

IBM TotalStorage™ Network Attached Storage 300
Model 325



Service Guide

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Model 325



Service Guide

NOTE

Before using this information and the product it supports read the safety information in "Appendix I. Notices" on page 173.

First Edition (July 2001)

This guide applies to the IBM TotalStorage™ Network Attached Storage 300.

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About this guide

This guide provides service procedures for the IBM TotalStorage™ Network Attached Storage 300.

Frequently used terms

The following list of terms, used within this document, have these specific meanings:

Term	Definition in this document
Drive bay	A receptacle into which you insert a hard disk drive in an appliance. The bays could be physically located in a separate rack from the appliance.
Engine	The processor that responds to requests for data from clients. This is where the operating software for the NAS 300 appliance resides.
Storage unit	Hardware that contains one or more drive bays, power supplies, and a network interface. Some storage units contain a RAID controller. There are no other components in a storage unit, and it is accessed by a NAS appliance.
Notes	These notices provide important tips, guidance, or advice.
Attention	These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
Caution	These notices indicate situations that can be potentially hazardous to you. A caution notice is placed just before descriptions of potentially hazardous procedure steps or situations.
Danger	These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice is placed just before descriptions of potentially lethal or extremely hazardous procedure steps or situations.

Publications

Hardcopy publications shipped with the Network Attached Storage

The following publications are shipped in hardcopy and are also provided in softcopy form at www.ibm.com/storage/support/nas:

- *IBM TotalStorage Network Attached Storage 300 Hardware Installation Guide, GA27-4275*

This publication provides procedures for setting up, cabling, and replacing components of the IBM TotalStorage Network Attached Storage .

- *Release Notes*

This document provides any changes that were not available at the time this publication was produced.

Related publications

The following publications contain additional information about the NAS 300:

- *IBM TotalStorage Network Attached Storage User's Reference, GA27-4276*
- *IBM TotalStorage Network Attached Storage Installation Guide, GA27-4275*

- *Safety Information*, 44L2247

Accessibility

The softcopy version of this guide and the other related publications are all accessibility-enabled for the IBM Home Page Reader.

Web sites

Getting help online

www.ibm.com/storage/support/nas

Here you can visit a support page that is specific to your hardware, complete with FAQs, parts information, technical hints and tips, technical publications, and downloadable files, if applicable.

Other helpful sites

www.ibm.com	Main IBM home page
www.ibm.com/storage	IBM Storage home page
www.ibm.com/storage/support/nas	IBM NAS Support home page
www.ibm.com/storage/nas	IBM NAS products
www.tivoli.com	Tivoli
www.cdpi.com	Columbia Data Products

Online support

Use the following Web site to obtain online support:

www.storage.ibm.com/support/nas

Chapter 1. General checkout

This chapter describes general checkout for the IBM TotalStorage™ Network Attached Storage 300, hereafter referred to as the IBM NAS 300.

For the IBM NAS 300 engines, diagnostic programs are stored in upgradable read-only memory (ROM). These programs are the primary method of testing the major internal components of the IBM NAS 300 engines (the system boards, planar Ethernet controllers, RAM, CD-ROMs, diskette drives, serial ports, hard drives, and parallel ports). See “Diagnostic programs and error messages” on page 17.

Also, if you cannot determine whether a problem is caused by the hardware or by the software, you can run the diagnostic programs to confirm that the hardware is working correctly.

For the RAID storage controllers and storage units, use the status LEDs, Symptom-to-FRU list, and the storage management software to diagnose problems.

Note: To display certain error messages and run certain diagnostics programs described in this guide, you need to attach (before power-up) a monitor, keyboard, and mouse to the engine.

When you run the diagnostic programs, a single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After the cause of the first error message is corrected, the other error messages might not occur the next time you run the test.

Notes:

1. If multiple error codes are displayed, diagnose the first error code displayed (see “Diagnostic error codes” on page 49).
2. If the appliance engine hangs with a POST error, go to “POST error codes” on page 53.
3. If the appliance engine hangs and no error is displayed, go to “Undetermined problems” on page 62.
4. Power supply problems, see “Power supply LED errors” on page 52.
5. Safety information, see “Appendix I. Notices” on page 173.
6. For intermittent problems, check the error log; see “Event/error logs” on page 17.

Checkout Steps

Checking out the engines

Perform the following steps:

1. Power-off the engine.
2. Check all cables and power cords.
3. Power-on the engine.
4. Record any POST error messages displayed on the screen. If an error is displayed, look up the first error in the “POST error codes” on page 53.
5. Check the information LED panel System Error LED; if on, see “Information panel system error LED” on page 48.

6. Check the System Error Log. If an error was recorded by the system, see “Chapter 4. Symptom-to-FRU index” on page 45.
7. Start the Diagnostic Programs. See “Starting the diagnostic programs” on page 18 .
8. Check for the following responses:
 - a. Beeps
 - b. Readable instructions or the Main Menu
9. If the diagnostics completed successfully and you still suspect a problem, see “Undetermined problems” on page 62.

Checking out the Fibre Channel hub

Perform the following steps:

1. Verify that all external covers are present and not damaged.
2. Ensure that all latches and hinges are in correct operating condition.
3. Check the power cord for damage.
4. Check the external signal cable for damage.
5. Check the cover for sharp edges, damage, or alterations that expose the internal parts of the device.
6. Correct any problems that you find.

Checking out the RAID storage controller and the storage units

Use the status LEDs, Symptom-to-FRU list, and the storage management software to diagnose problems. For information about diagnosing possible problems, see “Troubleshooting the RAID storage controllers and storage units” on page 35.

Note: If power was just applied to the RAID storage controller, the green and amber LEDs might turn on and off intermittently. Wait until the RAID storage controller finishes powering up before you begin checking for faults.

Chapter 2. Introduction

The IBM NAS 300 is a storage *appliance* that allows you to easily attach storage to a network. Because it is an appliance, you do not need to know about the internal operating system.

IBM NAS 300 overview

The IBM NAS 300 is a rack-mounted storage server consisting of the following components:

Engines

Two IBM 5187 Network Attached Storage Model 5RZ engines. These act as a "gateway" between your Ethernet network and the network-attached storage.

Fibre Channel Hubs

Two IBM 3534 Fibre Channel Hub Model 1RUs. These devices connect the engines to the storage controller.

RAID Storage Controller

An IBM 5191 RAID Storage Controller Model 2RU. This device delivers fast, high-volume data transfer, retrieval, and storage functions across multiple drives, to multiple hosts. Optionally, a second storage controller can be added to the IBM NAS 300 to increase the number of hard drives available.

Storage Units

Multiple IBM 5192 Network Attached Storage Storage Unit Model 1RU. These optional 10-drive expansion units add additional Fibre Channel (FC) disk storage.

IBM NAS 300 engines

The IBM NAS 300 comes standard with two IBM TotalStorage Network Attached Storage Models 5RZ engines.

Features

Each engine includes the following standard features:

- Dual 933 MHz processors
- 1-GB memory
- 1-port Fibre Channel adapter
- 1-built-in 10Base-T/100Base-TX Ethernet controller
- 9.1-GB hard disk drive
- Dual 270-W redundant power supplies

You can add the following features to each of the IBM NAS 300 engines:

- IBM 10/100 Ethernet Server adapters
- IBM Gigabit Ethernet SX Server adapters
- Netfinity Advanced System Management PCI Adapter
- IBM PCI Fast/Wide Ultra SCSI Adapter

For additional information about installing these adapters in the PCI slots, see "Appendix C. PCI Adapter Placement" on page 131.

Components

The following sections show the components of the engine.

Note: The hot-swap features of the engine enable you to remove and replace hard disk drives, power supplies, and fans without powering off the engine. Therefore, you can maintain the availability of your system while a hot-swap device is removed or replaced.

The following is a list of components found in each engine:

Microprocessors

Each engine comes with two 933 MHz Pentium III processors.

Memory modules

Each engine contains two 512 MB memory modules.

Non hot-swap drives

Each engine contains a 3.5-inch diskette drive and a compact disk drive.

Hot-swap hard disk drive

Each engine comes with one hot-swap hard disk drive. This drive is used by the engine's operating system.

Hot-swap fans

Each engine has three interchangeable hot-swap and redundant fans. If one fan fails, the other fans continue to operate. All fans must be installed to maintain proper cooling within your engine, even if one fan is not operational.

Hot-swap power supplies

Each engine comes with two hot-swap power supplies. Both power supplies must be installed to maintain proper cooling.

PCI adapters

Each engine has four available PCI slots. You can add optional Ethernet, ASM, and SCSI adapters. For more information about optional adapters, refer to the *IBM NAS 300 Installation Guide*.

Fibre Channel hub

The IBM NAS 300 Fibre Channel hub is an eight-port Fibre Channel hub that includes seven fixed short-wave optic ports, one gigabit interface converter (GBIC) port, and an operating system for building and managing a switched-loop architecture.

The hub is a high-performance fiber optic hub with the following characteristics:

- **Easy-to-use** — After the power-on self-test (POST) completes, you need only to add the IP address of the hub. The remainder of the hub's configuration is automated.
- **Flexible** — GBIC modules and fixed optic ports support fibre transmission media.
- **Reliable** — Hub uses highly integrated, multifunction application specific integrated circuit (ASIC) components.
- **High Performance** — Hub has a data transfer latency of less than 2 microseconds transferring data from any port to any port at peak Fibre Channel bandwidth of 100 MB per second when there is no port contention.

GBICs

Each IBM NAS 300 Fibre Channel hub accommodates one short-wavelength (SWL) GBIC module. The SWL fiber optic GBIC module, with SC connector color-coded black, is based on short-wavelength lasers supporting 1.0625 GB per second link speeds. This GBIC module supports 50-micron multimode fiber optic cables (up to 500 meters in length) and 62.5-micron multimode fiber optic cables (up to 175 meters in length). The GBIC module is shipped with a protective plug in place and should remain in place if no fiber optic cable is connected to the port.

Serial port connection

The Fibre Channel hub includes a serial port, which is used to set the IP address when setting up, reinitializing the Fibre Channel hub, or running diagnostics. The serial port connection is not used during normal operation.

The settings of the serial port are as follows:

- 8-bit
- No parity
- One stop bit
- 9600 baud
- Flow Control = None
- Emulation = Auto Detect

Note: The serial port and Telnet connection are mutually exclusive. There can be only one serial port session active at a time. Telnet takes priority, so the serial port is terminated when a Telnet connection is made. The serial connection is restored after the Telnet session is completed. Logging in again is required. A password is required to login to the serial port session as password checking is skipped only at initial power on.

Ethernet connection

The Ethernet port allows you to connecting the Fibre Channel hub to an existing 10/100BaseT Ethernet local area network (LAN). This Ethernet port provides the following functions:

- Provides access to the Fibre Channel hub's internal SNMP agent
- Permits remote Telnet and Web access for remote monitoring and testing
- Permits the setting or changing of the IP address

Note: The Ethernet port is only for Telnet, SNMP agent, and the Web-based server access. No fabric connection is used with this connection.

RAID storage controller

The IBM NAS 300 RAID storage controller comes with two RAID controllers, two power supplies, and two cooling units, and provides dual, redundant controllers, redundant cooling, redundant power, and battery backup of the RAID controller cache.

The IBM NAS 300 RAID storage controller supports *Fibre Channel*. It is a new technology, similar to a high-speed network, that you can use to connect large amounts of disk storage to a controller or cluster of controllers. Fibre Channel technology provides increased performance, scalability, availability, and distance for

attaching storage subsystems to network servers. The RAID storage controller provides for the attachment of Fibre Channel disk drives to give superior performance and redundancy.

Features

Each RAID storage controller includes the following standard features:

- Dual RAID Controllers
- 10 Fibre Channel 40—pin disk drives
- Dual power supplies and dual modular cooling fan assemblies
- Support for RAID levels 0, 1, 3, 5, and 10

Table 1. RAID storage controller features

<p>General</p> <ul style="list-style-type: none"> • Modular components: <ul style="list-style-type: none"> – High-capacity disk drives – RAID controllers – Power supplies – Cooling fans • Technology: <ul style="list-style-type: none"> – Support for disk arrays – Support for clustering – Fibre Channel host interface – Redundant data storage, cooling system, power system, and RAID controllers – Hot-swap technology for drives, power supplies, fans, and RAID controllers 	<ul style="list-style-type: none"> • User interface: <ul style="list-style-type: none"> – Built-in power, activity, and fault light emitting diodes (LEDs) – Identification labeling on customer replaceable units (CRUs), rear LEDs, switches, and connectors – Easy-to-replace drives, power supplies, RAID controllers, and fans <p>Disk drive storage</p> <p>Maximum drives per storage server: 10</p>	<p>RAID controllers</p> <ul style="list-style-type: none"> • Technology and interfaces: <ul style="list-style-type: none"> – Fibre Channel: 40-pin FC disk drives – Fibre Channel interface: Four Gigabit Interface Converter (GBIC) connectors for incoming and outgoing FC cables (two GBICs on each RAID controller)
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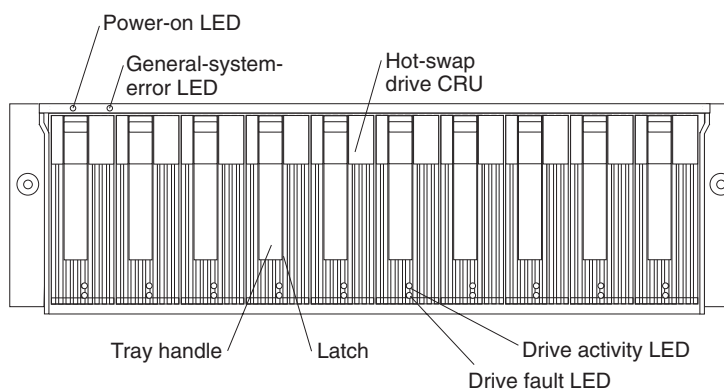
Components

The following sections show the components of the RAID storage controller.

Note: The hot-swap features of the RAID storage controller enable you to remove and replace hard disk drives, power supplies, RAID controllers, and fans without powering off the RAID storage controller. Therefore, you can maintain the availability of your system while a hot-swap device is removed or replaced.

Front view

The following illustration shows the components and controls on the front of the RAID storage controller.



Power-on LED

When on, this green light indicates that the unit has good dc power.

General-system-error LED

When on, this amber LED indicates that the RAID storage controller has a fault, such as in a power supply, fan unit, or hard disk drive.

Note: If the General-system-error LED is on continuously (not flashing), there is a problem with the RAID storage controller. Use the storage-management software to diagnose and repair the problem.

Hot-swap drive CRU

Your RAID storage controller comes standard with 10 hot-swap drive *customer replaceable units* (CRUs) in the storage server. Each drive CRU consists of a hard disk drive and tray.

Drive activity LED

Each drive CRU has a green Drive activity LED. When flashing, this green LED indicates drive activity. When on continuously, this green LED indicates that the drive is properly installed.

Drive fault LED

Each drive CRU has an amber Drive fault LED. When on, this amber LED indicates a drive failure. When flashing, this amber LED indicates that a drive identify or rebuild process is in progress.

Latch This multipurpose blue latch releases or locks the drive CRU in place.

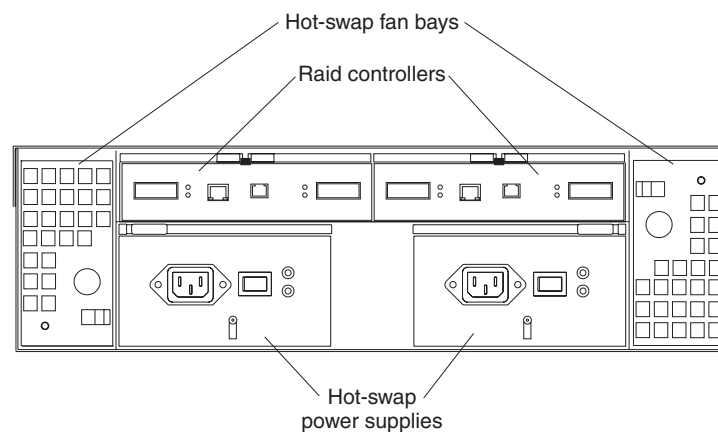
Tray handle

You can use this multipurpose handle to insert and remove a drive CRU in the bay.

For information on installing and replacing drive CRUs, see “Chapter 5. Installing and replacing IBM NAS 300 components” on page 67. For more information about the LEDs, see the *IBM NAS 300 User’s Reference*.

Back view

The following illustration shows the components at the back of the IBM NAS 300 RAID storage controller.



RAID controller

The RAID storage controller comes with one or two hot-swap RAID controllers. Each RAID controller contains two ports for Gigabit Interface

Converters (GBICs), which connect to the Fibre Channel cables. One GBIC connects to a host system. The other GBIC is used to connect additional storage units to the RAID controller.

Each RAID controller also contains a battery to maintain cache data in the event of a power failure.

Hot-swap fans

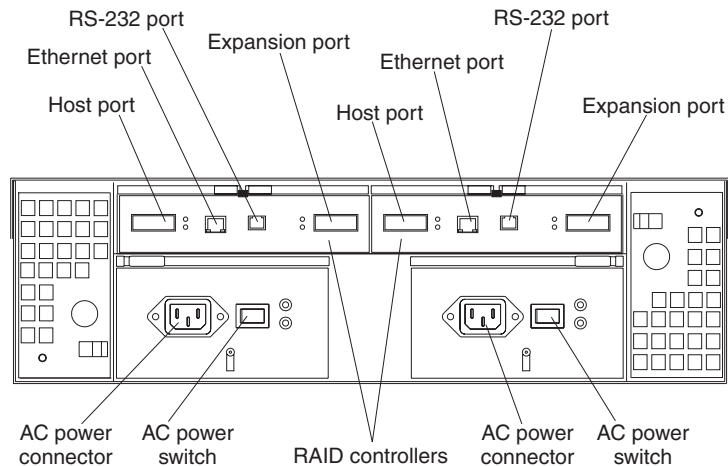
The RAID controller has two interchangeable hot-swap and redundant fan CRUs. Each fan CRU contains two fans. If one fan CRU fails, the second fan CRU continues to operate. Both fan CRUs must be installed to maintain proper cooling within your RAID controller, even if one fan CRU is not operational.

Hot-swap power supplies

The RAID controller comes with two hot-swap power supplies. Both power supplies must be installed to maintain proper cooling.

Interface ports and switches

The following illustration shows the ports and switches on the back of the RAID controller.



RAID controller

Each RAID controller contains several connectors and LEDs. Each controller has one host port and one expansion port for connecting the storage server to hosts or expansion units. You first insert GBICs into the ports and then connect the Fibre Channel cables.

Host port

The host port is used to connect a Fibre Channel cable from the IBM NAS 300 Fibre Channel hub. You first insert a GBIC into the port and then connect a Fibre Channel cable.

Ethernet port

The Ethernet port is for an RJ-45 10 BASE-T or 100 BASE-T Ethernet connection. Use the Ethernet connection to directly manage storage subsystems.

Expansion port

The expansion port is used to connect additional expansion units to the RAID controllers. You first insert a GBIC into the port and then connect a Fibre Channel cable.

RS-232 port

The RS-232 port is a TJ-6 modular jack and is used for an RS-232 serial connection. The RS-232 port is used by service personnel to perform diagnostic operations on the RAID controllers. An RS-232 cable comes with the RAID storage controller.

Storage Unit

The IBM NAS 300 storage unit is a compact unit that provides high-capacity, Fibre Channel (FC) disk storage. It delivers fast, high-volume data transfer, retrieval, and storage functions across multiple drives, to multiple hosts. The expansion enclosure is designed for continuous, reliable service; the modular, redundant disk drives, power supplies, ESM boards, and fans use hot-swap technology for easy replacement without shutting down the system.

The storage unit supports redundant, dual-loop configurations. Optional external FC cables and gigabit interface converters (GBICs) connect the RAID controller to the storage unit.

By adding an additional RAID storage controller, you can add up to seven 10–drive storage units to your IBM NAS 300.

Features

Each storage unit includes the following standard features:

- Dual ESM boards: The environmental services monitor (ESM) boards contain the expansion unit controls, switches, and LEDs. Each ESM board has two GBIC ports for connecting the storage unit to the RAID storage controller.
- 10 Fibre Channel 40–pin disk drives.
- Dual power supplies and dual modular cooling fan assemblies.

Table 2. storage unit features

General	Disk drive storage	ESM boards
<ul style="list-style-type: none">• Modular components:<ul style="list-style-type: none">– High-capacity disk drives– Environmental services monitor (ESM) boards– Power supplies– Cooling fans• Technology:<ul style="list-style-type: none">– Supports disk arrays– Supports clustering– Fibre Channel host interface– Redundant data storage, cooling system, power system, and ESM boards– Hot-swap technology for drives, power supplies, fans, and ESM boards• User interface:<ul style="list-style-type: none">– Built-in power, activity, and fault indicators– Identification labeling CRUs, rear indicator lights, switches, and connectors– Easy-to-replace drives, power supplies, ESM boards, and fans	Maximum drives per storage unit: 10	<ul style="list-style-type: none">• Technology and interfaces:<ul style="list-style-type: none">– Fibre Channel: 40-pin FC disk drives– Fibre Channel interface: Four, GBICs connectors for incoming and outgoing FC cables (two GBICs on each ESM board)

Components

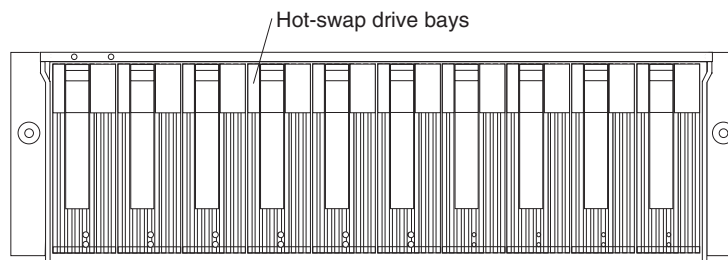
The following sections describe the components of the storage unit.

Note: The hot-swap features of the IBM NAS 300 storage unit enable you to remove and replace hard disk drives, power supplies, ESM boards, and fans without turning off the storage unit. Therefore, you can maintain the availability of your system while a hot-swap device is removed or replaced.

Storage unit CRUs

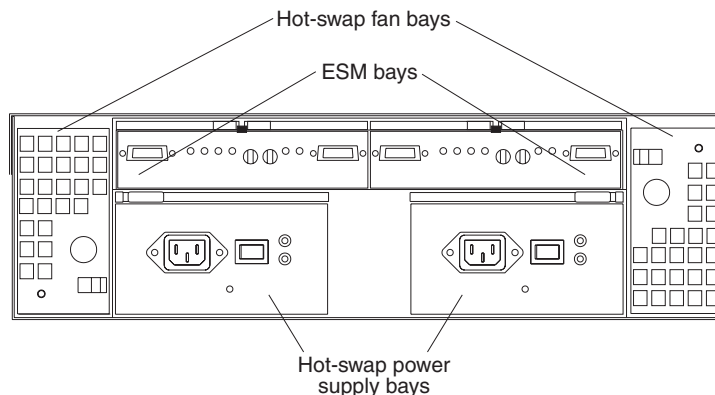
This section lists the storage unit CRUs.

Hot-swap drives: The following illustration shows the location of the hot-swap drive bays accessible from the front of your expansion unit. The storage unit contains 10 slim 40-pin FC hard disk drives. These drives come preinstalled in drive trays. This drive-and-tray assembly is called a *drive CRU* (customer replaceable unit).



Attention: Never hot-swap a drive CRU when its green Activity LED is flashing. Hot-swap a drive CRU only when its amber Fault LED is completely on and not flashing or when the drive is inactive with the green Activity LED completely on and not flashing.

Fan, ESM, and power supply CRUs: The following illustration shows the location of the hot-swap fan CRUs, the hot-swap ESM CRUs, and the hot-swap power supply CRUs.



ESM CRUs

Your storage unit comes with two hot-swappable ESM boards. The ESM boards provide a 1-Gb FC interface to the drives and monitors the overall

status of the storage unit. Each ESM board has two GBIC connector ports for connecting your storage unit to the controller or connecting two or more storage unit together. The ESM boards provide redundancy when both boards are configured into redundant FC loops.

Hot-swap fan CRUs

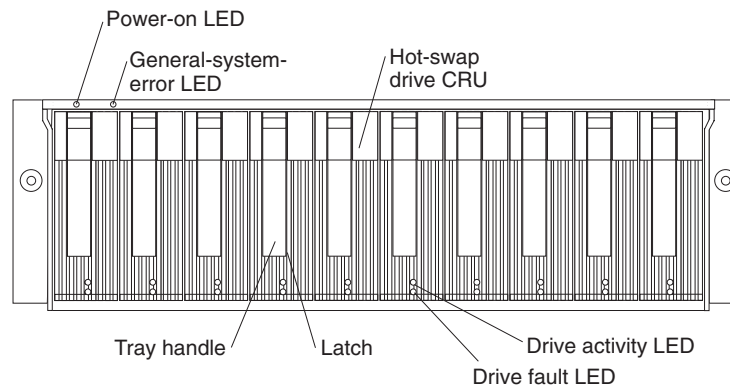
Your storage unit has two interchangeable hot-swap and redundant fan units. Each unit contains two fans. If one fan unit fails, the second fan unit continues to operate. Both fan units must be installed to maintain proper cooling within your expansion unit, even if one fan unit is not operational.

Hot-swap power supplies

Your storage unit comes with two hot-swap and redundant power supplies. Both power supplies must be installed to maintain proper cooling within your storage unit, even if one power supply is not operational.

Front controls and indicators

The primary controls on the front of the storage unit are shown in the following illustration.



Activity LED

Each drive CRU has an Activity LED. When flashing, this green LED indicates drive activity. When completely on, this green LED indicates the drive is properly installed.

Drive CRU

Your storage unit comes standard with 10 hot-swap drive CRUs. Each drive CRU consists of a hard disk drive and tray.

Fault LED

Each drive CRU has a Fault LED. When lit, this amber LED indicates a drive failure. When flashing, this amber LED indicates that a drive Identify or Rebuild process is in progress.

General system error LED

When lit, this amber LED indicates that the unit has a fault, such as in a power supply, fan unit, or hard disk drive.

Latch This multipurpose blue latch releases or locks the drive CRU in place.

Power-on LED

When lit, this green light indicates that the unit has good dc power.

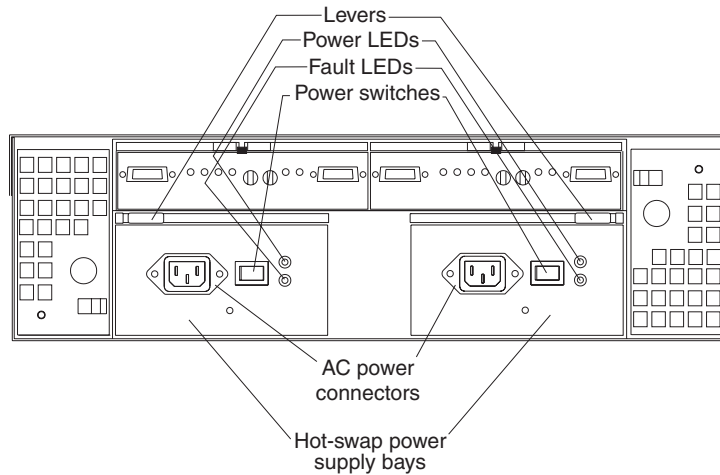
Tray handle

You can use this multipurpose handle to insert and remove a drive CRU in the bay.

Rear controls, indicators, and connectors

Two hot-swap power supply CRUs, two hot-swap fan CRUs, and two ESM boards are accessible from the back of the storage unit. These components contain several controls, indicators, and connectors.

Power supply controls, indicators, and connectors:



AC power connectors

The power cords for the power supplies connect here.

Fault LEDs

These amber Fault LEDs light if a power supply failure occurs or if the power supply is turned off.

Levers

Use these locking handles to remove or install a power supply.

Power LEDs

These green LEDs light when the storage unit is turned on and receiving ac power.

Power supply CRUs

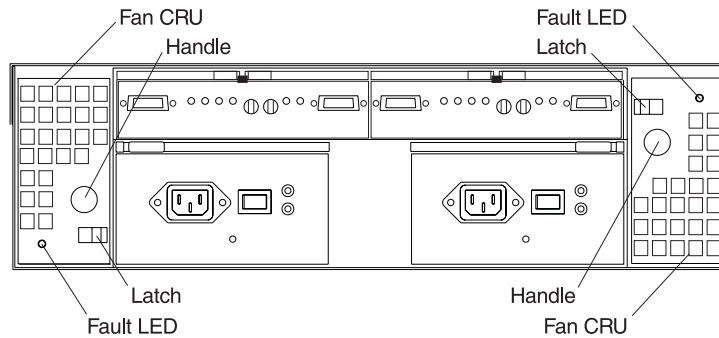
The two hot-swap power supplies are located here. Both power supply CRUs must be installed, even if one power supply is not operational.

Power switches

Use these switches to turn the power supplies on and off. You must turn both switches on to take advantage of the redundant power supplies.

Fan controls and indicators: The fans in your storage unit are hot-swappable and redundant. This means that your storage unit will continue to operate if a fan fails. It also means that you can remove and replace the fan while the storage unit is on and accessing drives.

Attention: The fans in your storage unit draw in fresh air and force out hot air. These fans are hot-swappable and redundant; however, when one fan fails, the fan unit must be replaced within 48 hours in order to maintain redundancy and optimum cooling. When you replace the failed unit, be sure to install the second fan within 10 minutes to prevent any overheating due to the lack of the additional fan unit.



Fan CRUs

The two fan CRUs are located here. These fans are hot-swappable and redundant.

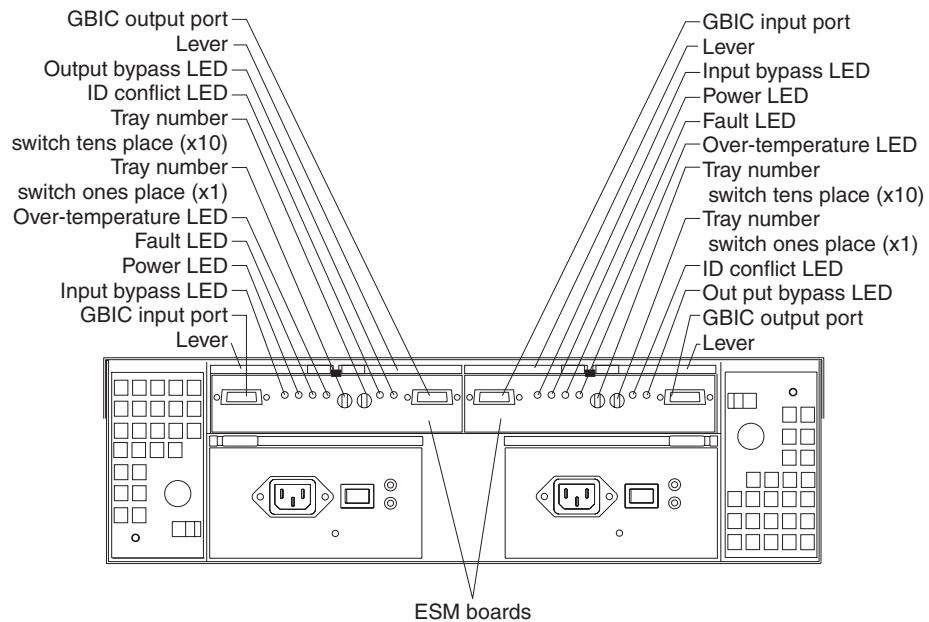
Fault LEDs

These amber LEDs light when a fan failure occurs.

Latches and handles

Use the latches and handles to remove or install the fan CRUs.

ESM boards user controls:



ESM boards

The environmental services monitor (ESM) boards contain the expansion unit controls, switches, and LEDs. Each ESM board has two GBIC ports for connecting the expansion unit to the controller.

Fault LEDs

These amber LEDs light when an ESM board failure occurs.

GBIC input ports

The two GBIC input ports are for attaching the optional GBICs to the storage unit.

GBIC output ports

The two GBIC output ports are for attaching the optional GBICs to the storage unit.

The optional GBICs (input and output) are for attaching your optical cables to the storage unit, then to the controller or additional storage unit. Insert the GBICs in the expansion unit GBIC ports and attach your FC cables to the GBICs, then connect the FC cables to the controller or additional storage unit.

ID conflict LEDs

These amber LEDs light if the storage unit tray ID settings for the ESM boards do not match. In this case, the storage unit uses the tray number of the left ESM board.

Input/Output bypass LEDs

These amber LEDs light when no valid input signal is detected and when no data is passed through the port. When no cable is connected to the port, the LEDs also light. Both ports on the ESM board are bypassed and the LEDs are lit in the event of an ESM board fault. In this case, the ESM Fault LED is also lit.

Levers

Use these levers when removing and inserting the ESM boards.

Power LEDs

These green LEDs are lit when there is power to the ESM board.

Over-temperature LEDs

These amber LEDs light if the storage unit overheats.

Tray number switches

These switches assign the physical addresses of the disk drives and the system management processors that are participating in the loop, and they identify the storage unit. The base switch (x1) sets the IDs of the disk drives on the loop. The settings of both the base ID switch (x1) and the extended ID switch (x10) together is the storage unit ID. The switches set the storage unit ID using values of 00 through 99. The base ID switch (x1) is for the ones position and the extended ID switch (x10) is for the tens position.

Supported software applications

For a list of the pre-loaded and optional software applications that are supported by your IBM NAS 300, refer to the *IBM TotalStorage Network Attached Storage 300 User's Reference*.

Chapter 3. Troubleshooting

This chapter provides basic troubleshooting information to help you resolve some common problems that might occur with your IBM NAS 300.

Note: The information is organized by IBM NAS 300 component (engines, Fibre Channel hub, and so on); however, if a Fibre Channel hub or one or more engines, RAID storage controllers, or storage units loses power to one power supply, check the circuit breakers on the power distribution units (PDUs) located inside the IBM NAS 300 left and right side covers.

Troubleshooting the engines

Diagnostic tools overview

The following tools are available to help you identify and resolve hardware-related problems:

- **POST beep codes, error messages, and error logs**

The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See “POST” on page 16 for more information.

- **Diagnostic programs and error messages**

The diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of your engine. See “Diagnostic programs and error messages” on page 17 for more information.

Note: To view error messages, attach a monitor, keyboard, and mouse to the each engine before it is powered-on.

- **Light path diagnostics**

Light-emitting diodes (LEDs) help you identify problems with engine components. These LEDs are part of the light-path diagnostics that are built into your engine. By following the *path of lights*, you can quickly identify the type of system error that occurred. See “Light path diagnostics” for more information.

Identifying problems using LEDs

Each engine has LEDs to help you identify problems with some engine components. These LEDs are part of the light path diagnostics built into the engine. By following the *path of lights*, you can identify the type of system error that occurred. See the following sections for more information.

Power supply LEDs

The ac and dc Power LEDs on the power supply provide status information about the power supply. See “Power supply LED errors” on page 52.

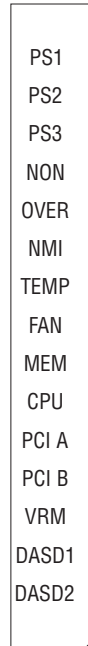
Light path diagnostics

You can use the light path diagnostics to quickly identify the type of system error that occurred. The diagnostics panel is under the “wind tunnel.” Each engine is designed so that any LEDs that are On, remain On when the engine shuts down as long as the ac power source is good and the power supplies can supply +5V dc current to the engine. This feature helps isolate the problem if an error causes the engine to shut down. See “Light path diagnostics table” on page 16.

Diagnostics LED panel

The following illustration shows the LEDs on the diagnostics panel on the system board. See “Light path diagnostics table” for information on identifying problems using these LEDs.

Note: You need to remove the top cover (see “Removing the cover and bezel” on page 70) to view these LEDs.



Light path diagnostics table

The System Error LED on the operator information panel is On when certain system errors occur. If the System Error LED is On, use the following table to help determine the cause of the error and the action to take. See table in “Information panel system error LED” on page 48.

POST

When you power-on the engine, it performs a series of tests to check the operation of its components and some of the options installed in the engine. This series of tests is called the power-on self-test or POST.

If POST finishes without detecting any problems, one long beep and three short beeps sound.

If POST detects a problem, a series of beeps sound. See “Beep symptoms” on page 45 and “POST error messages” on page 17 for more information.

Notes:

1. If you have a power-on password or administrator password set, you must type the password and press Enter, when prompted, before POST will continue.
2. A single problem might cause several error messages. When this occurs, work to correct the cause of the first error message. After you correct the cause of the first error message, the other error messages usually will not occur the next time you run the test.

POST error messages

Note: To view POST error messages, attach a monitor, keyboard, and mouse to each engine before it is powered-up.

The table, “POST error codes” on page 53, provides information about the POST error messages that can appear during startup.

Event/error logs

The POST error log contains the three most recent error codes and messages that the system generated during POST. The System Event/Error Log contains all error messages issued during POST and all system status messages from the Advanced System Management Processor. In event of a POST error, check the System Event/Error Log as it may indicate the most recent errors commonly associated with typical hardware failures. It may not detect all hardware failures but many times will provide an indicator as to the nature of key failures.

To view the contents of the error logs, start the Configuration/Setup Utility program (“Starting the Configuration/Setup Utility program” on page 111); then, select **Event/Error Logs** from the main menu.

Diagnostic programs and error messages

The engine diagnostic programs are stored in upgradable read-only memory (ROM) on the system board. These programs are the primary method of testing the major components of your engine.

For a list of error messages and codes, see “Diagnostic error codes” on page 49.

Diagnostic error messages indicate that a problem exists; they are not intended to be used to identify a failing part. Troubleshooting and servicing of complex problems that are indicated by error messages should be performed by trained service personnel.

Sometimes the first error to occur causes additional errors. In this case, the engine displays more than one error message. Always follow the suggested action instructions for the *first* error message that appears.

The following sections contain the error codes that might appear in the detailed test log and summary log when running the diagnostic programs.

The error code format is as follows:

fff-ttt-iii-date-cc-text message

where:

- fff** is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.
- ttt** is the three-digit failure code that indicates the exact test failure that was encountered.
- iii** is the three-digit device ID.
- date** is the date that the diagnostic test was run and the error recorded.
- cc** is the check digit that is used to verify the validity of the information.

text message

is the diagnostic message that indicates the reason for the problem.

Text messages

The diagnostic text message format is as follows:

Function Name: Result (test specific string)

where:

Function Name

is the name of the function being tested when the error occurred. This corresponds to the function code (fff) given in the previous list.

Result

can be one of the following:

Test Specific String

This is additional information that you can use to analyze the problem.

Passed

This result occurs when the diagnostic test completes without any errors.

Failed This result occurs when the diagnostic test discovers an error.

User Aborted

This result occurs when you stop the diagnostic test before it is complete.

Not Applicable

This result occurs when you specify a diagnostic test for a device that is not present.

Aborted

This result occurs when the test could not proceed because of the system configuration.

Warning

This result occurs when a possible problem is reported during the diagnostic test, such as when a device that is to be tested is not installed.

Starting the diagnostic programs

To start the diagnostic programs:

1. Ensure you have connected a monitor, keyboard, and mouse to each engine.

Notes:

- a. When you *do not* have a monitor, keyboard, and mouse attached and the engine passes POST, one long and three short beeps sound.
 - b. When you *have* a monitor, keyboard, and mouse attached and the engine passes POST, one beep sounds. If the engine fails POST, a series of beeps sound (see “Beep symptoms” on page 45 for more details) and an error message appears on the monitor screen.
2. Power-on the engine and watch the screen.
 3. When the message F2 for Diagnostics appears, press F2. If a POST error is encountered, a series of beeps sound and an error message appears on the monitor screen.
 4. Type in the appropriate password; then, press Enter. If a system error is encountered, the Configuration/Setup screen appears. Press **Esc** to start the Diagnostic program.

Note: To run the diagnostic programs, you must start the engine with the highest level password that is set. That is, if an administrator password is

set, you must enter the administrator password, not the power-on password, to run the diagnostic programs.

5. Select either **Extended** or **Basic** from the top of the screen. (*PC-Doctor 2.0* with a copyright statement appears at the bottom of this screen.)
6. When the Diagnostic Programs screen appears, select the test you want to run from the list that appears; then, follow the instructions on the screen.

Notes:

- a. Press F1 while running the diagnostic programs to obtain Help information. Also press F1 from within a help screen to obtain online documentation from which you can select different categories. To exit Help and return to where you left off, press **Esc**.
- b. If the engine stops during testing and you cannot continue, restart the engine and try running the diagnostic programs again.
- c. If you run the diagnostic programs with either no mouse or a USB mouse attached to your engine, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.
- d. You can test the USB keyboard by using the regular keyboard test. The regular mouse test can test a USB mouse. Also, you can run the USB hub test only if there are no USB devices attached.
- e. You can view engine configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.
- f. You cannot use the diagnostics program to test adapters. Use the procedure outlined in "Running adapter diagnostics" on page 25.

When the tests have completed, you can view the Test Log by selecting **Utility** from the top of the screen.

If the hardware checks out OK but the problem persists during normal engine operations, a software error might be the cause. If you suspect a software problem, refer to the information that comes with the software package.

Viewing the test log

The test log will not contain any information until after the diagnostic program has run.

Note: If you already are running the diagnostic programs, begin with step 4

To view the test log:

1. Ensure a monitor, keyboard, and mouse is connected to each engine.
2. Power-on the engine and watch the screen.
If the engine is on, shut down your operating system and restart the engine.
3. When the message F2 for Diagnostics appears, press F2.
If a power-on password or administrator password is set, the engine prompts you for it. Type in the appropriate password; then, press Enter.
4. When the Diagnostic Programs screen appears, select **Utility** from the top of the screen.
5. Select **View Test Log** from the list that appears; then, follow the instructions on the screen.

The system maintains the test-log data while the engine is powered-on. When you power-off the power to the engine, the test log is cleared.

Diagnostic error message tables

For descriptions of the error messages that might appear when you run the diagnostic programs see “Diagnostic error codes” on page 49.

Attention: If diagnostic error messages appear that are not listed in the tables, make sure that your engine has the latest levels of BIOS, Advanced System.

Recovering BIOS

If your BIOS has become corrupted, such as from a power failure during a flash update, you can recover your BIOS using the recovery boot block and a BIOS flash diskette.

Note: You can obtain a BIOS flash diskette from one of the following sources:

- Download a BIOS flash diskette from the website:www.storage.ibm.com/support/nas
- Contact your IBM service representative.

Troubleshooting the planar Ethernet controller

This section provides troubleshooting information for problems that might occur with the 10/100 Mbps planar Ethernet controller.

Network connection problems

If the Ethernet controller cannot connect to the network, check the following:

- Ensure that you have the engine correctly connected to the Ethernet with a verified cable that has been correctly built to the related Category 3, 4, or 5 unshielded twisted pair (UTP) standards.

The network cable must be securely attached at all connections. If the cable is attached but the problem persists, try a different cable.

If you set the Ethernet controller to operate at 100 Mbps, you must use Category 5 cabling.

If you directly connect two workstations (without a hub), or if you are not using a hub with X ports, use a crossover cable.

Note: To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.

- Ensure that heartbeat is inoperable on the adapter card or transceiver you are using to connect to the Ethernet.
- If you are connecting through an Ethernet hub or repeater, validate that the signal lights are operational while the device is on and connected to the LAN.
- Determine if the hub supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller lights on the operator information panel.

These lights indicate whether a problem exists with the connector, cable, or hub.

- The Ethernet Link Status light is On when the Ethernet controller receives a LINK pulse from the hub. If the light is Off, there might be a bad connector or cable, or a problem with the hub.
- The Ethernet Transmit/Receive Activity light is On when the Ethernet controller sends or receives data over the Ethernet Network. If the Ethernet Transmit/Receive Activity light is Off, make sure that the hub and network are operating and that the correct device drivers are loaded.

- Make sure that you are using the correct device drivers, supplied with your engine.
- Check for operating system-specific causes for the problem.
- Make sure that the device drivers on the client and engine are using the same protocol.
- Test the Ethernet controller by running the diagnostic program.

Ethernet controller troubleshooting chart

Use the following troubleshooting chart to find solutions to 10/100 Mbps Ethernet controller problems that have definite symptoms.

Table 3. Ethernet troubleshooting chart

Ethernet controller problem	Suggested Action
Ethernet Link Status light is not On.	<p>Check the following:</p> <ul style="list-style-type: none"> • Ensure that the hub is powered-on. • Check all connections at the Ethernet controller and the hub. • Check the cable. A crossover cable is required unless the hub has an <i>X</i> designation. • Use another port on the hub. • If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub. • If you manually configured the duplex mode, ensure that you also manually configure the speed. • Run diagnostics on the LEDs. <p>If the problem remains, go to “Starting the diagnostic programs” on page 18 to run the diagnostic programs.</p>
The Ethernet Transmit/Receive Activity light is not On.	<p>Check the following:</p> <p>Note: The Ethernet Transmit/Receive Activity LED is On only when data is sent to or by this Ethernet controller.</p> <ul style="list-style-type: none"> • Ensure that you have loaded the network device drivers. • The network might be idle. Try sending data from this workstation. • Run diagnostics on the LEDs. • The function of this LED can be changed by device driver load parameters. If necessary, remove any LED parameter settings when you load the device drivers.
Data is incorrect or sporadic.	<p>Check the following:</p> <ul style="list-style-type: none"> • Ensure that you are using Category 5 cabling when operating the engine at 100 Mbps. • Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.
The Ethernet controller stopped working when another adapter was added to the engine.	<p>Check the following:</p> <ul style="list-style-type: none"> • Ensure that the cable is connected to the Ethernet controller. • Ensure that your PCI system BIOS is current. • Reseat the adapter. • Ensure that the adapter you are testing is supported by the engine. <p>Go to “Starting the diagnostic programs” on page 18 to run the diagnostic programs.</p>
The Ethernet controller stopped working without apparent cause.	<p>Check the following:</p> <ul style="list-style-type: none"> • Run diagnostics for the Ethernet controller. • Try a different connector on the hub. • Reinstall the device drivers. Refer to your operating-system documentation and to the <i>IBM NAS 300 User's Reference</i> information. <p>If the problem remains, go to “Starting the diagnostic programs” on page 18 to run the diagnostic programs.</p>

10/100 Ethernet Adapter troubleshooting chart

You can use the following troubleshooting chart to find solutions to 10/100 Mbps Ethernet adapter problems that have definite symptoms.

Table 4. Ethernet troubleshooting chart

Ethernet adapter problem	Suggested Action
<p>The adapter cannot connect to the network.</p>	<p>Check the following:</p> <ol style="list-style-type: none"> 1. Ensure that the network cable is installed correctly. The cable must be securely attached at both RJ-45 connections (adapter and hub). The maximum allowable distance from adapter to the hub is 100 m (328 ft.). If the cable is attached and the distance is within acceptable limits but the problem persists, try a different cable. If you are directly connecting two computers without a hub or switch, make sure you are using a crossover cable. 2. Check the LED lights on the adapter. The adapter has two diagnostic LEDs, one on each side of the cable connector. These lights help you to determine whether there is a problem with the connector, cable, switch, or hub. <p>ACT/LNK — On</p> <ul style="list-style-type: none"> • Adapter and switch is receiving power and cable connection between them is good <p>ACT/LNK — Off</p> <p>Check the following:</p> <ul style="list-style-type: none"> • Adapter not sending or receiving data • Adapter or switch not receiving power • Cable connection between adapter and switch is faulty • Drivers not configured properly <p>ACT/LNK — Flashing</p> <p>Normal operation. LED flashes when the adapter sends or receives data. The frequency of the flashes varies with the amount of network traffic</p> <p>100 — On</p> <p>Adapter is operating at 100 Mbps</p> <p>100 — Off</p> <p>Adapter is operating at 10 Mbps</p> <ol style="list-style-type: none"> 3. Ensure that you are using the correct drivers. Ensure that you are using the drivers that come with this adapter. Drivers that support previous versions of this adapter do not support this version of the adapter. 4. Ensure that the switch port and the adapter have the same duplex setting. If you configured the adapter for full-duplex, ensure that the switch port is also configured for full-duplex. Setting the wrong duplex mode can degrade performance, cause data loss, or result in lost connections.
<p>Diagnostics pass, but the connection fails or errors occur.</p>	<p>Check the following:</p> <ol style="list-style-type: none"> 1. For 100 Mbps: <ul style="list-style-type: none"> • Use Category 5 cabling and ensure that the network cable is securely attached. • Verify the adapter is seated firmly in the slot and connected to a 100BASE-TX hub/switch (not 100BASE-T4). 2. Ensure the duplex mode setting on the adapter matches the setting on the switch

Table 4. Ethernet troubleshooting chart (continued)

Ethernet adapter problem	Suggested Action
The LNK LED is not On.	Check the following: <ol style="list-style-type: none"> 1. Ensure that you loaded the correct network drivers. 2. Check all connections at the adapter and the switch. 3. Try another port on the switch. 4. Ensure that the duplex mode setting on the adapter matches the setting on the switch. 5. Ensure that you have the correct type of cable between the adapter and the hub. 100BASE-TX requires two pairs. Some hubs require a crossover cable while others require a straight-through cable.
The ACT LED is not On.	Check the following: <ol style="list-style-type: none"> 1. Ensure that you loaded the correct network drivers. 2. The network might be idle. Try accessing a server. 3. The adapter is not transmitting or receiving data. Try another adapter. 4. Ensure that you are using two-pair cable for TX wiring.
Adapter stops working without apparent cause.	Check the following: <ol style="list-style-type: none"> 1. Run the diagnostics. 2. Try reseating the adapter in its slot, or try a different slot if necessary. 3. The network driver files might be corrupt or missing. Remove and then reinstall the drivers.
The LNK LED is not On when you connect the power.	Check the following: <p>Ensure that the network cable is securely attached at both ends.</p>

Gigabit Ethernet SX adapter troubleshooting chart

Use the following troubleshooting chart to find solutions to gigabit Ethernet adapter problems that have definite symptoms.

Table 5. Ethernet troubleshooting chart

Gigabit adapter problem	Suggested Action
No Link or TX/RX Activity	<p>If you cannot link to your switch, check the following:</p> <ol style="list-style-type: none"> Check the following LED lights on the adapter: <ul style="list-style-type: none"> TX — On The adapter is sending data RX — On The adapter is receiving data. Link — On The adapter is connected to a valid link partner and is receiving link pulses. Link — Off Link is inoperative. <ul style="list-style-type: none"> • Check all connections at the adapter and link partner • Make sure the link partner is set to 1000 Mbps and full-duplex • Ensure the required drivers are loaded PRO — Programmable LED Identifies the adapter by blinking. Use the Identify Adapter push-button in INTEL PROSet II to control blinking. Ensure that the cable is installed correctly. The network cable must be securely attached at all connections. If the cable is attached but the problem persists, try a different cable.
Your engine cannot find the Gigabit Ethernet SX adapter	<p>Check the following:</p> <ol style="list-style-type: none"> Verify that the adapter is seated firmly in the slot Try a different Gigabit Ethernet SX adapter
Diagnostics pass but the connection fails	<p>Check the following:</p> <p>Ensure the network cable is securely attached</p>
Another adapter stopped working after you installed the Gigabit Ethernet SX Adapter	<p>Check the following:</p> <ol style="list-style-type: none"> Verify that the cable is connected to the Gigabit Ethernet SX Adapter and not to another adapter. Check for a resource conflict Ensure both adapters are seated firmly in the slot Check all cables
The adapter stopped working without apparent cause	<p>Check the following:</p> <ol style="list-style-type: none"> Try reseating the adapter The network driver files might be damaged or deleted. Reinstall the drivers Try a different Gigabit Ethernet SX Adapter
LINK LED is not On	<p>Check the following:</p> <ol style="list-style-type: none"> Ensure that you have loaded the adapter driver Check all connections at the adapter and the buffered repeater or switch Try another port on the buffered repeater or switch Ensure that the buffered repeater or switch port is configured for 1000 Mbps and full-duplex. Try changing the auto-negotiation setting on the link partner, if possible

Table 5. Ethernet troubleshooting chart (continued)

Gigabit adapter problem	Suggested Action
RX or TX LED is no On	<p>Check the following:</p> <ol style="list-style-type: none"> 1. Ensure that you have loaded the adapter driver 2. Network might be idle; try logging in from a workstation 3. The adapter is not transmitting or receiving data; try another adapter

Running adapter diagnostics

This section describes how to test the adapters using the diagnostics tools.

This section describes how to test the adapters using the diagnostics tools.

Testing the Ethernet adapters with Intel PROSet II

Each IBM NAS 300 engine comes with Intel PROSet II. You can use PROSet to view the following:

- Adapter parameters such as MAC and IP addresses
- Network link status such as speed, duplex mode, and activity
- Device-driver level used for the adapter

You can also use PROSet II to test the 10/100 Ethernet and GB Ethernet PCI adapters for any problems with the adapter hardware, cabling, or network connections. PROSet performs a loopback test on the 10/100 Ethernet and GB Ethernet PCI cards.

To access the PROSet II utility, go into Terminal Services. For instructions on how to invoke Terminal Services. Within Terminal Services do the following steps:

1. Go to the Start menu, select **Settings**, then **Control Panel**.
2. Double-click the INTEL PROSet II icon in the Control Panel to start the INTEL PROSet II utility.
3. In the INTEL PROSet II utility, select the Ethernet adapter you want to test (Gigabit Ethernet PCI adapter or 10/100 Ethernet Adapter).
4. Select the **Diagnostics** tab. A list of available tests is displayed.
5. Select **Run Tests**. You can also select or deselect individual tests with the check boxes. If an error is detected, information about the error is displayed.
6. Repeat Steps 3 through 5 for each Ethernet adapter installed.

For additional information about Intel PROSet, please refer to the online help that accompanies the utility.

Testing the fibre-channel host adapter with FASt Check

Note: Ensure that there is no adapter activity before running the test or data can be lost.

The IBM NAS 300 engine also comes with FASt Check for viewing the status of the Fibre Channel connection as well as testing the adapter or cable. To use FASt Check, you should first go into Terminal Services.

You access FASt Check by going into the IBM NAS Admin console, selecting **NAS Management** → **Storage** → **NAS Utilities** → **FASt Check**. Then, select **Connect**. A diagnostic panel displays the following general information related to the Fibre Channel adapter which can be useful if you need to place a support call:

- Node name
- Serial number (in hex)
- Loop ID
- BIOS version
- Firmware version number
- Device driver version number
- PCI slot number

FASTT Check also provides the engine's world-wide name (WWN) as detailed in the *IBM NAS 300 User's Reference*.

To test the Fibre Channel adapter, select the adapter and then click the **Diagnostic** button. FASTT Check can perform fibre loopback and data tests.

For additional information relating to FASTT Check diagnostic functions, refer to the online help accessed from its panels.

Checking the FASTT host-bus adapter's fibre-channel connectivity: In addition to the above diagnostic function, you can use FASTT Check to determine if your physical fibre channel connections are in place by doing the following steps:

1. Once Connected with FASTT as above, select the **QLA2200 Adapter** icon, and verify that you see all Fibre Controllers that you are physically connected to. If you see a red **X** on the QLA2200 Adapter icon, and the icon is yellow, the adapter cannot register with the 3534 Fibre Channel hub. (A green icon means connections are in place.) Check the fibre cable connections, and if the QLA2200 adapter still does not connect, run the adapter and 3534 Fibre Channel hub diagnostics.
2. If the icon is green, click on the plus sign (+) in front of the adapter icon to see the state of the attached Fibre channel storage controllers. The absence of controllers in the display indicates connection problems.

For additional information relating to FASTT Check diagnostic functions, refer to the online help accessed from its panels.

Testing the Advanced System Management adapter

1. Insert the Advance System Management Utility CD-ROM into the CD-ROM drive and restart the engine. If the engine does not boot from the CD-ROM, use POST/BIOS setup to configure the CD-ROM drive as a boot device.
2. After your engine boots, the main option menu appears. The main menu contains the following selections:
 - Hardware Status and Information
 - Configuration Settings
 - Update System Management firmware
3. Use the up and down arrow keys to select **Hardware Status and Information** and press **Enter**. The Hardware Status and Information menu contains the list of Advanced System Management devices in the Gateway with the following diagnostic test results:

```

System Management Processor Communication : Passed
-> Built in Self Test Status ..... : Passed
    Boot Sector Code Revision ... :6, Build ID: RIET62A
    Main Application Code Revision :4, Build ID: ILET15A
  
```

```

System Management Processor Communication : Passed
-> Built in Self Test Status ..... : Passed
Boot Sector Code Revision ... :6, Build ID: WMICT60A
Main Application Code Revision :4, Build ID: WMXT57A

```

4. Use the up and down arrow keys to select the device you want to look at in more detail. Press **Enter**. You will see a list of tests and results on the device:

Current System Management Processor Status

```

Current BIST Results:
SRAM Memory Test: Passed
Serial Port 1 Test : Passed
Serial Port 2 Test: Passed
NVRAM Memory Test Passed
Realtime Clock Test Passed
Programmable Gate Array Test: Passed
I2C Interface Test: Passed
Main Application Checksum: Passed
Boot Sector Checksum: Passed

```

Current System Management Adapter Status

```

Current BIST Results:
SRAM Memory Test: Passed
Serial Port 1 Test : Passed
Serial Port 2 Test: Passed
NVRAM Memory Test Passed
Realtime Clock Test Passed
Programmable Gate Array Test: Passed
I2C Interface Test: Passed
Main Application Checksum: Passed
Boot Sector Checksum: Passed
Onboard Ethernet Hardware Test: Passed
PCI EEPROM Initialization Test: Passed

```

5. When you are finished viewing this information, press **Esc** to return to the main option menu. Remove the CD then restart the engine.

Power checkout

Power problems can be difficult to troubleshoot. For example, a short circuit can exist anywhere on any of the power distribution busses. Usually a short circuit causes the power subsystem to shut down because of an overcurrent condition.

A general procedure for troubleshooting power problems is as follows:

1. Power-off the system and disconnect the ac cord(s).
2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if there is a loose screw causing a short circuit on a circuit board.
3. Remove adapters and disconnect the cables and power connectors to all internal and external devices until the engine is at minimum configuration required for power-on (see "Minimum operating requirements" on page 62).
4. Reconnect the ac cord and power-on the engine. If it powers up successfully, replace adapters and devices one at a time until the problem is isolated. If the engine does not power-up from minimal configuration, replace FRUs of minimal configuration one at a time until the problem is isolated.

To use this method it is important to know the minimum configuration required to power-up an engine (see page 62). For specific problems, see "Power error messages" on page 59.

Replacing the battery

IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

CAUTION: When replacing the battery, use only IBM Part Number 10L6432 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

Note: In the U.S., call 1-800-IBM-4333 for information about battery disposal.

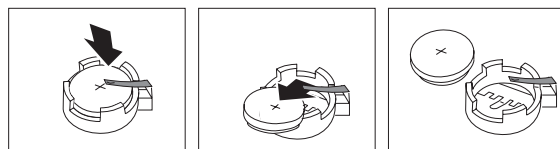
If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.

Note: Before you begin be sure to read any special handling and installation instructions supplied with the replacement battery.

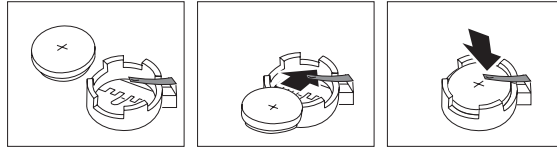
Note: After you replace the battery, you must reconfigure your engine and reset the system date and time.

To replace the battery:

1. Review any special handling and installation instructions supplied with the replacement battery.
2. Power-off the engine and peripheral devices and disconnect all external cables and power cords; then, remove the engine cover.
3. Remove the battery:
 - a. Use one finger to lift the battery clip over the battery.
 - b. Use one finger to slightly slide the battery from its socket. The spring mechanism behind the battery will push the battery out toward you as you slide it from the socket.
 - c. Use your thumb and index finger to pull the battery from under the battery clip.
 - d. Ensure that the battery clip is touching the base of the battery socket by pressing gently on the clip.



4. Insert the new battery:
 - a. Tilt the battery so that you can insert it into the socket, under the battery clip.
 - b. As you slide it under the battery clip, press the battery down into the socket.



5. Reinstall the engine cover and connect the cables.

Note: Wait approximately 20 seconds after you plug the power cord of your engine into an electrical outlet for the Power Control button to become active.

6. Power-on the engine.
7. Start the Configuration/Setup Utility program and set configuration parameters.
 - Set the system date and time.
 - Set the power-on password.
 - Reconfigure your engine.

Temperature checkout

Correct cooling of the engine is important for proper operation and reliability. Ensure that:

- Each of the drive bays has either a drive or a filler panel installed
- Each of the power supply bays has either a power supply or a filler panel installed
- The top cover is in place during normal operation
- There is at least 50 mm (2 inches) of ventilated space at the sides of the engine and 100 mm (4 inches) at the rear of the engine.
- The top cover is removed for no longer than 30 minutes while the engine is operating
- The processor housing cover covering the processor and memory area is removed for no longer than ten minutes while the engine is operating
- A removed hot-swap drive is replaced within two minutes of removal
- Cables for optional adapters are routed according to the instructions provided with the adapters (ensure that cables are not restricting air flow)
- The fans are operating correctly and the air flow is good
- A failed fan is replaced within 48 hours

In addition, ensure that the environmental specifications for the engine are met.

For more information on specific temperature error messages, see “Temperature error messages” on page 58.

Troubleshooting the Fibre Channel hub

Attention: If you are going to service a functional Fibre Channel hub, never unplug cables or GBICs when there is activity on the associated ports. This will cause immediate failure of the communications path. To determine if a port has active communications, see “Visually inspect LEDs” If it becomes necessary to unplug active ports, the you must stop communications on these ports.

Always begin problem determination by checking the following areas.

- System reported error or failure to access a device
- Visually inspect LEDs
- Determine if zoning is in effect
- Check for problems on attached devices

Before performing any repair action, gather as much information as possible.

System reported error or failure to access a device

Either the customer has reported a IBM NAS 300 related system error message or the customer has reported a failure accessing IBM NAS 300 storage. If the host reported error message from the IBM NAS 300 is known, or a customer communications failure symptom is known, see Table 6 on page 31 After identifying the error message or the symptom, perform the recommended service action.

Visually inspect LEDs

Observe the front panel LED status indicators, then check the information in Table 6 on page 31. If a faulty condition is observed, perform the recommended service action.

Check for problems on attached devices

To determine if the source of the problem is an attached device, check the following:

- LEDs
- Display panels
- Firmware levels

Checking the Fibre Channel hub

Attention: Do not remove cables or GBIC from ports that are:

- Blinking green: This is a normally operating port with communications in progress.
- Steady green: The port is connected to a functional device, but there is no data traffic in progress. If this port is believed to be the problem, the failure is not with the Fibre Channel hub. Instead, the attached device or host is not attempting to send data. See the appropriate host, device, or application documentation to resolve the problem.

Use the following procedure to ensure that the Use the following procedure to ensure that the Fibre Channel hub is good.

1. Remove the incoming cables from the suspect ports. Mark them to make sure that you can return them to the same port.
2. Remove and reseal the GBIC in port 7 if it is installed.

3. Insert one of the small single GBIC port wrap connectors (black for ports 0 - 6). For port 7 the connector is black if the GBIC is short wavelength or gray if it is long wavelength). Wait 10 seconds and observe the associated port LED. If it is slowly blinking green (every 2 seconds), the GBIC and port are functional. Do this for all suspect ports.
4. If all ports show a slow blinking green (blinks every 2 seconds), port LED, check the customer configuration information or the associated fibre-channel cables. See “Checking the customer configuration (action code 6)” on page 34 and “Suspect fibre-channel cable (action code 7)” on page 34.
5. If any of the LEDs for ports 0 - 6 do not blink green, replace the Fibre Channel hub. See “Working with the Fibre Channel hub” on page 110. If the LED for port 7 does not blink green, replace the GBIC, then continue with step 6.
6. After replacing the GBIC in port 7, insert the single port-wrap connector. If the port LED still does not blink green, replace the Fibre Channel hub. See “Working with the Fibre Channel hub” on page 110.

Service References

Table 6 lists the types of error messages or failure indications that might be encountered. For the recommended action, see the corresponding action code in Table 7 on page 32.

Table 6. Service reference table

Description	Action Code
System reported error message	
The customer has reported that a fan failure was reported to the system.	1
Customer reports a failure to communicate with a host or device	
Communication failure on all ports	2
Communication failure on some ports	3
Visual LED observation	
Slow yellow blink port LED (2 second blink)	3
Fast yellow blink port LED (1/2 second blink)	3
Steady yellow port LED	3
Slow green blink port LED (2 second interval)	3
Fast green blink port LED (1/2 second interval)	3
Steady green port LED (port is online and the connected host/device is not sending data)	0
Flickering green port LED (port is online and the connected host/device is sending data)	0
Interleaving green/yellow port LED (port is bypassed)	5
Port LED is off on port 7 (and a GBIC and cable are installed)	3
Port LED is off on port 7 (no GBIC installed)	0
Port LED is off on port 7 (GBIC installed but no cable)	3
Ready LED is anything other than steady green	3
Port LED is off on port 0, 1, 2, 3, 4, 5, or 6 (and a cable is installed)	3
Port LED is off on port 0, 1, 2, 3, 4, 5, or 6 (but no cable is installed)	3

Action Codes

Table 7 lists the action codes and the recommended actions.

Table 7. Action codes

Action code	Action
0	Normal, no action required
1	See “Fan failure (action code 1)”
2	See “All ports fail to communicate (action code 2)”
3	See “Abnormal port LED/Function (action code 3)”
4	See “Abnormal Ready LED (action code 4)” on page 34
5	See “Port in bypass mode (action code 5)” on page 34
6	See “Checking the customer configuration (action code 6)” on page 34
7	See “Suspect fibre-channel cable (action code 7)” on page 34

Fan failure (action code 1): This service action is due to a customer call regarding a hub message to the system that indicates a fan failure has occurred or you suspect a fan failure for another reason. Replace the Fibre Channel hub. See “Working with the Fibre Channel hub” on page 110.

All ports fail to communicate (action code 2): This service call is due to a complete failure (no data can be passed through the hub).

1. Observe the front of the Fibre Channel hub. If the ready LED is on and steadily green, see “Abnormal port LED/Function (action code 3)”.

If not, verify the following:

- a. The power cord is seated.
- b. There is power in the electrical outlet.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer’s responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (72XXD201)

2. If the LED is now on, unplug the unit from the electrical outlet, wait 15 seconds, then plug the unit into the electrical outlet.
3. If the ready LED is not on and steadily green, replace the entire 3534 Managed Hub. See “Working with the Fibre Channel hub” on page 110.

Abnormal port LED/Function (action code 3): You are here for one of the following reasons:

- You started from the action code for a total hub failure, and observed the ready LED was functioning normally
- The customer reported that only some ports were failing while others were operating.
- You observed an abnormal LED status on one or more ports.

Be sure that all cables and GBICs are properly seated. Observe the LEDs for the failing ports. If you do not know which ports are failing, go to “Checking the Fibre Channel hub” on page 30.

1. If the port LED blinks slow yellow (blinks every two seconds), the port is disabled. The customer needs to re-enable the port using the Storwatch Managed Hub Specialist Web interface or a Telnet session. See the *IBM NAS 300 User's Reference* for information on disabling and re-enabling ports. Have the customer re-enable the port.
2. If the port LED blinks fast yellow (blinks every 1/2 second), perform the following steps:
 - a. Remove the incoming cables from the failing ports. Mark them to ensure that you can return them to the same port.
 - b. If the port is port 7, remove and reseat the GBIC.
 - c. Insert one of the small single GBIC port wrap connectors (black for ports 0 - 6). For port 7, the connector is black if the GBIC is short wavelength or gray if it is long wavelength. Wait 10 seconds and observe the associated port LED. If it is blinking green, the GBIC and port are functional. Do this for all suspect ports. If all ports show a blinking green port LED, check the other customer configuration information or the associated fibre-channel cables. See "Checking the customer configuration (action code 6)" on page 34 and "Suspect fibre-channel cable (action code 7)" on page 34
 - d. If any of the LEDs for ports 0 - 6 do not blink green, replace the Fibre Channel hub. See "Working with the Fibre Channel hub" on page 110. If the LED for port 7 does not blink green, replace the GBIC with a new (known good) GBIC.
 - e. After replacing the GBIC in port 7, again insert the single port wrap connector. If the port LED still does not blink green, replace the Fibre Channel hub. See "Working with the Fibre Channel hub" on page 110.
3. If the port LED is steady yellow, this indicates that the port is receiving a signal, but the attached device is not yet online, and the device is likely not in the ready state. Have the customer make the device ready. If the customer is unable to correct the problem, see "Abnormal port LED/Function (action code 3)" on page 32.
4. If the port LED blinks a fast green (1/2-second blink, not a flickering light), replace the Fibre Channel hub. See "Working with the Fibre Channel hub" on page 110
5. If the port LED blinks slow green (2-second blink), it indicates that a bad cable or a wrap cable is installed. Perform the following steps:
 - a. Verify if a wrap cable is installed or if a wrap connector is installed at the other end of the cable. If either of these situations is true, correct it.
 - b. If a wrap cable or wrap connector is not installed, replace the cable or ask the customer to have his cabling supplier check the cable, whichever is appropriate.
6. If the port 0 - 6 LEDs show no light with no cable installed, or if port 7 shows no light with a GBIC installed but no cable, perform the following steps:
 - a. This is normal. A cable from an appropriate device needs to be installed if the port is to be used.
 - b. If the device cable is present, insert the cable into the GBIC or port.
7. If the port LED shows no light and a cable is installed, make sure that the attached device is turned on and ready.
8. If the attached device is turned on and ready, it is necessary to check other customer configuration information, or the associated fibre-channel cables. See "Checking the customer configuration (action code 6)" on page 34 and "Suspect fibre-channel cable (action code 7)" on page 34.

Abnormal Ready LED (action code 4): You are here because you have seen an abnormal indication for the ready LED.

1. Verify the following:
 - a. The power cord is seated.
 - b. There is power in the electrical outlet.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the products that attach to the system. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (72XXD201)

2. If the LED is now on, unplug the unit from the electrical outlet; wait 15 seconds, then plug the unit back into the electrical outlet.
3. If the ready LED is not on and steadily green, replace the entire 3534 Managed Hub. See "Working with the Fibre Channel hub" on page 110.

Port in bypass mode (action code 5): The port is in bypass mode because it has been unable to initialize the link.

1. Remove the cable from the port. The LED should go off.
 - If the LED goes off, go to step 2.
 - If the LED stays interleaving green and yellow, go to step 3.
 - If the LED goes to some other state, note the new state and refer to "Appendix F. Fibre Channel hub Diagnostics" on page 141 to determine correct action.
2. The LED is off. This state is normal operation for the Fibre Channel hub. When the cable was connected, the LED was interleaving green and yellow, indicating that the port was not receiving correct information over the fiber link to enable it to correctly initialize the link. See the appropriate manual for the device at the other end of the cable, and resolve why a valid link initialization frame is not being sent.
3. When the cable is removed, the LED should go to off. However, if it interleaves green and yellow, there is a problem with the hub.
 - If the interleaving port is 0 through 6, you must replace the hub. See "Working with the Fibre Channel hub" on page 110.
 - If the interleaving port is port 7, replace the GBIC and see if this resolves the problem. If replacing the GBIC module does not solve the problem, you must replace the Fibre Channel hub. See "Working with the Fibre Channel hub" on page 110.

Checking the customer configuration (action code 6):

1. Check the customer configuration to ensure that the customer has appropriately configured any systems, HBAs, storage devices, and code levels.
2. The HBAs should be running in FCAL mode. You should run diagnostics as available on the systems HBAs.

If the HBAs are correctly configured and pass diagnostics, and you have not found any fault with the Fibre Channel hub after reviewing and following all other instructions in the service procedures, you might need to replace the fibre-channel cable. Go to "Suspect fibre-channel cable (action code 7)".

Suspect fibre-channel cable (action code 7):

1. Verify that the ends of the suspect cable are fully seated and that the pair of fibre connectors are correctly oriented at both ends of the cable. You can easily check this by swapping the two fibres at one end to see if this corrects the problem. If this does not correct the problem, be sure to restore the fibre cables to their original configuration.
2. If the HBA does not have wrap capability and you have access to both ends of the cable, you can check it by plugging it into two short wavelength ports on the same Fibre Channel hub, if available. Make sure that twice the cables length is less than 500 m for short wavelength to do this test. Many bad cables can be detected by simply plugging them into two ports and observing the port indicator LEDs. The LEDs should blink slow green (blinks every 2 seconds). If they do not, the cable is bad.
3. If the host or device HBA has a diagnostic to wrap a cable, perform this diagnostic. If the diagnostic still reports failure, replace the cable or have the customer replace the cable.
 - If this is an IBM-provided cable, replace the cable. There are two lengths of cable available for the Fibre Channel hub (5-meter and 25-meter short wave). If these are appropriate, replace the cable.
 - If the cables were obtained from some other IBM product, you need to determine the appropriate FRU.
 - If the customer obtained the cable from someone other than IBM, the customer needs to replace the cable.
4. If the LED slowly blinks green, you can test it further by using the Cross Port diagnostic test. See “Appendix F. Fibre Channel hub Diagnostics” on page 141.
5. If it is not possible or not appropriate to access the Fibre Channel hub in this way, replace the short cable. If you are dealing with a long cable or one where both ends cannot be accessed at the Fibre Channel hub, you need to have the cable installer test the cable.

“Appendix F. Fibre Channel hub Diagnostics” on page 141 describes additional diagnostic procedures information including detailed diagnostic tests.

Troubleshooting the RAID storage controllers and storage units

IBM NAS 300 contains a Java-based storage management tool that manages, monitors and diagnoses the IBM NAS 300 RAID storage controllers and storage units. This tool provides an interface for storage management based on information supplied by the storage subsystem controllers. This tool, called SM7, is accessed on the IBM NAS 300 by using Windows Terminal Services which can be reached through UM Services using TCP/IP port 1411 or directly through Terminal Services via TCP/IP port 8099 or by using a directly attached keyboard and display. SM7 sends commands to the storage subsystem controllers. The controller firmware contains the necessary information to carry out the storage-management commands. The controller is responsible for validating and running the commands and providing status and configuration information back to the client software.

The storage-management software provides the best way to diagnose and repair storage server failures. The software can help you:

- Determine the nature of the failure
- Locate the failed component
- Determine the recovery procedures to repair the failure

Although the storage server has fault LEDs, these lights do not necessarily indicate which component has failed or needs to be replaced, or which type of recovery

procedure that you must perform. In some cases (such as loss of redundancy in various components), the fault LED does not turn on. Only the storage-management software can detect the failure. For example, the recovery procedure for a Predictive Failure Analysis (PFA) flag (impending drive failure) on a drive varies depending on the drive status (hot spare, unassigned, RAID level, current logical drive status, and so on). Depending on the circumstances, a PFA flag on a drive can indicate a high risk of data loss (if the drive is in a RAID 0 volume) or a minimal risk (if the drive is unassigned). Only the storage-management software can identify the risk level and provide the necessary recovery procedures.

Note: For PFA flags, the General-system-error LED and Drive fault LEDs do not turn on, so checking the LEDs will not notify you of the failure, even if the risk of data loss is high. Recovering from a RAID storage controller failure might require you to perform procedures other than replacing the component (such as backing up the logical drive or failing a drive before removing it). The storage-management software gives these procedures.

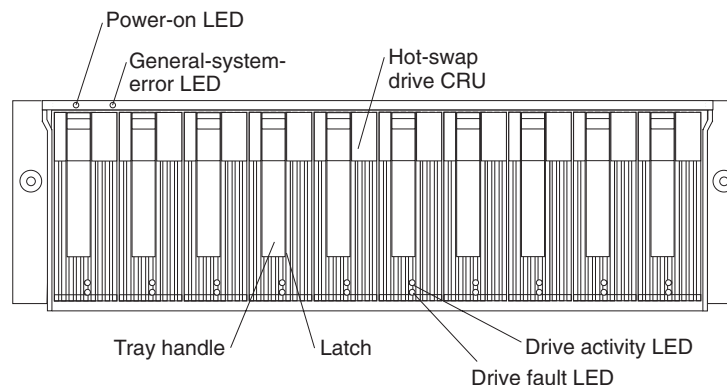
Attention: Not following the software-recovery procedures can result in data loss.

Checking the LEDs

The LEDs display the status of the IBM NAS 300 components. Green LEDs indicate a normal operating status; amber LEDs indicate a possible failure.

It is important to check all the LEDs on the front and back of the components when you turn on the power. In addition to checking for faults, you can use the LEDs on the front of the storage server to determine if the drives are responding to I/O transmissions from the network.

See the following diagram and Table 8 for information about the front-panel LEDs.



For information about rear-panel LEDs, see:

- Table 9 on page 37
- Table 10 on page 39
- Table 11 on page 39

Table 8. LEDs located on front panel of a RAID storage controller

LED	Color	Operating states ¹
-----	-------	-------------------------------

Table 8. LEDs located on front panel of a RAID storage controller (continued)

Drive active	Green	<ul style="list-style-type: none"> • On -Normal operation • Flashing -The drive is reading or writing data • Off - One of the following situations has occurred: <ul style="list-style-type: none"> – The storage server has no power – The storage subsystem has no power – The drive is not properly seated in the storage server – The drive has not spun up
Drive fault	Amber	<ul style="list-style-type: none"> • Off - Normal operation • Flashing - The storage-management software is locating a drive/logical drive/or storage subsystem • On - The drive has failed or a user failed the drive
Power	Green	<ul style="list-style-type: none"> • On -Normal operation • Off -One of the following situations has occurred: <ul style="list-style-type: none"> – The storage server has no power – The storage subsystem has no power – The power supply has failed – There is an overtemperature condition –
General system error	Amber	<ul style="list-style-type: none"> • Off - Normal operation • On -A storage server component has failed²
¹ Always use the storage-management software to identify the failure.		
² Not all component failures turn on this LED.		

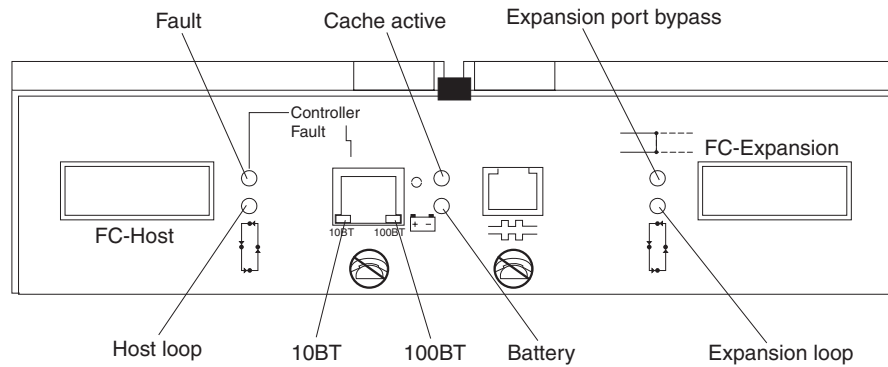






Table 9 shows the LEDs located on the rear of a RAID storage controller.

Table 9. LEDs located on rear panel of a RAID storage controller

Icon	LED	Color	Operating states ¹
	Fault	Amber	<ul style="list-style-type: none"> • Off -Normal operation • On -The RAID controller has failed.

Table 9. LEDs located on rear panel of a RAID storage controller (continued)

	Host loop	Green	<ul style="list-style-type: none"> • On -Normal operation • Off -One of the following situations has occurred: <ul style="list-style-type: none"> – The host loop is down/not turned on/or not connected – A GBIC has failed or the host port is not occupied. – The RAID controller circuitry has failed or the RAID controller has no power
	Cache active	Green	<ul style="list-style-type: none"> • On -There is data in the RAID controller cache. • Off -One of the following situations has occurred: <ul style="list-style-type: none"> – There is no data in cache – There are no cache options selected for this array – The cache memory has failed or the battery has failed
	Battery	Green	<ul style="list-style-type: none"> • On -Normal operation • Flashing -The battery is recharging or performing a self-test • Off -The battery or battery charger has failed
	Expansion port bypass	Amber	<ul style="list-style-type: none"> • Off - Normal operation • On -One of the following situations has occurred: <ul style="list-style-type: none"> – The expansion port is not occupied – The Fibre Channel cable is not attached to an expansion unit – The attached expansion unit is not turned on – A GBIC has failed a Fibre Channel cable has failed or a GBIC has failed on the attached expansion unit.
	Expansion loop	Green	<ul style="list-style-type: none"> • On -Normal operation • Off -The RAID controller circuitry has failed or the RAID controller has no power
No Icon	10BT and 100BT	Green	<ul style="list-style-type: none"> • If the Ethernet connection is 10BASE-T, the 10BT LED is on and 100BT LED flashes faintly • If the Ethernet connection is 100BASE-T, 10BT LED is off and 100BT LED is on. • If there is no Ethernet connection, then both LEDs are off.
<p>¹Always use the storage-management software to identify the failure.</p>			

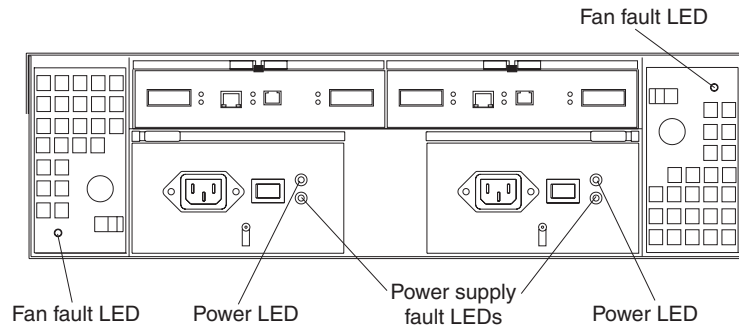


Table 10. Fan LED

LED	Color	Operating States ¹
Fault	Amber	<ul style="list-style-type: none"> • Off — Normal operation • On — The fan CRU has failed
¹ Always use the storage-management software to identify the failure.		

Table 11. Power supply LEDs

LED	Color	Operating States ¹
Fault	Amber	<ul style="list-style-type: none"> • Off — Normal operation • On — One of the following situations has occurred: <ul style="list-style-type: none"> – The power supply has failed – An overtemperature condition has occurred – The power supply is turned off
Power	Green	<ul style="list-style-type: none"> • Off — Normal operation • On — One of the following situations has occurred: <ul style="list-style-type: none"> – The power supply is disconnected – The power supply is seated improperly – The IBM NAS 300 has no power
¹ Always use the storage-management software to identify the failure.		

Use the following steps to verify the RAID storage controller, storage unit, drives, all components of the boxes and all interconnections between the boxes:

- Start SM7 via Terminal Services
- After it starts, click on the flashlight button so it will find the subsystems. It should display the subsystem trees.
- Double click a subsystem to bring up the management window which will show the subsystem tree with an unconfigured capacity branch.
- Verify that the unconfigured capacity matches the total that is supposed to be attached to that RAID controller.
- Verify that the "thermometer/fan/battery" button on the right side of each enclosure picture is GREEN
- Right click the subsystem listed at the top of the tree and select **locate**
- Verify that the amber light on all drives attached to that RAID controller are blinking. The drives *do not* have to be initialized to blink the drive lights.

Table 12 on page 40 lists the external indicators on the storage unit and explanations for the different states of the indicators.

Table 12. LEDs located on rear panel of a storage unit

Problem indicator	Component	Possible cause	Possible solutions
Amber LED on	Drive CRU	Drive has failed	Replace the drive that has failed.
	Fan CRU	Fan failure	Replace the fan that has failed.
RAID controller Fault LED	RAID controller	RAID controller has failed	If the RAID controller Fault LED is on, replace the RAID controller.
Expansion port bypass LED	Storage unit	GBIC port empty	No corrective action is needed if the system is properly configured. .
		Fibre Channel cable is not attached to the expansion unit	No corrective action is needed.
		No incoming signal detected	Reattach the GBICs and Fibre Channel cables. Replace input and output GBICs or cables as necessary.
Front panel — General system error Indicates that a fault LED somewhere on the storage server has turned on. (Check amber and green LEDs on all CRUs.)			
Amber LED is on and green LED off	Power-supply CRU	Power switch is turned off or ac power failure.	Turn on all power-supply power switches.
Amber and green LEDs on	Power-supply CRU	Power supply failure	Replace the failed power-supply CRU.
All green LEDs off	All CRUs	Subsystem power is off	Check that all storage-server power cords are plugged in and the power switches are on. If applicable, check that the main circuit breakers for the rack are turned on.
		AC power failure	Check the main circuit breaker and ac outlet.
		Power supply failure	Replace the power supply.
		Midplane failure	Replace the midplane
Amber LED flashing	Drive CRUs	Drive rebuild or identity is in process	No corrective action is needed

Table 12. LEDs located on rear panel of a storage unit (continued)

One or more green LEDs off	Power supply CRUs	Power cord unplugged or switches turned off	Make sure that the power cord is plugged in and the power-supply switches are turned on. Front panel Power supply problem Make sure that the cords are plugged in and power supplies are turned on.
	All drive CRUs	Midplane failure	Replace the midplane
	Battery	Battery failure	Replace the battery.
	Cache active	The cache is disabled, the cache has failed, battery failure	Use the storage-management software to enable the cache; replace the RAID controller; replace the battery
	Host loop	Host, managed hub, or switch is off or has failed	Check if host managed hub or switch is on. Replace attached devices that have failed.
		Fibre Channel cable has failed	Ensure that the Fibre Channel cables are undamaged and properly connected.
		GBIC has failed	Insure GBIC is seated properly; replace GBIC
		RAID controller has no power or has failed	Ensure that the unit is powered on. Replace RAID controller.
	Expansion loop	Drives are improperly installed or not installed	Ensure that the drives are properly installed.
		RAID controller has no power or has failed	Insure that the unit is powered on. Replace the RAID controller.
		Hard-drive failure	Replace the drive.
		Externally attached expansion port device has failed	Replace the drive; replace the expansion unit GBIC or Fiber Channel cable.

Table 12. LEDs located on rear panel of a storage unit (continued)

Intermittent or sporadic power loss to the storage server	Some or all CRUs	Defective ac power source or partially plugged-in power cord	Check the ac power source. Reseat all installed power cables and power supplies. If applicable, check the power components. Replace defective power cords. .
		Power supply has failed	Check for a Fault LED on the power supply, and replace the failed CRU.
		Midplane has failed	Replace the midplane
Unable to access drives	Drives and Fibre Channel loop	Fibre Channel cabling has failed	Insure that the Fibre Channel cables are undamaged and properly connected
		RAID controller has failed	Replace the RAID controller
		GBIC has failed	Insure GBIC is seated properly; replace GBIC

Powering the IBM NAS 300 on and off

This section contains instructions for powering the IBM NAS 300 on and off under normal and emergency situations. The clustering function requires special considerations when you need to power on or off. This section gives the details for those considerations.

If you are powering on the IBM NAS 300 after an emergency shutdown, see “Restoring power after an emergency” on page 43.

Powering on when clustering is active

1. Power on any UPS and allow it to return to normal operation.
2. Power on any network hubs or switches .
3. Power on all 5192 Network Attached Storage Storage Units and 3534 Managed Hubs. Give the 3534 Managed Hubs about three minutes to start up.
4. Power on each 5191 RAID Storage Controller. After about three to four minutes, the storage controllers will have completed their startup routine. You can verify this by making sure that for each drive in the storage controller and for each drive in the storage unit, the status LED (on the top front of the drive) is solid green (not blinking) for at least five seconds.
5. Power on the node that you shut down last in the powering off procedure.
6. Once the node comes up, start Cluster Administrator on that node and make sure that all resources are in an online state or shortly return to that state.
7. If no problems exist and all clustered resources are online, power on the node that you shut down first in the powering off procedure. Each resource for which that node is the preferred owner will fail back to that node and return to an online state.

Powering off when clustering is active

1. Make note of the order in which you shut down the nodes.
You shut the nodes down one at a time, and in the powering on procedure you start the nodes in the opposite order in which you powered them off.
2. On the node you want to shut down last (the second node), click **Cluster Administration**, located in IBM NAS Admin, in the Cluster Tools folder. If prompted for a cluster name, enter the name of the cluster, and then click **Open**. Make sure that all resources are in the online state.
3. With all clustered resources in the online state, on the node you want to shut down first (the first node), go to **Start, Shut Down** and select **Shut down** from the drop down menu. Click **OK**.
4. On the second node, in Cluster Administrator, wait for all resources to fail over to that node and return to the online state.
5. Once all resources are in the online state, and the first node has shut down, on the second node go to **Start, Shutdown** and select **Shut down** from the drop down menu. Click **OK**.
6. Once both nodes have shut down, power off each 5191 RAID Storage Controller by pressing the two power switches located on the rear of the unit.
7. Power off all 5192 Network Attached Storage Storage Units and 3534 Managed Hubs.
8. You may power down any network hubs or switches that are used exclusively by the Model 325. If they are used by other network attached devices, do not power these off.
9. You may also power off any Uninterruptible Power Supplies (UPS) that regulate power for the Model 325, provided that no other equipment that you wish to keep powered on is plugged into the same UPS.

Emergency Shutdown

This section contains instructions for emergency circumstances.

If you are turning on the IBM NAS 300 after an emergency shutdown or power outage, refer to “Restoring power after an emergency”.

Performing an emergency shutdown

Attention: Emergency situations might include fire, flood, extreme weather conditions, or other hazardous circumstances. If a power outage or emergency situation occurs, always turn off all power switches on all computing equipment. This will help safeguard your equipment from potential damage due to electrical surges when power is restored. If the IBM NAS 300 loses power unexpectedly, it might be due to a hardware failure in the power system.

Use this procedure to shut down during an emergency.

1. If you have time, stop all activity and check the LEDs (front and back). Make note of any Fault LEDs that are lit so you can correct the problem when you turn on the power again.
2. Turn off all power supply switches; then, unplug both external power cords from the IBM NAS 300.

Restoring power after an emergency

Use this procedure to restart the IBM NAS 300 if you turned off the power supply switches during an emergency shut down, or if a power failure or a power outage occurred.

1. After the emergency situation is over or power is restored, check the IBM NAS 300 for damage. If there is no visible damage, continue with Step 2; otherwise, have your system serviced.
2. After you have checked for damage, ensure that the power switches are in the off position; then, plug in the external power cord.
3. Turn on the power to each device, based on the startup sequence.
4. Turn on both power supply switches on the back of the RAID storage controllers and storage units.
5. Only the green LEDs on the front and back and the amber Bypass LEDs for unconnected GBIC ports should remain on. If other amber Fault LEDs are on, refer to *IBM NAS 300 User's Reference* for instructions.
6. Use your installed software application as appropriate to check the status of the IBM NAS 300.

Chapter 4. Symptom-to-FRU index

This chapter contains Symptom-to-FRU lists for the IBM NAS 300 components. These lists describe symptoms, errors, and the possible causes. The most likely cause is listed first.

Engine Symptom-to-FRU index

Use this Symptom-to-FRU index to help you decide which FRUs to have available when servicing your IBM NAS 300 engine.

The POST BIOS displays POST error codes and messages on the screen.

Note: These diagnostic error messages require the attachment of a monitor, keyboard, and mouse (before you power on the engine) to enable you to see them.

Power-on self-test

When you power on your IBM NAS 300, its engines perform a power-on self-test (POST) to check the operation of appliance components and some installed options.

If the POST finishes without detecting any problems, you will hear one long and three short beeps, if a monitor and keyboard are not attached to the appliance. When a monitor and keyboard are attached, you will hear one short beep. Any other series of beeps indicates a problem, and an error message appears on your screen.

Beep symptoms

Beep symptoms are short tones or a series of short tones separated by pauses (intervals without sound). See the following examples.

Beeps	Description
1-2-3	<ul style="list-style-type: none">• One beep• A pause (or break)• Two beeps• A pause (or break)• Three Beeps
4	Four continuous beeps

Beep/Symptom	FRU/Action
1-1-2 (Processor register test failed)	1. Processor
1-1-3 (CMOS write/read test failed)	1. Battery 2. System Board
1-1-4 (BIOS EEPROM checksum failed)	1. System Board
1-2-1 (Programmable Interval Timer failed)	1. System Board
1-2-2 (DMA initialization failed)	1. System Board

Beep/Symptom	FRU/Action
1-2-3 (DMA page register write/read failed)	1. System Board
1-2-4 (RAM refresh verification failed)	1. DIMM 2. System Board
1-3-1 (1st 64K RAM test failed)	1. DIMM
1-3-2 (1st 64K RAM parity test failed)	1. DIMM 2. System Board
2-1-1 (Secondary DMA register failed)	1. System Board
2-1-2 (Primary DMA register failed)	1. System Board
2-1-3 (Primary interrupt mask register failed)	1. System Board
2-1-4 (Secondary interrupt mask register failed)	1. System Board
2-2-2 (Keyboard controller failed)	1. System Board 2. Keyboard
2-2-3 (CMOS power failure and checksum checks failed)	1. Battery 2. System Board
2-2-4 (CMOS configuration information validation failed)	1. Battery 2. System Board
2-3-1 (Screen initialization failed)	1. Jumper on J14 2. System Board
2-3-2 (Screen memory failed)	1. System Board
2-3-3 (Screen retrace failed)	1. System Board
2-3-4 (Search for video ROM failed)	1. System Board
2-4-1 (Video failed; screen believed operable)	1. System Board
3-1-1 (Timer tick interrupt failed)	1. System Board
3-1-2 (Interval timer channel 2 failed)	1. System Board
3-1-3 (RAM test failed above address OFFFFH)	1. DIMM 2. System Board
3-1-4 (Time-Of-Day clock failed)	1. Battery 2. System Board
3-2-1 (Serial port failed)	1. System Board
3-2-2 (Parallel port failed)	1. System Board
3-2-3 (Math coprocessor failed)	1. Processor
3-2-4 (Failure comparing CMOS memory size against actual)	1. DIMM 2. Battery

Beep/Symptom	FRU/Action
3-3-1 (Memory size mismatch occurred; see "Memory Settings" on page 114)	<ol style="list-style-type: none"> DIMM Battery
3-3-2 (Critical SMBUS error occurred)	<ol style="list-style-type: none"> Disconnect the server power cord from outlet, wait 30 seconds and retry. System Board DIMMs DASD Backplane Power Supply Power Supply Backplane 12 C Cable
3-3-3 (No operational memory in system)	<ol style="list-style-type: none"> Install or reseat the memory modules, then do a 3 boot reset. (See "Using the Configuration/Setup Utility program" on page 111.) DIMMs Memory Board System Board
Two Short Beeps (Information only, the configuration has changed)	<ol style="list-style-type: none"> Run Diagnostics Run Configuration/Setup
Three Short Beeps	<ol style="list-style-type: none"> DIMM System Board
One Continuous Beep	<ol style="list-style-type: none"> Processor System Board
Repeating Short Beeps	<ol style="list-style-type: none"> Keyboard System Board
One Long and One Short Beep	<ol style="list-style-type: none"> Video adapter (if present) System Board
One Long and Two Short Beeps	<ol style="list-style-type: none"> Video adapter (if present) System Board
Two Long and Two Short Beeps	<ol style="list-style-type: none"> Video adapter

No Beep symptoms

No Beep Symptom	FRU/Action
No beep and the system operates correctly.	<ol style="list-style-type: none"> Check speaker cables Speaker System Board
No Beeps occur after successfully completing POST (The Power-On Status is disabled.)	<ol style="list-style-type: none"> Run Configuration/Setup, set the Start Options Power-On Status to enable. Check speaker connections System Board

No Beep Symptom	FRU/Action
No ac power (Power supply ac LED is off)	<ol style="list-style-type: none"> 1. Check the power cord. 2. Power Supply (If two are installed, swap them to determine if one is defective.) 3. Power Backplane 4. Hot-Swap Power AC Inlet Box
No beep and no video	1. See “Undetermined problems” on page 62
System will not power-up (Power supply ac LED is on)	1. See“Power supply LED errors” on page 52

Information panel system error LED

The system error LED is turned on when an error is detected. If the system error LED (an amber “!” on the lower right corner) is on, remove the cover and check the diagnostic panel LEDs. The following is a complete list of diagnostic panel LEDs followed by the FRU/Action for correcting the problem. The following chart is valid only when the system error LED is on.

Note: If a diagnostic panel LED is on and the information LED panel system error LED is off, there is probably an LED problem. Run LED diagnostics.

Notes:

1. To locate the LEDs on the system board.
2. Check the System Error Log for additional information before replacing a FRU.
3. The DIMM error LEDs, processor error LEDs, and VRM error LEDs turn off when the system is powered-off.

Diagnostic Panel LED	FRU/Action
All LEDs off (Check System Error Log for error condition, then clear System Error Log when the problem is found.)	<ol style="list-style-type: none"> 1. System Error Log is 75% full; clear the log. 2. PFA alert; check log for failure; clear PFA alert; remove AC power for at least 20 seconds, reconnect, then power up system. 3. Run Information Panel diagnostics.
CPU LED on (The LED next to the failing CPU should be on.)	1. Processor 1 or 2.
VRM LED on (The LED next to the failing VRM should be on.)	<ol style="list-style-type: none"> 1. Voltage regulator module indicated by the VRM LED on the system board that is turned on. 2. Processor indicated by the Processor LED.
DASD LED on (The LED located next to the drive bay that the failing drive is installed in will be turned on.)	<ol style="list-style-type: none"> 1. Failing drive. 2. Be sure the fans are operating correctly and the air flow is good. 3. SCSI Backplane.
FAN LED on	<ol style="list-style-type: none"> 1. Check individual fan LEDs. 2. Replace respective fan. 3. Fan Cable. 4. System Board. 5. Power Backplane Board.
MEM LED on (The LED next to the failing DIMM is on.)	<ol style="list-style-type: none"> 1. DIMM. 2. Failing DIMM in slot J1-J4.

Diagnostic Panel LED	FRU/Action
NMI LED on	<ol style="list-style-type: none"> 1. Reboot the system. 2. Check the System Error Log.
PCI A LED on	<ol style="list-style-type: none"> 1. PCI Card in slot 5. 2. Remove all PCI adapters from slots 1-5. 3. System Board.
PCI B LED on	<ol style="list-style-type: none"> 1. Card in slots 3-5. 2. Remove all PCI adapters from slots 1-5. 3. System Board.
PCI C LED on	<ol style="list-style-type: none"> 1. Remove all PCI adapters from slots 1-5. 2. System Board.
PS1 LED on	<ol style="list-style-type: none"> 1. Check the DC Good LED on power supply 1. If off, replace power supply 1. 2. Power Backplane.
PS2 LED on	<ol style="list-style-type: none"> 1. Check the DC Good LED on power supply 2. If off, replace power supply 2. 2. Power Backplane.
TEMP LED on (look at test cases)	<ol style="list-style-type: none"> 1. Ambient temperature must be within normal operating specifications. 2. Ensure fans are operating correctly. 3. Examine System Error Log. <ol style="list-style-type: none"> a. System over recommended temperature <ol style="list-style-type: none"> 1) Information LED Panel 2) System Board c. DASD over recommended temperature (DASD LED also on) <ol style="list-style-type: none"> 1) Overheating hard drive 2) DASD Backplane 3) System Board d. System over recommended temperature for CPU X (where X is CPU 1, 2,) (CPU LED also on) <ol style="list-style-type: none"> 1) CPU X e. System Board over recommended temperature 4. If the CPU LED on the diagnostics panel is also on, one of the microprocessors has caused the error.

Diagnostic error codes

Note: In the following error codes, if *XXX* is *000*, *195*, or *197* **do not** replace a FRU. The description for these error codes are:

- 000** The test passed.
- 195** The **Esc** key was pressed to abort the test.
- 197** This is a warning error and may not indicate a hardware failure.

For all error codes, replace/follow the FRU/Action indicated.

Error Code/Symptom	FRU/Action
001-XXX-000 (Failed core tests)	1. System Board
001-XXX-001 (Failed core tests)	1. System Board
001-250-000 (Failed System Board ECC)	1. System Board
001-250-001 (Failed System Board ECC)	1. System Board
005-XXX-000 (Failed Video test)	1. System Board
011-XXX-000 (Failed COM1 Serial Port test)	1. System Board
011-XXX-001 (Failed COM2 Serial Port test)	1. System Board
014-XXX-000 (Failed Parallel Port test)	1. System Board
015-XXX-001 (USB interface not found, board damaged)	1. System Board
015-XXX-015 (Failed USB external loopback test)	1. System Board 2. Make sure parallel port is not disabled. 3. Re-run USB external loopback test.
015-XXX-198 (USB device connected during USB test)	1. System Board 2. Remove USB devices from USB1 and USB2. 3. Re-run USB external loopback test.
020-XXX-000 (Failed PCI Interface test)	1. System Board
020-XXX-001 (Failed Hot-Swap Slot 1 PCI Latch test)	1. PCI Hot-Swap Latch Assembly 2. System Board
020-XXX-002 (Failed Hot-Swap Slot 2 PCI Latch test)	1. PCI Hot-Swap Latch Assembly 2. System Board
020-XXX-003 (Failed Hot-Swap Slot 3 PCI Latch test)	1. PCI Hot-Swap Latch Assembly 2. System Board
020-XXX-004 (Failed Hot-Swap Slot 4 PCI Latch test)	1. PCI Hot-Swap Latch Assembly 2. System Board
030-XXX-000 (Failed Internal SCSI interface test)	1. System Board
035-XXX-099	1. No adapters were found. 2. If adapter is installed re-check connection.
075-XXX-000 (Failed Power Supply test)	1. Power Supply
089-XXX-001 (Failed Microprocessor test)	1. VRM for Microprocessor 1 2. Microprocessor 1
089-XXX-002 (Failed Microprocessor test)	1. VRM 2 for Microprocessor 2 2. Microprocessor 2
165-XXX-000 (Failed Service Processor test)	1. System Board. Before replacing the System Board, ensure that System Board jumper J45 is not installed (the default) when the error occurs. 2. Power Backplane 3. Hot-Swap Drive Backplane

Error Code/Symptom	FRU/Action
180-XXX-000 (Diagnostics LED failure)	1. Run Diagnostic LED test for the failing LED.
180-XXX-001 (Failed information LED panel test)	1. Information LED Panel 2. Power Switch 3. Assembly
180-XXX-002 (Failed Diagnostics LED Panel test)	1. Diagnostics LED Panel 2. Power Switch 3. Assembly
180-XXX-003 (Failed System Board LED test)	1. System Board
180-XXX-004 (Failed System Board LED test)	1. System Board
180-XXX-005 (Failed SCSI Backplane LED test)	1. SCSI Backplane 2. SCSI Backplane Cable 3. System Board
180-XXX-006 (Memory Board LED test)	1. Memory Board 2. System Board
201-XXX-0NN (Failed Memory test, see "Memory Settings" on page 114)	1. DIMM Location slots 1-4 where NN = DIMM location. Note: NN=1=DIMM 2 =2=DIMM 1 =3=DIMM 4 =4=DIMM 3 2. System Board
201-XXX-999 (Multiple DIMM failure, see error text)	1. See error text for failing DIMMs 2. System Board
202-XXX-001 (Failed System Cache test)	1. VRM 1 2. Microprocessor 1
202-XXX-002 (Failed System Cache test)	1. VRM 2 2. Microprocessor 2
206-XXX-000 (Failed Diskette Drive test)	1. Cable 2. Diskette Drive 3. System Board
215-XXX-000 (Failed IDE CD-ROM test)	1. CD-ROM Drive Cables 2. CD-ROM Drive 3. System Board
217-XXX-000 (Failed BIOS Fixed Disk test)	1. Fixed Disk 1
301-XXX-000 (Failed Keyboard test)	1. Keyboard
405-XXX-000 (Failed Ethernet test on controller on the System Board)	1. Verify that Ethernet is not disabled in BIOS. 2. System Board
405-XXX-00N (Failed Ethernet test on adapter in PCI slot N)	1. Adapter in PCI slot N. 2. System Board
415-XXX-000 (Failed Modem test)	1. Cable Note: Ensure modem is present and attached to server. 2. Modem 3. System Board

Error symptoms

Error Symptom	FRU/Action
CD is not working properly.	<ol style="list-style-type: none"> 1. Clean the CD. 2. Run CD-ROM diagnostics 3. CD-ROM Drive
CD-ROM drive tray is not working . (The server must be powered-on)	<ol style="list-style-type: none"> 1. Insert the end of a paper clip into the manual tray-release opening. 2. Run CD-ROM diagnostics 3. CD-ROM Drive
CD-ROM drive is not recognized.	<ol style="list-style-type: none"> 1. Run Configuration/Setup, enable primary IDE channel. 2. Check cables and jumpers. 3. Check for correct device driver. 4. System Board 5. Run CD-ROM diagnostics 6. CD-ROM Drive
Power switch does not work and reset button does work. There is not a jumper for forcing power on for the server.	<ol style="list-style-type: none"> 1. Verify that the power-on control jumper on J23 extension cable is on pins 1 and 2. 2. Power Switch Assembly 3. System Board
Diskette drive in-use light stays on, or the system bypasses the diskette drive, or the diskette drive does not work	<ol style="list-style-type: none"> 1. If there is a diskette in the drive, verify that: <ol style="list-style-type: none"> a. The diskette drive is enabled in the Configuration/Setup utility program. b. The diskette is good and not damaged. (Try another diskette if you have one.) c. The diskette is inserted correctly in the drive. d. The diskette contains the necessary files to start the server. e. The software program is OK. f. Cable is installed correctly (proper orientation) 2. Run Diskette Drive Diagnostics 3. Cable 4. Diskette Drive 5. System Board

Power supply LED errors

Use the power supply LED information on the following page to troubleshoot power supply problems.

Note: The minimum configuration required for the dc Good light to come on is:

- Power Supply
- Power Backplane
- System Board (with pins 2 and 3 on J23 extension cable connected together to bypass the power switch.

AC Good LED	DC Good LED	Description	FRU/Action
Off	Off	No power to system or ac problem.	<ol style="list-style-type: none"> 1. Check ac power to system. 2. Power Supply

AC Good LED	DC Good LED	Description	FRU/Action
On	Off	Standby mode or dc problem.	<ol style="list-style-type: none"> Check system board cable connectors J32, J33, and J35. Move jumper on J32's extension cable to pins 2-3 to bypass power control. If the DC Good LED comes on, press Ctrl+Alt+Delete. Watch the screen for any POST errors. Check the System Error Log for any listed problems. If the system powers up with no errors: <ol style="list-style-type: none"> Power Switch Assembly System Board Remove the adapters and disconnect the cables and power connectors to all internal and external devices. Power-on the system. If the DC Good LED comes on, replace the adapters and devices one at a time until you isolate the problem. Power Supply Power Backplane System Board
On	On	Power is OK.	N/A

POST error codes

Note: These diagnostic error messages require the attachment of a monitor, keyboard, and mouse (before you power-on each engine) to enable you to see them.

In the following error codes, *X* can be any number or letter.

Error Code/Symptom	FRU/Action
062 (Three consecutive boot failures using the default configuration.)	<ol style="list-style-type: none"> Run Configuration/Setup Battery System Board Processor
101, 102 (System and processor error)	<ol style="list-style-type: none"> System Board
106 (System and processor error)	<ol style="list-style-type: none"> System Board
111 (Channel check error)	<ol style="list-style-type: none"> Failing 15A adapter Memory DIMM System Board
114 (Adapter read-only memory error)	<ol style="list-style-type: none"> Failing Adapter Run Diagnostics
129 (Internal cache error)	<ol style="list-style-type: none"> Processor
151 (Real time clock error)	<ol style="list-style-type: none"> Run Diagnostics Battery System Board

Error Code/Symptom	FRU/Action
161 (Real time clock battery error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board
162 (Device Configuration Error) Note: Be sure to load the default settings and any additional desired settings; then, save the configuration.	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. Failing Device 4. System Board
163 (Real-Time Clock error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board
164 (Memory configuration changed, see "Memory settings" on page 114.)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. DIMM
175 (Hardware error)	<ol style="list-style-type: none"> 1. System Board
176 (engine cover or cable cover was removed without a key being used)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board 3. C2 Security Switch
177, 178 (Security hardware error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
184 (Power-on password corrupted)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
185 (Drive startup sequence information corrupted)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
186 (Security hardware control logic failed)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
187 (VPD serial number not set.)	<ol style="list-style-type: none"> 1. Set serial number in Setup 2. System Board
188 (Bad EEPROM CRC #2)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
189 (An attempt was made to access the server with invalid passwords)	<ol style="list-style-type: none"> 1. Run Configuration/Setup, enter the administrator password
201 (Memory test error, see "Memory Settings" on page 114.) If the engine does not have the latest level of BIOS installed, update the BIOS to the latest level and run the diagnostic program again.	<ol style="list-style-type: none"> 1. DIMM 2. System Board
229 (Cache error)	<ol style="list-style-type: none"> 1. Processor
262 (DRAM parity configuration error)	<ol style="list-style-type: none"> 1. Run configuration /setup 2. Battery 3. System Board
289 (DIMM has been disabled by the user or system, see "Memory Settings" on page 114.)	<ol style="list-style-type: none"> 1. Run Configuration/Setup, if disabled by user 2. Disabled DIMM, if not disabled by user.

Error Code/Symptom	FRU/Action
301 (Keyboard or keyboard controller error)	<ol style="list-style-type: none"> 1. Keyboard 2. System Board
303 (Keyboard controller error)	<ol style="list-style-type: none"> 1. System Board
602 (Invalid diskette boot record)	<ol style="list-style-type: none"> 1. Diskette 2. Diskette Drive 3. Cable 4. System Board
604 (Diskette drive error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup and Diagnostics 2. Diskette Drive 3. Drive Cable 4. System Board
605 (Unlock failure)	<ol style="list-style-type: none"> 1. Diskette Drive 2. Drive Cable 3. System Board
662 (Diskette drive configuration error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup and Diagnostics 2. Diskette Drive 3. Drive Cable 4. System Board
762 (Coprocessor configuration error)	<ol style="list-style-type: none"> 1. Run configuration setup 2. Battery 3. Processor
962 (Parallel port error)	<ol style="list-style-type: none"> 1. Disconnect external cable on parallel port. 2. Run Configuration/Setup 3. System Board
11XX (System board serial port 1 or 2 error)	<ol style="list-style-type: none"> 1. Disconnect external cable on serial port. 2. Run Configuration/Setup 3. System Board
0001200 (Machine check architecture error)	<ol style="list-style-type: none"> 1. Processor 1
1301 (I ² C cable to front panel not found)	<ol style="list-style-type: none"> 1. Cable 2. Front Panel 3. Power Switch Assembly 4. System Board
1302 (I ² C cable from system board to power on and reset switches not found)	<ol style="list-style-type: none"> 1. Cable 2. Power Switch Assembly 3. System Board
1303 (I ² C cable from system board to power backplane not found)	<ol style="list-style-type: none"> 1. Cable 2. Power Backplane 3. System Board
1304 (I ² C cable to diagnostic LED board not found)	<ol style="list-style-type: none"> 1. Power Switch Assembly 2. System Board

Error Code/Symptom	FRU/Action
<p>1600 (The Service Processor is not functioning) Do the following before replacing a FRU:</p> <ol style="list-style-type: none"> 1. Ensure that a jumper is not installed on J45. 2. Remove the ac power to the engine, wait 20 seconds; then, reconnect the ac power. Wait 30 seconds; then, power-on the engine. 	<ol style="list-style-type: none"> 1. System Board
<p>1601 (The engine is able to communicate to the Service Processor, but the Service Processor failed to respond at the start of POST.) Do the following before replacing a FRU:</p> <ol style="list-style-type: none"> 1. Remove the ac power to the engine, wait 20 seconds; then, reconnect the ac power. Wait 30 seconds; then, power-on the engine. 2. Flash update the Service Processor. 	<ol style="list-style-type: none"> 1. System Board
<p>1762 (Hard Drive Configuration error)</p>	<ol style="list-style-type: none"> 1. Hard Drive 2. Hard Drive Cables 3. Run Configuration/Setup 4. Hard Drive Adapter 5. SCSI Backplane 6. System Board
<p>178X (Hard Drive error)</p>	<ol style="list-style-type: none"> 1. Hard Drive Cables 2. Run Diagnostics 3. Hard Drive Adapter 4. Hard Drive 5. System Board
<p>1800 (No more hardware interrupt available for PCI adapter)</p>	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
<p>1962 (Drive does not contain a valid boot sector)</p>	<ol style="list-style-type: none"> 1. Verify a bootable operating system is installed 2. Run Diagnostics 3. Hard Disk Drive 4. SCSI Backplane 5. Cable 6. System Board
<p>2400 (Video controller test failure)</p>	<ol style="list-style-type: none"> 1. Video Adapter (if installed) 2. System Board
<p>2462 (Video memory configuration error)</p>	<ol style="list-style-type: none"> 1. Video Adapter (if installed) 2. System Board

Error Code/Symptom	FRU/Action
5962 (IDE CD-ROM configuration error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. CD-ROM Drive 3. CD-ROM Power Cable 4. IDE Cable 5. System Board 6. Battery
8603 (Pointing Device Error)	<ol style="list-style-type: none"> 1. Pointing Device 2. System Board
00019501 (Processor 1 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> 1. VRM 1, VRM 2 2. Processor 1 3. System Board
00019502 (Processor 2 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> 1. VRM 2 2. Processor 2
00019701 (Processor 1 failed)	<ol style="list-style-type: none"> 1. Processor 1 2. System Board
00019702 (Processor 2 failed)	<ol style="list-style-type: none"> 1. Processor 2 2. System Board
00180100 (No room for PCI option ROM)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180200 (No more I/O space available for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180300 (No more memory (above 1MB for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180400 (No more memory (below 1MB for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
00180500 (PCI option ROM checksum error)	<ol style="list-style-type: none"> 1. Remove Failing PCI Card 2. System Board
00180600 (PCI to PCI bridge error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
00180700, 00180800 (General PCI error)	<ol style="list-style-type: none"> 1. System Board 2. PCI Card
01295085 (ECC checking hardware test error)	<ol style="list-style-type: none"> 1. System Board 2. Processor

Error Code/Symptom	FRU/Action
01298001 (No update data for processor 1)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 1
01298002 (No update data for processor 2)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 2
01298101 (Bad update data for processor 1)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 1
01298102 (Bad update data for processor 2)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 2
I9990301 (Fixed boot sector error)	<ol style="list-style-type: none"> 1. Hard Drive 2. SCSI Backplane 3. Cable 4. System Board
I9990305 (Fixed boot sector error, no operating system installed)	<ol style="list-style-type: none"> 1. Install operating system to hard drive.
I9990650 (AC power has been restored)	<ol style="list-style-type: none"> 1. Check cable 2. Check for interruption of power supply 3. Power Cable

SCSI error codes

Error Code	FRU/Action
<p>All SCSI Errors One or more of the following might be causing the problem:</p> <ul style="list-style-type: none"> • A failing SCSI device (adapter, drive, controller) • An improper SCSI configuration or SCSI termination jumper setting • An incorrectly installed cable • A defective cable 	<ol style="list-style-type: none"> 1. External SCSI devices must be powered-on before you power-on the server. 2. The cables for all external SCSI devices are connected correctly. 3. The last device in each SCSI chain is terminated correctly. 4. The SCSI devices are configured correctly.

Temperature error messages

Message	Action
DASD bank 2 Over Temperature (level-critical; Direct Access Storage Device bay "X" was over temperature)	<ol style="list-style-type: none"> 1. Ensure engine is being correctly cooled; see "Temperature checkout" on page 29.
DASD Over recommended Temperature (sensor X) (level-warning; DASD bay "X" had over temperature condition)	<ol style="list-style-type: none"> 1. Ensure engine is being correctly cooled; see "Temperature checkout" on page 29.
DASD under recommended temperature (sensor X) (level-warning; direct access storage device bay "X" had under temperature condition)	<ol style="list-style-type: none"> 1. Ambient temperature must be within normal operating specifications.

Message	Action
DASD 1 Over Temperature (level-critical; sensor for DASD1 reported temperature over recommended range)	1. Ensure engine is being correctly cooled ; see “Temperature checkout” on page 29.
Power Supply "X" Temperature Fault (level-critical; power supply "x" had over temperature condition)	1. Ensure engine is being correctly cooled ; see “Temperature checkout” on page 29. 2. Replace Power Supply "X"
System board is over recommended temperature (level-warning; system board is over recommended temperature)	1. Ensure engine is being correctly cooled ; see “Temperature checkout” on page 29. 2. Replace system board
System board is under recommended temperature (level-warning; system board is under recommended temperature)	1. Ambient temperature must be within normal operating specifications..
System over temperature for CPU "X" (level-warning; CPU "X" reporting over temperature condition)	1. Ensure engine is being correctly cooled ; see“Temperature checkout” on page 29
System under recommended CPU "X" temperature (level-warning; system reporting under temperature condition for CPU "X")	1. Ambient temperature must be within normal operating specifications.

Fan error messages

Message	Action
Fan "X" failure (level-critical; fan "X" had a failure)	1. Check connections to fan "X" 2. Replace fan "X"
Fan "X" fault (level-critical; fan "X" beyond recommended RPM range)	1. Check connections to fan "X" 2. Replace fan "X"
Fan "X" Outside Recommended Speed Action	1. Replace fan "X"

Power error messages

Message	Action
Power supply "X" current share fault (level-critical; excessive current demand on power supply "X")	1. See “Power checkout” on page 27
Power supply "X" DC good fault (level-critical; power good signal not detected for power supply "X")	1. Replace power supply "X"
Power supply "X" temperature fault	1. Replace fan "X"
Power supply "X" removed	1. No action required - information only
Power supply "X" fan fault (level-critical; fan fault in power supply "X")	1. Replace power supply "X"
Power supply "X" 12V fault (level-critical; overcurrent condition detected)	1. See “Power checkout” on page 27
Power supply "X" 3.3V fault (level-critical; 3.3V power supply "X" had an error)	1. See “Power checkout” on page 27

Message	Action
Power supply "X" 5V fault (level-critical; 5V power supply "X" had an error)	1. See "Power checkout" on page 27
System over recommended "X" current (level-non-critical; system running too much current on that voltage)	1. See "Power checkout" on page 27
System running non-redundant power (level-non-critical; system does not have redundant power)	1. Add another power supply 2. Remove options from system 3. System can continue to operate without redundancy protection if 1 and 2 above are not followed.
System under recommended voltage for "X" v (level-warning; indicated voltage supply under nominal value; value for "X" can be +12, -12, or +5)	1. Check connections to power subsystem 2. Replace power supply 3. Replace power backplane
System under recommended voltage on 3.3 v (level-warning; 3.3 volt supply under nominal value)	1. Check connections to power subsystem 2. Replace power supply 3. Replace power backplane
System under recommended X current (level-non-critical; system drawing less current than recommended on voltage "X")	1. See "Power checkout" on page 27
"X" V bus fault (level-critical; overcurrent condition on "X" voltage bus)	1. Check for short circuit on "X" voltage bus 2. See "Power checkout" on page 27
12V "X" bus fault (level-critical; overcurrent condition on 12 volt "X" voltage bus)	1. Check for short circuit on 12 volt "X" voltage bus 2. See "Power checkout" on page 27
5V fault (level-critical; overcurrent condition on 5 V subsystem)	1. Check for short circuit on 5 v bus 2. See "Power checkout" on page 27
240 VA fault (level-critical; overcurrent or overvoltage condition in power subsystem)	1. See "Power checkout" on page 27

Engine shutdown

Refer to the following tables when experiencing engine shutdown related to voltage or temperature problems.

Voltage related engine shutdown:

Message	Action
System shutoff due to "X" current over max value (level-critical; system drawing too much current on voltage "X" bus)	1. See "Power checkout" on page 27
System shutoff due to "X" current under min value (level-critical; current on voltage bus "X" under minimum value)	1. See "Power checkout" on page 27
System shutoff due to "X" V over voltage (level-critical; system shutoff due to "X" supply over voltage)	1. Check power supply connectors 2. Replace power supply 3. Replace power backplane
System shutoff due to "X" V under voltage (level-critical system shutoff due to "X" supply under voltage)	1. Check power supply connectors 2. Replace power supply 3. Replace power backplane

Message	Action
System shutoff due to VRM "X" over voltage	<ol style="list-style-type: none"> 1. Replace power supply 2. Replace power supply backplane

Temperature related engine shutdown:

Message	Action
System shutoff due to board over temperature (level-critical; board is over temperature)	<ol style="list-style-type: none"> 1. Ensure engine is being correctly cooled, see "Temperature checkout" on page 29. 2. Replace board
System shutoff due to CPU "X" over temperature (level-critical; CPU "X" is over temperature)	<ol style="list-style-type: none"> 1. Ensure engine is being correctly cooled, see "Temperature checkout" on page 29. 2. Replace CPU "X"
System shutoff due to CPU "X" under temperature (level-critical; CPU "X" is under temperature)	<ol style="list-style-type: none"> 1. Ambient temperature must be within normal operating specifications. 2.
System shutoff due to DASD temperature (sensor X) (level-critical; DASD area reported temperature outside recommended operating range)	<ol style="list-style-type: none"> 1. Ensure engine is being correctly cooled, see "Temperature checkout" on page 29.
System shutoff due to high ambient temperature (level-critical; high ambient temperature)	<ol style="list-style-type: none"> 1. Ambient temperature must be within normal operating specifications.
System shutoff due to system board under temperature (level-critical; system board is under temperature)	<ol style="list-style-type: none"> 1. Ambient temperature must be within normal operating specifications.

DASD checkout

Message	Action
Hard drive "X" removal detected (level-critical; hard drive "X" has been removed)	<ol style="list-style-type: none"> 1. Information only, take action as appropriate.

Host Built-In Self Test (BIST)

Message	Action
Host fail (level-informational; host's built-in self test failed)	<ol style="list-style-type: none"> 1. Reseat CPU 2. Reseat VRM 3. Replace CPU

Bus fault messages

Message	Action
Failure reading 12C device. Check devices on bus 0.	<ol style="list-style-type: none"> 1. Replace system board

Message	Action
Failure reading 12C device. Check devices on bus 1.	<ol style="list-style-type: none"> 1. Reseat power Supply 2. Replace power supply 3. Replace power supply backplane 4. Replace system board
Failure reading 12C device. Check devices on bus 2.	<ol style="list-style-type: none"> 1. Replace DASD backplane 2. Replace system board
Failure reading 12C device. Check devices on bus 3.	<ol style="list-style-type: none"> 1. Replace system board
Failure reading 12C device. Check devices on bus 4.	<ol style="list-style-type: none"> 1. Replace DIMM 2. Replace system board

Undetermined problems

You are here because the diagnostic tests did not identify the failure, the Devices List is incorrect, or the engine is inoperative.

Note: A corrupt CMOS can cause undetermined problems.

Check the LEDs on all the power supplies, see “Power supply LED errors” on page 52. If the LEDs indicate the power supplies are working correctly, return here and do the following:

1. Power-off the engine.
2. Be sure the system is cabled correctly.
3. Remove or disconnect the following (one at a time) until you find the failure (power-on the computer and reconfigure each time).
 - Any external devices
 - Surge suppressor device (on the engine)
 - Modem, mouse, or non-IBM devices
 - Each adapter
 - Drives
 - Memory-Modules (1 Gigabyte)

Note: Minimum operating requirements are:

- a. 1 Power Supply
 - b. Power Backplane
 - c. System Board
 - d. 1 Microprocessor and VRM
 - e. 1 Terminator Card
 - f. Memory Module (with a minimum of 1 bank of 128 MB DIMMs)
4. Power-on the engine. If the problem remains, suspect the following FRUs in the order listed:
 - Power Supply
 - Power Backplane
 - System Board

Notes:

1. If the problem goes away when you remove an adapter from the engine, and replacing that adapter does not correct the problem, suspect the System Board.
2. If you suspect a networking problem and all the system tests pass, suspect a network cabling problem external to the system.

Fibre Channel hub Symptom-to-FRU index

The Fibre Channel hub does not contain any FRUs other than one GBIC. For information on diagnosing Fibre Channel hub problems, see “Appendix F. Fibre Channel hub Diagnostics” on page 141.

RAID storage controller Symptom-to-FRU index

Use the storage-management software to diagnose and repair RAID storage controller unit failures. Use this table also to find solutions to problems that have definite symptoms.

Problem Indicator	FRU/Action
Amber LED on — Drive CRU	1. Replace the drive that has failed.
Amber LED on — Fan CRU	1. Replace the fan that has failed.
Amber LED on — RAID controller Fault LED	1. Replace the RAID controller.
Amber LED on — Expansion port Bypass LED	<ol style="list-style-type: none"> 1. No corrective action needed if system is properly configured and has no attached expansion storage units. 2. Reattach the GBICs and Fibre Channel cables. Replace input and output GBICs or cables as necessary. 3. Expansion storage unit.
Amber LED on — Front panel	1. Indicates a Fault LED somewhere on the RAID storage controller has turned on. (Check for amber LEDs on CRUs).
Amber LED on and green LED off — Power supply CRU	<ol style="list-style-type: none"> 1. Turn on all power supply power switches. 2. Check ac power.
Amber and green LEDs on — Power supply CRU	1. Replace the failed power-supply CRU.
All green LEDs off — All CRUs	<ol style="list-style-type: none"> 1. Check that both IBM NAS 300 power cords are plugged in. 2. Check all PDU circuit breakers are on. 3. Power supply 4. Midplane
Amber LED flashing — Drive CRUs	1. No corrective action is needed. (Drive rebuild or identity is in progress.)
One or more green LEDs off — Power supply CRUs	1. Make sure both power cords are plugged in and the PDU circuit breakers and power supply switches are on.
One or more green LEDs off — All drive CRUs	1. Midplane.
One or more green LEDs off — Front panel	<ol style="list-style-type: none"> 1. Make sure both power cords are plugged in and the PDU circuit breakers and power supply switches are on. 2. Midplane.
One or more green LEDs off — Battery	1. Battery
One or more green LEDs off — Cache active	<ol style="list-style-type: none"> 1. Use the storage-management software to enable the cache 2. RAID controller 3. Battery

Problem Indicator	FRU/Action
One or more green LEDs off — Host loop	<ol style="list-style-type: none"> 1. Check that Fibre Channel hub is on. Replace attached devices that have failed. 2. Fibre Channel cables 3. GBIC 4. RAID controller
One or more green LEDs off — Expansion loop	<ol style="list-style-type: none"> 1. Make sure drives are properly seated 2. RAID controller 3. Drive 4. GBIC or Fibre Channel cable
Intermittent or sporadic power loss to the RAID storage controller	<ol style="list-style-type: none"> 1. Check the ac power source 2. Reseat all installed power cables and power supplies 3. Replace defective power cords 4. Check for a Fault LED on the power supply and replace the failed CRU 5. Midplane
Unable to access drives on Drives and Fibre Channel loop	<ol style="list-style-type: none"> 1. Ensure that the Fibre Channel cables are undamaged and properly connected 2. RAID controller
Random errors on Subsystem	<ol style="list-style-type: none"> 1. Midplane

Note: If you cannot find the problem in the troubleshooting table, test the entire IBM NAS 300.

Storage unit Symptom-to-FRU index

Use this table also to find solutions to problems that have definite symptoms.

Problem Indicator	FRU/Action
Amber LED On (Front panel)	<ol style="list-style-type: none"> 1. General Machine Fault. Check for other amber LEDs on the storage unit.
Amber LED On	<ol style="list-style-type: none"> 1. Hard Disk Drive
Amber LED On	<ol style="list-style-type: none"> 1. Fan
Amber LED On	<ol style="list-style-type: none"> 1. ESM board 2. Check for fan fault LED 3. Unit is overheating. Check temperature.
Amber LED On, Green LED Off	<ol style="list-style-type: none"> 1. Turn power switch on 2. power cord 3. Fan Cable. 4. Reseat power supply 5. Replace power supply
Amber and green LEDs both On	<ol style="list-style-type: none"> 1. Power Supply
All green LEDs Off	<ol style="list-style-type: none"> 1. Check ac voltage at PDUs. Check ac voltage line inputs. 2. Power supplies 3. Midplane

Problem Indicator	FRU/Action
Intermittent power loss to storage unit	<ol style="list-style-type: none"> 1. Check ac voltage at PDUs. Check ac voltage line inputs. 2. Power supplies 3. Midplane
One or more green LEDs Off	<ol style="list-style-type: none"> 1. Check ac voltage at PDUs. Check ac voltage line inputs. 2. Power supplies 3. Midplane
One or more green LEDs Off	<ol style="list-style-type: none"> 1. No activity to the drive. This can be normal activity.
One or more green LEDs Off (All hard Disk Drives or those on one bus)	<ol style="list-style-type: none"> 1. Use SCSI RAID Manager to check drive status 2. SCSI cables 3. ESM board 4. Midplane

Chapter 5. Installing and replacing IBM NAS 300 components

This chapter describes how to add optional components to your IBM NAS 300 such as adapters to the IBM NAS 300 engines, an additional RAID storage controller, and additional storage units. It also describes procedures on replacing defective subcomponents, such as power supplies, fans, adapters, and so on.

Safety information

Before you begin adding or replacing components, read the safety information found in “Safety and environmental notices” on page 173.

Before you begin

Before you begin to install options in your IBM NAS 300, read the following information:

- Become familiar with the safety and handling guidelines specified under “Handling static-sensitive devices”, and read the safety statements in “Safety and environmental notices” on page 173. These guidelines will help you work safely while adding or replacing components.
- You do not need to power off the a IBM NAS 300 devices to replace the hot-swap hard disk drive, fans, or power supplies.
- The orange color on components and labels in your IBM NAS 300 indicates hot-swap components. This means that you can install or remove the component while the system is running, provided that your system is configured to support this function. For complete details about installing or removing a hot-swap component, see the information provided in this chapter.
- The blue color on components and labels identifies touch points where a component can be gripped, a latch moved, and so on.
- Make sure that you have an adequate number of properly grounded electrical outlets.
- Back up all important data before you make changes to disk drives.

Handling static-sensitive devices

When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 177.

Working inside a IBM NAS 300 component while power is on

Your IBM NAS 300 is designed to operate safely while powered on. Follow these guidelines when you work inside a component that is powered on:

- Avoid loose-fitting clothing on your forearms. Button long-sleeved shirts and do not wear cuff links while you are working inside a component.
- Do not allow your necktie or scarf to hang inside the component.
- Remove jewelry, such as bracelets, rings, necklaces, and loose-fitting wrist watches.

System reliability considerations

To help ensure proper cooling and system reliability, make sure that:

- All covers and filler plates are in place during normal operations.

- A removed hot-swap hard disk drive is replaced within two minutes of removal.
- If optional adapters are added to the IBM NAS 300 engines, cables for these adapters are routed according to the instructions provided with the adapters.
- A failed fan in any of the IBM NAS 300 units is replaced within 48 hours.

Installing and replacing IBM NAS 300 engine components

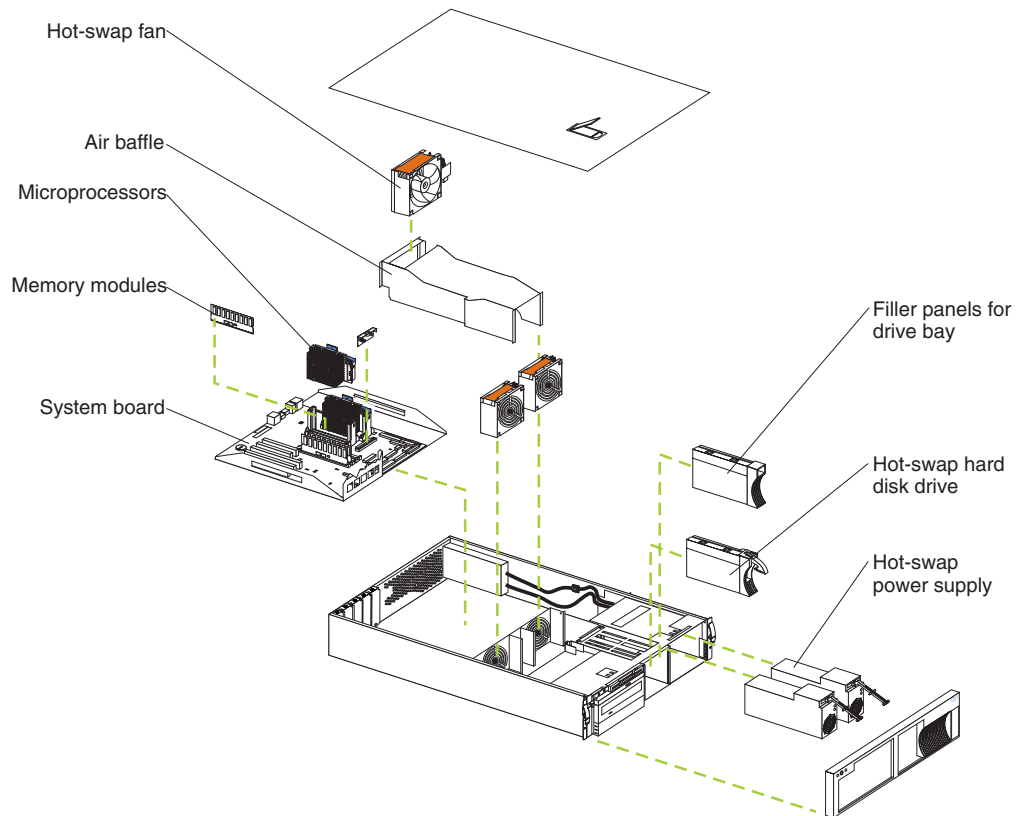
This section provides information and procedures necessary to install and replace IBM NAS 300 engine components.

Attention: When working on the IBM NAS 300, make sure you only pull out only one engine at a time from its secured position in the rack. Pulling out only one engine at a time allows the cable-restraint arms to maintain proper cable positioning.

Major components

The following illustration shows the major components of the IBM NAS 300 engine.

Note: The illustrations in this document might differ slightly from your hardware.

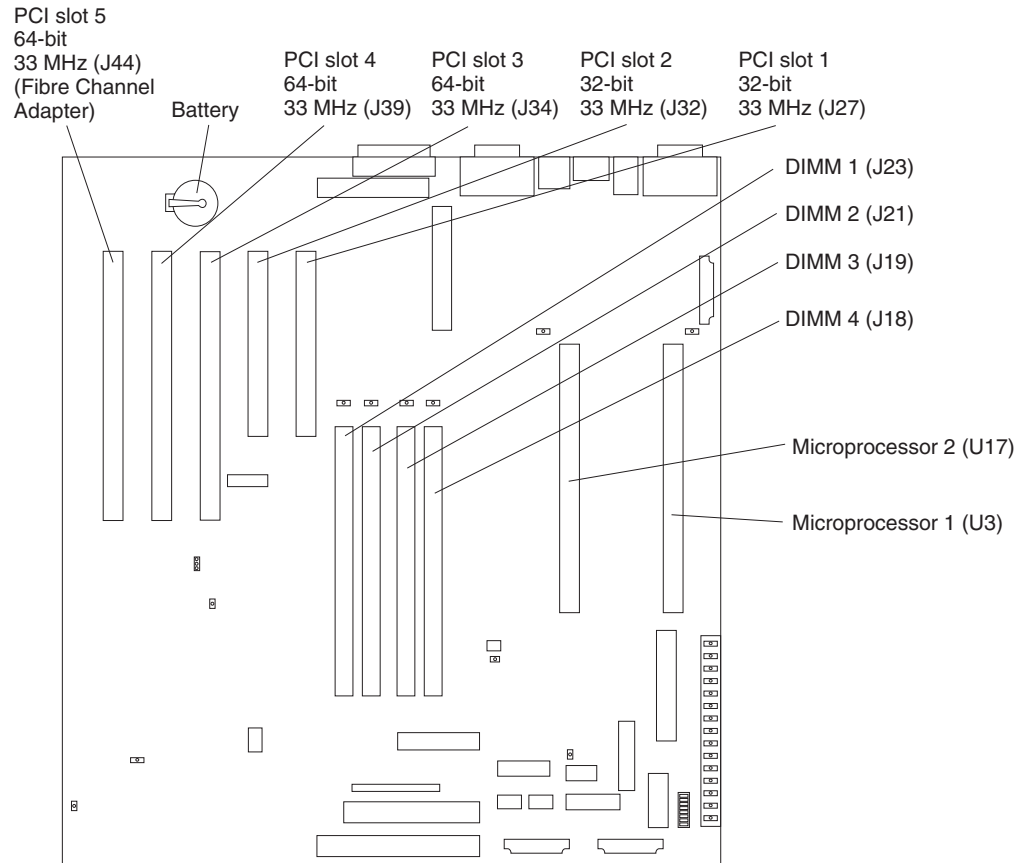


The illustrations in the following sections show the connectors, switches, and LEDs on the system board.

System board option connectors

The following illustration identifies system-board connectors for user-installable options or user-replaceable components.

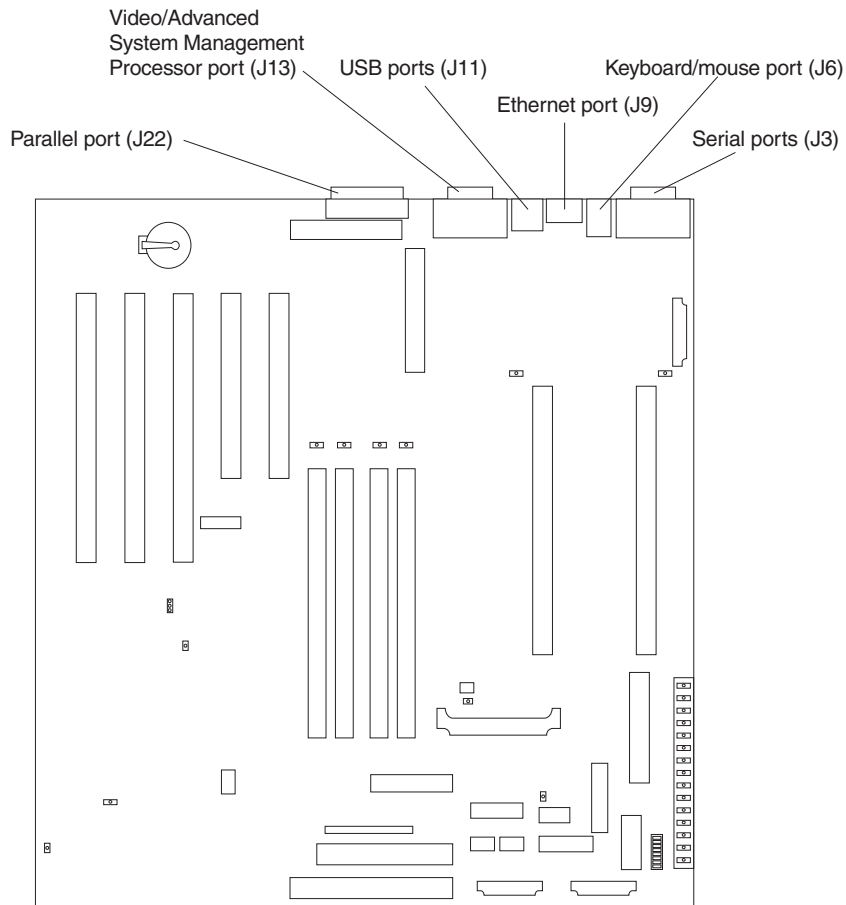
Note: The illustrations in this document might differ slightly from your hardware.



System board external port connectors

The following illustration shows the external port connectors on the system board.

Note: The illustrations in this document might differ slightly from your hardware.



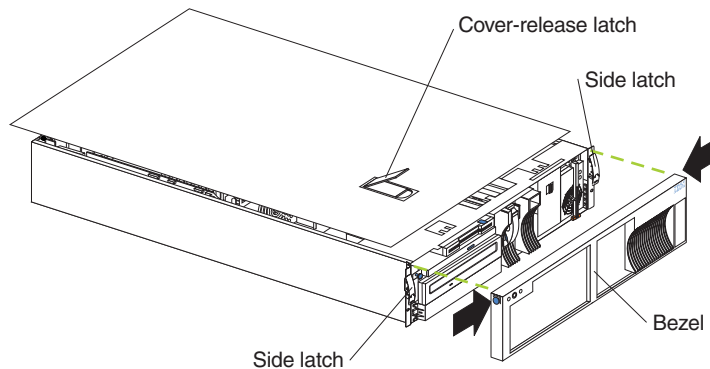
Installation and replacement procedures

This section describes how to add or remove internal components.

Removing the cover and bezel

Refer to the following illustration to remove the cover and bezel.

Note: The illustrations in this document might differ slightly from your hardware.



To remove the top cover, perform the following steps:

1. Review the information in “Before you begin” on page 67.

2. Release the left and right side rack latches and pull the engine out of the rack enclosure until both side rails lock.
3. Lift the cover-release latch. Lift the cover off and set the cover aside.
Attention: For proper cooling and airflow, replace the cover before powering on the engine. Operating the engine for extended periods of time (over 30 minutes) with the cover removed might damage components.

To remove the bezel, perform the following steps:

1. Press in on the top sides of the bezel and pull the bezel away from the front.
2. Store the bezel in a safe place.

Installing optional adapters

See page 69 for the location of the PCI expansion slots on the system board.

Note: The illustrations in this document might differ slightly from your hardware.

Adapter considerations: Before you install any adapters:

- Determine which expansion slot you will use for the adapter.
 - The second IBM FAStT Host Adapter (Fibre Channel) must be installed in slot 4, a 64-bit PCI slot.
 - The first IBM Gigabit Ethernet Server Adapter must be installed in slot 3. If you are installing a second IBM Gigabit Ethernet Server Adapter, it must be installed in slot 4. Both slot 3 and slot 4 are 64-bit PCI slots.
 - An IBM 10/100 Ethernet Server Adapter can be installed in any open PCI slot (either a 32-bit or a 64-bit PCI slot).
 - The Netfinity® Advanced System Manager PCI Adapter must be installed in PCI slot 1, a 32-bit PCI slot.

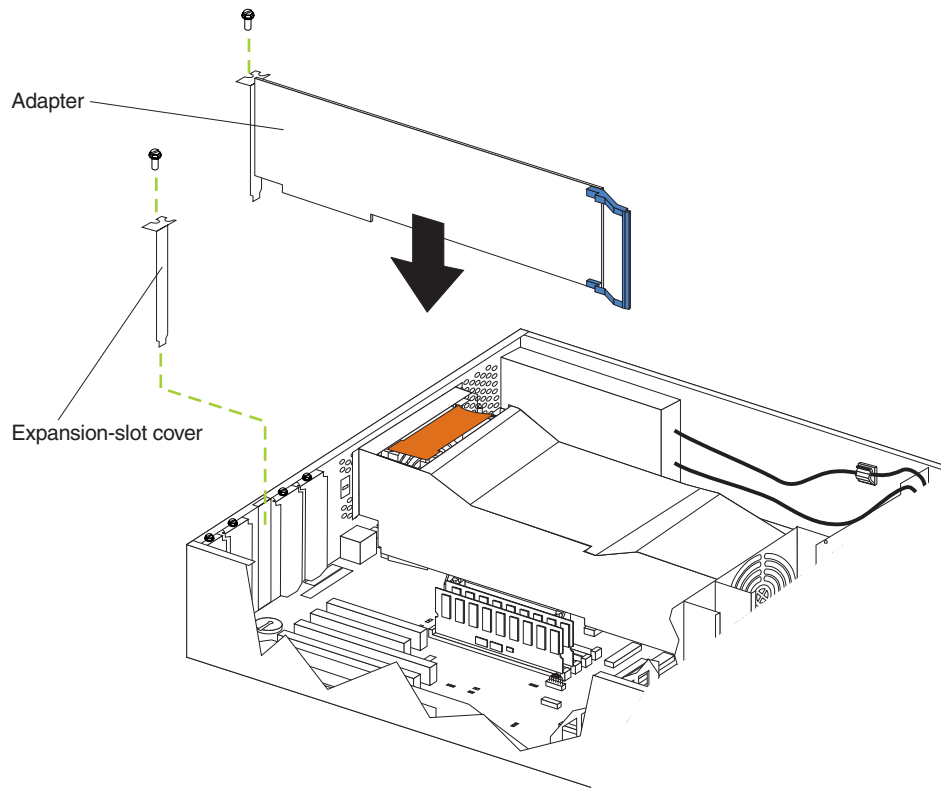
For more information about determining which PCI slot to use, see “Appendix C. PCI Adapter Placement” on page 131.

- Have a small, flat-blade screwdriver available.

Attention: Check the instructions that come with the adapter for any requirements or restrictions.

Installing an adapter: Refer to the following illustration to install an adapter.

Note: The illustrations in this document might differ slightly from your hardware.



To install an adapter, perform the following steps:

Attention: When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 177.

1. Review the information in “Before you begin” on page 67 and in “Safety and environmental notices” on page 173.
2. Power off the engine and disconnect all external cables and power cords.
3. Remove the top cover.
4. Remove the expansion-slot cover:

- a. Loosen and remove the screw on the top of the expansion-slot cover.
- b. Slide the expansion-slot cover out of the engine. Store it in a safe place for future use.

Attention: Expansion-slot covers must be installed on the openings for all vacant slots. This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.

5. Remove the adapter from the static-protective package.

Attention: Avoid touching the components and gold-edge connectors on the adapter.

6. Place the adapter, component-side up, on a flat, static-protective surface.
7. Install the adapter:
 - a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.
 - b. Press the adapter *firmly* into the expansion slot.

Attention: When you install an adapter in the engine, be sure that it is completely and correctly seated in the system-board connector before you apply power. Incomplete insertion might cause damage to the system board or the adapter.

- c. Insert and tighten the expansion-slot screw on the top of the adapter bracket.
8. Connect any needed cables to the adapter..

Attention: Route cables so that the flow of air from the fans is not blocked.

9. If you have other options to install, do so now; otherwise, go to “Installing the cover and bezel” on page 84.

Note: You can install up to four optional adapters on each engine.

Replacing the hard disk drive

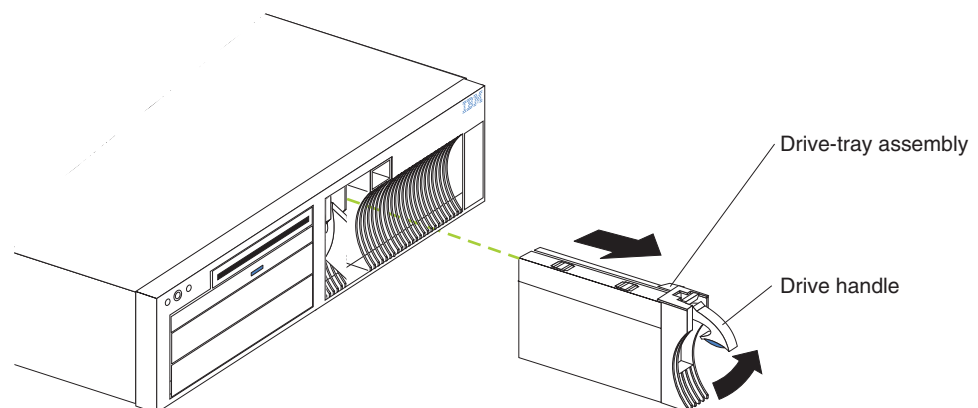
This section gives the procedure for replacing a defective hard disk drive.

Notes:

1. To minimize the possibility of damage to the hard disk drive, leave the engine in the rack while replacing the hard disk drive.
2. You do not have to turn off the engine to install hot-swap drives. However, you must turn off the engine when performing any steps that involve installing or removing cables.

Refer to the following illustration to replace a hard disk drive.

Note: The illustrations in this document might differ slightly from your hardware.



To replace a hard disk drive, perform the following:

Attention: When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 177.

1. Review the information in “Before you begin” on page 67.

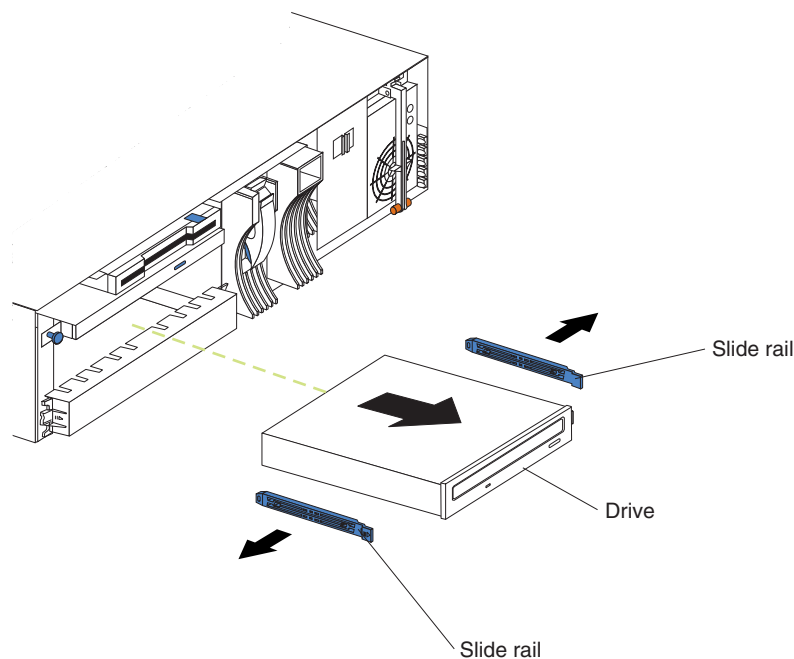
Attention: To maintain proper system cooling, do not operate the engine for more than two minutes without either a drive or a filler panel installed.

2. Lift up on the tray handle until it unlocks.
3. Gently pull the drive-tray assembly out of the bay until the drive disconnects from the backplane and then slide the drive assembly out of the engine.

4. Install a new hard disk drive:
 - a. Ensure the tray handle is open (that is, perpendicular to the drive).
 - b. Align the drive-tray assembly with the guide rails in the bay.
 - c. Gently push the drive-tray assembly into the bay until the drive connects to the backplane.
 - d. Push the tray handle down until it locks.
5. Check the hard disk drive status indicators to verify that the hard disk drive is operating properly.
 - When the amber light is on continuously, the drive has failed.
 - The green activity light flashes when there is activity on the drive.

Replacing the CD-ROM drive

Note: The illustrations in this document might differ slightly from your hardware.



To replace a defective CD-ROM drive, perform the following steps:

Attention: When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 177.

1. Review the information in “Before you begin” on page 67 and in “Safety and environmental notices” on page 173.
2. Power off the engine and then remove the cover and bezel. (See “Removing the cover and bezel” on page 70.)
3. If the drive that you are replacing is a laser product, observe the following safety precaution.



CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.

**DANGER**

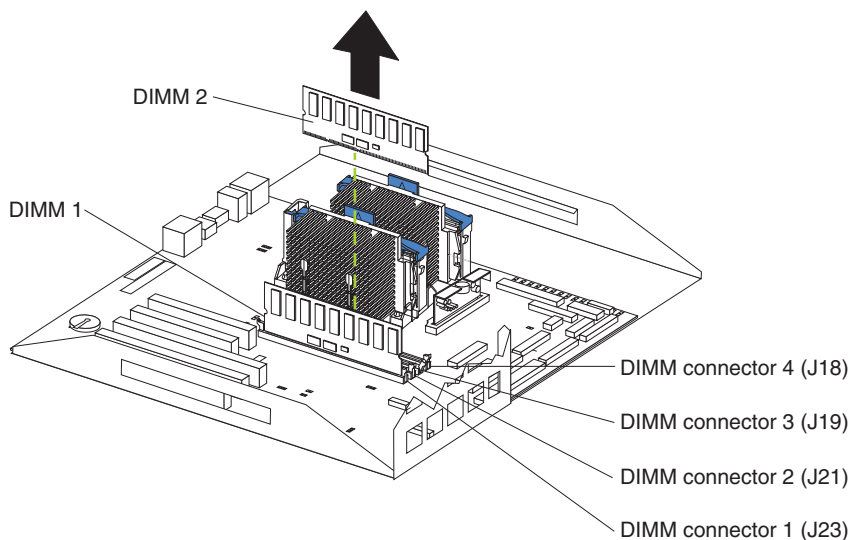
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following. Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Note: safety notice translations, see “Safety and environmental notices” on page 173.

4. Remove the cable connecting the CD-ROM drive to the IDE connector on the system board.
5. Slide out the old CD-ROM drive from the engine.
6. Touch the static-protective bag containing the drive to any unpainted metal surface on the engine; then, remove the new drive from the bag and place it on a static-protective surface.
7. Set any jumpers or switches on the drive according to the documentation that comes with the drive.
8. Install rails on the drive.
 - Remove the blue slide rails off the old CD-ROM drive.
 - Clip the rails onto the sides of the new drive.
9. Place the drive so that the slide rails engage in the bay guide rails. Push the drive into the bay until it clicks into place.
10. Reconnect the cable from the CD-ROM drive to the IDE connector on the system board.
11. Set the jumper on the back of the new drive to slave.

Installing or replacing memory modules

Your IBM NAS 300 engine comes fully configured with one 1 GB of memory, but to improve performance in certain environments, you can install an additional 1GB of memory (two–512KB DIMMs).



To install a new DIMM, perform the following steps:

Attention: When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 177.

1. Review the information in “Before you begin” on page 67 and in “Safety and environmental notices” on page 173. Also review the documentation that comes with your option.
2. Power off the engine and remove the cover. (See “Removing the cover and bezel” on page 70.)
3. Touch the static-protective package containing the DIMM to any unpainted metal surface on the engine. Then, remove the DIMM from the package.

Note: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.

4. Turn the DIMM so that the pins align correctly with the connector.
5. Insert the DIMM into the connector by pressing on one edge of the DIMM and then on the other edge of the DIMM. Be sure to press straight into the connector. Be sure that the retaining clips snap into the closed positions.
6. Make sure that the retaining clips are in the closed position. If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.

To replace a DIMM, perform the following steps:

1. Review the information in “Before you begin” on page 67 and in “Safety and environmental notices” on page 173. Also review the documentation that comes with your option.
2. Power off the engine and remove the cover. (See “Removing the cover and bezel” on page 70.)
3. Touch the static-protective package containing the DIMM to any unpainted metal surface on the engine. Then, remove the DIMM from the package.

Note: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.

4. Installing the new DIMM:
 - a. Turn the DIMM so that the pins align correctly with the connector.
 - b. Insert the DIMM into the connector by pressing on one edge of the DIMM and then on the other edge of the DIMM. Be sure to press straight into the connector. Be sure that the retaining clips snap into the closed positions.
 - c. Make sure that the retaining clips are in the closed position. If a gap exists between the DIMM and the retaining clips, the DIMM has not been properly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.

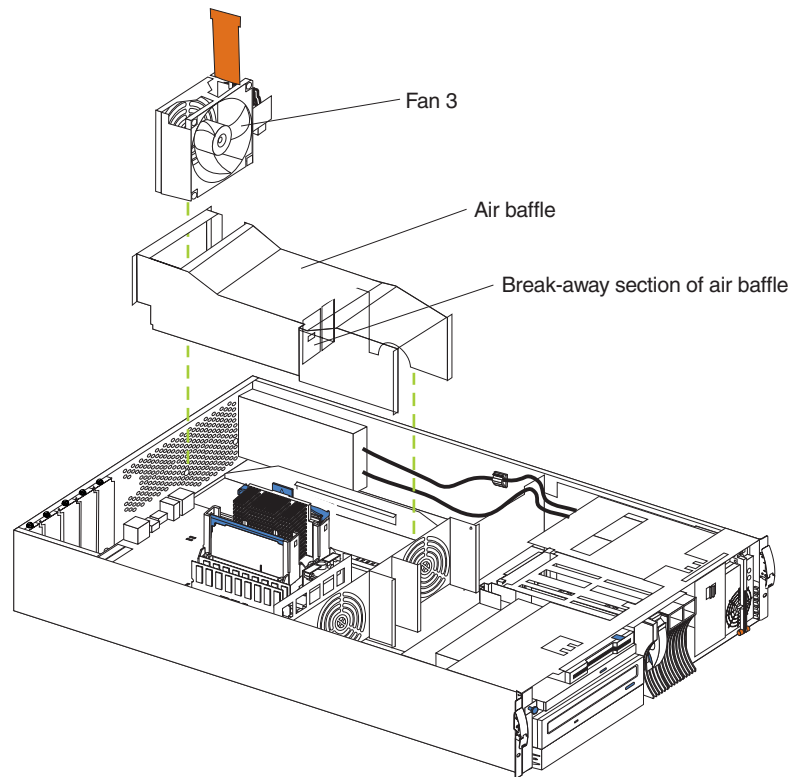
Replacing microprocessors

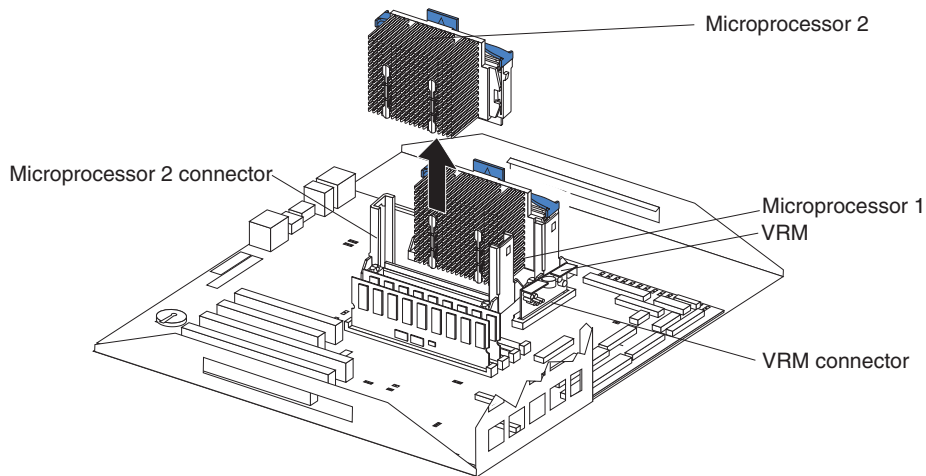
Each IBM NAS 300 engine comes with two microprocessors installed on the system board.

Note: Before you replace a defective microprocessor, review the documentation that comes with the microprocessor, so that you can determine whether you need to update the engine basic input/output system (BIOS). The latest level of BIOS for your engine is available through the Web at www.storage.ibm.com/support/nas.

Attention: To avoid damage and ensure proper engine operation when you install a new microprocessor, use microprocessors that have the same cache size and type, and the same clock speed.

Note: The illustrations in this document might differ slightly from your hardware.





To replace a microprocessor, perform the following steps:

Attention: When you handle Electrostatic Discharge-Sensitive devices (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 177.

1. Review the information in “Before you begin” on page 67 and in “Safety and environmental notices” on page 173.
2. Power off the engine and peripheral devices and disconnect all external cables and power cords; then, remove the cover (see “Removing the cover and bezel” on page 70).
3. Remove the fan 3 assembly by lifting the orange handle on top of the fan assembly and lifting out the fan assembly.
4. Remove the air baffle by grasping it at the sides and lifting it out.
5. Remove the defective microprocessor by pulling upward on the microprocessor handle and lifting it out.
6. Install the new microprocessor:
 - a. Touch the static-protective package containing the new microprocessor to any *unpainted* metal surface on the engine, then remove the microprocessor from the package.
 - b. Center the microprocessor over the microprocessor connector and carefully press the microprocessor into the connector.
7. Install the air baffle. Make sure that the sides of the air baffle fit inside the brackets on the engine.
8. Install the fan 3 assembly.
9. If you have other options to install or remove, do so now; otherwise, go to “Installing the cover and bezel” on page 84.

Replacing power supplies

Each IBM NAS 300 engine comes with two power supplies, which are hot-swappable.

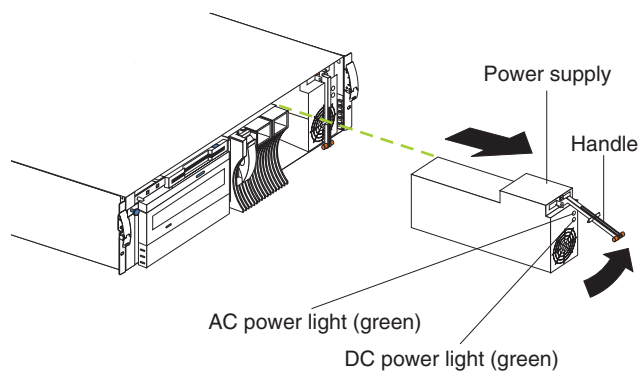


CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

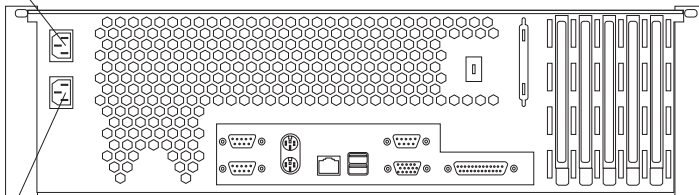


Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Note: safety notice translations, see “Safety and environmental notices” on page 173.



Power supply 1 power cord connector



Power supply 2 power cord connector

1. Remove the bezel. See “Removing the cover and bezel” on page 70.
2. Unplug the power cord for the power supply you want to replace from the electrical outlet.
3. Unplug the power cord from the back of the engine.
4. Lift up the power supply handle and gently slide the power supply out of the chassis.

Note: During normal operation, each power-supply bay must have a power supply installed for proper cooling.

5. Install the new power supply in the bay:
 - a. Place the handle on the power supply in the open position and slide the power supply into the chassis.
 - b. Gently close the handle to seat the power supply in the bay.

6. Re-plug the power cord for the new power supply into the power cord connector on the rear of the engine.
7. Re-plug the power cord into a properly grounded electrical outlet.
8. Verify that the DC Power light and AC Power light on the power supply are lit, indicating that the power supply is operating correctly.
9. Replace the bezel. (See “Installing the cover and bezel” on page 84.)

Installing and cabling the optional Advanced System Management (ASM) PCI adapter

Each engine comes standard with a communication port dedicated to the Advanced System Management (ASM) Processor to allow you to manage the engine at anytime from virtually anywhere. The optional ASM PCI adapter allows you to connect via LAN or modem from virtually anywhere for extensive remote management. The ASM PCI adapter works in conjunction with the ASM processor that is integrated into the base planar board of each of the two engines (an interconnect cable that connects both engines to the ASM PCI adapter). The ASM PCI adapter enables management through a Web browser interface, in addition to ANSI terminal, Telnet, and Netfinity Director. The adapter installation and cabling sequence follows:

Use an ASM PCI adapter that is connected to your ASM Interconnect bus as an Ethernet gateway for your ASM Interconnect bus, enabling all ASM information generated by engines attached to the ASM Interconnect bus to be forwarded to other systems on your Ethernet network.

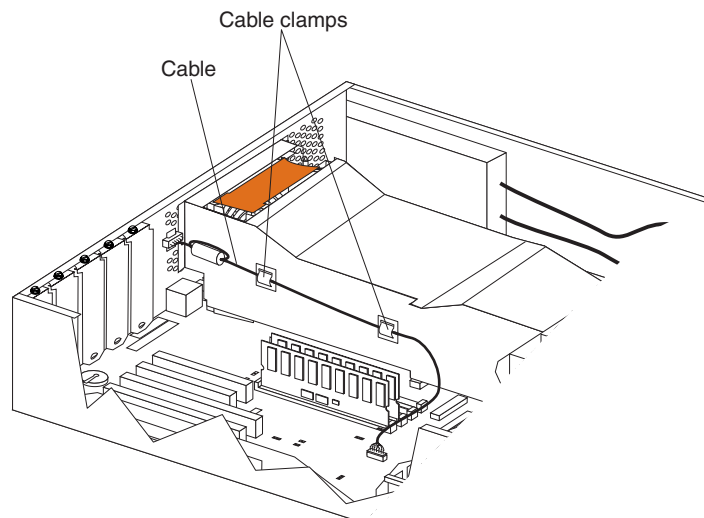
The ASM PCI adapter installation and cabling sequence follows:

1. Review the information in “Before you begin” on page 67 and in “Safety and environmental notices” on page 173.
2. Power-off the engine; and disconnect all external cables and power cords
3. Remove the top cover.

Cabling the ASM interconnect (internal) cable:

1. Route the Advanced System Management Interconnect option cable as shown in the following illustration.

Note: The illustrations in this document might differ slightly from your hardware.



Installing the ASM PCI adapter:

1. Remove the expansion-slot cover as shown in the following illustration:

- a. Loosen and remove the screw on the top of the expansion-slot cover.

Note: The ASM adapter should be installed in PCI slot 1. For more information on PCI-adapter slot locations, see “Appendix C. PCI Adapter Placement” on page 131.

- b. Slide the expansion-slot cover out of the engine. Store it in a safe place for future use.

Attention: Expansion-slot covers must be installed on the openings for all vacant slots. This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.

2. Remove the adapter from the static-protective package.

Attention: Avoid touching the components and gold-edge connectors on the adapter.

3. Place the adapter, component-side up, on a flat, static-protective surface.

4. Install the adapter:

- a. Carefully grasp the adapter by its top edge or upper corners, and align it with the expansion slot on the system board.

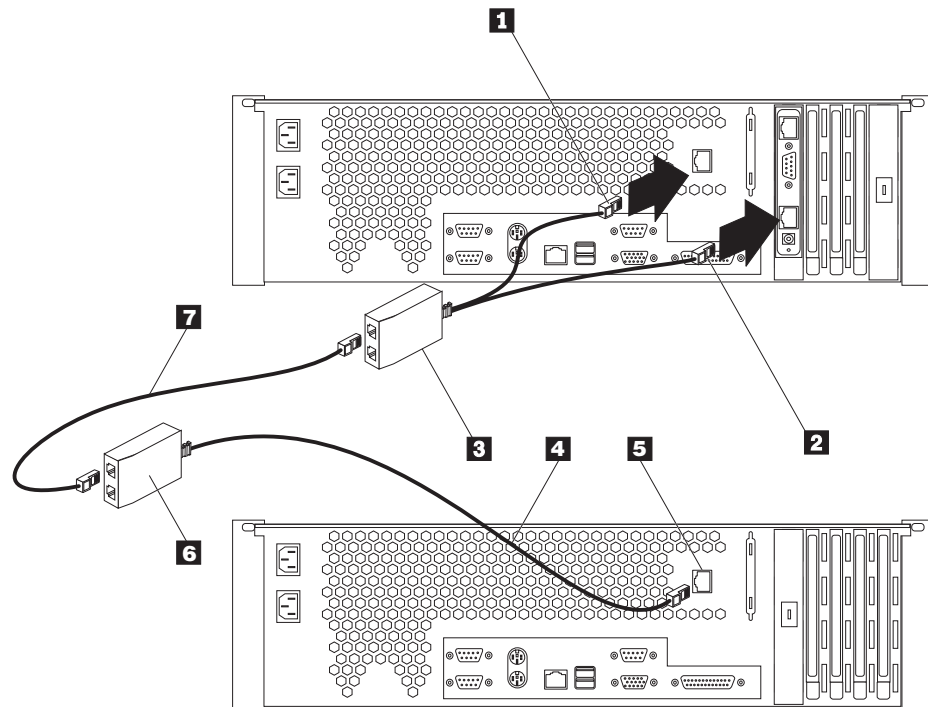
- b. Press the adapter *firmly* into the expansion slot.

Attention: When you install an adapter in the engine, ensure that it is completely and correctly seated in the system-board connector before you apply power. Incomplete insertion might cause damage to the system board or the adapter.

- c. Insert and tighten the expansion-slot screw on the top of the adapter bracket.

Cabling the ASM interconnect (external) cable:

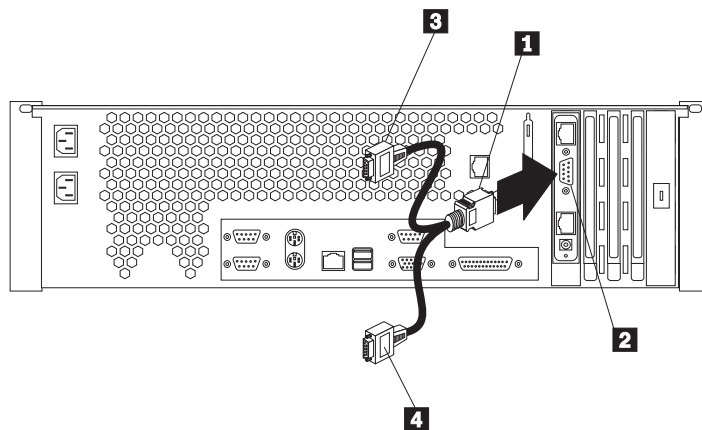
1. Connect the RJ-11 connector **1** on the ASM interconnect cable to the connector on the back of the engine as shown in the following illustration:.



2. Connect the other RJ-11 connector **2** on the ASM interconnect cable to the lower connector on the ASM adapter.
3. For each engine you want to manage with the ASM adapter, connect an ASM interconnect cable **4** to **5**, then connect **3** to **6** to the next engine, using the 6-ft. Ethernet cable **7** provided.

Connecting a serial cable: If you want to manage your engine remotely, you need to install the serial cable to connect a modem. Connect the serial cable to the ASM PCI adapter as shown in the following illustration:

1. Connect the serial connector on the serial cable **1** to the serial port on the ASM adapter **2**.

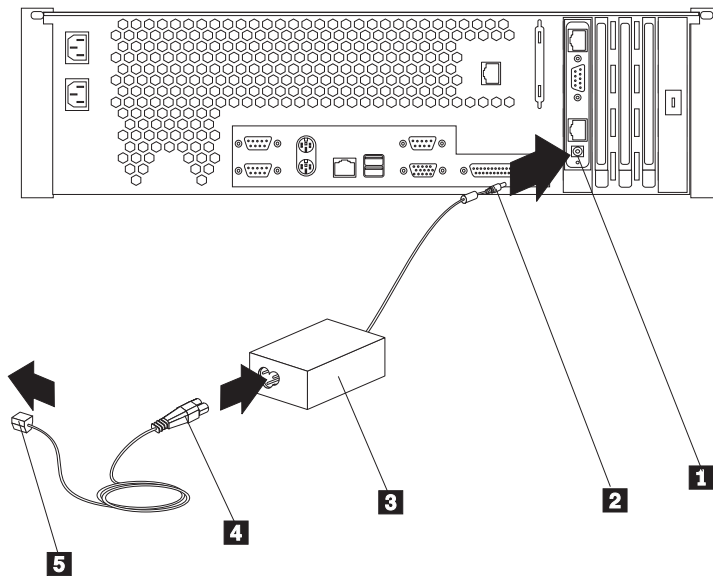


2. Connect either of the two serial connectors **3** or **4** to the device you want to connect the ASM adapter to.

Note: Each of the two serial connectors is labeled to help you determine which connector to use for a particular device. One connector is labeled “MODEM” and the other is labeled “COM_AUX”.

Completing the installation: To complete the installation of the ASM PCI adapter, do the following:

1. Reinstall the cover on the engine
2. Install the power unit adapter **3** by connecting the power unit control cable **2** to the connector on the ASM PCI adapter **1**.



3. Connect the power unit power cord **4** to the connector on the power unit adapter **3**.
4. Connect the system power cord **5** to an electrical outlet.
5. Complete your installation by powering on the engine and running the power-on diagnostics. Each time the engine is powered-on, it automatically runs a self-testing program to ensure that the hardware is running correctly. If power-on diagnostics complete successfully, the information light and the system error light is off.

If a problem is detected refer to the *TotalStorage Network Attached Storage 300 User's Reference* for troubleshooting procedures.

6. Configure your ASM PCI adapter; go to “Configuring the ASM PCI adapter”.

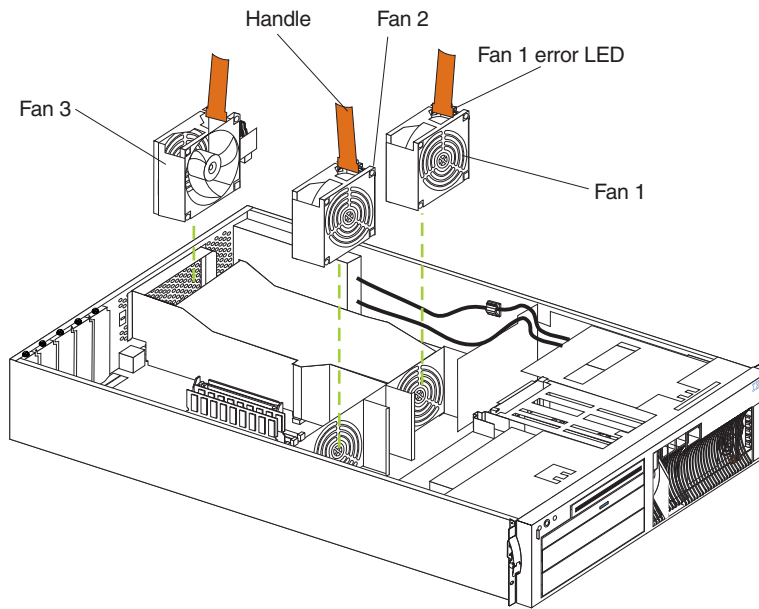
Configuring the ASM PCI adapter: Before you can remotely monitor your engine, you must configure your ASM PCI adapter. Configuration is described in the *TotalStorage Network Attached Storage 300 User's Reference*.

Replacing a fan assembly

Each IBM NAS 300 engine comes with three hot-swap fan assemblies. You do not need to power off the engine to replace a hot-swap fan assembly.

Attention: Replace a fan that has failed within 48 hours to help ensure proper cooling.

Note: The illustrations in this document might differ slightly from your hardware.

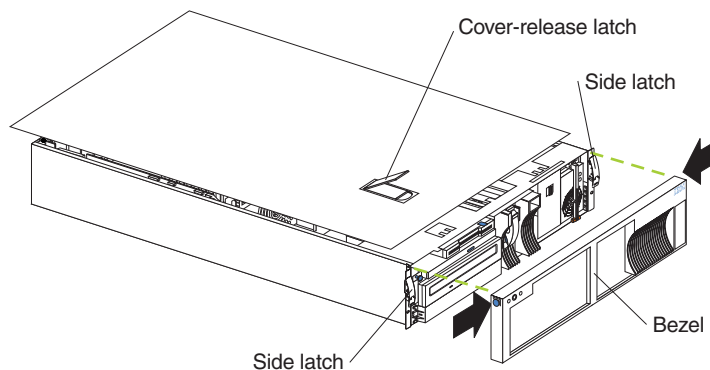


To replace a fan assembly:

1. Remove the cover. See “Removing the cover and bezel” on page 70.
Attention: To ensure proper system cooling, do not remove the top cover for more than 30 minutes during this procedure.
2. The LED on the failing fan assembly will be lit. Remove the failing fan assembly from the engine by lifting the orange handle on the top of the fan assembly and pulling the fan assembly out.
3. Slide the replacement fan assembly into the engine until it clicks into place.
4. Verify that the FAN LED on the diagnostics panel on the system board is not lit. If the FAN LED is lit, reseal the fan.
5. Replace the cover. See “Installing the cover and bezel”.

Installing the cover and bezel

Note: The illustrations in this document might differ slightly from your hardware.



To install the IBM NAS 300 engine cover:

1. Place the cover-release latch in the open (up) position and align the flanges on the left and right sides of the cover with the slots on the engine chassis.
2. Close the cover-release latch.

To install the bezel:

1. Align the trim bezel with the front of the engine.
2. Press inward on the top sides of the bezel and press the bezel toward the engine until it clicks into place.

To complete the installation:

If you disconnected any cables from the back of the engine, reconnect the cables; then, plug the power cords into properly grounded electrical outlets.

Replacing the entire engine

Replacing a rack-mounted engine is similar to replacing a Fibre Channel hub. See “Working with the Fibre Channel hub” on page 110 for the steps to replace a rack-mounted IBM NAS 300 component.

Installing and replacing RAID storage controller components

This section provides instructions to help you install or remove CRUs, such as hot-swap disk drives, fans, RAID controllers, and power supplies.

Handling static-sensitive devices

Attention: Static electricity can damage storage server components or options. To avoid damage, keep static sensitive devices in their static protective bag until you are ready to install them.

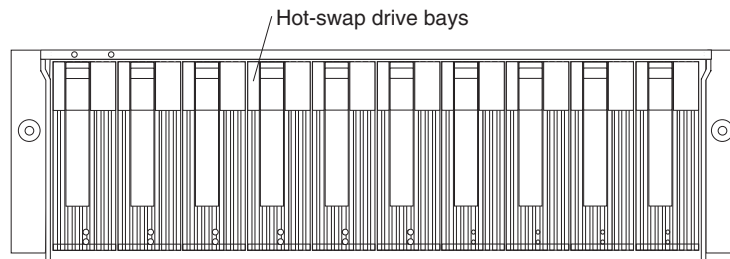
To reduce the possibility of electrostatic discharge (ESD) when you handle options and storage server components, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its anti-static package, touch it to an unpainted metal part of the storage server for at least two seconds. (This drains static electricity from the package and from your body.)
- Remove the device from its package and install it directly into your storage server without setting it down. If it is necessary to set the device down, place it on its static-protective package. Do not place the device on your storage server cover or any metal surface.
- Take additional care when handling devices during cold weather as heating reduces indoor humidity and increases static electricity.

Working with hot-swap drives

Drives are devices that the system uses to store and retrieve data. This section explains how you can replace a defective drive.

The following illustration shows the location of the hot-swap drive bays that are accessible from the front of the RAID storage controller.



Attention: Never hot-swap a drive CRU when its green Activity LED is flashing. Hot-swap a drive CRU only when its amber Fault LED is completely on and not flashing, or when the drive is inactive with the green Activity LED on and not flashing.

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

Drive CRUs

Each RAID storage controller contains 10 slim 40-pin Fibre Channel hard disk drives. These drives come preinstalled in drive trays. This drive-and-tray assembly is called a *drive CRU*.

Drive LEDs

Each drive CRU has two LEDs, which indicate the status for that particular drive. For information about the drive LED operating states and descriptions, see the *User's Reference*.

Fibre Channel loop IDs

When you replace a drive CRU in the RAID storage controller, the drive CRU connects into a printed circuit board called the *midplane*. The midplane sets the Fibre Channel loop ID automatically, based on the setting of the tray number switch and the physical location (bay) of the drive CRU.

Hot-swap hardware

The RAID storage controller contains hardware that you can use to replace a failed hard disk drive without turning off the RAID storage controller. Therefore, you can continue operating the system while a hard disk drive is removed or installed. These drives are known as *hot-swap* drives.

Slim drives

Hot-swap drive CRUs that are slightly smaller than the standard disk drive. These drive CRUs do not fill the entire drive bay. To maintain proper airflow and cooling, you must use a slim filler piece with each slim drive.

Replacing hot-swap drives

Drive problems include any malfunctions that delay, interrupt, or prevent successful I/O activity between the hosts and the hard disk drives. This section explains how to replace a failed drive.

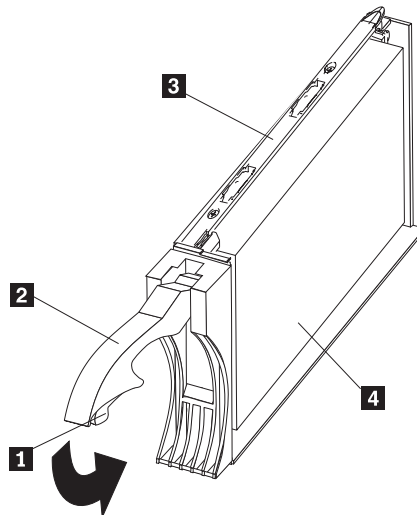
Attention: Failure to replace the drives in their correct bays might result in loss of data. If you are replacing a drive that is part of a RAID level 1 or RAID level 5 logical drive, ensure that you install the replacement drive in the correct bay.

Use the following procedure to replace host-swap drives:

1. Check the hardware and software documentation that is provided with the system to see if there are restrictions regarding hard disk drive configurations. Some system Fibre Channel configurations might not allow mixing different drive capacities or types within an array.
2. Check the storage-management software for recovery procedures for a drive that has failed. Follow the steps in the software procedure before continuing with this procedure.
3. Determine the location of the drive that you want to remove.

Attention: Never hot-swap a drive CRU when its green Activity LED is flashing. Hot-swap a drive CRU only when its amber Drive fault LED is on and not flashing, or when the drive is inactive with the green Activity LED on and not flashing.

4. Remove the drive CRU.
 - a. Press on the inside of the bottom of the tray handle to release the blue latch **1**.
 - b. Pull the handle **2** on the tray **3** out into the open position.
 - c. Lift the drive CRU partially out of the bay.
 - d. To avoid possible damage to the drive **4**, wait at least 20 seconds before fully removing the drive CRU from the RAID storage controller to allow for the drive to spin down.



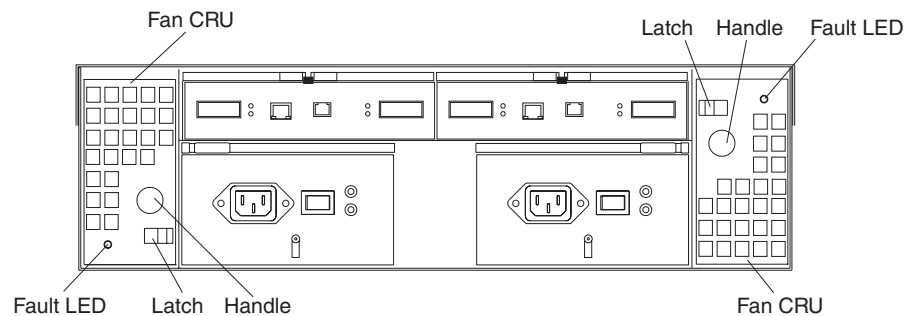
- e. Verify that there is proper identification (such as a label) on the drive CRU, and then slide it completely out of the RAID storage controller.
 - f. If you are replacing a slim drive, ensure that the filler piece remains in place for use with the new drive.
5. Install the new drive CRU.
 - a. Gently push the drive CRU into the empty bay until the tray handle **2** touches the storage-server bezel.
 - b. Push the tray handle **2** down into the closed (latched) position.
6. Check the drive LEDs.
 - a. When a drive is ready for use, the green Activity LED is on, and the amber Drive fault LED is off.
 - b. If the amber Drive fault LED is on and not flashing, remove the drive from the unit and wait 10 seconds; then, reinstall the drive.
7. Return to normal operation.

Working with hot-swap cooling fans

The RAID storage controller cooling system consists of two fan CRUs, each containing two fans. The fan CRUs circulate air inside the unit by pulling in air through the vents on the front of the drive CRUs and pushing out air through the vents in the back of each fan CRU.

If two fans fail, or the fans cannot maintain an internal temperature below 70°C (158°F), the power supplies in the unit will automatically shut down (an overtemperature condition). If this occurs, you must cool the unit and restart it. Refer to the *User's Reference*.

Attention: The fans in the storage server draw in fresh air and force out hot air. These fans are hot-swappable and redundant; however, when one fan fails, the fan CRU must be replaced within 48 hours to maintain redundancy and optimum cooling. When you replace the failed fan CRU, be sure to install the second fan CRU within 10 minutes to prevent any overheating due to the lack of the additional fan CRU.



Fan CRUs

The two fan CRUs are hot-swappable and redundant.

Fault LEDs

These amber LEDs light when a fan failure occurs.

Latches and handles

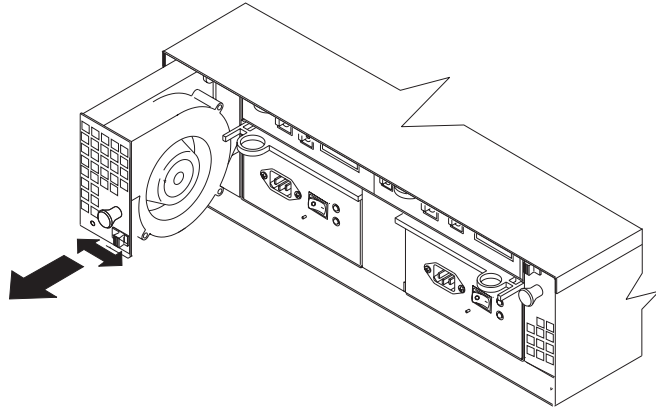
Use the latches and handles to remove or install the fan CRUs.

Attention: Do not run the RAID storage controller without adequate ventilation and cooling, because it might cause damage to the internal components and circuitry.

Both fan units must always be in place, even if one is not functioning properly, to maintain proper cooling.

Use the following procedure to replace a hot-swap fan:

1. Check the LEDs on the back of the storage server.
2. If the amber Fault LED is on, remove the fan CRU that has failed.
 - a. Slide the latch to unlock the fan CRU.
 - b. Use the handle (black knob) to pull the fan from the storage server.



3. Install the new fan unit.
 - a. Place the fan CRU in front of the fan slot.
 - b. Hold the latch open, and slide the fan all the way into the slot. If the fan does not go into the bay, rotate it 180°. Ensure that the latch is on the side closest to the center of the storage server.
 - c. Release the latch. If the lever remains open, pull back on the fan slightly, and then push it in again until the latch snaps into place.
4. Check the LEDs.

The Fault LEDs turn off after a few seconds; if they remain on, refer to the *User's Reference* .

Working with hot-swap power supplies

The RAID storage controller power system consists of two power supply CRUs. The power supply CRUs provide power to the internal components by converting incoming ac voltage to dc voltage. One power supply CRU can maintain electrical power to the unit if the other power supply is turned off or malfunctions. The power supply CRUs are interchangeable (by reversing the locking levers).

Each power supply CRU has a built-in sensor that detects the following conditions:

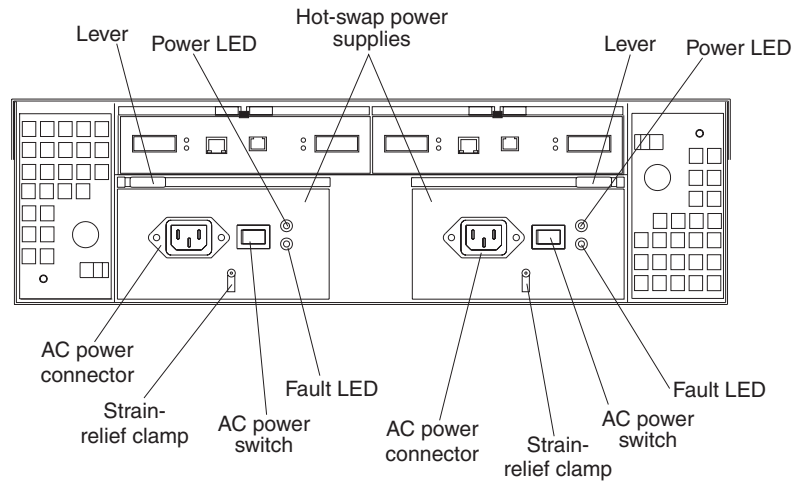
- Over-voltage
- Over-current
- Overheated power supply

If any of these conditions occurs, one or both power supplies will shut down. All power remains off until you cycle the power switches (turn the power switches off, wait at least 30 seconds, then turn the power switches ON). For more information, see the *User's Reference*.

The power supplies are CRUs and do not require preventive maintenance.

- Always keep the power supplies in their proper places to maintain proper controller-unit cooling.
- Use only the supported power supplies for your specific storage server.

The power-supply controls on the rear of the storage server are shown in the following illustration.



Levers

Use these locking handles to remove or install a power supply.

Power LED

These green LEDs light when the storage server is turned on and receiving ac power.

Fault LEDs

These amber LEDs light if a power supply failure occurs or if the power supply is turned off.

AC power switches

Use these switches to turn the power supplies on and off. You must turn on both switches to take advantage of the redundant power supplies.

AC power connectors

This is the connection for the ac power cord.

Strain-relief clamp

Use this clamp to provide strain relief on the power cord.

Removing a hot-swap power supply

Statement 8



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.

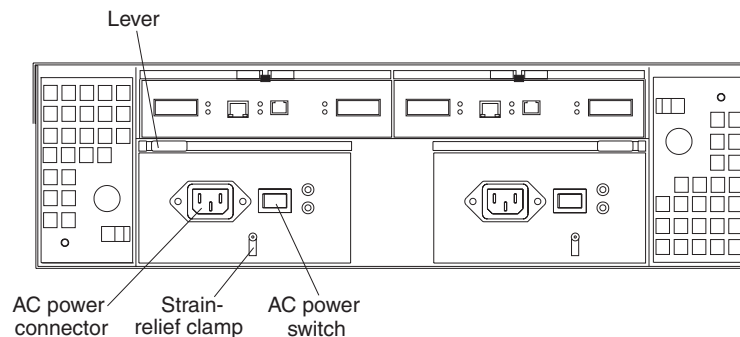


Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Note: safety notice translations, see “Safety and environmental notices” on page 173.

To remove a hot-swap power supply:

1. Turn off the ac power switch.

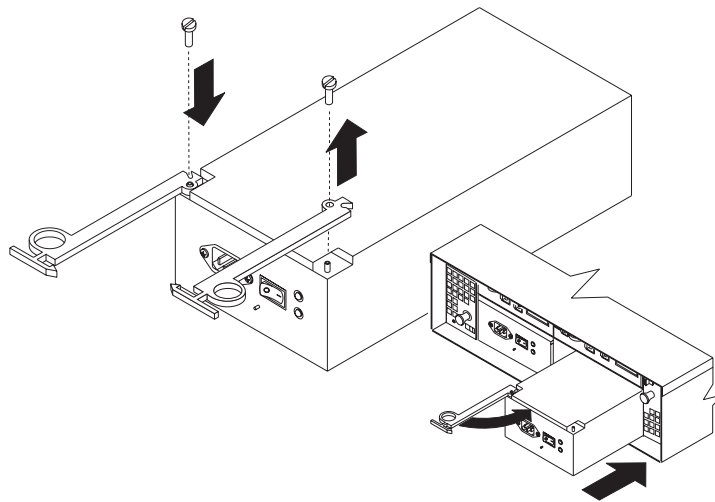


2. Unplug the power cord from the electrical outlet.
3. Disconnect the power cord from the ac power connector on the power supply.
4. Remove the nut and strain-relief clamp from the rear of the power supply.
5. Remove the power supply from the RAID storage controller, as follows:
 - a. Grasp the pull-ring on the power-supply lever, and squeeze the latch to release it.
 - b. Pull the lever open and remove the power supply.

Installing a hot-swap power supply

Note: When replacing a power supply that has failed, ensure that the power supply latch is mounted on the side of the power supply that faces the middle of the storage server. If it is not, remove the lever screw, flip the lever over, and

tighten the screw on the opposite side.



To install a hot-swap power supply:

Statement 8



CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.

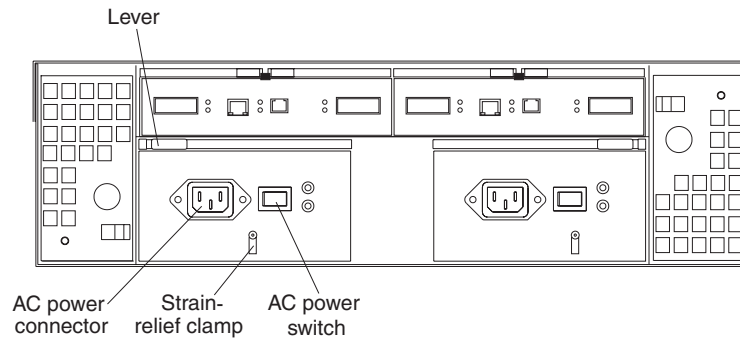


Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Note: safety notice translations, see “Safety and environmental notices” on page 173.

1. Ensure that the ac power switch is off on the power supply that you are installing.
2. Install the power supply in the RAID storage controller, as follows:
 - a. Slide the power supply into the RAID storage controller. Make sure that the lever is pulled straight out as you slide the power supply into the storage server.
 - b. Close the lever until the pull-ring latch locks in place. Make sure that the lever locks into place.
3. Wrap the strain-relief clamp around the power cord approximately 20 cm (8 in.) from the power-supply connection end.
4. Attach the power-supply nut, and tighten it securely.

5. Connect the power cord to the ac power connector.



6. Plug the power cord into a properly grounded electrical outlet.
7. Turn ON the power-supply switch.
8. Make sure that the green Power LED on the new power-supply CRU is on and the amber Fault LED is off.
 - If the Power LED is off, the power-supply CRU might not be installed correctly. Remove it and then reinstall it.
 - If the Fault LED is on or the Power LED stays off, refer to the storage-management software for problem determination.

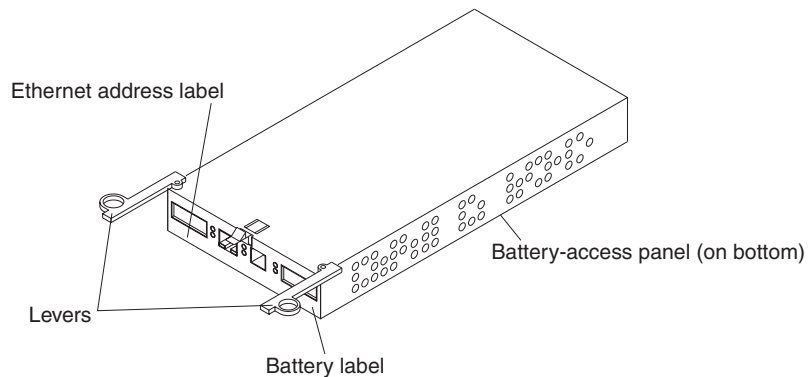
For more information about the LEDs, see the *User's Reference*.

Working with hot-swap RAID controllers

Each RAID controller fits into the back of the RAID storage controller and has the following components:

- Battery
- Cache memory
- One host port and one expansion port
- One Ethernet port
- One RS-232 port

Each RAID controller has a unique hardware Ethernet address, which is printed on a label on the front. There is also a label giving the installation and expiration date of the battery. The following illustration shows the location of these items.



Replacing a RAID controller

When instructed to do so by the storage-management software, replace a RAID controller that has failed.

Note: The replacement RAID controller CRU does not come with a RAID controller cache battery installed. You must remove the cache battery that is inside the existing RAID controller that you are replacing, and install that battery inside the replacement RAID controller CRU. The steps to remove and replace the battery are included in the following procedure.

To remove a RAID controller, do the following:

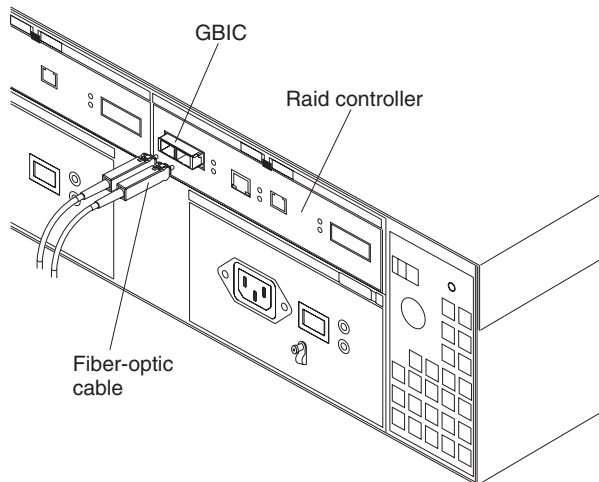
1. Check the storage-management software for instructions on RAID controller failure-recovery procedures. Follow the steps provided in the software documentation before continuing with step 2.
2. If you have redundant RAID controllers (dual-controller configuration), use the storage-management software to take the RAID controller that has failed offline.

Attention: To prevent data loss if you have a single controller configuration, you must shut down your system before you can replace the RAID controller. For the proper shutdown sequence, see “Powering the IBM NAS 300 on and off” on page 42.

3. Label each cable that connects to the RAID controller that has failed. This ensures that all cables will be properly reconnected to the new RAID controller.

Attention: Handle and install fiber optic cables properly to avoid degraded performance or loss of communications with devices. When working with fiber optic cables, do not pinch them, step on them, or locate them in aisles or walkways. Do not overtighten the cable straps or bend the cables to a radius smaller than 76 mm (3 in.).

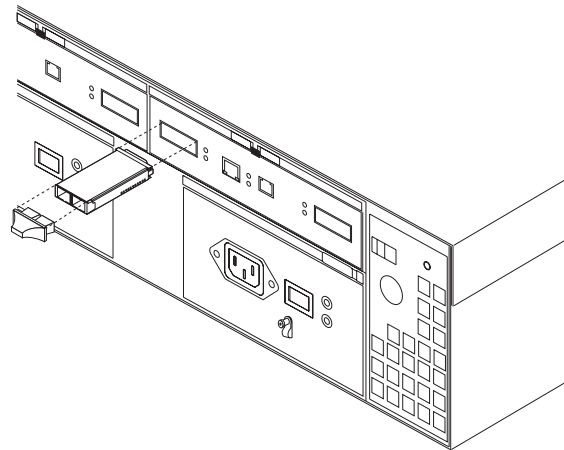
4. From the RAID controller that has failed, remove the Fibre Channel cables from the GBICs. The location of these components is shown in the following illustration.



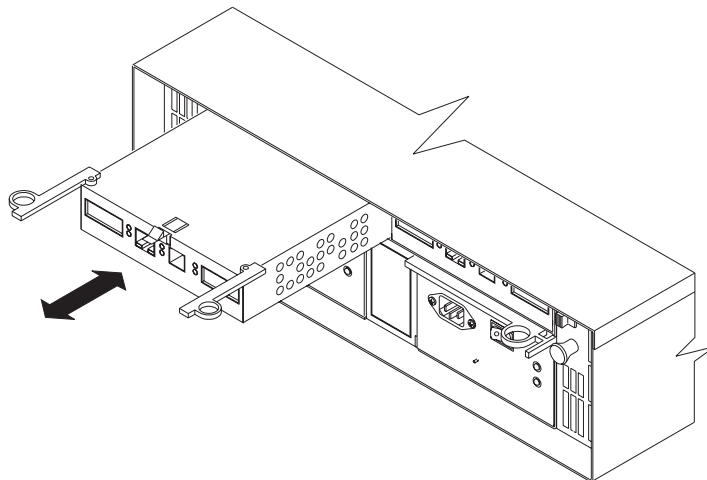
After removing the Fibre Channel cables, insert the protective caps.

5. Use the following procedure to remove the GBICs from the RAID controller that has failed.

- a. Move the metal latch on the GBIC to the unlocked (center) position.



- b. Pull the GBIC out of the port.
 - c. Insert the protective cap on the GBIC.
6. Remove the failed RAID controller (the Fault LED is on), as follows:
 - a. Push down on the latch (centered above the RAID controller). The levers pop out of the locked position.



- b. Grasp the pull-rings; then, pull on the levers and remove the RAID controller.

To install a new RAID controller, perform the following steps:

1. Unpack the new RAID controller.
Set the RAID controller on a dry, level surface away from magnetic fields. Save the packing material and documentation in case you need to return the RAID controller.
2. Using a Phillips head screwdriver, remove the eight screws from the battery access panel on the bottom of the replacement RAID controller CRU.
3. Connect the battery harness on the battery to the two-pin connector on the controller board.
4. Position the battery inside the replacement RAID controller, and replace the battery-access panel.

5. Copy the battery replacement information from the label on the front of the failed RAID controller to the label on the front of the replacement RAID controller CRU.
6. Install the new RAID controller, as follows:
 - a. Slide the RAID controller all the way into the empty slot.
 - b. Close both levers until the latch locks into place.

Attention: When you replace the failed RAID controller, the storage-management software automatically synchronizes the firmware between the existing controller and the new controller. After replacing a controller, always use the storage-management software to verify the firmware levels and NVSRAM files.
7. Insert the GBICs.
8. Connect the Fibre Channel cables to their original locations.
9. If you have a single-controller configuration, turn ON power to the storage server and attached devices. For the proper power-on sequence, see “Powering the IBM NAS 300 on and off” on page 42.
10. Wait approximately one minute, and then check the green Host Loop LED, green Expansion Loop LED, and amber Fault LED on the new RAID controller.
 - If the Host Loop LED or the Expansion Loop LED is off, the RAID controller might not be inserted correctly. Remove the CRU and reinsert it.
 - If the Fault LED is on, the Host Loop LED and the Expansion Loop LED stay off, or any other Fault LED is on, refer to the storage-management software for problem determination.
11. Refer to the storage-management software online help for instructions on bringing the controller online.

Replacing the battery in the RAID controller

Each RAID controller contains a rechargeable battery that maintains the data in the cache memory.

Use the following procedure if the storage-management software instructs you to replace the battery because the current battery has failed or is nearing its expiration date.

1. Check the storage-management software for instructions on battery replacement procedures. If you are not using write-cache mirroring, this might involve clearing cache memory on the RAID controller that contains the battery that has failed. Follow the steps given in the software procedure before continuing with this procedure.

Attention: When you handle electrostatic discharge (ESD) sensitive devices, take precautions to avoid damage from static electricity. For details about handling ESD-sensitive devices, see “Handling static-sensitive devices” on page 85.

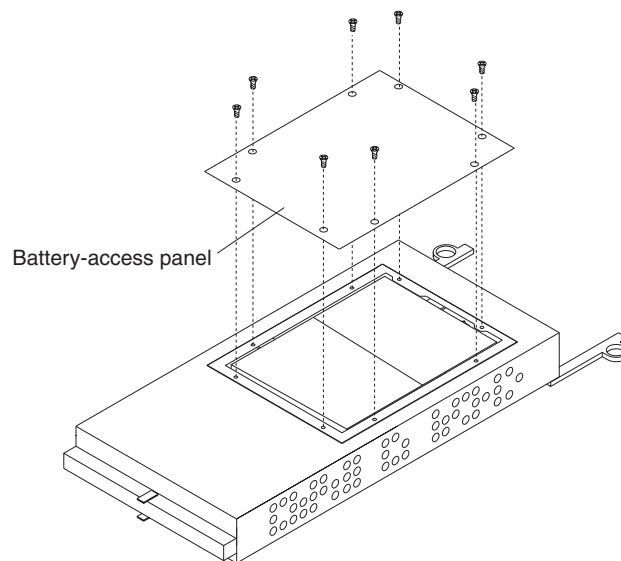
2. Unpack the new battery.

Set the new battery on a dry, level surface. Save all packing materials in case you need to return the battery.

Note: The battery comes with a new battery label. You will need this label later in the procedure.

3. Review all documentation that comes with the new battery for updated replacement procedures and other information.

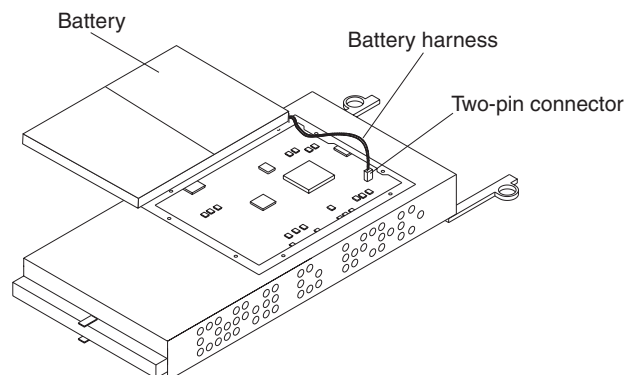
4. Use the storage-management software to locate the RAID controller containing the failed battery (the RAID controller Fault LED might be on).
5. Label each cable that connects to the RAID controller that contains the battery that has failed. This ensures that all cables will be properly reconnected to the RAID controller after you replace the battery.
6. Use the storage-management software to take the RAID controller offline that contains the battery that has failed.
7. From the RAID controller that contains the battery that has failed, remove the Fibre Channel cables and then the GBICs.
8. Remove the RAID controller as described in “Replacing a RAID controller” on page 93.
9. Using a Phillips head screwdriver, remove the eight screws from the battery access panel on the bottom of the RAID controller CRU, as shown in the following illustration.



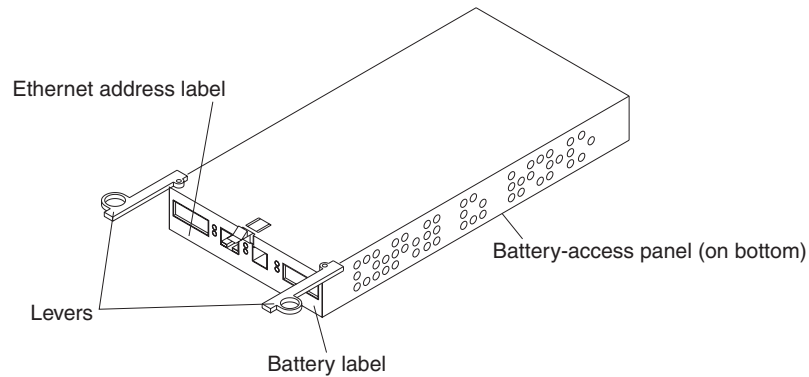
10. Lift the old battery out of the RAID controller CRU.

Note: If you cannot lift out the battery, turn over the RAID controller holding it upside-down close above a flat surface and let it fall out. Do not let the weight of the battery pull on the battery harness.

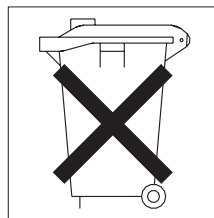
11. Disconnect the battery harness on the old battery from the two-pin connector on the controller board, and remove the battery, as shown in the following illustration.



12. Connect the battery harness on the new battery to the two-pin connector on the controller board.
13. Position the battery inside the RAID controller, and replace the battery-access panel.
14. Put the new battery label on the front of the RAID controller, over the old battery label. The location of the battery label is shown in the following illustration.



15. Write the battery replacement information on the label on the front of the new RAID controller CRU.
 - Date of Installation – Write today's date
 - Replacement Date – Write the date three years from now



CONTAINS
SEALED LEAD
BATTERY.
BATTERY
MUST BE
RECYCLED.

Pb

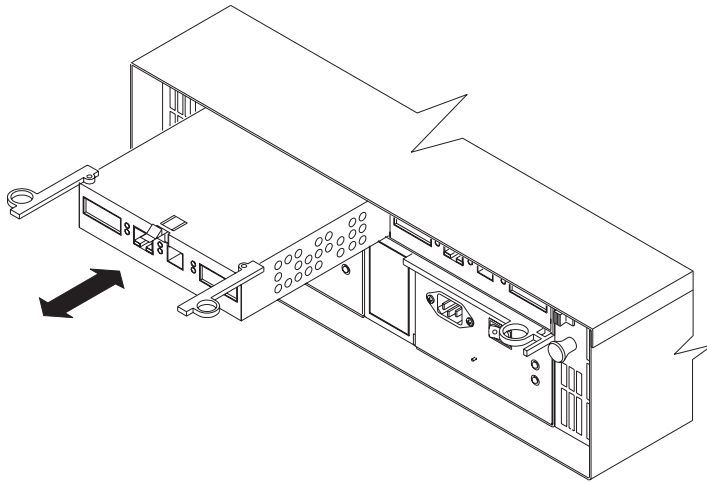
CAUTION:

Use proper facilities to recycle the used battery CRU. If the battery CRU is physically damaged or leaking electrolyte gel, *do not* ship it to a recycling center. The battery contains sealed lead-acid batteries that might be considered hazardous material. You must handle this unit in accordance with all applicable local and federal regulations.

For safety notice translations, see "Safety and environmental notices" on page 173 .

16. Dispose of the used battery CRU according to local and federal regulations, which might include hazardous material handling procedures.

17. Install the RAID controller, as shown in the following illustration.



- a. Slide the RAID controller all the way into the empty slot.
 - b. Close both levers until the latch locks into place.
18. Install the GBICs and then connect the Fibre Channel cables to their original locations.
 19. If you have a single-controller configuration, turn ON power to the storage server and attached devices. For the proper power-on sequence, see “Powering the IBM NAS 300 on and off” on page 42.
 20. Wait approximately one minute, and then check the green Host Loop LED, the green Expansion Loop LED, and the amber Fault LED on the new RAID controller.
 - If the Host Loop LED or the Expansion Loop LED is off, the RAID controller might not be inserted correctly. Remove the RAID controller and reinsert it.
 - If the Fault LED is on, the Host Loop LED and Expansion Loop LED stay off, or any other Fault LED is on, refer to the storage-management software for problem determination.
 21. Refer to the storage-management software online help for instructions on bringing the controller online and resetting the battery age.

Note: There are two cache batteries in the unit (one for each controller). Make sure that you reset the age for the correct battery. Also, you might get a software message indicating that the new battery has failed or is nearing its expiration date. This message will disappear after you reset the battery age through the software and battery charging is completed.

Installing GBICs and fiber optic cables

Each RAID controller unit has one host port and one expansion unit port. Gigabit Interface Converters (GBICs) are inserted into the ports, and then Fibre Channel cables are connected to the GBICs. This section provides information on installing GBICs. The GBICs are laser products.

Statement 3



Statement 3

CAUTION:

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



Danger

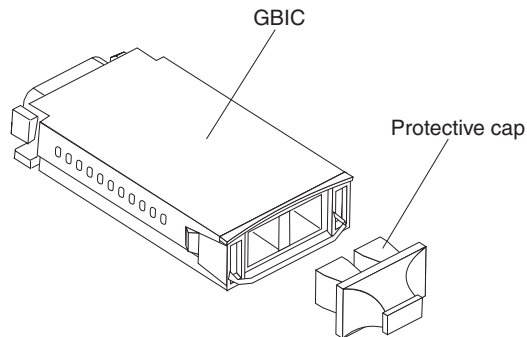
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Note: For safety notice translations, see “Safety and environmental notices” on page 173.

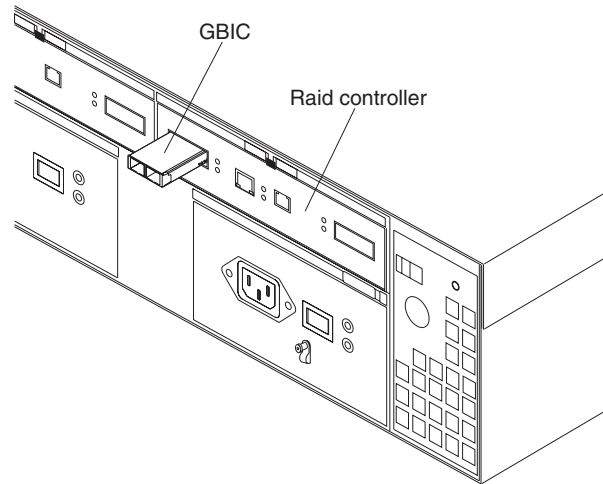
To install a GBIC, perform the following steps:

1. Remove the protective cap from the GBIC, as shown in the following illustration.

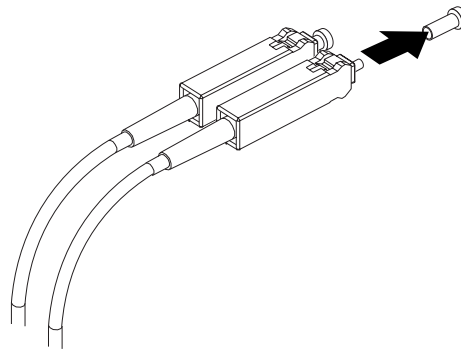


2. If the GBIC that you are installing has a metal latch, move the latch to the unlocked (center) position.

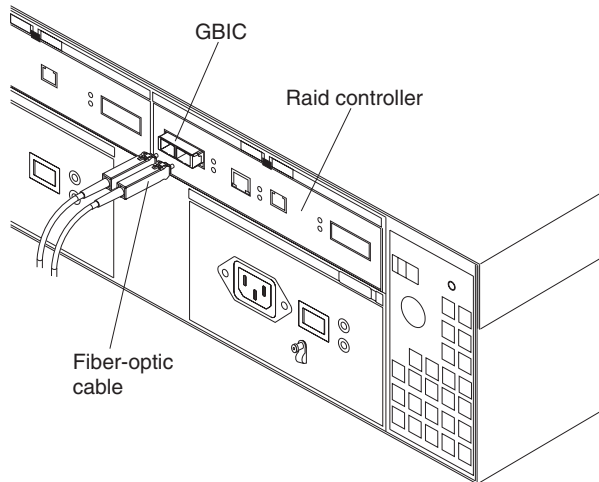
3. Insert the GBIC into the host or expansion port on the RAID controller, as shown in the following illustration.



4. After the GBIC is inserted all the way into the port, rotate the GBIC latch outward to the locked position (flush with the rear of the GBIC).
5. Move the GBIC latch to the unlocked (center) position.
6. Insert the GBIC into the GBIC port on the RAID controller.
7. Move the GBIC latch back to the locked position (flush with the rear of the GBIC).
8. Remove the protective caps from the fiber optic cable.



9. Connect the fiber optic cable to the installed GBIC, as shown in the following illustration.



Note: The fiber optic cable connection is keyed for proper insertion.

Installing and replacing storage unit components

This section provides instructions to help you install or remove CRUs, such as hot-swap drives, fans, ESM boards, and power supplies. This chapter also contains instructions for turning the storage unit on and off.

Handling static-sensitive devices

Static electricity, though harmless to you, can seriously damage storage unit components or options.

Note: When you are adding an internal option, do not open the static-protective package containing the option until you are instructed to do so.

When you handle options and other storage unit components, take these precautions to avoid damage from static electricity:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Never touch any exposed circuitry.
- Prevent others from touching components.
- When you are installing a new option, touch the static-protective package containing the option to a metal expansion-slot screw or other unpainted metal surface on the storage unit for at least two seconds. (This reduces static electricity from the package and from your body.)
- When possible, remove the option and install it directly into the storage unit without setting the option down. When this is not possible, place the static-protective package that the option comes in on a smooth, level surface and place the option on it.
- Do not place the option on the storage unit's covers or any metal surface.
- When possible, wear an electro-static discharge (ESD) protective ground strap.

Working with hot-swap drives

Before you begin

- Read the safety and handling guidelines provided in “Safety and environmental notices” on page 173 and “Handling static-sensitive devices” on page 102.
- Ensure that your current system configuration is working properly.
- Back up all important data before you make changes to storage devices, such as hard disk drives.

This section explains how you can replace a defective drive.

Before you remove drive CRUs, review the following information:

- **Drive CRUs:** Your storage unit supports IBM Fibre Channel (FC) hard disk drives. These IBM drives come preinstalled in a drive tray, ready for installation. (Do not detach the drive from the tray.) This drive and tray assembly is called a *drive CRU*.
- **Drive CRU labels:** A label is provided on the front of the drive CRU tray. Use this label to record the location information for each drive *before* you remove it. Ensure that you keep track of the drives and their corresponding bays.
Attention: If you reinstall a drive in the wrong bay, you might lose data.
- **Drive LEDs:** Each drive tray has two LEDs, which indicate the status for that particular drive. The drive LED states and descriptions are as follows.

LED	LED State	Definitions
Activity LED	Green flashing	The green light flashes to indicate FC activity to the drive.
Activity LED	Green on	The green light is on to indicate the drive is properly installed.
Fault LED	Amber flashing	The amber light flashes to indicate a drive rebuild is under way, or that a drive has been identified by software.
Fault LED	Amber on	The amber light is on to indicate a drive failure.

- **Fibre Channel loop IDs:**

When you replace a drive CRU in the storage unit, the drive tray plugs into a printed circuit board called the *midplane*. The midplane sets the Fibre Channel loop ID automatically, based on the setting of the tray number switch and the physical location (bay) of the drive CRU.

- **Hot-swap hardware:** Your storage unit contains hardware that enables you to replace a failed hard disk drive without turning off the storage unit. Therefore, you have the advantage of continuing to operate your system while a hard disk drive is removed.
- **Slim drives:** Hot-swap drive CRUs that are slightly smaller in size than the standard disk drive. These drive CRUs do not fill the entire drive bay. To maintain proper air flow and cooling, you must use a slim filler piece with each slim drive.

Replacing hot-swap drives

Drive problems include any malfunctions that delay, interrupt, or prevent successful I/O activity between the hosts and the hard disk drives in the storage unit. This section explains how to replace a failed drive.

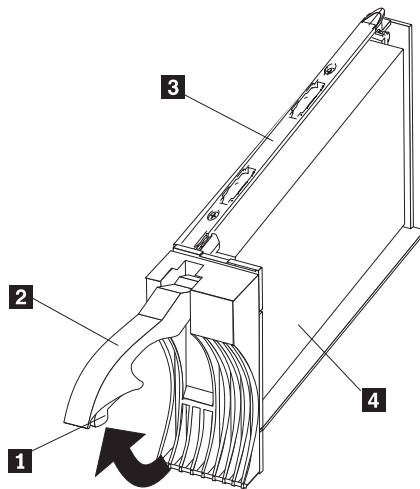
Attention: Failure to replace the drives in their correct bays might result in loss of data. If you are replacing a drive that is part of a RAID level 1 or RAID level 5 logical drive, ensure that you install the replacement drive in the correct bay.

Check the hardware and software documentation provided with your system to see if there are restrictions regarding hard disk drive configurations. Some system Fibre Channel (FC) configurations might not allow mixing different drive capacities or types within an array.

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

Attention: Never hot-swap a drive CRU when its green Activity LED is flashing. Hot-swap a drive CRU only when its amber Fault LED is completely on and not flashing, or when the drive is inactive with the green Activity LED completely on and not flashing.

2. Remove the drive CRU.
 - a. Press on the inside of the bottom of the tray handle to release the blue latch **1**.
 - b. Pull the handle **2** on the tray **3** out into the open position.
 - c. Lift the drive CRU partially out of the bay.
 - d. To avoid possible damage to the drive **4**, wait at least 20 seconds before fully removing the drive CRU from the storage unit to allow for the drive to spin down.



- e. Verify that there is proper identification (such as a label) on the drive CRU, then slide it completely out of the expansion unit.
 - f. Ensure that the filler piece remains in place for use with the new drive.
3. Install the new drive CRU.
 - a. Gently push the drive CRU into the empty bay until the tray handle **2** touches the storage unit bezel.
 - b. Push the tray handle **2** down into the closed (latched) position.
 4. Check the drive LEDs.
 - a. When a drive is ready for use, the green Activity LED is on and the amber Fault LED is off.

- b. If the amber Fault LED is completely on and not flashing, remove the drive from the unit and wait 10 seconds; then, reinstall the drive.
5. Return to normal operation.

Working with hot-swap power supplies

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

- The power supplies must always be in their proper places to maintain proper cooling.
- Use only the supported power supplies for your specific storage unit.

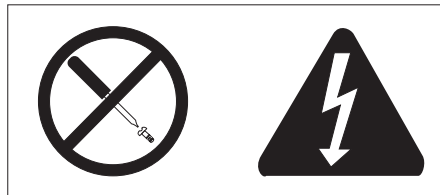
Removing a hot-swap power supply

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CAUTION:

Never remove the cover on a power supply or any part that has the following label attached.

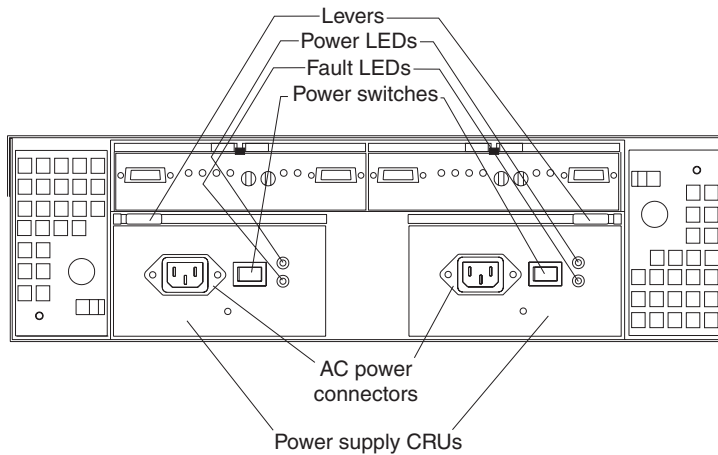


Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Note: For safety notice translations, see “Safety and environmental notices” on page 173.

To remove a hot-swap power supply:

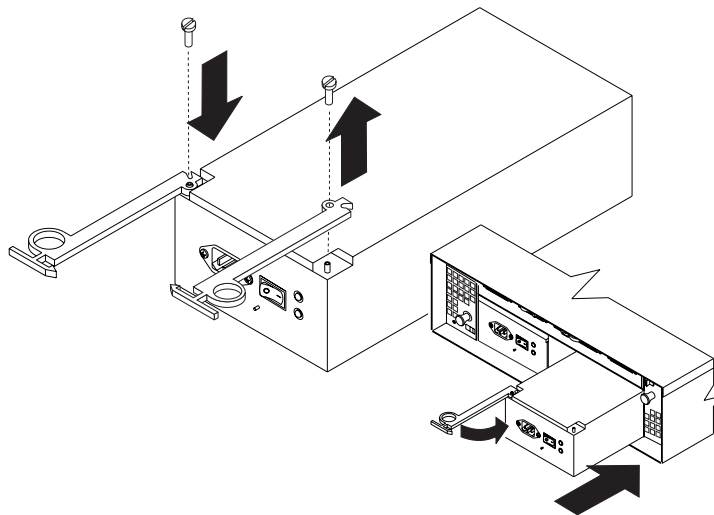
1. Turn the power supply switch to the OFF position.



2. Unplug the power supply cord from the electrical outlet.
3. Disconnect the power cord from the power supply.
4. Remove the nut and clamp from the rear of the power supply.
5. Remove the power supply from the storage unit.
 - a. Grasp the pull-ring on the power supply lever and squeeze the latch to release it.
 - b. Pull the lever open and remove the power supply.

Replacing a hot-swap power supply

Note: When replacing a power supply due to a failure, ensure that the power supply latch is mounted on the side of the power supply that faces the middle of the storage unit. If not, remove the lever screw, flip the lever over and tighten the screw on the opposite side.

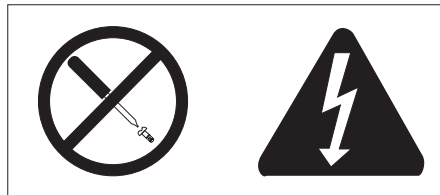


To replace a hot-swap power supply, perform the following steps:



CAUTION:

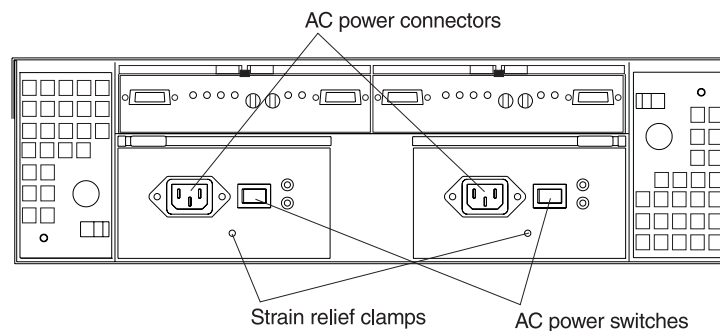
Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Note: For safety notice translations, see “Safety and environmental notices” on page 173.

1. Ensure that the ac power switch on the power supply you are installing is in the Off position.
2. Replace the power supply in the storage unit.
 - a. Slide the power supply into the storage unit. Be sure the lever is pulled straight out as you slide the power supply into the storage unit.
 - b. Close the lever until the pull-ring latch locks in place. Make sure that the lever locks into place.
3. Wrap the clamp around the power cord approximately 20 cm (8 in.) from the power supply connection end.
4. Attach the power supply nut and tighten it securely.
5. Connect the power cord to the power supply.



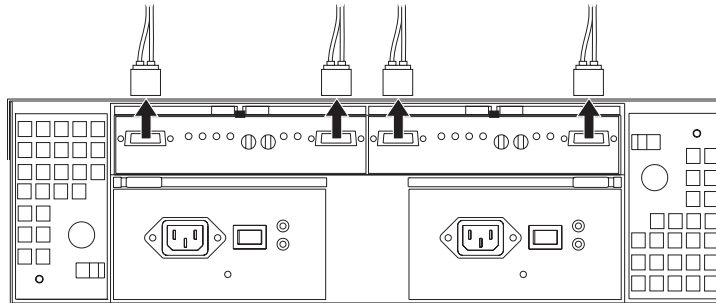
6. Plug the supply power cord into a properly grounded electrical outlet.
7. Turn the power supply switch to the ON position.

Working with hot-swap ESM boards

To replace an ESM board, perform the following steps:

1. Check the software documentation provided with your system for instructions on ESM board failure-recovery procedures. Follow the steps provided in the software documentation before continuing to step 2.
2. Label each cable to ensure that all cables are properly reconnected to the new ESM board.
3. Label the GBICs when you remove them. You must install the GBICs in the same positions on the new ESM board.
4. Remove the GBICs and FC cables from the failed ESM board.

Note: Be careful not to bend the FC cables at a sharp angle or pinch them with objects. This can decrease the performance or cause data loss.



5. To remove the failed ESM board (the Fault indicator light is lit), push down on the latch. The levers will pop out of the locked position.
6. Grasp the pull-rings and pull out on the levers, then remove the ESM board.
7. Set the tray numbers on the new ESM board to match the tray numbers on the failed ESM board.
8. Install the new ESM board by sliding it into the empty slot. Be sure the levers are pulled straight out as you slide the ESM board into the storage unit.
9. Close the levers until the pull-ring latch locks in place. Make sure that the levers lock into place.
10. Reattach the GBICs and FC cables to their original locations.
11. Check the Bypass LEDs at both ends of the reattached cables. If the Bypass LEDs are on, reattach the cables and GBICs.
12. Check the Power and Fault indicator lights on the new ESM board:
 - If the Power indicator is off, the ESM board might not be inserted correctly.
 - If the Fault indicator is lit, the Power indicator does not light, or any other Fault indicator is lit, refer to the *User's Reference*.
13. Refer to your storage-management software for instructions on enabling the ESM board.

Working with GBICs

The storage unit has four gigabit interface card (GBIC) ports (two on each ESM board). Use the GBIC ports to attach FC cables to the storage unit.

Working with hot-swap cooling fans

Attention: Do not run the storage unit without adequate ventilation and cooling, because it might cause damage to the internal components and circuitry.

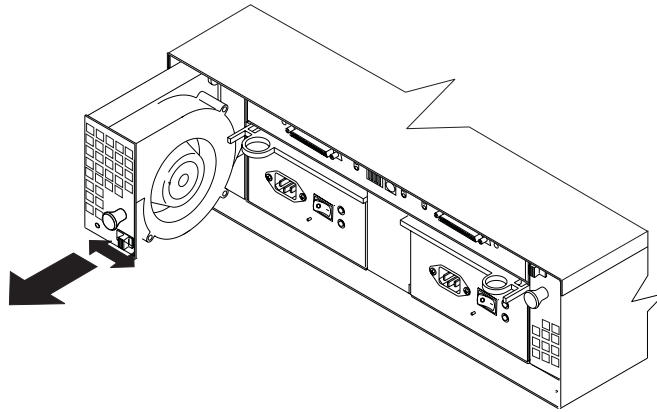
The fans are interchangeable and customer replaceable and do not require preventive maintenance. The fans help maintain proper air circulation across the components inside the storage unit. Air flows through the storage unit from the front to the back.

You can hot-swap the fans (replace them while the storage unit is turned on and running), as long as you complete the exchange within 10 minutes. This time limit applies only to the total time that a fan is out of the storage unit, beginning when you remove the failed unit and ending when you reseal the new one. This does not include the time it takes you to perform this entire procedure (checking LEDs, unpacking the new fan, and so on).

Both fan units must always be in place, even if one is not functioning properly, to maintain proper cooling.

Use the following procedure to replace a hot-swap fan:

1. Check the LEDs on the back of the storage unit.
2. If the amber Fault LED is on, remove the failed fan.
 - a. Slide the latch to unlock the fan CRU.
 - b. Use the handle (black knob) to pull the fan from the storage unit.



3. Install the new fan unit.
 - a. Place the fan CRU in front of the fan slot.
 - b. Hold the latch open and slide the fan all the way into the slot. If the fan does not go into the bay, rotate it 180°. Ensure that the latch is on the side closest to the center of the storage unit.
 - c. Release the latch. If the lever remains open, pull back on the fan slightly, then push it in again until the latch snaps into place.

4. Check the LEDs.

The Fault LEDs turn off after a few seconds; if they remain on, refer to the *User's Reference*.

Working with the Fibre Channel hub

In the IBM NAS 300, a Fibre Channel hub is considered to be a CRU and has no replaceable components. If a Fibre Channel hub is determined to be defective, the entire Fibre Channel hub must be replaced.

Removing a Fibre Channel hub

Note: You can use the same steps described here to remove a IBM NAS 300 engine.

To replace a Fibre Channel hub, perform the following steps:

1. Disconnect all cables and power cords taking note of the cable numbers for reconnecting to the new hub.
2. Remove the two locking screws securing the locking tabs on the Fibre Channel hub to the rack.
3. Slide the Fibre Channel hub out as far as possible.
4. Locate and press in the locking push-buttons on each side unlocking the inner moving slide bar.
5. Slide the Fibre Channel hub fully out and remove it from the rack.
6. Unscrew and remove the moving slide bar and the locking ears from the Fibre Channel hub. Retain the inner slide bars, locking tabs, and screws as they will be used to mount the new Fibre Channel hub.

Installing a new Fibre Channel hub

Note: You can use the same steps described here to install a new IBM NAS 300 engine.

To install a new Fibre Channel hub, perform the following steps:

1. Mount the moving slide and locking ears to the hub. Mount the moving portion of the slide first, and then the locking ears.
2. Insert the Fibre Channel hub and moving portion of the slides into the fixed portion of the slide on the rack. Align the portion of the rail mounted on the hub with the receiving rail members mounted in the rack. Push the hub all the way into the rack.
3. Slide the Fibre Channel hub back and forth on the rail several times to make sure it moves easily. Slide the 3534 Managed Hub fully back into the rack. Using the screws previously removed when the hub was replaced, lock the hub in the rack.

Chapter 6. Using system-level utilities

The following utilities are provided with each appliance engine.

Note: Using these utilities for each appliance engine requires the attachment of a monitor, keyboard, and mouse.

- **Configuration/Setup Utility**

The Configuration/Setup Utility program is part of the *basic input/output system (BIOS)* that comes with each appliance engine. You can use this program to configure serial and parallel port assignments, change interrupt request (IRQ) settings, change the drive startup sequence, set the date and time, and set passwords. See “Using the Configuration/Setup Utility program” for more information.

- **SCSISelect Utility**

With the built-in SCSISelect Utility program, you can configure the devices attached to the integrated SCSI controller. See “Using the SCSISelect utility program” on page 117 for more information.

Using the Configuration/Setup Utility program

This section provides the instructions needed to start the Configuration/Setup Utility program and descriptions of the menu choices available.

Starting the Configuration/Setup Utility program

To start the Configuration/Setup Utility program:

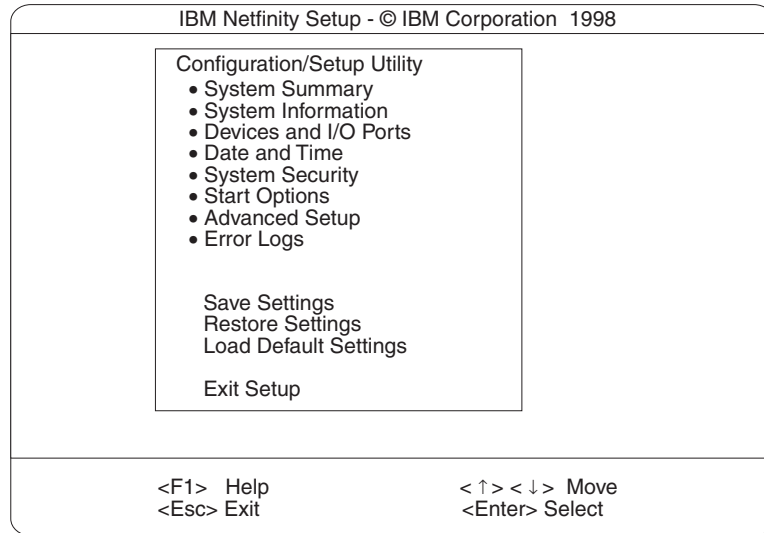
1. Power-on the appliance engine and watch the monitor screen.
2. When the message Press F1 for Configuration/Setup appears, press F1.

Note: If you have set both levels of passwords (user and administrator), you must enter the administrator password to access the full Configuration/Setup menu.

3. Follow the instructions that appear on the screen.

Choices available from the Configuration/Setup main menu

From the Configuration/Setup Utility main menu, you can select settings that you want to change. The Configuration/Setup Utility main menu is similar to the following:



Notes:

1. You can press F1 to display Help information for a selected menu item.
2. The choices on some menus might differ slightly, depending on the BIOS version in your server.

Descriptions of the choices available from the main menu are as follows:

- **System Summary**

Select this choice to display configuration information. This includes the type and speed of the microprocessors and the amount of memory installed.

Changes that you make to configuration settings appear on this summary screen. You cannot edit the fields.

This choice appears on both the full and limited Configuration/Setup Utility menus.

- **System Information**

Select this choice to display information about each appliance engine. Changes that you make on other menus might appear on this summary screen. You cannot edit any fields. The System Information choice appears only on the full Configuration/Setup Utility main menu.

- **Product Data**

Select this choice to view system information, such as the machine type and model, the appliance engine serial number, and the revision level or issue date of the BIOS stored in the flash electronically erasable programmable ROM (EEPROM).

- **System Card Data**

Select this choice to view vital product data (VPD) for some appliance engine components.

- **Devices and I/O Ports**

Select this choice to view or change the assignments for devices and input/output ports. This choice appears only on the full Configuration/Setup Utility main menu.

- **Date and Time**

Select this choice to set the system date and time and to change the system time sent to the Configuration/Setup Utility (service processor) when the server is started. This choice appears only on the full Configuration/Setup Utility main menu.

The system time is in a 24-hour format: hour:minute:second.

You can set a time delta to be added or subtracted from the system time that is sent to the service processor (Configuration/Setup Utility) each time the server is started. Use the number keys to enter the hours and minutes and + or – to add or subtract from the system time. If you want the system clock time to be the same as the Configuration/Setup Utility clock time, leave the value set at its default of 0.

- **System Security**

Select this choice to set passwords or a system owner's name. This choice appears only on the full Configuration/Setup Utility main menu.

You can implement two levels of password protection:

- **Power-on Password**

Select this choice to set or change a power-on password. See “Using passwords” on page 115 for more information.

- **Administrator Password**

Select this choice to set or change an administrator password.

Attention: If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user.

See “Using passwords” on page 115 for more information.

- **System Owner's Name**

Select this choice to specify a system owner's name, which will display during POST. You can remove or change the name only from the System Security menu. You can use any combination of up to 16 characters for the system owner's name.

- **Start Options**

Select this choice to view or change the start options. This choice appears only on the full Configuration/Setup Utility main menu. Start options take effect when you start each appliance engine.

You can select keyboard operating characteristics, such as the keyboard speed. You also can specify whether the keyboard number lock starts on or off. You also can enable the server to run without a diskette drive, monitor, or keyboard.

The appliance engine uses a startup sequence to determine the device from which the operating system loads. For example, you can define a startup sequence that checks for a startable diskette in the diskette drive, then checks the hard drive in bay 1, and then checks a network adapter.

You also can select which PCI SCSI adapter is given boot precedence. The first drive that is attached to the selected adapter will be assigned drive number 80L and the operating system will start from that drive. The default for boot precedence is Disabled. The range of choices depends upon the number of PCI SCSI adapters installed in the server.

You can enable a virus-detection test that checks for changes in the master boot record at startup. You also can choose to run POST in the enhanced mode or the quick mode.

- **Advanced Setup**

Select this choice to change values for advanced hardware features, such as cache control, and PCI configuration. This choice appears only on the full Configuration/Setup Utility main menu.

A warning message appears above the choices on this menu to alert you that the system might malfunction if these options are configured incorrectly. Follow the instructions on the screen carefully.

- **Processor Serial Number Access**

Select this choice to identify if the microprocessor serial number in the microprocessor is readable.

- **Core Chipset Control**

Select this choice to modify settings that control features of the core chip set on the system board.

Attention: Do not make changes here unless directed to do so by an IBM authorized service representative.

- **Cache Control**

Select this choice to enable or disable the microprocessor cache. In addition, you can define the microprocessor cache type as write-back (WB) or write-through (WT). Selecting write-back mode will provide the maximum system performance.

- **PCI Slot/Device Information**

Select this choice to view and identify system resources used by PCI devices. PCI devices automatically communicate with the appliance engine configuration information. This usually results in automatic configuration of a PCI device.

Attention: You must use the menu selections to save custom settings for the PCI Slot/Device Information choice. The save, restore and load default settings choices on the main menu of the Configuration/Setup Utility do not save the PCI Slot/Device Information settings.

After making changes, select:

- **Save and exit the PCI Utility** to save the changes and return to the Advanced Setup choice.
- **Exit the PCI Utility without saving changes** to ignore the changes, restore the previous settings, and return to the Advanced Setup choice.

PCI Device Control allows you to enable or disable the integrated SCSI, video, and Ethernet controllers. You can also enable or disable PCI slots from this menu.

- The default setting is Enable for all the controllers and PCI slots. If you select Disable, the system will not configure the disabled device and the operating system will not see the device. (This is equivalent to unplugging the device.)
- If the on-board SCSI controller is disabled and no other controller and mass storage device are installed, operating system startup cannot occur.
- If the video controller is disabled and no video adapter is installed, the server will have no video capability. However, turning the appliance engine off and on three times results in a default startup that enables video again.

- **Memory Settings**

Select this choice to manually disable or enable a bank of memory.

If a memory error is detected during POST or memory configuration, the server can automatically disable the failing memory bank and continue

operating with reduced memory capacity. If this occurs, you must manually enable the memory bank after the problem is corrected. Select **Memory Settings** from the Advanced Setup menu, use the arrow keys to highlight the bank that you want to enable; then, use the arrow keys to select **Enable**.

- **System Service Processor Settings**

Select this choice to view the interrupt-request setting (IRQ) used by the Configuration/Setup Utility (system service processor). You can then use the arrow keys to select a new IRQ setting for the Configuration/Setup Utility from the list of available choices.

- **Event/Error Logs**

Select this choice to view or clear error logs.

- Select **Clear error logs** to clear the error or event log.
- Select **POST Error Log** to view the three most recent error codes and messages that the system generated during POST.
- Select **System Event/Error Log** to view the system event/error log. The system event/error log contains all the system error and warning messages that the system has generated. You can use the arrow keys to move between pages in the system event/error log.

- **Save Settings**

Select this choice to save your customized settings.

- **Restore Settings**

Select this choice to delete your changes and restore the previous settings.

- **Load Default Settings**

Select this choice to cancel your changes and restore the factory settings.

- **Exit Setup**

If you have made any changes, the program will prompt you to save the changes or exit without saving the changes.

Using passwords

The **System Security** choice appears only on the full Configuration/Setup Utility menu. After you select this choice, you can implement two levels of protection: power-on password and administrator password.

Power-on password

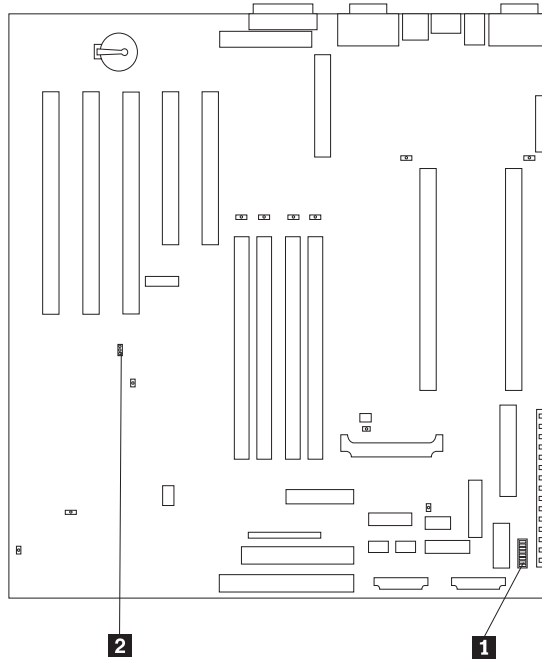
After you set a power-on password, you can enable the unattended-start mode. This locks the keyboard and mouse, but allows the system to start the operating system. The keyboard and mouse remain locked until you enter the correct password.

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. If you forget the power-on password, you can regain access to the appliance engine through one of the following methods:

- If an administrator password is set, enter the administrator password at the power-on prompt. Start the Configuration/Setup Utility program and change the power-on password.
- Change the position of the password override switch as described in “Setting the password override switch” on page 116.
- Remove the battery and then install the battery.

Setting the password override switch: The following illustration shows the location of the password override switch (switch 8 on switch block 1) on the system board.

Note: As shown in the illustration, switch 8 is the one at the top of the switch block.



1 System board switch block (SW1)

2 Boot block jumper (J37)

To set the password override switch:

1. Power-off the appliance engine and peripheral devices and disconnect all external cables and power cords; then, remove the cover.
2. Change the setting of the password override switch (switch 8 on switch block 1 on the system board) to ON.
3. Install the appliance engine cover and connect all external cables and power cords.

Note: You can now start the Configuration/Setup utility program and change the power-on password. If you want to be prompted for a password when you power-on the appliance engine, set the password override switch back to the OFF position.

Administrator password

Select this choice to set an administrator password. The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user.

Attention: If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

The following table provides a summary of the password features.

Table 13. Power-on and administrator password features

Type of password	Results
Power-on password	<ul style="list-style-type: none"> • Enter the password to complete the system startup. • All choices are available on the Configuration/Setup Utility main menu.
Administrator password	<ul style="list-style-type: none"> • No password is required to start the appliance engine. • Enter the password to access the Configuration/Setup Utility program. • All choices are available on the Configuration/Setup Utility main menu.
Administrator <i>and</i> power-on password	<ul style="list-style-type: none"> • You can enter either password to complete the appliance engine startup. • The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords, and allow a power-on password to be changed by the user. • The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access might include changing or deleting the power-on password.

Using the SCSISelect utility program

SCSISelect is a built-in, menu-driven configuration utility program that you can use to:

- View the default SCSI IDs
- Locate and correct configuration conflicts
- Perform a low-level format on a SCSI hard drive

The following sections provide the instructions needed to start the SCSISelect Utility and descriptions of the menu choices available.

Starting the SCSISelect utility program

To start the SCSISelect utility program:

1. Power-on the appliance engine.
2. When the <<< Press <CTRL><A> for SCSISelect™ Utility! >>> prompt appears, press Ctrl+A.

Note: If an administrator password has been set, a prompt appears asking you to enter the password to start the SCSISelect Utility program.

3. When prompted, select either channel A (internal) or channel B (external).
4. Use the arrow keys to select a choice from the menu.
 - Press Esc to return to the previous menu.
 - Press the F5 key to switch between color and monochrome modes (if your monitor permits).
5. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

Choices available from the SCSISelect menu

The following choices appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**
Select this choice to view or change the SCSI controller settings. To reset the SCSI controller to its default values, press F6; then, follow the instructions that appear on the screen.

You can view or change the following controller settings:

- **Host Adapter SCSI ID**
Select this choice to view the SCSI controller ID, normally 7.
- **SCSI Parity Checking**
Select this choice to view the assigned value of *Enabled*.
- **Host Adapter SCSI Termination**
Select this choice to view the assigned value of *Automatic*.
- **Boot Device Options**
Select this choice to configure startable device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.
- **SCSI Device Configuration**
Select this choice to configure SCSI device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

Note: The Maximum Sync Transfer Rate represents the transfer rate for Ultra SCSI devices.

- The transfer rate for Ultra3 SCSI LVD devices is 160.0 MB/s
- The transfer rate for Ultra2 SCSI LVD devices is 80.0 MB/s
- The transfer rate for Fast SCSI devices is 20.0 MB/s

- **Advanced Configuration Options**
Select this choice to view or change the settings for advanced configuration options. These options include enabling support for large hard drives and support for drives with UltraSCSI speeds.

- **SCSI Disk Utilities**

Select this choice to view the SCSI IDs that are assigned to each device or to format a SCSI device.

To use the utility program, select a drive from the list. Read the screens carefully before making a selection.

Note: If you press Ctrl+A before the selected drives are ready, an Unexpected SCSI Command Failure screen might appear. Restart the appliance engine and watch the SCSISelect messages as each drive starts. After the drive that you want to view or format starts, press Ctrl+A.

- **Format Disk**

Attention: The Low-Level Format program erases *all* data and programs.

Select this choice to perform a low-level format on a hard drive. Depending on the hard drive capacity, the Low-Level Format program could take up to two hours.

Use the Low-Level Format program:

- When you are installing software that requires a low-level format
- When you get recurring messages from the diagnostic tests directing you to run the Low-Level Format program on the hard drive
- As a last resort before replacing a failing hard drive

Note: If your server has a PCI RAID adapter installed, refer to the RAID adapter documentation for instructions for performing low-level formats on hard drives attached to the adapter.

To start the Low-Level Format program:

1. If the hard drive is working, make a backup copy of all the files and programs on the hard drive. (See your operating system information for instructions.)
2. Select **Format Disk**; then, follow the instructions on the screen.

Note: Hard drives normally contain more tracks than their stated capacity (to allow for defective tracks). A message appears on the screen if the defect limit is reached. If this happens, have the system serviced.

Appendix A. FRU information (service only)

Field Replacement Units (FRUs) for the xSeries 340 should be replaced by qualified service personnel only.

Removing the LED cover



- 1** Front LED cover
- 2** Tabs

To remove the LED cover, do the following:

1. Remove the cover.
2. From the back of the cover, release the four tabs **1** and gently pry away the LED cover **2**.

Removing the on/off reset board



- 1** On/Off Reset Board
- 2** Screw

To remove the on/off reset board:

1. Remove the cover.
2. Disconnect the cables from the system board.

3. Remove the screw **2**.
4. Gently pull off the board **1**.

Removing the diskette/CDROM drive

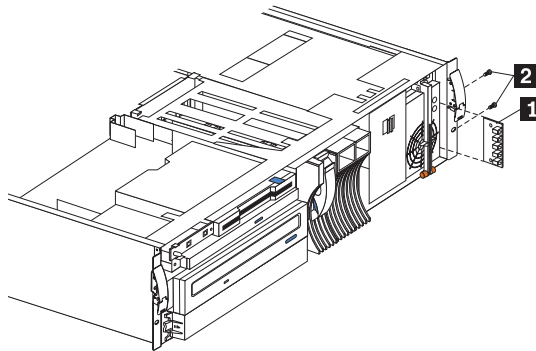


- 1** Screw
- 2** 12.7MM Diskette/CDROM Drive

To remove the LED board:

1. Remove the cover.
2. Disconnect the cable.
3. Remove the screw **1**.
4. Carefully pull out drive **2** to remove.

Removing the LED board



- 1** LED board
- 2** Screws(2)

To remove the LED board:

1. Remove the cover.
2. Disconnect the LED board cable from the system board .
3. Remove the two screws **2**.
4. Carefully slide out the board **1**.

Removing the SCSI backplane assembly

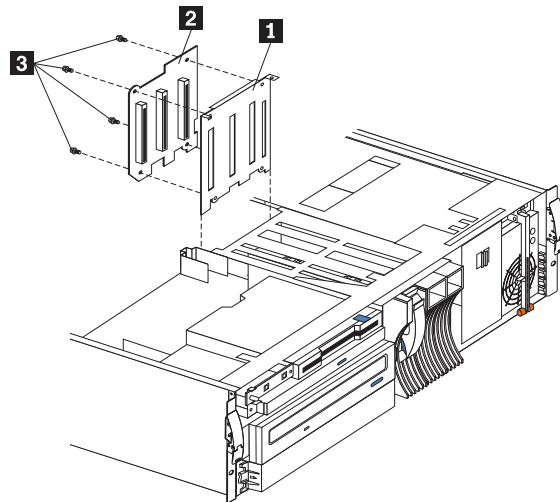


- 1** Screw
- 2** SCSI Backplane

To remove the hot-swap hard disk drive backplane:

1. Remove the cover.
2. Disconnect cables.
3. Remove the screw **1** from the top of the assembly.
4. Gently slide the SCSI backplane assembly **2** up to remove.

Removing the hot-swap hard disk drive backplane



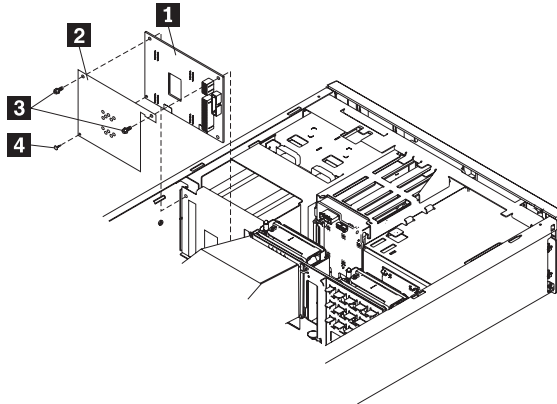
- 1** Backplane bracket
- 2** Backplane board
- 3** Screws (4)

To remove the hot-swap hard disk drive backplane:

1. Remove the cover.
2. Pull out the hard drives in order to disconnect them from the backplane.
3. Remove the screw from the top of the backplane bracket **1**.

4. Lift the backplane from the chassis.
5. Remove the cables from the backplane **2**.
6. Remove the four screws **3**.
7. Gently lift up to remove the backplane board **2**.

Removing the power supply backplane



- 1** Backplane
- 2** Insulator
- 3** Screws (2)
- 4** Plastic retainer

To remove the power supply backplane:

1. Remove the cover.
2. Remove power supplies from the backplane **1**.
3. Disconnect cables from the backplane.
4. Remove the two screws **3**.
5. Remove the plastic retainer **4**.
6. Remove insulator **2** and replace on new backplane.

Removing the AC Distribution Box



- 1** Screw
- 2** AC distributor box

- 3** Chassis clips
- 4** Chassis slot
- 5** Cable receptacle

To remove the AC distribution box:

1. Remove the cover.
2. Remove screw **1**.
3. Pull the AC distribution box **2** toward front of machine in order to release it from the chassis clips **3**.
4. Remove the two hot-swap power supplies.
5. Pull down on the cable receptacle **5** to release it from the chassis.

Note: To install the receptacle, push up into the chassis opening of slot **4**. Be sure to properly replace receptacles, 1 to 1 and 2 to 2 as labeled.

Removing the system board



- 1** System board cage
- 2** Knobs

To remove the system board:

1. Remove the cover.
2. Remove the rear air flow fan.
3. Remove the air cover.
4. Remove the system board cables.
5. Pull up on the two knobs **2**.
6. Pull up on the system board cage **1** to remove from the chassis.

Appendix B. Parts listing

This appendix lists the parts for the IBM NAS 300 components.

Fibre Channel hub 3535-1RU

Table 14. System parts listing for the IBM NAS 300 Fibre Channel hub

System Part (Model No.)	FRU No.
M/T 3534-1RU FC Hub Final Assembly	35L1801
Rack Slides	34L2722
Rack Mount Brackets	34L2767
Switch Securing Ears	34L2723

Engine 51875-RZ

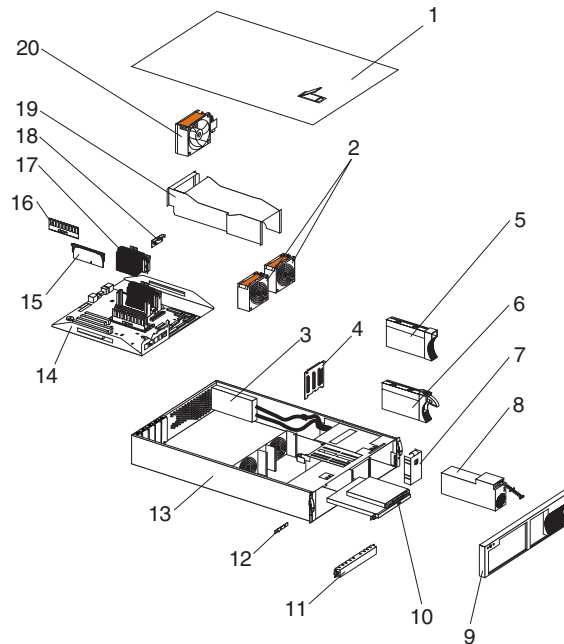


Table 15. System parts listing for the IBM NAS 300 engine

Index	System Part (Model No.)	FRU No.
1	Top Cover	38P7581
2	92MM X 38 Fan (2)	37L0305
3	AC Distribution Box Model	37L0313
4	SCSI Backplane Combo/Backplate Assembly	00N8953
5	Slim Hard Disk Drive Bezel Filler Assembly	00N7259
6	9.1 GB Hard Disk Drive, 10000 RPM	37L6216
8	Power Supply with Mounting, 270 WF	37L0311
9	Front Bezel 5187-5RZ	38P7582
10	12.7MM Diskette Drive	36L8645
10	24X CDROM (Primary)	09N0883
12	Card Assembly, Front Switch Card	00N7213
14	System Board	09N7812
16	512MB SDIMM Memory (All Models)	33L3128
17	933MHz/133 Processor & Heatsink Assembly	24P1715

Table 15. System parts listing for the IBM NAS 300 engine (continued)

Index	System Part (Model No.)	FRU No.
18	Voltage Regulator Module	36L8901
20	Rear Fan Assembly (92MM X 38)	00N7248
	Top Cover Service Label	38P7585
	PCI FAST/WIDE ULTRA SCSI Adapter	10L7095
	NETFINITY FASiT HOST Adapter	09N7292
	NETFINITY Management Adapter	06P5436
	Management Interconnect Cable RS485 Peer	03K9319
	Management Interconnect Cable Peer	03K9321
	NETFINITY 10/100 Ethernet Adapter	06P3609
	NETFINITY 1GB Ethernet Adapter	06P3709
	Blank 5.25 HDD Bezel (Snap Mount)	00N6407
	Memory Assembly, 128MB RDIMM P133	33L3124
	Baffle, Air	00N7172
	24X TEAC CDROM (Alternate)	19K1523
	Misc Rack Hardware Kit	00N7193
	Slide with Brackets (2)	00N7205
	Bracket, Cable Mgmt Chassis Attach (2)	00N7211
	Cable Management Arm Assembly (2)	00N7242
	Cable Management Arm Assembly (2)	00N7245
	Power Backplane Insulator	00N7188
	Card Assembly, Front Led Card (Baldplate)	00N7227
	Card Assembly, Power Backplane	00N7216
	Card Assembly (CD Interposer)	09N9451
	Card Assembly, SCSI Repeater 160M	00N7293
	Mounting Hardware/Cage	00N7196
	ON/OFF Switch Cover	09N8012
	Battery (3V)	33F8354
	Lens Cover	00N7178
	Misc FRU Kit	00N7179
	Left Ext. Interface Adapter Side Flange	00N7190
	Right Ext. Interface Adapter Side Flange	00N7192
	Hinge Pin (3)	00N7244
	Mounting Bracket Assembly (CD/FDD)	09N9452
	Frame Assembly	37L0303
	Cable, Power - IO Planar To Fans 1X7	00N7181
	Cable, Signal I2C - IO Planar To SCSI BP (2X7)	00N7185
	Cable, Signal-SCSI Single Ended-Planar-Media	00N7187
	Cable, Power-Signal-Power BP-IO Planar 2X10	03K9346
	Cable, Signal LVD- Planar-SCSI BP	37L0350
	Cable, Power - Pwr BP To IO Planar 2X12	37L0354
	Cable, Power - Pwr BP To SCSI BP& Drop	37L0358
	Cable, Signal LVD-SCSI-Jumper RPTR-SCSI BP	00N7198

RAID storage controller 5191–2RU

Table 16. System parts listing for the IBM NAS 300 RAID storage controller

System Part (Model No.)	FRU No.
M/T 5191-2RU RAID Cntrl Final Assembly	38P7578
DASD Bezel Filler Asm	37L0198
Front Bezel 5191-2RU	38P7638
Power Supply Asm (350 W)	19K1164
Blower Asm	09N7285

Table 16. System parts listing for the IBM NAS 300 RAID storage controller (continued)

System Part (Model No.)	FRU No.
FC Controller	19K1115
Rail Kit Left/Right	37L0067
HDD, 36.4 GB W/Slim Carrier	06P5781
GBIC Module Sw	03K9206
Cable 1M	37L0083
Misc. Hardware Kit	09N7288
Battery, Cache	19K1219

Storage Unit 5192-1RU

Table 17. System parts listing for the IBM NAS 300 storage unit

System Part (Model No.)	FRU No.
M/T 5192-1RU JBOD Final Assembly	38P7580
Rail Kit Left/Right	09N7285
Blower Assembly	37L0067
350W Power Supply Assembly	37L0059
Electronic Module (ESM, LVD/LVD)	37L0103
Front Bezel 5192-1RU	38P7579
Blank Tray Assembly	37L6708
HDD, 36.4 GB W/Slim Carrier	06P5781
GBIC Module Sw	03K9206
Misc Hardware Kit	09N7288

Power Cords

Table 18. Power cords

Description	Part No.
Power cord, 2 ft.	36L8858
Power cord, 3 ft.	36L8859
Power cord, 5 ft.	36L8860
Power cord, from PDU to ASM adapter	00N7691

Signal cables

Table 19. Power cords

Description	Part No.
Cable, 10 ft. CAT-5 UPT Ethernet straight-thru	38P7771
Cable, 10 FT. CAT-5 UTP Ethernet crossover	38P7576
2-meter fibre channel cable	38P7772
5-meter fibre channel cable	03K9202

Appendix C. PCI Adapter Placement

Each IBM NAS 300 engine contains five PCI adapter slots. Table 20 shows where the PCI adapters should be installed. To use the table, look in the left column Configuration to locate the row that contains the list of adapters installed (or to be installed) in your engine. This row then shows where the adapters should be installed.

Example 1: If you have a single Gigabit adapter (in addition to the standard Fibre Channel installed in Slot-5), that adapter should be installed in slot-3.

Example 2: If you have four additional adapters—two 10/100 Ethernet adapters, one Advanced Management, and one Gigabit Ethernet adapter – they should be installed in the following PCI slots:

- Slot-1 — Advanced Management
- Slot-2 — 10/100 Ethernet
- Slot-3 — Gigabit Ethernet
- Slot-4 — 10/100 Ethernet
- Slot-5 — Fibre Channel (standard)

Table 20. PCI Adapter Placement

Configuration	PCI Slot-1 (32-bit)	PCI Slot-2(32-bit)	PCI Slot-3(64-bit)	PCI Slot-4 (64-bit)	PCI Slot-5 (64-bit)
<ul style="list-style-type: none"> • 10/100- 10/100 Ethernet • Gig- Gigabit Ethernet • AM- Advanced Mgmt • SCSI- Small Computer System Interface 					
SCSI				SCSI	FC-std
Gig			Gig		FC-std
10/100		10/100			FC-std
AM	AM				FC-std
SCSI, AM	AM			SCSI	FC-std
SCSI, 10/100		10/100		SCSI	FC-std
SCSI, Gig			Gig	SCSI	FC-std
AM, 10/100	AM	10/100			FC-std
AM, Gig	AM		Gig		FC-std
10/100, Gig		10/100	Gig		FC-std
10/100, 10/100		10/100	10/100		FC-std
Gig, Gig			Gig	Gig	FC-std
SCSI, AM, 10/100	AM	10/100		SCSI	FC-std
SCSI, AM, Gig	AM		Gig	SCSI	FC-std
SCSI, 10/100, Gig		10/100	Gig	SCSI	FC-std
SCSI, 10/100, 10/100		10/100	10/100	SCSI	FC-std
SCSI, Gig, Gig		SCSI	Gig	Gig	FC-std
AM, 10/100, 10/100	AM	10/100	10/100		FC-std
AM, 10/100, Gig	AM	10/100	Gig		FC-std

Table 20. PCI Adapter Placement (continued)

AM, Gig, Gig	AM		Gig	Gig	FC-std
10/100, 10/100, 10/100	10/100	10/100	10/100		FC-std
Gig, 10/100, 10/100	10/100	10/100	Gig		FC-std
Gig, Gig, 10/100		10/100	Gig	Gig	FC-std
SCSI, AM, 10/100,10/100	AM	10/100	10/100	SCSI	FC-std
SCSI, 10/100, 10/100, 10/100	10/100	10/100	10/100	SCSI	FC-std
SCSI, AM, 10/100, Gig	AM	10/100	Gig	SCSI	FC-std
SCSI, AM, Gig, Gig	AM	SCSI	Gig	Gig	FC-std
SCSI, 10/100, Gig, Gig	SCSI	10/100	Gig	Gig	FC-std
SCSI, Gig, 10/100, 10/100	10/100	10/100	Gig	SCSI	FC-std
AM, 10/100, 10/100, 10/100	AM	10/100	10/100	10/100	FC-std
AM, 10/100, 10/100, Gig	AM	10/100	Gig	10/100	FC-std
AM, 10/100, Gig, Gig	AM	10/100	Gig	Gig	FC-std
10/100, 10/100, 10/100, 10/100	10/100	10/100	10/100	10/100	FC-std
Gig, 10/100, 10/100, 10/100	10/100	10/100	Gig	10/100	FC-std

Appendix D. Power Cable Placement

This appendix describes how the ac power is distributed throughout the IBM NAS 300 and how each of the IBM NAS 300 components are connected to this power source

Each IBM NAS 300 has two 3-phase power cords that connect to its own front-end power distribution unit (PDU). Each front-end PDU distributes the power to its own three single-phase PDUs. Because the RAID storage controllers and storage units each have dual power supplies, these power supplies are connected to different single phase PDUs, thus providing a level of power redundancy in the event an incoming supply should fail.

Your IBM NAS 300 comes pre-cabled for a maximum configuration. That means if you are adding components at a later time, the power cords have been preinstalled in the rack and you only need to attach the correct power cable to the newly installed component. Use Table 21 to determine which power cord you should use.

Example: If you install your first storage unit, you would install it in slot 2 which is directly above the first RAID storage controller. You would connect the powercord with the label “2” to the left power supply and the powercord with the label “15” to the right power supply.

Table 21. Power cord placement

IBM NAS 300 Component	Location in rack	Left powercord (as viewed from rear)	Right powercord (as viewed from rear)
First storage unit	slot-2 (directly above RAID storage controller #1)	2	15
Second storage unit	slot-3 (directly above storage unit #1)	3	16
Third storage unit	slot-4(directly above storage unit #2)	4	17
Fourth storage unit	slot-5 (directly above storage unit #3)	5	18
Second RAID storage controller	slot-6 (directly above storage unit #4)	6	19
Fifth storage unit	slot-7 (directly above RAID storage controller #2)	7	20
Sixth storage unit	slot-8 (directly above storage unit #5)	8	21
Seventh storage unit	slot-9 (directly above storage unit #6)	9	22

Appendix E. Signal Cable Placement

This appendix describes how to connect the fiber-optic signal cables between the RAID storage controllers and the Fibre Channel hub and any installed storage units.

Each IBM NAS 300 contains standard with a single RAID storage controller (referred to as RAID storage controller # 1). This RAID storage controller comes standard with 10 hard disk drives. For additional storage you can add up to four storage units; each storage unit containing 10 hard disk drives. For more storage you can add a second RAID storage controller (referred to as RAID storage controller # 2) and then connect up to three additional storage units to this second RAID storage controller.

The following illustration shows a fully-configured IBM NAS 300 and shows how the various IBM NAS 300 components are cabled together.

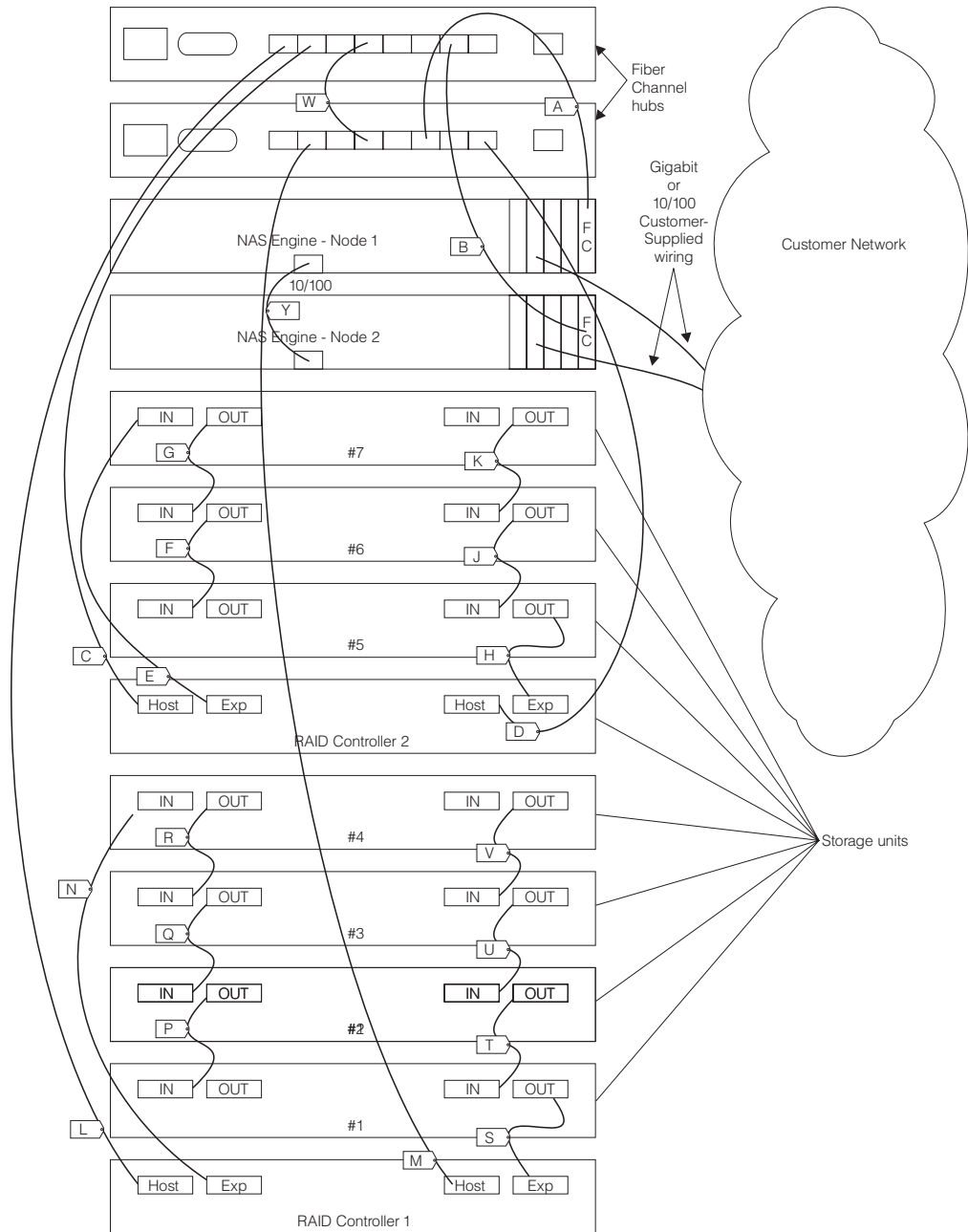


Table 22 on page 137 shows how to connect all the fiber optic cables to RAID storage controller #1 and to any storage units managed by RAID storage controller #1.

Table 23 on page 138 shows how to connect all the fiber optic cables to RAID storage controller #2 and to any storage units managed by RAID storage controller #2.

Example: If you were adding two new storage units to a base IBM NAS 300 (one RAID storage controller and no storage units), you would refer to Table 22 on page 137

page 137 find section "If you have RAID storage controller #1 and two storage units (SU #1 and SU #2)." You would need to install cables N, S, P, and T.

Table 22. Cable Placement for RAID storage controller #1

—If you have RAID storage controller #1 only (no storage units)		
Cable ID	From	To
L	Fibre Channel hub #1 port 1	RAID storage controller #1 Left Host
M	Fibre Channel hub #2 port 1	RAID storage controller #1 Right Host
No cables in RAID storage controller #1 Left EXP or RAID storage controller #1 Right EXP		
—If you have RAID storage controller #1 and one storage unit (SU #1)		
Cable ID	From	To
L	Fibre Channel hub #1 port 1	RAID storage controller #1 Left HOST
M	Fibre Channel hub #2 port 1	RAID storage controller #1 Right HOST
N	RAID storage controller #1 Left EXP	SC #1 Left IN
S	RAID storage controller #1 Right EXP	SC #1 Right OUT
No cables in SC #1 Left OUT or SC #1 Right IN		
—If you have RAID storage controller #1 and two storage units (SU #1 and SU #2)		
Cable ID	From	To
L	Fibre Channel hub #1 port 1	RAID storage controller #1 Left HOST
M	Fibre Channel hub #2 port 1	RAID storage controller #1 Right HOST
N	SC #2 Left IN	RAID storage controller #1 Left EXP
S	SC #1 Right OUT	RAID storage controller #1 Right EXP
P	SC #2 Left OUT	SC #1 Left IN
T	SC #2 Right OUT	SC #1 Right IN
No cables in SC #1 Left OUT or SC #2 Right IN		
—If you have RAID storage controller #1 and three storage units (SU #1, SU #2, and SU #3)		
Cable ID	From	To
L	Fibre Channel hub #1 port 1	RAID storage controller #1 Left HOST
M	Fibre Channel hub #2 port 1	RAID storage controller #1 Right HOST
N	SC #3 Left IN	RAID storage controller #1 Left EXP
S	SC #1 Right OUT	RAID storage controller #1 Right EXP
P	SC #2 Left OUT	SC #1 Left IN
T	SC #2 Right OUT	SC #1 Right IN
Q	SC #3 Left OUT	SC #2 Left IN
U	SC #3 Right OUT	SC #2 Right IN
No cables in SC #1 Left OUT or SC #3 Right IN		
—If you have RAID storage controller #1 and four storage units (SU #1, SU #2, SU #3, and SU #4)		

Table 22. Cable Placement for RAID storage controller #1 (continued)

Cable ID	From	To
L	Fibre Channel hub #1 port 1	RAID storage controller #1 Left HOST
M	Fibre Channel hub #2 port 1	RAID storage controller #1 Right HOST
N	SC #4 Left IN	RAID storage controller #1 Left EXP
S	SC #1 Right OUT	RAID storage controller #1 Right EXP
P	SC #2 Left OUT	SC #1 Left IN
T	SC #2 Right OUT	SC #1 Right IN
Q	SC #3 Left OUT	SC #2 Left IN
U	SC #3 Right OUT	SC #2 Right IN
R	SC #4 Left OUT	SC #3 Left IN
V	SC #4 Right OUT	SC #3 Right IN
No cables in SC #1 Left OUT or SC #4 Right IN		

Table 23. Cable Placement for RAID storage controller #2

—If you have RAID storage controller #2 only (no storage units)		
Cable ID	From	To
C	Fibre Channel hub #1 port 2	RAID storage controller #2 Left Host
D	Fibre Channel hub #2 port 2	RAID storage controller #2 Right Host
No cables in RAID storage controller #2 Left EXP or RAID storage controller #2 Right EXP		
—If you have RAID storage controller #2 and one storage unit (SU #5)		
Cable ID	From	To
C	Fibre Channel hub #1 port 2	RAID storage controller #2 Left HOST
D	Fibre Channel hub #2 port 2	RAID storage controller #2 Right HOST
E	RAID storage controller #2 Left EXP	SC #5 Left IN
H	RAID storage controller #2 Right EXP	SC #5 Right OUT
No cables in SC #5 Left OUT or SC #5 Right IN		
—If you have RAID storage controller #2 and two storage units (SU #5 and SU #6)		
Cable ID	From	To
C	Fibre Channel hub #1 port 2	RAID storage controller #2 Left HOST
D	Fibre Channel hub #2 port 2	RAID storage controller #2 Right HOST
E	SC #6 Left IN	RAID storage controller #2 Left EXP
H	SC #5 Right OUT	RAID storage controller #2 Right EXP
F	SC #6 Left OUT	SC #5 Left IN
J	SC #6 Right OUT	SC #5 Right IN
No cables in SC #5 Left OUT or SC #6 Right IN		
—If you have RAID storage controller #1 and three storage units (SU #5, SU #6, and SU #7)		
Cable ID	From	To

Table 23. Cable Placement for RAID storage controller #2 (continued)

C	Fibre Channel hub #1 port 2	RAID storage controller #2 Left HOST
D	Fibre Channel hub #2 port 2	RAID storage controller #2 Right HOST
E	SC #7 Left IN	RAID storage controller #2 Left EXP
H	SC #5 Right OUT	RAID storage controller #2 Right EXP
F	SC #6 Left OUT	SC #5 Left IN
J	SC #6 Right OUT	SC #5 Right IN
G	SC #7 Left OUT	SC #6 Left IN
K	SC #7 Right OUT	SC #6 Right IN
No cables in SC #5 Left OUT or SC #7 Right IN		

Appendix F. Fibre Channel hub Diagnostics

This appendix provides diagnostic information for the Fibre Channel hub.

General information

The Fibre Channel hub is designed for maintenance-free operation. When there is a suspected failure, the Fibre Channel hub has self-diagnostic capabilities to aid in isolating any equipment or fabric failures.

The Fibre Channel hub supports power-on self-tests (POSTs) and diagnostic tests. The diagnostic tests determine the status of the Fibre Channel hub and isolate problems.

Telnet commands are used to determine the status of the hub error conditions, and operating statistics. A Telnet session can be established from the IBM StorWatch SAN Fibre Channel Managed Hub Specialist. The same Telnet commands can also be issued using the service terminal connected to the serial port.

Attention: Many of the diagnostic tests are disruptive to hub operation. Read the information on each diagnostic before beginning a test or procedure.

Isolating a system fault

Various loopback paths are built into the Fibre Channel hub hardware for diagnostic purposes. A loopback path test within the Fibre Channel hub verifies the proper internal fibre-channel port logic functions and the paths between the interfaces and central memory.

Diagnostics also supports external loops that include the system board and the GBIC module in cross-port configurations. These port-to-port diagnostics allow you to check installed fiber cables and perform port fault isolation.

Removing power

After all data transferring processes external to the Fibre Channel hub are completed, removing power from the hub does not disrupt the fabric.

Note: Error messages are stored in random access memory (RAM) and are lost when power is removed from the Fibre Channel hub. Access the error message log to view and note any error messages before removing power from the Fibre Channel hub.

Running diagnostics on the Fibre Channel hub

There are three methods to run diagnostics. All methods involve the use of Telnet commands and differ only in the initial login requirement and the access level given to the user.

Attaching to the serial port while the Fibre Channel hub is off

1. If you can attach your service terminal to the hub before turning it on, you are automatically logged on as the admin ID and can issue all diagnostic commands. You can watch the progress of the POST diagnostics as they are posted to your service terminal.

2. If you can attach this way, attach your service terminal to the serial port on the front of the hub and start a terminal emulation session on your service terminal.
3. Start up the hub by plugging the power cord into an electrical outlet.
4. As the hub executes a POST, you will see the results posted.
5. When the hub has completed POST, you are logged on as admin. The hub leaves the terminal session open. Press **Enter**. The hub responds with:
Admin>
6. You can perform any of the diagnostics described in this section by typing the appropriate command. The hub shows the results as the diagnostic progresses.

Attaching to the serial port while the Fibre Channel hub is on

1. If the 3534 Managed Hub is on, you can attach your service terminal, login, and run most diagnostics. However, you need to get an admin username and password recognized by the Fibre Channel hub from the system administrator.
2. After you get an admin username, stop any Ethernet session active on the Ethernet port.
3. Attach your service terminal to the serial port on the Fibre Channel hub. The Ethernet port and the serial port are mutually exclusive.
4. On your service port login using the admin username:

Login *username*

The hub responds:

Password

5. Type in the password you were given. The password does not display as you type it in. The hub responds with your username:

Username>

You can now type any diagnostic command and observe the results as they are logged to your service terminal.

Running diagnostics from a Telnet session on the Ethernet

The easiest way to run diagnostics is through a LAN-attached server that can access the Fibre Channel hub Ethernet port.

You need to get an admin level username and password from the system administrator, as well as the hub IP address or name.

When you have the IP address, admin level username, and password, perform the following steps:

1. Go to the server having LAN access and, in an open window, type:
Telnet IPAddress or name (the hub IP address or name you were given by the system administrator)
The hub responds: *login*
2. Type the username you were given and press **Enter**.
The hub responds:
Iaddress password:
3. Type the password you were given. The hub responds:
Username>

You can now type any diagnostic command and observe the results as the hub displays them in your Telnet session.

Power-on self tests

Table 24 lists the diagnostic tests that are automatically run during POST.

Table 24. Post description

Test	Brief description
Memory test	Checks CPU RAM memory.
Port register test	Checks the ASIC registers and SRAMs.
Central memory test	Checks the system board SRAMs.
CMI conn test	Checks the CMI bus between ASICs.
CAM test	Checks the CAM.
Port loopback test	Checks all of the hub's hardware: frames are transmitted, looped back, and received.

POST runs differently depending on the startup method. A power cycle (disconnecting from power and reconnecting to power) is considered a cold start. All other starts from a powered-on state (such as restart or panic) are considered warm starts.

From a cold start condition, executing a POST runs the long version of ramTest. From a warm start condition, executing a POST runs a shorter version of ramTest. The start time with POST varies depending on the startup method.

A Fibre Channel hub that is restarted with POST disabled generates the DIAG-POST_SKIPPED error log message.

Diagnostic commands

All commands are case sensitive and must be entered exactly as shown.

These tests are available from the Telnet session or from the service terminal connected to the local serial port. The test name is followed by the command used to run the test.

- Hub offline (**switchDisable**)
- Memory test (**ramTest**)
- Port register test (**portRegTest**)
- Central memory test (**centralMemoryTest**)
- CMI conn test (**cmiTest**)
- CAM test (**camTest**)
- Port loopback test (**portLoopbackTest**)
- Cross port test (**crossPortTest**)
- Spin silk test (**spinSilk**)
- SRAM data retention test (**sramRetentionTest**)
- CMem data retention test (**cmemRetentionTest**)
- Hub online (**switchEnable**)

Simultaneously press **Ctrl+C** and **Enter** to abort, continue, view stats, or log test results. When you press Ctrl+C and Enter, you receive the message:

'Diags: (Q)uit, (C)ontinue, (S)tats, (L)og

- Enter Q to abort the diag test
- Enter C to continue testing
- Enter S to view statistics
- Enter L to save results

Attention: All offline diagnostics are disruptive to Fibre Channel hub operations. Before attempting these diagnostic test or procedures, make sure that the entire hub is available.

Note: See “Error message tables” on page 156 for the actual error message descriptions and the appropriate service actions.

Table 25 shows the available offline and online tests.

Table 25. Offline and online tests

Offline tests	Offline and online tests
portRegTest	ramTest
centralMemoryTest	crossPortTest
cmiTest	
sramRetentionTest	
cmemRetentionTest	
camTest	
portLoopbackTest	
spinSilk	

ramTest

The ramTest command is used to check CPU RAM memory. This test validates proper memory function.

```
switch:qadmin> ramTest
```

```
Running System DRAM Test..... passed.
```

Related error messages:

- DIAG=MEMORY
- DIAG=MEMSZ
- DIAG=MEMNULL

portRegTest

The portRegTest command is used to check each register and static memory located on the system board and validates that all registers can be successfully accessed. Registers are set under firmware control and are used to control the hardware route selection and other internal hardware functions.

Attention: Do not execute the portRegTest command on an operational Fibre Channel hub. Before issuing the portRegTest command, disable the hub using the switchDisable command.

```
switch:qadmin> portRegTest
```

```
Running Port Register Test.... passed.
```

Related error messages:

- DIAG=REGERR
- DIAG=REGERR_UNRST
- DIAG=BUS_TIMEOUT

centralMemoryTest

The centralMemoryTest command is used to check the central memory in each ASIC as follows:

- The built-in self-repair (BISR) circuit in each ASIC chip does not report failure to repair bad cells (bISR test).
- The data cells can be uniquely written and read correctly (data write/read test).
- The data in any one ASIC can be read from any other ASIC (asic-asic test_).
- Bad parity can be detected and flagged in the error register and interrupt posted (parity error test).
- Buffer number error can be detected and flagged in the error register and interrupt posted (buffer number error test).
- Chip number error can be detected and flagged in the error register and interrupt posted (chip number error test).

Attention: Do not execute the centralMemoryTest command on an operational Fibre Channel hub. Before issuing the centralMemoryTest command, disable the Fibre Channel hub using the switchDisable command.

```
switch:qadmin> centralMemoryTest
```

```
Running Central Memory Test.... passed.
```

Related error messages:

- DIAG=CMBISTRO
- DIAG=CMBISRF
- DIAG=CMLCMTO
- DIAG=LCMRS
- DIAG=LCMEM
- DIAG=LCMEMTX
- DIAG=CMNOBUF
- DIAG=CMERRTYPE
- DIAG=CMERRPTN
- DIAG=PORTABSENT
- DIAG=BADINIT
- DIAG=TIMEOUT

cmiTest

The cmiTest command verifies that control messages can be correctly sent from any ASIC to any ASIC. It also tests that the checksum check is OK.

Attention: Do not execute the cmiTest command on an operational Fibre Channel hub. Before issuing the cmiTest command, disable the Fibre Channel hub using the switchDisable command.

```
switch:qadmin> cmiTest
```

```
Running CMI Test.... passed.
```

Related error messages:

- DIAG=BADINIT
- DIAG=INTNIL
- DIAG=CMISA1
- DIAG=CMINOCAP
- DIAG=CMIDATA
- DIAG=CMICKSUM

camTest

The `camTest` command verifies that the SID translation required by QuickLoop and implemented using content addressable memories (CAM) are functioning correctly.

Attention: Do not execute the `camTest` command on an operational Fibre Channel hub. Before issuing the `camTest` command, disable the Fibre Channel hub using the `switchDisable` command.

```
switch:qadmin> camTest
```

```
Running CAM Test.... passed.
```

Related error messages:

- DIAG=CAMINIT
- DIAG=CAMID
- DIAG=XMIT

portLoopbackTest

The `portLoopbackTest` command verifies the intended functional operation of the Fibre Channel hub by sending frames from each port's transmitter back to the same port's receiver through an internal hardware loopback. It tests the Fibre Channel hub circuitry up to the serial output of the ASIC.

The loopback point chosen by the `portLoopbackTest` command depends on what kind of GBIC module is present. If a GBIC other than an optical SWL or LWL GBIC is present, the test loops back only at the input (rather than the output) of the serial link. Copper and unknown GBIC types fall within this category. On the Fibre Channel hub, Ports 0 - 6 are all treated as if a SWL GBIC is present.

The command syntax is:

```
portLoopbackTest nFrames
```

Attention: Do not execute the `portLoopbackTest` command on an operational Fibre Channel hub. Before issuing the `portLoopbackTest` command, disable the Fibre Channel hub using the `switchDisable` command.

If you do not include the `nFrames` parameter, the loopback test runs continuously until you press Enter again. If the test does not find an error, there is no output. You can choose to continue the test, view statistics, or view an error log. Table 26 on page 147 shows the loopback errors message fields. While the test is running, all interface module front panel LEDs rapidly blink green indicating that the test is finding no errors and is processing.

```
switch:qadmin> portLoopbackTest
```

```
Running Port Loopback Test....
```

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: s

Diagnostics Status: Sun Jan 1 00:00:00 2000

port#: 0 1 2 3 4 5 6 7
diags: OK OK OK OK OK OK OK
state: UP UP UP UP UP UP UP UP

lm0: 4654 frTx 4654 frRx 0 LLI_errs.
lm1: 4654 frTx 4654 frRx 0 LLI_errs.
lm2: 4654 frTx 4654 frRx 0 LLI_errs.
lm3: 4654 frTx 4654 frRx 0 LLI_errs.
lm4: 4654 frTx 4654 frRx 0 LLI_errs.
lm5: 4654 frTx 4654 frRx 0 LLI_errs.
lm6: 4654 frTx 4654 frRx 0 LLI_errs.
lm7: 4654 frTx 4654 frRx 0 LLI_errs.

Central Memory OK
Total Diag Frames Tx: 38032
Total Diag Frames Rx: 39232

Table 26. portLoopbackTest field descriptions

Field	Description
Diagnostics status	The title header displays the time the diagShow command was executed.
port#	The port number.
diags	Port's current diagnostic status. Possible values include OK, BAD.
state	Port's current state. Possible values include UP (active), DN (inactive).
lm0-7 (8-port)	The frame counts of active ports. The display shows the number of frames transmitted and received and low level interface counts (LLI_errs).
Central memory status	Central memory status. Possible values include OK, FAULTY.
Total diag frames Tx	The total diagnostics frames transmitted (Tx) since start up. This number usually corresponds to the total frames received (Rx) but may differ because of failure modes.
Total diag frames Rx	The total diagnostics frames received (Rx) since start up. This number usually corresponds to the total frames transmitted (Tx) but may differ because of failure modes.

Related error messages:

- DIAG=INIT
- DIAG=PORTDIED
- DIAG=XMIT
- DIAG=TIMEOUT
- DIAG=ERRSTAT
- DIAG=STAT
- DIAG=DATA
- DIAG=PORTABSENT

sramRetentionTest

The sramRetentionTest command is used to verify the following:

- Data written into the ASIC memories are retained
- Data bits do not drop when read after some amount of delay since the write.

Attention: Do not execute the sramRetentionTest command on an operational Fibre Channel hub. Before issuing the sramRetentionTest command, disable the Fibre Channel hub using the switchDisable command.

```
switch:qadmin> sramRetentionTest
```

```
Running SRAM Retention Test....
```

Related error messages:

- DIAG=REGERR
- DIAG=REGERR_UNRST
- DIAG=TIMEOUT

cmemRetentionTest

The cmemRetentionTest command is used to verify the following:

- Data written into the SRAMs that make up the central memory are retained
- Data bits do not drop when read after some amount of delay since the write.

Attention: Do not execute the cmemRetentionTest command on an operational Fibre Channel hub. Before issuing the cmemRetentionTest command, disable the Fibre Channel hub using the switchDisable command.

```
switch:qadmin> cmemRetentionTest
```

```
Running cmemRetention Test.... passed
```

Related error messages:

- DIAG=LCMEM
- DIAG=LCMRS
- DIAG=LCMTO

crossPortTest

The crossPortTest command verifies the intended functional operation of the Fibre Channel hub. The crossPortTest command sends frames from each port's transmitter using the GBIC, the imbedded optics, and the external cable back to another port's receiver. It exercises the entire path of the Fibre Channel hub.

A port can be connected to any port in the same Fibre Channel hub provided the connection is of the same technology. For example, this means that SWL ports are connected to SWL ports and LWL ports are connected to LWL ports.

Note: All ports on the Fibre Channel hub must be connected if GBIC mode is disabled, or else the Fibre Channel hub shows an error condition. When running the cross port test, you must set the operating mode value to 0 or 1. Modes 2 and 3 do not send out the extended link parameters (ELP) used to discover switches and hubs. If the ELP is not sent, the Fibre Channel hub does not know the port is connected to another port on the same hub and the test fails.

The crossPortTest command behaves differently according to the following modes:

- switchEnable or switchDisable mode
- singlePortAlso mode
- GBIC mode

switchEnable or switchDisable mode

- Online mode

In the online mode, where the Fibre Channel hub is enabled prior to executing the test, it only tests ports that are cable loopbacked to ports in the same Fibre Channel hub. Ports connected outside of the Fibre Channel hub under test are ignored. To run, the test must find:

- At least one port (if singlePortAlso mode is active)
- Two ports (if singlePortAlso mode is not active – default) cable loopbacked to each other.

If this criteria is not met, the test displays the following message in the Telnet shell:

```
Need at least 1 port(s) connected to run this test.
```

or

```
Need at least 2 port(s) cross-connected to run this test.
```

- Offline mode

In the offline mode, where the Fibre Channel hub is disabled prior to executing the test, it tests and expects that all ports are cable loopbacked to similar ports in the same Fibre Channel hub. If one or more ports are found not connected, it aborts the test. The test determines which port is connected to which port by transmitting frames. As such if any pair of ports are not properly connected for various reasons (improperly seated GBICs or cables, bad GBICs or cables, or improper connection of SWL to LWL, and so on), the test ends with the following message in the Telnet shell:

```
One or more ports is not active, please double-check fibres on all ports.
```

singlePortAlso mode

The singlePortAlso mode is specified by executing the crossPortTest command with the second argument a value of 1 as follows:

```
sw:admin> crossPortTest 0, 1
```

In this mode, crossPortTest allows a port to be cable loopbacked to itself (port M is connected to port M) in addition to the cross connection supported (port M is connected to port N). This can be used to isolate bad ports.

GBIC mode

Note: Ensure that you reset GBIC mode before returning the Fibre Channel hub to normal operation.

The GBIC mode is activated by executing the following command prior to executing the crossPortTest command:

```
sw:admin> setGbicMode 1
```

When activated, only ports with a GBIC or imbedded optics present are included in the crossPortTest list of ports to test. For example, if GBIC mode is activated:

- Ports 0 - 6 (which have imbedded optics) are always included in the testing
- Port 7 is only included if a GBIC is plugged into Port 7

The state of the GBIC mode is saved in flash. It stays activated (even after restarts or power on and off cycles) until it is disabled as follows:

```
sw:admin> setGbicMode 0
```

An example mode of operation would be to disable the Fibre Channel hub, set the GBIC mode to 1, and execute the `crossPortTest` command with `singlePortAlso` activated. The `crossPortTest` would then limit its testing to:

- All ports with GBIC and embedded optics present
- All ports with GBIC and embedded optics present and properly cable loopbacked
- Allow ports to be connected to itself (single port connections)

Note: If a GBIC is failing severely, such that the `crossPortTest` cannot determine if a GBIC is even installed, that port is not tested, and is not reported as failing. Therefore, it is important to make sure that testing occurs on all the ports that are intended. This can be done by observing the screen messages from the `crossPortTest`.

The command syntax is:

```
crossPortTest <nFrames>, <0 or 1>,
```

where

<nFrames>

determines the number of frames to run. If you do not include the `<nFrames>` parameter, the test runs until you press **Enter**.

<0 or 1>

determines if a single port looped back to itself is allowed:

- 0** a single port loopback is not allowed (default)
- 1** a single port loopback is allowed

```
switch:admin> crossPortTest
```

```
Running Cross Port Test.....
switchName: JR-6011
switchType: 3.1
switchState: Testing
switchRole: Disabled
switchDomain: 1 (unconfirmed)
switchId: fffc01
switchWwn: 10:00:00:60:69:00:60:11
port 0: sw Testing Loopback->1
port 1: sw Testing Loopback->0
port 2: sw Testing Loopback->7
port 3: sw Testing Loopback->6
port 4: sw Testing Loopback->5
port 5: sw Testing Loopback->4
port 6: sw Testing Loopback->3
port 7: sw Testing Loopback->2
```

Port SNMP Physical Flags

```
-----
0: Testing In_Sync PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
1: Testing In_Sync PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
2: Testing In_Sync PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB LOGIN
3: Testing In_Sync PRESENT ACTIVE E_PORT G_PORT U_PORT SEGMENTED CBL_LB
```

Related error messages:

- DIAG=INIT
- DIAG=PORTDIED

- DIAG=XMIT
- DIAG=TIMEOUT
- DIAG=ERRSTAT
- DIAG=STATS
- DIAG=PORTWRONG
- DIAG=DATA
- DIAG=PORTABSENT

spinSilk

The spinSilk command is used to verify the intended functional operation of the Fibre Channel hub by sending frames from the transmitter of each port through the GBIC, the imbedded optics and external cable, and back to another port's receiver at the full hardware speed of 1 Gb per second. It exercises the entire path of the Fibre Channel hub.

Because the CPU is not comparing data on each frame as with the other two frame tests, the DIAG-DATA error is never reported during spinSilk. However, the other error messages defined for crossPortTest and their corresponding probable causes and actions are applicable to spinSilk.

The operation of spinSilk is affected by the state of the GBIC mode. The GBIC mode is activated by executing the following command prior to executing the spinSilk command:

```
switch:admin> setGbicMode 1
```

When activated, only ports with a GBIC or embedded optics present are included in the spinSilk list of ports to test. For example, if GBIC mode is activated, ports 0 - 6, which have imbedded optics, are always included in the testing. Port 7 is only included if a GBIC is plugged into it.

The state of the GBIC mode is saved in flash. It stays activated (even after restarts or power on and off cycles) until it is disabled as follows:

```
switch:admin> setGbicMode 0
```

An example mode of operation would be to disable the Fibre Channel hub, set the GBIC mode to 1, and execute the spinSilk command which would limit its testing to:

- All ports with GBIC and embedded optics present
- All ports with GBIC and embedded optics present properly cableloop backed

Attention: Do not execute the spinSilk command on an operational Fibre Channel hub. Before issuing the spinSilk command, disable the Fibre Channel hub using the switchDisable command.

Note: When running the spinSilk test, you must set the operating mode value to 0 or 1. Modes 2 and 3 do not send out the ELP used to discover switches and hubs. If the ELP is not sent, the Fibre Channel hub does not know the port is connected to another port on the same Fibre Channel hub and the test fails. Using operating mode 0 when running spinSilk is preferred.

The command syntax is:

```
spinSike nMillions
```

where:

nMillions

the number of frames for the test to execute expressed in millions of frames. If you do not include the nMillions parameter, the spinSilk test runs until the Enter key is pressed.

```
switch:admin> spinSilk 2

Running Spin Silk.....
One moment please...
switchName: SR-7371
switchType: 2.2
switchState: Testing
switchRole: Disabled
switchDomain: 1 (unconfirmed)
switchId: fffc01
switchWwn: 10:00:00:60:69:00:73:71
port 0: sw Testing Loopback->1
port 1: sw Testing Loopback->0
port 2: sw Testing Loopback->3
port 3: lw Testing Loopback->2
port 4: lw Testing Loopback->5
port 5: sw Testing Loopback->4
port 6: sw Testing Loopback->7
port 7: sw Testing Loopback->6
Transmitting... done.
Spinning...
port 0 Rx/Tx 1 of 2 million frames.
port 1 Rx/Tx 1 of 2 million frames.
port 2 Rx/Tx 1 of 2 million frames.
port 3 Rx/Tx 1 of 2 million frames.
port 4 Rx/Tx 1 of 2 million frames.
port 5 Rx/Tx 1 of 2 million frames.
port 6 Rx/Tx 1 of 2 million frames.
port 7 Rx/Tx 2 of 2 million frames.
Diagnostics Status: Thu Jul 30 14:43:36 1999
port#:0 1 2 3 4 5 6 7
diags: OK OK OK OK OK OK OK OK
state: UP UP UP UP UP UP UP UP
lm0: 2044334 frTx 2053602 frRx 0 LLI_errs. <looped-1>
lm1: 2046987 frTx 2049307 frRx 0 LLI_errs. <looped-0>
lm2: 2046259 frTx 2050415 frRx 0 LLI_errs. <looped-3>
lm3: 2048907 frTx 2038532 frRx 0 LLI_errs. <looped-2>
lm4: 2038717 frTx 2049093 frRx 0 LLI_errs. <looped-5>
lm5: 2049555 frTx 2052277 frRx 0 LLI_errs. <looped-4>
lm6: 2048260 frTx 2047600 frRx 0 LLI_errs. <looped-7>
lm7: 2051407 frTx 2047246 frRx 0 LLI_errs. <looped-6>

Central Memory OK
Total Diag Frames Tx: 130432
Total Diag Frames Rx: 134752
```

Related error messages:

- DIAG=INIT
- DIAG=PORTDIED
- DIAG=XMIT
- DIAG=PORTSTOPPED
- DIAG=ERRSTAT
- DIAG=ERRSSTATS
- DIAG=PORTABSENT

diagClearError

The diagClearError command clears diagnostic errors detected on a specified port. The command syntax is:

```
diagClearError <port #>
```

If you do not specify the port number, all errors are cleared.

Note: Issuing this command does not clear the error log.

```
switch:admin> diagClearError
```

diagDisablePost

The diagDisablePost command disables POST processing. The start up time without POST processing is approximately 50 to 55 seconds for warm or cold starts. A Fibre Channel hub restarted without POST generates the DIAG-POST_SKIPPED error.

Note: You should normally always execute POST processing to ensure the operational status of the Fibre Channel hub during the start up stage.

```
switch:admin> diagDisablePost
Committing configuration...done.
On next reboot, POST will be skipped.
```

diagEnablePost

The diagEnablePost command Enables POST processing. The choice remains in effect across power on and off cycles until toggled by the user. The start up time with POST processing is approximately 110 – 120 seconds for a warm POST and 165 – 175 seconds for a cold POST. The factory default enables POST processing.

```
switch:admin> diagEnablePost
Committing configuration...done.
On next reboot, POST will be executed.
```

diagShow

The diagShow command summarizes the diagnostic results since the Fibre Channel hub was last started up, including POST results. The fields are described in Table 27 on page 154.

The diagShow command also allows you to loop on the command. For example, diagShow 4 executes diagShow every 4 seconds, continuously, until stopped by pressing **Enter**. This may be used to isolate a bad GBIC. A port with a changing LLI_errs value is prefixed by "***" in the display.

```
switch:admin> diagShow

Diagnostics Status: Sun Jan 1 00:00:00 2000
port#: 0 1 2 3 4 5 6 7
diags: OK OK OK OK OK OK OK OK
state: UP UP UP UP UP UP UP UP
1m0: 2044334 frTx 2053602 frRx 0 LLI_errs. <loop-1>
1m1: 2046987 frTx 2049307 frRx 0 LLI_errs. <loop-0>
1m2: 2046259 frTx 2050415 frRx 0 LLI_errs. <loop-3>
1m3: 2048907 frTx 2038532 frRx 0 LLI_errs. <loop-2>
1m4: 2038717 frTx 2049093 frRx 0 LLI_errs. <loop-5>
1m5: 2049555 frTx 2052277 frRx 0 LLI_errs. <loop-4>
1m6: 2048260 frTx 2047600 frRx 0 LLI_errs. <loop-7>
1m7: 2051407 frTx 2047246 frRx 0 LLI_errs. <loop-6>
```

```
Central Memory OK
```

Table 27. diagShow command field descriptions

Field	Description
Diagnostics status	The title header displays the time diagShow was executed.
port#	The port number.
diags	diagsCurrent diagnostic status of the port. Possible values include OK, BAD.
state	Current state of the port. Possible values include UP (active), DN (inactive).
1m0-7 (8-port) 1m0-15 (16-port)	The frame counts of active ports. The display shows the number of frames transmitted and received and low level interface counts (LLI_errs).
Central memory status	Central memory status. Possible values include OK, FAULTY.
Total diag frames Tx	The total diagnostics frames transmitted (Tx) since start up. This number usually corresponds to the total frames received (Rx) but may differ because of failure modes.
Total diag frames Rx	The total diagnostics frames received (Rx) since start up. This number usually corresponds to the total frames transmitted (Tx) but may differ because of failure modes.

setGbicMode

The GBIC mode, when enabled, forces crossPortTest or spinSilk to limit its testing to only those ports whose GBICs or imbedded optics are detected present.

To enable GBIC mode execute:

```
switch:admin> setGbicMode 1
```

To disable GBIC mode execute:

```
switch:admin> setGbicMode 0
```

supportShow

The supportShow command prints the Fibre Channel hub's information for debugging purposes. supportShow executes the following commands in the order shown:

```
version
tempShow
psShow
licenseShow
diagShow
errDump
switchShow
portFlagsShow
portErrShow
mqShow
portSemShow
portShow
portRegShow
portRouteShow
fabricShow
topologyShow
```

```
q1Show
nsShow
nsAllShow
cfgShow
configShow
faultShow
traceShow
portLogDump
```

Command syntax

```
supportShow <firstPort>, <lastPort>, <numlog>
```

Where:

firstPort

First port of range of ports to dump information. The default, if no operand is specified, is to print the state of port 0. If only firstPort is specified, only the information for firstPort is printed.

lastPort

Last port of range of ports to dump information. If firstPort is specified, but lastPort is not specified, it defaults to printing firstPort only for the port based commands (portShow, portRegShow, portRouteShow).

nLog Number of lines of portLogDump to print:

- 0** means dump all lines (default)
- N** means dump the last N lines
- <0** means skip portLogDump

0 means dump all lines (default) N means dump the last N lines <0 means skip portLogDump

```
switch:admin> supportShow
VxWorks: 5.3.1
Firmware: v2.0_beta3
Made on: Fri Mar 19 16:29:55 PST 1999
Flash: Fri Mar 19 16:30:19 PST 1999
BootProm: Tue Dec 29 17:32:38 PST 1998
none:
No licenses
28 29 30 29 27 Centigrade
82 84 86 84 80 Fahrenheit
```

Diagnostic error message formats

If any port fails during a diagnostic test, it is marked BAD in the status display. To retest a port that has been marked BAD, clear the port and set to OK using the diagClearError (port#) command. This command clears the port status only and does not clear the logs or change the port's condition. The diagClearError (port#) command should only be used during diagnostic procedures to reset a bad port for retest.

Some messages contain the following abbreviations:

- sb = Should be
- er = Bits inb error

Note: If you run the portStatsShow command or the diagShow command before running a test, errors may appear as a result of the normal synchronization

process. These errors should be addressed if the number of errors found increases when running the portStatsShow command again.

Table 28 lists probable failures and actions recommended.

Table 28. Probable failure actions

Failed test	Action
ramTest	1– Replace the Fibre Channel hub
portRegTest	
centralMemoryTest	
cmiTest	
cmemRetentionTest	
sramRetentionTest	
camTest	
portLoopbackTest	
crossPortTest	2– Further diagnostic action required. Failure can be system board, GBIC, embedded optic, or cable. This is typically the result of running a wrap test. The tests should be run again after swapping cables and GBICs to determine cause. It is unlikely that the system board is at fault as most system board failures cause a POST failure.
spinSilk	

Error message numbers

An error number ERR#xxxx appears at the end of an error message. Table 29 matches each error number with the test that caused the error and the name of the error. Look up the complete definition of the error name and the actions that will correct it in Table 28.

Error message tables

Table 29 shows the diagnostic error messages, their description and probable cause and action to be taken (see Table 28).

Table 29. Diagnostic error messages

Message	Description	Probable cause	Action
DIAG-BADINT Err#1030, 2030 [centralMemoryTest, cmiTest]	Port received an interrupt when not expecting one.	ASIC failure	1
DIAG-BUS_TIMEOUT Err#0BoF, 4040F [portRegTest, sramRetentionTest]	ASIC register or ASIC SRAM did not respond to an ASIC data access.	ASIC failure	1
DIAG-CAMSID Err#223C [camTest]	ASIC failed SID NO translation test.	ASIC failure	1
DIAG-CLEAR_ERR Err#0001	Port's diag error flag (OK or BAD) is cleared.	Informational only	None required
DIAG-CMBISRF Err#1021 [centralMemoryTest]	ASIC's central memory SRAMs did not complete the BISR within the time-out period.	ASIC failure	1

Table 29. Diagnostic error messages (continued)

DIAG-CMBISRTO Err#1020 [centralMemoryTest]	ASIC's central memory SRAMs did not complete the BISR within the time-out period.	ASIC failure	1
DIAG-CMERRPTN Err#102B [centralMemoryTest]	Error detected at the wrong port.	ASIC failure	1
DIAG-CMERRTYPE Err#102A [centralMemoryTest]	Port got the wrong CMEM error type.	ASIC failure	1
DIAG-CMICKSUM Err#2036 [cmiTest]	CMI message received failed bad checksum test.	ASIC or system board failure	1
DIAG-CMIDATA Err#2035 [cmiTest]	CMI data received did not match data transmitted.	ASIC or system board failure	1
DIAG-CMIINVCAP Err#2034 [cmiTest]	Unintended ASIC erroneously got CMI capture flag.	ASIC or system board failure	1
DIAG-CMINOCAP Err#2033 [cmiTest]	CMI intended receiver ASIC failed to get CMI capture flag.	ASIC or system board failure	2
DIAG-CMISA1 Err#2032 [cmiTest]	An attempt to send a CMI message from ASIC to ASIC failed.	ASIC failure	1
DIAG-CMNOBUF Err#1029 [centralMemoryTest]	Port could not get any buffer.	ASIC failure	1
DIAG-DATA Err#266E, 306E [portLoopbackTest, crossPortTest]	Payload received by port did not match payload transmitted.	System board, GBIC module, embedded optic or fiber cable failure	1

Table 29. Diagnostic error messages (continued)

DIAG-ERRSTAT Err#2640-2647, 3040-3047, 3840-3847 [portLoopbackTest, crossPortTest, spinSilk]	Port error statistics counter is non-zero, meaning an error was detected when receiving frames. One of the following status errors occurred: <ul style="list-style-type: none"> • Enc_in – Encoding error, inside frame • CRC_err – Cyclic redundancy check on frame failed • TruncFrm – Truncated frame • FrmTooLong – Frame too long • BadEOF – Bad end of file • Enc_out – Encoding error, outside frame • BadOrdSet – Bad symbol on fiber-optic cable • DiscC3 – Discarded class 3 frames 	ASIC, system board, GBIC module, embedded optic or fiber cable failure	1
DIAG-INIT Err#264F, 304F, 384F [portLoopbackTest, crossPortTest, spinSilk]	Port failed to go active in the loopback mode requested.	ASIC, system board, GBIC module, embedded optic or fiber cable failure	1
DIAG-INTNIL Err#2031 [cmiTest]	ASIC failed to get a CMI error (interrupt).	ASIC failure	1
DIAG-INTNOTCLR Err#102C [centralMemoryTest]	The interrupt bit could not be cleared.	ASIC failure	1
DIAG-LCMEM Err#1027 [centralMemoryTest, cmemRetentionTest]	Data read from the central memory location did not match data previously written into the same location.	ASIC failure	1
DIAG-LCMEMTX Err#1F27, 1028 [centralMemoryTest]	Central memory transmit path failure: ASIC 1 failed to read ASIC 2 using the transmit path.	System board failure	1
DIAG-LCMRS Err#1F25, 1025 [centralMemoryTest, cmemRetentionTest]	Central memory read short: M bytes requested but got less than M bytes.	ASIC failure	1
DIAG-LCMTO Err#1F26, 1026 [centralMemoryTest, cmemRetentionTest]	Central memory timeout: Data transfer initiated did not complete within the timeout period.	ASIC failure	1
DIAG-MEMNULL Err#0112 [ramTest]	Test failed to malloc.	System board failure	1
DIAG-MEMSZ Err#0111 [ramTest]	Memory size to be tested is less than or equal to zero.	System board failure	1

Table 29. Diagnostic error messages (continued)

DIAG-MEMORY Err#0110 [ramTest]	Data read from RAM location did not match previously written data into same location.	CPU RAM failure	1
DIAG-PORTABSENT Err#2670, 3070, 3870 [portLoopbackTest, crossPortTest, spinSilk]	Port is not present.	ASIC or system board failure	1
DIAG-PORTDIED Err#265F, 305F, 385F [portLoopbackTest, crossPortTest, spinSilk]	Port was in loopback mode and then went inactive.	ASIC, GBIC module, embedded optic or fiber cable failure	2
DIAG-PORTSTOPPED Err#3874 [spinSilk]	Port is no longer transmitting, as indicated by the number of frames transmitted counter being stuck at N frames.	ASIC, GBIC module, embedded optic or fiber cable failure	2
DIAG-PORTWRONG Err#3078 [crossPortTest]	Frame erroneously received by port M instead of the intended port N.	ASIC failure	1
DIAG-POST_SKIPPED Err# 0004 [managed hub initialization]	POST is skipped. It's message recommended that POST be executed.	Informational only	None required
DIAG-REGERR Err#0B15, 0415 [portRegTest, sramRetentionTest]	Data read from ASIC register or ASIC SRAM did not match data previously written into same location.	ASIC failure	1
DIAG-REGERR_UNRST Err#0B16, 0416 [portRegTest, sramRetentionTest]	Port failed to unreset.	ASIC failure	1
DIAG-STATS Err#2660 - 2662, 3060 - 3062 [portLoopback Test, crossPortTest]	Port counter value did not match the number of frames actually transmitted. Possible counters reporting: <ul style="list-style-type: none"> • FramesTx - number of frames transmitted • FramesRx - number of frames received • Cl3FrmRx - number of class 3 frames received 	ASIC, GBIC module, embedded optic or fiber cable failure	2
DIAG-TIMEOUT Err#266F, 306F, 386F [portLoopbackTest, crossPortTest, centralMemoryTest]	For portLoopbackTest and crossPortTest: Port failed to receive frame within time-out period For centralMemoryTest: Port failed to detect an interrupt within the timeout period.	ASIC, GBIC module, embedded optic or fiber cable failure	2

Table 29. Diagnostic error messages (continued)

DIAG-XMIT Err#2271, 2671, 3071, 3871 [portLoopbackTest, crossPortTest, spinSilk, camTest]	Port failed to transmit frame.	ASIC failure	1
--	--------------------------------	--------------	---

Table 30 shows the system error messages, their description, and probable cause.

Table 30. System error messages

Message	Description	Probable Cause	Action
TEMP, 4_FAILED, LOG_CRITICAL	Managed hub overheated	Fan failure	1
TEMP, 5_FAILED, LOG_CRITICAL	Managed hub overheated	Fan Failure	1
FANS, 1_FAILED, LOG_WARNING	Managed hub overheated	Fan failure	1
FANS, 2_FAILED, LOG_ERROR	Managed hub overheated	Fan failure	1
FANS, 3_FAILED, LOG_CRITICAL	Managed hub overheated	Fan failure	1
FANS, 4_FAILED, LOG_CRITICAL	Managed hub overheated	Fan failure	1
FANS, 5_FAILED, LOG_CRITICAL	Managed hub overheated	Fan failure	1
FANS, 6_FAILED, LOG_CRITICAL	Managed hub overheated	Fan failure	1
POWER, 1_FAILED, LOG_CRITICAL	Managed hub power failure	Power supply failure	1

Appendix G. Shared storage setup

This chapter gives the details for setting up and configuring the IBM NAS 300 storage.

The following steps need to be followed if your shared storage is not configured, and only for the first node. If your shared storage is configured, the only steps you need to do are to create the Quorum disk and ensure that the disks are labeled the same on each node.

The Model 325 comes with preconfigured shared storage spanning nine disks. The storage is formatted as an array, at RAID-level 5, consisting of the following LUNs:

- A LUN of 500 MB, for the Quorum drive (drive letter will be *G*)
- A second LUN, composed of the remaining space (approximately 270 Gbytes) and used as a share drive with one hot spare

You can use this preconfigured storage, or delete it and configure new storage. If you delete it, you will need to complete the steps in this chapter.

Note: If you set up the shared storage with Storage Manager 7, you need to configure the storage on one node only. For the other node (the joining node), the only part of shared storage setup that you will need to complete is assigning drive letters on the shared storage, making sure that the drive letters are the same as those on the first node.

With Storage Manager 7, you can configure and manage the DASD mounted in the IBM 5191 RAID Storage Controller Model 2RU (storage controller) and IBM 5192 Network Attached Storage Storage Unit Model 1RU (storage unit) enclosures.

Storage Manager 7 provides a GUI for managing storage subsystems. It features two main windows:

Enterprise Management	Use this window to add, remove, and monitor all storage subsystems within the management domain.
Subsystem Management	Use this window to manage individual storage subsystem components.

You manage the storage subsystems through the Fibre Channel I/O path between the engines and the RAID controllers (host-agent method). The Storage Manager 7 software is installed on both engines allowing you to manage the storage subsystems from a Terminal Services session open on either node's engine.

Starting Enterprise Management

The Enterprise Management window is the first window to open when you start the software. Use the Enterprise Management window to:

- Add and discover the storage subsystems you want to manage
- Provide a comprehensive view of all storage subsystems in your management domain
- Perform batch storage subsystem management tasks using the Script Editor

Use the following procedure to start the Enterprise Management window. You will do these steps on one node, and then bring up the other node to validate the input.

1. Select **Start → Programs**.
2. Select **Netfinity Fibre Channel Storage Manager 7 client**. The client software starts, displaying the Enterprise Management window and the Confirm Initial Automatic Discovery window.

Note: The Enterprise Management window can take up to five minutes to open. No wait-cursor (such as an hourglass) is displayed. If you do not want to perform the initial automatic discovery, select **No**.

3. Select **Yes** to begin an initial automatic discovery of hosts and storage subsystems attached to the local subnetwork on which the management station is installed.

The software sends a broadcast message across the local subnetwork where the management station is installed. It discovers host-agent managed storage subsystems if the hosts that provide network management connections to the storage subsystems respond to the broadcast. The software discovers directly managed storage subsystems if the controllers in those storage subsystems respond to the broadcast message.

Note: It can take up to a minute for the Enterprise Management window to refresh after an initial automatic discovery.

If you need to stop the automatic discovery operation, close the Enterprise Management window.

When the initial automatic discovery is complete, you can see all hosts and storage subsystems attached to the local subnetwork.

If you do not see all hosts and storage subsystems (fibre RAID and so on), do the following:

- Check the hardware and connections for possible problems (refer to the hardware documentation for specific procedures).
- Refer to the Enterprise Management online Help topic about discovering storage subsystems.

If any device shows a status of Unresponsive, use the software to remove the device from the management domain and then add it again. Refer to the Enterprise Management online Help for instructions on removing and adding devices.

A storage subsystem might be duplicated in the device tree after an automatic discovery, if the storage subsystem is directly managed but is attached to a host with the host-agent software installed and running. In this case, you can remove

the duplicate storage management icon from the device tree using the remove device option in the Enterprise Management window.

Continue with “Renaming storage subsystems”.

Renaming storage subsystems

When you start Storage Manager 7 for the first time, the storage subsystems are unnamed. If you want to rename them, you can use the Subsystem Management window to rename each storage subsystem from unnamed to the name you want. Refer to the renaming storage subsystems topic in the Subsystem Management online Help. The Help topic provides detailed instructions for renaming storage subsystems. As a security precaution, it is recommended that you protect the storage subsystems with a password.

Continue with “Starting Subsystem Management”.

Starting Subsystem Management

The Subsystem Management window enables you to manage selected subsystems.

Use the following procedure to open a Subsystem Management window for a selected storage subsystem:

1. In the Enterprise Management window, select a storage subsystem.
2. Select **Tools** ⇒ **Manage Device**. The software displays the Subsystem Management window for the selected storage subsystem. Note: Using the open Subsystem Management window, you can manage only the selected storage subsystem. However, you can open multiple Subsystem Management windows to manage other storage subsystems.
3. Continue with “Renaming storage subsystems”.

Creating arrays and logical drives

To create an array or logical drive, perform the following procedure:

1. Highlight a storage subsystem in the Enterprise Management window and select **Tools** ⇒ **Manage Device** to start a Subsystem Management window for that storage subsystem.
2. Create all of your planned arrays and logical drives on this storage subsystem using the **Configure** ⇒ **Create Array/Logical Drive** option.
3. Repeat the arrays/logical drive configuration for each storage subsystem connected to your cluster.

Note: If you make any other logical drive additions or deletions, you must make them known to the other node in a cluster configuration.

4. Go to “Creating Quorum arrays and LUNs under the Storage Manager 7 application”.

Creating Quorum arrays and LUNs under the Storage Manager 7 application

When you begin this procedure, all drives display in an unconfigured state with one massive size. To begin creating arrays and LUNS, right-click on **Unconfigured Capacity** and select **Create Array**. Your choices will be **Automatic** or **Manual**, depending on your requirements. Automatic-mode chooses drives vertically across

different enclosures connected to that particular storage controller, which spreads out the array bandwidth, and can also keep arrays running in case of a total storage unit failure.

In this procedure, it is recommended that all arrays are RAID-5. The first logical drive is configured as the 500 MB Quorum drive. Once the first logical drive is created, create a logical drive with the rest of the space. Create arrays using the rest of the unconfigured capacity until all of the arrays are created and initializing. (This will take place in the background automatically).

During this procedure, you will see System Settings Change notifications that new hardware has been found, and you will be asked whether you want to restart your computer. Do not restart your computer at this point.

Finally, you will also see a System Settings Change message that Windows 2000 has finished installing new devices, and you will be asked whether you want to restart you computer. Again, do not restart your computer at this point. Leave this message in the foreground until the array initialization completes. The drives will initialize for approximately 48 minutes for every 50 GB.

Once the initialization for all arrays completes, restart the system.

Continue with “Format the logical drives”.

Format the logical drives

Follow this procedure to format logical drives.

Note: Do **NOT** upgrade any disks to dynamic. Only basic disks are supported for clustering. In addition, all partitions used for clustering must be primary partitions.

1. After rebooting, open **IBM NAS Admin** and select **Disk Management (Local)**, in the **Storage** folder.
2. You will see a Write Signature and Upgrade Disk Wizard pop up on the screen. Click **Cancel**.
3. Right-click on the bottom right, where it says **Disk 1**, and select **Write Signature**.
4. Write Signature to all disks that will be accessed by the NOS (All disks in view).
5. On the Quorum drive:
 - a. Right-click and select **Create Partition** and click **Next**.
 - b. Select **Primary Partition** and click **Next**.
 - c. Select **Whole Disk** size and click **Next**.
 - d. Enter the following properties:
 - File System of *NTFS*
 - Volume Label of *Quorum Disk*
 - e. Click **Finish**.

Do **not** enable disk compression, and select **Finish**.

6. Format all other drives, but do **not** enable compression. Use all space available for each drive for each logical drive assigned by the operating system. Assign a drive letter of *G* for the first drive (the Quorum drive), *H* for the second drive (the first user volume), and so on.

At this point, you have set up shared storage.

Configure the fibre-attached storage

You can configure the fibre-attached storage with the following steps or contact your disk administrator to have them done.

1. Double-click the **IBM NAS Admin** icon, then click **Storage**, then **Disk Management**.
2. Create a logical drive for the Quorum disk (RAID 5 is recommended for performance and redundancy). The drive should be at least 500 MB in size, but no larger than 1 GB. Also, the Quorum disk requires its own LUN.
3. Do not create any arrays that are RAID 0, as this is not supported.
4. If needed, see “Testing the fibre-channel host adapter with FAStT Check” on page 25.
5. Rescan the disks. The **Rescan** function is located under the **Action** menu.

Note: You cannot dynamically add storage to a defined volume when that volume is in a cluster.

Appendix H. Fast!UTIL options

This appendix provides detailed configuration information for advanced users who want to customize the configuration of the FAST Host Adapter and the connected devices. However, customizing the configuration is not recommended, as the adapter was configured specifically for the Model 325.

The board can be configured using Fast!UTIL. Access Fast!UTIL by pressing **Alt + Q** during the adapter BIOS initialization (it may take a few seconds for the Fast!UTIL menu to appear). If you have more than one FAST Host Adapter, Fast!UTIL prompts you to select the adapter you want to configure. After changing the settings, Fast!UTIL restarts your system to load the new parameters.

Attention: If the configuration settings are incorrect, your FAST Host Adapter board might not function properly.

Configuration settings

This is the first selection on the Fast!UTIL Options menu. These settings configure the Fibre Channel (FC) devices and the FAST Host Adapter to which they are attached.

Host adapter settings

From the Configuration Settings menu in Fast!UTIL, select **Host Adapter Settings**. The default settings for the FAST Host Adapter are listed in Table 31 and described in the following paragraphs.

Table 31. Host adapter settings

Setting	Options	Default
Host Adapter BIOS	Enabled or Disabled	Disabled
Frame Size	512, 1024, 2048	2048
Loop Reset Delay	0-15 seconds	5 seconds
Adapter Hard Loop ID	Enabled or Disabled	Disabled
Hard Loop ID	0-125	125

Host Adapter BIOS

When this setting is disabled, the ROM BIOS on the FAST Host Adapter is disabled, freeing space in upper memory. This setting must be enabled if you are booting from an FC disk drive attached to the FAST Host Adapter. The default is Disabled.

Frame Size

This setting specifies the maximum frame length supported by the FAST Host Adapter. The default size is 1024. If using F-Port (point-to-point) connections, change this setting to 2048 for maximum performance.

Loop Reset Delay

After resetting the loop, the firmware does not initiate any loop activity for the number of seconds specified in this setting. The default is 5 seconds.

Adapter Hard Loop ID

This setting forces the adapter to attempt to use the ID specified in the Hard Loop ID setting. The default is Disabled.

Hard Loop ID

If the Adapter Hard Loop ID setting is enabled, the adapter attempts to use the ID specified in this setting. The default ID is 0.

Selectable boot settings

Though you can access this option from the Configuration Settings menu, do not change the settings as booting from Fibre Channel is not supported.

Restore default settings

You can access this option from the Configuration Settings menu. It restores the FAST Host Adapter default settings.

Raw NVRAM data

This option displays the adapter's NVRAM contents in hexadecimal format. This is a QLogic troubleshooting tool; you cannot modify the data.

Advanced adapter settings

You can access this option from the Configuration Settings menu. The default settings for the FAST Host Adapter are listed in Table 32 and described in the following paragraphs.

Table 32. Advanced adapter settings

Setting	Options	Default
Execution Throttle	1-256	256
Fast Command Posting	Enabled or Disabled	Enabled
>4 GByte Addressing	Enabled or Disabled	Disabled
LUNs per Target	0, 8, 16, 32, 64, 128, 256	0
Enable LIP Reset	Yes or No	No
Enable LIP Full Login	Yes or No	Yes
Enable Target Reset	Yes or No	Yes
Login Retry Count	0-255	30
Port Down Retry Count	0-255	30
Drivers Load RISC Code	Enabled or Disabled	Enabled
Enable Database Updates	Yes or No	No
Disable Database Load	Yes or No	No
IOCB Allocation	1-512 buffers	256 buffers
Extended Error Logging	Enabled or Disabled	Disabled

Execution Throttle

Specifies the maximum number of commands executing on any one port. When a port's execution throttle is reached, no new commands are executed until the current command finishes executing. The valid options for this setting are 1-256. The default (optimum) is 256.

Fast Command Posting

Decreases command execution time by minimizing the number of interrupts. The default is Enabled.

>4 GByte Addressing.

Enable this option if the system has more than 4 GB of memory available. The default is Disabled.

LUNs per Target

Specifies the number of LUNs per target. Multiple LUN support is typically for redundant array of independent disks (RAID) boxes that use LUNs to map drives. The default is 0.

Enable LIP Reset

Determines the type of loop initialization process (LIP) reset that is used when the operating system initiates a bus reset routine. When this setting is yes, the driver initiates a global LIP reset to clear the target device reservations. When this setting is no, the driver initiates a global LIP reset with full login. The default is No.

Enable LIP Full Login

Instructs the ISP chip to log in to all ports after any LIP. The default is Yes.

Enable Target Reset

Enables the drivers to issue a Target Reset command to all devices on the loop when a SCSI Bus Reset command is issued. The default is Yes.

Login Retry Count

Specifies the number of times the software tries to log in to a device. The default is 30 retries.

Port Down Retry Count

Specifies the number of times the software retries a command to a port returning port down status. The default is 30 retries.

Drivers Load RISC Code

When this setting is enabled, the host adapter uses the RISC firmware that is embedded in the software driver. When this setting is disabled, the software driver loads the RISC firmware found on the system. The default is Enabled.

Note: The driver being loaded must support this setting. If the driver does not support this setting, the result is the same as disabled regardless of the setting. Leaving this option enabled guarantees a certified combination of software driver and RISC firmware.

Enable Database Updates

When enabled, it allows the software to save the loop configuration information in flash memory when the system powers down. The default is No.

Note: This option usually applies to Windows NT and Windows 2000 operating environments.

Disable Database Load

When enabled, the device database is read from the Registry during driver initialization. When disabled, the device database is created dynamically during driver initialization. The default is No.

IOCB Allocation

Specifies the maximum number of buffers from the firmware's buffer pool that are allocated to any one port. The default is 256 buffers.

Extended Error Logging

Provides additional error and debug information to the operating system. When enabled, events are logged into the Windows NT or Windows 2000 Event Viewer. The default is Disabled.

Extended Firmware Settings

You can access this option from the Configuration Settings menu. The default settings for the FASTT Host Adapter are listed in Table 33 and described immediately following the table.

Table 33. Extended firmware settings

Setting	Options	Default
Extended Control Block	Enabled or Disabled	Enabled
RIO Operation Mode	0, 1, 2, 3, 4	0
Connection Options	0, 1, 2, 3	3
Class 2 Service	Enabled or Disabled	Disabled
ACK0	Enabled or Disabled	Disabled
Fibre Channel Tape Support	Enabled or Disabled	Disabled
Fibre Channel Confirm	Enabled or Disabled	Disabled
Command Reference Number	Enabled or Disabled	Disabled
Read Transfer Ready	Enabled or Disabled	Disabled
Response Timer	0-255	0
Interrupt Delay Timer	0-255	0

Extended Control Block

Enables all other extended firmware settings. The default is Enabled.

RIO Operation Mode

Specifies the reduced interrupt operation (RIO) modes, if supported by the software driver. RIO modes allow posting multiple command completions in a single interrupt (see Table 34). The default is 0.

Table 34. RIO operation modes

Option	Operation mode
0	No multiple responses
1	Multiple responses, 16 bit handles, interrupt host
2	Multiple responses, 32 bit handles, interrupt host
3	Multiple responses, 16 bit handles, delay host interrupt
4	Multiple responses, 32 bit handles, delay host interrupt

Connection Options

Defines the type of connection (loop or point to point) or connection preference (see Table 35). The default is 3.

Table 35. Connection options

Option	Type of connection
0	Loop only
1	Point-to-point only

Table 35. Connection options (continued)

2	Loop preferred, otherwise point to point
3	Point-to-point, otherwise loop

Class 2 Service

Enables Class 2 service parameters to be provided during all automatic logins (loop ports). The default is Disabled.

ACK0 Determines the type of acknowledge (ACK) used. When this setting is enabled, sequence ACK is used. When this setting is disabled, frame ACK is used. The default is Disabled.

Note: The Class 2 Service setting must be enabled to use the ACK0 setting.

Fibre Channel Tape Support

This setting is reserved for Fibre Channel tape support. . The default is Disabled.

Fibre Channel Confirm

This setting is reserved for Fibre Channel tape support. . The default is Disabled.

Command Reference Number

This setting is reserved for Fibre Channel tape support. . The default is Disabled.

Read Transfer Ready

This setting is reserved. The default is Disabled.

Response Timer

Contains the value (in 100-microsecond increments) used by a timer to limit the time waiting accumulating multiple responses. For example, if this field is 8, the time limit is 800 microseconds. The default is 0.

Interrupt Delay Timer

Contains the value (in 100-microsecond increments) used by a timer to set the wait time between accessing (DMA) a set of handles and generating an interrupt. The default is 0.

Scan Fibre Channel Devices

Use this option to scan the FC loop and list all the connected devices by loop ID. Information about each device is listed, for example, vendor name, product name, and revision. This information is useful when configuring your FASTT Host Adapter and attached devices.

Fibre Disk Utility

This option scans the FC loop bus and lists all the connected devices by loop ID. You can select a disk device and perform a low-level format or verify the disk media.

CAUTION:

Performing a low-level format destroys all data on the disk.

Loopback Data Test

This option performs a data test using an FC loop or a loopback connector.

CAUTION:

Performing this test will disrupt data if tested in a FC loop.

Select Host Adapter

Use this setting to select a specific FASt Host Adapter if you have multiple FASt Host Adapters in your system.

Appendix I. Notices

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Safety and environmental notices

The following sections describe the safety and environmental items you must consider for an IBM Network Attached Storage Appliance.

Safety notices

General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
 1. Ensure you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb.) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.
Remember: Metal objects are good electrical conductors.
- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Electrical safety



Caution:

Electrical current from power, telephone, and communication cables can be hazardous. To avoid personal injury or equipment damage, disconnect the attached power cords, telecommunication systems, networks, and modems before you open the appliance covers, unless instructed otherwise in the installation and configuration procedures.

Observe the following rules when working on electrical equipment.

Important: Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
 - Performing a mechanical inspection
 - Working near power supplies
 - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has exposed electrical circuits, observe the following precautions:
 - Ensure that another person, familiar with the power-off controls, is near you.
Remember: Another person must be there to switch off the power, if necessary.
 - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.
Remember: There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
 - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
 - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts with the power on when they are removed from their normal operating places in a machine:
 - Power supply units
 - Pumps
 - Blowers and fans
 - Motor generators
 - Similar units

This practice ensures correct grounding of the units.

- If an electrical accident occurs:
 - Use caution; do not become a victim yourself.
 - Switch off power.
 - Send another person to get medical aid.

Safety inspection guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock).
- Explosive hazards, such as a damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
 - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.

- b. The power cord should be the appropriate type as specified in the parts listings.
- c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling electrostatic discharge-sensitive devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes:

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

Note: The use of a grounding system is desirable but not required to protect against ESD damage.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
- Use the round ground-prong of the AC plug on AC-operated computers.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Translated safety notices

The safety notices in this section are provided in the following languages:

- English

- Brazilian Portuguese
- Chinese
- French
- German
- Italian
- Korean
- Spanish

Important: All safety notices in the *Appliance Library* begin with a number. This number is used to cross-reference an English caution or danger notice with translated versions of the caution or danger notice in this section.

Be sure to read all safety notices before performing any of the instructions.

Statement 1



DANGER

Electrical current from power, telephone and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

Statement 2



CAUTION:

When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

Statement 3



CAUTION:

When laser products (such as CD-ROMs, DVD-ROM drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following:

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

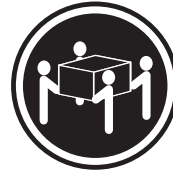
Statement 4



≥18 kg (37 lbs)



≥32 kg (70.5 lbs)



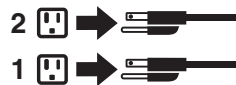
≥55 kg (121.2 lbs)

CAUTION:
Use safe practices when lifting.

- Statement 5



CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 10



CAUTION:
Do not place any object weighing more than 82 kg (180 lb.) on top of rack-mounted devices.



Importante:

Todas as instruções de cuidado e perigo da *appliance Library* começam com um número. Este número é utilizado para fazer referência cruzada de uma instrução de cuidado ou perigo no idioma inglês com as versões traduzidas das instruções de cuidado ou perigo encontradas nesta seção.

Por exemplo, se uma instrução de cuidado é iniciada com o número 1, as traduções para aquela instrução de cuidado aparecem nesta seção sob a instrução 1.

Certifique-se de ler todas as instruções de cuidado e perigo antes de executar qualquer operação.

Instrução 1



PERIGO

A corrente elétrica proveniente de cabos de alimentação, de telefone e de comunicações é perigosa.

Para evitar risco de choque:

- Não conecte ou desconecte cabos e não realize instalação, manutenção ou reconfiguração deste produto durante uma tempestade com raios.
- Conecte todos os cabos de alimentação a tomadas elétricas corretamente instaladas e aterradas.
- Conecte todos os equipamentos ao qual esse produto será conectado a tomadas corretamente instaladas.
- Sempre que possível, utilize apenas uma das mãos para conectar ou desconectar cabos de sinal.
- Nunca ligue qualquer equipamento quando existir evidência de danos por fogo, água ou na estrutura.
- Desconecte cabos de alimentação, sistemas de telecomunicação, redes e modems antes de abrir as tampas dos dispositivos, a menos que especificado de maneira diferente nos procedimentos de instalação e configuração.
- Conecte e desconecte cabos conforme descrito na seguinte tabela, ao instalar ou movimentar este produto ou os dispositivos conectados, ou ao abrir suas tampas.

Para Conectar:	Para Desconectar:
<ol style="list-style-type: none"> 1. DESLIGUE Tudo. 2. Primeiramente, conecte todos os cabos aos dispositivos. 3. Conecte os cabos de sinal aos conectores. 4. Conecte os cabos de alimentação às tomadas. 5. LIGUE os dispositivos. 	<ol style="list-style-type: none"> 1. DESLIGUE Tudo. 2. Primeiramente, remova os cabos de alimentação das tomadas. 3. Remova os cabos de sinal dos conectores. 4. Remova todos os cabos dos dispositivos.

Instrução 2



CUIDADO:

Ao substituir a bateria de lítio, utilize apenas uma bateria IBM, Número de Peça 33F8354 ou uma bateria de tipo equivalente, recomendada pelo fabricante. Se o seu sistema possui um módulo com uma bateria de lítio, substitua-o apenas pelo mesmo tipo de módulo, do mesmo fabricante. A bateria contém lítio e pode explodir se não for utilizada, manuseada e descartada de maneira correta.

Não:

- Jogue ou coloque na água
- Aqueça a mais de 100°C (212°F)
- Conserte nem desmonte

Para descartar a bateria, entre em contato com a área de atendimento a clientes IBM, pelo telefone (011) 889-8986, para obter informações sobre como enviar a bateria pelo correio para a IBM.

Instrução 3



PRECAUCIÓN:

Quando produtos a laser (unidades de CD-ROM, unidades de DVD, dispositivos de fibra ótica, transmissores, etc.) estiverem instalados, observe o seguinte:

- Não remova as tampas. A remoção das tampas de um produto a laser pode resultar em exposição prejudicial à radiação de laser. Nenhuma peça localizada no interior do dispositivo pode ser consertada.
- A utilização de controles ou ajustes ou a execução de procedimentos diferentes dos especificados aqui pode resultar em exposição prejudicial à radiação.

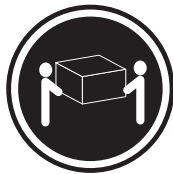


PERIGO

Alguns produtos a laser contêm um diodo laser da Classe 3A ou Classe 3B embutido. Observe o seguinte:

Radiação de laser quando aberto. Não olhe diretamente para o raio a olho nu ou com instrumentos óticos, e evite exposição direta ao raio.

Instrução 4



≥18 kg (37 lbs)



≥32 kg (70,5 lbs)



≥55 kg (121,2 lbs)

CUIDADO:

Ao levantar a máquina, faça-o com segurança.

Instrução 5



CUIDADO:

Os botões Liga/Desliga localizados no dispositivo e na fonte de alimentação não desligam a corrente elétrica fornecida ao dispositivo. O dispositivo também pode ter mais de um cabo de alimentação. Para remover toda a corrente elétrica do dispositivo, assegure que todos os cabos de alimentação estejam desconectados da fonte de energia elétrica.



CUIDADO:

Instrução 10



CUIDADO:



Não coloque nenhum objeto com peso superior a 82 kg (180 lbs.) sobre dispositivos montados em rack.

重要:

中的所有提醒和危险条款前都有一个数字标识。该数字是用来交叉引用一个英文的提醒和危险条款及本部分中的与之对应的已翻译成其它文字的提醒和危险条款。

例如，如果一个提醒条款前的数字为 1，则本部分中相应的译文也带有标号 1。

在执行任何指示的操作之前，请确保您已经阅读了全部提醒和危险条款。

声明 1



危险

电源、电话和通信电缆中带有危险电流。

为避免电击：

雷电期间不要拆接电缆或安装、维修及重新配置本产品。

将所有电源线连接至正确布线并已安全接地的电源插座上。

将与本产品连接的所有设备连接至正确布线的插座上。

尽量只使用单手拆接信号电缆。

有水、火及结构损坏迹象时，请勿打开任何设备。

除非在安装配置过程中有明确指示，否则，打开设备机盖前应先断开与电源线、远程通信系统、网络和调制解调器的所有连接。

安装、移动或打开本产品及其附带设备的机盖时，应按下表所述连接和断开电缆。

连接时：

1. 关闭所有设备。
2. 首先将所有电缆连接至设备。
3. 将信号电缆连接至接口。
4. 将电源线连接至插座。

断开连接时：

1. 关闭所有设备。
2. 首先从插座中拔出电源线。
3. 从接口上拔下信号电缆。

声明 2



警告:

更换锂电池时,只能使用 IBM 产品号 33F8354 或者是厂商推荐的等同类型的电池。

如果系统模块中含有锂电池,则只能使用同一厂商制造的同一类型的模块进行更换。电池中含有锂,如果使用、拿放或处理不当,可能会发生爆炸。

请勿对电池进行下列操作:
扔入或浸入水中
加热超过 100 (212 F)
进行修理或分解
请按本地法规要求处理电池。

声明 3



警告:

安装激光产品(如 CD-ROM、DVD 驱动器、光纤设备或送话器)时,应注意以下事项:

不要拆除外盖。拆除激光产品的外盖可能会导致激光辐射的危险,本设备中没有用户可维修的部件。

非此处指定的其它控制、调整或与性能有关的操作都有可能致激光辐射的危险。



危险

某些激光产品中包含内嵌的 3A 级或 3B 级激光二极管。请注意以下事项。
打开时会产生激光辐射。不要直视光束,不要使用光学仪器直接观看光束,避免直接暴露于光束之下。

声明 4



≥18 kg (37 磅)



≥32 kg (70.5 磅)



≥55 kg (121.2 磅)

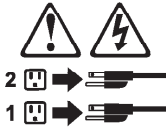
警告：
抬起时请采用安全操作方法。

声明 5



警告：

使用设备上的电源控制按钮和电源上的开关都不能断开本设备上的电流。
另外，本设备可能带有多条电源线。若要断开设备上的所有电流，请确
保所有电源线均已与电源断开连接。



声明 6



警告：

如果在电源线连接设备的一端安装了固定松紧夹，则必须将电源线的另一端连接至
使用方便的电源。

声明 7



警告:

如果设备带有外门，则在移动或抬起设备前应将其拆除或固定以避免造成人员伤害。外门支撑不了设备的重量。

声明 8



警告:

不要拆除电源外盖或贴有下列标签的任何部件。



贴有此标签的组件内部存在高电压、高电流的危险。这些组件中没有用户可维修的部件。如果怀疑其中的部件存在问题，应与服务技术人员联系。

声明 9



警告:

为避免人员伤害，拆除设备上的风扇前应拨下热插拔风扇电缆。

声明 10



警告:

机柜安装的设备上面不能放置重于 82kg (180 磅) 的物品。



> 82 kg (180 磅)

声明 11



警告：

下面的标签表明附近有锋利的边、角或接头。



声明 12



警告：

下面的标签表明附近有高热表面。



重要資訊：

中所有「注意」及「危險」的聲明均以數字開始。此一數字是用來作為交互參考之用，英文「注意」或「危險」聲明可在本節中找到相同內容的「注意」或「危險」聲明的譯文。

例如，有一「危險」聲明以數字 1 開始，則該「危險」聲明的譯文將出現在本節的「聲明」1 中。

執行任何指示之前，請詳讀所有「注意」及「危險」的聲明。

聲明 1



危險

電源、電話及通信電纜上所產生的電流均有危險性。

欲避免電擊危險：

- 在雷雨期間，請勿連接或切斷本產品上的任何電纜線，或安裝、維修及重新架構本產品。
- 請將電源線接至接線及接地正確的電源插座。
- 請將本產品隨附的設備連接至接線正確的插座。
- 儘可能使用單手來連接或切斷信號電纜線。
- 當設備有火燒或泡水的痕跡，或有結構性損害時，請勿開啓該設備的電源。
- 在安裝及架構之時，若非非常熟悉，在開啓裝置蓋子之前，請切斷電源線、電信系統、網路及數據機。
- 在安裝、移動本產品或附加裝置，或開啓其蓋子時，請依照下表中「連接」及「切斷」電纜線的步驟執行。

連接：

1. 關閉所有開關。
2. 先將所有電纜線接上裝置。
3. 將信號電纜接上接頭。
4. 再將電源線接上電源插座。
5. 開啓裝置的電源。

切斷：

1. 關閉所有開關。
2. 先自電源插座拔掉電源線。
3. 拔掉接頭上的所有信號電纜。
4. 再拔掉裝置上的所有電纜線。

聲明 2



注意：

更換電池時，只可使用 IBM 零件編號 33F8354 的電池，或製造商建議之相當類型的電池。若系統中具有包含鋰電池的模組，在更換此模組時，請使用相同廠商製造的相同模組類型。如未正確使用、處理或丟棄含有鋰的電池時，可能會引發爆炸。

請勿將電池：

- 丟入或浸入水中
- 加熱超過 100 °C (212 °F)
- 修理或拆開

請遵照當地法令規章處理廢棄電池。

聲明 3



注意：

安裝雷射產品 (如 CD-ROM、DVD 光碟機、光纖裝置或發射器) 時，請注意下列事項：

- 請勿移開蓋子。移開雷射產品的蓋子，您可能會暴露於危險的雷射輻射之下。裝置中沒有需要維修的組件。
- 不依此處所指示的控制、調整或處理步驟，您可能會暴露於危險的輻射之下。



危險

有些雷射產品含有內嵌式 Class 3A 或 Class 3B 雷射二極體。請注意下列事項：

開啓時會產生雷射輻射。請勿凝視光束，不要使用光學儀器直接觀察，且應避免直接暴露在光束下。

聲明 4



≥ 18 公斤 (37 磅) ≥ 32 公斤 (70.5 磅) ≥ 55 公斤 (121.2 磅)

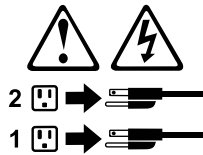
注意：

抬起裝置時，請注意安全措施。

聲明 5



注意：
裝置上的電源控制按鈕及電源供應器上的電源開關均無法關閉裝置上的電流。
本裝置可能有一條以上的電源線。如要移除裝置上的所有電流，請確認所有電源線已與電源分離。



聲明 10



注意：
請勿將任何重量超過 82 公斤 (180 磅) 的物品置於已安裝機架的裝置上方。



> 82 公斤 (180 磅)

Important:

Toutes les consignes Attention et Danger indiquées dans la bibliothèque *appliance* sont précédées d'un numéro. Ce dernier permet de mettre en correspondance la consigne en anglais avec ses versions traduites dans la présente section.

Par exemple, si une consigne de type Attention est précédée du chiffre 1, ses traductions sont également précédées du chiffre 1 dans la présente section.

Prenez connaissance de toutes les consignes de type Attention et Danger avant de procéder aux opérations décrites par les instructions.



DANGER

Le courant électrique passant dans les câbles de communication, ou les cordons téléphoniques et d'alimentation peut être dangereux.

Pour éviter tout risque de choc électrique:

- **Ne manipulez aucun câble et n'effectuez aucune opération d'installation, d'entretien ou de reconfiguration de ce produit au cours d'un orage.**
- **Branchez tous les cordons d'alimentation sur un socle de prise de courant correctement câblé et mis à la terre.**
- **Branchez sur des socles de prise de courant correctement câblés tout équipement connecté à ce produit.**
- **Lorsque cela est possible, n'utilisez qu'une seule main pour connecter ou déconnecter les câbles d'interface.**
- **Ne mettez jamais un équipement sous tension en cas d'incendie ou d'inondation, ou en présence de dommages matériels.**
- **Avant de retirer les carters de l'unité, mettez celle-ci hors tension et déconnectez ses cordons d'alimentation, ainsi que les câbles qui la relie aux réseaux, aux systèmes de télécommunication et aux modems (sauf instruction contraire mentionnée dans les procédures d'installation et de configuration).**
- **Lorsque vous installez ou que vous déplacez le présent produit ou des périphériques qui lui sont raccordés, reportez-vous aux instructions ci-dessous pour connecter et déconnecter les différents cordons.**

Connexion	Déconnexion
<ol style="list-style-type: none"> 1. Mettez les unités hors tension. 2. Commencez par brancher tous les cordons sur les unités. 3. Branchez les câbles d'interface sur des connecteurs. 4. Branchez les cordons d'alimentation sur des prises. 5. Mettez les unités sous tension. 	<ol style="list-style-type: none"> 1. Mettez les unités hors tension. 2. Débranchez les cordons d'alimentation des prises. 3. Débranchez les câbles d'interface des connecteurs. 4. Débranchez tous les câbles des unités.



Notice n° 2

ATTENTION:

Remplacez la pile au lithium usagée par une pile de référence identique exclusivement - voir la référence IBM - ou par une pile équivalente recommandée par le fabricant. Si votre système est doté d'un module contenant une pile au lithium, vous devez le remplacer uniquement par un module identique, produit par le même fabricant. La pile contient du lithium et présente donc un risque d'explosion en cas de mauvaise manipulation ou utilisation.

- **Ne la jetez pas à l'eau.**
- **Ne l'exposez pas à une température supérieure à 100 °C.**
- **Ne cherchez pas à la réparer ou à la démonter.**

Pour la mise au rebut, reportez-vous à la réglementation en vigueur.



Notice n° 3

ATTENTION:

Si des produits laser sont installés (tels que des unités de CD-ROM ou de DVD, des périphériques contenant des fibres optiques ou des émetteurs-récepteurs), prenez connaissance des informations suivantes:

- **N'ouvrez pas ces produits pour éviter une exposition directe au rayon laser. Vous ne pouvez effectuer aucune opération de maintenance à l'intérieur.**
- **Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites dans le présent document.**



DANGER

Certains produits laser contiennent une diode laser de classe 3A ou 3B.
Prenez connaissance des informations suivantes:

Rayonnement laser lorsque le carter est ouvert. Évitez de regarder fixement le faisceau ou de l'observer à l'aide d'instruments optiques. Évitez une exposition directe au rayon.

Notice n° 4



≥18 kg



≥32 kg



≥55 kg

ATTENTION:

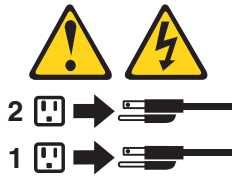
Faites-vous aider pour soulever ce produit.

Notice n° 5



ATTENTION:

Le bouton de mise sous tension/hors tension de l'unité et l'interrupteur d'alimentation du bloc d'alimentation ne coupent pas l'arrivée de courant électrique à l'intérieur de la machine. Il se peut que votre unité dispose de plusieurs cordons d'alimentation. Pour isoler totalement l'unité du réseau électrique, débranchez tous les cordons d'alimentation des socles de prise de courant.



Notice n° 10



ATTENTION:

Ne posez pas d'objet dont le poids dépasse 82 kg sur les unités montées en armoire.

Wichtig:

Alle Sicherheitshinweise in dieser *server-Bibliothek* beginnen mit einer Nummer. Diese Nummer verweist auf einen englischen Sicherheitshinweis mit den übersetzten Versionen dieses Hinweises in diesem Abschnitt.

Wenn z. B. ein Sicherheitshinweis mit der Nummer 1 beginnt, so erscheint die Übersetzung für diesen Sicherheitshinweis in diesem Abschnitt unter dem Hinweis 1.

Lesen Sie alle Sicherheitshinweise, bevor Sie eine Anweisung ausführen.

Hinweis 1



VORSICHT

Elektrische Spannungen von Netz-, Telefon- und Datenübertragungsleitungen sind gefährlich.

Aus Sicherheitsgründen:

- Bei Gewitter an diesem Gerät keine Kabel anschließen oder lösen. Ferner keine Installations-, Wartungs- oder Rekonfigurationsarbeiten durchführen.

- Gerät nur an eine Schutzkontaktsteckdose mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Alle angeschlossenen Geräte ebenfalls an Schutzkontaktsteckdosen mit ordnungsgemäß geerdetem Schutzkontakt anschließen.
- Signalkabel möglichst einhändig anschließen oder lösen.
- Keine Geräte einschalten, wenn die Gefahr einer Beschädigung durch Feuer, Wasser oder andere Einflüsse besteht.
- Die Verbindung zu den angeschlossenen Netzkabeln, Telekommunikationssystemen, Netzwerken und Modems ist vor dem öffnen des Gehäuses zu unterbrechen. Es sei denn, dies ist in den zugehörigen Installations- und Konfigurationsprozeduren anders angegeben.
- Nur nach den nachfolgend aufgeführten Anweisungen arbeiten, die für Installation, Transport oder öffnen von Gehäusen von Personal Computern oder angeschlossenen Einheiten gelten.

Kabel anschließen:	Kabel lösen:
<ol style="list-style-type: none"> 1. Alle Geräte ausschalten und Netzstecker ziehen. 2. Zuerst alle Kabel an Einheiten anschließen. 3. Signalkabel an Anschlußbuchsen anschließen. 4. Netzstecker an Steckdose anschließen. 5. Gerät einschalten. 	<ol style="list-style-type: none"> 1. Alle Geräte ausschalten. 2. Zuerst Netzstecker von Steckdose lösen. 3. Signalkabel von Anschlußbuchsen lösen. 4. Alle Kabel von Einheiten lösen.

Hinweis 2



ACHTUNG:

Eine verbrauchte Batterie nur durch eine Batterie mit der IBM Teilenummer 33F8354 oder durch eine vom Hersteller empfohlene Batterie ersetzen. Wenn Ihr System ein Modul mit einer Lithium-Batterie enthält, ersetzen Sie es immer mit dem selben Modultyp vom selben Hersteller. Die Batterie enthält Lithium und kann bei unsachgemäßer Verwendung, Handhabung oder Entsorgung explodieren.

Die Batterie nicht:

- mit Wasser in Berührung bringen.
- über 100° C erhitzen.
- reparieren oder zerlegen.

Die örtlichen Bestimmungen für die Entsorgung von Sondermüll beachten.

Hinweis 3



ACHTUNG:

Wenn ein Laserprodukt (z. B. CD-ROM-Laufwerke, DVD-Laufwerke, Einheiten mit Glasfaserkabeln oder Transmitter) installiert ist, beachten Sie Folgendes:

- Das Entfernen der Abdeckungen des CD-ROM-Laufwerks kann zu gefährlicher Laserstrahlung führen. Es befinden sich keine Teile innerhalb des CD-ROM-Laufwerks, die vom Benutzer gewartet werden müssen. Die Verkleidung des CD-ROM-Laufwerks nicht öffnen.
- Steuer- und Einstellelemente sowie Verfahren nur entsprechend den Anweisungen im vorliegenden Handbuch einsetzen. Andernfalls kann gefährliche Laserstrahlung auftreten.



VORSICHT

Manche CD-ROM-Laufwerke enthalten eine eingebaute Laserdiode der Klasse 3A oder 3B. Die nachfolgend aufgeführten Punkte beachten.

Laserstrahlung bei geöffneter Tür. Niemals direkt in den Laserstrahl sehen, nicht direkt mit optischen Instrumenten betrachten und den Strahlungsbereich meiden.

Hinweis 4



≥18 kg



≥32 kg



≥55 kg

ACHTUNG:

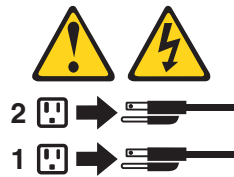
Beim Anheben der Maschine die vorgeschriebenen Sicherheitsbestimmungen beachten.

Hinweis 5



ACHTUNG:

Mit dem Betriebsspannungsschalter an der Vorderseite des Gerätes und dem Betriebsspannungsschalter am Netzteil wird die Stromversorgung für das Gerät nicht unterbrochen. Das Gerät könnte auch mehr als ein Netzkabel aufweisen. Um die gesamte Stromversorgung des Gerätes auszuschalten, muß sichergestellt werden, daß alle Netzkabel aus den Netzsteckdosen herausgezogen wurden.



Hinweis 10



ACHTUNG:



Keine Gegenstände, die mehr als 82 kg wiegen, auf Rack-Einheiten ablegen.

Importante:

Tutti gli avvisi di attenzione e di pericolo riportati nella pubblicazione *appliance Library* iniziano con un numero. Questo numero viene utilizzato per confrontare avvisi di attenzione o di pericolo in inglese con le versioni tradotte riportate in questa sezione.

Ad esempio, se un avviso di attenzione inizia con il numero 1, la relativa versione tradotta è presente in questa sezione con la stessa numerazione.

Prima di eseguire una qualsiasi istruzione, accertarsi di leggere tutti gli avvisi di attenzione e di pericolo.

Avviso 1



PERICOLO

La corrente elettrica circolante nei cavi di alimentazione, del telefono e di segnale è pericolosa.

Per evitare il pericolo di scosse elettriche:

- Non collegare o scollegare i cavi, non effettuare l'installazione, la manutenzione o la riconfigurazione di questo prodotto durante i temporali.
- Collegare tutti i cavi di alimentazione ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Collegare qualsiasi apparecchiatura collegata a questo prodotto ad una presa elettrica correttamente cablata e munita di terra di sicurezza.
- Quando possibile, collegare o scollegare i cavi di segnale con una sola mano.
- Non accendere qualsiasi apparecchiatura in presenza di fuoco, acqua o se sono presenti danni all'apparecchiatura stessa.
- Scollegare i cavi di alimentazione, i sistemi di telecomunicazioni, le reti e i modem prima di aprire i coperchi delle unità, se non diversamente indicato nelle procedure di installazione e configurazione.
- Collegare e scollegare i cavi come descritto nella seguente tabella quando si effettuano l'installazione, la rimozione o l'apertura dei coperchi di questo prodotto o delle unità collegate.

Per collegare:	Per scollegare:
<ol style="list-style-type: none">1. SPEGNERE tutti i dispositivi.2. Collegare prima tutti i cavi alle unità.3. Collegare i cavi di segnale ai connettori.4. Collegare i cavi di alimentazione alle prese elettriche.5. ACCENDERE le unità.	<ol style="list-style-type: none">1. SPEGNERE tutti i dispositivi.2. Rimuovere prima i cavi di alimentazione dalle prese elettriche.3. Rimuovere i cavi di segnale dai connettori.4. Rimuovere tutti i cavi dalle unità.

Avviso 2



ATTENZIONE:

Quando si sostituisce la batteria al litio, utilizzare solo una batteria IBM con numero parte 33F8354 o batterie dello stesso tipo o di tipo equivalente consigliate dal produttore. Se il sistema di cui si dispone è provvisto di un modulo contenente una batteria al litio, sostituire tale batteria solo con un tipo di modulo uguale a quello fornito dal produttore. La batteria contiene litio e può esplodere se utilizzata, maneggiata o smaltita impropriamente.

Evitare di:

- Gettarla o immergerla in acqua
- Riscaldarla ad una temperatura superiore ai 100°C
- Cercare di ripararla o smontarla

Smaltire secondo la normativa in vigore (D.Lgs 22 del 5/2/9) e successive disposizioni nazionali e locali.

Avviso 3



ATTENZIONE:

Quando si installano prodotti laser come, ad esempio, le unità DVD, CD-ROM, a fibre ottiche o trasmettitori, prestare attenzione a quanto segue:

- Non rimuovere i coperchi. L'apertura dei coperchi di prodotti laser può determinare l'esposizione a radiazioni laser pericolose. All'interno delle unità non vi sono parti su cui effettuare l'assistenza tecnica.
- L'utilizzo di controlli, regolazioni o l'esecuzione di procedure non descritti nel presente manuale possono provocare l'esposizione a radiazioni pericolose.



PERICOLO

Alcuni prodotti laser contengono all'interno un diodo laser di Classe 3A o Classe 3B. Prestare attenzione a quanto segue:

Aperto l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici ed evitare l'esposizione diretta al fascio.

Avviso 4



≥18 kg



≥32 kg



≥55 kg

ATTENZIONE:

Durante il sollevamento della macchina seguire delle norme di sicurezza.

Avviso 5



ATTENZIONE:

Il pulsante del controllo dell'alimentazione situato sull'unità e l'interruttore di alimentazione posto sull'alimentatore non disattiva la corrente elettrica fornita all'unità. L'unità potrebbe disporre di più di un cavo di alimentazione. Per disattivare la corrente elettrica dall'unità, accertarsi che tutti i cavi di alimentazione siano scollegati dalla sorgente di alimentazione.



Avviso 10



ATTENZIONE:



Non poggiare oggetti che pesano più di 82 kg sulla parte superiore delle unità montate in rack.

경고문 1



위험

전원, 전향 및 통신 케이블로부터 흘러 나오는 전류는 위험합니다.

전기 충격을 피하려면:

- 뇌우를 동반할 때는 케이블의 연결이나 철수, 이 제품의 설치, 유지보수 또는 재구성을 하지 마십시오.
- 모든 전원 코드를 적절히 배선 및 접지해야 합니다.
- 이 제품에 연결될 모든 장비를 적절하게 배선된 콘센트에 연결하십시오.
- 가능한한 신호 케이블을 한 손으로 연결하거나 끊으십시오.
- 화재, 수해 또는 구조상의 손상이 있을 경우 장비를 켜지 마십시오.
- 설치 및 구성 프로시저에 다른 설명이 없는 한, 장치 덮개를 열기 전에 연결된 전원 코드, 원거리 통신 시스템, 네트워크 및 모뎀을 끊어 주십시오.
- 제품 또는 접속된 장치를 설치, 이동 및 덮개를 열 때 다음 설명에 따라 케이블을 연결하거나 끊도록 하십시오.

연결하려면:

1. 모든 스위치를 끕니다.
2. 먼저 모든 케이블을 장치에 연결합니다.
3. 신호 케이블을 커넥터에 연결합니다.
4. 콘센트에 전원 코드를 연결합니다.
5. 장치 스위치를 켭니다.

연결을 끊으려면:

1. 모든 스위치를 끕니다.
2. 먼저 콘센트에서 전원 코드를 뽑습니다.
3. 신호 케이블을 커넥터에서 제거합니다.
4. 장치에서 모든 케이블을 제거합니다.

경고문 2



주의:

리튬 배터리를 교체할 때는 IBM 부품 번호 33F8354 또는 제조업체에서 권장하는 동등한 유형의 배터리를 사용하십시오. 시스템에 리튬 배터리를 갖고 있는 모듈이 있으면 동일한 제조업체에서 생산된 동일한 모듈 유형으로 교체하십시오. 배터리에 리튬이 있을 경우 제대로 사용, 처리 또는 처분하지 않으면 폭발할 수 있습니다.

다음은 주의하십시오.

- 던지거나 물에 담그지 않도록 하십시오.
- 100°C(212°F) 이상으로 가열하지 마십시오.
- 수리하거나 분해하지 마십시오.

지역 법령이나 규정의 요구에 따라 배터리를 처분하십시오.

경고문 3



주의:

레이저 제품(CD-ROMs, DVD 드라이브, 광 장치 또는 트랜스미터 등과 같은)이 설치되어 있을 경우 다음을 유의하십시오.

- 덮개를 제거하지 마십시오. 레이저 제품의 덮개를 제거했을 경우 위험한 레이저 광선에 노출될 수 있습니다. 이 장치 안에는 서비스를 받을 수 있는 부품이 없습니다.

- 여기에서 지정하지 않은 방식의 제어, 조절 또는 실행으로 인해 위험한 레이저 광선에 노출될 수 있습니다.



위험

일부 레이저 제품에는 클래스 3A 또는 클래스 3B 레이저 다이오드가 들어 있습니다. 다음을 주의하십시오.

열면 레이저 광선에 노출됩니다. 광선을 주시하거나 광학 기계를 직접 쳐다보지 않도록 하고 광선에 노출되지 않도록 하십시오.

경고문 4



≥18 kg (37 lbs)



≥ 32 kg (70.5 lbs)



≥ 55 kg (121.2 lbs)

주의:

기계를 들 때는 안전하게 들어 올리십시오.

경고문 5



주의:

장치의 전원 제어 버튼 및 전원 공급기의 전원 스위치는 장치에 공급되는 전류를 차단하지 않습니다. 장치에 둘 이상의 전원 코드가 연결되어 있을 수도 있습니다. 장치에서 모든 전류를 차단하려면 모든 전원 코드가 전원으로부터 차단되어 있는지 확인하십시오.





주의:

서랍형 모델의 장치 상단에 82 kg(180 lbs.)이 넘는 물체를 올려 놓지 마십시오.



> 82 kg (180 lbs)

Importante:

Todas las declaraciones de precaución de esta *Biblioteca del servidor* empiezan con un número. Dicho número se emplea para establecer una referencia cruzada de una declaración de precaución o peligro en inglés con las versiones traducidas que de dichas declaraciones pueden encontrarse en esta sección.

Por ejemplo, si una declaración de peligro empieza con el número 1, las traducciones de esta declaración de precaución aparecen en esta sección bajo Declaración 1.

Lea atentamente todas las declaraciones de precaución y peligro antes de llevar a cabo cualquier operación.

Declaración 1



PELIGRO

La corriente eléctrica de los cables telefónicos, de alimentación y de comunicaciones es perjudicial.

Para evitar una descarga eléctrica:

- No conecte ni desconecte ningún cable ni realice las operaciones de instalación, mantenimiento o reconfiguración de este producto durante una tormenta.
- Conecte cada cable de alimentación a una toma de alimentación eléctrica con conexión a tierra y cableado correctos.
- Conecte a tomas de alimentación con un cableado correcto cualquier equipo que vaya a estar conectado a este producto.
- Si es posible, utilice una sola mano cuando conecte o desconecte los cables de sent.al.
- No encienda nunca un equipo cuando haya riesgos de incendio, de inundación o de daños estructurales.
- Desconecte los cables de alimentación, sistemas de telecomunicaciones, redes y módems conectados antes de abrir las cubiertas del dispositivo a menos que se indique lo contrario en los procedimientos de instalación y configuración.

- Conecte y desconecte los cables tal como se describe en la tabla siguiente cuando desee realizar una operación de instalación, de traslado o de apertura de las cubiertas para este producto o para los dispositivos conectados.

Para la conexión	Para la desconexión
<ol style="list-style-type: none"> 1. APÁGUELO todo. 2. En primer lugar, conecte los cables a los dispositivos. 3. Conecte los cables de señal a los conectores. 4. Conecte cada cable de alimentación a la toma de alimentación. 5. ENCIENDA el dispositivo. 	<ol style="list-style-type: none"> 1. APÁGUELO todo. 2. En primer lugar, retire cada cable de alimentación de la toma de alimentación. 3. Retire los cables de señal de los conectores. 4. Retire los cables de los dispositivos.

Declaración 2



PRECAUCIÓN:

Cuando desee sustituir la batería de litio, utilice únicamente el número de pieza 33F8354 de IBM o cualquier tipo de batería equivalente que recomiende el fabricante. Si el sistema tiene un módulo que contiene una batería de litio, sustitúyalo únicamente por el mismo tipo de módulo, que ha de estar creado por el mismo fabricante. La batería contiene litio y puede explotar si el usuario no la utiliza ni la maneja de forma adecuada o si no se desprende de la misma como corresponde.

No realice las acciones siguientes:

- Arrojarla al agua o sumergirla
- Calentarla a una temperatura que supere los 100°C (212°F)
- Repararla o desmontarla

Despréndase de la batería siguiendo los requisitos que exija el reglamento o la legislación local.

Declaración 3



PRECAUCIÓN:

Cuando instale productos láser (como, por ejemplo, CD-ROM, unidades DVD, dispositivos de fibra óptica o transmisores), tenga en cuenta las advertencias siguientes:

- No retire las cubiertas. Si retira las cubiertas del producto láser, puede quedar expuesto a radiación láser perjudicial. Dentro del dispositivo no existe ninguna pieza que requiera mantenimiento.
- El uso de controles o ajustes o la realización de procedimientos que no sean los que se han especificado aquí pueden dar como resultado una exposición perjudicial a las radiaciones.

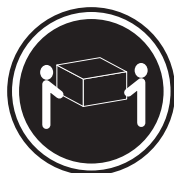


PELIGRO

Algunos productos láser contienen un diodo de láser incorporado de Clase 3A o de Clase 3B. Tenga en cuenta la advertencia siguiente.

Cuando se abre, hay radiación láser. No mire fijamente el rayo ni lleve a cabo ningún examen directamente con instrumentos ópticos; evite la exposición directa al rayo.

Declaración 4



≥18 kg (37 libras)



≥32 kg (70,5 libras)



≥55 kg (121,2 libras)

PRECAUCIÓN:

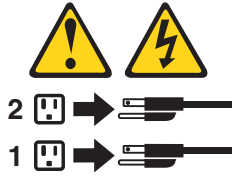
Tome medidas de seguridad al levantar el producto.

Declaración 5



PRECAUCIÓN:

El botón de control de alimentación del dispositivo y el interruptor de alimentación de la fuente de alimentación no apagan la corriente eléctrica suministrada al dispositivo. Es posible también que el dispositivo tenga más de un cable de alimentación. Para eliminar la corriente eléctrica del dispositivo, asegúrese de desconectar todos los cables de alimentación de la fuente de alimentación.



Declaración 10



PRECAUCIÓN:



No coloque ningún objeto que pese más de 82 kg (180 libras) encima de los dispositivos montados en bastidor.

Environmental notices

Electronic emission notices

Federal Communications Commission (FCC) Statement: Federal Communications Commission (FCC) Class A Statement

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

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

Industry Canada Class A emission compliance statement: This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled *Digital Apparatus*, ICES-003 of Industry Canada.

Avis de Conformité aux normes d'Industrie Canada: Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouiller : *Appareils Numériques*, NMB-003 édictée par Industrie Canada.

Australia and New Zealand Class A statement: Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement: Notice to Customers

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

European Union (EU) conformity statement: This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. Such cables and connectors are available from IBM authorized dealers. IBM cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

EMC Directive 89/336/EEC Statements: This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

FCCA (Text für alle in Deutschland vertriebenen EN 55022 Klasse A Geräte.): Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30. August 1995 (bzw. der EMC EG Richtlinie 89/336)

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist Scott Enke, Director, Worldwide Manufacturing Operations, PO Box 12195, 3039 Cornwallis, Research Triangle Park, NC U.S.A. 27709–2195.

Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:

“Warnung: Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.”

EN 50082-1 Hinweis:

“Wird dieses Gerät in einer industriellen Umgebung betrieben (wie in EN 50082-2 festgelegt), dann kann es dabei eventuell gestört werden. In solch einem Fall ist der Abstand bzw. die Abschirmung zu der industriellen Störquelle zu vergrößern.”

Anmerkung:

Um die Einhaltung des EMVG sicherzustellen, sind die Geräte, wie in den IBM Handbüchern angegeben, zu installieren und zu betreiben.

Taiwan electrical emission statement:

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Japanese Voluntary Control Council for Interference (VCCI) statement:

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

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Readers' Comments — We'd Like to Hear from You

IBM TotalStorage™ Network Attached Storage 300
Model 325
Service Guide

Overall, how satisfied are you with the information in this book?

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Overall satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How satisfied are you that the information in this book is:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Accurate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to find	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Easy to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Well organized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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