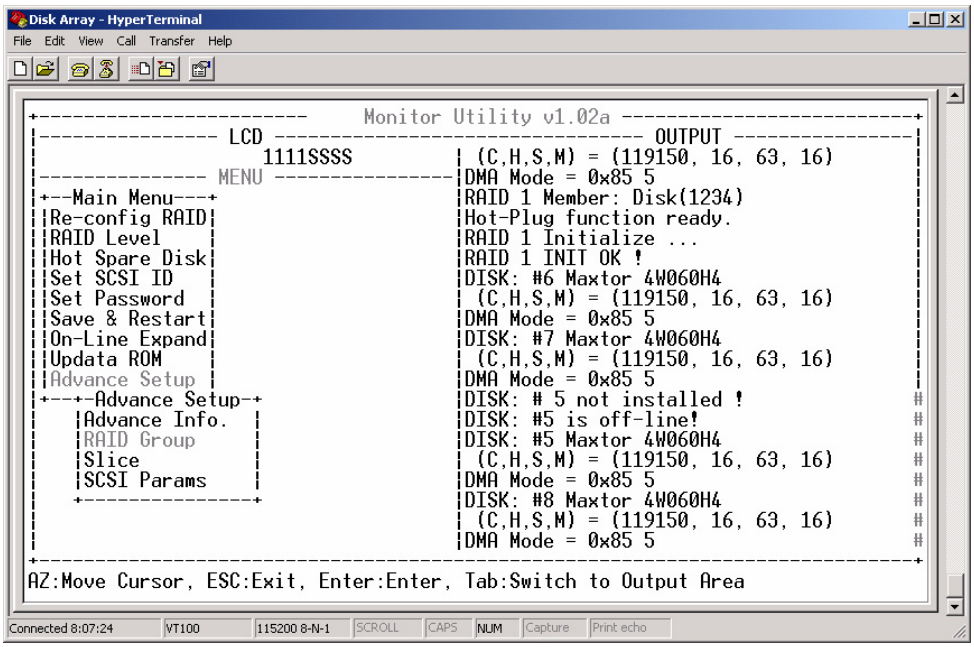
The disk array system can be configured with up to four independent disk groups. Different RAID levels can be assigned to each disk group, which contain specified numbers of disks. In addition, an existing disk group can be reconfigured with a new RAID level and number of disks.

This section describes how to create a new disk group, assign a RAID level to the group, and how to set the number of disks belonging to the group.

Caution

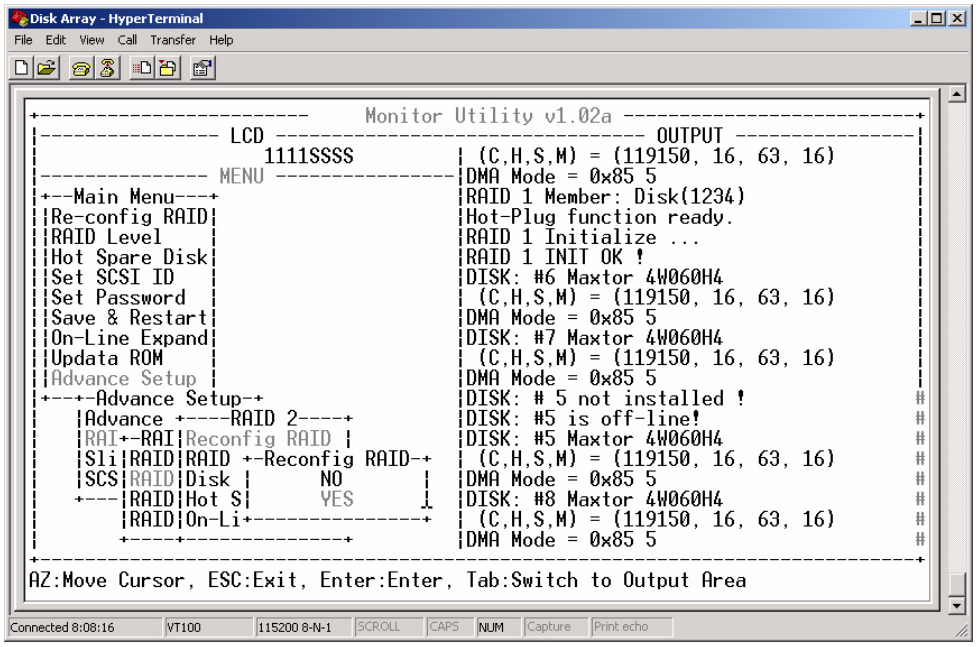
Backup your data before attempting to change the RAID setup from a single RAID group to multiple RAID groups.

1. Start the disk array setup utility as described in "Starting the Disk Array Setup Utility" on page 34.
2. Select *Advance Setup*.
3. Select *RAID Group*.



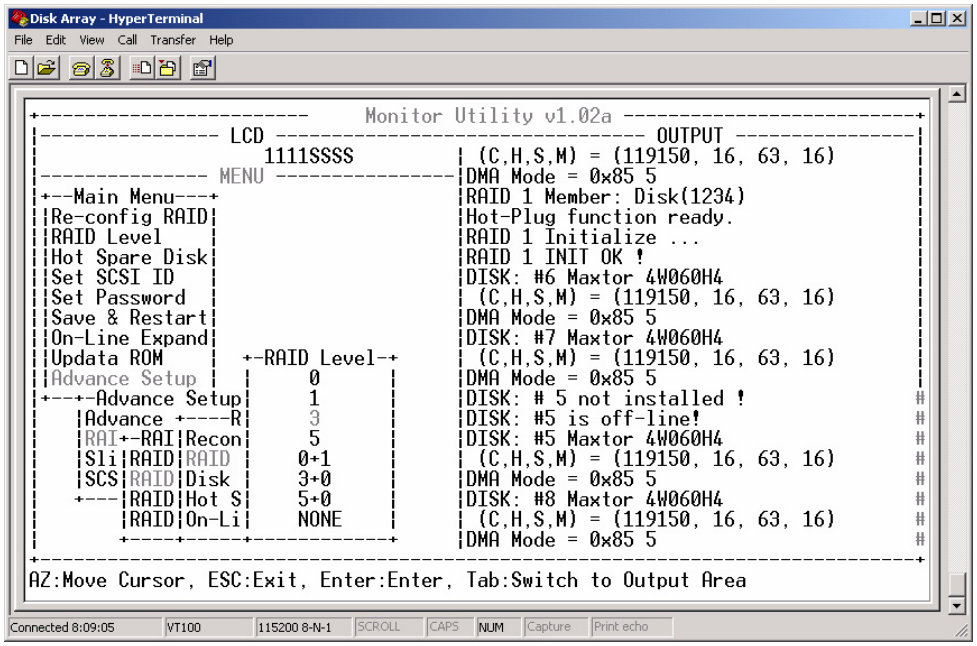
4. Select *RAID 1, 2, 3, or 4* from the RAID Group menu.

5 Select *Reconfig RAID*, then select *YES*.

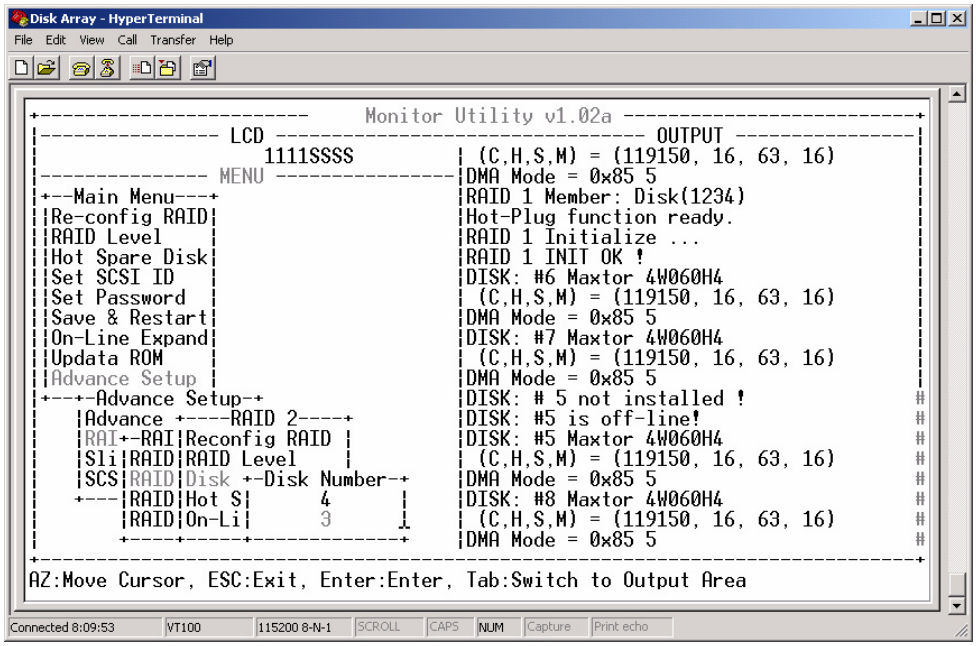


6 Select *RAID Level*. The RAID Level menu appears.

7 Select *0, 1, 3, 5, 0+1, 3+0, 5+0, or NONE* (JBOD).



8 Select *Disk Number*, then select the number of disks for the new disk group.



9 Select *Hot Spare*, then select *Yes* to set one disk as a hot spare.

Note

At least one disk must be marked as spare for the hot spare setting to be useful.

10 Press <Escape> until the main menu appears.

11 Select *Save & Restart*, then select *YES*. The disk array restarts and builds the disk group

Caution

- Saving configuration changes causes the disk controller's working parameters to change, which may result in unpredictable data transfer if the change occurs during input/output operations. All activity between the disk array and the host(s) should be stopped before saving configuration changes.
- All data will be lost when the RAID level is changed.

12 Repeat steps 1 to 11 for each disk group to be added.

Slice and LUN Mapping

Each disk group can be divided into eight independent slices. Each slice can be assigned to a Logical Unit Number (LUN) on a primary or secondary host interface ID.

Example 1: Single Host, Single RAID.

- LUN 0 maps to RAID 1, Slice 0.
- LUN 1 maps to RAID 1, Slice 1.

Example 2: Single Host, Multiple RAID.

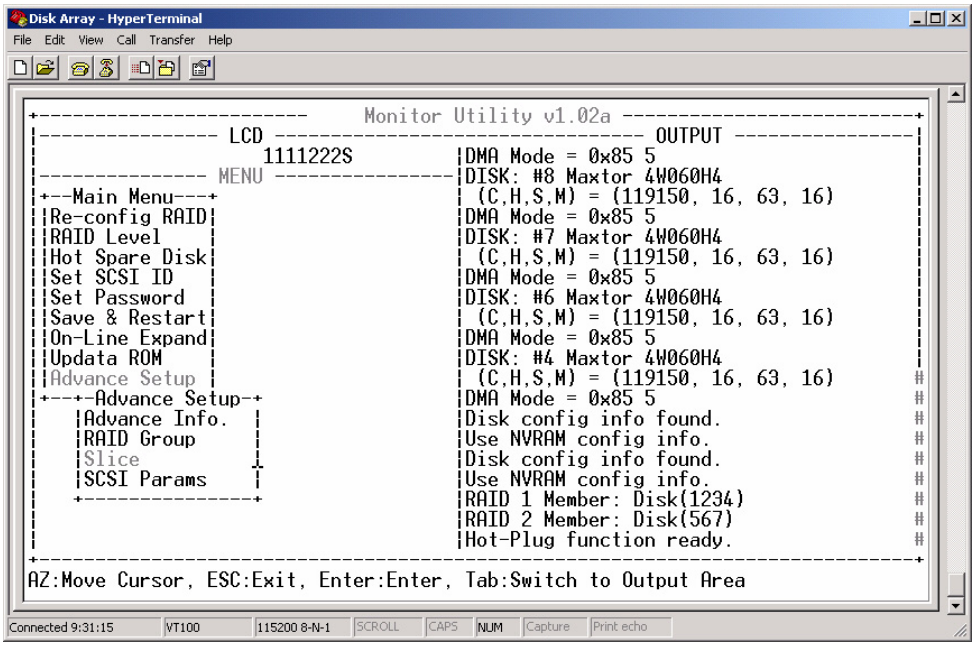
- LUN 0 maps to RAID 1, Slice 0.
- LUN 1 maps to RAID 2, Slice 1.

Example 3: Dual Hosts, Single RAID.

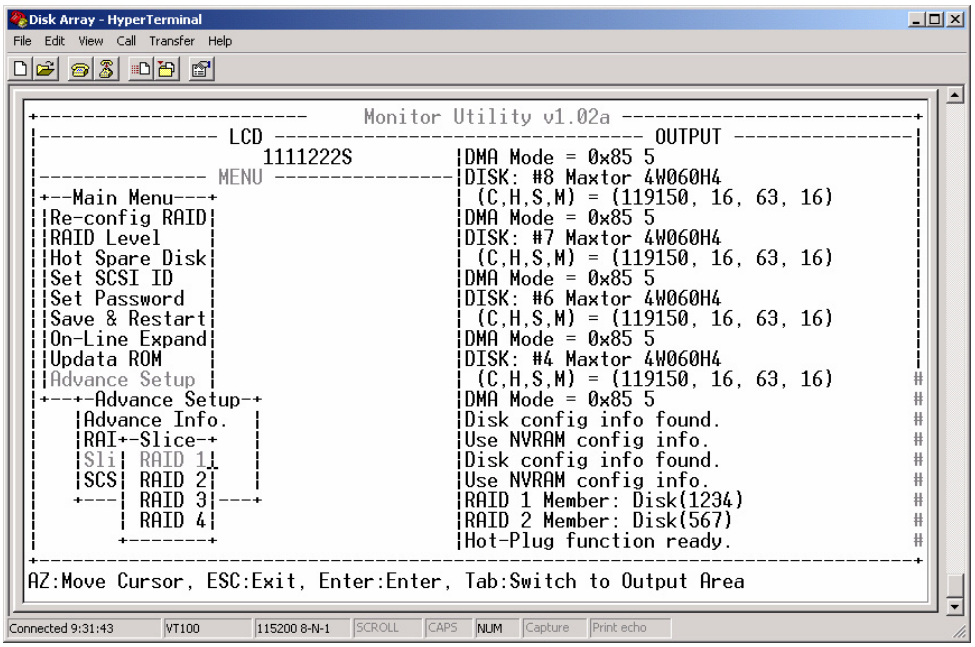
- LUN 1 on the primary host interface maps to RAID 1, Slice 0,
- LUN 0 on the secondary host interface maps to RAID 1, Slice 0

This section describes how to divide a disk group into slices, and how to assign each slice to a primary or secondary host interface ID, and LUN.

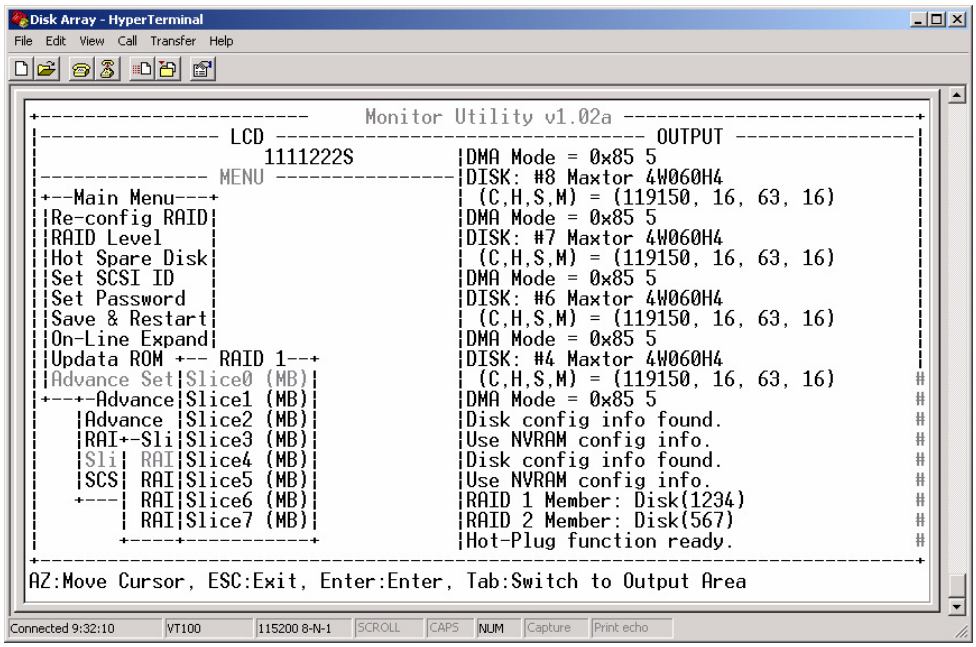
1. Start the disk array setup utility as described on page 34.
2. Select *Advance Setup*. The Advance Setup menu appears.



3 Select *Slice* then select the RAID group (*RAID 1, 2, 3, or 4*) to be partitioned.



4 Select *Slice 0, 1, 2, 3, 4, 5, 6, or 7*.



5 Enter the capacity of the slice in megabytes (MB), then press <Enter>. The system displays the capacities of the remaining slices automatically.

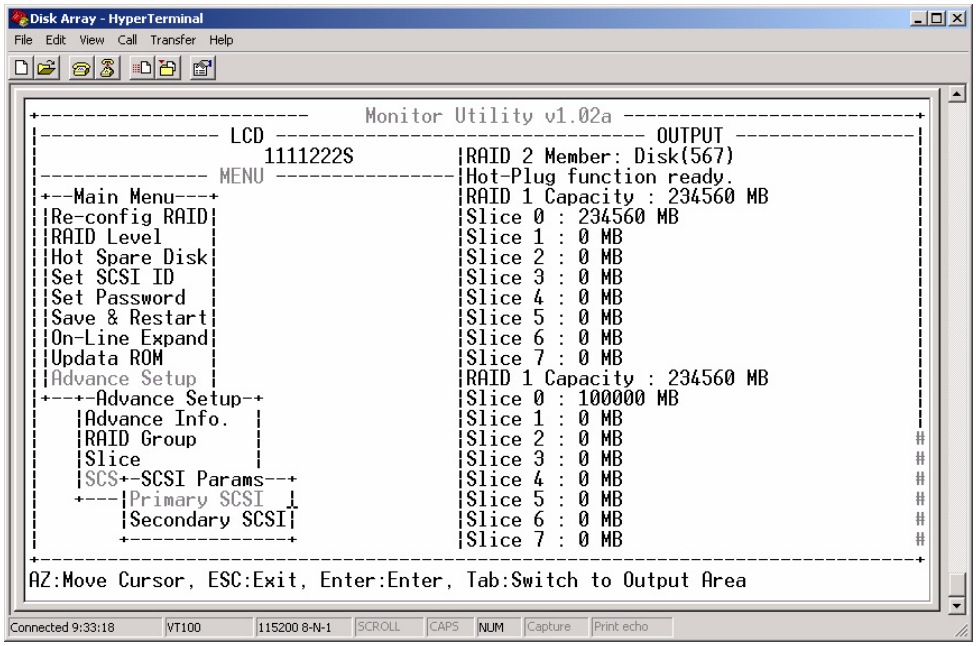
Note

The maximum capacity for each slice is 2 TB (terabytes).

6 Press <Escape> until the Advance Setup menu appears.

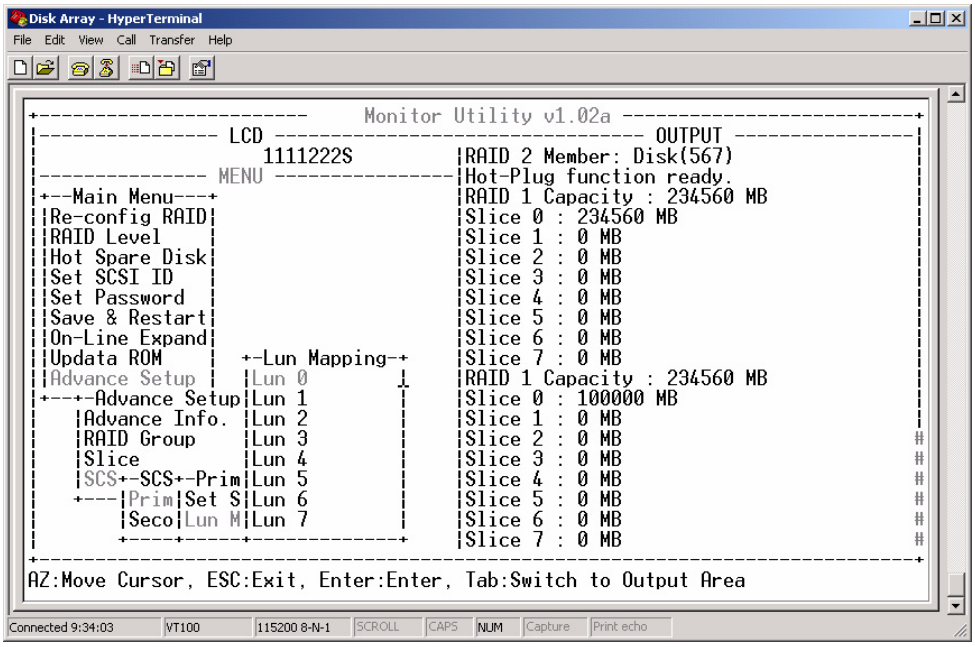
7 Select *SCSI Params* (PA-4800) or *FIBRE Params* (PA-4811). The SCSI Params (PA-4800) or FIBRE Params (PA-4811) menu appears.

8 Select *Primary SCSI* (PA-4800) or *Secondary SCSI* (PA-4800); or select *Primary FIBRE* (PA-4811) or *Secondary FIBRE* (PA-4811).

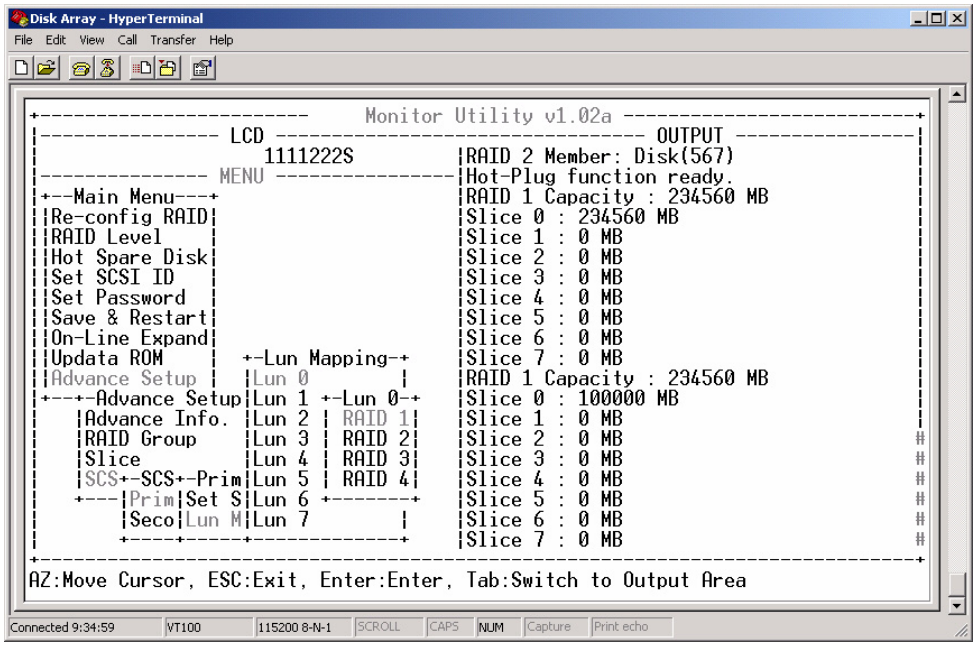


9 Select *Lun Mapping*. The Lun Mapping menu appears.

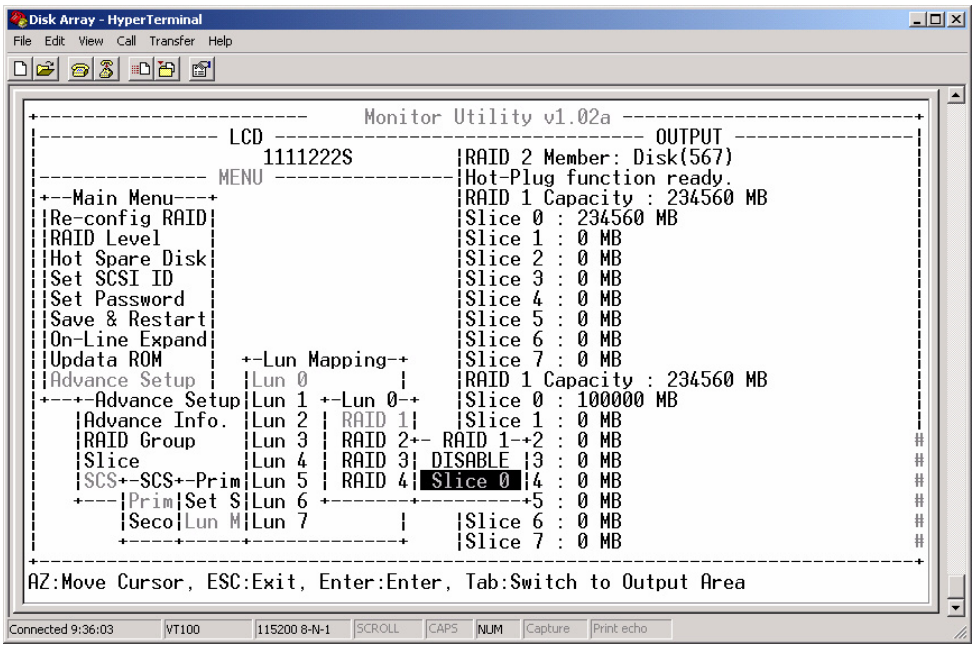
10 Select *Lun 0, 1, 2, 3, 4, 5, 6, or 7* to map the LUN to the RAID group's selected slice.



11 Select *RAID 1, 2, 3, or 4*.



12 Select a slice from the menu or select *DISABLE* to prevent the slice from being mapped to a LUN.



13 Press <Escape> until the main menu appears.

14 Repeat steps 1 to 13 for each LUN to be mapped to a slice.

15 Select *Save & Restart* from the main menu, then select *YES*. The disk array restarts and builds the disk group.

Changing Slice Capacity

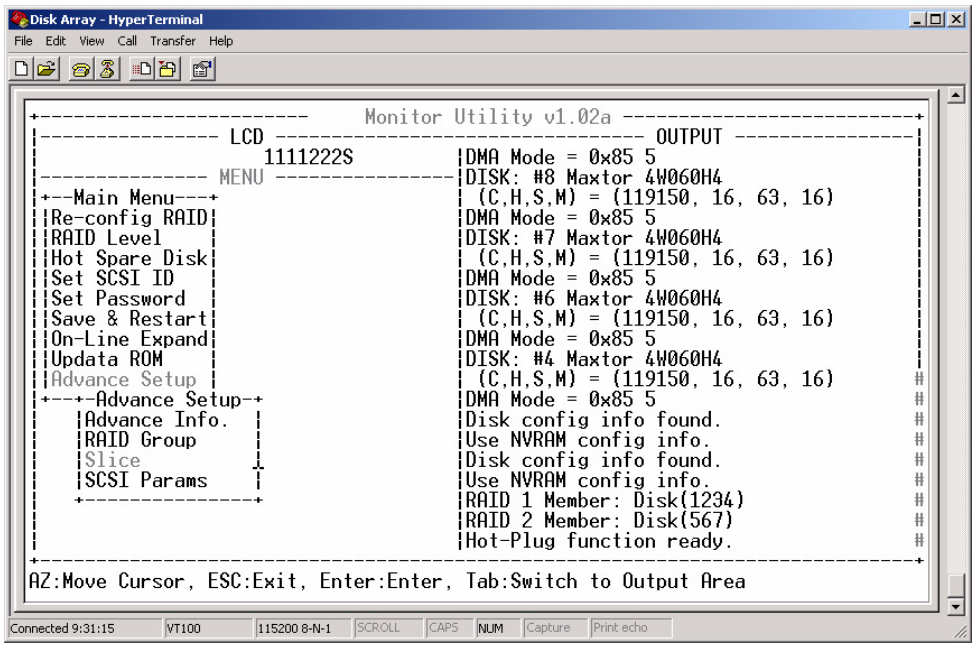
Before changing slice capacities, each slice must be reset to 0 MB. Once this has been completed, new slice capacities and LUN mappings can be set (see "Slice and LUN Mapping" on page 51).

Caution

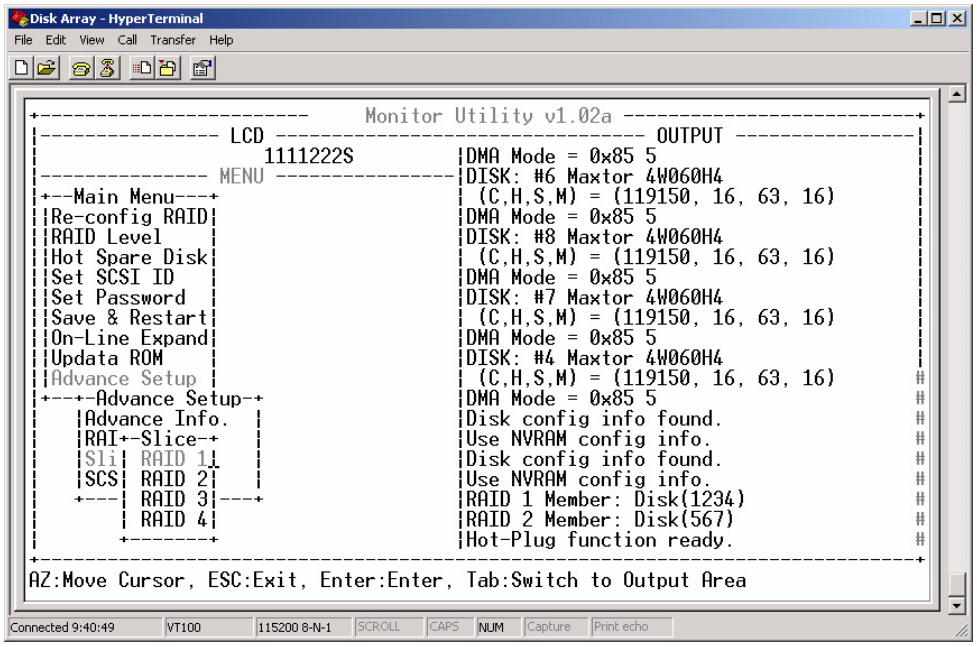
All data will be lost when slice capacities are set to 0 MB. Backup your data before attempting to change slice capacities.

Follow these instructions to change slice capacities.

1. Start the disk array setup utility as described on page 34.
2. Select *Advance Setup*. The Advance Setup menu appears.
3. Select *Slice* to partition the RAID capacity.

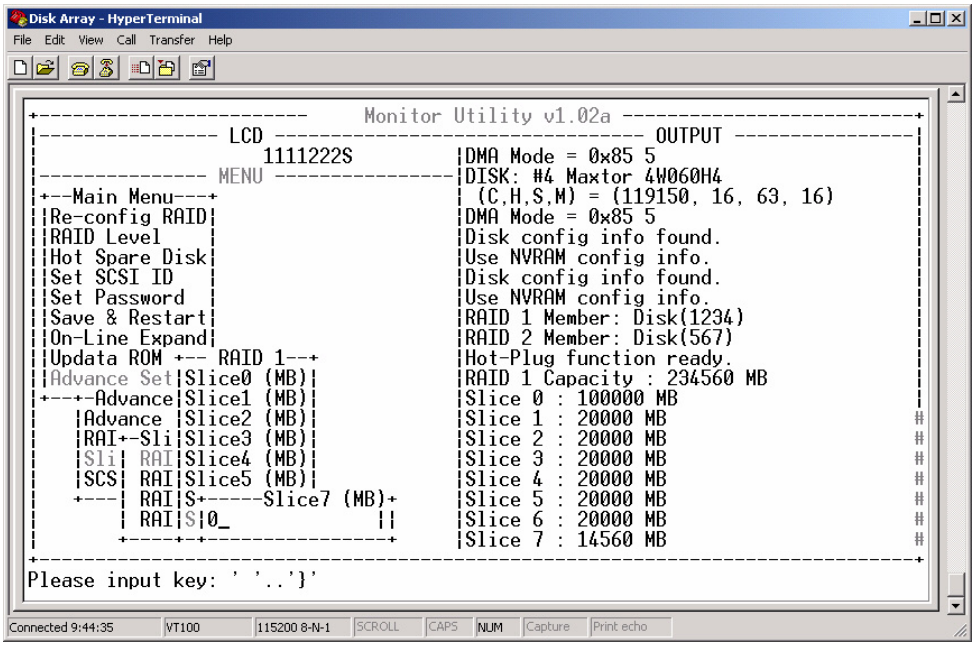


4 Select the RAID group (*RAID 1, 2, 3, or 4*) to be partitioned.

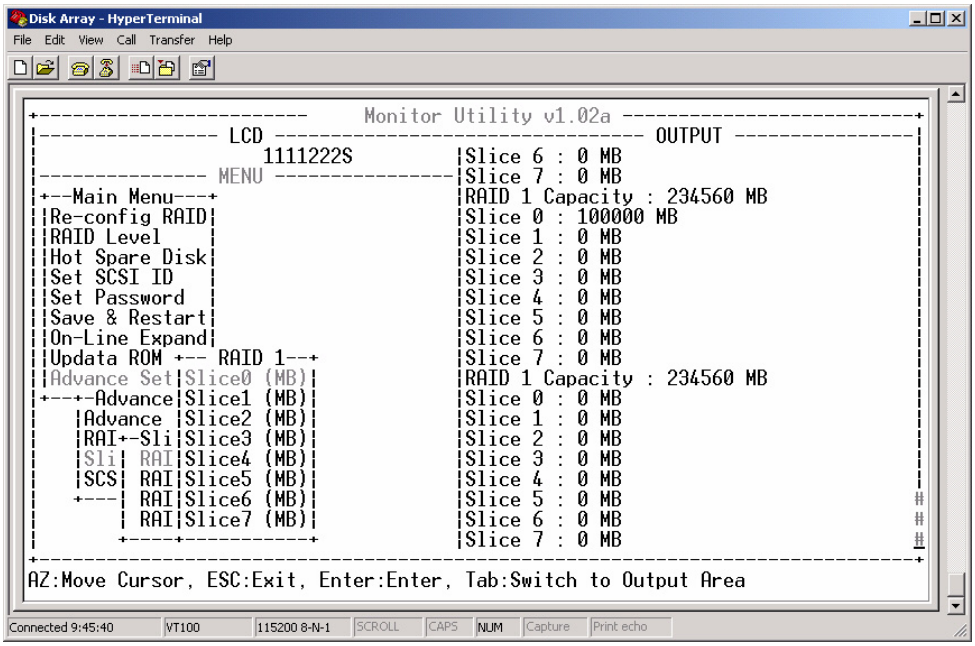


5 Press <Enter> to show slices for the selected RAID group.

6 Select *Slice 7* and press <Enter>. Type “0” and press <Enter> again to reset the capacity of slice 7 to 0 megabytes (MB).



7 Set the capacities of slices 6, 5, 4…0 to 0 MB as described in the previous step.



8 Press <Escape> until the main menu appears.

9 Refer to “Slice and LUN Mapping” on page 51 to enter new slice capacities and LUN mappings.

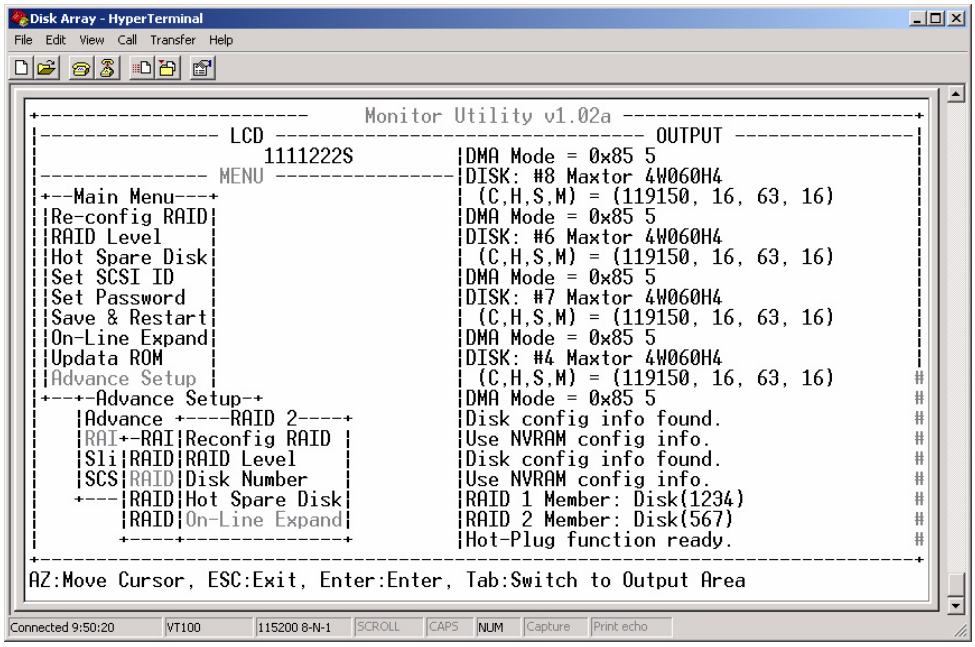
Expanding Multiple Disk Groups

Follow these instructions to expand a disk group by adding one or more disks when multiple disk groups have been created.

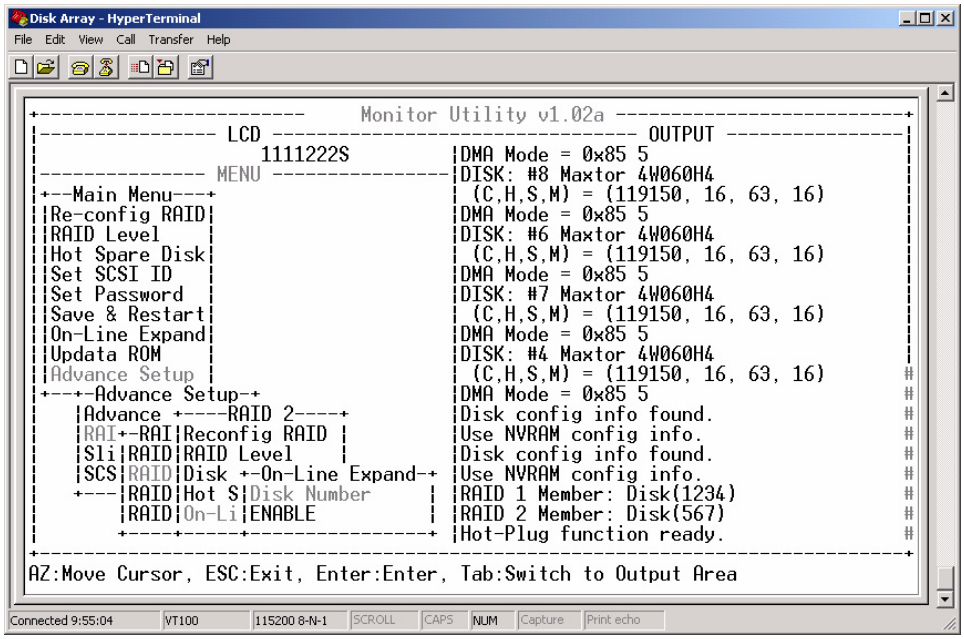
Note

Install new disks in the disk array system before starting on-line expansion.

1. Start the disk array setup utility as described in "Starting the Disk Array Setup Utility" on page 34.
2. Select *Advance Setup*, *RAID Group*, then the RAID group (*RAID Group 1, 2, 3, or 4*) that you want to add capacity to.
3. Select *On-Line Expand*.



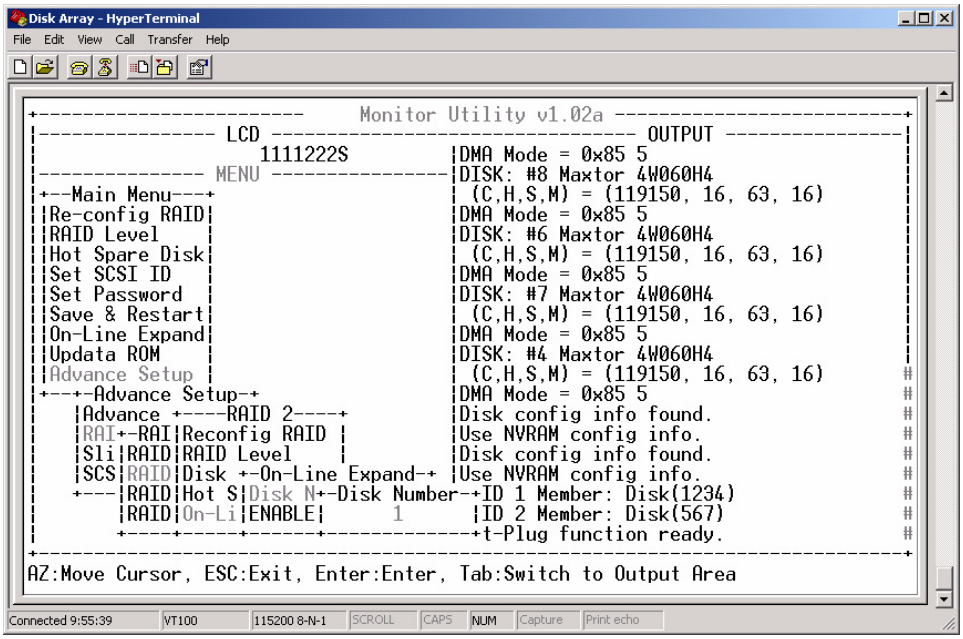
4 Select *Disk Number*.



5 Select the number of disks to add to the disk group.

Note

The disk setup utility shows only the number of disks available.



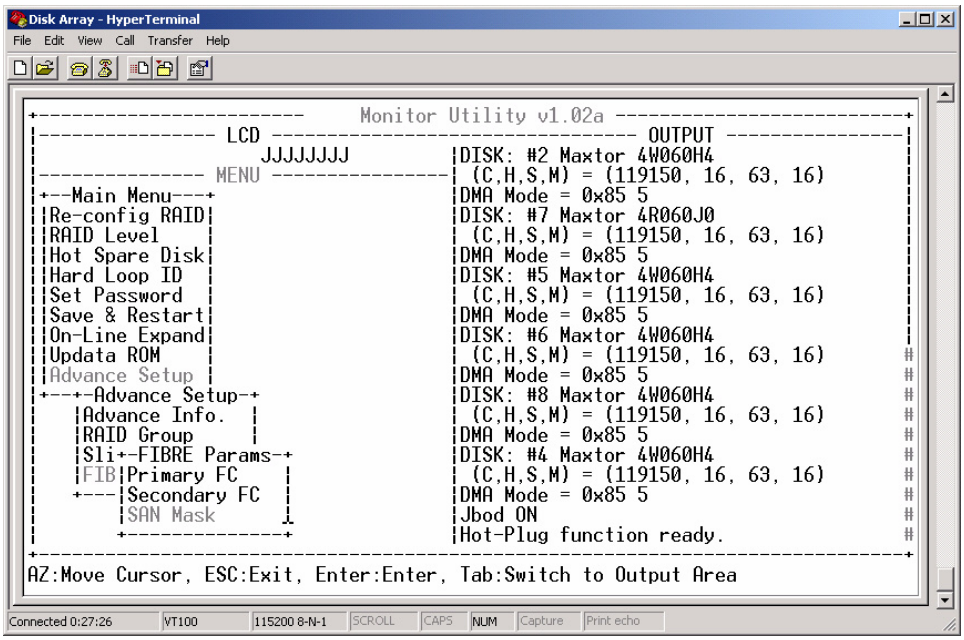
6 Select *ENABLE* from the On-Line Expand menu. The disk group is expanded to include the number of spare disks specified.

7 Repeat steps 1 to 6 for each disk group to be expanded.

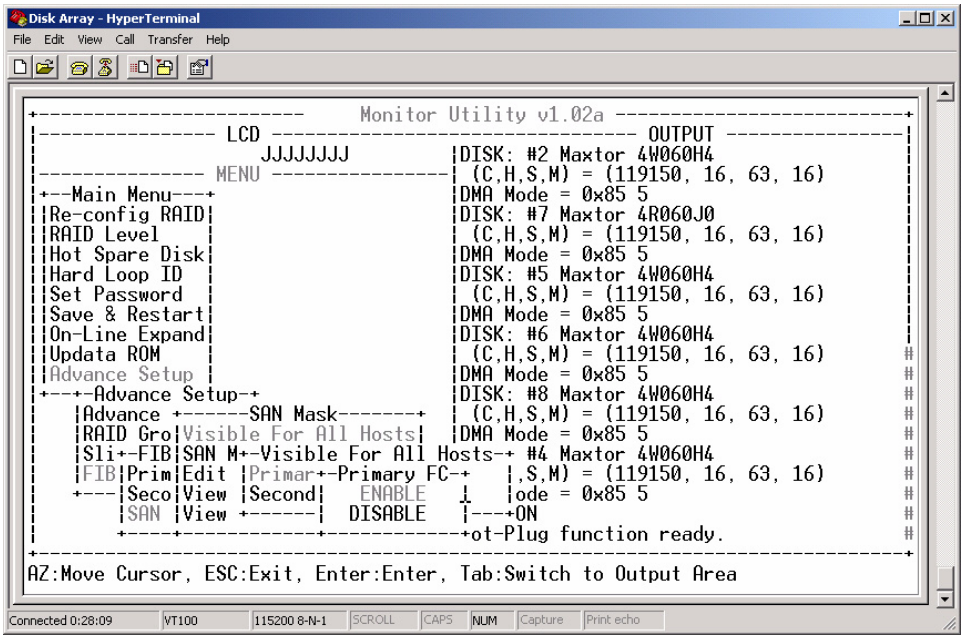
Setting the PA-4811 SAN Mask

The SAN mask allows the use of a Fibre World Wide Name (WWN) to identify specific storage devices on a SAN. Follow these instructions to set a SAN mask for the PA-4811.

1. Start the disk array setup utility as described on page 36.
2. Select *Advance Setup*, *FIBRE Params*, *SAN Mask*.

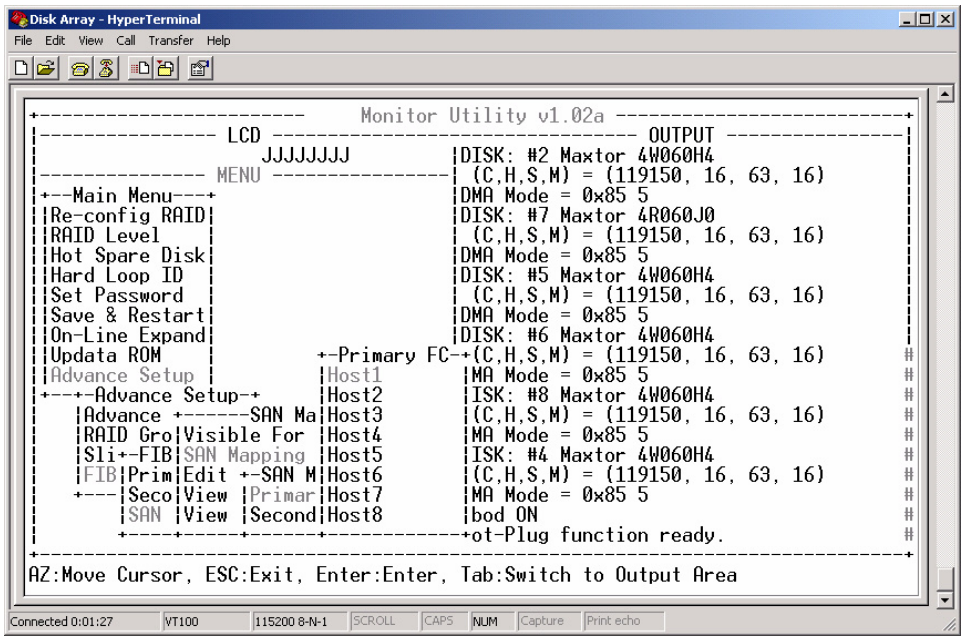


3. Select *Visible For All Hosts*, *Primary FC*, *Disable*.
   The default (enable) allows all devices in the SAN to access data through the primary fibre channel interface.

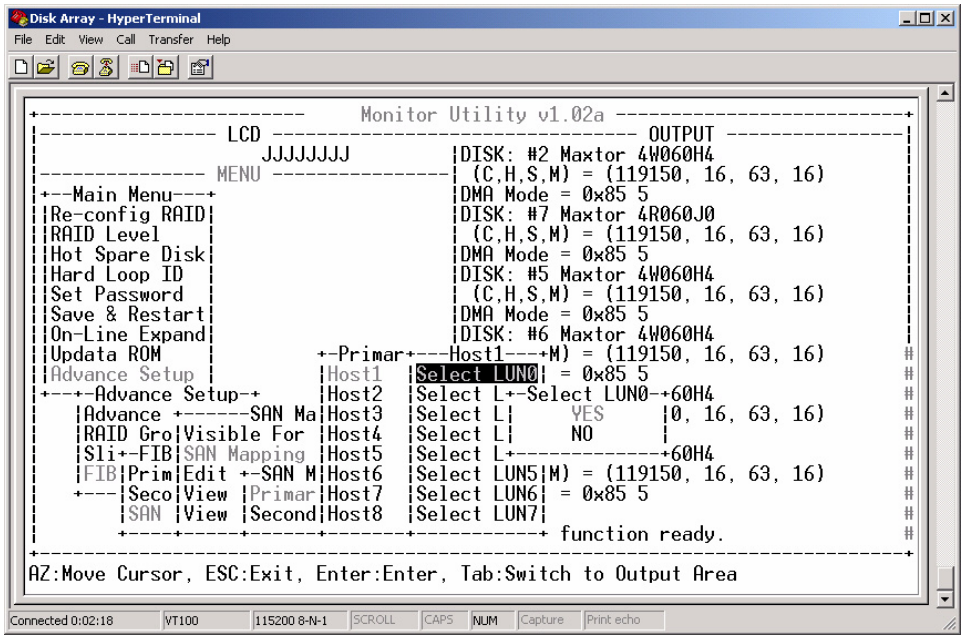


4 Press <Escape> until the SAN Mask menu appears.

5 Select *SAN Mapping*, *Primary FC*.



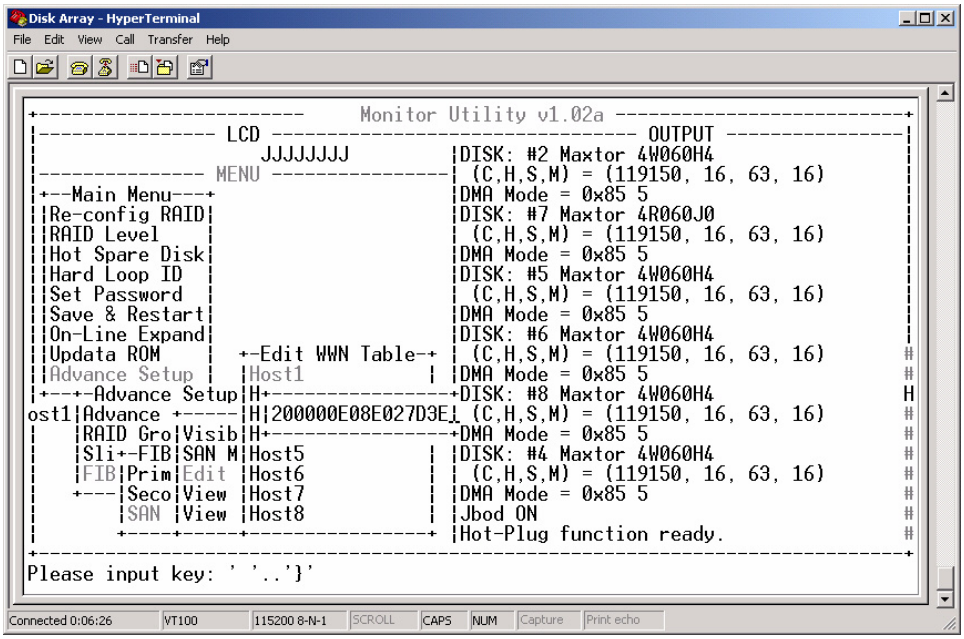
6 Select the host number, select the LUN number that is to be mapped to the host number, then select YES to activate the selected mapping.



This function limits read and write access to the data on the specified LUN number configured on the disk array system. Up to eight hosts can be mapped to up to eight LUNs per fibre channel.

7 Press <Escape> until the SAN Mask menu appears.

8 Select *Edit WWN Table*, select the host that is to be given a new WWN, then type the sixteen digit hex number of the fibre channel host interface card. Each fibre channel interface card has a unique WWN, or node name. Up to eight WWNs can be used. Refer to the fibre channel host interface card documentation for more details.

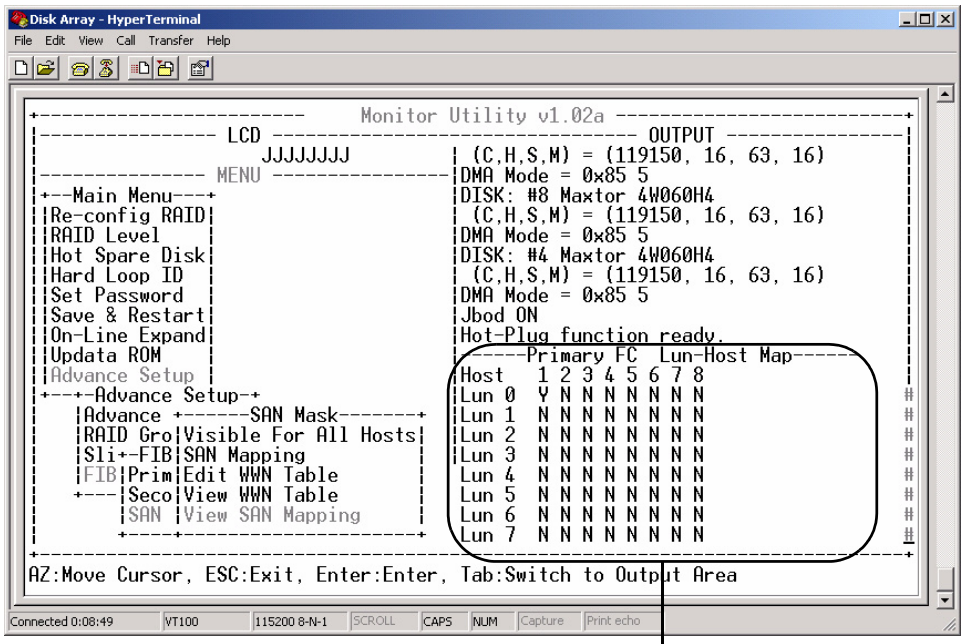


9 Select *Save & Restart* from the main menu, then select *YES*. The disk array restarts with the new configuration.

Viewing the PA-4811 SAN Mapping

Follow these instructions to view the PA-4811 SAN mapping.

1. Start the disk array setup utility as described on page 36.
2. Select *Advance Setup*, *FIBRE Params*, *SAN Mask*, *View SAN Mapping*, then select *Primary FC* or *Secondary FC*.

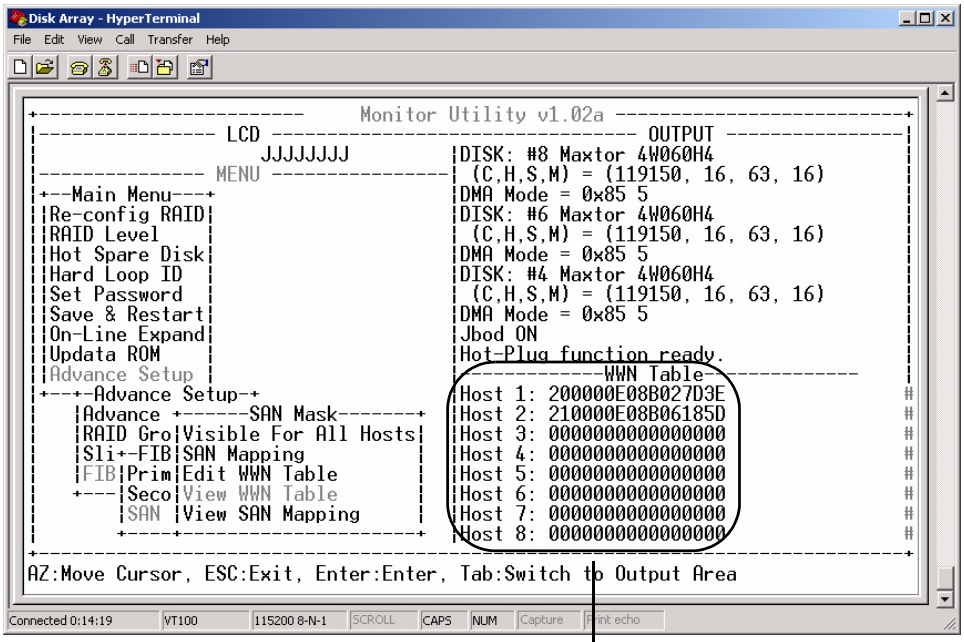


SAN Mapping Table

Viewing the PA-4811 WWN Table

Follow these instructions to view the PA-4811 WWN table.

1. Start the disk array setup utility as described on page 36.
2. Select *Advance Setup*, *FIBRE Params*, *SAN Mask*, *View WWN Table*.



World Wide Name Table

5 Maintenance

Replacing a Disk

A disk failure is indicated when the Power/Error LED at the front of the drive tray turns red and the audible alert sounds.

Note

Turn off the audible alert by pressing the Up ↑ and Down ↓ function buttons on the front panel twice simultaneously.

The LCD panel displays the failure with the symbol “R” or “W”. “R” indicates a disk failure or error, and “W” indicates that there are too many bad sectors on the disk.

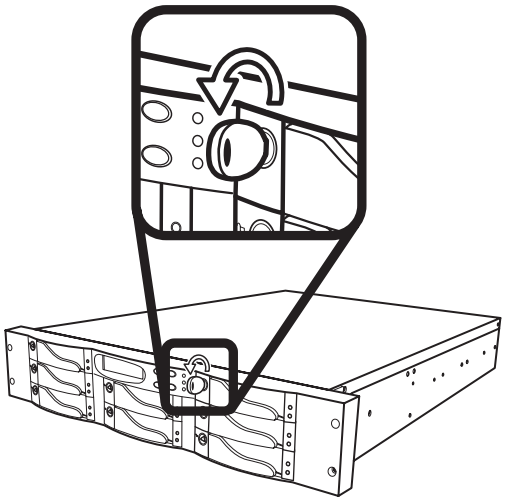
Example:

```
112222WR
```

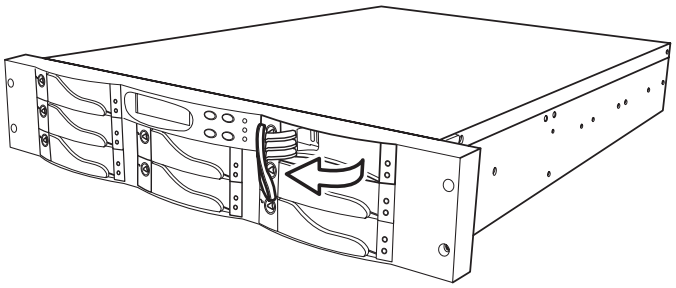
- Disks 1 to 2 are members of RAID group 1.
- Disks 3 to 6 are members of RAID group 2.
- Disk 7 has too many bad sectors.
- Disk 8 has an error or a fault.

Disks are hot swappable, which means that they can be inserted and removed while the disk array is powered on and operating. Follow these instructions to replace a failed disk.

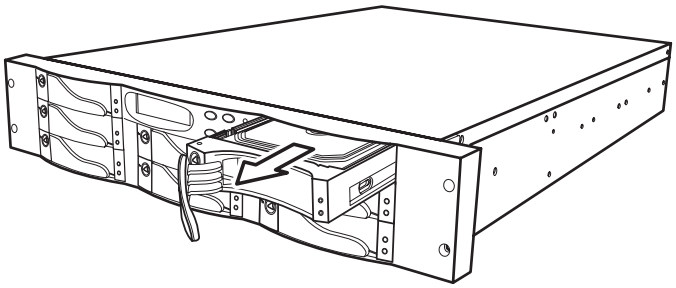
1 Unlock the disk tray with an included disk tray key.



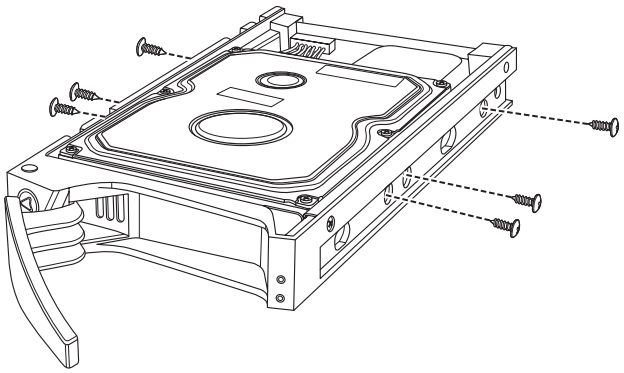
2 Gently pull the disk tray handle to the opened position.



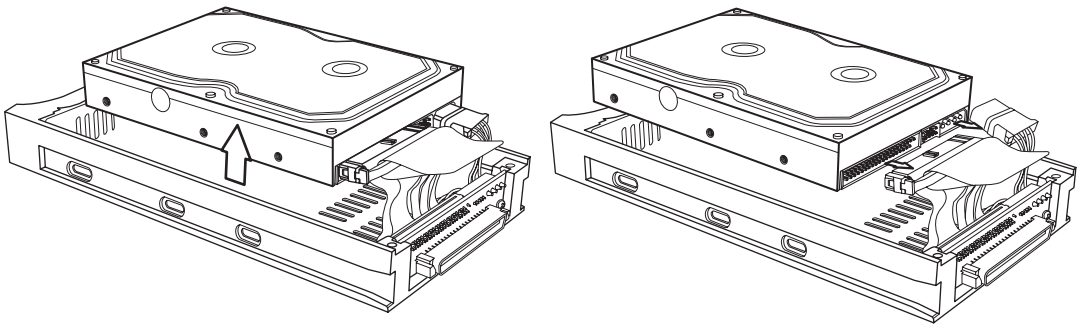
3 Remove the disk tray.



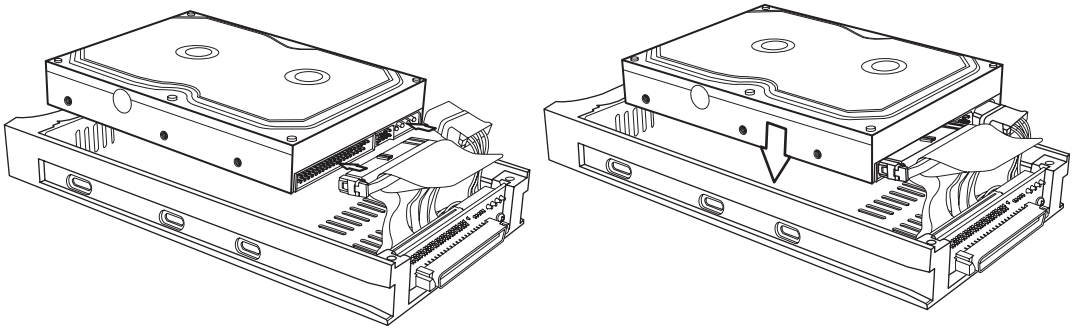
4 Remove the screws from the disk.



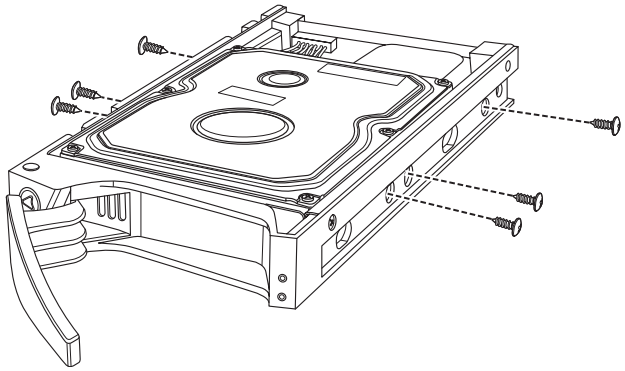
5 Remove the failed disk from the disk tray then remove the disk tray connectors from the disk.



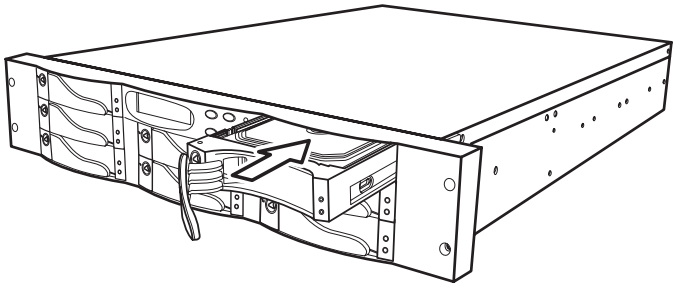
6 Insert the disk tray connectors into the new disk then insert the disk into the disk tray.



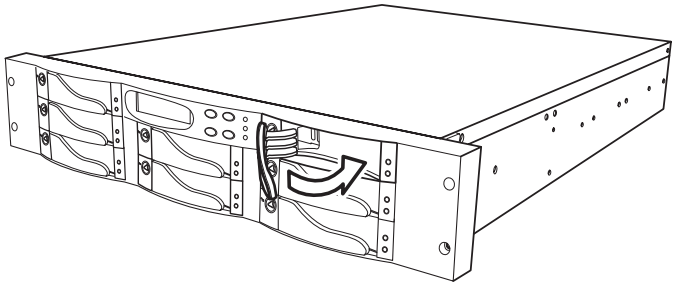
7 Attach the disk to the disk tray with the screws supplied by the disk vendor.



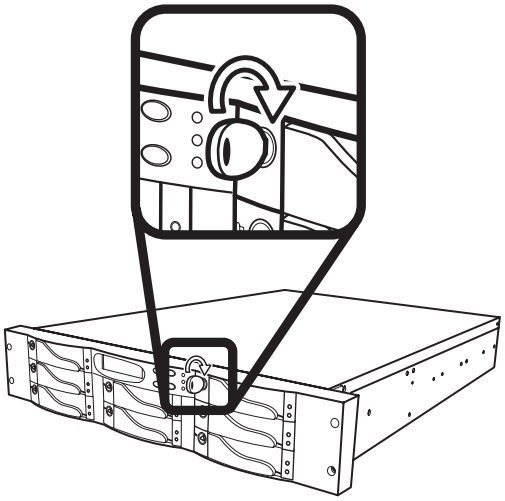
8 Slide the disk tray back into the empty slot.



9 Slowly push the disk tray handle closed.



10 Lock the disk tray. The disk array automatically begins rebuilding the RAID.



Replacing a Power Supply

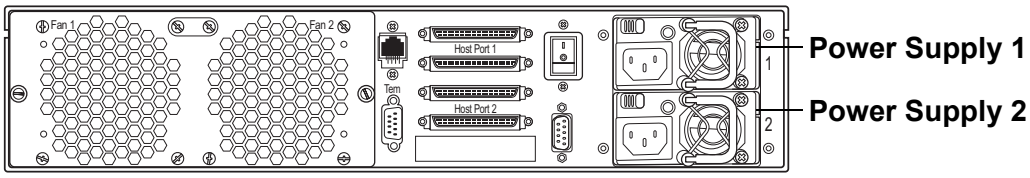
The disk array system is equipped with a Power Supply Fail Indicator LED at the front of the unit that turns red when one of the power supplies fails. The message "Power x failure" also appears on the LCD panel, where x refers to power supply 1, or 2, and an audible alert sounds.

Note

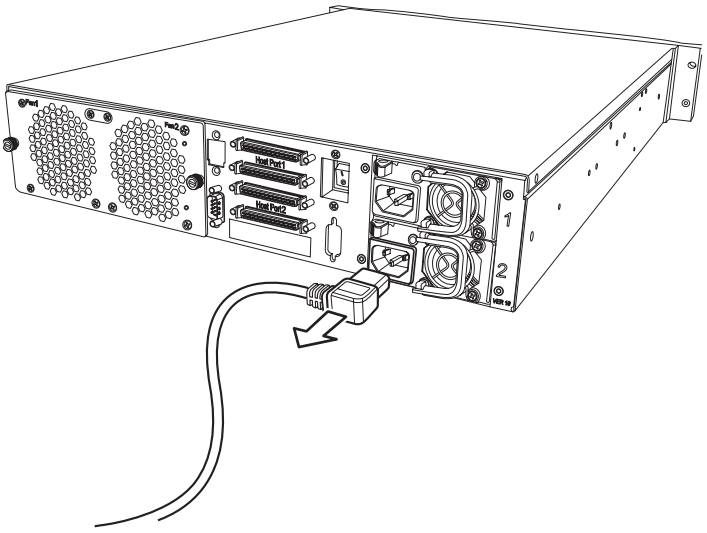
Turn off the audible alert by pressing the Up ↑ and Down ↓ function buttons on the front panel twice simultaneously.

Power supplies are hot swappable, which means that they can be inserted and removed while the disk array is powered on and operating. Follow these instructions to replace a failed power supply.

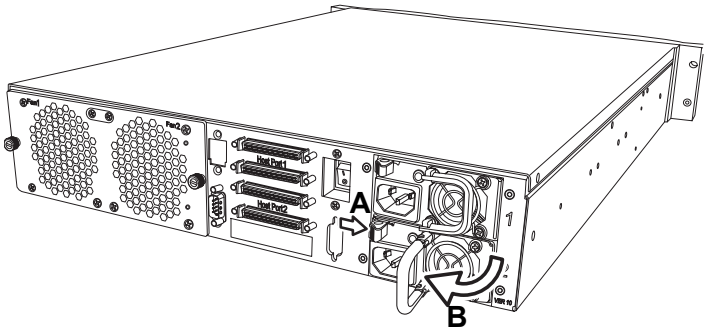
1. Identify the power supply that has failed. The Power supply on indicator LED glows red on the power supply that has failed.



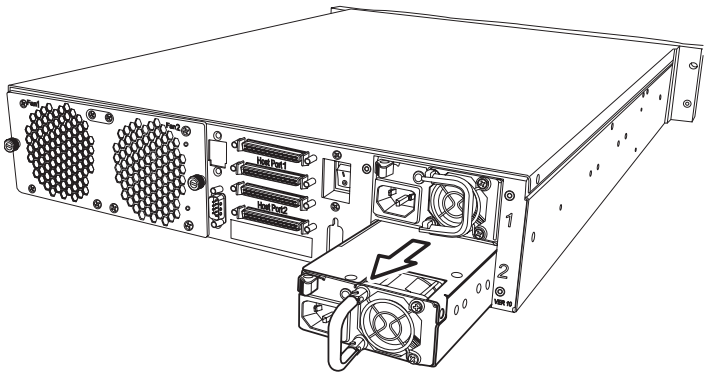
2. Unplug the power cable connected to the failed power supply unit.



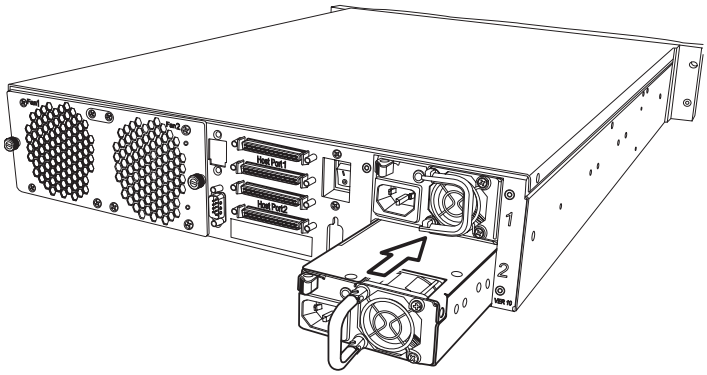
3 Push the power supply release switch (A) in the direction illustrated and pull the power supply handle out (B) at the same time.



4 Remove the power supply unit.



5 Insert a new power supply unit in the empty power supply unit slot. The power supply automatically locks into position when fully inserted.



6 Reconnect the power cable. The Power supply on indicator LED glows green on the power supply that has just been replaced.

Replacing a Fan

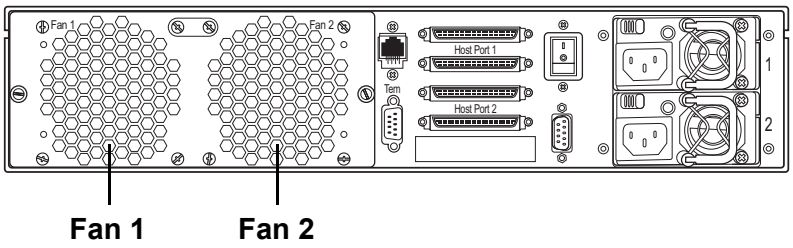
A fan failure is indicated by the LCD panel message “Fan x failure”, where x refers to Fan 1 or Fan 2. An audible alert also sounds.

Note

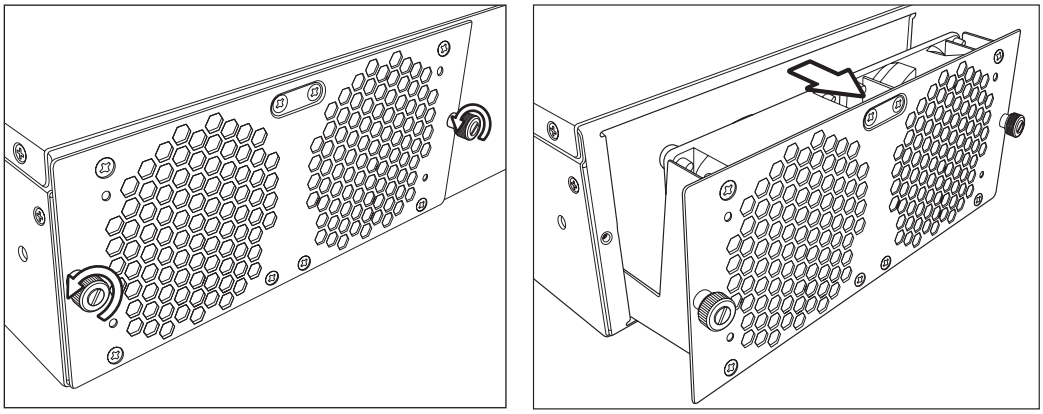
Turn off the audible alert by pressing the Up ↑ and Down ↓ function buttons on the front panel twice simultaneously.

Follow these instructions to replace a failed fan.

1 Identify the fan that has failed.



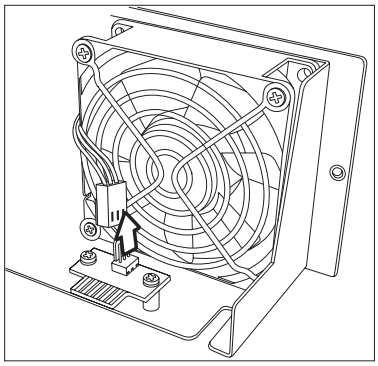
2 Loosen the fan enclosure thumbscrews, then pull the fan enclosure out of the chassis.

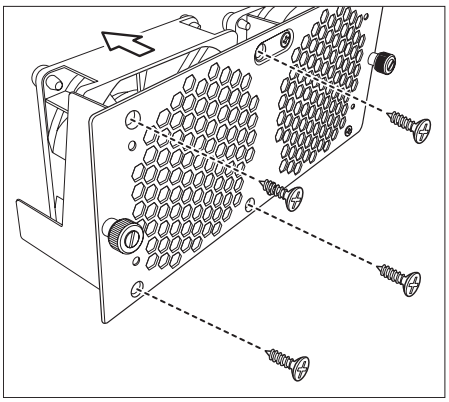


Caution

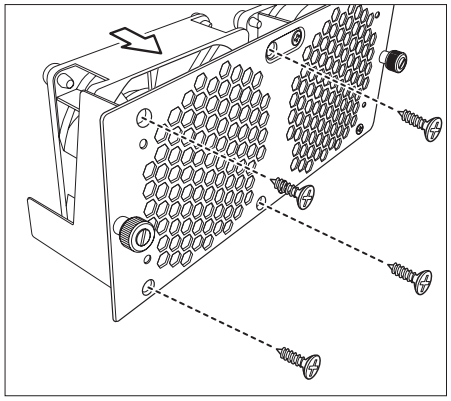
High speed rotating fan blades can cause injury. Wait until both fans have stopped completely before removing either of them.

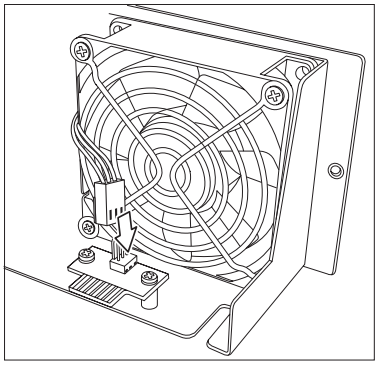
3 Unplug the power connector, remove the screws, then remove the failed fan.





4 Secure the new fan with the screws removed in the previous step, then insert the power connector.

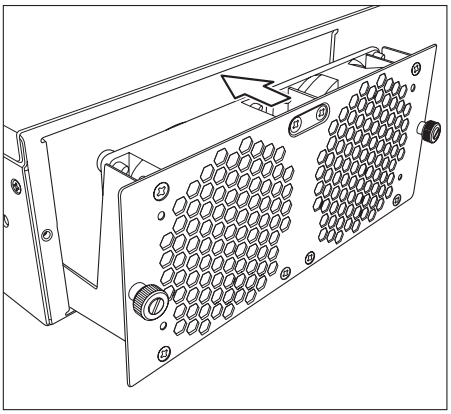


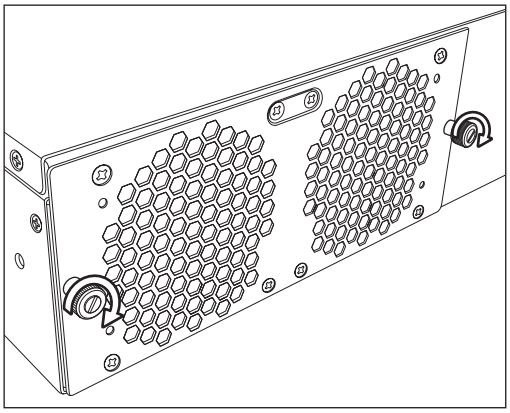


Caution

The fan will begin rotating immediately after it is plugged in. Keep your fingers away from the blades.

5 Insert the fan enclosure into the chassis, then tighten the fan enclosure thumbscrews.





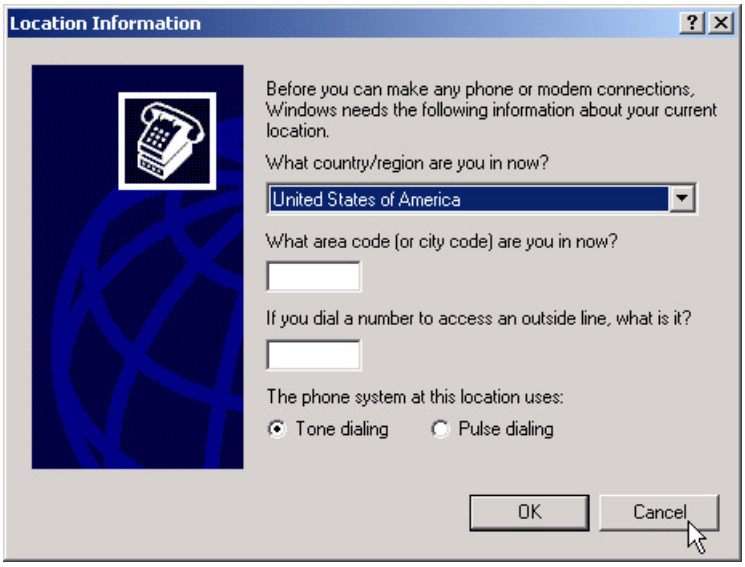
Upgrading Firmware

Follow these instructions to install new firmware.

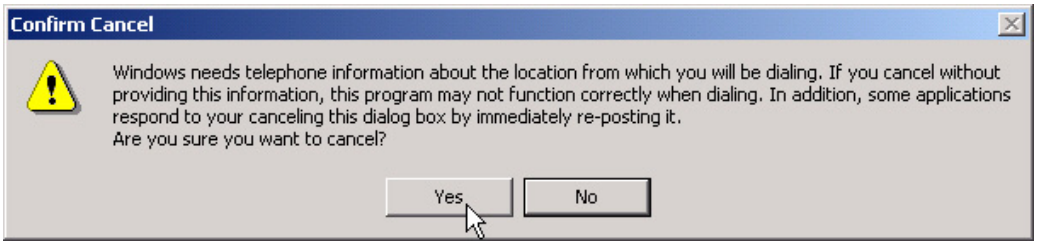
Caution

Do not attempt to upgrade the firmware when there is activity between the disk array and the host(s). All activity to the controller should be stopped before updating firmware.

1. Save the new firmware on your computer's hard drive.
2. Set up a VT100 terminal emulation session as described in "Starting the Disk Array Setup Utility" on page 34.
3. Click **Start**, **Programs**, **Accessories**, **Communications**, **HyperTerminal**. Then click **Disk Array.ht** (or the name you used to save the terminal configuration) to start a VT100 session.
4. The Location Information window appears. Because HyperTerminal communicates with the disk array system directly through an RS-232 cable, this information is not necessary. Click **Cancel**.

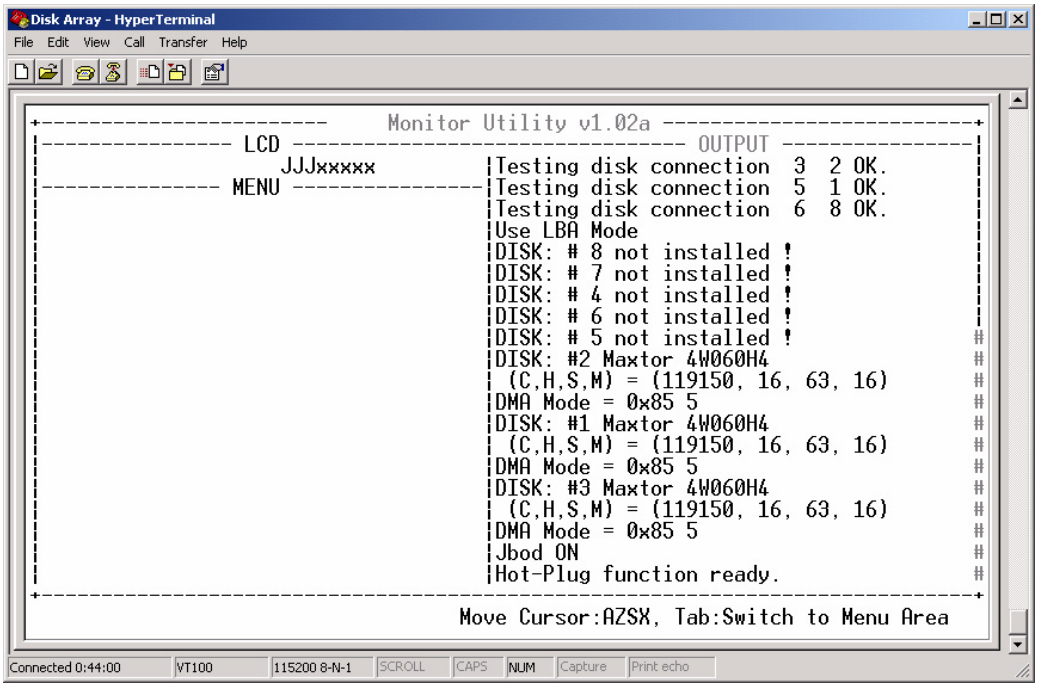


5. The Confirm Cancel dialog box appears. Click **Yes**.



6 Click **OK** when the HyperTerminal information dialog box appears.

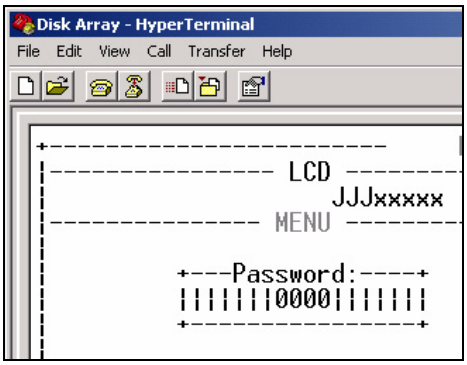
7 Press <CTRL>+<D> to display the disk array setup utility main screen.



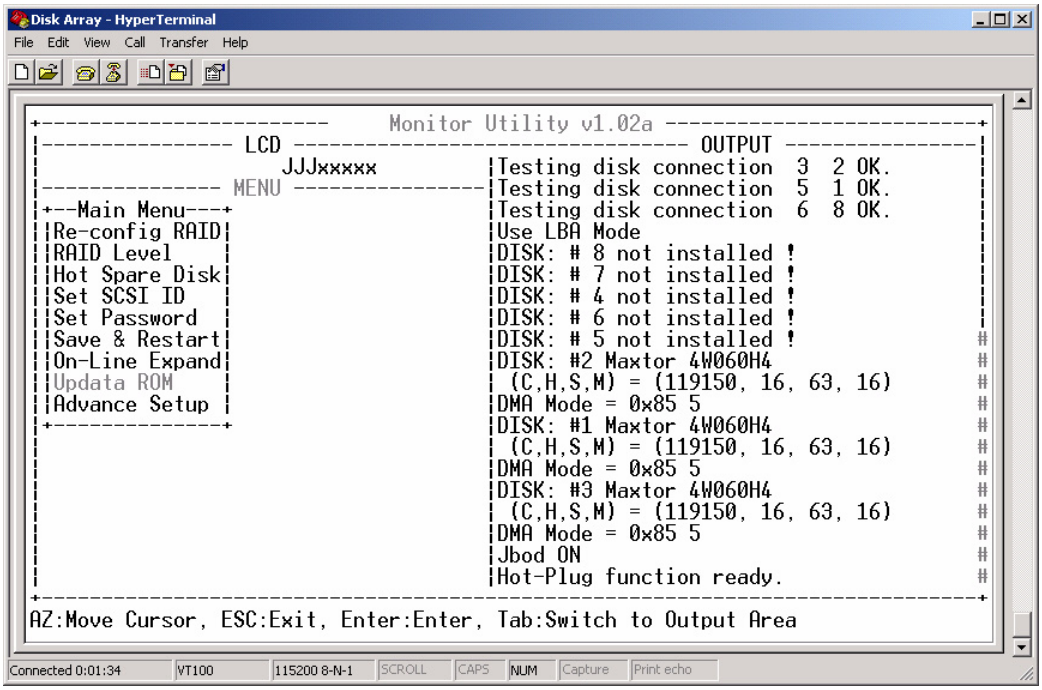
8 Press <Tab> to switch to the menu area. The MENU heading on the left of the disk array setup utility main screen is highlighted.

9 Press <Enter>. The Password prompt appears.

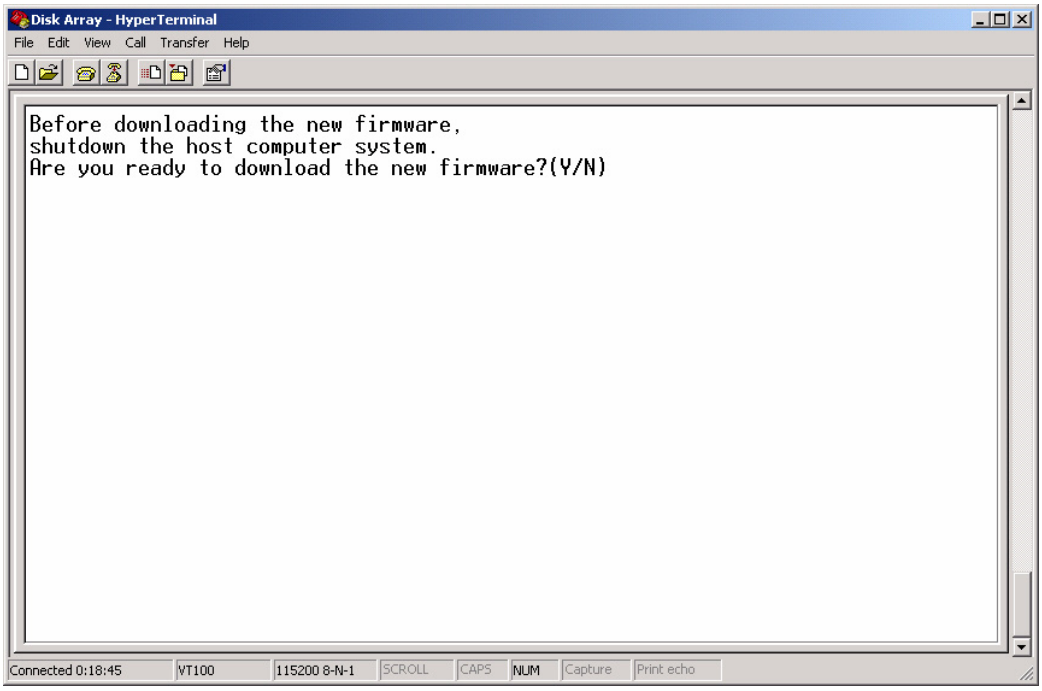
10 Enter the password (see “Setting the Password” on page 43) and press <Enter>. The Main Menu appears.



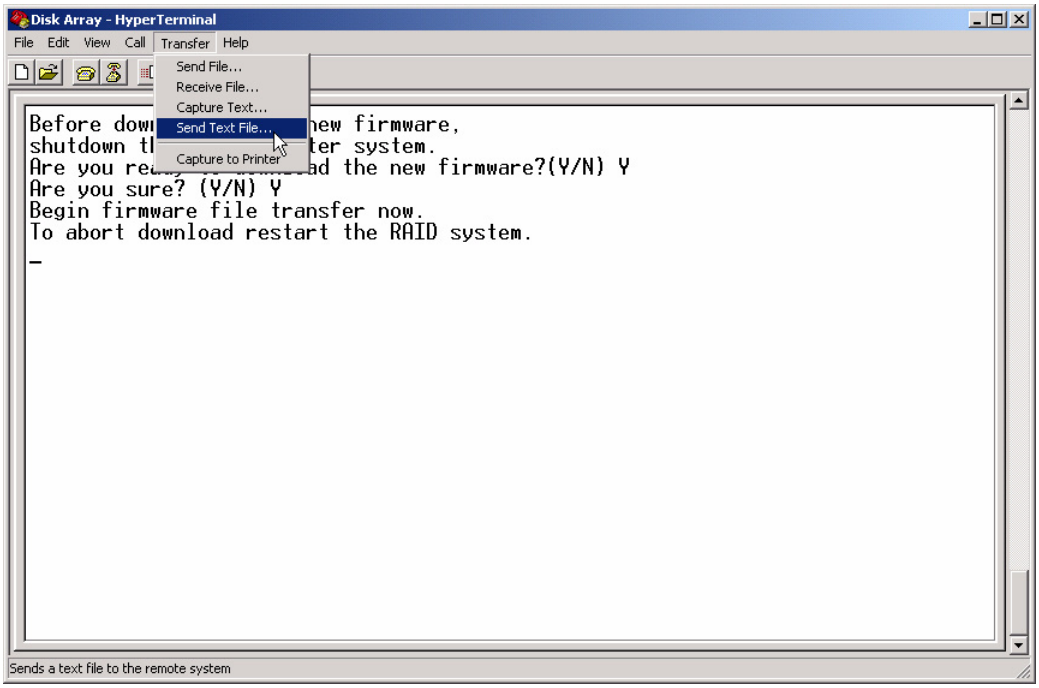
11 Press the down arrow key to scroll down the main menu until *Update ROM* is highlighted, then press <Enter>. The firmware download confirmation screen appears.



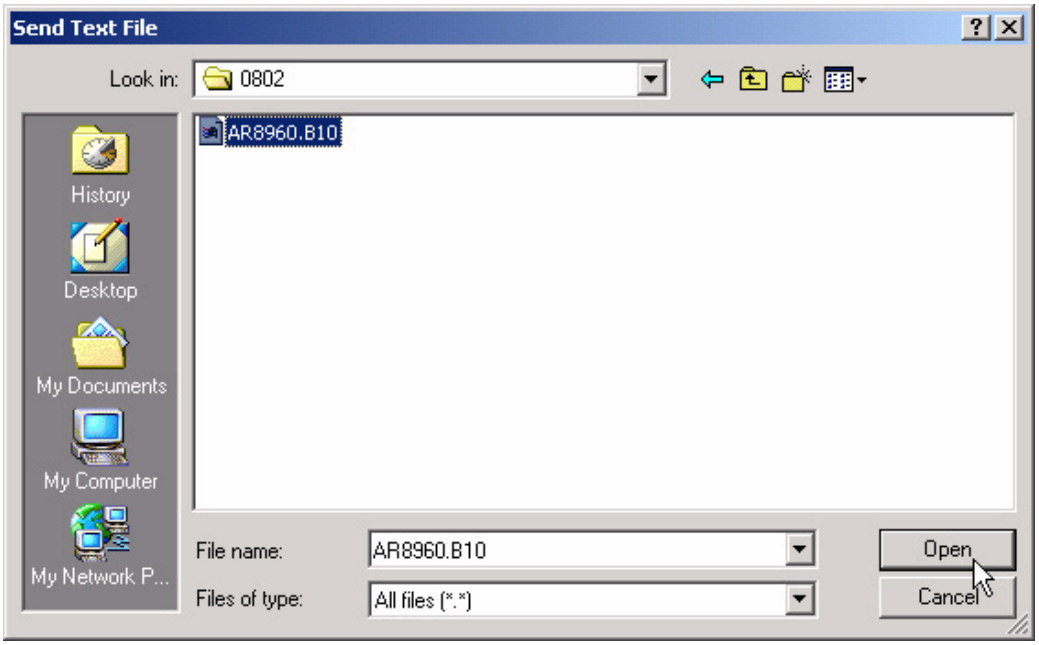
12 Press <Y> to confirm that you are ready to download the new firmware. A second confirmation appears. Press <Y> again. A prompt to begin firmware download appears.



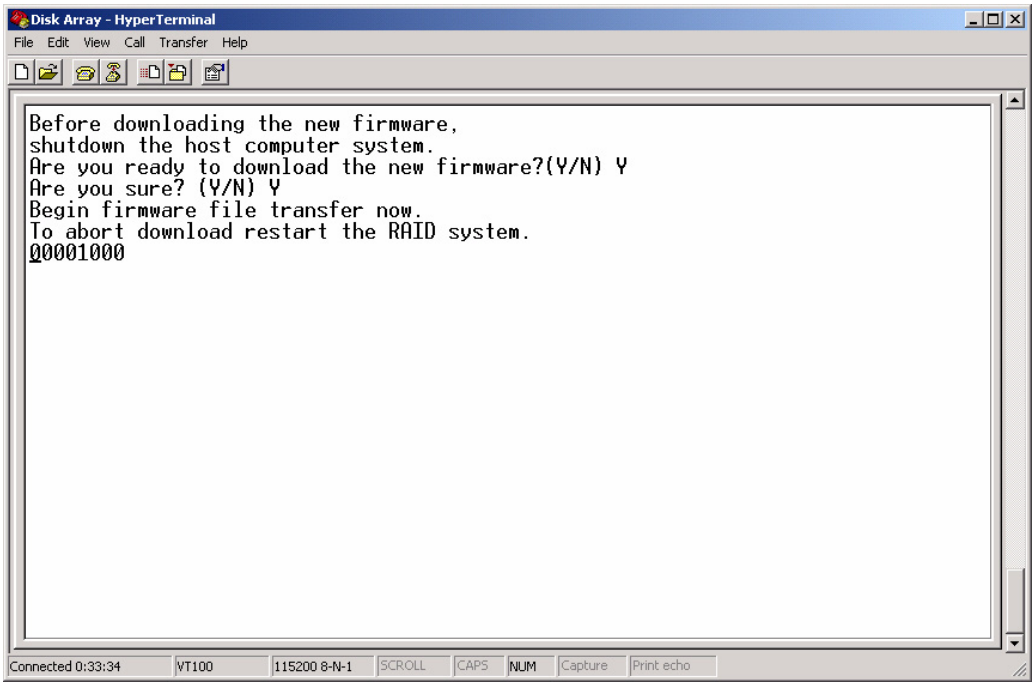
13 Click **Transfer**, **Send Text File...** The Send Text File dialog box appears.



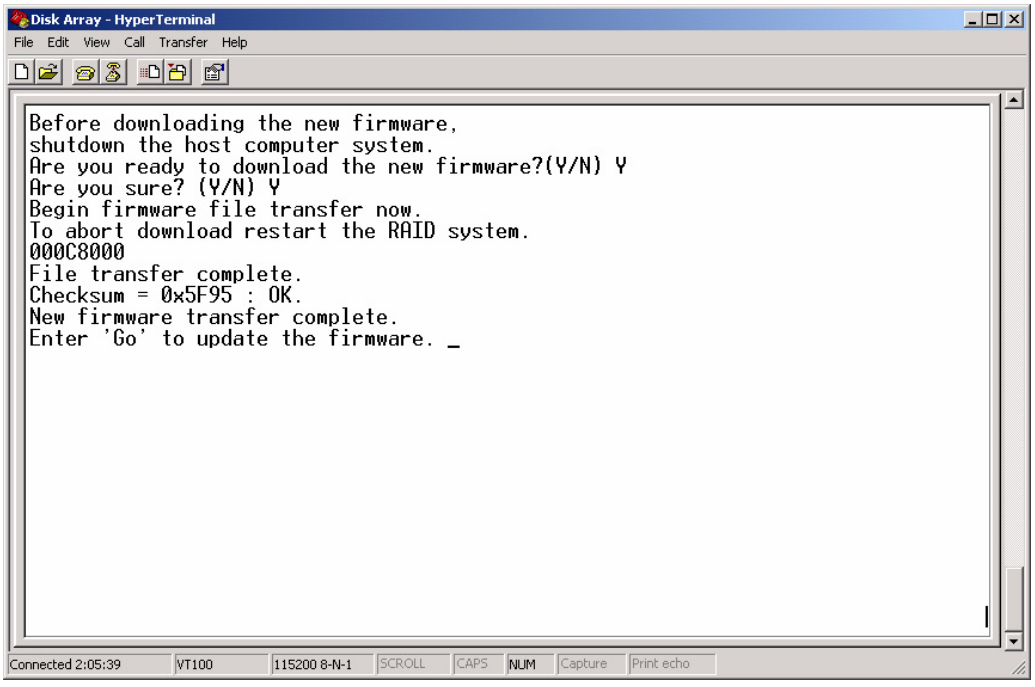
14 Browse to the directory that contains the new firmware file, select it, and click **Open**.



15 A progress counter appears. The firmware download takes about 1 hour and 20 minutes. The download is complete when the File transfer complete message appears.



16 Type “Go”. A second confirmation appears. Type “Go” again. A progress counter appears. The firmware update takes less than 30 seconds. The update is complete when the disk array setup utility main screen appears. The disk array automatically resets itself to activate the new firmware.



Upgrading Memory

The disk array system comes with 128 MB of built-in memory that is expandable to a maximum of 512 MB.

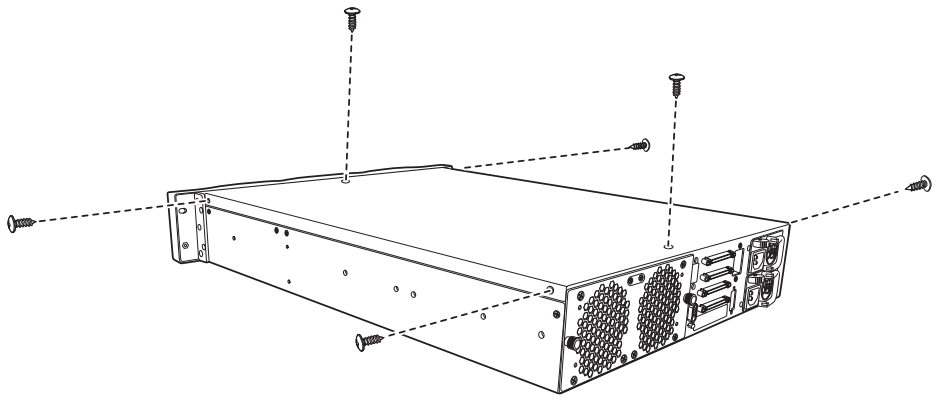
Additional expansion memory modules meeting the following specifications can be purchased from a local computer parts dealer.

Item	Specification
Memory Type	3.3V PC100/133 SDRAM 144pin DIMM
Form Factor	Supports 144pin DIMMs of 64 MB, 128 MB, 256 MB, or 512 MB
Physical Height (max.)	1.15 inches (29.2mm)

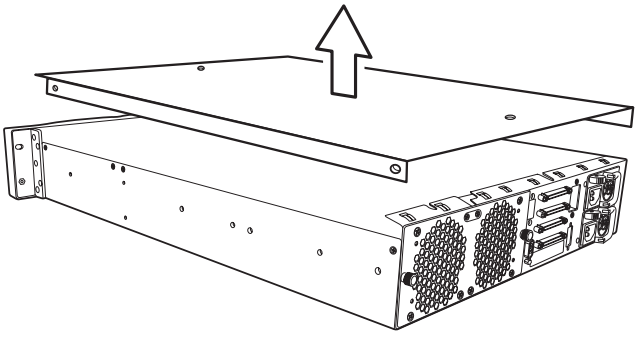
The following table lists the acceptable configurations of memory chips on DIMMs supported by the disk array system.

Total Capacity	Arrangement of Memory Chips on the DIMM no. of chips (capacity x bus width)			
64 MB	8 (8Mx8)	8 (4Mx16)	4 (8Mx16)	
128 MB	16 (8Mx8)	8 (16Mx8)	8 (8Mx16)	4 (16Mx16)
256 MB	16 (16Mx8)	8 (32Mx8)		
512 MB	16 (32Mx8)			

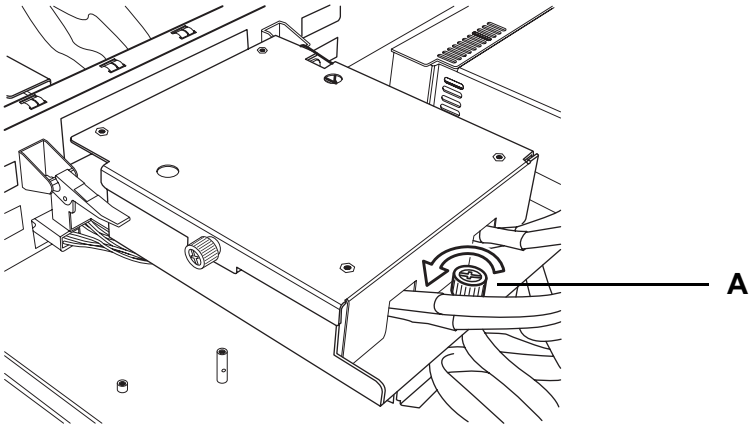
1 Remove the six screws from the disk array system top cover as illustrated.



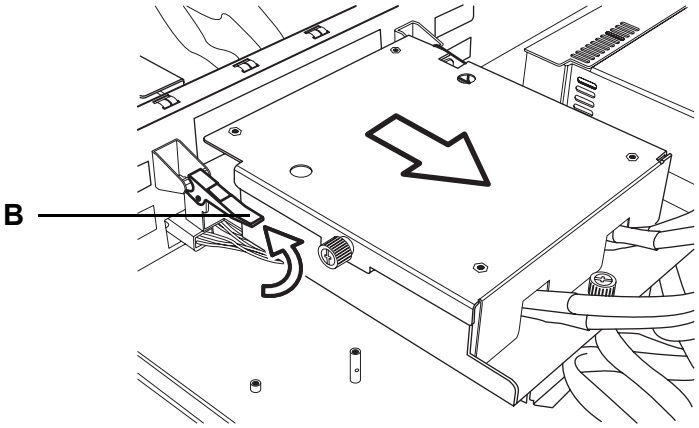
2 Lift the cover.



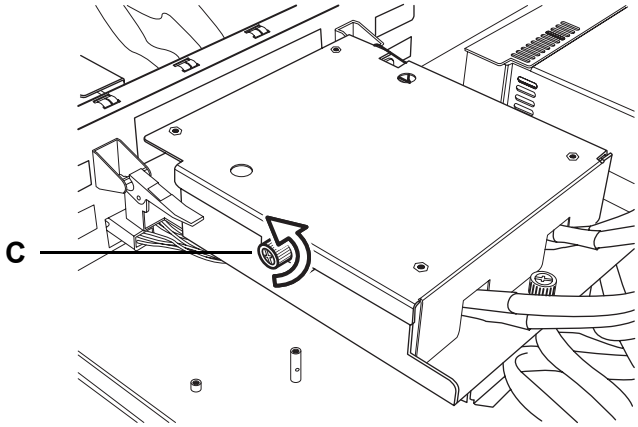
3 Unscrew the controller cage thumbscrew that is at the rear (A).



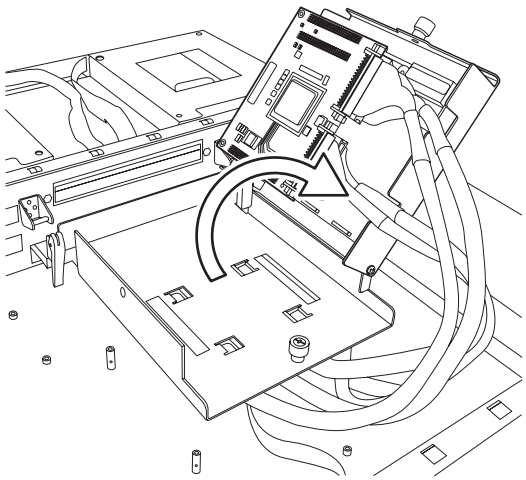
4 Lift the controller cage lever (B) to release the controller cage from the backplane.



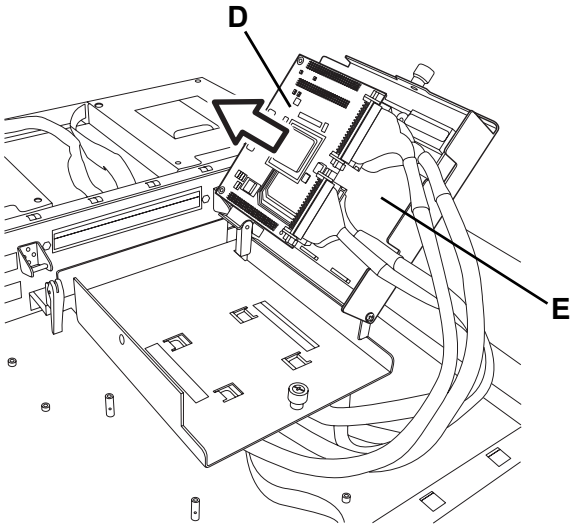
5 Unscrew the controller cage thumbscrew that is at the side (C).



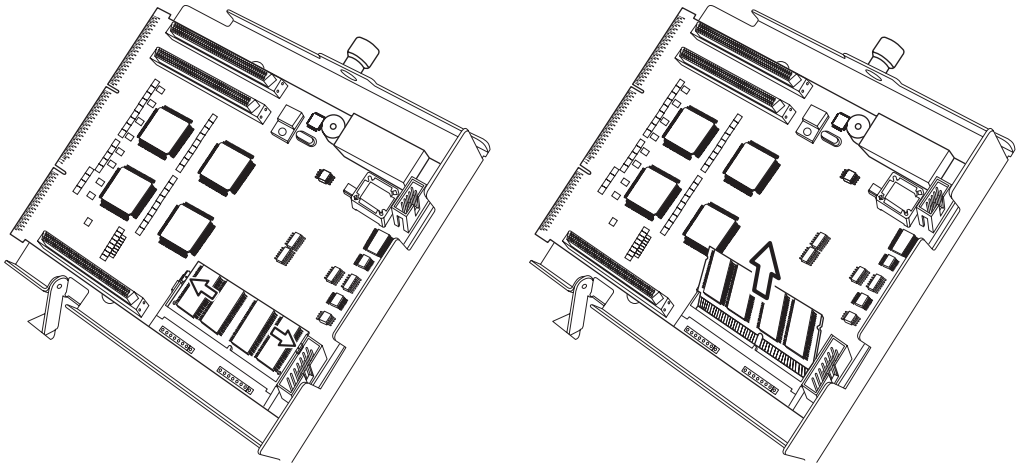
6 Open the controller cage



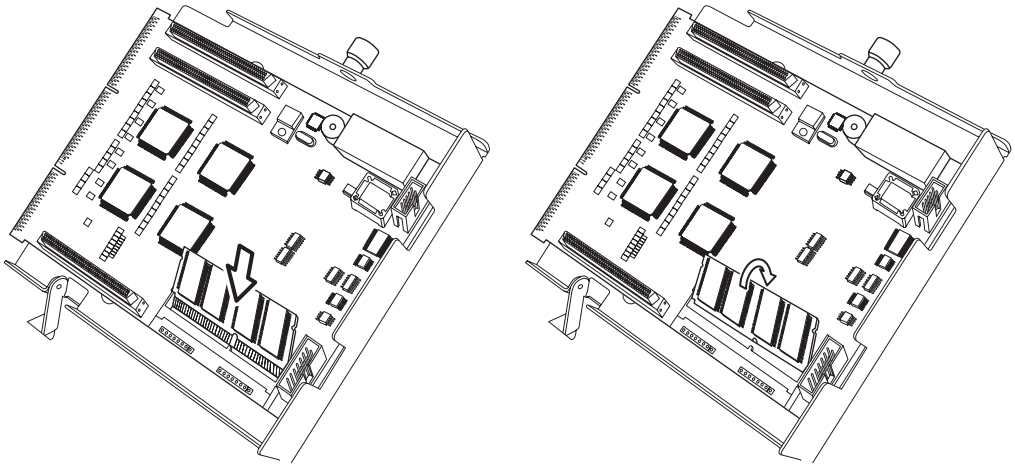
7 Carefully lift the daughterboard (D) from the disk group controller (E).



8 Pull the DIMM retaining clips away from the DIMM, then remove the DIMM. The DIMM springs out of the socket.



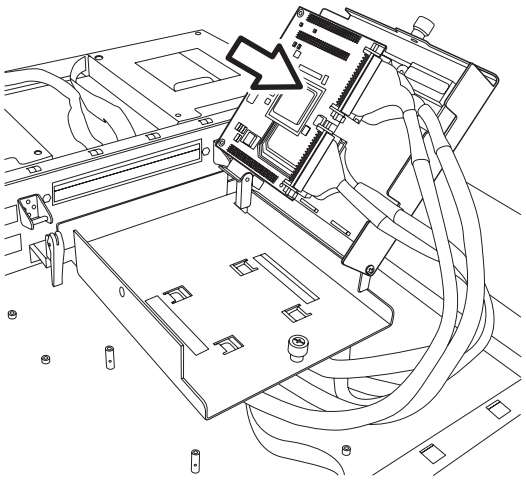
9 Gently push the new DIMM into the socket at 45 degrees, then push the corners of the DIMM down. The DIMM is secured by the DIMM socket retaining clips.



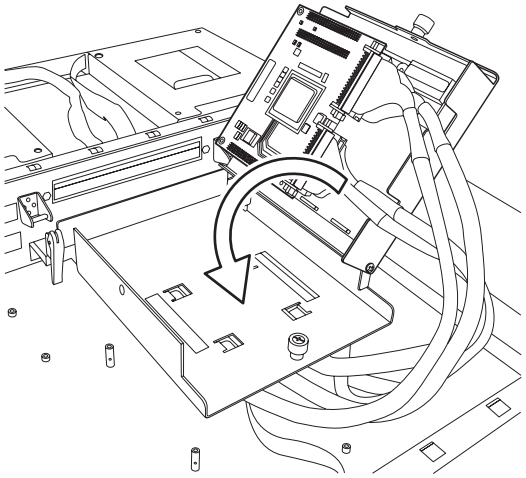
Note

The DIMM module will fit in only one direction. Do not force the DIMM into place.

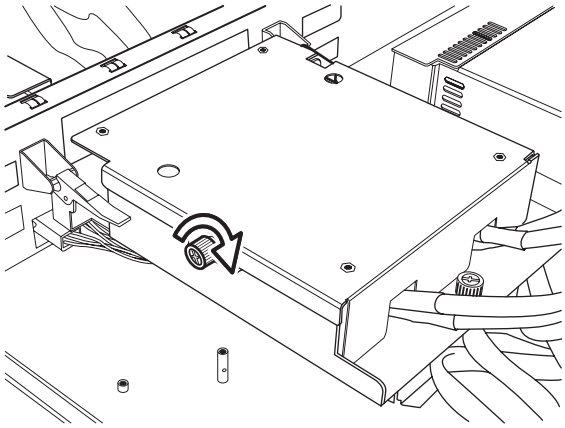
10 Replace the daughterboard on the disk group controller, taking care to align the connectors.



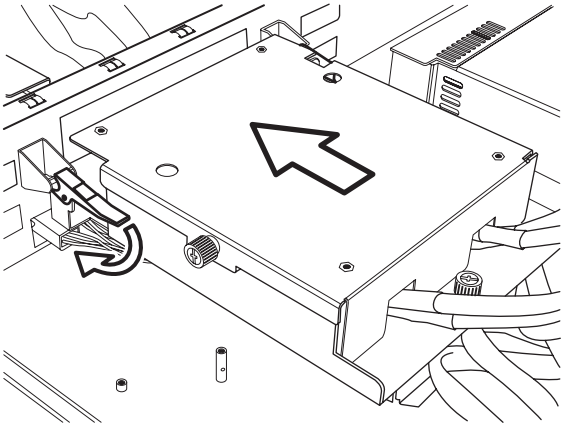
11 Close the controller cage.



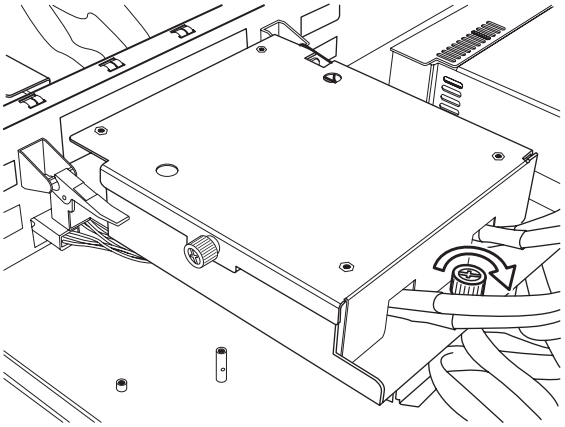
12 Tighten the controller cage thumbscrew that is at the side.



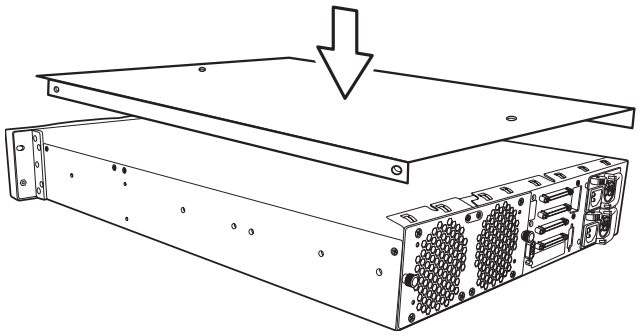
13 Lower the controller cage lever to insert the controller cage into the backplane.



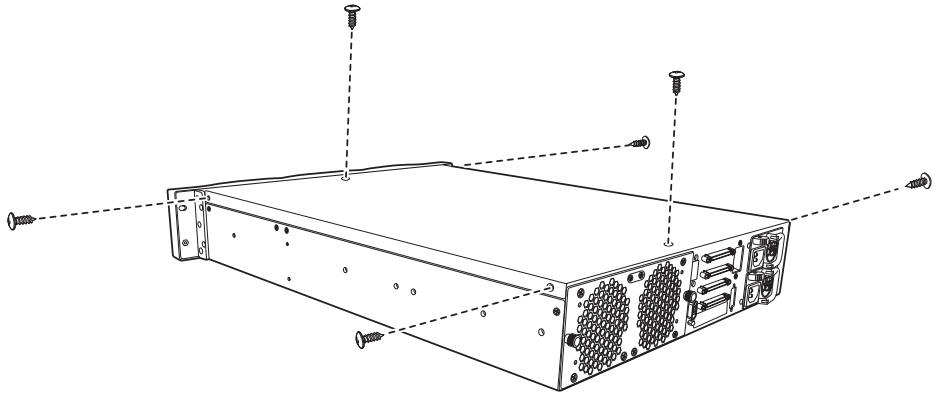
14 Tighten the controller cage thumbscrew that is at the rear.



15 Place the top cover on the disk array system.



16 Replace the six screws to fix the top cover on the disk array system chassis.



Appendix

Specifications

Item	Specification
Host Interface	SCSI Ultra 160 (PA-4800) or 2Gb Fibre Channel (PA-4811)
Disk Interface	8 x ATA 100 MB/s
Dimensions	88 mm (H) x 483 mm (W) x 583 mm (D)
RAID Functions	• Raid levels: JBOD, 0, 1, 0+1, 3, 5, 3+0 or 5+0 • Hot spare support • Disk hot swapping with automatic online rebuilding • Multiple raid (max. 4)
Disk Array Functions	• O/S independent and transparent • Maximum fault tolerant capacity > 1.5 TB • 128 ~ 512 MB SDRAM • LCD panel operation indicator • Audible alarm/Disable alarm • Optional battery backup for disk array status • LED indicator on disk failures
Connectors	• 4 x Ultra 160 SCSI ports (PA-4800) or 2 x 2Gb Fibre Channel ports (PA-4811) • 1 x RS-232 Serial port (115200, n, 8, 1) • 1 x RJ-45 Ethernet port (10 Mbps)
Power Supply	• 300W (1+1) redundant • 100 - 240 VAC, 47-63 Hz, +/- 10% • Over voltage, current, power, and short circuit protection • LED indicates power status • Operating temperature: 0°C ~ 50°C • Operating humidity: 20 ~ 90% • Output: +5V, +3.3V, +12V • Maximum load: 30A, 20A, 18A • Minimum load 1A, 0.5A, 0.5A • Harmonic: meets EN6100-3-2 standard • EMI/RFI: CE, FCC class B and CISPR class B • Safety: UL, cUL, CB, TUV
Warranty	3 year warranty
EMI	CE class B, FCC class B, C-Tick class B and BSMI class B
Safety	UL, cUL, CB, and TUV

Item	Specification	
Controller	CPU	Intel i80303 64-bit RISC microprocessor
	Disk Interface	ATA100
	Disk Channels	8 channels with daughter board support
	Disk Interface Chipset	Highpoint 370A
	Memory Type	144-pin SO-DIMM
	Memory Sockets	1
	Memory Size	up to 512 MB
	LCD Interface	One LCD panel, 2 lines by 16 characters
	Button Interface	Up, Down, ESC, and Enter
	Battery Backup Interface	Yes
	Daughter Board Interface	Yes (1 x 64 bit/66 MHz and 1 x 32 bit/33 MHz)
	PCI Interface	1 x 64 bit/66 MHz and 1 x 32 bit/33 MHz
	Backplane Interface (connector)	Slot-2
Backplane	Disk Channel Support	8 channels
	Disk Number Support	8 disks
	Disk Connector Type	SCA-2, 80-pin
	Disk Power On Sequence	Select by jumper (H/W: power on all disks, S/W: 4 disks at a time with 2 ms interval)
	Temperature Sensors	5
	Power Connector Type	ATX x 2
	Fan Connector Type	1 x 3-pin with housing, 2.54 mm pitch (1 red, 1 white)

Item	Specification
Cooling Fans	**Temperature** / **Fan 1** / **Fan 2** Under 25°C / 1/3 speed / 1/3 speed 26°C ~ 40°C / 1/2 speed / 1/2 speed 41°C ~ 50°C / 2/3 speed / 2/3 speed Over 51°C / Full speed / Full speed Fan 1 Failure / Failed / Full speed Fan 2 Failure / Full speed / Failed
Management Software	• Terminal – Through RS-232 – Text Mode – Platform Independent • Global-Eyes – Win32 Platform – System monitoring via SCSI channel – ASPI required • Global-Net – Platform Independent – System monitoring via Ethernet port – Web Server required – Browser Based

Error Messages

Event	Message on LCD	Message on GUI
Temperature over 50ºC	Over Temp.	Over Temp.
Fan x malfunction	Fan X Failed	Fan X Failed
Power x malfunction	Power X Failed	Power X Failed
Under 3.315V, over 3.465V	Show error voltage x.xxV	Show error voltage x.xxV
Under 4.75V, over 5.25V	Show error voltage x.xxV	Show error voltage x.xxV
Under 11.4V, over 12.6V	Show error voltage x.xxV	Show error voltage x.xxV

Operating Environment

Item	Temperature
Operating Temperature	5ºC to 40ºC
Non-operating Temperature	-25ºC to 60ºC
Relative Humidity	10% to 85%, non-condensing

Warnings and Certifications

Federal Communications Commission (FCC)

This FCC certification applies in the U.S. and Canada. This equipment has been tested and found to comply with the limits for a Class B 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 residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user's guide, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.