

IBM TotalStorage™ NAS Gateway 300  
Model G27



# Hardware Service Guide

**NOTE**

Before using this information and the product it supports, read the safety information in Appendix D, "Notices" on page 161.

**First Edition (October 2002)**

This guide applies to the IBM TotalStorage™ NAS Gateway 300, Model G27 appliances.

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## About this guide

This guide provides service procedures for the IBM TotalStorage™ NAS Gateway 300, which consists of the Model G27 appliance. *NAS 300G* will be used in this guide to refer to the Model G27.

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## Who should read this guide

This guide is intended for trained service personnel.

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## How this guide is organized

This guide contains the following chapters and appendices:

Chapter 1, “General checkout” on page 1 describes the general checkout procedure for the NAS 300G.

Chapter 2, “General information” on page 3 provides an overview of the NAS 300G.

Chapter 3, “Troubleshooting” on page 9 provides basic troubleshooting information to help you resolve some common problems that might occur with the appliance.

Chapter 4, “Symptom-to-part index” on page 29 lists symptoms, errors, and the possible causes.

Chapter 5, “Adding and replacing components” on page 59 provides information on adding and replacing components.

Chapter 6, “Using system-level utilities” on page 135 describes the utilities provided with the appliance.

Appendix A, “Communication adapters” on page 145 provides the PCI slot locations for different adapter combinations.

Appendix B, “Using the Recovery and Supplementary CD-ROMs” on page 153 provides instructions using the recovery CD-ROM.

Appendix C, “Parts listings” on page 157 lists the part numbers for the appliance.

Appendix D, “Notices” on page 161 provides emission notices and trademark information.

Appendix E, “Safety notices” on page 167 provides important safety notices.

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## Notices used in this book

This publication contains notices that relate to a specific topic. The Caution and Danger notices also appear in the multilingual safety book included with the NAS 300G. Each notice is numbered for easy reference to the corresponding notices in the safety book.

The notice definitions are as follows:

- |                  |  |
|------------------|--|
| <b>Notes</b>     | These notices provide important tips, guidance, or advice.   |
| <b>Attention</b> | These notices indicate possible damage to programs, devices, or data. An attention notice appears before the instruction or situation in which damage could occur. |
| <b>Caution</b>   | These notices indicate situations that can be potentially hazardous  |

to you. A caution notice appears before the description of a potentially hazardous procedure step or situation.

**Danger**

These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice appears before a description of a potentially lethal or extremely hazardous procedure step or situation.

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## Publications

### Hardcopy publications shipped with the NAS 300G

The following publications are shipped in hardcopy and are also provided in softcopy form at [www.ibm.com/storage/support/](http://www.ibm.com/storage/support/):

- *IBM TotalStorage NAS Gateway 300 Hardware Installation Guide*, GA27-4320  
This publication provides procedures for setting up, cabling, and replacing components of the NAS 300G.
- *IBM TotalStorage NAS Gateway 300 Quick Start Instructions*  
This fanfold publication describes how to install the appliance as it is shipped.
- *Safety Information—Read This First*, SD21-0030  
This publication contains general safety information translated into different languages.

### Related publications

The following publications are available on a CD shipped with this product and at [www.ibm.com/storage/support/](http://www.ibm.com/storage/support/):

- *IBM TotalStorage NAS Gateway 300 User's Reference*, GA27-4321  
This manual describes how to configure and use the software provided with the product.
- *IBM TotalStorage NAS Gateway 300 Hardware Installation Guide*, GA27-4320  
This guide describes the installation procedures for this product and is intended for the customer.
- *IBM TotalStorage NAS Gateway 300 Quick Start Instructions*  
This publication describes how to install the appliance as it is shipped.
- *IBM TotalStorage Network Attached Storage Translated Safety Notices*, GA67-0043  
This booklet contains translations of safety notices specific to this product.

### Accessibility

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

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## Web sites

This section lists the Web sites where additional technical information is found.

### Getting help online

Be sure to visit the support page that is specific to your hardware, complete with FAQs, parts information, technical hints and tips, technical publications, and downloadable files, if applicable. This page is at [www.ibm.com/storage/support/](http://www.ibm.com/storage/support/).

### Other helpful sites

[www.ibm.com](http://www.ibm.com)  
[www.ibm.com/storage](http://www.ibm.com/storage)

Main IBM home page  
IBM Storage home page



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## Chapter 1. General checkout

This chapter describes the general checkout procedures for the NAS 300G. Use these procedures at the beginning of a service call.

Diagnostic programs are stored in upgradable read-only memory (ROM) on the system board, on the CD-ROMs, and in the software. These programs are the primary method of testing the major components of the engine (the system board, Ethernet controller, random-access memory [RAM], CD-ROM, diskette drive, and hard disk drives). See “Diagnostic programs” on page 14.

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### General tips

- If multiple error codes are displayed, diagnose the first error code displayed (see “Diagnostic error codes” on page 34).
- If you cannot determine whether a problem is caused by the hardware or by the software, you can run the Base System Diagnostics to confirm that the hardware is working correctly.
- If the engine hangs with a power-on self-test (POST) error, go to “POST error codes” on page 45.
- If the engine hangs and no error is displayed, go to “Undetermined problems” on page 55.
- For power supply problems, see “Power-supply LED errors” on page 51.
- For intermittent problems, check the error log; see “Event/error logs” on page 13.
- For safety information, see Appendix D, “Notices” on page 161.

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### Checkout steps

As you perform these steps, refer to “Engine controls and indicators” on page 61 as needed:

1. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine.
2. Check all cables and power cords.
3. Attach a monitor, keyboard, and mouse to the engine.
4. Power ON the engine.
5. 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 45.
6. Check the information LED panel System Error LED; if it is on, see “Information-panel system error LED” on page 32.
7. Check the System Event/Error Log as described in “Event/error logs” on page 13. If an error was recorded by the system, see Chapter 4, “Symptom-to-part index” on page 29.
8. Start the Base System Diagnostics programs. See “Starting the diagnostic programs” on page 15.
9. Check for the following responses:
  - a. Beeps
  - b. Readable instructions or the Main Menu
10. If the Base System Diagnostics completed successfully and you still suspect a problem, see “Undetermined problems” on page 55.



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## Chapter 2. General information

This guide provides instructions for servicing the hardware for the IBM TotalStorage™ NAS Gateway 300, which is a double-node Model G27. This high-speed, high-performance device attaches application and transaction servers to an enterprise Storage Area Network (SAN).

This chapter describes the features and options of the NAS 300G.

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### Overview of hardware

The NAS 300G allows storage to be attached easily to a network and be running with minimal setup time. This appliance is designed to perform one specialized job, so complex software needed to run additional applications does not exist in the system.

The NAS 300G comprises hardware and software that allows any system to access files through the network by making requests. The NAS 300G parses the requests, locates the files in its pool of storage devices, and then sends a response to the requestor. To accelerate access to recently used data, the NAS 300G caches that information within its memory. Caching increases the throughput of the NAS 300G.

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### Products and features

The NAS 300G has the following standard and optional features.

#### Standard features

Table 1 lists the standard features of the Model G27.

*Table 1. Standard features of the Model G27*

Hardware	Model G27
System	Each engine: <ul style="list-style-type: none"><li>• Two 2.4-GHz processors</li><li>• 512-KB Level-2 cache per processor</li><li>• Advanced System Management support</li><li>• Six PCI expansion slots</li></ul>
Memory	Each engine: <ul style="list-style-type: none"><li>• 512 KB</li><li>• Type: Double data rate (DDR) Synchronous DRAM (SDRAM) with RDIMM connectors</li><li>• Upgradable to a maximum of 4.5 GB</li></ul>
Hot-swap hard disk drives (HDDs)	Each engine: one Ultra160 10 000 rpm 36.4 GB
Service processor	Imbedded system management processor

Table 1. Standard features of the Model G27 (continued)

Hardware	Model G27
Power supplies	Two 560W (180 - 256V)

## Optional features

Table 2 lists the optional features of the Model G27.

**Note:** The optional Model G27 features must be applied to both engines in the cluster.

Table 2. Optional features of Model G27

Feature type	Feature	Model G27	Feature code
Memory (In addition to the standard memory, one of the following options must be installed.)	2 x 512 MB	Option	0301
	2 x 1 GB	Option	0302
Adapters	IBM Gigabit Ethernet SX Server Adapter	Option	0006
	PRO/1000 XT Server Adapter by Intel	Option	0018
	Alacritech 100x4 Quad-Port Server Accelerated Adapter	Option	0015
	Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter	Option	3305
	IBM PCI Ultra160 SCSI adapter (LVD/SE)	Option	0013
	Qlogic 2340 1-port Fibre Channel adapter	Option	3705
	Qlogic 2342 2-port Fibre Channel adapter	Option	3706
Service processor	Remote Supervisor Adapter	Option	0010
Storage	36.4 GB 10K Ultra160 SCSI Hot-Swap SL HDD	Option to add one for mirrored OS	3121

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## Specifications

### Dimensions

	<b>Model G27</b>
Width	440 mm (17.3 in.)
Height	216 mm (8.5 in.)
Depth	674 mm (26.5 in.)

### Weight

	<b>Model G27</b>
Minimum configuration (approximate)	67 kg (148 lb.)
Maximum configuration (approximate)	91.6 kg (202 lb.)

### Operating environment

	<b>Model G27</b>
Air temperature	10° - 35° C (50.0° - 95.0° F)
[at maximum altitude of 2134 m (7000 ft.)]	
Humidity	8% - 80%

### Nonoperating (power-off) environment

	<b>Model G27</b>
Air temperature	-40° - 60° C (-40.0° - 140° F)
(at maximum altitude of 2134 m [7000 ft.]	
Humidity	8% - 80%

### Heat output

	<b>Model G27</b>
Minimum configuration	341 BTU (100 W)
Maximum configuration	2600 BTU (760 W)

### Power requirements

	<b>Model G27</b>
Voltage low range	90 - 137 Vac, 47- 53Hz
Voltage high range	180 - 265 Vac, 57 - 63 Hz
Power consumption	0.1 - 0.8 kVA

---

## Supported software applications

For a list of the preloaded and optional software applications that are supported by the NAS 300G, refer to the *IBM TotalStorage NAS Gateway 300 User's Reference*.

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## Operator information panel

The operator information panel on the front of the appliance contains status LEDs.

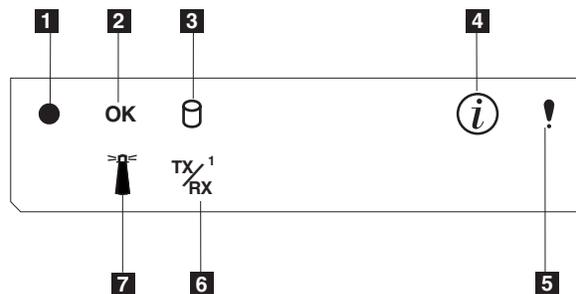


Figure 1. Operator information panel

- 1** **Power-on LED:** This green LED is on when system power is present in the appliance. When this LED flashes, the appliance is in standby mode (the system power supply is turned off and ac power is present). If this LED is not on, the power cord is not connected, the power supply has failed, or this LED has failed.
- 2** **POST complete (OK) LED:** This green LED is on when when POST completes without any errors.
- 3** **Hard disk drive activity LED:** This green LED is on when there is activity on the internal hard disk drive.
- 4** **Information LED:** This amber LED is on when the information log contains information about certain conditions in your appliance that might affect performance. For example, the LED is on if your appliance does not have functioning redundant power. An LED on the diagnostic panel on the system board will also be on.
- 5** **System error LED:** This amber LED is on when a system error occurs. An LED on the diagnostic panel on the system board will also be on to further isolate the error.
- 6** **Ethernet transmit/receive activity (TX/RX<sup>1</sup>) LED:** This green LED is on when there is transmit or receive activity to or from the appliance on the integrated Ethernet port.
- 7** **System locator LED:** This blue LED can be turned on remotely to identify a specific engine.

---

## Connecting the two engines

Once the two engines of the NAS 300G are installed in the rack, connect their integrated Ethernet ports with the 10-ft. Ethernet cross-over cable supplied as shown in Figure 2.

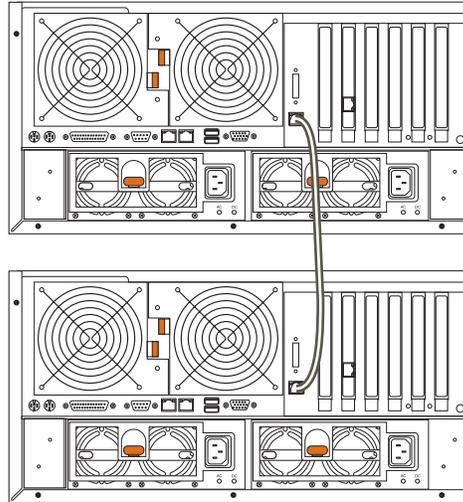


Figure 2. Connecting the two engines of the NAS 300G

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## RAID-1 mirroring

The appliance hardware has a RAID-1 mirroring option using the onboard SCSI adapter. The System and Maintenance partitions are mirrored using two 36-GB hard drives to provide increased reliability and failover capability. This feature provides physical mirroring of the boot volume through firmware, thus providing extra reliability for the system's boot volume without burdening the host CPU. The RAID-1 mirroring must be enabled on both engines of the appliance.

To enable RAID-1 mirroring:

1. Power OFF the appliance (see "Shutting down and powering on the NAS Gateway 300" on page 9).
2. Attach a monitor, keyboard, and mouse to the first engine.
3. Ensure that there are two hard disk drives in the engine (see "Installing a hard disk drive" on page 101).
4. Power ON the appliance.
5. When the LSI Logic BIOS starts and displays *Press CTRL-C to start LSI Logic Configuration Utility*, press **CTRL** and **C**.
6. Press **Enter** to select channel 1.
7. Select *Mirroring Properties* and press **Enter**.
8. Press the space bar to change *No* to *Primary* in the column labeled *Mirrored Pair*.
9. Press **Esc**.
10. Select *Save changes then exit this menu* and press **Enter**. The drives will begin to synchronize.
11. Press **Esc**.
12. Select *Exit the Configuration Utility* and press **Enter**.
13. The engine will reboot automatically.
14. Repeat this process for the other engine.

---

## Chapter 3. Troubleshooting

This chapter provides basic troubleshooting information to help you resolve some common problems that might occur with your appliance. Use Table 3 as an index to this information.

Table 3. Troubleshooting index

Topic	Located on page
Powering on and shutting down procedures	9
Overview of LEDs, POST, and diagnostic programs	10
Troubleshooting the Ethernet Controller	16
Troubleshooting adapters	18
Power checkout	27
Temperature checkout	27
Recovering BIOS	28

---

### Shutting down and powering on the NAS Gateway 300

The clustering function requires special considerations when you need to shut down and power on the NAS Gateway 300. This section gives the details for those considerations.

#### Shutting down the NAS Gateway 300 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 shut them down.
2. On the node that 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 that 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 failover to that node and return to the online state.
5. When 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. You can power off any network hubs or switches that are used exclusively by the NAS Gateway 300. If they are used by other network attached devices, do not power these off.
7. You can also power off any uninterruptible power supplies (UPS) that regulate power for the NAS Gateway 300, provided that no other equipment that you want to keep powered on is plugged into the same UPS.

## Powering on the NAS Gateway 300 when clustering is active

1. Power on any UPS that you powered off in the powering off procedure, and allow it to return to normal operation.
2. Power on any network hubs or switches that you powered off in the powering off procedure.
3. Power on the node that you shut down **last** in the powering off procedure.
4. After 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.
5. 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.

---

## Diagnostic tools overview

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

- **Light-path diagnostics**

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 “Identifying problems using LEDs” on page 11 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” on page 14 for more information.

**Note:** You must connect a keyboard, mouse, and monitor to your appliance in order to see error messages. If the engine does not recognize the monitor, keyboard, and mouse, reboot the engine while they are connected. If a Remote Supervisor Adapter is used for system management, the logs can be accessed remotely.

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

The POST generates beep codes and messages to indicate successful test completion or the detection of a problem. See “POST” on page 12 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. There are three sources of LED information:

- Operator information panel
- Power supply
- Diagnostics panel

### Operator information panel

The System Error LED on the operator information panel on the front of the appliance is on when certain system errors occur. Refer to “Operator information panel” on page 6 for more information on the operator information panel.

### Power-supply LEDs

The AC Power LED and DC Power LED on the power supply provide status information about the power supply. Figure 3 shows the location of the power-supply LEDs.

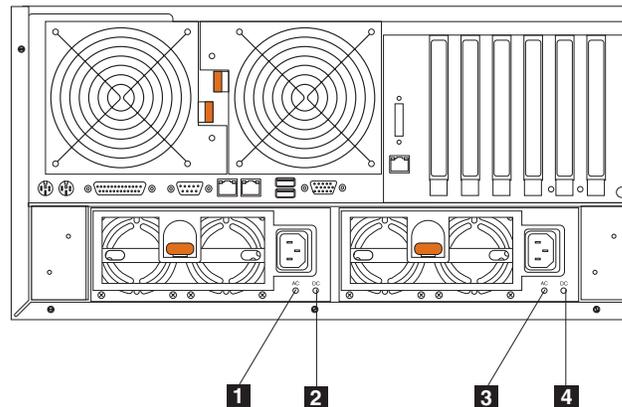


Figure 3. Location of the power-supply LEDs

- |          |                                     |
|----------|-------------------------------------|
| <b>1</b> | Power supply 1 AC power LED (green) |
| <b>2</b> | Power supply 1 DC power LED (green) |
| <b>3</b> | Power supply 2 AC power LED (green) |
| <b>4</b> | Power supply 2 DC power LED (green) |

See “Power-supply LED errors” on page 51 for error messages.

### Diagnostics panel LEDs

You can use the light-path diagnostics to quickly identify the type of system error that occurred. The diagnostics panel is under the cover. You can also view the diagnostics panel through the cover by partially sliding the engine out of the rack. Each engine is designed so that any LEDs that are on, remain on when the engine shuts down if the ac power source is good and the power supplies can supply +5 V dc current to the engine. This feature helps isolate the problem if an error causes the engine to shut down.

Figure 4 on page 12 shows the LEDs on the diagnostics panel.

**Note:** You might have to remove the cover to view these LEDs. (For more information on removing the cover, see “Removing the cover” on page 78). See Table 28 on page 70 for more information on the LEDs.

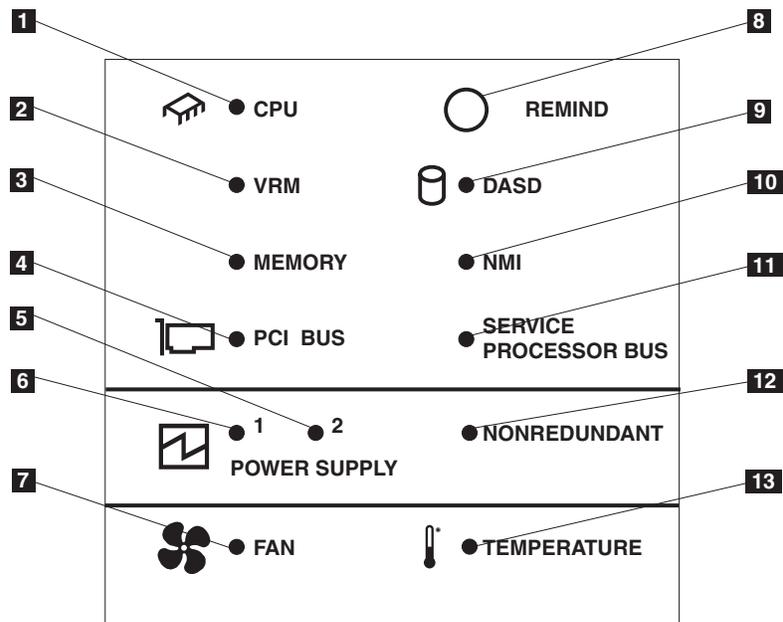


Figure 4. LED diagnostics panel

- |           |                           |
|-----------|---------------------------|
| <b>1</b>  | CPU LED                   |
| <b>2</b>  | VRM LED                   |
| <b>3</b>  | Memory LED                |
| <b>4</b>  | PCI Bus LED               |
| <b>5</b>  | Power supply 1 LED        |
| <b>6</b>  | Power supply 2 LED        |
| <b>7</b>  | Fan LED                   |
| <b>8</b>  | Remind button             |
| <b>9</b>  | DASD LED                  |
| <b>10</b> | NMI LED                   |
| <b>11</b> | Service Processor Bus LED |
| <b>12</b> | Nonredundant LED          |
| <b>13</b> | Temperature LED           |

## 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 (POST).

One beep after the POST completes successfully indicates that the NAS 300G is operating correctly.

If the POST detects a problem, a series of beeps sound. See “Beep symptoms” on page 29 and “Error messages” on page 13 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.

**Error messages**

**Note:** You must connect a keyboard, mouse, and monitor to your appliance in order to see error messages. If the engine does not recognize the monitor, keyboard, and mouse, reboot the engine while they are connected. If a Remote Supervisor Adapter is used for system management, the logs can be accessed remotely.

The table, “POST error codes” on page 45, 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 Remote Supervisor Adapter. In the event of a POST error, check the System Event/Error Log, as it will contain the most recent errors. This log often provides an indicator as to the nature of key failures.

To view the contents of the error logs, start the Configuration/Setup Utility program (see “Starting the Configuration/Setup Utility program” on page 135); then select **Event/Error Logs** from the main menu (see page 139).

**SCSI messages**

If you receive a SCSI error message while using the SCSISelect Utility, use the following list to determine the cause of the error and the action to take.

One or more of the following conditions might be causing the problem:

- A failing SCSI adapter or drive
- An incorrect SCSI configuration
- Duplicate SCSI IDs in the same SCSI chain
- An incorrectly installed SCSI terminator
- A defective SCSI terminator
- An incorrectly installed cable
- A defective cable

Verify that:

- The external SCSI devices are powered on. External devices must be powered on before powering on the NAS 300G.
- The cables or all external SCSI devices are connected correctly.
- The last device in each SCSI chain is terminated correctly.
- The SCSI devices are configured correctly.

You will receive these messages only when running the SCSISelect Utility. See “Using the SCSISelect utility program” on page 141.

## Diagnostic programs

The engine diagnostic programs are stored in upgradable read-only memory (ROM) on the system board, on CD-ROMs, and in the software. These programs are the primary method of testing the major components of your engine. Diagnostic error messages indicate that a problem exists; they are not intended to be used to identify a failing part.

The error messages and codes are listed in “Diagnostic error codes” on page 34.

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.

Error codes appear in the detailed test log and summary log when running the diagnostic programs.

### Format of an error code

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.

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 have one of these values:

#### Passed

The diagnostic test completed without any errors.

**Failed** The diagnostic test discovered an error.

#### User aborted

You stopped the diagnostic test before it was complete.

#### Not applicable

You specified a diagnostic test for a device that is not present.

**Aborted**

The test could not proceed because of the system configuration.

**Warning**

A possible problem was reported during the diagnostic test, such as a tested device was not installed.

**Test specific string**

Additional information that you can use to analyze the problem.

**Starting the diagnostic programs**

To start the diagnostic programs:

**Note:** You must connect a keyboard, mouse, and monitor to your appliance in order to see error messages. If the engine does not recognize the monitor, keyboard, and mouse, reboot the engine while they are connected (see “Shutting down and powering on the NAS Gateway 300” on page 9). If a Remote Supervisor Adapter is used for system management, the logs can be accessed remotely.

1. Ensure you have connected a monitor, keyboard, and mouse to each engine. When you have a monitor, keyboard, and mouse attached and POST completes successfully, one beep sounds. If the engine fails POST, a series of beeps sound (see “Beep symptoms” on page 29 for more details) and an error message appears on the monitor screen.

**Note:** You might receive a configuration change informational message about a newly-discovered mouse. Accept the message and continue.

2. Power on the engine and watch the screen.
3. When the message F2 for Diagnostics appears, press **F2**.
4. Type in the appropriate password; then, press **Enter**.

**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, rather than 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 from 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 run the diagnostic programs again.
- c. If you run the diagnostic programs with no 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. To view engine configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on), select **Hardware Info** from the top of the screen.
- e. You cannot use the Base System Diagnostics program to test adapters; use the procedure outlined in “Running adapter diagnostics” on page 25.

When the tests have completed, 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 *IBM TotalStorage NAS Gateway 300 User's Reference* included on the Documentation CD.

### Viewing the test log

The test log will contain no information until the diagnostic tests have completed.

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

To view the test log:

1. Ensure that a monitor, keyboard, and mouse are 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.

You can also view the test log using the Remote Supervisor Adapter interface. See the *IBM Remote Supervisor Adapter User's Guide* provided on the Documentation CD.

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## Troubleshooting the Ethernet Controller

This section provides troubleshooting information for problems that might occur with the Ethernet Controller.

### Network connection problems

If the Ethernet Controller cannot connect to the network:

- Ensure that the engine is correctly connected to the Ethernet with a verified cable that has been 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 or better 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.

- If you are connecting through an Ethernet hub or repeater, make sure that the signal LEDs are operational while the device is on and connected to the LAN.
- Determine whether the hub supports auto-negotiation. If not, configure the integrated Ethernet Controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet Controller LEDs on the operator information panel.
  - These LEDs indicate whether a problem exists with the connector, cable, or hub.
    - The Ethernet Link Status LED is on when the built-in Ethernet Controller receives a LINK pulse from the hub. If the LED is off, there might be a bad connector or cable, or a problem with the hub.
    - The Ethernet Transmit/Receive Activity LED is on when the built-in Ethernet Controller sends or receives data over the Ethernet network. If the Ethernet Transmit/Receive Activity LED 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 causes for the problem that are specific to the operating system.
- Make sure that the device drivers on the client and engine are using the same protocol.
- Test the Ethernet Controller by running the engine diagnostic programs, as described in “Diagnostic programs” on page 14.

## Gigabit Ethernet Controller troubleshooting chart

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

Table 4. Ethernet controller troubleshooting chart

Ethernet Controller problem	Suggested action
Ethernet-link status light is not on.	<ul style="list-style-type: none"> <li>• Ensure that the engine is powered on.</li> <li>• Check all connections at the Ethernet Controller.</li> <li>• Check the cable. A crossover cable is required.</li> <li>• If you manually configured the duplex mode, ensure that you also manually configured the speed.</li> <li>• Run Base System Diagnostics on the LEDs.</li> </ul> <p>If the problem remains, go to “Starting the diagnostic programs” on page 15 to run all of the diagnostic programs.</p>
The Ethernet transmit/receive activity light is not on.	<p><b>Note:</b> 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"> <li>• Ensure that you have loaded the network device drivers.</li> <li>• The network might be idle. Attempt to send data from this workstation.</li> <li>• Run Base System Diagnostics on the LEDs.</li> <li>• 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.</li> </ul>
Data is incorrect or sporadic.	<ul style="list-style-type: none"> <li>• Ensure that you are using Category 5 cabling when operating the engine at 100 and 1000 Mbps.</li> <li>• Make sure that the cables do not run close to noise-inducing sources, such as fluorescent lights.</li> </ul>

Table 4. Ethernet controller troubleshooting chart (continued)

Ethernet Controller problem	Suggested action
The Ethernet Controller stopped working when another adapter was added to the engine.	<ul style="list-style-type: none"> <li>• Ensure that the cable is connected to the Ethernet Controller.</li> <li>• Ensure that your PCI system BIOS is current.</li> <li>• Reseat the adapter.</li> <li>• Ensure that the adapter you are testing is supported by the engine.</li> </ul> <p>If the problem remains, go to “Starting the diagnostic programs” on page 15 to run the diagnostic programs.</p>
The Ethernet Controller stopped working without apparent cause.	<ul style="list-style-type: none"> <li>• Run Base System Diagnostics for the Ethernet Controller.</li> <li>• Use a different connector.</li> <li>• Reinstall the device drivers. Refer to your operating-system documentation and to the <i>IBM TotalStorage NAS Gateway 300 User's Reference</i> for more information.</li> </ul> <p>If the problem remains, go to “Starting the diagnostic programs” on page 15 to run the diagnostic programs.</p>

## Troubleshooting adapters

This section explains how to troubleshoot adapters.

### Ethernet adapters

Refer to these sections when troubleshooting your Ethernet adapters.

#### IBM Gigabit Ethernet SX Server Adapter troubleshooting chart

Use the troubleshooting chart in Table 5 to find solutions to the IBM Gigabit Ethernet SX Server Adapter problems that have definite symptoms.

Table 5. IBM Gigabit Ethernet SX Server Adapter troubleshooting chart

IBM Gigabit Ethernet SX Server Adapter problem	Suggested action
No Link or TX/RX activity.	<p>If you cannot link to your switch:</p> <ol style="list-style-type: none"> <li>1. Check the following LED lights on the adapter: <ul style="list-style-type: none"> <li><b>TX — On</b> The adapter is sending data.</li> <li><b>RX — On</b> The adapter is receiving data.</li> <li><b>Link — On</b> The adapter is connected to a valid link partner and is receiving link pulses.</li> <li><b>Link — Off</b> Link is inoperative. <ul style="list-style-type: none"> <li>• Check all connections at the adapter and link partner.</li> <li>• Make sure that the link partner is set to 1000 Mbps and full-duplex.</li> <li>• Ensure that the required drivers are loaded.</li> </ul> </li> <li><b>PRO — Programmable LED</b> Identifies the adapter by blinking. Use the Identify Adapter push-button in Intel PROSet II to control blinking.</li> </ul> </li> <li>2. 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.</li> </ol>

Table 5. IBM Gigabit Ethernet SX Server Adapter troubleshooting chart (continued)

<b>IBM Gigabit Ethernet SX Server Adapter problem</b>	<b>Suggested action</b>
The engine cannot find the IBM Gigabit Ethernet SX Server Adapter.	<ol style="list-style-type: none"> <li>1. Verify that the adapter is seated firmly in the slot.</li> <li>2. Try a different IBM Gigabit Ethernet SX Server Adapter.</li> <li>3. Try a different slot.</li> </ol>
Diagnostics pass but the connection fails.	Ensure that the network cable is securely attached.
Another adapter stopped operating correctly after you installed the IBM Gigabit Ethernet SX Server Adapter.	<ol style="list-style-type: none"> <li>1. Verify that the cable is connected to the IBM Gigabit Ethernet SX Server Adapter and not to another adapter.</li> <li>2. Check for a resource conflict.</li> <li>3. Ensure that both adapters are seated firmly in the slot.</li> <li>4. Check all cables.</li> </ol>
The adapter stopped working without apparent cause.	<ol style="list-style-type: none"> <li>1. Reseat the adapter.</li> <li>2. The network driver files might be damaged or deleted. Reinstall the drivers.</li> <li>3. Use a different IBM Gigabit Ethernet SX Server Adapter.</li> </ol>
LINK LED is not on.	<ol style="list-style-type: none"> <li>1. Ensure that you have loaded the adapter driver.</li> <li>2. Check all connections at the adapter and the buffered repeater or switch.</li> <li>3. Use another port on the buffered repeater or switch.</li> <li>4. Ensure that the buffered repeater or switch port is configured for 1000 Mbps and full-duplex.</li> <li>5. Change the auto-negotiation setting on the link partner, if possible.</li> </ol>
RX or TX LED is not on.	<ol style="list-style-type: none"> <li>1. Ensure that you have loaded the adapter driver.</li> <li>2. The network might be idle; log in from a workstation.</li> <li>3. The adapter is not transmitting or receiving data; use another adapter.</li> </ol>

### **PRO/1000 XT Server Adapter by Intel troubleshooting chart**

Use the troubleshooting chart in Table 6 to find solutions to the PRO/1000 XT Server Adapter by Intel problems that have definite symptoms.

Table 6. PRO/1000 XT Server Adapter by Intel troubleshooting chart

<b>PRO/1000 XT Server Adapter by Intel problem</b>	<b>Suggested action</b>
The engine cannot find the PRO/1000 XT Server adapter.	<ol style="list-style-type: none"> <li>1. Verify that the adapter is seated firmly in the slot.</li> <li>2. Reboot the engine.</li> <li>3. Try a different PRO/1000 XT Server Adapter by Intel.</li> </ol>
Diagnostics pass but the connection fails.	<ol style="list-style-type: none"> <li>1. Verify that the responding link is operating correctly.</li> <li>2. Ensure that the network cable is securely attached.</li> <li>3. Try a different cable.</li> </ol>

Table 6. PRO/1000 XT Server Adapter by Intel troubleshooting chart (continued)

PRO/1000 XT Server Adapter by Intel problem	Suggested action
Another adapter stopped operating correctly after you installed the PRO/1000 XT Server Adapter by Intel.	<ol style="list-style-type: none"> <li>1. Verify that the cable is securely connected to the PRO/1000 XT Server Adapter by Intel and not to another adapter.</li> <li>2. Check for a resource conflict as indicated by problem icons in Device Manager. To access Device Manager:               <ol style="list-style-type: none"> <li>a. Right-click on My Computer, and and select <i>Manage</i>.</li> <li>b. Select <i>Device Manager</i>.</li> </ol> </li> <li>3. Reload all PCI device drivers.</li> <li>4. Ensure that both adapters are seated firmly in the slot.</li> <li>5. Check all cables.</li> </ol>
PRO/1000 XT Server Adapter by Intel is unable to connect at 1000 Mbps, instead it connects at 100 Mbps.	<ol style="list-style-type: none"> <li>1. Ensure that the cable is the correct type (Cat 5).</li> <li>2. Try another cable.</li> </ol>
The adapter stopped working without apparent cause.	<ol style="list-style-type: none"> <li>1. Reseat the adapter.</li> <li>2. The network driver files might be damaged or deleted. Reinstall the drivers using Device Manager. To access Device Manager:               <ol style="list-style-type: none"> <li>a. Right-click on My Computer, and and select <i>Manage</i>.</li> <li>b. Select <i>Device Manager</i>.</li> <li>c. Select <i>Update Drivers</i>.</li> <li>d. Reload the appropriate driver found in c:\drivers.</li> </ol> </li> <li>3. Reboot the engine.</li> <li>4. Try a different cable.</li> <li>5. Use a different PRO/1000 XT Server Adapter by Intel.</li> </ol>
LINK LED is off.	<ol style="list-style-type: none"> <li>1. Ensure that you have loaded the adapter driver.</li> <li>2. Check all connections at the adapter and the buffered repeater or switch.</li> <li>3. Use another port on the buffered repeater or switch.</li> <li>4. Ensure that the cable is securely attached.</li> <li>5. Change the auto-negotiation setting on the link partner, if possible.</li> </ol>
The link light is on, but communications are not correctly established.	<ol style="list-style-type: none"> <li>1. Ensure that the latest drivers are loaded.</li> <li>2. Ensure that the adapter and its link partner are set to either auto-negotiate or set to the same speed and duplex settings.</li> </ol>
The ACT light is off.	<ol style="list-style-type: none"> <li>1. Ensure that the drivers are loaded.</li> <li>2. Try accessing a server.</li> <li>3. Try another PRO/1000 XT Server Adapter by Intel.</li> <li>4. Ensure that the cable is securely attached.</li> </ol>
Windows message: Unable to remove PROSet in SAFE mode.	<p>If the engine hangs after configuring the adapters with the PROSet utility, perform the following steps:</p> <ol style="list-style-type: none"> <li>1. Start Windows in Safe mode.</li> <li>2. Access the Device Manager and disable the network adapters and teams.</li> <li>3. Restart the engine.</li> <li>4. Windows should operate normally if the disabled adapters were causing the problem.</li> </ol>

Table 6. PRO/1000 XT Server Adapter by Intel troubleshooting chart (continued)

PRO/1000 XT Server Adapter by Intel problem	Suggested action
LED indicators	<ul style="list-style-type: none"> <li>• ACT/LNK               <ul style="list-style-type: none"> <li><b>Green on</b> The adapter is connected to a valid link partner.</li> <li><b>Green flashing</b> Data activity is detected.</li> <li><b>Off</b>     No link is detected.</li> <li><b>Yellow flashing</b> There is an identity problem. Use the Identify Adapter button in Intel PROSet II to control the blinking. See the PROSet online help for more information.</li> </ul> </li> <li>• The color identifies the adapter data rate: 10=OFF 100=GREEN 1000=YLW               <ul style="list-style-type: none"> <li><b>Off</b>     The adapter is operating at a 10-Mbps data rate.</li> <li><b>Green on</b> The adapter is operating at a 100-Mbps data rate.</li> <li><b>Yellow on</b> The adapter is operating at a 1000-Mbps data rate</li> </ul> </li> </ul>

### Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter troubleshooting chart

Use the troubleshooting chart in Table 7 to find solutions to the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter problems that have definite symptoms.

Table 7. Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter troubleshooting chart

Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter problem	Suggested action
Error message: "Setup cannot find OEMSETUP.INF or OEMSETNT.INF"	<ul style="list-style-type: none"> <li>• Make sure that you are installing from the Adapters tab of the Network Control Panel Applet.</li> <li>• Make sure that you are specifying the correct drive letter for your CD-ROM drive.</li> </ul>
Error message: "No SLIC adapters found"	Make sure that the adapter has been correctly installed in the PCI slot and that the PCI slot is enabled.
Event log reports "SLIC <x> Has determined that the adapter is not functioning properly"	<ul style="list-style-type: none"> <li>• Run the diagnostics Network Control Panel Applet.</li> <li>• Replace the adapter.</li> </ul>
Event log reports "SLIC <x>: Could not find an adapter"	<ul style="list-style-type: none"> <li>• Ensure that the card was not moved from its original slot.</li> <li>• Uninstall the adapter from the adapters tab of the Network Control Panel Applet, reboot, and then reinstall.</li> </ul>

Table 7. Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter troubleshooting chart (continued)

Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter problem	Suggested action
Event log reports “The Alacritech 100 or 1000 Series Server Adapter service failed to start due to the following error: The system cannot find the file specified.”	Update the drivers with the drivers found at: <a href="http://www.ibm.com/storage/support">www.ibm.com/storage/support</a>
There is no connectivity with other computers on the network.  Pinging does not work.	<ul style="list-style-type: none"> <li>• Make sure that the cables are attached securely at both RJ-45 connections (adapter and switch) and that the network cable is functional.</li> <li>• Check the LEDs on the adapter. These LEDs help indicate if there are problems with the adapter, switch, or cable.</li> </ul>
TCP connections can be established to other systems on the same subnet, but connections cannot be established to systems on the other side of a router.	<p>If you have a Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter and an adapter from another manufacturer installed on your system, <b>and</b> your network is configured such that the route from your system to the remote system is different than the route from the remote system back to your system (a routing loop), then it might not be possible to establish a TCP connection. To solve this problem, perform one of the following solutions:</p> <ul style="list-style-type: none"> <li>• Replace the existing adapter with an Alacritech 100 or 1000 Series Server Adapter, or</li> <li>• Reconfigure the network to eliminate the routing loop, or</li> <li>• Disable TCP/IP Offload on the interfaces associated with the routing loop by completing this procedure:  <b>Note:</b> Disabling SLI TCP/IP Offload will disable the performance benefits of the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter on that interface. Complete these steps only when required. <ol style="list-style-type: none"> <li>1. From the start menu, open the Network &amp; Dial-up Connections folder located in the <i>Settings</i> menu.</li> <li>2. Double-click the LAN connection of the interface you wish to disable TCP Offload.</li> <li>3. Click the Properties button. Deselect the box labeled <i>Alacritech TCP Fast-path driver</i>. Click <b>OK</b>.</li> <li>4. Restart the engine.</li> </ol> </li> </ul>
IPSEC does not function through the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter interface.	<p>In order to use IPSEC with the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter, disable SLIC TCP/IP Offload on the interface through which you want to establish the IPSEC connection. To disable the SLIC TCP/IP Offload, complete these steps:</p> <ol style="list-style-type: none"> <li>1. From the start menu, open the Network &amp; Dial-up Connections folder located in the <i>Settings</i> menu.</li> <li>2. Double-click the LAN connection of the interface you wish to disable TCP Offload.</li> <li>3. Click the Properties button. Deselect the box labeled <i>Alacritech TCP Fast-path driver</i>. Click <b>OK</b>.</li> <li>4. Restart the engine.</li> </ol>

Table 7. Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter troubleshooting chart (continued)

Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter problem	Suggested action
QOS does not work through the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter interface	<p>In order to use QOS with the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter, disable SLIC TCP/IP Offload on the interface through which you want to establish the QOS connection. To disable the SLIC TCP/IP Offload, complete these steps:</p> <ol style="list-style-type: none"> <li>1. From the start menu, open the Network &amp; Dial-up Connections folder located in the <i>Settings</i> menu.</li> <li>2. Double-click the LAN connection of the interface you wish to disable TCP Offload.</li> <li>3. Click the Properties button. Deselect the box labeled <i>Alacritech TCP Fast-path driver</i>. Click <b>OK</b>.</li> <li>4. Restart the engine.</li> </ol>
Network monitoring does not function through the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter.	<p>Network monitoring applications require packet access to the network, and are incompatible with the session layer interface provided by the SLIC TCP/IP Offload. In order to use network monitoring with the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter, disable SLIC TCP/IP Offload on the interface through which you want to use network monitoring. To disable the SLIC TCP/IP Offload, complete these steps:</p> <ol style="list-style-type: none"> <li>1. From the start menu, open the Network &amp; Dial-up Connections folder located in the <i>Settings</i> menu.</li> <li>2. Double-click the LAN connection of the interface you wish to disable TCP Offload.</li> <li>3. Click the Properties button. Deselect the box labeled <i>Alacritech TCP Fast-path driver</i>. Click <b>OK</b>.</li> <li>4. Restart the engine.</li> </ol>
Firewall software does not work through the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter interface.	<p>Firewall applications require packet access to the network, and are incompatible with the session layer interface provided by the SLIC TCP/IP Offload. In order to use network monitoring with the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter, disable SLIC TCP/IP Offload on the interface through which you want to use for a firewall. To disable the SLIC TCP/IP Offload, complete these steps:</p> <ol style="list-style-type: none"> <li>1. From the start menu, open the Network &amp; Dial-up Connections folder located in the <i>Settings</i> menu.</li> <li>2. Double-click the LAN connection of the interface you wish to disable TCP Offload.</li> <li>3. Click the Properties button. Deselect the box labeled <i>Alacritech TCP Fast-path driver</i>. Click <b>OK</b>.</li> <li>4. Restart the engine.</li> </ol>
Microsoft Network Load Balancing does not work through the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter interface.	<p>In order to use Microsoft Network Load Balancing with the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter, disable SLIC TCP/IP Offload on the interfaces which you want to use for Microsoft Network Load Balancing. To disable the SLIC TCP/IP Offload, complete these steps:</p> <ol style="list-style-type: none"> <li>1. From the start menu, open the Network &amp; Dial-up Connections folder located in the <i>Settings</i> menu.</li> <li>2. Double-click the LAN connection of the interface you wish to disable TCP Offload.</li> <li>3. Click the Properties button. Deselect the box labeled <i>Alacritech TCP Fast-path driver</i>. Click <b>OK</b>.</li> <li>4. Restart the engine.</li> </ol>

Table 7. Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter troubleshooting chart (continued)

Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter problem	Suggested action
Point-to-Point Tunneling Protocol (PPTP) does not work through the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter interface.	<p>PPTP connections cannot be established through a SLIC TCP/IP Offload-enabled interface. In order to use PPTP with the Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter, disable SLIC TCP/IP Offload on the interfaces through which you want to establish a PPTP connection. To disable the SLIC TCP/IP Offload, complete these steps:</p> <ol style="list-style-type: none"> <li>1. From the start menu, open the Network &amp; Dial-up Connections folder located in the <i>Settings</i> menu.</li> <li>2. Double-click the LAN connection of the interface you wish to disable TCP Offload.</li> <li>3. Click the Properties button. Deselect the box labeled <i>Alacritech TCP Fast-path driver</i>. Click <b>OK</b>.</li> <li>4. Restart the engine.</li> </ol>
<p>When uninstalling the Alacritech TCP Fast-path driver, an error message appears with the message:</p> <p>“Could not uninstall the Alacritech TCP Fast-path driver component. The error is 0x800F020B”</p>	No corrective action is necessary.

### Alacritech 100x4 Quad-Port Server Accelerated Adapter

Table 8 displays the LED definitions for the Alacritech 100x4 Quad-Port Server Accelerated Adapter LED definitions.

Table 8. Alacritech 100x4 Quad-Port Server Accelerated Adapter LED definitions

LED	Indication	Meaning
LNK	Off	Either the adapter or the switch (or both) are not receiving power, or the cable connection between them is faulty.
	Green	The adapter and switch are receiving power. The cable connection between them is good. A 100 Mbps link has been established.
	Amber	The adapter and switch are receiving power. The cable connection between them is good. A 10 Mbps link has been established.
ACT	Off	The adapter is not sending or receiving network data.
	Flashing amber	The adapter is sending or receiving network data.

## Running adapter diagnostics

This section describes how to test the adapter using the diagnostics.

**Note:** Running the adapter diagnostics will disrupt the network connection.

### Ethernet adapters

This section explains how to test Ethernet adapters.

#### **IBM Gigabit Ethernet SX Server Adapter, PRO/1000 XT Server Adapter by**

**Intel:** The NAS 300G is equipped with the Intel® PROSet II utility for:

- Monitoring the status of the Ethernet adapter PCI cards
- Testing the Ethernet adapter to see if there are any problems with the adapter hardware, the cabling, or the network connection
- Isolating problems during troubleshooting

To access the PROSet utility, you must first go into Terminal Services. For instructions on how to invoke Terminal Services, refer to “Terminal Services and the IBM NAS Administration Console” in the *IBM TotalStorage NAS Gateway 300 User’s Reference*. Within Terminal Services perform the following steps:

1. Double-click the **Intel PROSet II** icon in the Control Panel to start the Intel PROSet II utility.
2. In the Intel PROSet II utility, select the Ethernet adapter you want to test (IBM Gigabit Ethernet SX Server Adapter or PRO/1000 XT Server Adapter by Intel).
3. Select the **Diagnostics** tab. A list of available tests is displayed.
4. Select **Run Tests**.  
You can also select or clear individual tests with the check boxes. If an error is detected, information about the error is displayed.
5. Repeat steps 2 through 4 for each Ethernet adapter installed in the engine.

#### **Alacritech 100x4 Quad-Port Server Accelerated Adapter and Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter:**

Note that running these diagnostic tests will disrupt all ports of the adapter.

Use the following procedure to run diagnostic tests on this adapter:

1. Open the Control Panel.
2. In the Network dialog box, select the *Adapters* tab.
3. Select one of the Alacritech 100x4 Quad-Port Server Accelerated Adapter or Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter ports.
4. Click **Properties**.
5. Select the *Diagnostics* tab.
6. Click **Run**. The adapter will complete the self-test of the IPP and the selected port of the adapter.
7. Close the Network Control Panel by clicking **OK**.

## Fibre Channel adapter (Fibre Channel)

**Note:** The Fibre Channel adapter diagnostics utility that was used in earlier versions was FAStT Check.

Each engine has FAStT MSJ for viewing the status of your Fibre Channel connection as well as testing the adapter. To use FAStT MSJ utility, you must first go into Terminal Services. For instructions on how to invoke Terminal Services, refer to “Terminal Services and the IBM NAS Administration Console” in the *IBM TotalStorage NAS Gateway 300 User's Reference*.

Access FAStT MSJ by going into the IBM NAS administrator console and selecting **NAS Management > Storage > NAS Utilities > FAStT MSJ**. Then select **Connect**. A diagnostic panel displays the following general information related to your Fibre Channel adapter, which can be useful if you need to place a support call:

- Node name (the worldwide name or MAC address of the Fiber Channel adapter)
- Loop ID
- BIOS version
- Firmware version number
- Device-driver version number
- PCI slot number

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

To test the Fibre Channel adapter, select the adapter and then select **Diagnostic**.

### Remote Supervisor Adapter

1. Insert the Remote Supervisor Adapter Support 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.

After the engine boots, the main menu displays.

2. Use the Up and Down arrow keys to select **Hardware Status and Information** and press **Enter**. The Hardware Status and Information menu reports on the Advanced System Management devices in the NAS 300G in the following manner:

```
System Management Processor Communication : Passed
-> Built in Self Test Status ..... : Passed
Boot Sector Code Revision ... :16, Build ID: CNET15A
Main Application Code Revision :16, Build ID: TUET15A
```

---

## Testing the connection between two engines

Verify that the LINK OK lights for both engines are on. The LINK OK light is on the operator information panel.

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## 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. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the system and disconnect the ac cords.
2. Check for loose cables in the power subsystem. Also check for short circuits; for example, a loose screw could cause 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 56).
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 the minimal configuration, replace FRUs of the minimal configuration one at a time until the problem is isolated.

For specific power problems, see “Power error messages” on page 51.

---

## Temperature checkout

Cooling of the engine is important for correct 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 in.) of ventilated space at the sides of the engine and 100 mm (4 in.) 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 10 minutes while the engine is operating.
- A removed hot-swap drive is replaced within 2 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. See “Products and features” on page 3.

For more information on specific temperature error messages, see “Temperature error messages” on page 54.

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## 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 Web site at [www.storage.ibm.com/support/nas](http://www.storage.ibm.com/support/nas).
- Contact your IBM service representative.

The flash memory of the NAS 300G contains a protected area that cannot be overwritten. The recovery boot block is a section of code in this protected area that enables the NAS 300G to start up and to read a flash diskette. The flash utility recovers the system BIOS from the BIOS recovery files on the diskette.

To recover the BIOS:

1. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the NAS 300G and peripheral devices. Disconnect all external cables and power cords. Remove the cover.
2. Locate the boot-block jumper block (J28) on the system board.
3. Place a jumper on pins 2 and 3 to enable BIOS backup page.
4. Insert the BIOS flash diskette into the diskette drive.
5. Reconnect all external cables and power cords.
6. Restart the NAS 300G.
7. After the NAS 300G completes the POST, select **1 -- Update POST/BIOS** from the menu that contains various flash (update) options.
8. When you are asked if you would like to move the current POST/BIOS image to the backup ROM location, type **N**.  
**Attention:** Typing **Y** will copy the corrupted BIOS into the secondary page.
9. When you are asked if you would like to save the current code on a diskette, select **N**.
10. You will be asked to select the language that you want to use. Select your language (**0 - 7**) and press **Enter** to accept your choice. You will be prompted to remove the diskette and press **Enter** to restart the system. Remove the flash diskette from the diskette drive.
11. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the NAS 300G.
12. Remove the jumper on the boot-block jumper block, or move it to pins 1 and 2 to return to normal startup mode.
13. Restart the NAS 300G. The NAS 300G should start up normally.

---

## Chapter 4. Symptom-to-part index

The Symptom-to-part index lists symptoms, errors, and the possible causes. The most likely cause is listed first. Use this Symptom-to-part index to help you decide which field-replaceable units (FRUs) to have available when servicing your engine.

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

**Note:** You must connect a keyboard, mouse, and monitor to your appliance in order to see error messages. If the engine does not recognize the monitor, keyboard, and mouse, reboot the engine while they are connected. If a Remote Supervisor Adapter is used for system management, the logs can be accessed remotely.

Use Table 9 to locate a type of symptom.

*Table 9. Error symptoms index*

Symptom	Located on page
Beep	29
No beep	32
Diagnostic error codes	34
Error	39
POST error codes	45
Fan error messages	50
Power supply	51
Power error messages	51
SCSI error codes	52
Bus fault messages	52
DASD checkout	53
Engine shutdown	53
Temperature error messages	54
Host Built-In Self-test	55
Undetermined problems	55

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### Beep symptoms

Beep symptoms are short tones or a series of short tones separated by pauses (intervals without sound). Table 10 on page 30 shows an example of beep symptoms. See Table 11 on page 30 for a listing of the beep symptoms.

**Note:** One beep after successfully completing POST indicates the engine is functioning correctly.

Table 10. Examples of beep symptoms

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

Table 11. Beep symptoms

Beep/symptom	Description	Part/action
1-1-2	Microprocessor register test failed.	<ol style="list-style-type: none"> <li>1. Optional microprocessor (if installed)</li> <li>2. Microprocessor</li> <li>3. System board</li> </ol>
1-1-3	CMOS write/read test failed.	<ol style="list-style-type: none"> <li>1. Battery</li> <li>2. System board</li> </ol>
1-1-4	BIOS EEPROM checksum failed.	<ol style="list-style-type: none"> <li>1. Recover BIOS</li> <li>2. System board</li> </ol>
1-2-1	Programmable Interval Timer failed.	System board
1-2-2	DMA initialization failed.	System board
1-2-3	DMA page register write/read failed.	System board
1-2-4	RAM refresh verification failed.	<ol style="list-style-type: none"> <li>1. DIMM</li> <li>2. System board</li> </ol>
1-3-1	First 64K RAM test failed	DIMM
2-1-1	Secondary DMA register failed.	System board
2-1-2	Primary DMA register failed.	System board
2-1-3	Primary interrupt mask register failed.	System board
2-1-4	Secondary interrupt mask register failed.	System board
2-2-1	Interrupt vector loading failed.	System board
2-2-2	Keyboard controller failed.	<ol style="list-style-type: none"> <li>1. System board</li> <li>2. Keyboard</li> </ol>
2-2-3	CMOS power failure and checksum checks failed.	<ol style="list-style-type: none"> <li>1. Battery</li> <li>2. System board</li> </ol>
2-2-4	CMOS configuration information validation failed.	<ol style="list-style-type: none"> <li>1. Battery</li> <li>2. System board</li> </ol>
2-3-1	Screen initialization failed.	System board
2-3-2	Screen memory failed.	System board

Table 11. Beep symptoms (continued)

Beep/symptom	Description	Part/action
2-3-3	Screen retrace failed.	System board
2-3-4	Search for video ROM failed.	System board
2-4-1	Video failed; screen believed operable.	System board
3-1-1	Timer tick interrupt failed.	System board
3-1-2	Interval timer channel 2 failed.	System board
3-1-3	RAM test failed above address X'OFFFHH'.	1. DIMM 2. System board
3-1-4	Time-Of-Day clock failed.	1. Battery 2. System board
3-2-1	Serial port failed.	System board
3-2-2	Parallel port failed.	System board
3-2-3	Math coprocessor test failed.	1. Microprocessor 2. System board
3-2-3	Failure comparing CMOS memory size against actual.	1. DIMM 2. Battery
3-3-1	Memory size mismatch occurred.	1. DIMM 2. Battery
3-3-2	Critical SMBUS error occurred.	1. Disconnect the engine power cord from outlet, wait 30 seconds and retry. 2. System board. 3. DIMMs. 4. DASD backplane. 5. Power supply. 6. Power cage assembly. 7. I <sup>2</sup> C cable.
3-3-3	No operational memory in system.	1. Install or reseal the memory modules, and then do a 3 boot reset. (For more information on a 3 boot reset, see "Using the Configuration/Setup Utility program" on page 135.) 2. DIMMs. 3. Memory board. 4. System board.
4-4-4	Optional Remote Supervisor Adapter not installed in slot 1 or not functioning correctly.	1. Verify that the adapter is installed in slot 1. 2. Adapter. 3. System board.
<b>Two short beeps</b>	Information only, the configuration has changed.	1. Run Base System Diagnostics. 2. Run the Configuration/Setup Utility program.
<b>Three short beeps</b>		1. DIMM 2. System board

Table 11. Beep symptoms (continued)

Beep/symptom	Description	Part/action
One continuous beep		<ol style="list-style-type: none"> <li>1. Microprocessor</li> <li>2. Optional microprocessor (if installed)</li> <li>3. System board</li> </ol>
Repeating short beeps		<ol style="list-style-type: none"> <li>1. Keyboard</li> <li>2. System board</li> </ol>
One long and one short beep		System board
One long and two short beeps		System board
One long and three short beeps		<ol style="list-style-type: none"> <li>1. Monitor</li> <li>2. System board</li> </ol>
Two long and two short beeps		System board

## No beep symptoms

Table 12. No beep symptoms

No-beep symptom	Part/action
No beep and the system operates correctly.	<ol style="list-style-type: none"> <li>1. Verify that the speaker cables are securely connected.</li> <li>2. Speaker.</li> <li>3. System board.</li> </ol>
No beeps occur after successfully completing POST (the power-on status is disabled)	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, and set the Start Options Power-On Status to enable.</li> <li>2. Check the speaker connection.</li> <li>3. System board.</li> </ol>
No ac power (power supply ac LED is off)	<ol style="list-style-type: none"> <li>1. Check the power cord.</li> <li>2. Power supply. (If two are installed, swap them to determine if one is defective.)</li> <li>3. Power cage assembly.</li> <li>4. Hot-swap power ac inlet box.</li> </ol>
No beep and no video	See "Undetermined problems" on page 55.
System will not start (power supply ac LED is on)	See "Power-supply LED errors" on page 51.

## Information-panel system error LED

The system error LED is turned on when an error is detected. If the system error LED is on, remove the cover and check the diagnostic panel LEDs. Table 13 on page 33 contains a complete list of diagnostic panel LEDs followed by the part or action required to correct the problem. This table is valid only when the system error LED is on.

**Notes:**

1. 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.
2. To locate the LEDs on the system board see Figure 12 on page 69.
3. Check the System Event/Error Log for additional information before replacing a FRU.
4. The DIMM-error LEDs, processor-error LEDs, and VRM-error LEDs turn off when the system is shut down.

Table 13. Errors diagnosed by the diagnostic panel LEDs

Diagnosics panel LED	Part/action
<b>All LEDs off</b> (Check System Error Log for error condition, then clear System Error Log when the problem is found.)	<ol style="list-style-type: none"> <li>1. System Error Log is 75% full; clear the log.</li> <li>2. PFA alert; check log for failure; clear PFA alert; remove ac power for at least 20 seconds, reconnect, and then turn on the system.</li> <li>3. Run light path diagnostics.</li> </ol>
<b>MEMORY LED on</b> (The LED next to the failing DIMM is on.)	<ol style="list-style-type: none"> <li>1. Failing DIMM</li> <li>2. System board</li> </ol>
<b>CPU LED on</b> (The LED next to the failing CPU is on.)	<ol style="list-style-type: none"> <li>1. Microprocessor 1 or 2</li> <li>2. System board</li> </ol>
<b>PCI BUS LED on</b>	<ol style="list-style-type: none"> <li>1. Remove all PCI adapters from slots on affected bus (see “Adapters” on page 81).</li> <li>2. System board.</li> </ol>
<b>VRM LED on</b> (The LED next to the failing VRM is on.)	<ol style="list-style-type: none"> <li>1. Voltage regulator module indicated by the lit VRM LED.</li> <li>2. Microprocessor indicated by the microprocessor LED.</li> </ol>
<b>DASD LED on</b> (The LED located next to the drive bay that the failing drive is installed in is lit. Check the amber drive LED for the failing hard drive.)	<ol style="list-style-type: none"> <li>1. Be sure that the fans are operating correctly and the airflow is good.</li> <li>2. If installed, reseal I<sup>2</sup>C cable between DASD backplane and DASD I<sup>2</sup>C on the system board (J10).</li> <li>3. Failing drive. SCSI channel A has failed. (This is the SCSI channel for the hot-swap hard disk drives).</li> <li>4. SCSI backplane.</li> </ol>
<b>SERVICE PROCESSOR BUS LED</b>	<ol style="list-style-type: none"> <li>1. Unplug the power supplies from the engine for 30 seconds, and then plug in and retry.</li> <li>2. Reflash or update firmware for ISMP, BIOS.</li> <li>3. System board.</li> </ol>
<b>POWER SUPPLY 1 LED on</b>	<ol style="list-style-type: none"> <li>1. Check the dc good LED on power supply 1. If it is off, replace power supply 1.</li> <li>2. Power cage assembly.</li> </ol>
<b>POWER SUPPLY 2 LED on</b>	<ol style="list-style-type: none"> <li>1. Check the dc good LED on power supply 2. If it is off, replace power supply 2.</li> <li>2. Power cage assembly.</li> </ol>
<b>NONREDUNDANT LED on</b>	<ol style="list-style-type: none"> <li>1. Check the PS1 and PS2 LEDs and replace any indicated power supply.</li> <li>2. Install an additional power supply or remove optional devices from the engine.</li> </ol>
<b>NMI LED on</b>	<ol style="list-style-type: none"> <li>1. Restart the engine.</li> <li>2. Check the System Error Log.</li> </ol>

Table 13. Errors diagnosed by the diagnostic panel LEDs (continued)

Diagnosics panel LED	Part/action
<b>TEMPERATURE LED on</b>	<ol style="list-style-type: none"> <li>1. Ambient temperature must be within normal operating specifications. See “Specifications” on page 5.</li> <li>2. Ensure filler panels are installed in all empty bays.</li> <li>3. Ensure fans are operating correctly by checking the fan LEDs.</li> <li>4. Examine System Error Log.               <ol style="list-style-type: none"> <li>a. System over recommended temperature                   <ul style="list-style-type: none"> <li>• Information LED panel</li> </ul> </li> <li>b. DASD over recommended temperature (DASD LED also on)                   <ol style="list-style-type: none"> <li>1) Overheating hard drive</li> <li>2) DASD backplane</li> </ol> </li> <li>c. System over recommended temperature for CPU x (where x is 1 or 2) (CPU LED is also on)                   <ol style="list-style-type: none"> <li>1) CPU x</li> <li>2) System board</li> </ol> </li> </ol> </li> <li>5. If the CPU LED on the diagnostics panel is also lit, one of the microprocessors has caused the error.</li> </ol>
<b>FAN LED on</b>	<ol style="list-style-type: none"> <li>1. Check individual fan LEDs.</li> <li>2. Replace respective fan.</li> <li>3. Fan cable.</li> <li>4. System board.</li> <li>5. Power cage assembly.</li> </ol>

## Diagnostic error codes

**Note:** In the following error codes, if *XXX* is *000*, *195*, or *197*, **do not** replace a part. 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 Part/action indicated.

**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.

Table 14 describes diagnostic error codes and their suggested actions.

Table 14. Diagnostic error codes

Error code/symptom	Meaning	Part/action
<b>001-XXX-000</b>	Failed core tests.	System board
<b>001-XXX-001</b>	Failed core tests.	System board
<b>001-250-000</b>	Failed system board ECC.	System board
<b>001-250-001</b>	Failed system board ECC.	System board
<b>005-XXX-000</b>	Failed video test.	System board
<b>011-XXX-000</b>	Failed COM1 serial port test.	System board

Table 14. Diagnostic error codes (continued)

Error code/symptom	Meaning	Part/action
011-XXX-001	Failed COM2 serial port test.	System board
014-XXX-000	Failed parallel port test.	System board
015-XXX-001	USB interface not found, board damaged.	System board
015-XXX-015	Failed USB external loopback test.	No action required. USB is not required for normal functioning.
015-XXX-198	USB device connected during USB test.	No action required. USB is not required for normal functioning.
020-XXX-000	Failed PCI interface test.	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.	System board
035-XXX-099		1. No adapters were found. 2. If adapter is installed recheck connection.
035-XXX-S99	Failed RAID test on PCI slot <i>S</i> , where <i>S</i> = number of failing PCI slot. Check System Error Log before replacing a part.	1. Adapter 2. SCSI backplane 3. Cable
035-XXX-SNN	Check System Error Log before replacing a part. <i>s</i> = number of failing PCI slot, <i>nn</i> = SCSI ID of failing fixed disk.	Hard disk drive with SCSI ID <i>nn</i> on RAID adapter in PCI slot <i>s</i> .
035-253-S99	RAID adapter initialization failure.	1. ServeRAID adapter in slot <i>s</i> is not configured correctly. Obtain the basic and extended configuration status and see the <i>ServeRAID User's Reference on the Documentation CD-ROM</i> for more information. 2. Cable. 3. SCSI backplane. 4. Adapter.
075-XXX-000	Failed power supply test.	Power supply
089-XXX-001	Failed microprocessor test.	1. VRM 1 for microprocessor 1 2. Microprocessor 1
089-XXX-002	Failed optional microprocessor test.	1. VRM 2 for optional microprocessor 2 2. Optional microprocessor 2

Table 14. Diagnostic error codes (continued)

Error code/symptom	Meaning	Part/action
<b>166-198-000 System Management: Aborted</b>	Unable to communicate with ASM. It may be busy. Run the test again.	<ol style="list-style-type: none"> <li>1. Run the diagnostic test again.</li> <li>2. Correct other error conditions and retry. These include other failed system management tests and items logged in the System Error Log of the optional Remote Supervisor Adapter.</li> <li>3. Disconnect all engine and option power cords from the engine, wait 30 seconds, reconnect, and retry.</li> <li>4. Remote Supervisor Adapter, if installed.</li> <li>5. System board.</li> </ol>
<b>166-201-001 System Management: Failed</b>	I <sup>2</sup> C bus error(s). See SERVPROC and DIAGS entries in event log.	<ol style="list-style-type: none"> <li>1. If installed, reseal the I<sup>2</sup>C cable between the Remote Supervisor Adapter (in PCI slot 1/J32) and the system board (J27).</li> <li>2. Reseat memory DIMMs.</li> <li>3. Memory DIMMs.</li> <li>4. System board.</li> </ol>
<b>166-201-002 System Management: Failed</b>	I <sup>2</sup> C bus error(s) See SERVPROC and DIAGS entries in event log.	<ol style="list-style-type: none"> <li>1. Reseat I<sup>2</sup>C cable between the operator information panel and the system board (J24).</li> <li>2. Reseat I<sup>2</sup>C cable between the diagnostics panel and the system board (J23).</li> <li>3. Operator information panel.</li> <li>4. Diagnostics panel.</li> <li>5. System board.</li> </ol>
<b>166-201-003 System Management: Failed</b>	I <sup>2</sup> C bus error(s) See SERVPROC and DIAGS entries in event log.	<ol style="list-style-type: none"> <li>1. Reseat cables between the system board and the power supply or power cage assembly.</li> <li>2. Power cage assembly.</li> <li>3. System board.</li> </ol>
<b>166-201-004 System Management: Failed</b>	I <sup>2</sup> C bus error(s) See SERVPROC and DIAGS entries in event log.	<ol style="list-style-type: none"> <li>1. DASD backplane</li> <li>2. System board</li> </ol>
<b>166-201-005 System Management: Failed</b>	I <sup>2</sup> C bus error(s) See SERVPROC and DIAGS entries in event log.	<ol style="list-style-type: none"> <li>1. Reseat Memory DIMMs.</li> <li>2. Reseat microprocessors.</li> <li>3. Memory DIMMs.</li> <li>4. Microprocessors.</li> <li>5. System board.</li> </ol>
<b>166-250-000 System Management: Failed</b>	I <sup>2</sup> C cable is disconnected. Reconnect I <sup>2</sup> C cable between Remote Supervisor Adapter and system board.	<ol style="list-style-type: none"> <li>1. Reseat I<sup>2</sup>C cable between the Remote Supervisor Adapter (in PCI slot 1/J32) and the system board (J27).</li> <li>2. I<sup>2</sup>C cables.</li> <li>3. Replace the Remote Supervisor Adapter.</li> <li>4. System board.</li> </ol>

Table 14. Diagnostic error codes (continued)

Error code/symptom	Meaning	Part/action
<b>166-260-000 System Management: Failed</b>	Restart Remote Supervisor Adapter Error. After restarting, Remote Supervisor Adapter communication was lost. Unplug and cold boot to reset the Remote Supervisor Adapter.	<ol style="list-style-type: none"> <li>1. Disconnect all engine and option power cords from the engine, wait 30 seconds, reconnect, and retry.</li> <li>2. Reseat the Remote Supervisor Adapter (in PCI slots 1/J32).</li> <li>3. Replace the Remote Supervisor Adapter.</li> </ol>
<b>166-342-000 System Management: Failed</b>	ASM adapter BIST indicate failed tests.	<ol style="list-style-type: none"> <li>1. Ensure that the latest firmware levels are installed for Remote Supervisor Adapter and BIOS.</li> <li>2. Disconnect all engine and option power cords from engine, wait 30 seconds, reconnect, and retry.</li> <li>3. Remote Supervisor Adapter.</li> </ol>
<b>166-400-000 System Management: Failed</b>	ISMP self test result failed tests: x where x = Flash, RAM, or ROM.	<ol style="list-style-type: none"> <li>1. Reflash or update firmware for ISMP.</li> <li>2. System board.</li> </ol>
<b>180-XXX-000</b>	Diagnostics panel LED failure.	Run diagnostics panel LED test for the failing LED.
<b>180-XXX-001</b>	Failed front LED panel test.	<ol style="list-style-type: none"> <li>1. Operator information panel</li> <li>2. System board</li> </ol>
<b>180-XXX-002</b>	Failed diagnostics LED panel test.	<ol style="list-style-type: none"> <li>1. Diagnostics panel</li> <li>2. System board</li> </ol>
<b>180-361-003</b>	Failed fan LED test.	<ol style="list-style-type: none"> <li>1. Fan(s)</li> <li>2. System board</li> </ol>
<b>180-XXX-003</b>	Failed system board LED test.	System board
<b>180-XXX-005</b>	Failed SCSI backplane LED test.	<ol style="list-style-type: none"> <li>1. SCSI backplane</li> <li>2. SCSI backplane cable</li> <li>3. System board</li> </ol>
<b>201-XXX-0NN</b>	Failed memory test.	<ol style="list-style-type: none"> <li>1. DIMM Location slots 1-6 where <b>nn = DIMM location.</b> <b>Note:</b> nn : 1=DIMM 1 2=DIMM 2 3=DIMM 3 4=DIMM 4 5=DIMM 5 6=DIMM 6.</li> <li>2. System board</li> </ol>
<b>201-XXX-999</b>	Multiple DIMM failure, see error text.	<ol style="list-style-type: none"> <li>1. See error text for failing DIMMs.</li> <li>2. System board.</li> </ol>
<b>202-XXX-001</b>	Failed system cache test.	<ol style="list-style-type: none"> <li>1. VRM 1</li> <li>2. Microprocessor 1</li> </ol>
<b>202-XXX-002</b>	Failed system cache test.	<ol style="list-style-type: none"> <li>1. VRM 2</li> <li>2. Microprocessor 2</li> </ol>

Table 14. Diagnostic error codes (continued)

Error code/symptom	Meaning	Part/action
206-XXX-000	Failed diskette drive test.	<ol style="list-style-type: none"> <li>1. Cable</li> <li>2. Diskette drive</li> <li>3. System board</li> </ol>
215-XXX-000	Failed IDE CD-ROM drive test.	<ol style="list-style-type: none"> <li>1. CD-ROM drive cables</li> <li>2. CD-ROM drive</li> <li>3. System board</li> </ol>
217-198-XXX	Could not establish drive parameters.	<ol style="list-style-type: none"> <li>1. Check cable and termination.</li> <li>2. SCSI backplane.</li> <li>3. Hard disk.</li> </ol>
217-XXX-000	Failed BIOS hard disk test. <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	Logical drive 1
217-XXX-001	Failed BIOS hard disk test. <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	Logical drive 2
217-XXX-002	Failed BIOS hard disk test. <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	Logical drive 3
217-XXX-003	Failed BIOS hard disk test. <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	Logical drive 4
217-XXX-004	Failed BIOS hard disk test. <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	Logical drive 5
217-XXX-005	Failed BIOS hard disk test. <b>Note:</b> If RAID is configured, the hard disk number refers to the RAID logical array.	Logical drive 6
264-XXX-0NN	Failed tape drive test.	<ol style="list-style-type: none"> <li>1. Tape cartridge, if user executed the Read/Write Tape Drive test (failure code of XXX = 256)</li> <li>2. SCSI or power cable connected to tape drive with SCSI ID <i>nn</i></li> <li>3. Tape drive with SCSI ID <i>nn</i> (refer to the Help and Service Information appendix of the tape drive's User Guide)</li> <li>4. System board or SCSI controller (run SCSI controller diagnostic to determine if the SCSI bus is functioning properly.)</li> </ol>
264-XXX-999	Errors on multiple tape drives, see error text for more information.	See error messages/text in the Base System Diagnostics error log for detailed information on each individual tape drive error.
301-XXX-000	Failed keyboard test.	Keyboard

Table 14. Diagnostic error codes (continued)

Error code/symptom	Meaning	Part/action
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 <i>n</i> .	1. Adapter in PCI slot <i>n</i> 2. System board
415-XXX-000	Failed Modem test.	No action required. A modem is not required for normal functioning.

## Error symptoms

You can use the error symptom table to find solutions to problems that have definite symptoms.

If you cannot find the problem in the error symptom charts, go to “Starting the diagnostic programs” on page 15 to test the engine.

If you have just added new software or a new option and your engine is not working, do the following before using the error symptom charts:

- Remove the software or device that you just added.
- Run the diagnostic tests to determine if your engine is running correctly.
- Reinstall the new software or new device.

Table 15 contains information on error symptoms and suggested actions. In the table, if the entry in the Part/action column is a suggested action, perform that action; if it is the name of a component, reseal the component and replace it if necessary. The most likely cause of the symptom is listed first.

Table 15. Error symptoms and suggested actions

CD-ROM drive problems	
Symptom	Part/action
CD-ROM drive is not recognized.	<ol style="list-style-type: none"> <li>1. Verify that: <ul style="list-style-type: none"> <li>• The primary IDE channel to which the CD-ROM drive is attached is enabled in the Configuration/Setup Utility program. <b>Note:</b> On an engine with a single IDE channel, only the primary channel can be used.</li> <li>• All cables and jumpers are installed correctly.</li> <li>• The correct device driver is installed for the CD-ROM drive.</li> </ul> </li> <li>2. Run CD-ROM drive diagnostics.</li> <li>3. CD-ROM drive.</li> </ol>

Table 15. Error symptoms and suggested actions (continued)

<b>Diskette drive problems</b>	
<b>Symptom</b>	<b>Part/action</b>
Diskette drive activity LED stays on, or the system bypasses the diskette drive.	<ol style="list-style-type: none"> <li>1. If there is a diskette in the drive, verify that: <ul style="list-style-type: none"> <li>• The diskette drive is enabled in the Configuration/Setup utility program.</li> <li>• The diskette is good and not damaged. (Try another diskette if you have one.)</li> <li>• The diskette is inserted correctly in the drive.</li> <li>• The diskette contains the necessary files to start the engine.</li> <li>• The software program is working properly.</li> <li>• The cable is installed correctly (in the proper orientation).</li> </ul> </li> <li>2. Run diskette drive diagnostics.</li> <li>3. Cable.</li> <li>4. Diskette drive.</li> <li>5. System board.</li> </ol>
<b>Hard disk drive problems</b>	
<b>Symptom</b>	<b>Part/action</b>
Not all drives are recognized by the hard disk drive diagnostic test (Fixed Disk test).	<ol style="list-style-type: none"> <li>1. Remove the first drive not recognized and try the hard disk drive diagnostic test again.</li> <li>2. If the remaining drives are recognized, replace the drive you removed with a new one.</li> </ol>
System stops responding during hard disk drive diagnostic test.	<ol style="list-style-type: none"> <li>1. Remove the hard disk drive being tested when the engine stopped responding and try the diagnostic test again.</li> <li>2. If the hard disk drive diagnostic test runs successfully, replace the drive you removed with a new one.</li> </ol>
<b>General problems</b>	
<b>Symptom</b>	<b>Part/action</b>
Problems such as broken cover locks or indicator LEDs not working	Broken CRU/FRU
<b>Intermittent problems</b>	
<b>Symptom</b>	<b>Part/action</b>
A problem occurs only occasionally and is difficult to detect.	<ol style="list-style-type: none"> <li>1. Verify that: <ul style="list-style-type: none"> <li>• All cables and cords are connected securely to the rear of the engine and attached options.</li> <li>• When the engine is turned on, air is flowing from the rear of the engine at the fan grill. If there is no airflow, the fan is not working. This causes the engine to overheat and shut down.</li> <li>• Ensure that the SCSI bus and devices are configured correctly and that the last external device in each SCSI chain is terminated correctly.</li> </ul> </li> <li>2. Check the system error log from Setup or through the diagnostics in the optional Remote Supervisor Adapter.</li> </ol>

Table 15. Error symptoms and suggested actions (continued)

<b>Keyboard, mouse, or point-device problems</b>	
<b>Symptom</b>	<b>Part/action</b>
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> <li>1. Verify that: <ul style="list-style-type: none"> <li>• The keyboard cable is securely connected to the system, and the keyboard and mouse cables are not reversed.</li> <li>• The engine and the monitor are turned on.</li> </ul> </li> <li>2. Keyboard.</li> <li>3. System board.</li> </ol>
The mouse or pointing device does not work.	<ol style="list-style-type: none"> <li>1. Verify that the mouse or pointing-device cable is securely connected, and that the keyboard and mouse cables are not reversed.</li> <li>2. Mouse or pointing device.</li> <li>3. System board.</li> </ol>
<b>Memory problems</b>	
<b>Symptom</b>	<b>Part/action</b>
The amount of system memory displayed is less than the amount of physical memory installed.	<ol style="list-style-type: none"> <li>1. Verify that: <ul style="list-style-type: none"> <li>• The memory modules are seated properly.</li> <li>• You have installed the correct type of memory.</li> <li>• If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program.</li> <li>• All banks of memory on the DIMMs are enabled. The engine might have automatically disabled a DIMM bank when it detected a problem or a DIMM bank could have been manually disabled.</li> </ul> </li> <li>2. Check POST error log for error message 289: <ul style="list-style-type: none"> <li>• If the DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.</li> <li>• If the DIMM was disabled by the user or by POST: <ol style="list-style-type: none"> <li>a. Start the Configuration/Setup Utility program.</li> <li>b. Enable the DIMM.</li> <li>c. Save the configuration and restart the engine.</li> </ol> </li> </ul> </li> <li>3. DIMM.</li> <li>4. System board.</li> </ol>
<b>Microprocessor problems</b>	
<b>Symptom</b>	<b>Part/action</b>
The engine emits a continuous tone during POST. (The startup (boot) microprocessor is not working properly.)	<ol style="list-style-type: none"> <li>1. Verify that the startup microprocessor is seated properly.</li> <li>2. Startup microprocessor.</li> </ol>

Table 15. Error symptoms and suggested actions (continued)

Monitor problems	
Symptom	Part/action
Testing the monitor.	See the information that comes with the monitor for adjusting and testing instructions. (Some IBM® monitors have their own self-tests.)
The screen is blank.	<ol style="list-style-type: none"> <li>1. Verify that: <ul style="list-style-type: none"> <li>• The engine power cord is plugged into the engine and a working electrical outlet.</li> <li>• The monitor cables are connected properly.</li> <li>• The monitor is turned on and the Brightness and Contrast controls are adjusted correctly.</li> <li>• If the engines are C2T chained together, verify that: <ul style="list-style-type: none"> <li>– The C2T chain cables are securely connected to the engines.</li> <li>– The C2T breakout cable is connected correctly.</li> <li>– A engine that is turned on is selected.</li> </ul> </li> </ul> </li> </ol> <p><b>Important:</b> In some memory configurations, the 3-3-3 beep code might sound during POST followed by a blank display screen. If this occurs and the <b>Boot Fail Count</b> feature in the Start Options of the Configuration/Setup Utility program is set to <b>Enabled</b> (its default setting), you must restart the engine three times to force the system BIOS to reset the CMOS values to the default configuration (memory connector or bank of connectors enabled).</p> <ol style="list-style-type: none"> <li>2. If you have verified these items and the screen remains blank, replace: <ol style="list-style-type: none"> <li>a. Monitor</li> <li>b. System board</li> </ol> </li> </ol>
Only the cursor appears.	See “Undetermined problems” on page 55.
The monitor works when you turn on the engine but goes blank when you start some application programs.	<ol style="list-style-type: none"> <li>1. Verify that: <ul style="list-style-type: none"> <li>• The application program is not setting a display mode higher than the capability of the monitor.</li> <li>• You installed the necessary device drivers for the applications.</li> </ul> </li> <li>2. If you have verified these items and the screen remains blank, replace the monitor.</li> </ol>
The screen is wavy, unreadable, rolling, distorted, or has screen jitter.	<ol style="list-style-type: none"> <li>1. If the monitor self-tests show the monitor is working properly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. (Moving a color monitor while it is turned on might cause screen discoloration.) Then move the device and the monitor at least 305 mm (12 in.) apart. Turn on the monitor. <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>a. To prevent diskette drive read/write errors, be sure the distance between monitors and diskette drives is at least 76 mm (3 in.).</li> <li>b. Non-IBM monitor cables might cause unpredictable problems.</li> <li>c. An enhanced monitor cable with additional shielding is available for the 9521 and 9527 monitors. For information about the enhanced monitor cable, contact your IBM reseller or IBM marketing representative.</li> </ol> </li> <li>2. System board.</li> </ol>
Wrong characters appear on the screen.	<ol style="list-style-type: none"> <li>1. If the wrong language is displayed, update the BIOS code with the correct language.</li> <li>2. System board.</li> </ol>

Table 15. Error symptoms and suggested actions (continued)

<b>Option problems</b>	
<b>Symptom</b>	<b>Part/action</b>
An IBM option that was just installed does not work.	<ol style="list-style-type: none"> <li>1. Verify that: <ul style="list-style-type: none"> <li>• You followed the installation instructions that came with the option.</li> <li>• The option is installed correctly.</li> <li>• You have not loosened any other installed options or cables.</li> <li>• You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration.</li> </ul> </li> <li>2. Option you just installed.</li> </ol>
An IBM option that used to work does not work now.	<ol style="list-style-type: none"> <li>1. Verify that all of the option hardware and cable connections are secure.</li> <li>2. If the option comes with its own test instructions, use those instructions to test the option.</li> <li>3. If the failing option is a SCSI option, verify that: <ul style="list-style-type: none"> <li>• The cables for all external SCSI options are connected correctly.</li> <li>• The last option in each SCSI chain, or the end of the SCSI cable, is terminated correctly.</li> <li>• Any external SCSI option is turned on. You must turn on an external SCSI option before turning on the engine.</li> </ul> </li> <li>4. Failing option.</li> </ol>
<b>Power problems</b>	
<b>Symptom</b>	<b>Part/action</b>
The engine does not turn on.	<ol style="list-style-type: none"> <li>1. Verify that: <ul style="list-style-type: none"> <li>• The power cables are properly connected to the engine.</li> <li>• The electrical outlet functions properly.</li> <li>• The type of memory installed is correct.</li> <li>• If you just installed an option, remove it, and restart the engine. If the engine now turns on, you might have installed more options than the power supply supports.</li> </ul> </li> <li>2. If LEDs for CPUs or VRMs are on, verify that: <ol style="list-style-type: none"> <li>a. A VRM is populated for each microprocessor.</li> <li>b. Override front panel pushbutton by turning on switch 7 of SW1; if power comes on: <ol style="list-style-type: none"> <li>1) Service processor error.</li> <li>2) Power reset card.</li> </ol> </li> </ol> </li> <li>3. See "Undetermined problems" on page 55.</li> </ol>
The engine does not turn off.	<ol style="list-style-type: none"> <li>1. Verify whether you are using an ACPI or non-ACPI operating system. If you are using a non-ACPI operating system: <ol style="list-style-type: none"> <li>a. Press Ctrl+Alt+Delete.</li> <li>b. Turn off the system by holding the power-control button for 4 seconds.</li> <li>c. If engine fails during BIOS POST and power-control button does not work, remove the AC power cord.</li> </ol> </li> <li>2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.</li> </ol>

Table 15. Error symptoms and suggested actions (continued)

<b>Serial port problems</b>	
<b>Symptom</b>	<b>Part/action</b>
The number of serial ports identified by the operating system is less than the number of serial ports installed.	<ol style="list-style-type: none"> <li>Verify that: <ul style="list-style-type: none"> <li>Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports is disabled.</li> <li>The serial-port adapter, if you installed one, is seated properly.</li> </ul> </li> <li>Failing serial port adapter.</li> </ol>
A serial device does not work.	No corrective action. A serial device is not required for normal functioning.
<b>Software problem</b>	
<b>Symptom</b>	<b>Part/action</b>
Suspected software problem.	<ol style="list-style-type: none"> <li>To determine if problems are caused by the software, verify that: <ul style="list-style-type: none"> <li>Your engine has the minimum memory needed to use the software. For memory requirements, see the information that comes with the software. <p><b>Note:</b> If you have just installed an adapter or memory, you might have a memory address conflict.</p> </li> <li>The software is designed to operate on your engine.</li> <li>Other software works on your engine.</li> <li>The software that you are using works on another system.</li> </ul> <p>If you received any error messages when using the software program, see the information that comes with the software for a description of the messages and suggested solutions to the problem.</p> </li> <li>If you have verified these items and the problem remains, contact your place of purchase.</li> </ol>
<b>Universal Serial Bus (USB) port problems</b> The USB ports are not enabled.	
<b>Symptom</b>	<b>Part/action</b>
A USB device does not work.	No corrective action. A USB device is not required for normal functioning.

## POST error codes

**Note:** You must connect a keyboard, mouse, and monitor to your appliance in order to see error messages. If the engine does not recognize the monitor, keyboard, and mouse, reboot the engine while they are connected. If a Remote Supervisor Adapter is used for system management, the logs can be accessed remotely.

Table 16 describes POST error codes and their suggested actions. *X* can be any number or letter.

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

Table 16. POST error codes

Error code/symptom	Meaning	Part/action
062	Three consecutive startup failures using the default configuration.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Battery.</li> <li>3. System board.</li> <li>4. Microprocessor.</li> </ol>
101, 102	System and processor error.	System board
106	System and processor error.	System board
111	Channel check error.	<ol style="list-style-type: none"> <li>1. Memory DIMM</li> <li>2. System board</li> </ol>
114	Adapter read-only memory error.	<ol style="list-style-type: none"> <li>1. Failing adapter.</li> <li>2. Run Base System Diagnostics.</li> </ol>
129	Internal cache error.	<ol style="list-style-type: none"> <li>1. Microprocessor</li> <li>2. Optional microprocessor (if installed)</li> </ol>
151	Real time clock error.	<ol style="list-style-type: none"> <li>1. Run Base System Diagnostics.</li> <li>2. Battery.</li> <li>3. System board.</li> </ol>
161	Real time clock battery error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Battery.</li> <li>3. System board.</li> </ol>
162	Device configuration error. <b>Note:</b> Be sure to load the default settings and any additional desired settings; then, <i>save the configuration</i> .	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Battery.</li> <li>3. Failing device.</li> <li>4. System board.</li> </ol>
163	Real-time clock error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Battery.</li> <li>3. System board.</li> </ol>
164	Memory configuration changed.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. DIMM.</li> <li>3. System board.</li> </ol>
175	Hardware error.	System board

Table 16. POST error codes (continued)

<b>Error code/symptom</b>	<b>Meaning</b>	<b>Part/action</b>
<b>176</b>	Computer cover or cable cover was removed without a key being used.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. System board.</li> </ol>
<b>177, 178</b>	Security hardware error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. System board.</li> </ol>
<b>184</b>	Power-on password damaged.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. System board.</li> </ol>
<b>185</b>	Drive startup sequence information corrupted.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. System board.</li> </ol>
<b>186</b>	Security hardware control logic failed.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. System board.</li> </ol>
<b>187</b>	VPD serial number not set.	<ol style="list-style-type: none"> <li>1. Set serial number in the Configuration/Setup Utility program.</li> <li>2. System board.</li> </ol>
<b>188</b>	Bad EEPROM CRC #2.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. System board.</li> </ol>
<b>189</b>	An attempt was made to access the engine with invalid passwords.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, and type the administrator password.</li> </ol>
<b>201</b>	Memory test error. 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"> <li>1. DIMM</li> <li>2. System board</li> </ol>
<b>229</b>	Cache error.	<ol style="list-style-type: none"> <li>1. Microprocessor</li> <li>2. Optional microprocessor (if installed)</li> </ol>
<b>262</b>	DRAM parity configuration error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Battery.</li> <li>3. System board.</li> </ol>
<b>289</b>	DIMM disabled by POST or user.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, if the DIMM was disabled by the user.</li> <li>2. Disabled DIMM, if not disabled by user.</li> </ol>
<b>301</b>	Keyboard or keyboard controller error.	<ol style="list-style-type: none"> <li>1. Keyboard</li> <li>2. System board</li> </ol>
<b>303</b>	Keyboard controller error.	System board
<b>602</b>	Invalid diskette boot record.	<ol style="list-style-type: none"> <li>1. Diskette</li> <li>2. Diskette drive</li> <li>3. Cable</li> <li>4. System board</li> </ol>

Table 16. POST error codes (continued)

Error code/symptom	Meaning	Part/action
<b>604</b>	Diskette drive error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program and Base System Diagnostics.</li> <li>2. Diskette drive.</li> <li>3. Drive cable.</li> <li>4. System board.</li> </ol>
<b>605</b>	Unlock failure.	<ol style="list-style-type: none"> <li>1. Diskette drive</li> <li>2. Drive cable</li> <li>3. System board</li> </ol>
<b>662</b>	Diskette drive configuration error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program and Base System Diagnostics.</li> <li>2. Diskette drive.</li> <li>3. Drive cable.</li> <li>4. System board.</li> </ol>
<b>762</b>	Coprocessor configuration error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Battery.</li> <li>3. Microprocessor.</li> </ol>
<b>962</b>	Parallel port error.	No corrective action. No parallel device is required for normal functioning.
<b>11XX</b>	System board serial port 1 or 2 error.	<ol style="list-style-type: none"> <li>1. Disconnect the external cable on the serial port.</li> <li>2. Run the Configuration/Setup Utility program.</li> <li>3. System board.</li> </ol>
<b>1301</b>	I <sup>2</sup> C cable to front panel not found.	<ol style="list-style-type: none"> <li>1. Cable</li> <li>2. Front panel</li> <li>3. Power switch assembly</li> <li>4. System board</li> </ol>
<b>1302</b>	I <sup>2</sup> C cable from system board to power on and reset switches not found.	<ol style="list-style-type: none"> <li>1. Cable</li> <li>2. Power switch assembly</li> <li>3. System board</li> </ol>
<b>1303</b>	I <sup>2</sup> C cable from system board to power backplane not found.	<ol style="list-style-type: none"> <li>1. Cable</li> <li>2. Power cage assembly, if installed</li> <li>3. System board</li> </ol>
<b>1304</b>	I <sup>2</sup> C cable to diagnostic LED board not found.	<ol style="list-style-type: none"> <li>1. Power switch assembly</li> <li>2. System board</li> </ol>
<b>1600</b>	<p>The system management processor is not functioning. Do the following before replacing a part:</p> <ol style="list-style-type: none"> <li>1. Ensure that a jumper is not installed on J34.</li> <li>2. Remove the ac power to the engine, wait 20 seconds; then, reconnect the ac power. Wait 30 seconds; then, turn on the engine.</li> </ol>	System board

Table 16. POST error codes (continued)

Error code/symptom	Meaning	Part/action
1601	<p>The system is able to communicate to the system management processor, but the system management processor failed to respond at the start of POST. Do the following before replacing a part:</p> <ol style="list-style-type: none"> <li>1. Remove the ac power to the engine, wait 20 seconds; then, reconnect the ac power. Wait 30 seconds; then, turn on the engine.</li> <li>2. Flash update the Remote Supervisor Adapter. See the <i>Remote Supervisor Adapter User's Guide</i> provided on the Documentation CD-ROM for more information.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remote Supervisor Adapter, if installed</li> <li>2. System board</li> </ol>
1602	Cable for optional service processor adapter not installed.	Disconnect all engine and option power cords from engine, wait 30 seconds, reconnect, and retry.
1762	Hard disk configuration error.	<ol style="list-style-type: none"> <li>1. Hard disk drive.</li> <li>2. Hard disk cables.</li> <li>3. Run the Configuration/Setup Utility program.</li> <li>4. Hard disk adapter.</li> <li>5. SCSI backplane.</li> <li>6. System board.</li> </ol>
178X	Fixed disk error.	<ol style="list-style-type: none"> <li>1. Hard disk cables.</li> <li>2. Run Base System Diagnostics.</li> <li>3. Hard disk adapter.</li> <li>4. Hard disk drive.</li> <li>5. System board.</li> </ol>
1800	No more hardware interrupt available for PCI adapter.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Failing adapter.</li> <li>3. System board.</li> </ol>
1962	Drive does not contain a valid boot sector.	<ol style="list-style-type: none"> <li>1. Verify that a startable operating system is installed.</li> <li>2. Run Base System Diagnostics.</li> <li>3. Hard disk drive.</li> <li>4. SCSI backplane.</li> <li>5. Cable.</li> <li>6. System board.</li> </ol>
2400	Video controller test failure.	System board
2462	Video memory configuration error.	System board

Table 16. POST error codes (continued)

Error code/symptom	Meaning	Part/action
<b>5962</b>	IDE CD-ROM drive configuration error.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program and load the default values.</li> <li>2. CD-ROM drive.</li> <li>3. CD-ROM power cable.</li> <li>4. IDE cable.</li> <li>5. System board.</li> <li>6. Battery.</li> </ol>
<b>8603</b>	Pointing-device error.	<ol style="list-style-type: none"> <li>1. Pointing device</li> <li>2. System board</li> </ol>
<b>0001200</b>	Machine check architecture error.	<ol style="list-style-type: none"> <li>1. Microprocessor 1</li> <li>2. Optional microprocessor 2</li> </ol>
<b>00012000</b>	Microprocessor machine check.	<ol style="list-style-type: none"> <li>1. Microprocessor</li> <li>2. System board</li> </ol>
<b>00019501</b>	Microprocessor 1 is not functioning - check VRM and microprocessor LEDs.	<ol style="list-style-type: none"> <li>1. VRM 1</li> <li>2. Microprocessor 1</li> <li>3. System board</li> </ol>
<b>00019502</b>	Microprocessor 2 is not functioning - check VRM and microprocessor LEDs.	<ol style="list-style-type: none"> <li>1. VRM 2</li> <li>2. Microprocessor 2</li> </ol>
<b>00019701</b>	Microprocessor 1 failed.	<ol style="list-style-type: none"> <li>1. Microprocessor 1</li> <li>2. System board</li> </ol>
<b>00019702</b>	Microprocessor 2 failed.	<ol style="list-style-type: none"> <li>1. Microprocessor 2</li> <li>2. System board</li> </ol>
<b>00180100</b>	A PCI adapter has requested memory resources that are not available.	<ol style="list-style-type: none"> <li>1. Ensure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program Utility program. If the memory resource settings are not correct, change the settings.</li> <li>2. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. (See the documentation provided with the adapter.)</li> </ol>
<b>00180200</b>	No more I/O space available for PCI adapter.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Failing adapter.</li> <li>3. System board.</li> </ol>
<b>00180300</b>	No more memory (above 1MB for PCI adapter).	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Failing adapter.</li> <li>3. System board.</li> </ol>
<b>00180400</b>	No more memory (below 1MB for PCI adapter).	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program.</li> <li>2. Failing adapter.</li> <li>3. System board.</li> </ol>

Table 16. POST error codes (continued)

Error code/symptom	Meaning	Part/action
00180500	PCI option ROM checksum error.	1. Remove failing PCI card. 2. System board.
00180600	PCI to PCI bridge error.	1. Run the Configuration/Setup Utility program. 2. Failing adapter. 3. System board.
00180700, 00180800	General PCI error.	1. System board 2. PCI card
00181000	PCI error.	1. Adapter 2. System board
01295085	ECC checking hardware test error.	1. System board 2. Microprocessor
01298001	System BIOS installed on this engine does not support level of processor.	Microprocessor 1.
01298002	System BIOS installed on this engine does not support level of processor.	Microprocessor 2.
01298101	System BIOS installed on this engine does not support level of processor.	Microprocessor 1.
01298102	System BIOS installed on this engine does not support level of processor.	Microprocessor 2.
I9990301	Hard disk sector error.	1. Hard disk drive 2. SCSI backplane 3. Cable 4. System board
I9990305	Hard disk sector error, no operating system installed.	Install operating system to hard disk.
I9990650	AC power has been restored.	1. Check cable. 2. Check for interruption of power. 3. Power cable.

## Fan error messages

Table 17. Fan error messages

Message	Action
<b>Fan “X” failure</b> (level-critical; fan “X” had a failure)	1. Check connections to fan “X” 2. Replace fan “X” <b>Note:</b> See Figure 40 on page 98 for fan identification.
<b>Fan “X” fault</b> (level-critical; fan “X” beyond recommended RPM range)	1. Check connections to fan “X” 2. Replace fan “X” <b>Note:</b> See Figure 40 on page 98 for fan identification.

Table 17. Fan error messages (continued)

Message	Action
Fan “X” outside recommended speed	Replace fan “X” <b>Note:</b> See Figure 40 on page 98 for fan identification.

## Power-supply LED errors

Use the information in Table 18 to troubleshoot power-supply problems.

**Note:** The minimum configuration required to enable the DC power LED is:

- Power supply
- Power backplane
- System board (with pins 2 and 3 on the J23 extension cable connected to bypass the power switch; see Figure 11 on page 67).

Table 18. Power-supply LED errors

AC good LED	DC good LED	Description	Part/action
Off	Off	No power to system or ac problem.	<ol style="list-style-type: none"> <li>1. Check ac power to the system.</li> <li>2. Power supply.</li> </ol>
On	Off	Standby mode or dc problem.	<ol style="list-style-type: none"> <li>1. Check system board cable connectors J4 and J10. Move switch 7 of SW 1 to bypass power control. If the dc good LED is lit, press Ctrl+Alt+Delete. Watch the screen for any POST errors. Check the System Error Log for any listed problems. If the system starts with no errors:               <ol style="list-style-type: none"> <li>a. Power switch assembly</li> <li>b. System board</li> </ol> </li> <li>2. Remove the adapters and disconnect the cables and power connectors to all internal and external devices. Turn on the system. If the dc good LED is lit, replace the adapters and devices one at a time until you isolate the problem.</li> <li>3. Power supply.</li> <li>4. Power cage assembly, if installed.</li> <li>5. System board.</li> </ol>
On	On	Power is working properly.	N/A

## Power error messages

Table 19. Power error messages

Message	Action
<b>Power supply x current share fault</b> (level-critical; excessive current demand on power supply x)	Replace power supply x.
<b>Power supply x DC good fault</b> (level-critical; power good signal not detected for power supply x)	Replace power supply x.
<b>Power supply x temperature fault</b>	Replace power supply x.

Table 19. Power error messages (continued)

Message	Action
<b>Power supply x removed</b>	No action required - information only.
<b>Power supply x fan fault</b> (level-critical; fan fault in power supply x)	Replace power supply x.
<b>Power supply x 12 V fault</b> (level-critical; overcurrent condition detected)	See "Power checkout" on page 27.
<b>Power supply x 3.3 V fault</b> (level-critical; 3.3 V power supply x had an error)	See "Power checkout" on page 27.
<b>Power supply x 5 V fault</b> (level-critical; 5 V power supply x had an error)	See "Power checkout" on page 27.
<b>System running non-redundant power</b> (level-noncritical; system does not have redundant power)	Replace power supply. <b>Note:</b> System can continue to operate without redundancy protection.
<b>System under recommended voltage for x</b> (level-warning; indicated voltage supply under nominal value; value for x can be +12, -12, or +5)	<ol style="list-style-type: none"> <li>1. Check connections to the power subsystem.</li> <li>2. Power supply.</li> <li>3. Power cage assembly.</li> </ol>

## SCSI error codes

Table 20 describes SCSI error codes and their suggested actions.

Table 20. SCSI error codes and actions

Error code	Meaning	Part/action
<b>All SCSI Errors</b>	<p>You may be experiencing one or more of the following problems:</p> <ul style="list-style-type: none"> <li>• A failing SCSI device (adapter, drive, or controller)</li> <li>• An incorrect SCSI configuration or SCSI termination jumper setting</li> <li>• Duplicate SCSI IDs in the same SCSI chain</li> <li>• A missing or incorrectly installed SCSI terminator</li> <li>• A defective SCSI terminator</li> <li>• An incorrectly installed cable</li> <li>• A defective cable</li> </ul>	<ol style="list-style-type: none"> <li>1. Ensure that the external SCSI devices were powered-on before the appliance was powered-on.</li> <li>2. Ensure that the cables for all external SCSI devices are connected correctly.</li> <li>3. If you have attached an external SCSI device to the appliance, make sure the external SCSI termination is set to automatic.</li> <li>4. Ensure that the last device in each SCSI chain is terminated correctly.</li> <li>5. Ensure that the SCSI devices are configured correctly.</li> </ol>

## Bus fault messages

Table 21. Bus fault messages

Message	Action
<b>Failure reading I<sup>2</sup>C device</b> (Check devices on bus 0)	<ol style="list-style-type: none"> <li>1. If installed, reseal the I<sup>2</sup>C cable between Remote Supervisor Adapter (in PCI slot 1/J32) and system board (J45).</li> <li>2. Memory DIMMs.</li> <li>3. System board.</li> </ol>

Table 21. Bus fault messages (continued)

Message	Action
<b>Failure reading I<sup>2</sup>C device</b> (Check devices on bus 1)	<ol style="list-style-type: none"> <li>1. Reseat the I<sup>2</sup>C cable between the operator information panel and system board (J24).</li> <li>2. Operator information panel.</li> <li>3. System board.</li> </ol>
<b>Failure reading I<sup>2</sup>C device</b> (Check devices on bus 2)	<ol style="list-style-type: none"> <li>1. Reseat the cable between system board and the power supply (power cage assembly) (J10).</li> <li>2. Power cage assembly.</li> <li>3. Power supply.</li> <li>4. System board.</li> </ol>
<b>Failure reading I<sup>2</sup>C device.</b> (Check devices on bus 3)	<ol style="list-style-type: none"> <li>1. Reseat the cable between the DASD backplane and connector (J10) of system board.</li> <li>2. DASD backplane.</li> <li>3. System board.</li> </ol>
<b>Failure reading I<sup>2</sup>C device</b> (Check devices on bus 4)	System board

## DASD checkout

Table 22. DASD checkout messages

Message	Action
<b>Hard disk drive “X” removal detected</b> (level: critical; hard disk drive “X” has been removed)	Information only; take action as appropriate.

## Engine shutdown

Refer to Table 23 and Table 24 on page 54 when experiencing engine shutdown related to voltage or temperature problems.

## Voltage-related engine shutdown

Table 23. Voltage-related shutdown

Message	Action
<b>System shutoff due to x current over max value</b> (level-critical; system drawing too much current on voltage x bus)	See “Power checkout” on page 27.
<b>System shutoff due to x V over voltage</b> (level-critical; system shutoff due to x supply over voltage)	<ol style="list-style-type: none"> <li>1. Check the power-supply connectors.</li> <li>2. Power supply.</li> <li>3. Power cage assembly.</li> </ol>
<b>System shutoff due to x V under voltage</b> (level-critical system shutoff due to x supply under voltage)	<ol style="list-style-type: none"> <li>1. Check the power-supply connectors.</li> <li>2. Power supply.</li> <li>3. Power cage assembly.</li> </ol>
<b>System shutoff due to VRM x over voltage</b>	Replace VRM x.

Table 23. Voltage-related shutdown (continued)

Message	Action
<b>System shutoff due to excessive (&lt; 240 VA) loading</b>	<ol style="list-style-type: none"> <li>1. See “Power checkout” on page 27.</li> <li>2. Cycle ac on/off.</li> </ol>

## Temperature-related engine shutdown

Table 24. Temperature related shutdown

Message	Action
<b>System shutoff due to board over temperature</b> (level-critical; board is over temperature)	<ol style="list-style-type: none"> <li>1. Ensure that the system is being correctly cooled; see “Specifications” on page 5.</li> <li>2. Replace board.</li> </ol>
<b>System shutoff due to CPU x over temperature</b> (level-critical; CPU x is over temperature)	<ol style="list-style-type: none"> <li>1. Ensure that the system is being correctly cooled; see “Specifications” on page 5.</li> <li>2. Replace CPU x.</li> </ol>
<b>System shutoff due to CPU x under temperature</b> (level-critical; CPU x is under temperature)	Ambient temperature must be within normal operating specifications; see “Specifications” on page 5.
<b>System shutoff due to DASD temperature (sensor x)</b> (level-critical; DASD area reported temperature outside recommended operating range)	Ensure that the system is being correctly cooled; see “Specifications” on page 5.
<b>System shutoff due to high ambient temperature</b> (level-critical; high ambient temperature)	Ambient temperature must be within normal operating specifications; see “Specifications” on page 5.
<b>System shutoff due to system board under temperature</b> (level-critical; system board is under temperature)	Ambient temperature must be within normal operating specifications; see “Specifications” on page 5.

## Temperature error messages

Table 25. Temperature error messages

Message	Action
<b>DASD Over Temperature</b> (level-critical; direct access storage device bay x was over temperature)	Ensure that the system is being correctly cooled; see “Specifications” on page 5.
<b>DASD Over recommended Temperature (sensor x)</b> (level-warning; DASD bay x had over temperature condition)	Ensure that the system is being correctly cooled; see “Specifications” on page 5.
<b>DASD under recommended temperature (sensor x)</b> (level-warning; direct access storage device bay x had under temperature condition)	Ambient temperature must be within normal operating specifications; see “Specifications” on page 5.
<b>DASD Over Temperature</b> (level-critical; sensor for DASD1 reported temperature over recommended range)	Ensure that the system is being correctly cooled; see “Specifications” on page 5.
<b>Power supply x Temperature Fault</b> (level-critical; power supply x had over temperature condition)	<ol style="list-style-type: none"> <li>1. Ensure that the system is being correctly cooled; see “Specifications” on page 5.</li> <li>2. Replace power supply x</li> </ol>

Table 25. Temperature error messages (continued)

Message	Action
<b>System board is over recommended temperature</b> (level-warning; system board is over recommended temperature)	<ol style="list-style-type: none"> <li>1. Ensure that the system is being correctly cooled; see “Specifications” on page 5.</li> <li>2. Replace the system board.</li> </ol>
<b>System board is under recommended temperature</b> (level-warning; system board is under recommended temperature)	Ambient temperature must be within normal operating specifications; see “Specifications” on page 5.
<b>System over temperature for CPU x</b> (level-warning; CPU x reporting over temperature condition)	Ensure that the system is being correctly cooled; see “Specifications” on page 5.
<b>System under recommended CPU x temperature</b> (level-warning; system reporting under temperature condition for CPU x)	Ambient temperature must be within normal operating specifications; see “Specifications” on page 5.

---

## Host Built-In Self Test

Table 26. Host built-in self test messages

<b>Note:</b> If the replacement procedure is not in the <i>IBM TotalStorage NAS Gateway 300 Hardware Installation Guide</i> , then the component should be replaced by a field service technician.	
Message	Action
<b>Host fail</b> (level-informational; built-in self-test for the host failed)	<ol style="list-style-type: none"> <li>1. Reseat the microprocessor.</li> <li>2. Reseat the VRM.</li> <li>3. Replace the microprocessor CPU.</li> </ol>

---

## Undetermined problems

Use the information in this section if the diagnostic tests did not identify the failure, the devices list is incorrect, or the system is inoperative. Make sure that the default settings are loaded in the Configuration/Setup Utility.

**Notes:**

1. Damaged data in CMOS can cause undetermined problems.
2. Damaged data in BIOS code can cause undetermined problems.

Check the LEDs on all the power supplies. If the LEDs indicate the power supplies are working correctly, complete the following steps:

1. Power off the engine.
2. Be sure that the engine is cabled correctly.

3. Remove or disconnect the following devices (one at a time) until you find the failure (turn on the engine and reconfigure each time):

- Any external devices

- Surge suppressor device (on the engine)

- Mouse or non-IBM devices

- Each adapter

- Drives

- Memory modules [minimum requirement = 512 MB (2 banks of 256 MB DIMMs)]

**Note:** Minimum operating requirements are:

- a. One power supply

- b. Power cage assembly

- c. System board

- d. One microprocessor and VRM

- e. Memory module (with a minimum of two 256 MB DIMMs)

4. Power on the engine. If the problem remains, suspect the following parts in the order listed:

- Power supply

- Power cage assembly

- System board

**Notes:**

1. If the problem goes away when you remove an adapter from the system 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.

---

## Problem determination tips

Due to the variety of hardware and software combinations that can be encountered, use the following information to assist you in problem determination. If possible, have this information available when requesting assistance from Service Support and Engineering functions.

- Machine type 5196 and Model G27
- Microprocessor or hard disk upgrades
- Failure symptom
  - Do Base System Diagnostics fail?
  - What, when, where, single, or multiple systems?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - If it has been working, what changes were made prior to it failing?
  - Is this the original reported failure?
- Base System Diagnostics version
  - Type and version level
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- Operating system software
  - Type and version level

**Note:** To eliminate confusion, identical systems are considered identical only if they:

1. Are the exact machine type and models
2. Have the same BIOS level
3. Have the same adapters/attachments in the same locations
4. Have the same address jumpers/terminators/cabling
5. Have the same software versions and levels
6. Have the same diagnostics code (version)
7. Have the same configuration options set in the system
8. Have the same setup for the operation system control files

Comparing the configuration and software set up between working and nonworking systems will often lead to problem resolution.



---

## Chapter 5. Adding and replacing components

This chapter describes how to add optional adapters as well as replace defective base components, such as hard disk drives, memory, processors, and power supplies.

---

### Before you begin

Before you begin to install options in the Model G27, read the following information:

- Become familiar with the safety and handling guidelines specified under:
  - “Handling static-sensitive devices” on page 60
  - Appendix E, “Safety notices” on page 167
  - “Working inside an appliance while power is on” on page 60
- You do not need to shut down the Model G27 or remove covers to install or replace hot-swap power supplies or hot-swap hard drives.
- The blue color on components and labels inside your engine identifies touch points where a component can be gripped, a latch moved, and so on.
- The orange color on components and labels in your engine indicates hot-swap components. Hot-swap components can be installed or removed while the system is running, provided that your system is configured to support this function.
- Ensure that you have an adequate number of grounded electrical outlets for the Model G27 and any other options that you intend to install.
- Back up all important data before you make changes to hard drives.
- Have a small, flat-blade screwdriver available.

### Safety information

Before you begin installing components, read the safety information found in “Basic safety information” on page 167. For translations of the safety notices that are included in this guide, refer to *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.

### System reliability considerations

Adding non-supported options to the base configurations could increase power requirements beyond the limit for redundancy. To ensure that redundancy is maintained, check the status of the Nonredundant LED on the system board after you install any option. For information on the Nonredundant LED, see “LEDs” on page 68.

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

- Each of the drive bays has either a drive or a filler panel installed.
- The cover is in place during normal operations, or is removed for no longer than 30 minutes while the appliance is operating.
- There is space around the appliance to allow the appliance cooling system to operate correctly.
  - For the NAS 300G engine, leave about 127 mm (5 in.) of space around the front and rear of the appliance.
  - For the NAS 300G engine, refer to the documentation that comes with the rack.

- A removed hot-swap drive is replaced within 2 minutes of removal.
- Cables for optional adapters are routed according to the instructions provided with the adapters.
- A failed fan is replaced within 48 hours.

## Working inside an appliance while power is on

Your appliance is designed to operate safely while powered on with the cover removed. Follow these guidelines when you work inside an appliance that is powered on:

- Avoid loose-fitting clothing on your forearms. Button long-sleeved shirts before working inside the appliance; do not wear cuff links while you are working inside the appliance.
- Do not allow your necktie or scarf to hang inside the appliance.
- Remove jewelry, such as bracelets, rings, necklaces, and loose-fitting wrist watches.
- Remove items from your shirt pocket (such as pens or pencils) that could fall into the appliance as you lean over it.
- Take care to avoid dropping any metallic objects, such as paper clips, hair pins, or screws, into the appliance.

## Handling static-sensitive devices

When you handle devices that are sensitive to electrostatic discharge (ESD), take precautions to avoid damage from static electricity. For details on handling these devices, see “Handling electrostatic discharge-sensitive devices” on page 175.

---

## Location of components and indicators

### Major components of the NAS 300G

Figure 5 on page 61 shows the major components of each engine.

**Note:** This illustration might differ slightly from your hardware.

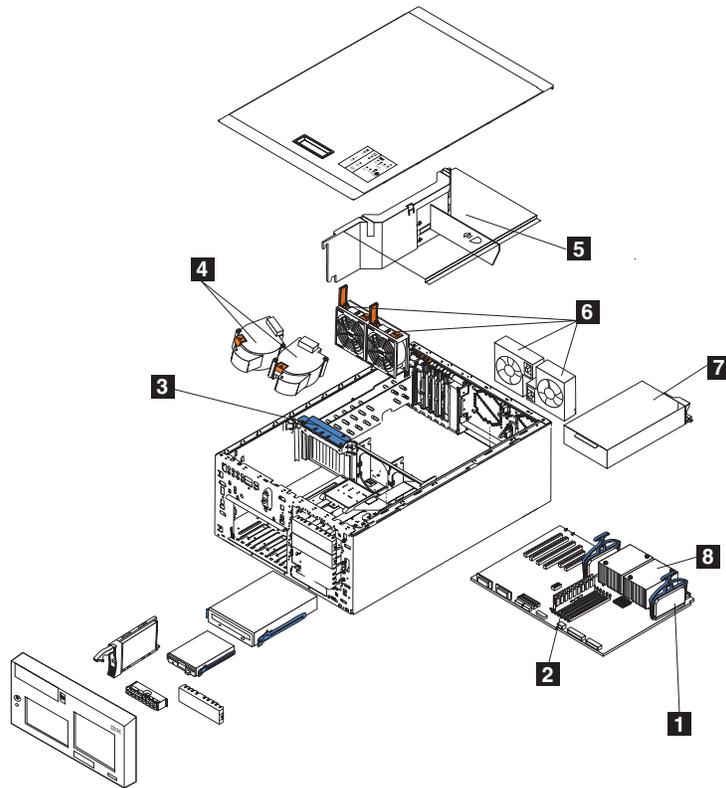


Figure 5. Locations of major components

- 1** Voltage regulator module (VRM)
- 2** Memory modules
- 3** Adapter-support bracket
- 4** Blower fans (larger fans)
- 5** Air baffle
- 6** Fans (smaller fans)
- 7** Power supply
- 8** Microprocessor

## Engine controls and indicators

This section describes the controls and indicators on the Model G27.

### Engine front view

Figure 6 on page 62 illustrates the controls and indicators on the front of the engine of the Model G27.

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

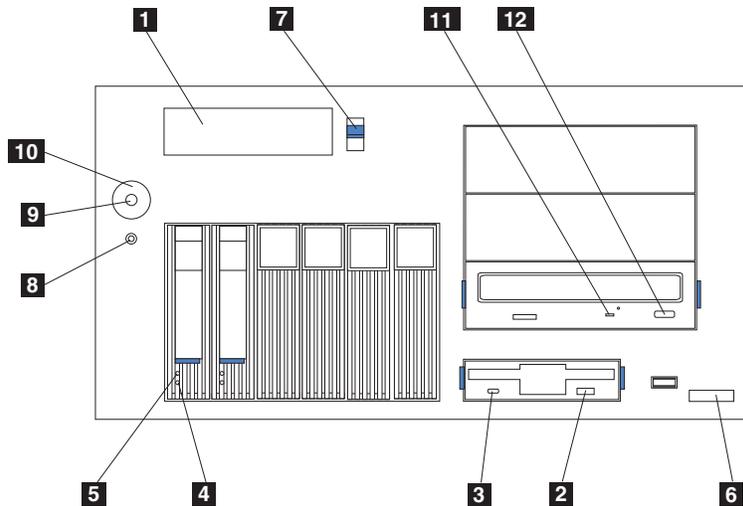


Figure 6. NAS 300G engine front view

- 1 Operator information panel:** The LEDs on this panel give status information for your appliance.
  - 2 Diskette eject button:** Use this button to remove a floppy disk from the drive.
  - 3 Diskette drive activity LED:** This LED is on or flashing when the controller is accessing the drive. Do *not* remove a diskette when this LED is on.
  - 4 Hard disk drive status LED:** Each of the hot-swappable drives has a hard disk drive status LED. When this amber LED is on continuously, the drive has failed. When the LED flashes slowly (one flash per second), the drive is being rebuilt. When the LED flashes rapidly (three flashes per second), the controller is identifying the drive.
  - 5 Hard disk drive activity LED:** Each of the hot-swappable drives has a hard disk drive activity LED. When this green LED is on or flashing, the controller is accessing the drive.
  - 6 Machine type, model number, and serial number:** The machine type, model number, and serial number of your Model G27.
  - 7 Blue cover release latch:** Use this latch when removing the cover.
  - 8 Reset button:** Press this button to reset the engine and run the power-on self-test (POST).
- Attention:** Press this button only when the engine is hung. Pressing this button when the engine is booting or operating may make the appliance nonoperational or corrupt the drives.
- 9 Power button:** Powers the Model G27 on and off.
  - 10 Power-button shield (if installed):** This prevents accidentally powering off the engine.
  - 11 CD-ROM drive activity LED:** This green LED is on or flashing when the controller is accessing the drive.
  - 12 CD-eject button:** Use this button to remove the CD-ROM from the drive.

### Engine rear view

Figure 7 on page 63 illustrates the controls and indicators on the back of the engine of the Model G27.

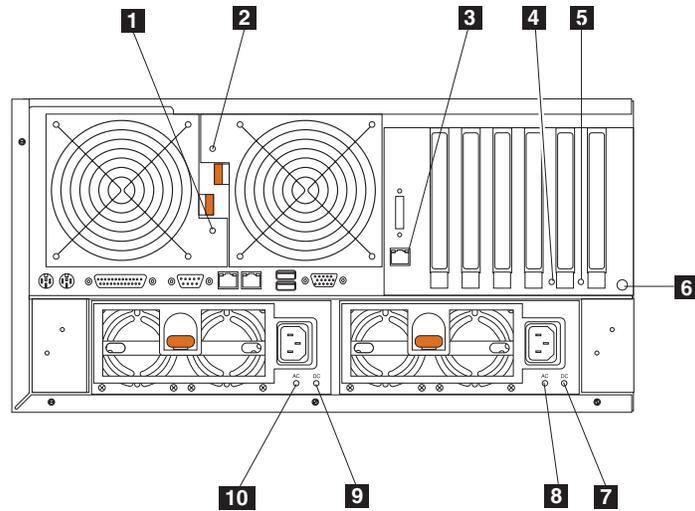


Figure 7. NAS 300G engine rear view

- 1 Fan 1 LED:** This LED provides status information about Fan 1 (rear fan). During normal operation, this LED is off.
- 2 Fan 2 LED:** This LED provides status information about Fan 2 (rear fan). During normal operation, this LED is off.
- 3 Ethernet link status LED:** This LED is on the Ethernet connector. When this LED is on, there is an active connection on the Ethernet port.
- 4 PCI-X slot 5 attention LED:** This LED is disabled on the engine. It is shown only for reference. For an illustration showing this LED on the system board, see Figure 12 on page 69.
- 5 PCI-X slot 6 attention LED:** This LED is disabled on the engine. It is shown only for reference. For an illustration showing this LED on the system board, see Figure 12 on page 69.
- 6 NMI button:** The Non-Maskable Interrupt button is for service use only.
- 7 DC power LED for power supply 2:** This LED provides status information about the power supply. During normal operation, the DC power LED is on.
- 8 AC power LED for power supply 2:** This LED provides status information about the power supply. During normal operation, the AC power LED is on.
- 9 DC power LED for power supply 1:** This LED provides status information about the power supply. During normal operation, the DC power LED is on.
- 10 AC power LED for power supply 1:** This LED provides status information about the power supply. During normal operation, the AC power LED is on.

## System board component locations

This section contains information about components on the system board.

### System-board connectors

Figure 8 on page 64 identifies system-board connectors.

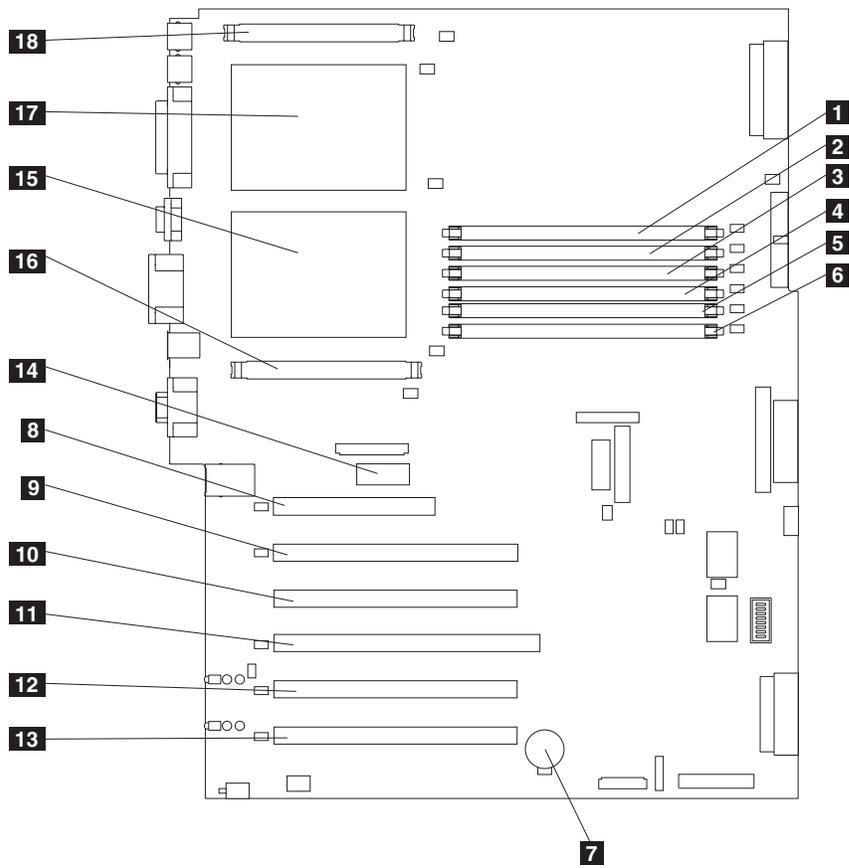


Figure 8. System board connectors

**Note:** The number in parentheses is the location on the system board.

- 1** DIMM slot 1 (J7)
- 2** DIMM slot 2 (J9)
- 3** DIMM slot 3 (J11)
- 4** DIMM slot 4 (J12)
- 5** DIMM slot 5 (J14)
- 6** DIMM slot 6 (J15)
- 7** Battery (BH1)
- 8** PCI slot 1 32-bit 5.0 v (J32)
- 9** PCI slot 2 64-bit 3.3 v (J36)
- 10** PCI slot 3 64-bit 3.3 v (J38)
- 11** PCI slot 4 64-bit 3.3 v (J41)
- 12** PCI slot 5 64-bit 3 v 133-MHz (J43)
- 13** PCI slot 6 64-bit 3 v 133-MHz (J45)
- 14** Remote Supervisor Adapter (J27)
- 15** Microprocessor 1 (U13)
- 16** VRM 1 (J17)
- 17** Microprocessor 2 (U9)
- 18** VRM 2 (J1)

## Internal cables

Figure 9 identifies system-board connectors for internal cables.

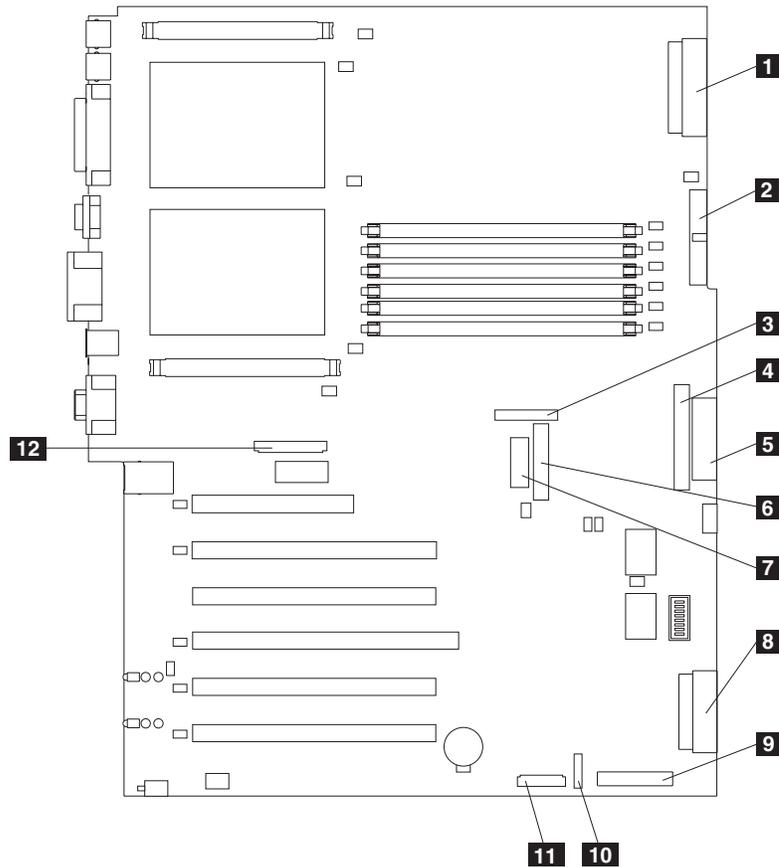


Figure 9. System-board internal cable connectors

- 1** Power (J4)
- 2** Power signal (J10)
- 3** Center fans (J18)
- 4** IDE CD-ROM drive (J21)
- 5** Diskette drive (J22)
- 6** Diagnostics panel (J23)
- 7** Operator-information panel (J24)
- 8** SCSI channel A (J44)
- 9** SCSI channel B (J51)
- 10** On/off/reset panel (J47)
- 11** Front fans (J50)
- 12** Rear fans (J25)

## External devices

Figure 10 identifies system-board connectors for external devices.

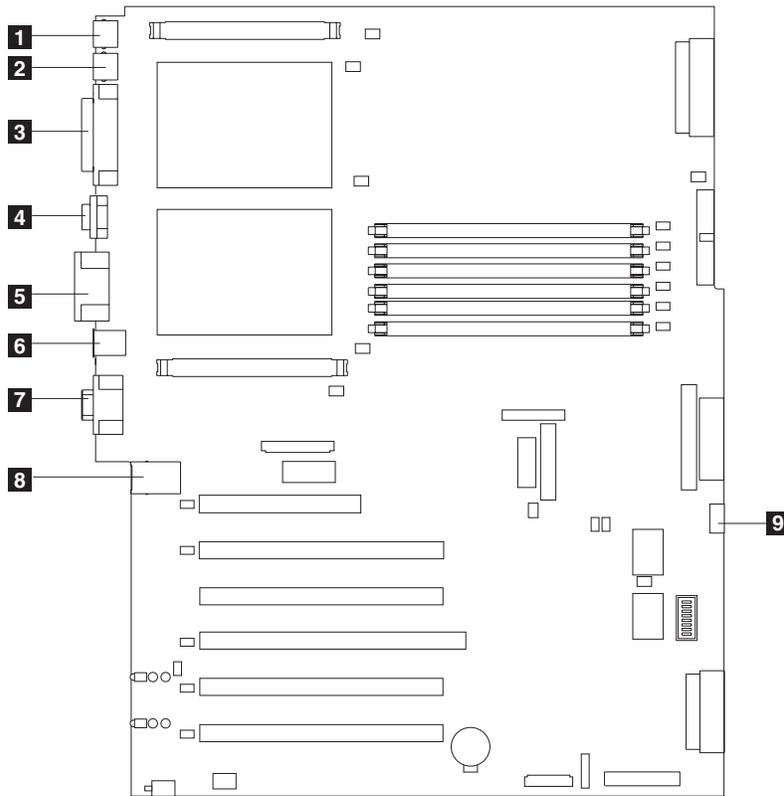


Figure 10. System-board external port connectors

- |          |                                      |
|----------|--------------------------------------|
| <b>1</b> | Keyboard port (J2)                   |
| <b>2</b> | Mouse port (J3)                      |
| <b>3</b> | Parallel port (Not supported) (J5)   |
| <b>4</b> | Serial port (Not supported) (J8)     |
| <b>5</b> | RS-485 port (J13)                    |
| <b>6</b> | Rear USB port (Not supported) (J16)  |
| <b>7</b> | Video port (J19)                     |
| <b>8</b> | Ethernet port (J26)                  |
| <b>9</b> | Front USB port (Not supported) (J29) |

## Switches and jumpers

Figure 11 identifies the switch block (SW1) and jumper blocks (J28 and J42) on the system board.

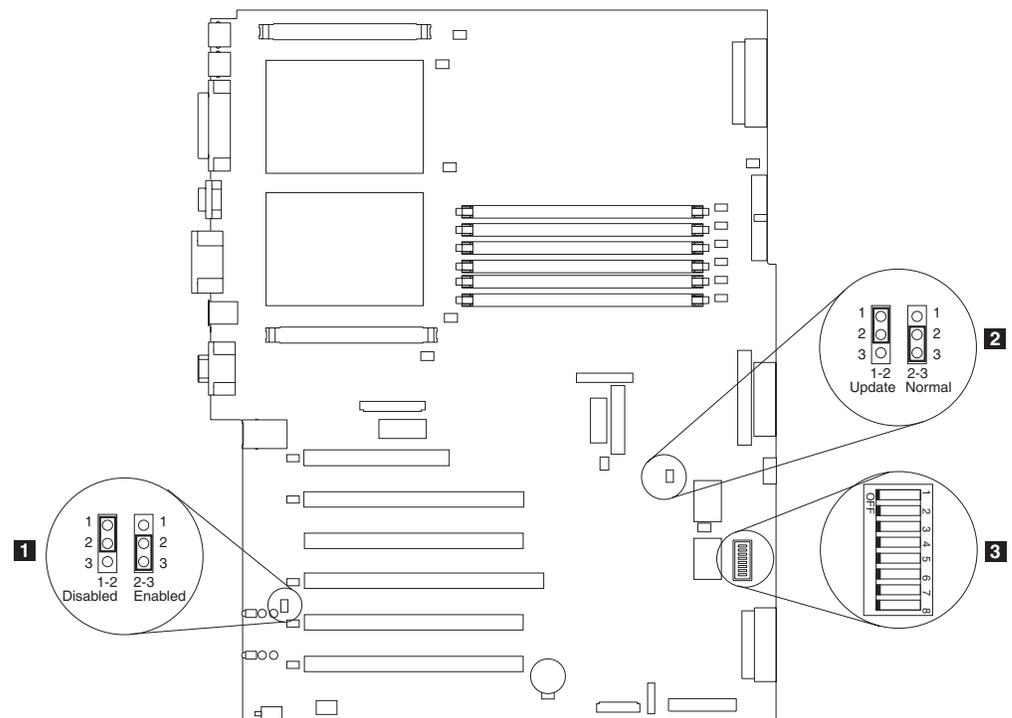


Figure 11. System-board switches and jumpers

- 1** Adapter jumper (J42)
- 2** Boot block recovery jumper (J28)
- 3** System board switch block (SW1)

### System-board jumper blocks

Any jumper blocks on the system board that are not shown in Figure 11 are reserved. For normal operation of the system, the jumpers are already installed and positioned correctly.

### Switches

The switch block contains microswitches 1 - 8. Switch 8 is at the left of the switch block when looking from the front of the engine, and switch 1 is at the right. The Off position for each switch is toward the rear of the engine.

The switches are already set to the correct settings for normal operation. Do not modify the settings unless instructed to do so by an IBM support representative.

Table 27 describes the function for each switch.

Table 27. Switches 1-8

Switch number	Default value	Switch description
8	Off	Reserved.
7	Off	Power-on override. When toggled to the on position, this switch forces the engine to turn on, overriding the power-on button.
6	Off	Power-on password override. Changing the position of this switch bypasses the power-on password check the next time the engine is turned on and starts the Configuration/Setup Utility program so that you can change or delete the power-on password. You do not need to move the switch back to the default position after the password is overridden.  Changing the position of this switch does not affect the administrator password check if an administrator password is set.
5	Off	Reserved.
4	Off	Reserved.
3	Off	Reserved.
2	Off	Reserved.
1	Off	Reserved.

## LEDs

Figure 12 on page 69 identifies system-board LEDs. You might need to refer to this figure when troubleshooting a problem.

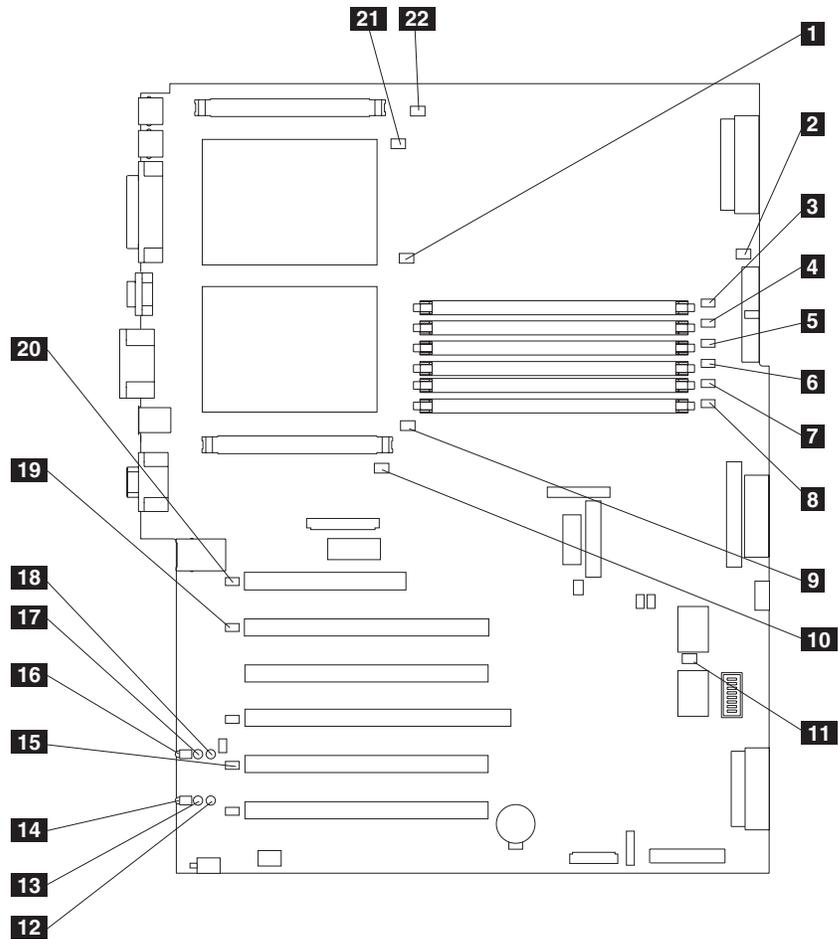


Figure 12. System-board LED locations

- 1** CPU mismatch error LED (CR14)
- 2** Power error LED (CR15)
- 3** DIMM 1 error LED (CR16)
- 4** DIMM 2 error LED (CR17)
- 5** DIMM 3 error LED (CR18)
- 6** DIMM 4 error LED (CR20)
- 7** DIMM 5 error LED (CR22)
- 8** DIMM 6 error LED (CR23)
- 9** CPU 1 error LED (CR24)
- 10** VRM 1 error LED (CR33)
- 11** Service processor activity LED (CR67)
- 12** PCI-X slot 6 power LED (CR79)
- 13** PCI-X slot 6 internal attention LED (CR78) (Disabled)
- 14** PCI-X slot 6 external attention LED (CR77) (Disabled)
- 15** PCI-X bus C error LED (CR76)
- 16** PCI-X slot 5 external attention LED (CR74) (Disabled)
- 17** PCI-X slot 5 internal attention LED (CR73) (Disabled)
- 18** PCI-X slot 5 power LED (CR75)
- 19** PCI-X bus B error LED (CR68)
- 20** PCI bus A error LED (CR66)
- 21** CPU 2 error LED (CR4)
- 22** VRM 2 error LED (CR1)

Diagnostics-panel LEDs viewed with the cover off:

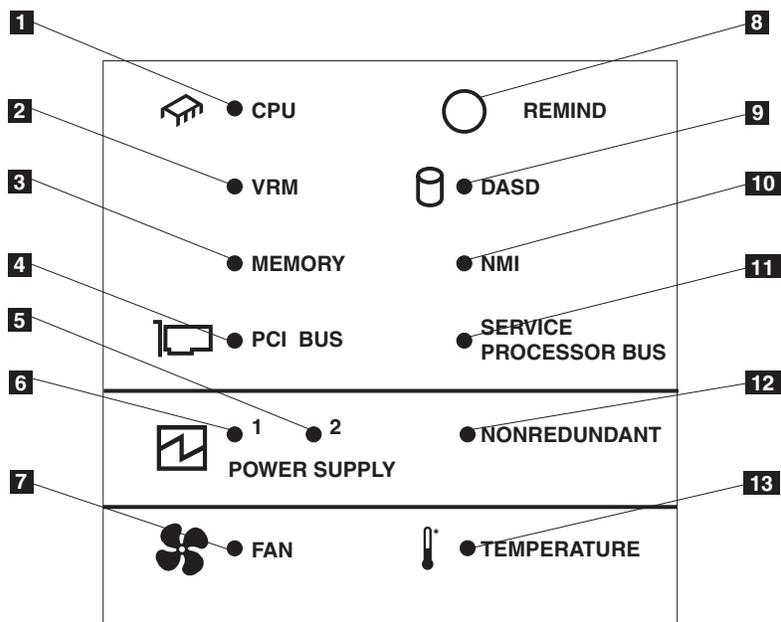


Figure 13. Diagnostics panel LEDs (viewed with the cover off)

Table 28. Diagnostics-panel LED descriptions

Index	Name	Meaning
<b>1</b>	CPU	Microprocessor failure. One or both microprocessors have failed.
<b>2</b>	VRM	Error on VRM or on integrated voltage regulator. The LED next to the affected VRM will also be on.
<b>3</b>	Memory	Memory failure. One or more memory DIMMs have failed.
<b>4</b>	PCI BUS	Error on the PCI bus or system board.
<b>5</b>	Power supply 2	Power supply 2 failure.
<b>6</b>	Power supply 1	Power supply 1 failure.
<b>7</b>	Fan	A fan failed or is operating slowly.
<b>8</b>	Remind button	Press this button to temporarily reset the LEDs on the diagnostics panel.
<b>9</b>	DASD	A hot-swap hard disk drive, backplane, or other part of SCSI channel A has failed. The amber LED next to the drive bay with the failing drive will also be on.
<b>10</b>	NMI	A non-maskable interrupt occurred.
<b>11</b>	Service Processor bus	The system environmental monitor detected an error.
<b>12</b>	Nonredundant	Nonredundant power.
<b>13</b>	Temperature	The operating temperature inside the engine was exceeded.

## Internal drive bays

Internal hard disk drives are installed in *bays*. The drive bays of the Model G27 are in the front of the engine, as shown in Figure 14.

### NAS 300G engine

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

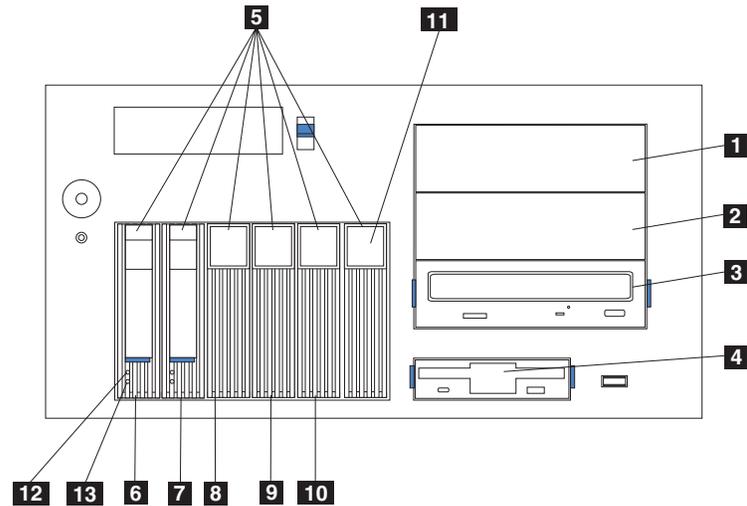


Figure 14. Installing internal drive bays for the NAS 300G engine

- 1** Non-hot-swap bay A
- 2** Non-hot-swap bay B
- 3** CD-ROM drive
- 4** Diskette drive
- 5** Hot-swap bays
- 6** Hot-swap SCSI hard-disk-drive bay 0 (SCSI ID 0)
- 7** Hot-swap SCSI hard-disk-drive bay 1 (SCSI ID 1)
- 8** Hot-swap SCSI hard-disk-drive bay 2 (SCSI ID 2) (unused)
- 9** Hot-swap SCSI hard-disk-drive bay 3 (SCSI ID 3) (unused)
- 10** Hot-swap SCSI hard-disk-drive bay 4 (SCSI ID 4) (unused)
- 11** Hot-swap SCSI hard-disk-drive bay 5 (SCSI ID 5) (unused)
- 12** Hard disk drive activity light
- 13** Hard disk drive status light

## Connecting external options

This section provides information about the following I/O ports on your engine. Most of these ports are on the rear of the engine.

- One keyboard port
- One auxiliary-device port (pointing device) port
- One parallel port (not enabled)
- One serial port (not enabled)
- Two RS-485 ports dedicated to the system service processor
- Two Universal Serial Bus (USB) version 1.1 ports (not enabled)
- One video port
- One Gigabit Ethernet port
- One SCSI port on the rear of the engine

This section shows you the location of the parts to which you can connect any external devices.

Before attaching an external device, read “Before you begin” on page 59 and the documentation that comes with your options. Use the information in this section to understand the input/output ports on the appliance.

The NAS 300G is a headless appliance. It is not necessary to attach a keyboard or monitor to the appliance during installation or normal operation.

## Input/output connector locations

Figure 15 shows the input/output connectors (ports) on the rear of the engine.

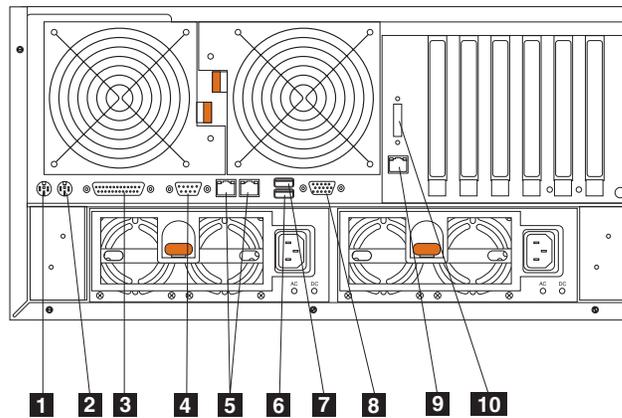


Figure 15. Input and output connector ports for the NAS 300G engine

- 1** Keyboard port
- 2** Mouse port
- 3** Parallel port (not enabled)
- 4** Serial port (not enabled)
- 5** RS-485 port (ASM interconnect)
- 6** Universal Serial Bus (USB) port 2 (not enabled)
- 7** USB port 1 (not enabled)
- 8** Video port
- 9** Ethernet port
- 10** External SCSI port (not used)

**Note:** The ASM connectors are dedicated for use by the Remote Supervisor Adapter.

## Input/output ports

This section provides information about the input/output (I/O) ports.

**Keyboard port:** There is one keyboard connector on the rear of your engine.

The Figure 16 shows the keyboard connector on the rear of your engine. This connector conforms to the industry standard for a PS/2<sup>®</sup> keyboard.

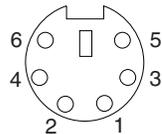


Figure 16. Keyboard port

**Auxiliary-device (pointing device) port:** The system board has one auxiliary-device port that supports a mouse or other pointing device.

The following illustration shows the auxiliary-device connector on the rear of the engine. This connector conforms to the industry standard for a PS/2 pointing device.

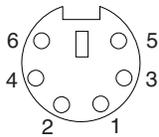


Figure 17. Mouse port

**Parallel port:**

**Note:** This port is not enabled. It is shown for reference only.

Figure 18 shows the 25-pin, female D-shell parallel-port connector on the rear of the engine.

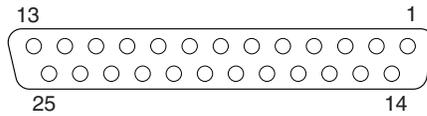


Figure 18. Parallel port

**Serial port:**

**Note:** The serial port is not enabled. It is shown for reference only.

Each engine has one standard serial port.

Figure 19 shows the 9-pin, male D-shell serial-port connector on the rear of the engine. This connector conforms to the industry standard.

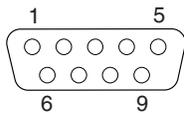


Figure 19. Serial port

**RS-485 (ASM interconnect) port:** For information about the RS-485 port, see “Remote Supervisor Adapter” on page 124.

### **Universal Serial Bus version 1.1 ports:**

**Note:** The USB ports are not enabled. They are shown for reference only.

Each USB port has an external connector on the front and rear of the engine for attaching USB compatible devices.

Figure 20 shows the USB-port connectors on the front and rear of your engine. These connectors conform to the USB version 1.1 standard.

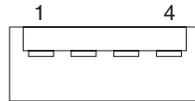


Figure 20. USB ports

**Video port:** Each engine has an integrated super video graphics array (SVGA) video controller. This controller is not removable, but you can disable it through the Configuration/Setup Utility program or by installing a PCI video adapter.

**Note:** If you install a PCI video adapter, the BIOS will automatically disable the integrated video controller.

Figure 21 shows the 15-pin analog video connector on the rear of the engine. This connector conforms to the industry standard.

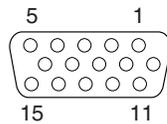


Figure 21. Video port

**Gigabit Ethernet port:** Each engine comes with an integrated Gigabit Ethernet controller. This controller provides an interface for connecting to 10-Mbps, 100-Mbps, or 1000-Mbps networks and provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

To access the Ethernet connector, connect a Category 3, 4, or 5 unshielded twisted-pair (UTP) cable to the Ethernet (RJ-45) connector on the rear of the engine. See Figure 10 on page 66.

**Note:** The 100BASE-TX Fast Ethernet standard and 1000BASE-T standard require that the cabling in the network be Category 5 or higher.

The Ethernet (RJ-45) connector has one LED that indicates Ethernet-link status. When this green LED is on, there is an active connection on the Ethernet port. Activity between the engine and the network is indicated by the Ethernet transmit/receive activity LED on the front of the engine (see Figure 1 on page 6).

*Ethernet connector:* There is an RJ-45 Ethernet connector on the back of the engine. See Figure 15 on page 73 for the location of this connector. Figure 22 shows the pin-number assignments for the RJ-45 connector. These assignments apply to 10BASE-T, 100BASE-TX, and 1000BASE-T devices.

This connector is used to connect the two engines.

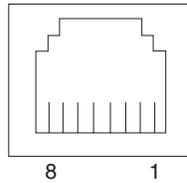


Figure 22. Integrated Gigabit Ethernet controller port

**SCSI ports:**

The engine has one SCSI port located on the rear of the engine. This SCSI port uses the integrated SCSI controller on the system board to provide an external port for tape backup.

*SCSI cabling requirements:* For information about the maximum length of SCSI cable, see the American National Standards Institute (ANSI) SCSI standards on the ANSI Web site at <http://www.ansi.org/> on the World Wide Web. Adhering to these standards will help to ensure that your engine operates correctly.

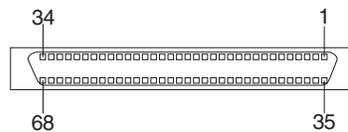
*SCSI IDs:* Each SCSI device that is connected to a SCSI controller must have a unique SCSI ID. This ID enables the SCSI controller to identify the device and ensure that different devices on the same SCSI channel do not attempt to transfer data simultaneously. SCSI devices that are connected to different SCSI channels can have duplicate SCSI IDs. Table 29 lists the SCSI IDs for the hard disk drives and backplanes that are connected to one channel. In the typical configuration, the standard hard disk drives and backplane are connected to channel A.

*Table 29. SCSI IDs for standard hot-swap hard disk drives and backplane*

Device	SCSI ID
Drive bay 5	5
Drive bay 4	4
Drive bay 3	3
Drive bay 2	2
Drive bay 1	1
Drive bay 0	0
Backplane	8

The hot-swap-drive backplane controls the SCSI IDs for the internal hot-swap drive bays. However, when you attach an external SCSI device to an optional SCSI adapter, you must set a unique ID for the device. See the information that comes with the device for instructions to set its SCSI ID.

*SCSI system-board connectors:* Figure 23 shows the 68-pin, female D-shell SCSI connectors. These connectors conform to the SCSI standard.



*Figure 23. SCSI connectors*

---

## Installation and replacement procedures

This section describes how to add or remove internal hardware components.

### Removing the cover

This section provides steps for removing the cover from the Model G27.

#### NAS 300G engine

To remove the top cover:

1. Review the information in “Before you begin” on page 59.
2. If you are planning to install or remove any part other than a hot-swap hard disk drive or hot-swap power supply, shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and all attached devices and disconnect all external cables and power cords.
3. Push the plastic cover-release latch on the front of the engine down to release the cover.
4. While pushing the plastic cover-release latch, slide the cover slightly toward the rear of the engine; the cover will stop after approximately 25 mm (1 inch). Release the cover-release latch; then, lift the cover off the engine and set the cover aside.

**Attention:** For correct cooling and airflow, replace the cover before powering on the appliance. Operating the appliance for extended periods of time (over 30 minutes) with the cover removed might damage appliance components.

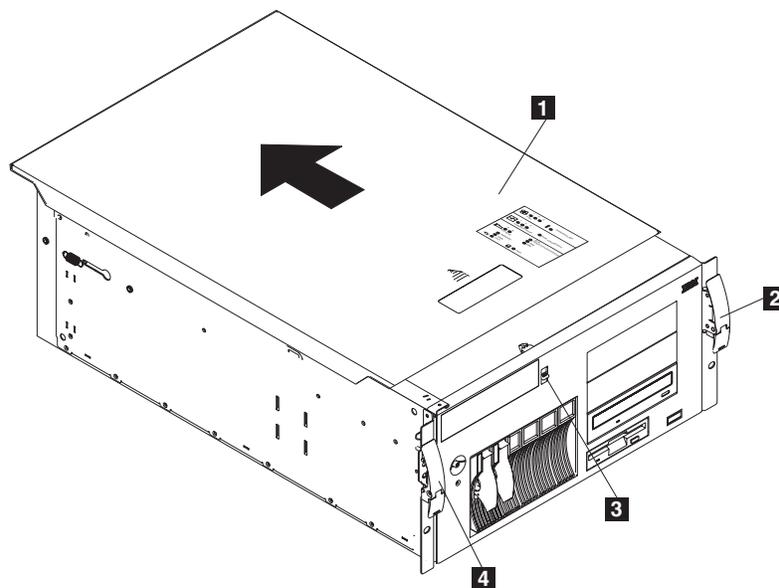


Figure 24. Removing the cover of the NAS 300G engine

- |          |                     |
|----------|---------------------|
| <b>1</b> | Cover               |
| <b>2</b> | Right-side latch    |
| <b>3</b> | Cover-release latch |
| <b>4</b> | Left-side latch     |

## Removing the bezel

### NAS 300G engine

To remove the bezel:

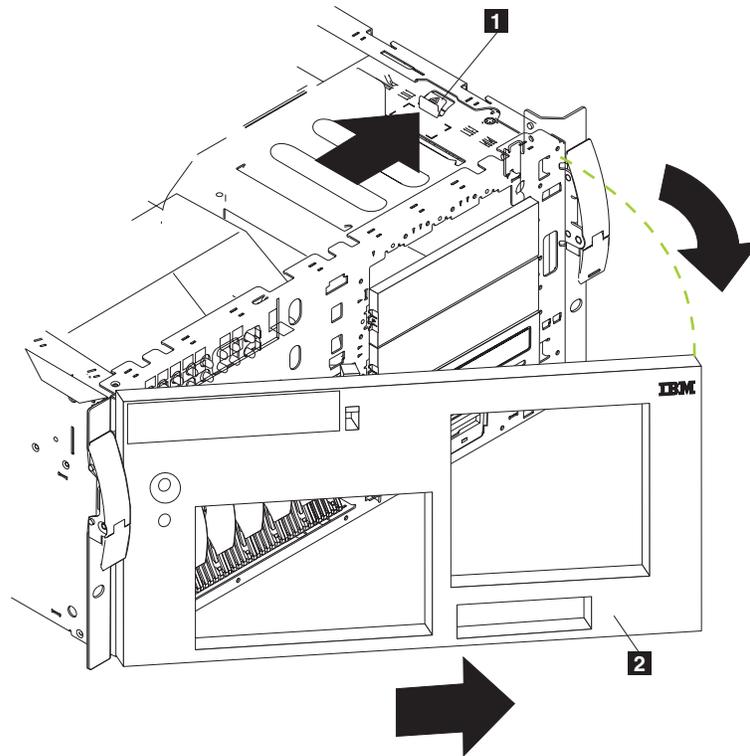


Figure 25. Removing the bezel of the NAS 300G engine

- 1** Bezel-release lever
- 2** Bezel

1. Remove the cover and locate the bezel-release lever.
2. Press the bezel-release lever to the unlocked position as indicated on the lever.
3. Pull the right side of the bezel away from the chassis; then, slide the bezel to the right to disengage the tabs.
4. Remove the bezel from the engine and store the bezel in a safe place.

## Active PCI assembly

1. Review the information in “Before you begin” on page 59.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine.
3. Disconnect all external cables and power cords from the back of the engine.
4. Remove the cover (see “Removing the cover” on page 78).
5. Remove all adapters and spacers (see “Adapters” on page 85).
6. Disconnect the card cable from the system board.
7. Press the two tabs (see Figure 26 on page 80) on the card and remove it from the chassis.

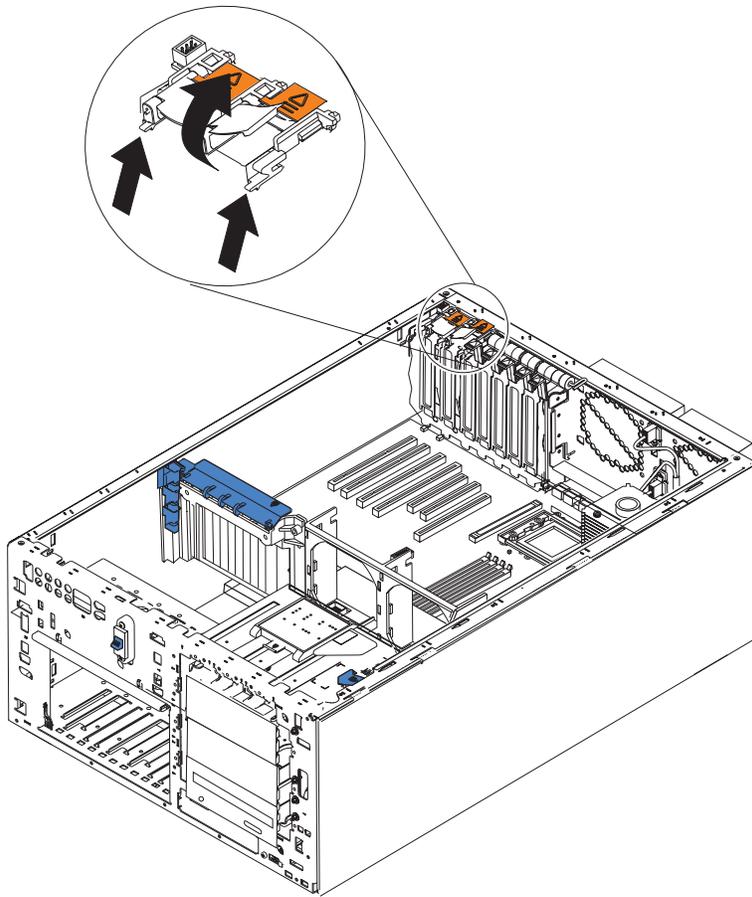


Figure 26. Removing the Active PCI card

8. To replace the Active PCI card, line up the two tabs with the notches on the chassis and snap the assembly into place; then, connect the cable to the system board.

## Adapters

See Figure 27 for the location of the PCI expansion slots on the system board.

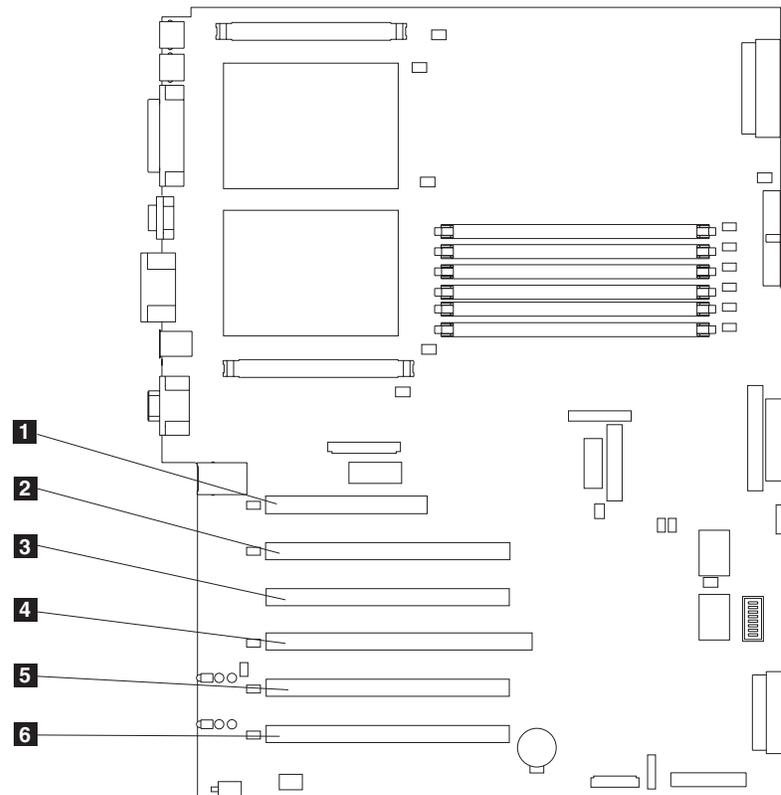


Figure 27. Location of the PCI expansion slots

- |          |                               |
|----------|-------------------------------|
| <b>1</b> | PCI slot 1 32-bit 5.0 V (J32) |
| <b>2</b> | PCI slot 2 64-bit 3.3 V (J36) |
| <b>3</b> | PCI slot 3 64-bit 3.3 V (J38) |
| <b>4</b> | PCI slot 4 64-bit 3.3 V (J41) |
| <b>5</b> | PCI slot 5 64-bit 3 V (J43)   |
| <b>6</b> | PCI slot 6 64-bit 3 V (J45)   |

## **Adapter considerations**

Before you install any adapters:

- Determine which expansion slot you will use for the adapter by using either the rules in “Adapter placement rules” on page 145 or the tables in Appendix A, “Communication adapters” on page 145. See “PCI adapter placement” on page 145 for help identifying the adapters.
- Have a small, flat-blade screwdriver available.
- Check the instructions that come with the adapter for any requirements or restrictions.

## Adapter-support bracket

When working with some options, you must first remove the adapter-support bracket to access certain components or connectors on the system board.

**Note:** The center-fan bracket is attached to the adapter-support bracket. Both brackets are removed and installed together as a single unit.

Complete the following steps to remove the adapter-support bracket:

1. Review the information in “Before you begin” on page 59.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine and disconnect all power cords and external cables; then, remove the cover (see “Removing the cover” on page 78).
3. See Figure 28 and slide the air-baffle assembly out of the guides; then, remove it from the engine.

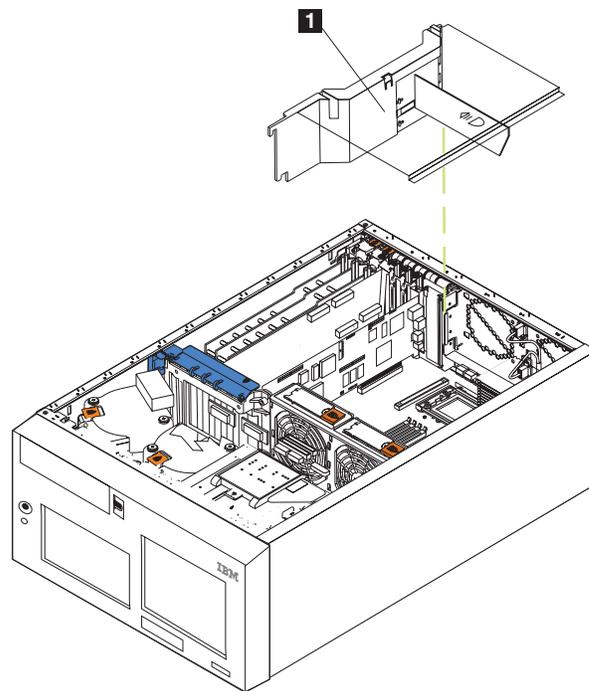


Figure 28. Removing the air-baffle assembly

### **1** Air-baffle assembly

4. Disconnect any cables that are connected to the full-length adapters.
5. Lift the adapter-retention clip on top of the adapter-support bracket and the adapter-retention latch from each full-length adapter; then, remove the full-length adapters. (See Figure 30 on page 85 for the location of the adapter-retention clip.)
6. Lift and remove the plastic dividers from PCI-X slots 5 and 6 by lifting the ends of the dividers out of the adapter support bracket and tilting the dividers up and out of the engine.

7. Disconnect the end of the cable that is attached to the center-fans connector (J18). See Figure 9 on page 65 for the location of the center-fans connector. To disconnect this cable:
  - a. Press the small tab on the flat part of the cable connector facing away from the memory modules.
  - b. While pressing the tab, disconnect the cable.
8. Remove the adapter-support bracket (see Figure 29).

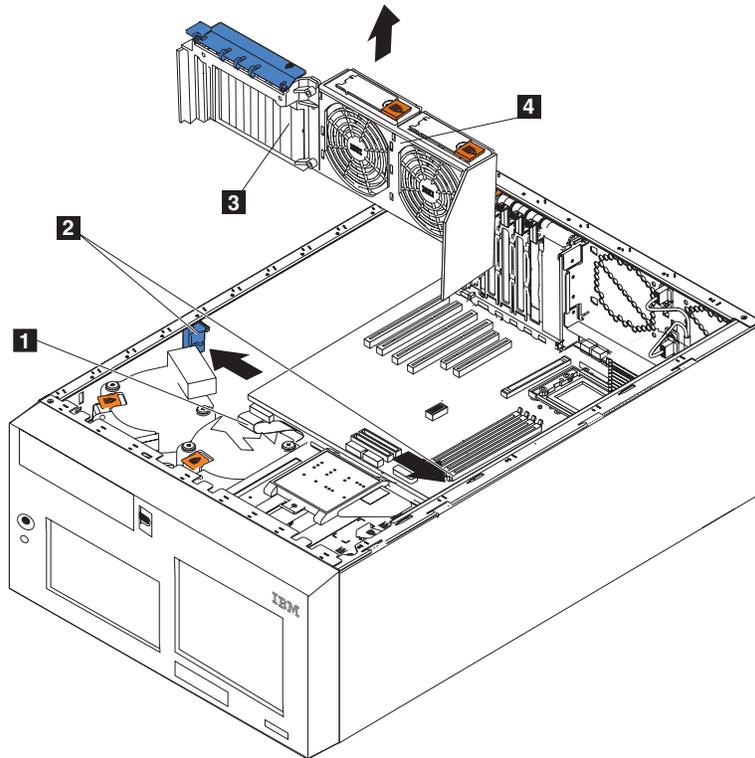


Figure 29. Removing the adapter-support bracket

- 1** SCSI cable
- 2** Adapter-support bracket latches
- 3** Adapter-support bracket
- 4** Center-fan bracket

- a. Press the release tab on each adapter-support bracket latch. There are two latches, one at each end of the adapter-support bracket.
- b. Slide the adapter-support bracket out of the guides; then, remove it from the engine.

**Note:** To reinstall the adapter-support bracket and other components that you removed or disconnected, reverse the preceding steps. Remember to reroute the cables that you disconnected and reconnect the center-fan cable to connector J18 on the system board.

9. Continue with the option installation or removal procedure.

## Adapters

Figure 30 shows how to install a PCI adapter.

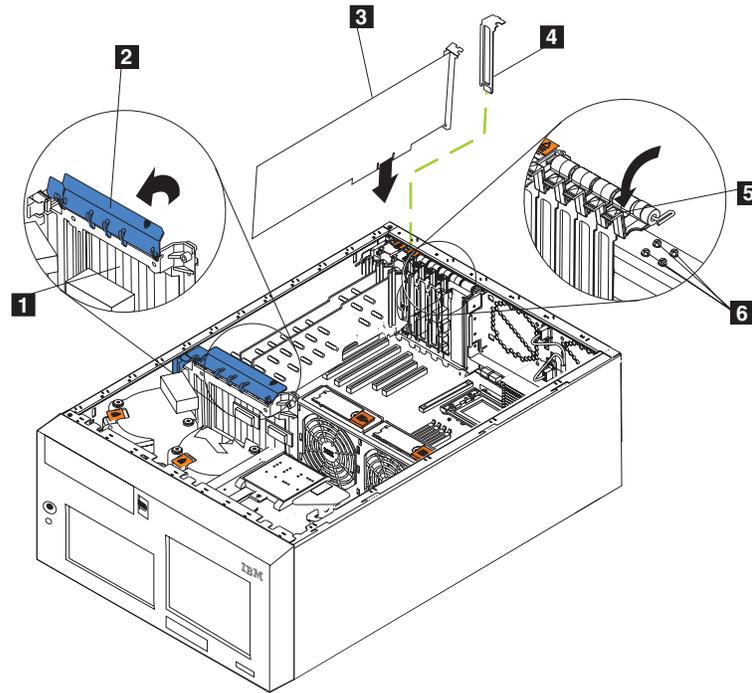


Figure 30. Installing an adapter (NAS 300G engine)

- 1 Adapter-support bracket
- 2 Adapter-retention clip
- 3 Adapter
- 4 Expansion-slot cover
- 5 Adapter-retention latch
- 6 Backup expansion-slot screws

**Attention:** When you handle devices that are sensitive to electrostatic discharge (ESDs), take precautions to avoid damage from static electricity. For details on handling these devices, refer to “Handling electrostatic discharge-sensitive devices” on page 175.

Follow these steps to install a PCI or PCI-X adapter:

1. Review the safety precautions listed in *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and peripheral devices. Disconnect all external cables and power cords; then, remove the cover. See “Removing the cover” on page 78 for details.
3. Determine which expansion slot you will use for the adapter using either the rules explained in “Adapter placement rules” on page 145 or the plug combination charts in Appendix A, “Communication adapters” on page 145. Be sure to check the instructions that come with the adapter for any requirements or restrictions.

4. If you are installing an adapter in PCI slot 1 or PCI-X slots 2 through 4, lift the tab on the expansion-slot cover. Continue with the next step.  
If you are installing an adapter in PCI-X slot 5 or 6, slide the orange adapter-retention-latch release toward the rear of the engine and hold it there while you lift the black adapter-retention latch to the unlocked (open) position, as shown in Figure 31.

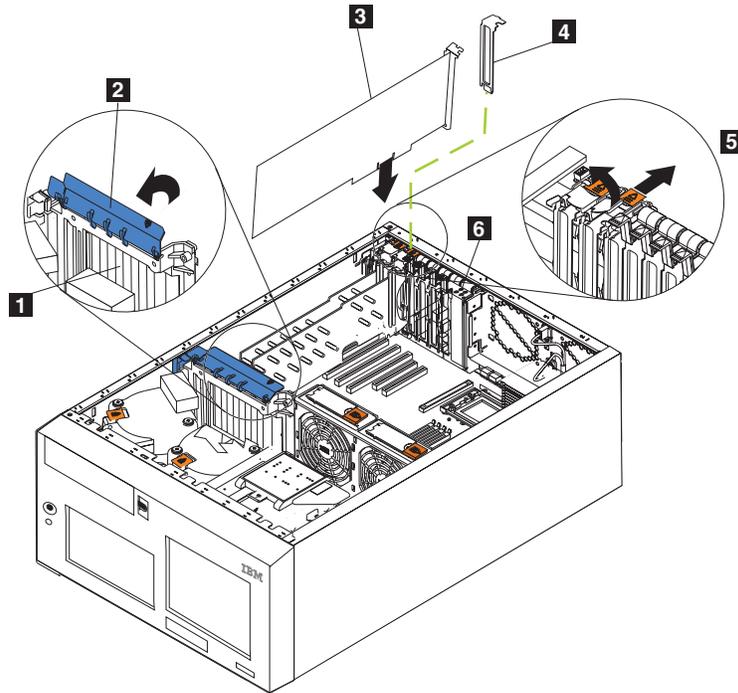


Figure 31. Installing an adapter into slots 5 or 6

- |          |                         |
|----------|-------------------------|
| <b>1</b> | Adapter-support bracket |
| <b>2</b> | Adapter-retention clip  |
| <b>3</b> | Adapter                 |
| <b>4</b> | Expansion-slot cover    |
| <b>5</b> | Adapter-retention latch |

**Attention:** Expansion-slot covers must be installed on all empty slots. This maintains the electronic emissions characteristics of the system and ensures correct cooling of system components.

5. Remove the expansion-slot cover:
  - a. Push down the arrow on the adapter-retention-bracket release tab and the tab below, and pull to remove the bracket.
  - b. Slide the expansion-slot cover out of the appliance. Store it in a safe place for future use.
6. If you are installing a full-length adapter, lift the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.

7. Refer to the documentation that comes with your adapter for any cabling instructions. It might be easier for you to route any cables before you install the adapter.

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

8. Grasp the adapter by the metal bracket or adapter guide end and remove the adapter from the static-protective package.
9. Place the adapter, component-side up, on a flat, static-protective surface.
10. 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 appliance, 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. Secure an adapter in slots 1-4 with a screw: insert one of the backup expansion-slot screws (see Figure 30 on page 85 for the location of the screws) through the top of the adapter bracket into the screw hole to secure the adapter.
  - d. Lower the adapter-retention latch over the top corner of the adapter. In slot 5 or 6, make sure that the latch is in the locked (closed) position.
11. If you installed a full-length adapter, close the adapter-retention clip on the adapter-support bracket. Otherwise, continue with the next step.
12. Connect any needed cables to the adapter.

**Attention:** Route cables so that they do not block the flow of air from the fans.
13. If you have other options to install or remove, do so now; otherwise, go to “Installing the cover” on page 133.

## Battery

There is only one battery in each engine that might need replacing. It is located on the system board.

### Engine battery replacement

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 safety guidelines.



**CAUTION:**

<2-16> 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.

**Note:** For translated versions of this safety notice, refer to *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which is on the publications CD that was shipped with your appliance.

**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 correct manner. To order replacement batteries, call 1 800-772-2227 within the United States.

Before you begin:

- Read “Before you begin” on page 59.
- Follow any special handling and installation instructions supplied with the replacement battery.
- Attach a monitor and keyboard.

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

To replace the battery:

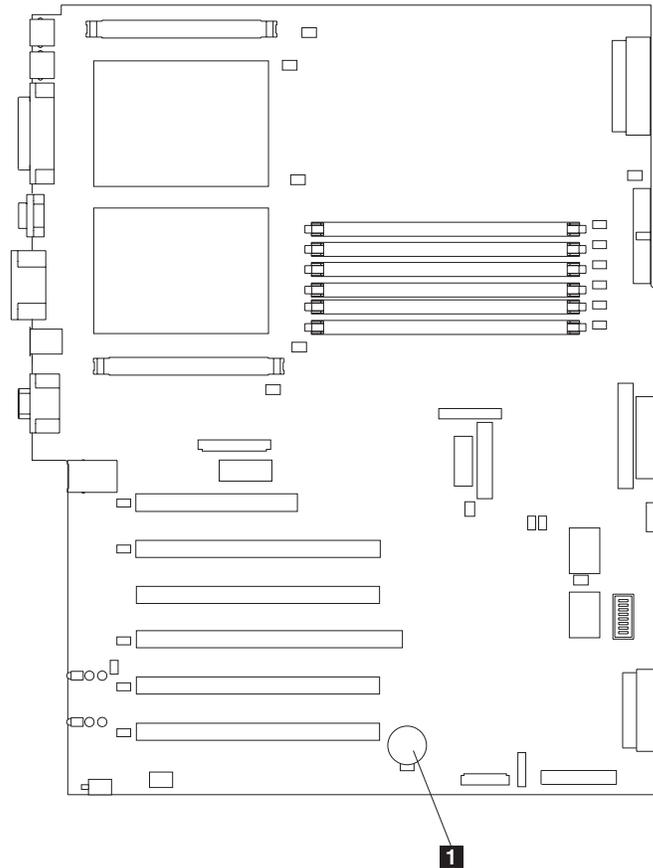
1. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and peripheral devices, and disconnect all external cables and power cords.
2. Remove the cover (see “Removing the cover” on page 78).
3. Lift the adapter-retention clip on top of the adapter-support bracket (see “Adapter-support bracket” on page 83).

4. Remove all of the full-length adapters and plastic dividers (see “Adapters” on page 85).

**Attention:** Note the location of the adapters. You must replace each adapter in the same slot from which it was removed.

**Note:** You do not need to unplug the internal adapter cables.

5. Locate the battery (connector BH1) on the system board using Figure 32.



**1** Battery

Figure 32. Replacing the battery

6. Remove the plastic cover on the system board.
7. Remove the battery:
  - a. Use one finger to press the top of the battery clip away from the battery until the battery releases upward from the socket as shown in Figure 33 on page 90.
  - b. Lift and remove the battery from the socket.

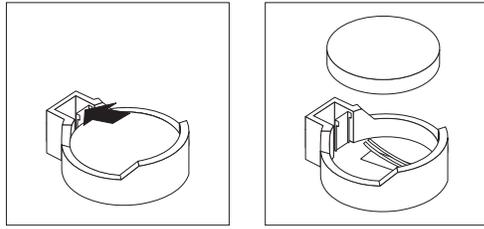


Figure 33. Releasing the battery

8. Insert the new battery:

**Note:** Ensure that the polarity of the battery is correct. The positive (+) side must face up.

- a. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
- b. Press the battery down into the socket until it clicks under the battery clip, as shown in Figure 34.

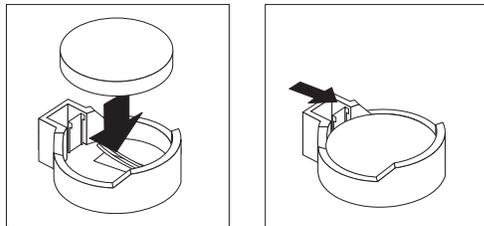


Figure 34. Inserting the new battery

9. Reinstall the adapters and plastic dividers in the same slots from where they were removed, and reconnect any internal cables that were disconnected (see “Adapters” on page 85).
10. Replace the adapter-support bracket (see “Adapter-support bracket” on page 83).

**Note:** You must reinstall the air-baffle assembly when you reinstall the adapter-support bracket. Make sure that no cable is under the adapter-support bracket or interferes with the center fans.

**Important:** To ensure correct cooling and engine operation, you must keep the air-baffle cover closed.

11. Reinstall the engine cover, and connect the power cords and external cables.

**Note:** Wait approximately 20 seconds after you plug the power cords of your appliance into electrical outlets for the power button to become active.

12. Power on the appliance.
13. Start the Configuration/Setup Utility program and set configuration parameters:
  - Set the system date and time
  - Set the power-on password
  - Reconfigure your appliance

# CD-ROM drive

**Note:** The appliance's electromagnetic interference (EMI) integrity and cooling are both protected by having the non-hot-swap drive bays covered or occupied.

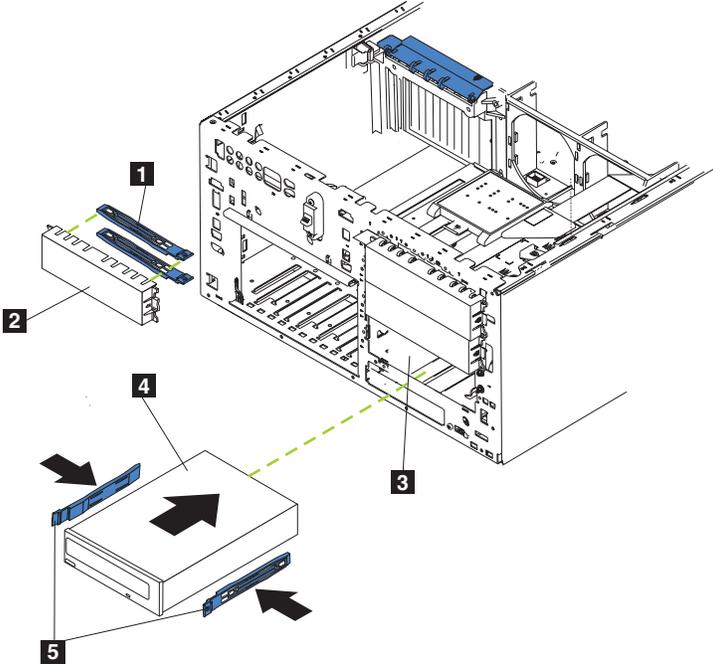


Figure 35. Replacing a CD-ROM drive

- 1 Blue slide rails
- 2 Filler panel
- 3 Non-hot-swap bay
- 4 Non-hot-swap drive
- 5 Slide rails

To replace a CD-ROM drive:

1. Review the safety precautions in *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and peripheral devices and then remove the cover, door, and bezel (see “Removing the cover” on page 78 and “Removing the bezel” on page 79 for details).
3. Unplug the power and data cables attached to the rear of the drive (the power cable is labeled P6).
4. Remove the CD-ROM drive by pressing on the blue tabs on side of the drive and pulling the drive out of the bay.
5. Observe the following safety precaution:



**CAUTION:**

<2–8> When laser products (such as CD-ROMs, 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 translations of this safety notice, refer to *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.

6. Set the jumpers to the slave setting according to the documentation that comes with the drive.
7. Align the rails on the drive with the guide rails in the drive bay.
8. Push the drive into the bay until it clicks into place.

9. Connect a power and data cables to the back of the drive. Both cables are included with the engine. The data cable is labeled *CD*, while the power cable is labeled *P6*. The connectors are keyed and can be inserted only one way.
10. If you have other options to install or remove, do so now; otherwise, replace the cover, door, and bezel (see “Removing the cover” on page 78 and “Removing the bezel” on page 79 for details).
11. If you are replacing an IDE drive, load the system image on the hard disk drive (see Appendix B, “Using the Recovery and Supplementary CD-ROMs” on page 153).

## DASD backplane assembly

To remove the DASD backplane assembly:

1. Review the safety precautions listed in *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and peripheral devices and disconnect all external cables and power cord.
3. Remove the cover and bezel (see “Removing the cover” on page 78 and “Removing the bezel” on page 79).
4. Pull out the hot-swap hard disk drives just far enough to disengage the DASD backplane assembly. Do **not** pull the drives all the way out.
5. Remove the two front fans (see “Hot-swap fan” on page 97).
6. Disconnect and remove the adapters and spacers (see “Adapters” on page 85).
7. Remove the two center fans (see “Hot-swap fan” on page 97).
8. Remove the plastic baffle (see Figure 45 on page 107).
9. Disconnect the DASD cables from the DASD backplane.

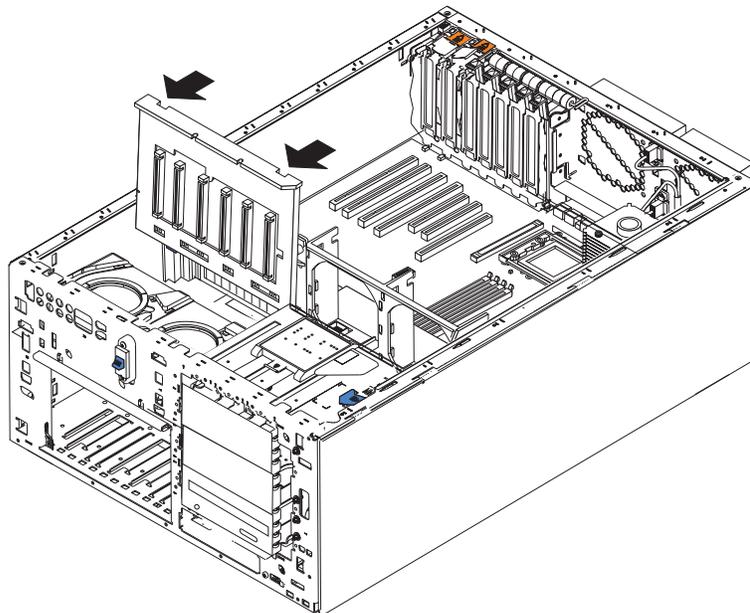


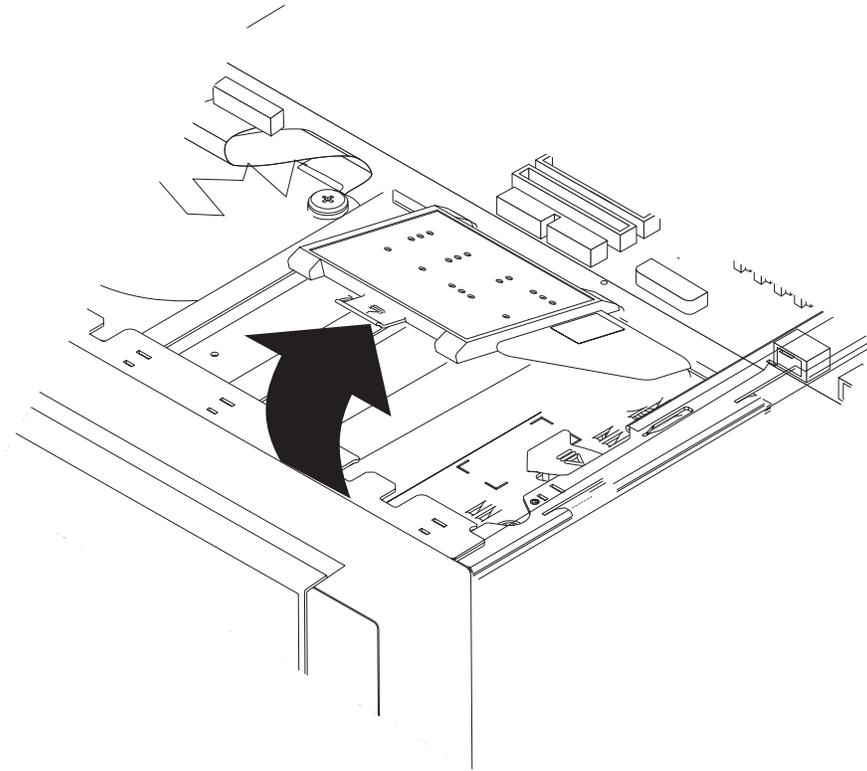
Figure 36. Removing the DASD backplane

10. Press the release latches in the direction of the system board and pull the backplane out of the engine.
11. To replace the DASD backplane, reverse the previous steps, making sure to place the backplane assembly over the two guide pins on the chassis floor.
12. Replace the cover and bezel (see “Removing the cover” on page 78 and “Removing the bezel” on page 79).

## Diagnosics panel card

To remove the diagnostics panel card:

1. Review the information in “Before you begin” on page 59.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine.
3. Disconnect all external cables and power cords from the back of the engine.
4. Remove the cover (see “Removing the cover” on page 78).
5. Disconnect and remove adapters and spacers (see “Adapters” on page 85).
6. Remove the two central fans (see “Hot-swap fan” on page 97).
7. Remove the plastic baffle (see Figure 45 on page 107).
8. Remove the adapter-support bracket (see “Adapter-support bracket” on page 83).
9. Disconnect the diagnostics panel card cable from the system board (J23) by pinching the tabs on the ends of the cable together and removing the cable.
10. Slide the CD-ROM drive out enough to allow access to the cable (see “CD-ROM drive” on page 91).
11. Grasp the tab on the diagnostics panel card and gently pull up and to the right until the card assembly releases.



*Figure 37. Removing the diagnostics panel card*

12. To replace the diagnostics panel card, line up the two notches on the left and snap the assembly into place; then, connect the cable to the system board.
13. Reverse the steps to reconnect the items that were disconnected.
14. Replace the cover (see “Installing the cover” on page 133).

## **Diskette drive**

Complete the following steps to remove the diskette drive.

1. Review the information in “Before you begin” on page 59.
2. Turn off the engine and all attached devices.
3. Disconnect all external cables and power cords from the back of the engine.
4. Remove the cover (see “Removing the cover” on page 78).
5. Remove the front bezel (see “Removing the bezel” on page 79).
6. Press in on the two blue diskette drive release tabs until the drive is released from the chassis.

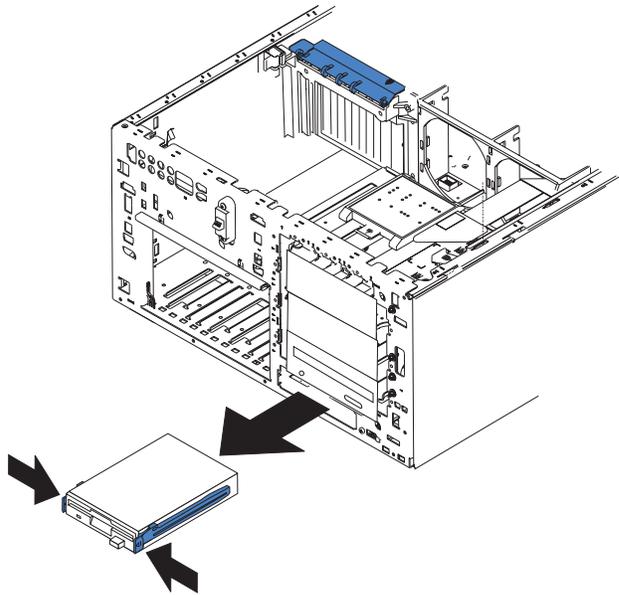


Figure 38. Removing the diskette drive

7. Carefully pull the drive away from the chassis until the cables at the rear of the drive are accessible.
8. Remove the two cables from the back of the drive and pull the drive out.
9. To replace the diskette drive, reverse the previous steps.

**Note:** If you are replacing the drive, prepare the new drive by completing the following procedure:

- a. Remove the side rails from the drive by gently pulling them away from the drive until they detach.
- b. Insert one pin of the rail into the notch near the rear of the drive.
- c. Pushing the rail gently toward the rear of the drive, insert the other pin into the notch near the front of the drive.
- d. Press in on the metal strip in the rail to secure the rail to the drive.

## Front-fan housing

To remove the front-fan housing:

1. Review the safety precautions listed in *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and peripherals, and disconnect the power cords and external cables.
3. Remove the cover (see “Removing the cover” on page 78).
4. Remove the bezel (see “Removing the bezel” on page 79).
5. Remove the two front fans (see “Hot-swap fan” on page 97).
6. Disconnect and remove adapters and spacers (see “Adapters” on page 85).
7. Remove the two center fans (see “Hot-swap fan” on page 97).
8. Remove the plastic baffle (see Figure 45 on page 107).
9. Remove the adapter-support bracket (see Figure 29 on page 84).
10. Remove the DASD backplane (see “DASD backplane assembly” on page 93).

11. Disconnect the fan cable from the system board:
  - a. Press the small tab on the flat part of the cable connector facing the inside of the chassis.
  - b. While pressing the tab, disconnect the cable.
12. Press in the tabs ( **1** ) with the tip of a flat-blade screwdriver until the housing releases and tilts up ( **2** ); then, pull the housing out of the two notches on the front of the chassis and lift ( **3** ) the housing out of the engine.

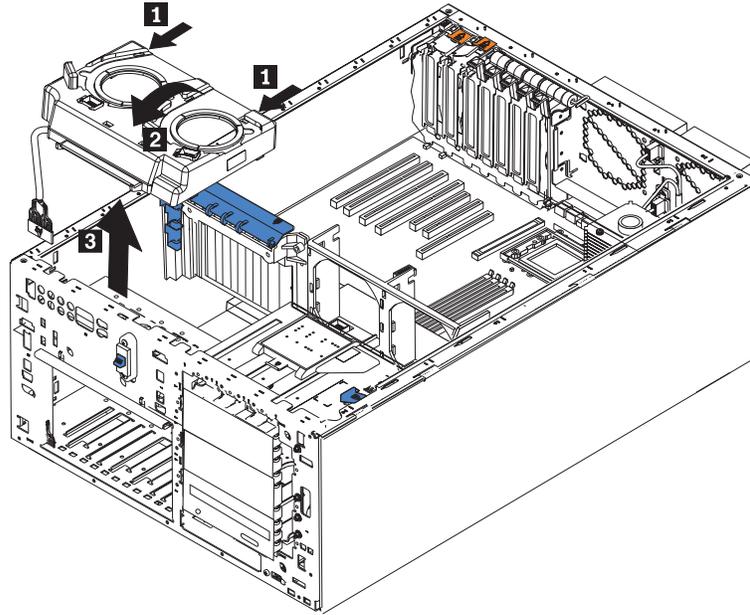


Figure 39. Removing the front fan housing

13. To replace the blower housing, reverse the previous steps, making sure that the two tabs are inserted into the notches on the front of the chassis.

## Hot-swap fan

Each engine comes with six hot-swap fans (two front fans in connector J50, two center fans in connector J18, and two rear fans in connector J25). The two largest fans (in connector J50) are also known as blowers. You do not need shut down the engine to replace a hot-swap fan. Figure 40 on page 98 shows the numbering scheme for identifying the fans.

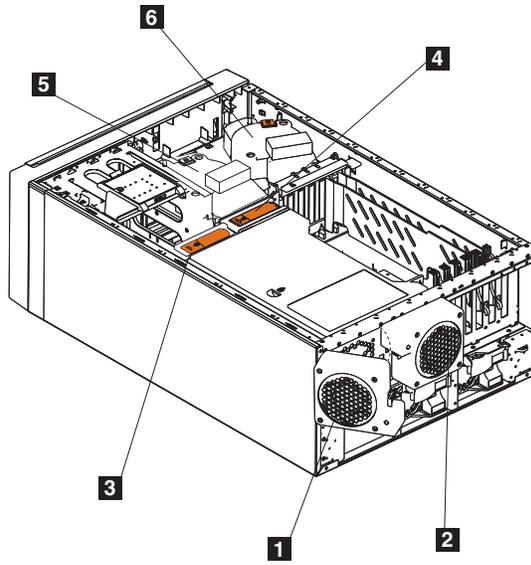


Figure 40. Fan identification

- |          |       |
|----------|-------|
| <b>1</b> | Fan 1 |
| <b>2</b> | Fan 2 |
| <b>3</b> | Fan 3 |
| <b>4</b> | Fan 4 |
| <b>5</b> | Fan 5 |
| <b>6</b> | Fan 6 |

**Attention:** To help ensure correct cooling, if a fan fails, replace it within 48 hours.

Figure 41 shows how to replace hot-swap fans.

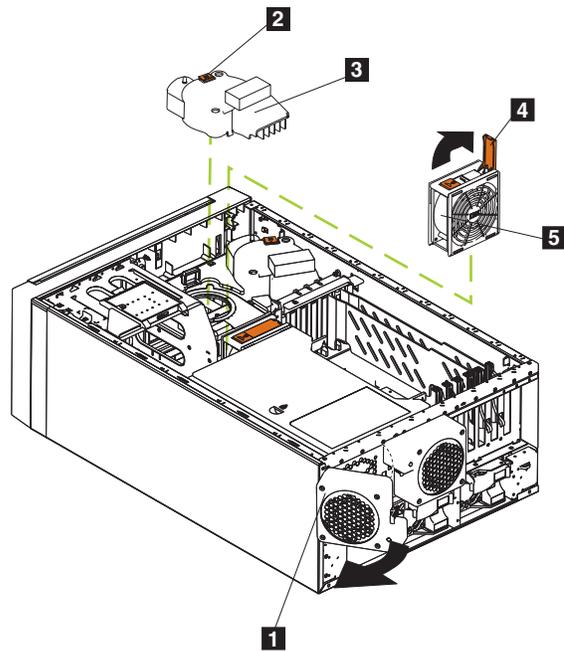


Figure 41. Replacing a hot-swap fan

- 1** Fan release latch for rear fans (1 and 2)
- 2** Fan assembly latch for front fans (5 and 6)
- 3** Hot-swap fan assembly
- 4** Release lever for the center fans (3 and 4)
- 5** Hot-swap fan

Determine which fan to replace by checking the LEDs on the fans. The front fans, center fans, and rear fans are installed differently from each other. This section contains separate instructions for each group of fans.

## Replacing a front fan

Complete the following steps to replace front fan 5 or 6 in connector J50:

1. Review the information in “Before you begin” on page 59.
2. Remove the cover (see “Removing the cover” on page 78).  
**Attention:** To ensure correct system cooling, do not remove the cover for more than 30 minutes during this procedure.
3. Press the orange fan-release latch in the direction indicated by the arrow.
4. Pull the fan out of the engine.
5. Align the two tabs on the replacement fan with the notches in the fan housing and press the fan into the corresponding connector. Press the front edge of the fan to engage the latch fully and secure the fan.
6. Verify that the FAN LED on the diagnostic LED panel is not on. If the FAN LED is on, reseal the fan.
7. Reinstall the cover (see “Installing the cover” on page 133).

## Replacing a center fan

Complete the following steps to replace center fan 3 or 4 in connector J18:

1. Review the information in “Before you begin” on page 59.
2. Remove the cover (see “Removing the cover” on page 78).  
**Attention:** To ensure correct system cooling, do not remove the engine cover for more than 30 minutes during this procedure.
3. Press the orange fan-release latch in the direction indicated by the arrow; the latch arm springs up.
4. Pull the fan out of the engine.
5. Press the orange fan-release latch in the direction indicated by the arrow and open the latch; then, slide the replacement fan into the engine. Press the latch arm to snap it into place and secure the fan.  
  
**Note:** When you slide the fan into the engine, make sure that the orange fan-release latch is at the top.
6. Verify that the FAN LED on the diagnostics LED panel is not on. If the FAN LED is on, reseal the fan.
7. Reinstall the cover (see “Installing the cover” on page 133).

## Replacing a rear fan

Complete the following step to replace rear fan 1 or 2 in connector J25:

1. Review the information in “Before you begin” on page 59.
2. Press and pull out on the orange fan-release latch on the rear fan bracket; then, lift the fan away and out of the hinge cutouts.
3. Touch an unpainted metal part of the engine for at least 2 seconds; then, slide the replacement fan into the engine. (Make sure that the fan fits correctly into the hinge cutouts on the rear of the engine.)
4. When you have the fan correctly seated, push on the fan-release latch until it clicks into place.
5. Verify that the FAN LED on the diagnostics LED panel is not on. If the FAN LED is on, reseal the fan.

## Hard disk drive

This section gives the procedure for installing a hard disk drive. If you want to remove a drive, reverse the steps. Note that you should wait at least 20 seconds before fully removing the drive to allow it to spin down.

### Notes:

1. To minimize the possibility of damage to the hard disk drive, leave a rack-mounted engine in the rack while replacing the hard disk drive.
2. You **do not** have to shut down the engine to install hot-swap hard disk drives, unless the engine has only one hard disk drive. However, you must shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine when performing any steps that involve installing or removing cables.

### Installing a hard disk drive

#### Attention:

- To maintain correct system cooling, do not operate the appliance for more than 2 minutes without either a hard disk drive or a filler panel installed in each drive bay. Therefore, if you are replacing a defective hot-swap drive, either leave the defective drive in place or put in a filler panel until you have a replacement drive.
- When you handle electrostatic discharge-sensitive devices (ESDs), take precautions to avoid damage from static electricity. For details about handling these devices, refer to “Handling electrostatic discharge-sensitive devices” on page 175.

To install a hot-swap hard disk drive in a drive bay:

1. Remove the filler panel from one of the empty hot-swap drive bays by inserting your finger in the depression on the filler panel and pulling it away from the appliance. Save the filler panel in case you need it in the future.
2. Install the hot-swap hard disk drive in the drive bay:
  - a. Ensure that the tray handle is open (that is, perpendicular to the hard disk drive).
  - b. Align the rails on the hard disk drive assembly with the guide rails in the drive bay.
  - c. Gently push the hard disk drive assembly into the drive bay until it connects to the backplane.
  - d. Push the tray handle toward the closed position until it locks the hard disk drive in place.

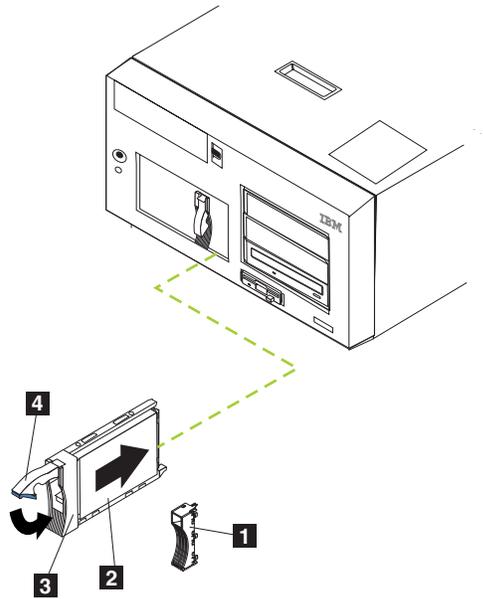


Figure 42. Installing a hard disk drive

- 1** Filler panel
- 2** Hard disk drive
- 3** Drive tray
- 4** Drive-tray handle (in open position)

3. Locate the filler piece on the inside of the filler panel.
4. Pull up on the small latch inside the filler panel to release the filler piece.
5. Tilt the filler piece up from the filler panel; then remove it from the tray.
6. Insert the filler piece into the empty space that is left in the drive bay.
7. Check the hard-disk-drive status indicators to verify that the hard disk drives are operating correctly. The Hard-disk-drive status LED is immediately to the right of the hard disk drive.
  - When the green LED flashes rapidly (three flashes per second), the controller is identifying the hard disk drive.
  - When the green LED flashes slowly (one flash per second), the hard disk drive is being rebuilt.
  - When the amber LED is on, the hard disk drive has failed.

## Replacing a hot-swap hard drive

You do not have to shut down the appliance to remove or install the hot-swap hard disk drives. You must replace only one hot-swap hard disk drive at the time.

### Attention:

- If you partially or completely remove a good drive instead of a defective one, you can lose valuable data. Before you remove a hot-swap hard drive, check the hard-disk-drive status LED on the front of the drive. If the LED is amber, the drive is defective.

This situation is especially relevant because this appliance has a RAID adapter installed. The RAID adapter can rebuild the data that you need, provided that certain conditions are met.

- Before you remove a hot-swap hard drive that is not defective, back up all important data.

See “Installing a hard disk drive” on page 101 while you perform the steps in this procedure.

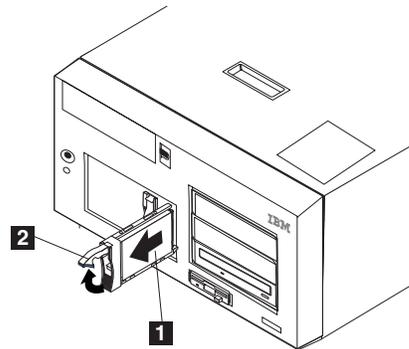


Figure 43. Removing a hard disk drive in a hot-swap drive bay

- 1** Hard disk drive
- 2** Drive tray handle (in open position)

To replace a drive in a hot-swap drive bay:

1. Before you begin, read the documentation that comes with your hard drive.
2. Locate the defective drive by checking for an amber hard-drive-status LED on the front of the drive.
3. Remove the defective hot-swap hard disk drive:
  - a. Pull the drive tray handle to the open position (perpendicular to the hard drive) to disengage the hard disk drive connector from the backplane at the back of the drive bay.
  - b. Wait approximately 30 seconds to allow the hard disk drive to spin down.
  - c. Pull the hot-swap hard disk drive assembly from the hot-swap drive bay.
4. Install the replacement hot-swap hard disk drive in the hot-swap drive bay (see Figure 44 on page 104).

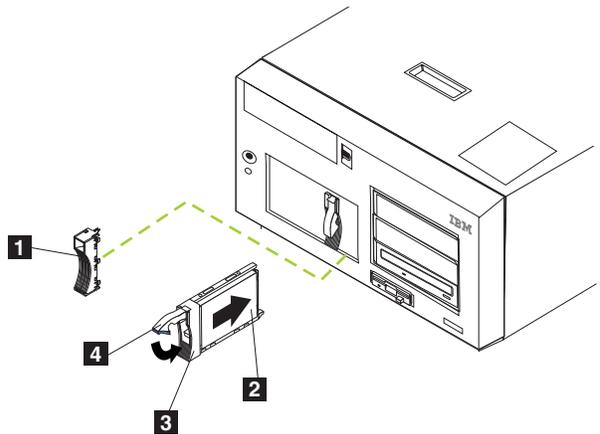


Figure 44. Replacing a hard disk drive in a hot-swap drive bay

- |          |                                      |
|----------|--------------------------------------|
| <b>1</b> | Slim filler panel                    |
| <b>2</b> | Hard disk drive                      |
| <b>3</b> | Drive tray                           |
| <b>4</b> | Drive tray handle (in open position) |

- a. Ensure that the tray handle is open (that is, perpendicular to the hard disk drive).
  - b. Align the rails on the hard disk drive assembly with the guide rails in the drive bay.
  - c. Gently push the hard disk drive assembly into the drive bay until the hard disk drive connects to the backplane.
  - d. Push the tray handle toward the closed position until it locks the hard disk drive in place.
5. Check the hard-disk-drive status LED to verify that the hard disk drive is installed correctly. The hard-disk-drive status LED is located to the immediate right of the hard disk drive.
    - When the amber LED is on, the drive has failed.
    - When the amber LED flashes slowly (one flash per second), the hard disk drive is being rebuilt.
    - When the amber LED flashes rapidly (three flashes per second), the controller is identifying the hard disk drive.
  6. If your appliance is a NAS 300G engine, close the appliance door.

## Memory modules

Adding memory to your engine increases performance. You can increase the amount of memory in your engine by installing memory-module options. When you install memory, you must install a pair of matched dual inline memory modules (DIMMs).

### Notes:

1. The system board contains 6 DIMM connectors and supports two-way memory interleaving.
2. The DIMM options available for your engine are 2 x 256 MB, and 2 x 1 GB. Your engine supports a minimum of 512 MB and a maximum of 4.5 GB (or 6 GB if you replace both standard 256-MB DIMMs with a pair of 1 GB DIMMs) of system memory.

3. The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. The BIOS will display the total amount of installed memory and the amount of configured memory.
4. Your engine comes standard with two 256-MB DIMMs, (for a total of 512-MB of memory) installed in the DIMM 5 and DIMM 6 memory connectors (J14 and J15, respectively). When you install additional DIMMs, be sure to install them in pairs, with the next pair in DIMM connectors 3 and 4 (J11 and J12), and the final pair in DIMM connectors 1 and 2 (J7 and J9).
5. Each DIMM in a single pair must be the same size, speed, type, and technology. You can mix compatible DIMMs from various manufacturers.
6. Each DIMM pair does not have to contain DIMMs of the same size, speed, type, and technology as the other DIMM pairs.
7. Install only 133 MHz, 2.5 V, 184-pin, double-data-rate (DDR), PC2100, registered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2100 SDRAM Registered DIMM specification.
8. Your engine supports Chipkill™ memory.
9. You do not need to save new configuration information when installing or removing DIMMs. The only exception is if you replace a faulty DIMM that was marked as **Disabled** in the **Memory Settings** menu. In this case, you need to re-enable that memory row in the Configuration/Setup Utility or reload the default memory settings.

Memory modules must be added, installed, or replaced two modules at a time.

Before installing the memory modules:

- Become familiar with the safety and handling guidelines specified under “Handling electrostatic discharge-sensitive devices” on page 175.
- The blue color on components and labels inside your NAS 300G identifies touch points where a component can be gripped, a latch moved, and so on. The only exception to this is the power supplies, which are orange.
- Before you begin installing components, read the safety information found in Appendix E, “Safety notices” on page 167.
- Install the DIMMs in the order shown in Table 30.

*Table 30. DIMM installation sequence*

Pair	DIMM connectors	Diagnostic reference
First	6 and 5 (J15, J14)	Bank 3
Second	4 and 3 (J12, J11)	Bank 2
Third	2 and 1 (J9, J7)	Bank 1

To install a memory module:

1. Review the documentation that comes with your DIMM.

**Attention:** When you handle devices sensitive to electrostatic discharge (ESDs), take precautions to avoid damage from static electricity. For details on handling these devices, refer to “Handling electrostatic discharge-sensitive devices” on page 175.



## DANGER

<1-5> 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

- a. Turn everything OFF.
- b. First, attach all cables to devices.
- c. Attach signal cables to connectors.
- d. Attach power cords to outlet.
- e. Turn device ON.

### To Disconnect

- a. Turn everything OFF.
- b. First, remove power cords from outlet.
- c. Remove signal cables from connectors.
- d. Remove all cables from devices.



## CAUTION:

<2-19> 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.

**Note:** For translated versions of this safety notice, refer to *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which is on the publications CD that was shipped with your appliance.

2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and peripheral devices, and disconnect all external cables and power cords.
3. Remove the cover (see “Removing the cover” on page 78).
4. Open the cover on the air-baffle assembly as shown in Figure 45.

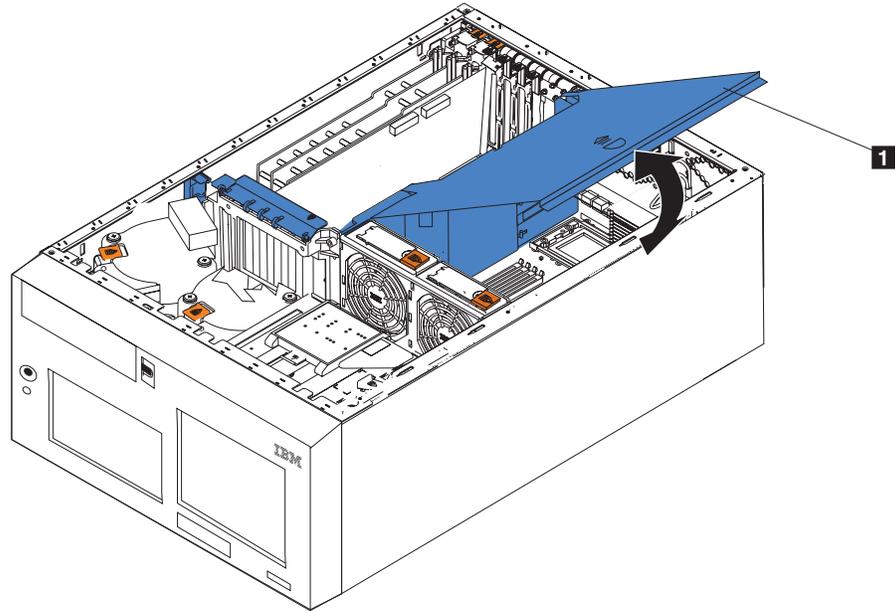


Figure 45. Opening the air-baffle assembly cover

**1** Air-baffle assembly cover

**Note:** It is not necessary to remove the air-baffle assembly to perform this procedure.

5. Locate the DIMM connectors on the system board. Determine the slots into which you will be adding or replacing the DIMMs (see Table 30 on page 105 for the correct installation sequence).
6. If you are replacing a DIMM, open the retaining clips and remove the defective DIMM by pulling it firmly out of the connector.

7. Touch the static-protective package containing the new DIMM to any unpainted metal surface on the appliance, and remove the DIMM from the package. This discharges any static electricity from the package and from your body.
8. Ensure that the DIMM retaining clips are in the open position.

**Note:** Handle the retaining clips gently to avoid breaking them or damaging the DIMM connectors.

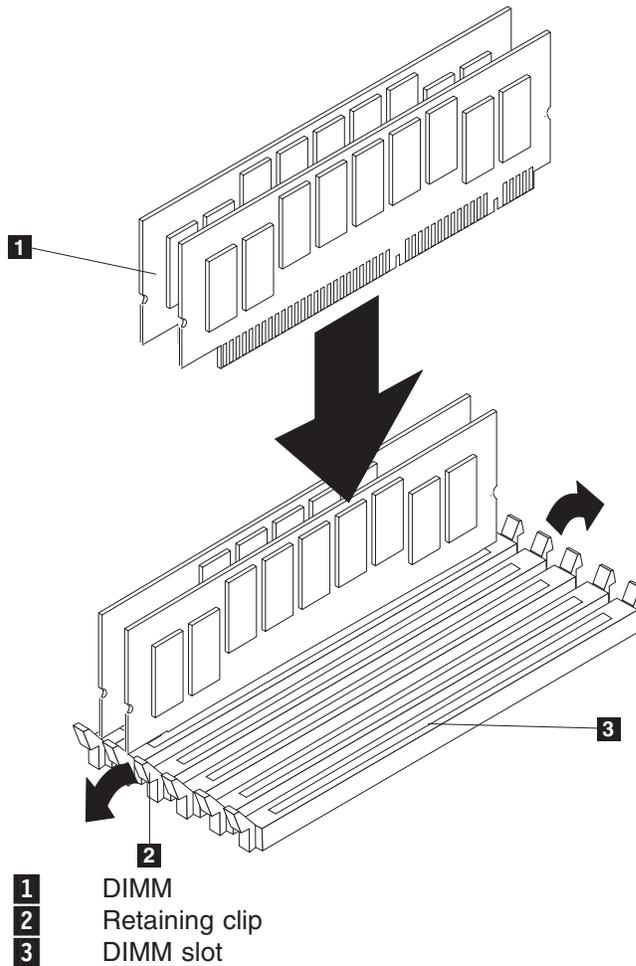


Figure 46. DIMM slots and retaining clips

9. Turn the DIMM so that the pins align correctly with the connector. Note the notches in the DIMM edge that key the DIMM to the connector.
10. Insert the DIMM into the connector by pressing on one end of the DIMM and then on the other end of the DIMM. Be sure to press straight into the connector. Be sure that the retaining clips snap into the closed position.

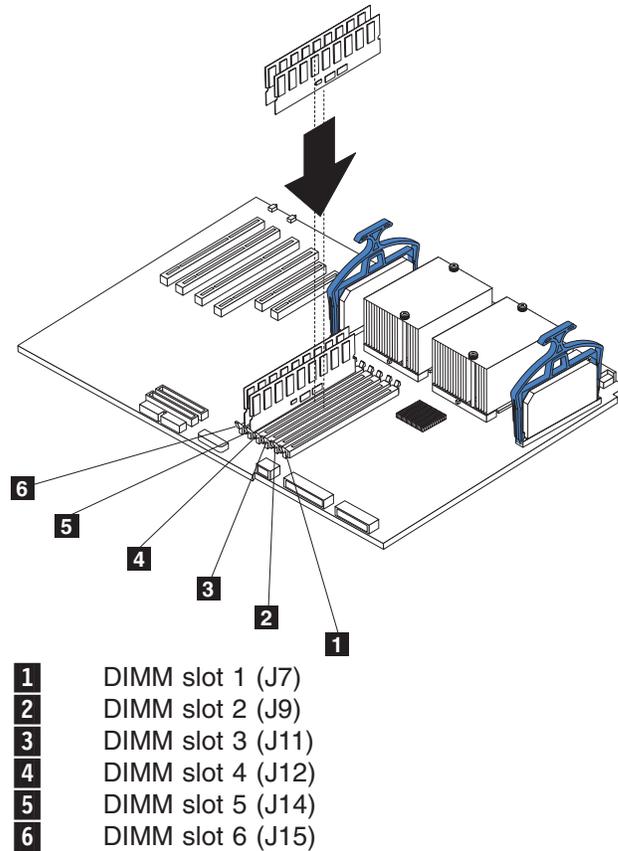


Figure 47. Installing a DIMM

11. 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 correctly seated. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.
12. Repeat steps 7 on page 108 through 11 for the remaining DIMM.
13. Close the cover on the air-baffle assembly.
14. Replace the cover (see “Installing the cover” on page 133).
15. Reconnect any power cords and external cables.

## Microprocessor

The standard NAS 300G engine has two microprocessors installed on the system board. If you added an optional additional microprocessor on the NAS 300G engine, your appliance can operate as a symmetric multiprocessing (SMP) appliance, enhancing performance. Use these instructions to **add** a second microprocessor. If two microprocessors are installed, then use these instructions to **replace** a microprocessor.

**Attention:** To avoid damage and ensure correct appliance operation when you install a microprocessor, use microprocessors that have the same cache size and type, and clock speed. Microprocessor internal clock frequencies and external clock frequencies must be identical.

**Important:** A boot processor must always be installed in socket U13 of the system board. See Figure 8 on page 64 for the location of the boot processor.

**Notes:**

1. When you install a microprocessor in socket U9, you must also install the voltage regulator module (VRM) that comes with the microprocessor, in VRM connector J1.
2. The microprocessor sockets in this engine contain built-in termination for the microprocessor bus; therefore, terminator cards are not required for empty microprocessor sockets. However, for airflow, an empty microprocessor socket must contain a microprocessor baffle.
3. The microprocessor speeds are automatically set for this engine; therefore, you do not need to set any microprocessor frequency-selection jumpers or switches.

To install a microprocessor:

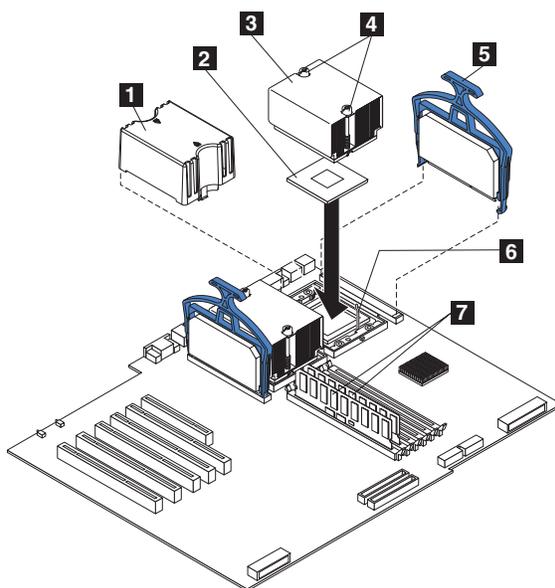


Figure 48. Installing an additional microprocessor

- |          |                              |
|----------|------------------------------|
| <b>1</b> | Microprocessor baffle        |
| <b>2</b> | Microprocessor 2             |
| <b>3</b> | Heat sink 2                  |
| <b>4</b> | Captive screws               |
| <b>5</b> | VRM 2                        |
| <b>6</b> | Microprocessor release lever |
| <b>7</b> | DIMM slots                   |

**Attention:** When you handle devices that are sensitive to electrostatic discharge, take precautions to avoid damage from static electricity. For details on handling these devices, refer to “Handling electrostatic discharge-sensitive devices” on page 175.

1. Review the safety precautions listed in *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and peripheral devices. Disconnect all external cables and power cords. Remove the cover (see “Removing the cover” on page 78 for details).

3. Open the cover on the air-baffle assembly. See Figure 45 on page 107 for an illustration.

**Note:** It is not necessary to remove the air-baffle assembly for this procedure.

4. Locate the second microprocessor socket (connector U27) on the system board.
5. Remove the microprocessor baffle from the microprocessor socket.
6. If the second microprocessor socket is covered with protective film, peel and remove the film.
7. Install the VRM included in the microprocessor kit.

**Attention:** Use of other VRMs might cause your appliance to overheat.

- a. Center the VRM over the VRM connector. Ensure that the VRM is oriented and aligned correctly.
  - b. Carefully but firmly push down the VRM clip handle to seat the VRM in the connector.
  - c. Ensure that the VRM snaps into the connector on both sides.
8. Install the microprocessor:
    - a. Touch the static-protective package containing the new microprocessor to any **unpainted** metal surface on the appliance; then remove the microprocessor from the package.
    - b. Pull out and lift up on the microprocessor-release lever to unlock the microprocessor socket.
    - c. Center the microprocessor over the microprocessor connector aligning the gold alignment arrow on the corner of the microprocessor with the cut-out arrow on the connector. See Figure 49.

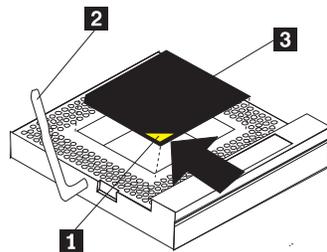


Figure 49. Aligning the microprocessor

- 1 Alignment arrow
- 2 Microprocessor release lever
- 3 Microprocessor

- d. Carefully place the microprocessor into the connector.

**Attention:** Do not use excessive force when pressing the microprocessor into the socket.

- e. Carefully close the microprocessor release lever to secure the microprocessor in the socket.

9. Install the heat sink on the microprocessor:
  - a. Remove the protective film from the bottom of the heat sink.

**Notes:**

- 1) Do not set down the heat sink after you remove the protective film.

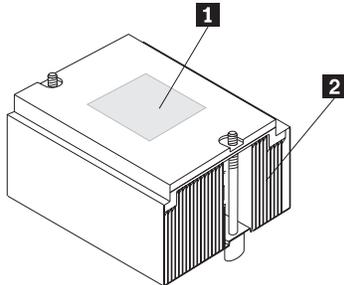


Figure 50. Microprocessor heat sink

- |          |                |
|----------|----------------|
| <b>1</b> | Thermal grease |
| <b>2</b> | Heat sink      |

- 2) Do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the microprocessor or heat sink becomes contaminated, see “Thermal grease” on page 113.
  - b. Align and place the heat sink on top of the microprocessor (grease side down) in the retention bracket. Press firmly on the heat sink.
  - c. Secure the heat sink to the microprocessor by tightening the captive screws. Alternate between the two captive screws in the heat sink while tightening them.

**Attention:** Alternate the tightening of the two captive screws to prevent damage to the microprocessor. Ensure that the screws are completely tightened (until they stop); otherwise, damage to the microprocessor will occur.
10. Close the cover on the air-baffle assembly.
  11. If you have other options to install or remove, do so now; otherwise, go to “Installing the cover” on page 133.
  12. Reconnect the power cords and external cables.

## Removing the microprocessor

Complete the following steps to remove a microprocessor.

1. Review the information in “Before you begin” on page 59.
2. Turn off the engine and disconnect all power cords and external cables; then, remove the cover (see “Removing the cover” on page 78).
3. Open the cover on the air-baffle assembly. (see Figure 45 on page 107).

**Note:** It might be easier to turn the engine on its side and remove the air baffle to access the microprocessors.

4. Identify the microprocessor to be removed.

5. Remove the heat sink:
  - a. Loosen one captive screw fully; then, loosen the other captive screw.  
**Attention:** Loosening one screw fully before loosening the other screw will help to break the thermal bond that adheres the heat sink to the microprocessor.
  - b. Pull the heat sink off of the microprocessor.
6. Open the microprocessor release lever.

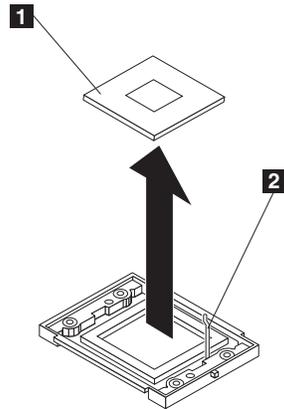


Figure 51. Removing the microprocessor

- 1** Microprocessor
- 2** Microprocessor release lever

7. Pull the microprocessor out of the socket.

To install a microprocessor, see “Microprocessor” on page 109.

### Thermal grease

This section contains information about removing and replacing the thermal grease between the heat sink and the microprocessor. The thermal grease must be replaced any time the heat sink has been removed from the top of the microprocessor and is going to be reused, or when debris is found in the grease.

Complete the following steps to replace damaged or contaminated thermal grease on the microprocessor and heat sink.

1. Review the information in “Before you begin” on page 59.
2. Place the heat sink on a clean work surface.
3. Remove the cleaning pad from its package and unfold it completely.
4. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

**Note:** Be sure that all of the thermal grease is removed.

5. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.



Figure 52. Thermal grease syringe

6. Use the thermal grease syringe to place 16 uniformly spaced dots of 0.01ML each on the top of the microprocessor.

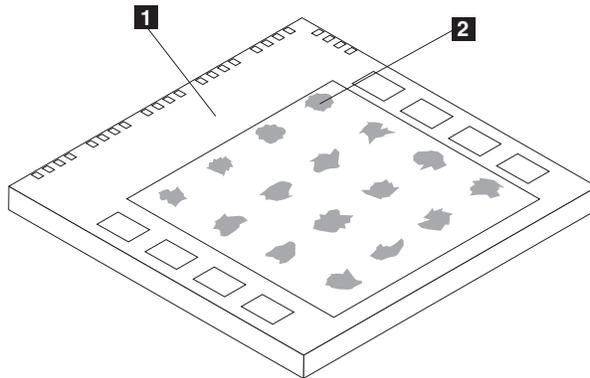


Figure 53. Applying the thermal greasing to the microprocessor

- |          |                           |
|----------|---------------------------|
| <b>1</b> | Microprocessor            |
| <b>2</b> | 0.01 ml of thermal grease |

**Note:** 0.01 ml is one tick mark on the syringe. If the grease is applied correctly, approximately half (0.22 ml) of the grease will remain in the syringe.

7. Install the heat sink onto the microprocessor as described in “Microprocessor” on page 109.

## Operator information panel

To remove the operator information panel of a NAS 300G engine, perform the following steps:

1. Review the information in “Before you begin” on page 59.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine and any attached devices.
3. Disconnect all external cables and power cords from the back of the engine.
4. Remove the cover (see “Removing the cover” on page 78).
5. Remove the front bezel (see “Removing the bezel” on page 79).
6. Remove the two front fans (see “Hot-swap fan” on page 97).
7. Disconnect and remove adapters and spacers (see “Adapters” on page 85).
8. Remove the two central fans (see “Hot-swap fan” on page 97).
9. Remove the adapter-support bracket (see “Adapter-support bracket” on page 83).
10. Slide the CD-ROM drive out enough to allow access to the cable (see “CD-ROM drive” on page 91).
11. Remove the DASD backplane (see “DASD backplane assembly” on page 93).
12. Remove the front-fan housing (see “Front-fan housing” on page 96).
13. Disconnect the operator information panel cable from the system board (see Figure 9 on page 65) for the location of the connector.
14. From outside the engine, push the two tabs on the panel as shown in Figure 54, making sure to press the tab near the chassis; the panel will disengage from the chassis.

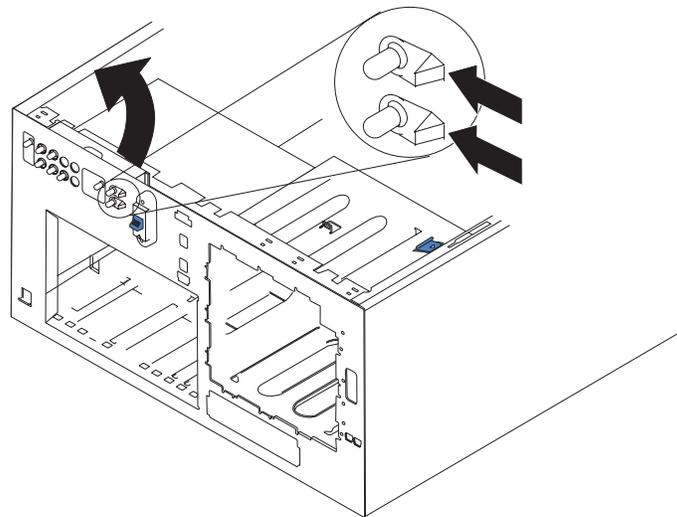


Figure 54. Removing the operator information panel

15. Remove the panel, carefully threading the cable past the other components and through the opening in the chassis.

**Note:** If the cable has been secured in the cable clamps, gently pull it out of the clamps before pulling the cable through the opening in the chassis.

16. To install the operator information panel, reverse the previous steps.

**Notes:**

- a. Thread the cable through the opening in the chassis and extend it into the engine before attaching the operator information panel.
- b. Secure the cable in the cable clamps along the inside of the chassis.
- c. Fit the left tab (in the rack configuration, this is the top tab) into the lip on the chassis, and then press on the right tab (in the rack configuration, this is the bottom tab) until it snaps into place.

## Power-button shield

A plastic power-button shield is included to prevent accidentally powering off the engine. The power-button shield is in a bag that is taped to the front of the engine. To install the power-button shield:

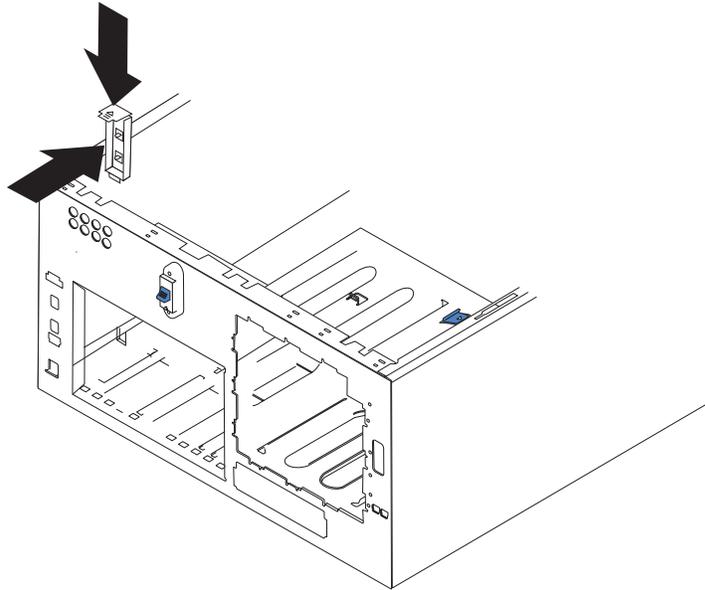
1. Remove the power-button shield from the plastic bag.
2. Locate the white power button on the front of the engine.
3. Align the two prongs on the power-button shield with the channels next to the power button.
4. Inserting the prongs into the channels, snap the power-button shield to the bezel.
5. To remove the power-button shield, gently pry it from the bezel.

## Power-reset card

Complete the following steps to remove the power reset card in the NAS 300G engine:

1. Review the information in “Before you begin” on page 59.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine.
3. Disconnect all external cables and power cords from the back of the engine.
4. Remove the bezel (see “Removing the bezel” on page 79).
5. Remove the cover (see “Removing the cover” on page 78).
6. Remove the front fans (see “Hot-swap fan” on page 97).
7. Disconnect and remove adapters and spacers (see “Adapters” on page 85).
8. Remove the two central fans (see “Hot-swap fan” on page 97).
9. Remove the plastic baffle (see Figure 45 on page 107).
10. Remove the adapter-support bracket (see “Adapter-support bracket” on page 83).
11. Remove the DASD backplane (see “DASD backplane assembly” on page 93).
12. Remove the front-fan housing (see “Front-fan housing” on page 96).
13. Disconnect the power-reset card cable from the system board (J47) (see Figure 9 on page 65 for the location of the connector).

14. Press the tab on the front of the power-reset card and lift it out from inside the chassis.



*Figure 55. Removing the power-reset card*

15. To replace the power reset card, reverse the previous steps, threading the cable carefully.

## Power supply

Your appliance has two hot-swap power supplies, installed in bays 1 and 2. The second power supply provides redundancy. Each power supply has two status indicators. See Figure 56 for information about the status indicators and power supply bay locations for the appliance.

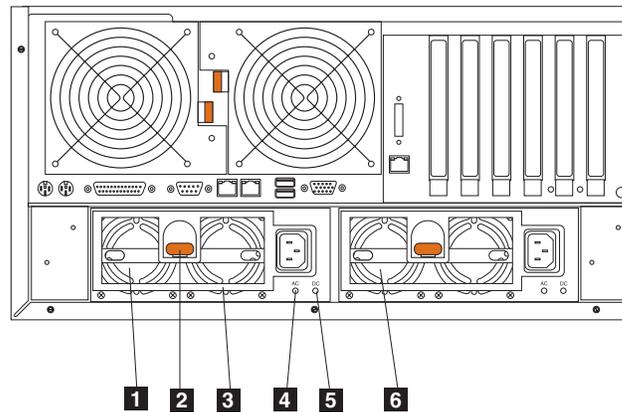


Figure 56. Replacing a hot-swap power supply

- 1** **Hot-swap power supply 2** - LED PS2 on the system board diagnostics panel refers to this power supply. See Figure 12 on page 69 for more information about the diagnostics panel.
- 2** **Release latch** - This release latch is used to release power supply 2.
- 3** **Handle** - This handle is used to pull out power supply 2 when the release latch is activated.
- 4** **AC power LED** - This LED provides status information about the power supply. During normal operation, both the AC and DC Power LEDs are on.
- 5** **DC power LED** - This LED provides status information about the power supply. During normal operation, both the AC and DC Power LEDs are on.
- 6** **Hot-swap power supply 1** - LED PS1 on the system board diagnostics panel refers to this power supply. See Figure 12 on page 69 for more information about the diagnostics panel.



**DANGER**

<1-2> Do not try to open the covers of the power supply module.



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.

**Notes:**

1. If you have functioning redundancy, you do not need to switch off the power to the appliance to install hot-swap power supplies.  
NAS 300G provides power redundancy and hot-swappability.
2. When replacing a power supply, do not remove the power supply until you are ready to install its replacement.

**Attention:** If you remove a power supply while the appliance is running and you do not have functioning power redundancy, your appliance will abruptly cease to function.

To replace a hot-swap power supply:

1. Review the information in “Before you begin” on page 59.
2. The LEDs on the power supplies indicate whether a power supply has failed.
  - a. If a power supply has failed, go to step 5 on page 121.
  - b. Otherwise, continue with step 3.
3. Remove the engine covers (see “Removing the cover” on page 78).
4. Determine which power supply has failed by checking the LEDs on the diagnostics panel on the system board.
  - If the Nonredundant LED is on, you do not have redundancy: **shut down the appliance** (see “Shutting down and powering on the NAS Gateway 300” on page 9) and peripheral devices.

**Note:** The Information LED on the operator information panel on the front of the appliance also will be on. See “Engine controls and indicators” on page 61 for the location and contents of the operator information panel.

- If the Nonredundant LED is not on, you have redundancy and do not need to shut down the appliance.

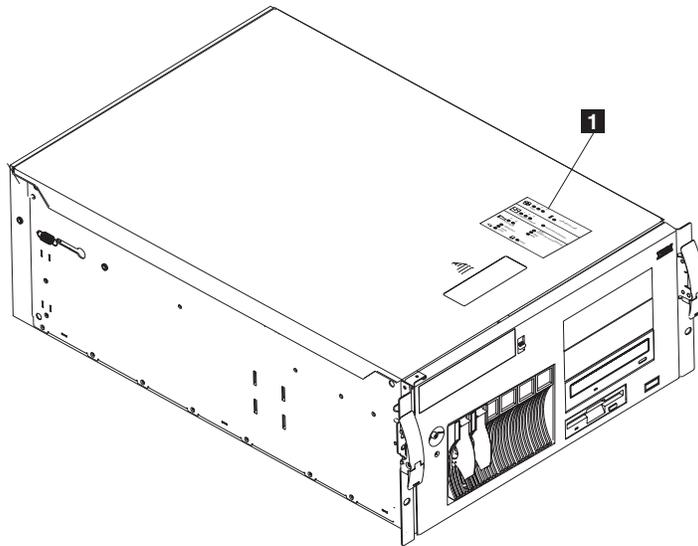


Figure 57. Location of the diagnostics panel (NAS 300G engine)

**1** Diagnostics panel



**CAUTION:**  
The following label indicates a hot surface nearby.



**Note:** For translations of this safety notice, refer to *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.

5. Remove the defective power supply:
  - a. Unplug the defective power supply.
  - b. Press the orange release lever and pull the power-supply handle. This disconnects the power supply from the power-supply backplane.

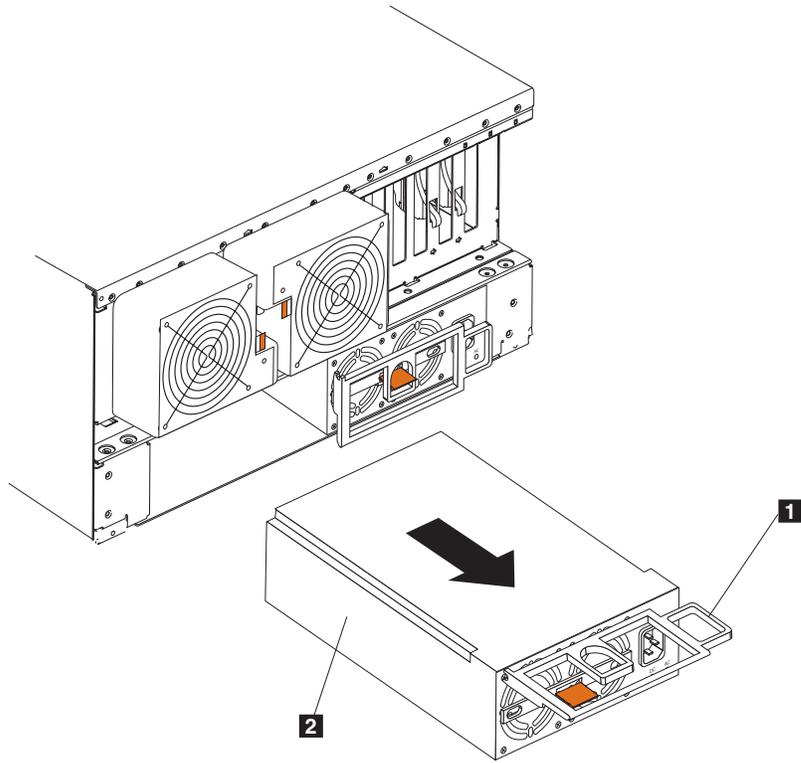


Figure 58. Removing a hot-swap power supply

- 1** I/O cable-restraint bracket
- 2** Power-cord-restraint bracket
- 3** Power-supply handle (in the open position)
- 4** Power supply

c. Gently slide out the power supply.

6. Install the replacement power supply in the bay:
  - a. Place the handle on the power supply in the open position (that is, perpendicular to the power supply) and slide the power supply into the chassis.
  - b. Gently push the power supply into the bay until it connects to the power supply backplane.

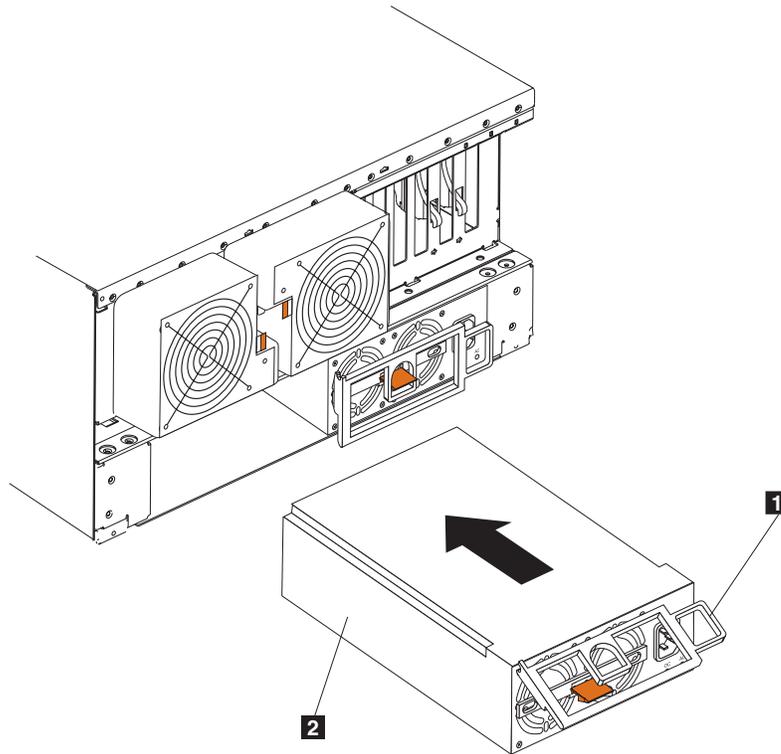


Figure 59. Installing a hot-swap power supply

- |          |   |
|----------|---|
| <b>1</b> | I/O cable-restraint bracket                     |
| <b>2</b> | Power cord restraint bracket                    |
| <b>3</b> | Power-supply handle (in the half-open position) |
| <b>4</b> | Power supply                                    |

- c. Close the handle to seat the power supply in the bay.
7. Plug the power cord for the power supply you just installed into the power-cord connector.
8. Open the cable-restraint housing by pulling down the top end of the cable-restraint housing.
9. Route the power cord through the cable-restraint bracket.
10. Plug the power cord into a grounded electrical outlet.
11. Verify that the DC Power LED and AC Power LED on the power supply are on, indicating that the power supply is operating correctly.

## Remote Supervisor Adapter

The optional Remote Supervisor Adapter provides remote system management for the Model G27 hardware and operating system, independent of the status of the hardware.

A Remote Supervisor Adapter that is connected to the ASM Interconnect bus is used as an Ethernet gateway for the ASM Interconnect bus, enabling all ASM information generated by the Model G27 attached to the ASM Interconnect bus to be forwarded to other systems on your Ethernet network.

### Installing the adapter

To install the Remote Supervisor Adapter:

1. Review the safety precautions listed in *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine and attached devices.
3. If the NAS 300G engine is in a rack, pull it out from the rack.
4. Remove the cover (see “Removing the cover” on page 78).
5. Open the blue adapter-retention clip.
6. Open the adapter-retention latch on slot 1.
7. Slide the expansion-slot cover from PCI slot 1 (see Figure 60 on page 125). Store it in a safe place.

**Attention:** Expansion-slot covers must be installed in all vacant slots. This provision maintains the electronic emission characteristics of the engine and ensures cooling of engine components.

8. Remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.

9. Install the adapter:
  - a. Carefully grasp the adapter by its top edge or upper corners, and align it with expansion slot 1.

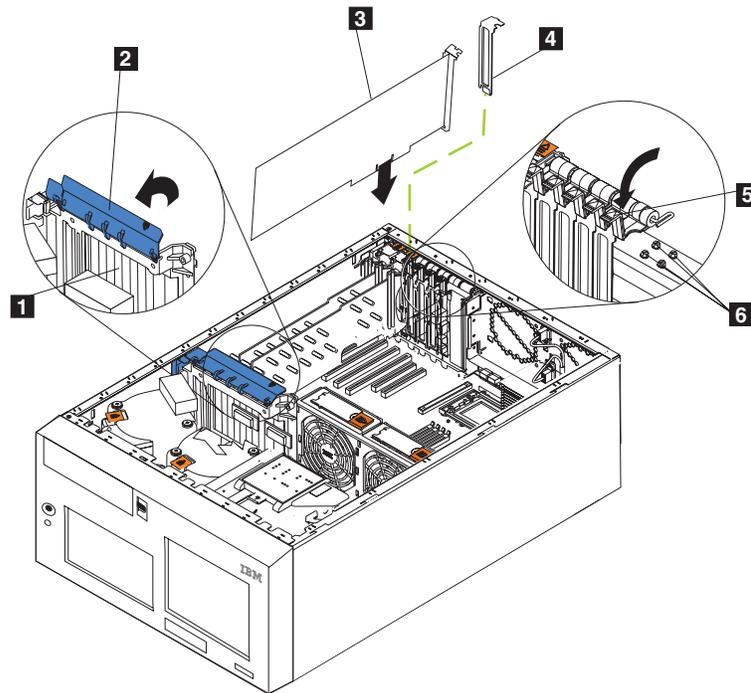


Figure 60. Installing a Remote Supervisor Adapter

- |          |                              |
|----------|------------------------------|
| <b>1</b> | Adapter-support bracket      |
| <b>2</b> | Adapter-retention clip       |
| <b>3</b> | Adapter                      |
| <b>4</b> | Expansion-slot cover         |
| <b>5</b> | Adapter-retention latch      |
| <b>6</b> | Backup expansion-slot screws |

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

**Attention:** When you install the adapter in the engine, be sure it is completely and correctly seated in the connector before you power on the engine. Incorrect insertion might cause damage to the system board or the adapter.
- c. Secure the adapter with a screw: insert one of the backup expansion-slot screws (see Figure 60 for the location of the screws) through the top of the adapter bracket into the screw hole to secure the adapter.
- d. Lower the adapter-retention latch over the top corner of the adapter.
- e. Close the blue adapter-retention clip.

10. Connect the 20-pin ribbon cable:
  - a. Connect one end of the 20-pin ribbon cable to the system-management connector on the adapter. The 20-pin, ribbon-cable connector ends are keyed for correct installation.

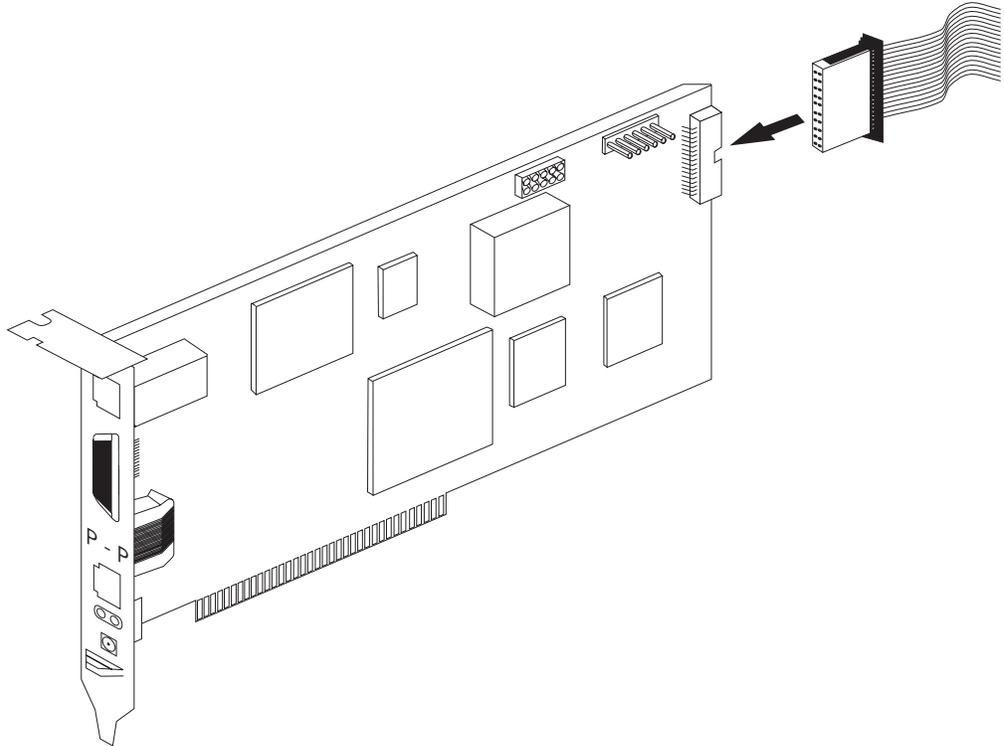


Figure 61. Connecting the 20-pin ribbon cable to the Remote Supervisor Adapter

- b. Connect the other end of the cable to the system-management connector (J27) on the system board. Item **1** in Figure 62 on page 127 shows the location of the system-management connector on the system board.

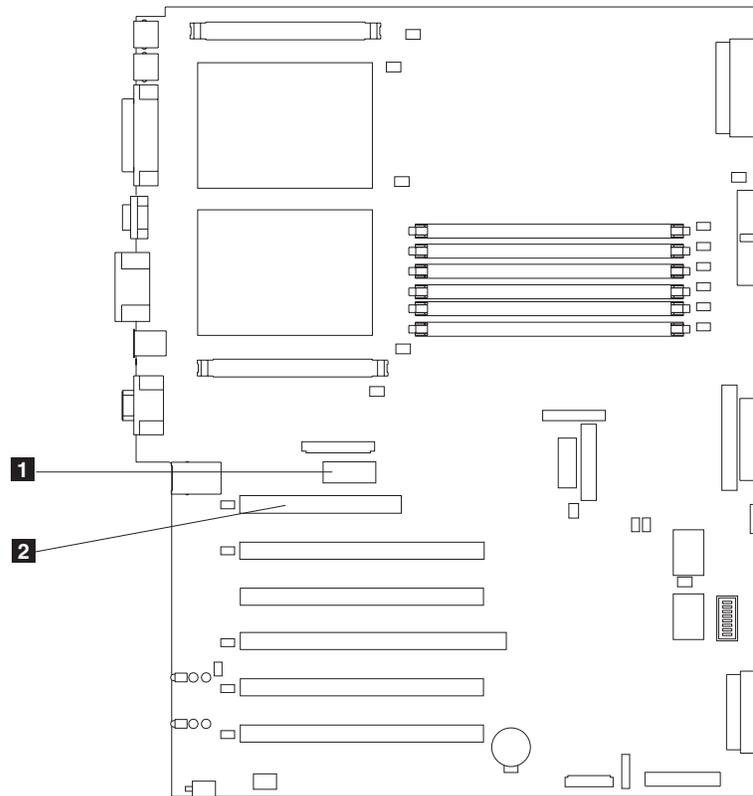


Figure 62. Remote Supervisor Adapter connectors on the system board

- 1** System-management connector (J27)
- 2** PCI slot 1

11. Replace the cover.
12. If the appliance was in a rack, return it to the rack.
13. Connect the external cables and power cords.
14. Continue with “Connecting the LAN and serial port cables”.

### Connecting the LAN and serial port cables

The appliance is managed remotely through either a LAN using the Ethernet port or a serial port. If the connection to the Remote Supervisor Adapter is a LAN connection, continue with “Cabling the Ethernet LAN port”. If the connection is a serial port, continue with “Cabling the serial port” on page 128.

**Cabling the Ethernet LAN port:** To attach the Ethernet cables:

**Attention:** To avoid damage to the Ethernet connector on the Remote Supervisor Adapter, do not plug the ASM Interconnect module into the Ethernet (RJ-45) port.

1. Connect one end of a Category 3 or Category 5 Ethernet cable to the Ethernet port on the Remote Supervisor Adapter. Connect the other end of the Ethernet cable to your network.

2. Check the Ethernet LEDs. The location of the LEDs is shown in Figure 63.

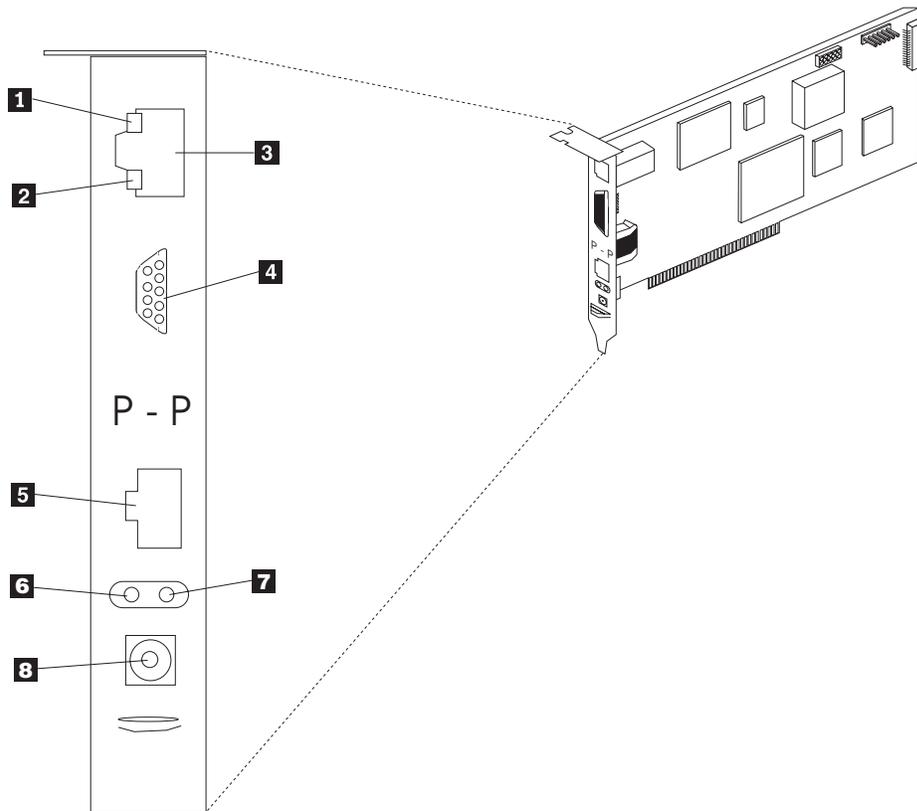


Figure 63. Ethernet LEDs and external ports on the Remote Supervisor Adapter

- 1** Ethernet link LED - The green Ethernet link LED is on when the Ethernet cable is connected correctly.
- 2** Ethernet activity LED - The green Ethernet activity LED is flashing when there is Ethernet activity.
- 3** Ethernet port
- 4** Serial port
- 5** ASM interconnect port
- 6** Error LED (amber)
- 7** Power LED (green)
- 8** External power-supply connector

**Cabling the serial port:** To connect to the serial port, connect a modem or null-modem cable to the serial port on the Remote Supervisor Adapter.

## Connecting the ASM Interconnect module to the NAS 300G

The ASM Interconnect module connects the Remote Supervisor Adapter to the ASM interconnect network. This module is included with the Remote Supervisor Adapter option.

To connect the ASM Interconnect module to the Remote Supervisor Adapter:

1. Connect the ASM Interconnect module **2** to the Remote Supervisor Adapter ASM Interconnect port **1**. This port is labeled *P - P* (for *peer-to-peer*) on the back panel of the adapter. Figure 64 shows the Remote Supervisor Adapter installed in the NAS 300G engine.

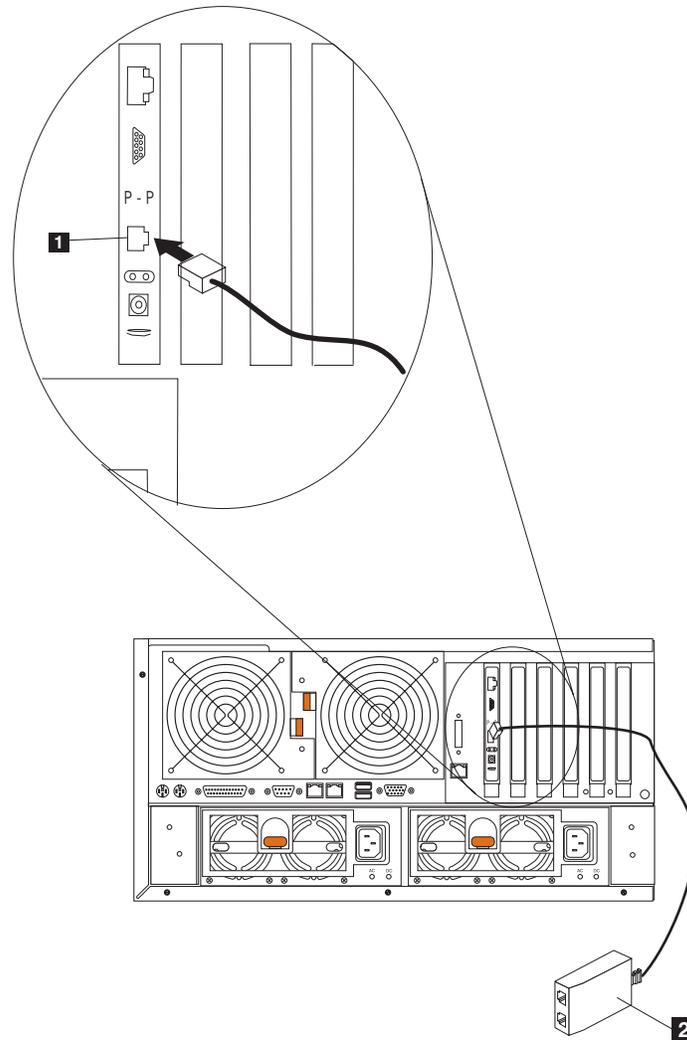


Figure 64. Connecting the ASM interconnect module to the Remote Supervisor Adapter

- 1** ASM interconnect port
  - 2** ASM interconnect module
2. Connect one or two Category 3 or Category 5 Ethernet cables to the other end of the ASM Interconnect module.

For full management capability, you can install a Remote Supervisor Adapter in both engines. In the following example, an Ethernet cable connects the administrator's system to the Remote Supervisor Adapter that is installed in a NAS 300G. In this case, the NAS 300G uses the LAN connection to forward system management data generated by the other engines in the ASM interconnect network to the remote system-management administrator.

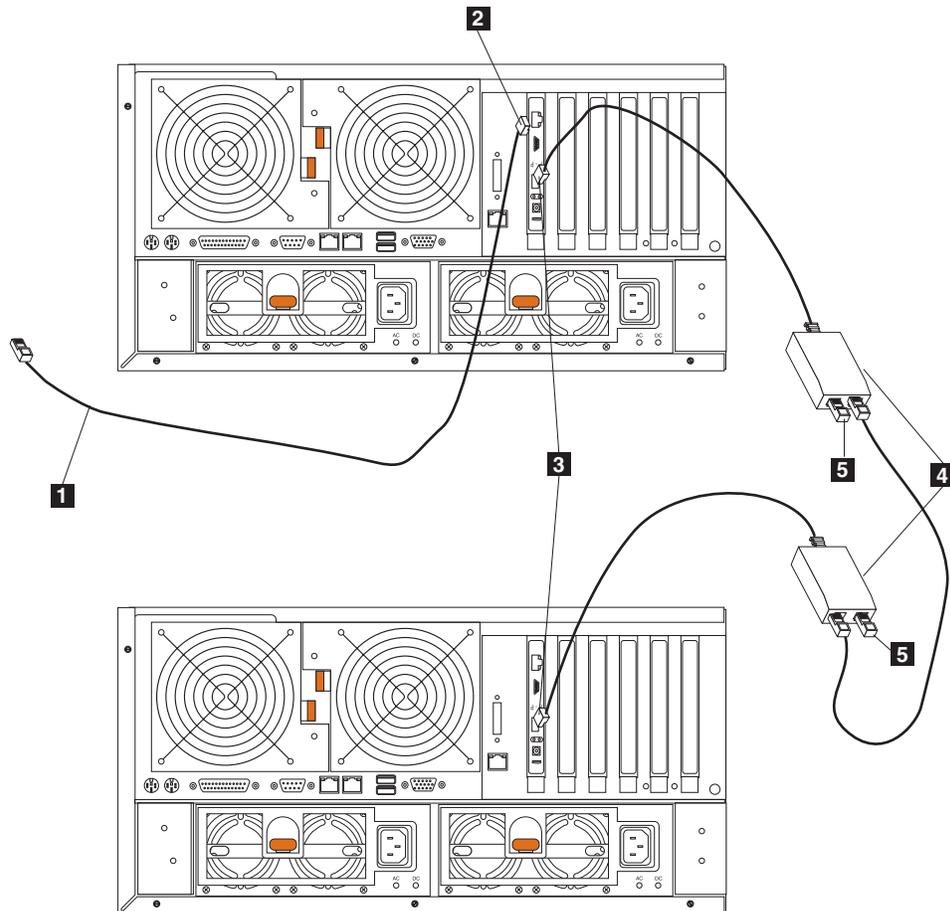


Figure 65. Connecting two NAS 300G engines using two Remote Supervisor Adapters

- 1** Ethernet connection to the remote-system-management administrator's system
- 2** Ethernet port on the Remote Supervisor Adapter in right engine
- 3** Peer-to-peer connection on the Remote Supervisor Adapter
- 4** ASM interconnect modules
- 5** Terminator plugs

**Attention:** When you handle devices sensitive to static electricity, take precautions to avoid damage from static electricity. For details about handling static-sensitive devices, see "Handling electrostatic discharge-sensitive devices" on page 175.

## System board

To remove the system board:

1. Review the safety precautions listed in *IBM TotalStorage Network Attached Storage Translated Safety Notices*, which can be found on the Documentation CD that was shipped with your appliance.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the appliance and peripheral devices and disconnect all external cables and power cords.

**Note:** When replacing the system board, you must either update the system with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image.

3. Lay the engine so that the cover is facing up.
4. Remove the cover and bezel (see “Removing the cover” on page 78 and “Removing the bezel” on page 79).
5. Remove all adapters and spacers (see “Adapters” on page 85).
6. Remove the two central fans (see “Hot-swap fan” on page 97).
7. Remove the plastic baffle.
8. Remove the adapter-support bracket (see “Adapter-support bracket” on page 83).
9. Disconnect all cables from the system board.

**Note:** Place all disconnected cables carefully to the side so that they do not come in contact with the center of the system board.

10. Remove all microprocessors and VRMs and set them aside on the static-protected surface for reinstallation (see “Removing the microprocessor” on page 112).
11. Remove the DIMMs and set them aside on a static-protected surface for reinstallation (see “Memory modules” on page 104).

**Note:** When you set the DIMMs aside, be sure to keep track of the slots they belong to; DIMMs must be installed in pairs of the same size, speed, type, and technology.

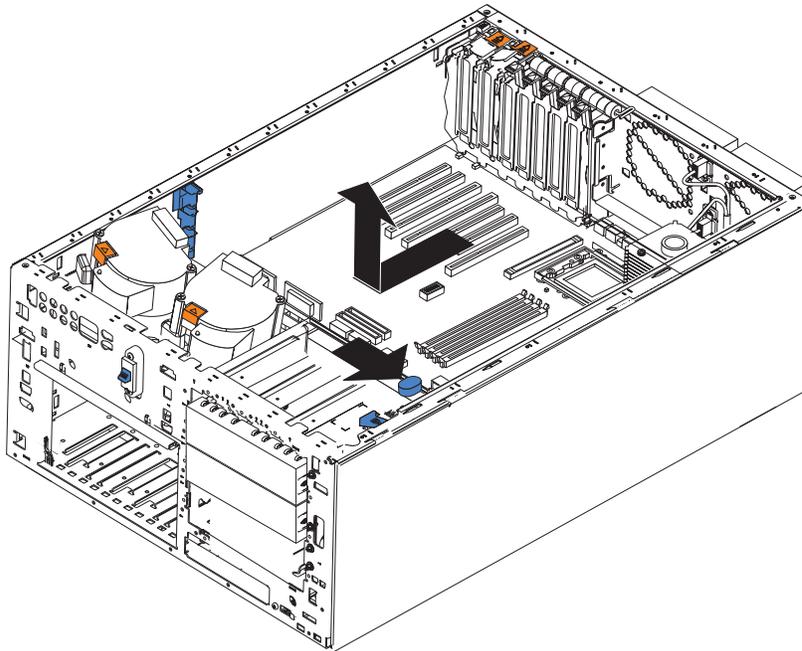


Figure 66. Removing the system board

12. Push the system-board release latch toward the side of the system board where the DIMM slots are located to release the board.

**Note:** The board will not be released until the latch is pushed to be approximately parallel with the DIMM slots.

13. Carefully lift out the system board.
14. Lay the replacement system board on the engine floor with the release lever in the open position.
15. Slide the lever toward the side of the system board with the adapter slots until the system board is secure.
16. Reverse steps 5 on page 131 through 11 on page 131 to replace the removed components.

**Note:** When replacing the components in the engine, be sure to route all cables so that they are not exposed to undue pressure.

17. Replace the cover (see “Installing the cover and bezel” on page 133) and external cables.

## Installing the cover and bezel

### Installing the cover

*NAS 300G engine:*

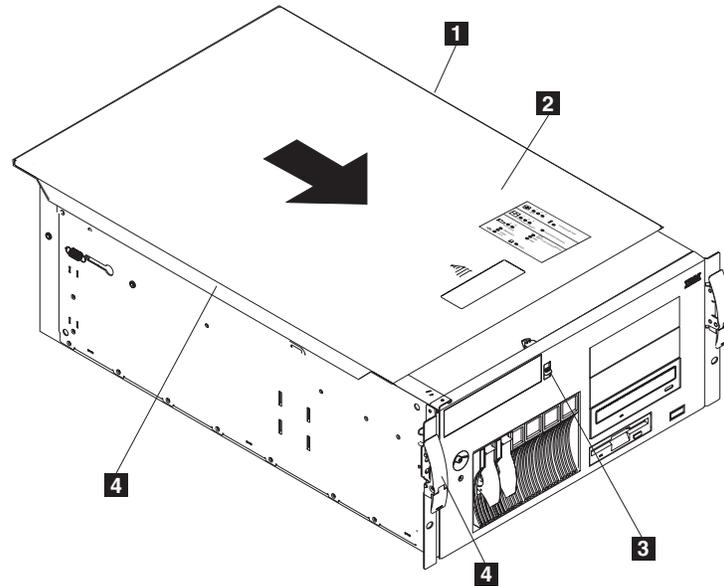


Figure 67. Replacing the NAS 300G engine cover

- |          |                     |
|----------|---------------------|
| <b>1</b> | Flange              |
| <b>2</b> | Cover               |
| <b>3</b> | Cover-release latch |
| <b>4</b> | Flange              |

To replace the appliance top cover:

1. Verify that all cables, adapters, and other components are installed and seated correctly, and that there are no loose tools in the engine.
2. Place the cover-release latch in the open (up) position.
3. Place the lip of the left side of the cover over the top-left edge of the engine chassis.
4. Rotate the cover to a horizontal position, inserting the tabs at the right side of the cover in the matching slots in the engine chassis.
5. Slide the cover forward until it locks in place.
6. Reconnect any cables to the back of the engine.
7. Plug the power cords into a grounded electrical outlet.

## Installing the bezel

### NAS 300G engine:

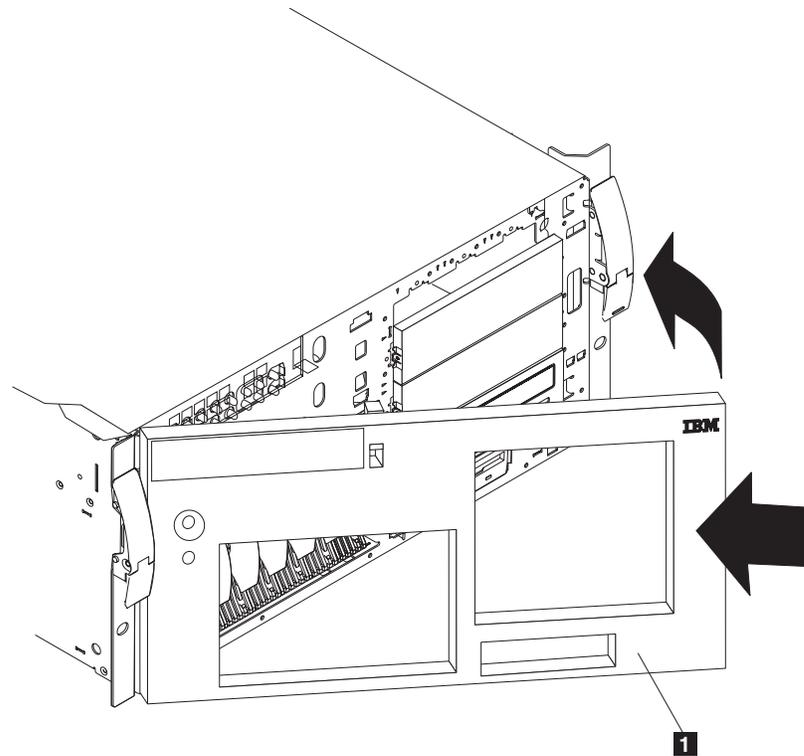


Figure 68. Replacing the NAS 300G engine bezel

#### **1** Bezel

To replace the bezel:

1. Review the information in “Before you begin” on page 59.
2. Place the two tabs on the bottom of the bezel in the matching holes on the engine chassis.
3. Press the top of the bezel toward the engine until the bezel clicks into place.

---

## Chapter 6. Using system-level utilities

The following utilities are provided with each engine.

**Note:** Using these utilities requires the attachment of a monitor, keyboard, and mouse prior to powering on the appliance.

- **Configuration/Setup Utility**

The Configuration/Setup Utility program is part of the basic input/output system (BIOS) that comes with each 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**

This utility allows you to configure the devices attached to the integrated SCSI controller. See “Using the SCSISelect utility program” on page 141 for more information.

- **ServeRAID programs**

The ServeRAID programs are included with the NAS 300G. Refer to the ServeRAID documentation provided on the Documentation CD.

---

### 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 engine and watch the display 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 Figure 69 on page 136.

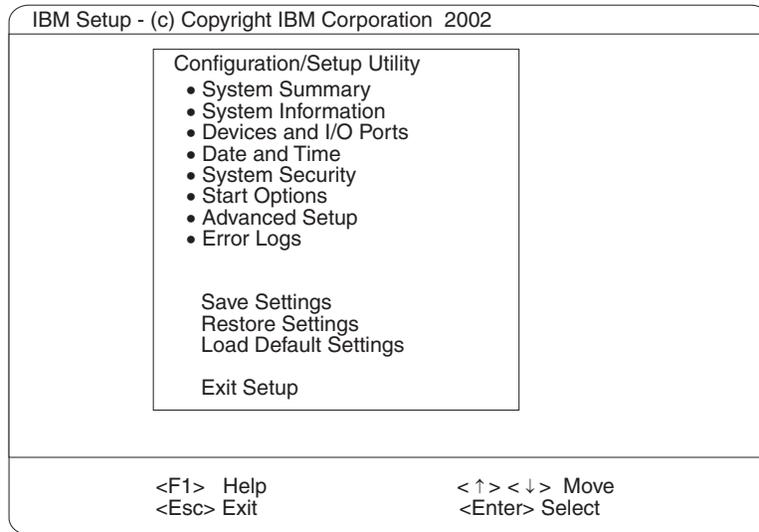


Figure 69. Configuration/Setup Utility main menu

**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 System Summary to display configuration information. This information 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 panel. You cannot edit the fields.

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

- **System Information**

Select System Information to display information about each 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 Product Data to view system information, such as the machine type and model, the 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 System Card Data to view vital product data (VPD) for some engine components.

- **Devices and I/O Ports**

Select Devices and I/O Ports 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 Date and Time 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 System Security 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 Power-on Password to set or change a power-on password. See "Using passwords" on page 139 for more information.

- **Administrator Password**

Select Administrator Password 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 139 for more information.

- **System Owner's Name**

Select System Owner's Name 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 Start Options 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 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 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 finally 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 Advanced Setup 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 Processor Serial Number Access to identify if the microprocessor serial number in the microprocessor is readable.

- **Core Chipset Control**

Select Core Chipset Control 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 Cache Control 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 PCI Slot/Device Information to view and identify system resources used by PCI devices. PCI devices automatically communicate with the 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 setting 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 engine off and on three times results in a default startup that enables video again.

- **Memory Settings**  
Select Memory Settings 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, use the following steps to manually enable the memory bank after the problem is corrected.
  1. Select **Memory Settings** from the Advanced Setup menu.
  2. Use the arrow keys to highlight the bank that you want to enable.
  3. Use the arrow keys to select **Enable**.
- **System Service Processor Settings**  
Select System Service Processor Settings to view the interrupt request (IRQ) setting 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 Event/Error Logs 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 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 this log.
- **Save Settings**  
Select Save Settings to save your customized settings.
- **Restore Settings**  
Select Restore Settings to delete your changes and restore the previous settings.
- **Load Default Settings**  
Select Load Default Settings 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 System Security, 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 mode 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.

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, use one of the following methods to regain access to the engine:

- 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”.
- Remove the battery and then reinstall the battery.

**Setting the password-override switch:** Use Figure 70 to set the power-on password override switch.

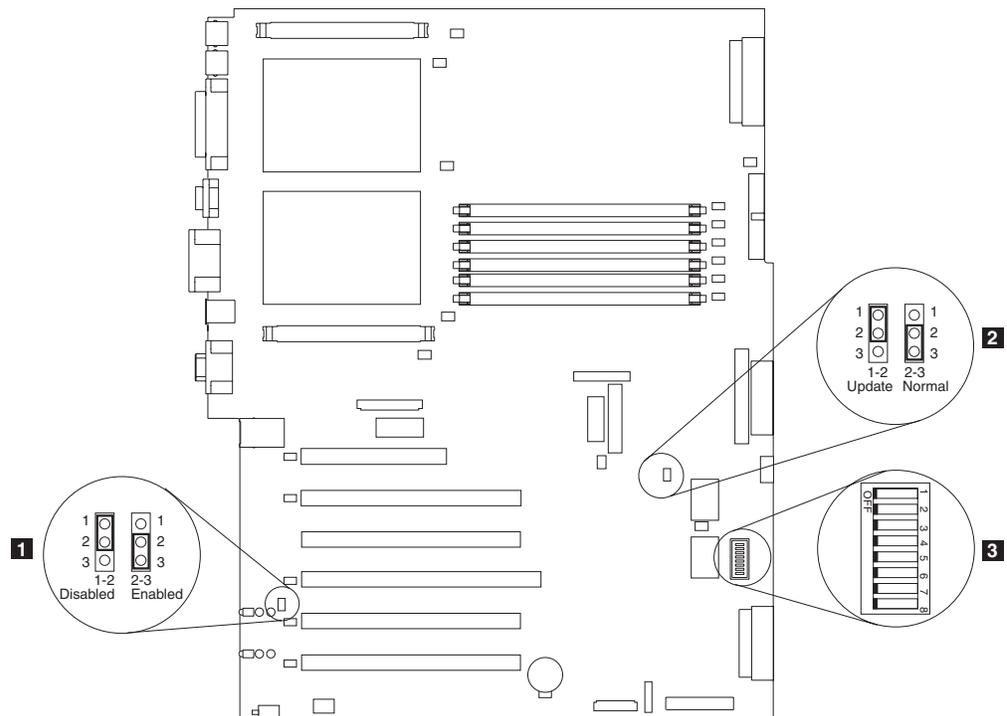


Figure 70. Setting the power-on password override switch

- 1** IXA adapter jumper (J42)
- 2** Boot block recovery jumper (J28)
- 3** System-board switch block (SW1); power-on password override switch is switch 6.

To set the password-override switch:

1. Review the information in “Before you begin” on page 59.
2. Shut down (see “Shutting down and powering on the NAS Gateway 300” on page 9) the engine and power off peripheral devices. Disconnect all external cables and power cords. Remove the cover; see “Removing the cover” on page 78.
3. Change the setting of the password-override switch (switch 8 on switch block 1 on the system board) to on.  
Switch 8 is at the bottom of the switch block.

4. Install the engine cover (see “Installing the cover” on page 133) 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 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 31. Power-on and administrator password features

Type of password	Results
Power-on password	<ul style="list-style-type: none"> <li>• Enter the password to complete the system startup.</li> <li>• All choices are available on the Configuration/Setup Utility main menu.</li> </ul>
Administrator password	<ul style="list-style-type: none"> <li>• No password is required to start the engine.</li> <li>• Enter the password to access the Configuration/Setup Utility program.</li> <li>• All choices are available on the Configuration/Setup Utility main menu.</li> </ul>
Administrator <i>and</i> power-on password	<ul style="list-style-type: none"> <li>• You can enter either password to complete the engine startup.</li> <li>• 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.</li> <li>• 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.</li> </ul>

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## 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 disk 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 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 Configure/View Host Adapter Settings 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 Host Adapter SCSI ID to view the SCSI controller ID, which is normally 7.

- **SCSI Parity Checking**

Select SCSI Parity Checking to view the assigned value of Enabled.

- **Host Adapter SCSI Termination**

Select Host Adapter SCSI Termination to view the assigned value of Automatic.

- **Boot Device Options**

Select Boot Device Options 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 SCSI Device Configuration 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 the PCI Fast/Wide Ultra SCSI Adapter is 40 MBps
- The transfer rate for the PCI Ultra160 SCSI Adapter is 160 MBps

- **Advanced Configuration Options**

Select Advanced Configuration Options to view or change the settings for advanced configuration options. These options include enabling support for large hard disk drives and support for drives with Ultra SCSI speeds.

- **SCSI Disk Utilities**

Select SCSI Disk Utilities 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 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-disk-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 disk drive
- As a last resort before replacing a failing hard disk 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 disk drives attached to the adapter.

To start the Low-Level Format program:

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

**Note:** Hard disk 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 message appears, have the system serviced.

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## Appendix A. Communication adapters

The NAS 300G requires a Fibre Channel adapter to be selected. The NAS 300G also has the following optional adapters:

- Alacritech 100x4 Quad-Port Server Accelerated Adapter
- IBM Gigabit Ethernet SX Server Adapter
- IBM PCI Ultra160 SCSI adapter (LVD/SE)
- Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter
- PRO/1000 XT Server Adapter by Intel
- Qlogic 2340 1-port Fibre Channel adapter
- Qlogic 2342 2-port Fibre Channel adapter
- Remote Supervisor Adapter

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### PCI adapter placement

These sections explain how to determine the correct positions for PCI adapters.

#### Adapter placement rules

Adapter placement rules guide which adapter to install in a PCI slot. These rules consist of *priority* and *slot location*. Priority is the sequence in which you install the adapters. Determining the slot location requires eliminating already filled slots and placing the adapter into the first available slot according to its possible slot locations. The priority and slot locations are shown in Table 32 on page 146. To determine the location of the slots:

1. Arrange the adapters in order, one having the highest priority, using the Priority column in Table 32 on page 146. Refer to the illustrations later in this appendix for help identifying the adapters.
2. Place the highest priority adapter into the first available slot location listed in the slot location column of Table 32 on page 146.
3. Repeat step 2 until all adapters are installed.

**Example 1:** If you are installing a single IBM Gigabit Ethernet SX Server Adapter, that adapter should be installed in slot 2.

**Example 2:** If you are installing five adapters—one Qlogic 2340 1-port Fibre Channel adapter, two IBM Gigabit Ethernet SX Server Adapters, one IBM PCI Ultra160 SCSI adapter (LVD/SE), and one Alacritech 100x4 Quad-Port Server Accelerated Adapter—they should be installed in the following slots:

- Slot 1 — Empty
- Slot 2 — IBM Gigabit Ethernet SX Server Adapter
- Slot 3 — IBM Gigabit Ethernet SX Server Adapter
- Slot 4 — Alacritech 100x4 Quad-Port Server Accelerated Adapter
- Slot 5 — IBM PCI Ultra160 SCSI adapter (LVD/SE)
- Slot 6 — Qlogic 2340 1-port Fibre Channel adapter

Table 32. Adapter installation rules

Priority	Adapter	Slot location	Maximum quantity
1	Qlogic 2342 2-port Fibre Channel adapter	6	1
2	Qlogic 2340 1-port Fibre Channel adapter	6, 5	2
3	Remote Supervisor Adapter	1	1
4	IBM PCI Ultra160 SCSI adapter (LVD/SE)	5	1
5	Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter	2, 3, 4 5	2
6	IBM Gigabit Ethernet SX Server Adapter	2, 3, 4, 5	2
7	PRO/1000 XT Server Adapter by Intel	2, 3, 4, 5	2
8	Alacritech 100x4 Quad-Port Server Accelerated Adapter	2, 3, 4, 5	2

## Adapter placement charts

The following tables show you where to install the PCI adapters.

### Notes:

1. In the following charts, FC in slot 6 denotes a the SAN adapter, which must be either Qlogic 2342 2-port Fibre Channel adapter or Qlogic 2340 1-port Fibre Channel adapter. The SAN adapter is always in slot 6.
2. The Remote Supervisor Adapter is the only adapter that is supported in slot 1. For this reason, the Remote Supervisor Adapter can be added to any of the combinations in these charts that do not already list a Remote Supervisor Adapter .
3. An engine can be ordered with a maximum of one adapter for tape backup (either a Qlogic 2340 1-port Fibre Channel adapter or a IBM PCI Ultra160 SCSI adapter (LVD/SE)). In these charts, *Tape* refers to the tape backup adapter. If there is a tape backup adapter, it is always installed in slot 5.
4. The minimum number of Ethernet adapters in each engine is one, while the maximum number of Ethernet adapters in each engine is four.
5. The on-board Ethernet controllers on each engine of the NAS 300G are used to connect the engines. For this reason, there must be an Ethernet adapter installed in one of the engines of the NAS 300G for network connectivity. The configurations that meet this requirement and are valid for the NAS 300G appear in boldface type in the tables.

### Adapter abbreviations

<b>FC</b>	Qlogic 2340 1-port Fibre Channel adapter or Qlogic 2342 2-port Fibre Channel adapter
<b>GB</b>	IBM Gigabit Ethernet SX Server Adapter
<b>CEN</b>	PRO/1000 XT Server Adapter by Intel
<b>EN4</b>	Alacritech 100x4 Quad-Port Server Accelerated Adapter
<b>CENA</b>	Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter
<b>RSA</b>	Remote Supervisor Adapter
<b>Tape</b>	Tape includes one and only one of the following: <ul style="list-style-type: none"><li>• IBM PCI Ultra160 SCSI adapter (LVD/SE)</li><li>• Qlogic 2340 1-port Fibre Channel adapter</li></ul>

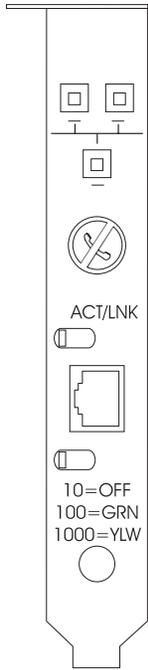


Figure 71. PRO/1000 XT Server Adapter by Intel

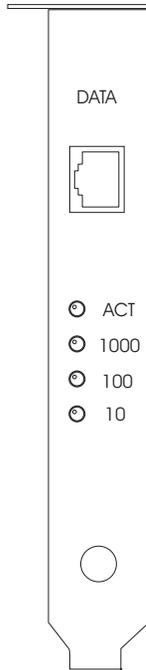


Figure 72. Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter

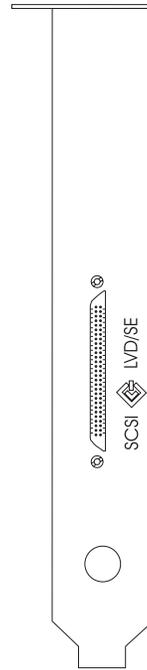


Figure 73. IBM PCI Ultra160 SCSI adapter (LVD/SE)

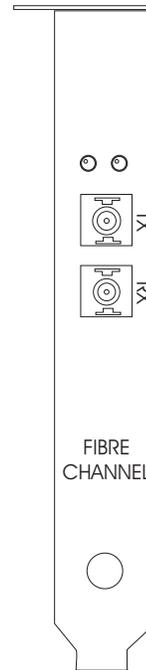


Figure 74. Qlogic 2340 1-port Fibre Channel adapter

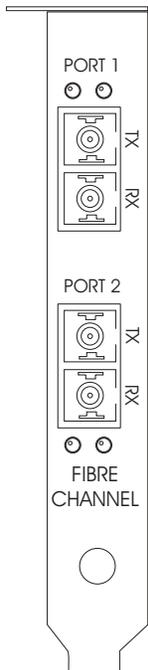


Figure 75. Qlogic 2342 2-port Fibre Channel adapter

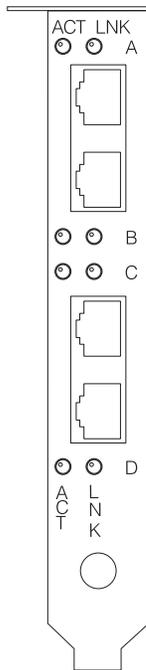


Figure 76. Alacritech 100x4 Quad-Port Server Accelerated Adapter

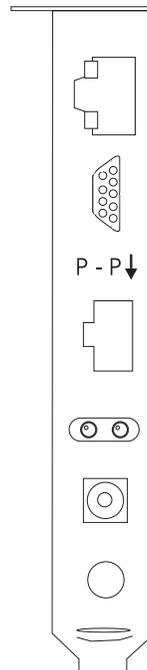


Figure 77. Remote Supervisor Adapter

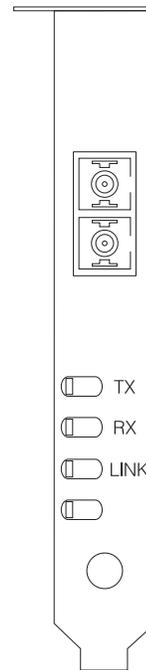


Figure 78. IBM Gigabit Ethernet SX Server Adapter

## No options

Table 33 shows the adapter placement with no options.

Table 33. No options

Configuration	PCI Slot-1 (32-bit)	PCI Slot-2 (64-bit)	PCI Slot-3 (64-bit)	PCI Slot-4 (64-bit)	PCI Slot-5 (64-bit)	PCI Slot-6 (64-bit)
						FC

## RSA only options

Table 34 shows the adapter placement with only an RSA option.

Table 34. RSA only options

Configuration	PCI Slot-1 (32-bit)	PCI Slot-2 (64-bit)	PCI Slot-3 (64-bit)	PCI Slot-4 (64-bit)	PCI Slot-5 (64-bit)	PCI Slot-6 (64-bit)
RSA	RSA					FC

## Tape only options

Table 35 shows the adapter placement with only a tape backup option.

Table 35. Tape only options

Configuration	PCI Slot-1 (32-bit)	PCI Slot-2 (64-bit)	PCI Slot-3 (64-bit)	PCI Slot-4 (64-bit)	PCI Slot-5 (64-bit)	PCI Slot-6 (64-bit)
LVD	RSA				LVD	FC
FC1	RSA				FC1	FC

## Network only options

Table 36 shows Ethernet network options without tape backup.

Table 36. Ethernet network options

Configuration	PCI Slot-1 (32-bit)	PCI Slot-2 (64-bit)	PCI Slot-3 (64-bit)	PCI Slot-4 (64-bit)	PCI Slot-5 (64-bit)	PCI Slot-6 (64-bit)
CENA	RSA	CENA				FC
GB	RSA	GB				FC
CEN	RSA	CEN				FC
EN4	RSA	EN4				FC
CENA, CENA	RSA	CENA	CENA			FC
CENA, GB	RSA	CENA	GB			FC
GB, GB	RSA	GB	GB			FC
CEN, CEN	RSA	CEN	CEN			FC
CEN, CENA	RSA	CENA	CEN			FC
CEN, GB	RSA	GB	CEN			FC
EN4, EN4	RSA	EN4	EN4			FC
EN4, CEN	RSA	CEN	EN4			FC
EN4, CENA	RSA	CENA	EN4			FC
EN4, GB	RSA	GB	EN4			FC

Table 36. Ethernet network options (continued)

Configuration	PCI Slot-1 (32-bit)	PCI Slot-2 (64-bit)	PCI Slot-3 (64-bit)	PCI Slot-4 (64-bit)	PCI Slot-5 (64-bit)	PCI Slot-6 (64-bit)
EN4, EN4, CEN	RSA	CEN	EN4	EN4		FC
EN4, EN4, CENA	RSA	CENA	EN4	EN4		FC
EN4, EN4, GB	RSA	GB	EN4	EN4		FC
EN4, CEN, CEN	RSA	CEN	CEN	EN4		FC
EN4, CEN, CENA	RSA	CENA	CEN	EN4		FC
EN4, CEN, GB	RSA	GB	CEN	EN4		FC
EN4, CENA, CENA	RSA	CENA	CENA	EN4		FC
EN4, CENA, GB	RSA	CENA	GB	EN4		FC
EN4, GB, GB	RSA	GB	GB	EN4		FC
CEN, CEN, CENA	RSA	CENA	CEN	CEN		FC
CEN, CEN, GB	RSA	GB	CEN	CEN		FC
CEN, CENA, CENA	RSA	CEN	CENA	CEN		FC
CEN, CENA, GB	RSA	CENA	GB	CEN		FC
CEN, GB, GB	RSA	GB	GB	CEN		FC
CENA, CENA, GB	RSA	CENA	CENA	GB		FC
CENA, GB, GB	RSA	CENA	GB	GB		FC
EN4, EN4, CEN, CENA	RSA	CENA	CEN	EN4	EN4	FC
EN4, EN4, CEN, GB	RSA	GB	CEN	EN4	EN4	FC
EN4, EN4, CEN, CEN	RSA	CEN	CEN	EN4	EN4	FC
EN4, EN4, CENA, CENA	RSA	CENA	CENA	EN4	EN4	FC
EN4, EN4, CENA, GB	RSA	CENA	GB	EN4	EN4	FC
EN4, EN4, GB, GB	RSA	GB	GB	EN4	EN4	FC
EN4, CEN, CEN, CENA	RSA	CENA	CEN	CEN	EN4	FC
EN4, CEN, CEN, GB	RSA	GB	CEN	CEN	EN4	FC
EN4, CEN, CENA, CENA	RSA	CENA	CENA	CEN	EN4	FC
EN4, CEN, CENA, GB	RSA	CENA	GB	CEN	EN4	FC
EN4, CEN, GB, GB	RSA	GB	GB	CEN	EN4	FC
EN4, CENA, CENA, GB	RSA	CENA	CENA	GB	EN4	FC
EN4, CENA, GB, GB	RSA	CENA	GB	GB	EN4	FC
CEN, CEN, CENA, CENA	RSA	CENA	CENA	CEN	CEN	FC
CEN, CEN, CENA, GB	RSA	CENA	GB	CEN	CEN	FC
CEN, CEN, GB, GB	RSA	GB	GB	CEN	CEN	FC
CEN, CENA, CENA, GB	RSA	CENA	CENA	GB	CEN	FC
CEN, CENA, GB, GB	RSA	CENA	GB	GB	CEN	FC
CENA, CENA, GB, GB	RSA	CENA	CENA	GB	GB	FC

## Tape and network options

Table 37 on page 151 shows Ethernet network options with tape backup.

Table 37. Tape backup with Ethernet network option

Configuration	PCI Slot-1 (32-bit)	PCI Slot-2 (64-bit)	PCI Slot-3 (64-bit)	PCI Slot-4 (64-bit)	PCI Slot-5 (64-bit)	PCI Slot-6 (64-bit)
TAPE, CENA	RSA	CENA			Tape	FC
TAPE, GB	RSA	GB			Tape	FC
TAPE, CEN	RSA	CEN			Tape	FC
TAPE, EN4	RSA	EN4			Tape	FC
TAPE, CENA, CENA	RSA	CENA	CENA		Tape	FC
TAPE, CENA, GB	RSA	CENA	GB		Tape	FC
TAPE, CEN, CEN	RSA	CEN	CEN		Tape	FC
TAPE, CEN, CENA	RSA	CENA	CEN		Tape	FC
TAPE, CEN, GB	RSA	GB	CEN		Tape	FC
TAPE, GB, GB	RSA	GB	GB		Tape	FC
TAPE, EN4, EN4	RSA	EN4	EN4		Tape	FC
TAPE, EN4, CEN	RSA	CEN	EN4		Tape	FC
TAPE, EN4, CENA	RSA	CENA	EN4		Tape	FC
TAPE, EN4, GB	RSA	GB	EN4		Tape	FC
TAPE, EN4, EN4, CEN	RSA	CEN	EN4	EN4	Tape	FC
TAPE, EN4, EN4, CENA	RSA	CENA	EN4	EN4	Tape	FC
TAPE, EN4, EN4, GB	RSA	GB	EN4	EN4	Tape	FC
TAPE, EN4, CEN, CEN	RSA	CEN	CEN	EN4	Tape	FC
TAPE, EN4, CEN, CENA	RSA	CENA	CEN	EN4	Tape	FC
TAPE, EN4, CEN, GB	RSA	GB	CEN	EN4	Tape	FC
TAPE, EN4, CENA, CENA	RSA	CENA	CENA	EN4	Tape	FC
TAPE, EN4, CENA, GB	RSA	CENA	GB	EN4	Tape	FC
TAPE, EN4, GB, GB	RSA	GB	GB	EN4	Tape	FC
TAPE, CEN, CEN, CENA	RSA	CENA	CEN	CEN	Tape	FC
TAPE, CEN, CEN, GB	RSA	GB	CEN	CEN	Tape	FC
TAPE, CEN, CENA, CENA	RSA	CENA	CENA	CEN	Tape	FC
TAPE, CEN, CENA, GB	RSA	CENA	GB	CEN	Tape	FC
TAPE, CEN, GB, GB	RSA	GB	GB	CEN	Tape	FC
TAPE, CENA, CENA, GB	RSA	CENA	CENA	GB	Tape	FC
TAPE, CENA, GB, GB	RSA	CENA	GB	GB	Tape	FC



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## Appendix B. Using the Recovery and Supplementary CD-ROMs

**Attention:** Changing the preloaded software configuration of this product, including applying or installing unauthorized service packs or updates to preinstalled software, or installing additional software products that are not included in either the preloaded image or on the Supplementary CD-ROM, may not be supported and could cause unpredictable results. For updated compatibility information, see <http://www.storage.ibm.com/support>

To correct problems with a preloaded software component, back up your user and system data. Then use the Recovery CD-ROM Set to restore the preloaded software image.

This chapter describes the applications included on the Supplementary and Recovery CD-ROMs, and how and when you should use them.

As an alternative to using the Recovery CD-ROM Set, you can use the restore portion of the disaster recovery solution provided by Persistent Storage Manager (PSM) to recover the node, if you have met the requirements (including creating a PSM backup image and PSM recovery diskette). The restore function allows you to restore the node to its state at the time of the PSM backup, in one step, without having to revert to the original (factory) configuration. Refer to the *IBM TotalStorage NAS Gateway 300 User's Reference* to determine whether you have met the requirements. If so, you can use the PSM recovery method. If you have not met the requirements for using the PSM recovery method or if the PSM recovery fails, then you must use the Recovery CD-ROM Set as described in this chapter.

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### Using the Recovery Enablement Diskette and Recovery CD-ROM

The Recovery CD-ROM Set contains the preload image for this appliance and is used to recover the preloaded image on either node. You must start the (failed) appliance node using the Recovery Enablement Diskette before you can boot from Recovery CD-ROM 1.

**CAUTION:**

**The NAS 300G does not have a monitor, keyboard, or mouse attached to it under normal operating conditions. Because of this, you can not interact with the preload-image restore process using a monitor. Starting Recovery CD-ROM 1 will, without visually prompting the user, automatically destroy all data on the system drive. Use the Recovery Enablement Diskette and Recovery CD-ROM Set only when it is absolutely necessary to restore the preloaded system image.**

To recover the preloaded image on a (failed) node, perform the following steps. Note that the recovery process invalidates persistent images and leaves them in a state that is inconsistent with their pre-recovery state. So, if you plan to use the Recovery CD-ROM Set, it is recommended that you first delete all persistent images to ensure a clean reload of the system software.

1. Attach a keyboard and display to the appliance.
2. On the other (working) node of the Model G27, select **Cluster Administration**, located in the Cluster Tools folder in the IBM NAS Admin. If prompted for a cluster name, enter the name of the cluster, and then click **Open**.

3. The cluster name appears in the left panel. Underneath it, locate the name of the failed node, right-click on the failed node machine name, and select **Evict Node**. The name of the failed node will be removed from the left pane, and the cluster will now contain only the working node of the Model G27.
4. Insert the Recovery Enablement Diskette into the diskette drive of the failed node and restart the node. When the Recovery Enablement Diskette has completed loading and modifying your node startup sequence, the node will begin a continuous beep. Do not continue with this procedure until the node begins the beep.

**Important**

The Recovery Enablement Diskette enables the Model G27 to start from the CD-ROM-ROM drive. You will not be able to restore the preload image from the Recovery CD-ROM Set without first restarting the appliance using the Recovery Enablement Diskette.

5. Remove the Recovery Enablement Diskette from the diskette drive of the appliance.
6. Place Recovery CD-ROM 1 in the CD-ROM-ROM drive of the failed node and restart the node.
7. If you installed additional processor memory on the failed node, the BIOS configuration program will appear. Click **Continue** on the first panel, click **Continue** again, click **Exit Setup**, and finally, click **Yes, save and exit Setup**.
8. The recovery process will begin automatically. Follow the instructions provided by the image restoration software, and the original manufacturing preload will be restored. During the restoration of the preload, you will be prompted to insert the other recovery CD-ROMs into the CD-ROM-ROM drive. When the preload image is restored, the node restarts automatically.
9. If you installed additional processor memory, the BIOS configuration program will now appear a second time. Click **Continue** on the first panel, click **Continue** again, click **Exit Setup**, and finally, click **Yes, save and exit Setup**. You may now detach the keyboard and display from the failed node and allow the recovery process to complete automatically.

**Important**

- After the node restarts, a series of configuration and system preparation programs that finish configuring the node run automatically. These programs must finish running before you use any included applications (such as the IBM Advanced Appliance Configuration Utility or the Terminal Services Client) to connect to or configure the Model G27. Do not connect to or configure the appliance for at least 15 minutes after system restart. This notice applies only to the first time the Model G27 is started after using the Recovery CD-ROM Set.
- Logical Disk 0 will be configured to have a 6-GB NTFS boot partition. Any other previously configured logical disk drives, as well as the remainder of Logical Disk 0 (which, on the original hard disk drive of the node, contains the Maintenance partition, but for a replacement hard disk drive would not contain any other partitions), will be unchanged.

10. Reinstall all software updates you had installed on the appliance. Or, if the Recovery CD-ROM Set you used in this procedure is a newer version than the

one you received with the Model G27, reinstall only those software updates that are newer than those on the Recovery CD-ROM Set.

11. If you are using the recovery procedure to restore the failed node after replacing the internal hard disk drive, continue with this step. Otherwise, go to Step 12. You must now rebuild the Maintenance (D) partition on the new hard disk drive, as the recovery process only rebuilds the System (C) partition.  
Start Disk Management on the failed node. You can do this in one of two ways:
  - a. Start a Terminal Services session to the node and click the **IBM NAS Admin** icon. From the IBM NAS Administration console that appears, select **Computer Management** and **Disk Management**.
  - b. Start a *Windows 2000 for NAS* user interface session to the node and select **Disks and Volumes**. Select **Disks and Volumes** again, and then provide your administrator user name and password when prompted.

When Disk Management has started, perform these steps:

- a. In the Disk Management window, right-click on the unallocated area of Disk 0 and then click **Create Partition**.
- b. In the Create Partition wizard, click **Next** and select **Primary Partition**.
- c. Click **Next** and select **D:** as the drive letter.
- d. Click **Next** and select **FAT32** as the file system. Change the volume label to Maintenance.
- e. Click **Finish** to close the wizard. The partition will then be formatted.

When formatting is complete, the status of the partition should appear as Healthy, and the other properties should appear as: name Maintenance, drive letter D, and file system FAT32.

12. On the failed (now recovered) node, follow the procedures for configuring a joining node located in the *IBM TotalStorage NAS Gateway 300 User's Reference*. The recovered node will rejoin the cluster which already contains the other (working) node. You will also need to reconfigure any cluster resource balancing you had set up prior to recovery, such that the recovered node will again be the preferred owner of any resources for which it had been the preferred owner prior to the recovery.

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## Using the Supplementary CD-ROM

The Supplementary CD-ROM contains documentation and copies of key software applications that are preinstalled on the Model G27. Table 38 on page 156 includes the names of the directories found on the Supplementary CD-ROM and a description of the contents of the directory.

Table 38. Supplementary CD-ROM directories

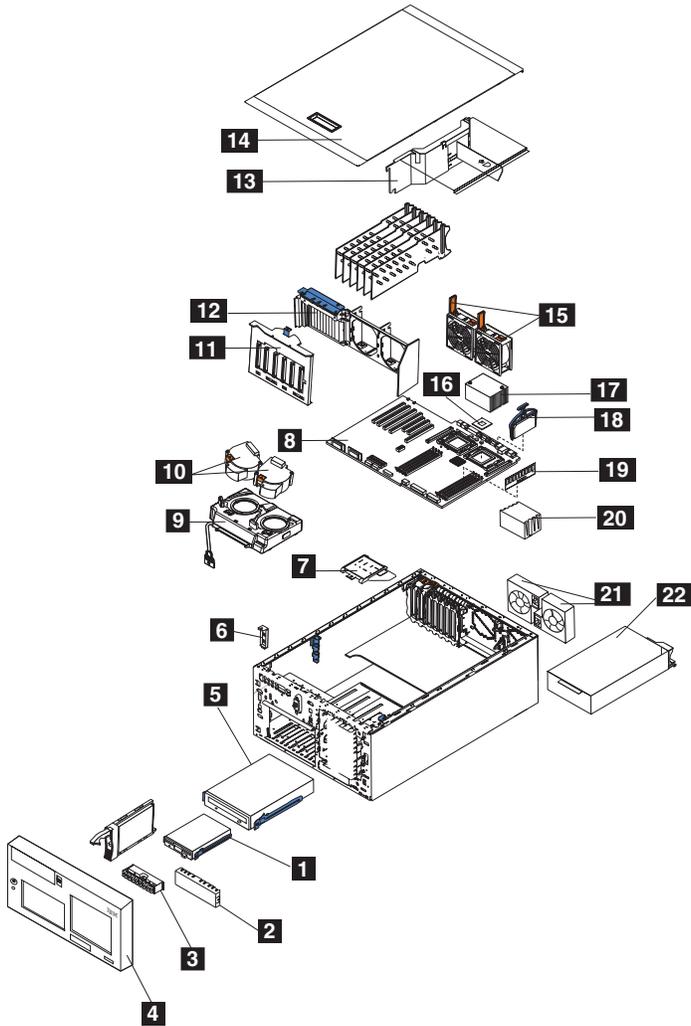
Directory name	Contents
IBM Advanced Appliance Configuration	<p>IBM Advanced Appliance Configuration console and agent installation files. The IBM Advanced Appliance Configuration agent is preinstalled as a Windows Powered service on the NAS 300G. To install the Advanced Appliance Configuration console (on another network-attached workstation running Windows 98, Windows NT, or Windows 2000), run Ipsetup.exe (if you have Supplementary CD-ROM Version 1.5) from the x:\IBM Advanced Appliance Configuration directory, where x is the drive letter assigned to your workstation's CD-ROM drive.</p> <p><b>Note:</b> When the installation completes, it will leave behind a temporary directory named iaacu on the workstation, under the directory specified by the TEMP environment variable (usually c:\temp; you can determine the value of the TEMP variable by typing set temp from a DOS command prompt). You should remove this directory (using Windows Explorer) after the installation has completed.</p>
DiskImages	<p>A diskette image for the Recovery Enablement Diskette. To create the Recovery Enablement Diskette, run RecovDsk.bat and insert a HD 1.44 floppy diskette into drive A when prompted. Be sure to read the readme.txt file located in this directory for last minute and model-specific updates.</p>
I386	<p>Windows Powered installation files. You may be prompted to insert your Windows Powered CD-ROM-ROM if you add device drivers, OS features, and so on. If so, insert the Supplementary CD-ROM and specify path x:\i386, where x is the drive letter assigned to your CD-ROM-ROM drive.</p>
W2KSP2	<p>Windows Powered Service Pack 2, which is preloaded on the NAS 300G. You should reapply Service Pack 2 if you add any device drivers, OS features, and so on . Run the executable w2ksp2.exe and follow the instructions provided.</p>
Services for UNIX	<p>SFU 2.2 installation files, zipped into a self-extracting executable, sfu22.exe. If you add features that are not preloaded, you will be prompted for these installation files. You will need to extract the installation files onto the hard disk drive of the NAS 300G. It is recommended that you use the maintenance drive (D drive) as the destination, but you can use the system drive (C drive). On whatever drive you choose, make sure that you have at least 250 MB of free space, create a temporary directory on the drive, and then issue the following command from the Services for UNIX directory on the Supplementary CD-ROM: sfu22 path, where path is the drive letter and path of the temporary directory you created. When you are prompted by the Services for UNIX installation to provide the path of the installation files, specify the same path you specified in extracting the files from the CD-ROM.</p>
Terminal Services Client	<p>The standalone Win32 Terminal Services Client application. The appliance supports Web-based terminal services, so this is an optional installation. To install the Terminal Services Client, run setup.exe from the Disk1 subdirectory.</p>
readme.txt	<p>A text file that describes the contents of the Supplementary CD-ROM.</p>

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## Appendix C. Parts listings

The following pages contains exploded views and parts lists of the IBM TotalStorage NAS Appliance Model G27.

# Assembly 1: NAS 300G engine Appliance



## Assembly 1: (continued)

Asm- Index	Part Number	Units	Description
1-	38P7560	1	NAS 300G engine Appliance
-1	76H4091	1	• floppy drive, 1.44 MB
-2	00N6407	1	• 5.25 in. media blank bezel
-3	59P5808	1	• Operator information panel
-4	38P7623	1	• bezel assembly
-5	33P3203	1	• CD-ROM, 48X
-5	33P3207	1	• CD-ROM, 48X (alternate part)
-6	25P3306	1	• power reset card
-7	21P9728	1	• Diagnostics panel card
-8	48P9045	1	• system board assembly
-9	00N6409	1	• front fan housing
-10	09N7499	1	• fan assembly
-11	33P2961	1	• DASD backplane with carrier assembly
-12	59P4159	1	• Guide, fan/card assembly
-13	59P4160	1	• baffle
-14	21P9660	1	• cover
-15	09N9474	2	• fan assembly, 92 mm
-16	37L3570	1	• microprocessor, 2.4-0K-L3
-17	25P6309	2	• heat sink
-18	49P2021	1	• voltage regulator module, 9.05
-19		1	• memory
-		2	• • 512 MB 133 MHz ECC SDRAM RDIMM memory
-		2	• • 1 GB 133 MHz ECC SDRAM RDIMM memory
-20	25P6309	1	• heat sink
-21	21P9707	2	• fan, rear, hot-swap
-22	36L8819	2	• power supply, 250 Watt
-		1	• hard disk drives
-	06P5759	1	• • 36.4 GB 10K-5 Ultra 160 SCSI Hot-Swap SL hard disk drive
-	19K0615	1	• • 36.4 GB 10K-4 Ultra 160 SCSI Hot-Swap SL hard disk drive (alternate part)
-	06P5760	1	• • 73.4 GB 10K-5 Ultra 160 SCSI Hot-Swap SL hard disk drive (alternate part)
-	06P6245	1	• hot-swap hard disk drive filler blank
-	49P2025	1	• power cage assembly
-		1	• adapters
-	06P2215	1	• • IBM PCI Ultra160 SCSI adapter (LVD/SE)
-	09N7292	1	• • Qlogic 2340 1-port Fibre Channel adapter
-		1	• • Qlogic 2342 2-port Fibre Channel adapter
-		1	• • Alacritech 1000x1 Single-Port Server and Storage Accelerated adapter
-	06P3709	1	• • IBM Gigabit Ethernet SX Server Adapter
-	38P7829	1	• • Alacritech 100x4 Quad-Port Server Accelerated Adapter
-	22P6801	1	• • PRO/1000 XT Server Adapter by Intel
-		1	• • Remote Supervisor Adapter
-	24P2589	1	• • • Card assembly
-	06P5739	1	• • • Card assembly (Japan)
-	37L6903	1	• • • Battery
-	00N9561	1	• • • Battery (Japan)
-	19K6131	1	• • • ServeRAID support CD
-	24P2925	1	• • • ServeRAID support CD (Japan)
-	00N6412	2	• DASD slide
-	00N6413	2	• diskette drive slide
-	33F8354	1	• system board battery 3.0 volt (8590)
-	31P6027	1	• thermal grease kit
-	37L6063	1	• cable, blower
-	21P9681	1	• cable, rear fan

## Assembly 1: (continued)

Asm-Index	Part Number	Units	Description
-	21P9684	1	• cable, fan
-	59P4201	1	• cable, SCSI 15.71 in.
-	59P4199	1	• cable, SCSI 10 in.
-	21P9685	1	• cable, switch CD
-	24P5069	1	• cable, floppy disk drive
-	24P5085	1	• cable, IDE CD-ROM drive
-	00N6417	1	• rack kit
-	00N6419	1	• miscellaneous rack parts kit
-	00N6429	2	• rack bracket assemblies
-	21P9562	1	• chassis mechanical shell

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## Appendix D. Notices

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## 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.

<p><b>Warning:</b> 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.</p>
---

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.

## Chinese Class A warning 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.

中华人民共和国“A类”警告声明

声明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

## 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

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## Appendix E. Safety notices

The following sections describe the safety and environmental items you must consider for an IBM NAS Appliance.

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### Basic safety information



#### DANGER

**Before you begin to install this product, read the safety information in *Caution: Safety Information--Read This First*, SD21-0030. This booklet describes safe procedures for cabling and plugging in electrical equipment.**



**Gevarr:** Voodrat u begint met de installatie van dit produkt, moet u eerst de veiligheidsinstructies lezen in de brochure *PAS OP! Veiligheidsinstructies--Lees dit eerst*, SD21-0030. Hierin wordt beschreven hoe u elektrische apparatuur op een veilige manier moet bekabelen en aansluiten



**Danger:** Avant de procéder à l'installation de ce produit, lisez d'abord les consignes de sécurité dans la brochure *ATTENTION: Consignes de sécurité--A lire au préalable*, SD21-0030. Cette brochure décrit les procédures pour câbler et connecter les appareils électriques en toute sécurité.



**Perigo:** Antes de começar a instalar deste produto, leia as informações de segurança contidas em *Cuidado: Informações Sobre Segurança--Leia Primeiro*, SD21-0030. Esse folheto descreve procedimentos de segurança para a instalação de cabos e conexões em equipamentos elétricos.



危險：安裝本產品之前，請先閱讀  
"Caution: Safety Information--Read  
This First" SD21-0030 手冊中所提  
供的安全注意事項。這本手冊將會說明  
使用電器設備的纜線及電源的安全程序。



Opasnost: Prije nego što počnete sa instalacijom produkta, pročítajte naputak o pravilima o sigurnom rukovanju u Upozorenje: Pravila o sigurnom rukovanju - Prvo pročítaj ovo, SD21-0030. Ovaj privitak opisuje sigurnosne postupke za priključivanje kabela i priključivanje na električno napajanje.



**Upozornění:** než zahájíte instalaci tohoto produktu, přečtěte si nejprve bezpečnostní informace v pokynech „Bezpečnostní informace“ č. 21-0030. Tato brožurka popisuje bezpečnostní opatření pro kabeláž a zapojení elektrického zařízení.



**Fare!** Før du installerer dette produkt, skal du læse sikkerhedsforskrifterne i *NB: Sikkerhedsforskrifter – Læs dette først* SD21-0030. Vejledningen beskriver den fremgangsmåde, du skal bruge ved tilslutning af kabler og udstyr.



**Gevarr:** Voordat u begint met het installeren van dit produkt, dient u eerst de veiligheidsrichtlijnen te lezen die zijn vermeld in de publikatie *Caution: Safety Information - Read This First*, SD21-0030. In dit boekje vindt u veilige procedures voor het aansluiten van elektrische apparatuur.



**VARRA:** Ennen kuin aloitat tämän tuotteen asennuksen, lue julkaisussa *Varoitus: Turvaohjeet–Lue tämä ensin*, SD21-0030, olevat turvaohjeet. Tässä kirjasessa on ohjeet siitä, mitensähkölaitteet kaapeloidaan ja kytketään turvallisesti.



**Danger :** Avant d'installer le présent produit, consultez le livret *Attention : Informations pour la sécurité–Lisez-moi d'abord*, SD21-0030, qui décrit les procédures à respecter pour effectuer les opérations de câblage et brancher les équipements électriques en toute sécurité.



**Vorsicht:** Bevor mit der Installation des Produktes begonnen wird, die Sicherheitshinweise in *Achtung: Sicherheitsinformationen–Bitte zuerst lesen*. IBM Form SD21-0030. Diese Veröffentlichung beschreibt die Sicherheitsvorkehrungen für das Verkabeln und Anschließen elektrischer Geräte.



**Κίνδυνος:** Πριν ξεκινήσετε την εγκατάσταση αυτού του προϊόντος, διαβάστε τις πληροφορίες ασφαλείας στο φυλλάδιο *Caution: Safety Information-Read this first*, SD21-0030. Στο φυλλάδιο αυτό περιγράφονται οι ασφαλείς διαδικασίες για την καλωδίωση των ηλεκτρικών συσκευών και τη σύνδεσή τους στην πρίζα.



**Vigyázat:** Mielőtt megkezdi a berendezés üzembe helyezését, olvassa el a *Caution: Safety Information-Read This First*, SD21-0030 könyvecskében leírt biztonsági információkat. Ez a könyv leírja, milyen biztonsági intézkedéseket kell megtenni az elektromos berendezés huzalozásakor illetve csatlakoztatásakor.



**Pericolo:** prima di iniziare l'installazione di questo prodotto, leggere le informazioni relative alla sicurezza riportate nell'opuscolo *Attenzione: Informazioni di sicurezza-Prime informazioni da leggere* in cui sono descritte le procedure per il cablaggio ed il collegamento di apparecchiature elettriche.



危険： 導入作業を開始する前に、安全に関する小冊子SD21-0030 の「最初にお読みください」(Read This First)の項をお読みください。  
この小冊子は、電気機器の安全な配線と接続の手順について説明しています。



위험: 이 제품을 설치하기 전에 반드시 "주의: 안전 정보-시작하기 전에" (SD21-0030) 에 있는 안전 정보를 읽으십시오.



**ОПАСНОСТ**

Пред да почнете да го инсталирате овој продукт, прочитајте ја информацијата за безбедност:  
"Предупредување: Информација за безбедност: Прочитајте го прво ова", SD21-0030.  
Оваа брошура опишува безбедносни процедури за каблирање и вклучување на електрична опрема.



**Fare:** Før du begynner å installere dette produktet, må du lese sikkerhetsinformasjonen i *Advarsel: Sikkerhetsinformasjon – Les dette først*, SD21-0030 som beskriver sikkerhetsrutinene for kabling og tilkobling av elektrisk utstyr.



Uwaga:

Przed rozpoczęciem instalacji produktu należy zapoznać się z instrukcją:

"Caution: Safety Information - Read This First", SD21-0030.

Zawiera ona warunki bezpieczeństwa przy podłączaniu do sieci elektrycznej i eksploatacji.



**Perigo:** Antes de iniciar a instalação deste produto, leia as informações de segurança *Cuidado: Informações de Segurança–Leia Primeiro*, SD21-0030. Este documento descreve como efectuar, de um modo seguro, as ligações eléctricas dos equipamentos.



**ОСТОРОЖНО:** Прежде чем устанавливать этот продукт, прочтите Инструкцию по технике безопасности в документе "Внимание: Инструкция по технике безопасности -- Прочестъ в первую очередь", SD21-0030. В этой брошюре описаны безопасные способы каблирования и подключения электрического оборудования.



Nebezpečenstvo: Pred inštaláciou výrobku si prečítajte bezpečnostné predpisy v

Výstraha: Bezpečnostné predpisy - Prečítaj ako prvé, SD21-0030. V tejto brožúrke sú opísané bezpečnostné postupy pre pripojenie elektrických zariadení.



Pozor: Preden začnete z instalacijo tega produkta preberite poglavje: "Opozorilo: Informacije o varnem rokovanju-preberite pred uporabo," SD21-0030. To poglavje opisuje pravilne postopke za kabliranje.



**Peligro:** Antes de empezar a instalar este producto, lea la información de seguridad en *Atención: Información de Seguridad–Lea Esto Primero*, SD21-0030. Este documento describe los procedimientos de seguridad para cablear y enchufar equipos eléctricos.



**Varning — livsfara:** Innan du börjar installera den här produkten bör du läsa säkerhetsinformationen i dokumentet *Varning: Säkerhetsföreskrifter – Läs detta först*, SD21-0030. Där beskrivs hur du på ett säkert sätt ansluter elektrisk utrustning.



危險：

開始安裝此產品之前，請先閱讀安全資訊。

注意：

請先閱讀 - 安全資訊 SD21-0030

此冊子說明插接電器設備之電纜線的安全程序。

## 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 (earthing) requirements

Electrical grounding (earthing) 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.



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## Glossary of terms and abbreviations

This glossary includes terms and definitions from:

- *The American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies can be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018. Definitions are identified by the symbol (A) after the definition.
- The *ANSI/EIA Standard - 440A: Fiber Optic Terminology*, copyright 1989 by the Electronics Industries Association (EIA). Copies can be purchased from the Electronics Industries Association, 2001 Pennsylvania Avenue N.W., Washington, D.C. 20006. Definitions are identified by the symbol (E) after the definition.
- The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions of published parts of this vocabulary are identified by the symbol (I) after the definition; definitions taken from draft international standards, committee drafts, and working papers being developed by ISO/IEC JTC1/SC1 are identified by the symbol (T) after the definition, indicating that final agreement has not yet been reached among the participating National Bodies of SC1.

### A

**adapter load balancing.** The ability of several adapters in a team to be active simultaneously, with the outbound-traffic load balanced across all the adapters in the team; spreading tasks among adapters improves performance by preventing uneven distribution of workload. If one adapter in the team fails, the outbound traffic is redistributed across the remaining active adapters in the team. See also *teaming*.

**assigned disk.** A disk that is mapped to a logical drive.

**attachment.** A port or a pair of ports, optionally including an associated optical bypass, that are managed as a functional unit. A dual attachment includes two ports: a port A and a port B. A single attachment consists of one port: port S.

### B

**Basic Input/Output System (BIOS).** The personal computer code that controls basic hardware operations, such as interactions with diskette drives, hard disk drives, and the keyboard.

**BIOS.** See *Basic Input/Output System*.

**bits per second (bps).** The rate at which bits are transmitted per second. Contrast with *baud*.

**bps.** See *bits per second*.

**buffer.** See *buffer storage*.

**buffer storage.** (1) A special-purpose storage or storage area allowing, through temporary storage, the data transfer between two functional units having different transfer characteristics. A buffer storage is used between non-synchronized devices, a serial and a parallel device, or between devices having different transfer rates. (2) In word processing, a temporary storage in which text is held for processing or communication (T).

**bus.** See *data bus*.

### C

**CIFS.** See *Common Internet File System*.

**client.** A computer system or process that requests access to the data, services, or resources of a server (another computer system or process). Multiple clients may share access to a common server.

**client-server model.** A common way to describe network services and the model user processes (programs) of those services.

**cluster.** (1) A station that consists of a control unit (a *cluster controller*) and the terminals attached to it. (2) A group of APPN nodes that have the same network ID and the same topology database. A cluster is a subset of a network identifier (NETID) subnetwork. See also *high-availability cluster multiprocessing (HACMP)* and *network identifier (NETID)*.

**collision avoidance.** In carrier sense multiple access with collision avoidance (CSMA/CA), the process of sending a jam signal and waiting for a variable time before transmitting data. The process is designed to avoid two or more simultaneous transmissions.

**Common Internet File System (CIFS).** A protocol that enables collaboration on the Internet by defining a remote file-access protocol that is compatible with the way applications already share data on local disks and network file servers.

**connect.** In a LAN, to physically join a cable from a station to an access unit or network connection point. Contrast with *attach*.

**CRU.** See *customer-replaceable unit*.

**customer-replaceable unit (CRU).** An assembly or part that a customer can replace in its entirety when any of its components fail. Contrast with *field-replaceable unit*.

## D

**DASD.** See *direct access storage device*.

**data bus.** A bus used to communicate data internally and externally to and from a processing unit, storage, and peripheral devices (A).

**device parity protection.** A function that protects data stored on a disk-unit subsystem from being lost because of the failure of a single disk unit in the disk-unit subsystem. When a disk-unit subsystem has device parity protection and one of the disk units in the subsystem fails, the subsystem continues to run. The disk-unit subsystem reconstructs the data after the disk unit in the subsystem is repaired or replaced. See also *RAID*.

**DHCP.** See *Dynamic Host Configuration Protocol*.

**DIMM.** See *dual inline memory module*.

**direct access storage device (DASD).** A mass-storage medium on which a computer stores data. Contrast with *random access memory (RAM)*.

**DNS.** See *Domain Name System*.

**Domain Name System (DNS).** In the Internet suite of protocols, the distributed database system used to map domain names to IP addresses.

**drive bay.** A receptacle in an appliance into which you insert a hard-disk-drive module. The bays are in storage units that can be located in a different rack from the appliance.

**dual inline memory module (DIMM).** A small circuit board with memory-integrated circuits containing signal and power pins on both sides of the board.

**Dynamic Host Configuration Protocol (DHCP).** A protocol defined by the Internet Engineering Task Force (IETF) that is used for dynamically assigning IP addresses to computers in a network.

## E

**EISA.** See *Extended Industry Standard Architecture*.

**electromagnetic compatibility (EMC).** The design and test of products to meet legal and corporate specifications dealing with the emissions and susceptibility to frequencies in the radio spectrum. Electromagnetic compatibility is the ability of various electronic equipment to operate correctly in the intended electromagnetic environment.

**electrostatic discharge (ESD).** An undesirable discharge of static electricity that can damage equipment and degrade electrical circuitry.

**EMC.** See *electromagnetic compatibility*.

**engine.** The unit that contains the processors that respond to requests for data from clients. The operating software for the IBM TotalStorage appliance resides in the engine.

**equivalent paths.** A collection of paths to the storage device. The paths have no switchover time penalty when changing from one path group to another while accessing the storage device.

**error.** A discrepancy between a computed, observed, or measured value or condition and the true, specified, or theoretically correct value or condition (A) (I). Contrast with *failure*.

**ESD.** See *electrostatic discharge*.

**Ethernet.** A standard protocol for a 10-Mbps baseband local area network (LAN) that allows multiple access and manages contention by using carrier sense multiple access with collision detection (CSMA/CD) as the access method.

**Ethernet network.** A baseband LAN with a bus topology in which messages are broadcast on a coaxial cable using a carrier sense multiple access/collision detection (CSMA/CD) transmission method.

**expansion slot.** In personal-computer systems, one of several receptacles in the rear panel of the system unit into which a user can install an adapter.

**Extended Industry Standard Architecture (EISA).** The PC bus standard that extends the AT bus (ISA bus) to 32 bits and provides support for bus master. It was announced in 1988 as a 32-bit alternative to the Micro Channel that would preserve investment in existing boards. PC and AT cards (ISA cards) can plug into an EISA bus.

## F

**fabric.** A complex network using hubs, switches and gateways. For example, Fibre Channel uses a fabric to connect devices. A fabric can be as simple as a single cable connecting two devices.

**failback.** The restoration of an appliance to its initial configuration after detection and repair of a failed network or component.

**failover.** (1) The automatic recovery of resources in the event of a network outage, or failure of the hardware or software. (2) A cluster event in which the primary database server or application server switches to a backup system due to the failure of the primary server.

**Fast Etherchannel (FEC).** A proprietary technology developed by Cisco that creates a team of two to four 10/100 Ethernet adapters or ports to increase transmission and reception throughput. Adapter fault tolerance is also supported by this technology.

**feature code.** A code used by IBM to process hardware and software orders.

**FEC.** See *Fast Etherchannel*.

**fiber optic cable.** See *optical cable*.

**field-replaceable unit (FRU).** An assembly that is replaced in its entirety when any one of its components fails. In some cases, a FRU may contain other FRUs. Contrast with *customer-replaceable unit*.

**flash memory.** A type of non-volatile storage device that must be erased in fixed blocks rather than single bytes.

**FRU.** See *field-replaceable unit*.

## G

**gateway.** A device that acts as a router to transfer packets between networks, but occurs at the transport layer. See also *router*.

**GEC.** See *Gigabit Etherchannel*.

**Gigabit Etherchannel (GEC).** A proprietary technology developed by Cisco that creates a team of two Gigabit Ethernet adapters to increase transmission and reception throughput. Adapter fault tolerance is also supported by this technology.

## H

**hertz (Hz).** A unit of frequency equal to one cycle per second.

**Note:** In the United States, line frequency is 60 Hz or a change in voltage polarity 120 times per second; in Europe, line frequency is 50 Hz or a change in voltage polarity 100 times per second.

**host.** (1) In TCP/IP, any system that has at least one Internet address associated with it. A host with multiple network interfaces may have multiple internet addresses associated with it. The host can be a client, a server, or both. (2) In Fibre Channel technology, any system that has at least one worldwide name associated with it. A host with multiple network interfaces may have multiple worldwide names associated with it.

## I

**IETF.** See *Internet Engineering Task Force*.

**iLUN.** See *iSCSI client logical-unit number*.

**Internet Engineering Task Force (IETF).** The task force of the Internet Architecture Board (IAB) that is responsible for solving the short-term engineering needs of the Internet. The IETF consists of numerous working groups, each focused on a particular problem. Internet standards are typically developed or reviewed by individual working groups before they can become standards.

**Internet Protocol (IP).** A protocol that routes data through a network or interconnected networks. IP acts as an intermediary between the higher protocol layers and the physical network.

**interrupt request (IRQ).** An input found on a processor that causes it to suspend normal instruction execution temporarily and to start executing an interrupt handler routine.

**IP.** See *Internet Protocol*.

**IRQ.** See *interrupt request*.

**iSCSI client logical-unit number (iLUN).** A unique number that is assigned to each virtual logical unit number (VLUN). The iLUN for a single client starts at zero and increments sequentially.

## J

**jumper.** A connector between two pins on a network adapter that enables or disables an adapter option, feature, or parameter value.

## L

**LAN.** See *local area network*.

**local area network (LAN).** A network in which a set of devices is connected to one another for communication and that can be connected to a larger network.

**logical drive.** A unit of virtual storage that is made available to the network through virtual logical unit numbers (VLUNs) and iSCSI client logical-unit number (iLUNs). It consists of one or more physical disks that are combined using RAID 0, 1, 1E, 5, or 5E technology.

**logical unit.** A type of network-accessible unit that enables users to gain access to network resources and communicate with each other.

**logical unit number (LUN).** An identifier used on a SCSI bus to distinguish among up to eight devices (logical units) with the same SCSI ID.

**loop.** A closed unidirectional signal path connecting input/output devices to a system.

**LUN.** See *logical unit number*.

## M

**megahertz (MHz).** A unit of measure of frequency. One megahertz equals 1 000 000 hertz.

**MHz.** See *megahertz*.

**multicast address.** A type of IP address, which identifies a group of interfaces and permits all of the systems that are in that group to receive the same packet of information.

## N

**N.** See *newton*.

**NAS.** See *network-attached storage*.

**NetBIOS.** A standard interface to networks, IBM personal computers (PCs), and other compatible PCs. It is used on LANs to provide message, print-server, and file-server functions. Application programs that use NetBIOS need not manage the details of LAN data-link-control protocols.

**network-attached storage (NAS).** A task-optimized storage device directly attached to a network that operates independently of the general-purpose file servers.

**Network File System (NFS).** A protocol, developed by Sun Microsystems, Incorporated, that allows any host in a network to mount another host's file directories. After a file directory is mounted, it appears to reside on the local host.

**network information services (NIS).** A set of UNIX network services (for example, a distributed service for retrieving information about the users, groups, network addresses, and gateways in a network) that resolve naming and addressing differences among computers in a network.

**newton (N).** The unit of force required to impart an acceleration of one meter per second per second to a mass of one kilogram ( $1 \text{ m/s}^2$ ).

**NFS.** See *Network File System*.

**NIS.** See *network information services*.

## O

**optical cable.** A fiber, multiple fibers, or a fiber bundle in a structure built to meet optical, mechanical, and environmental specifications (E).

## P

**path.** In a network, a route between two nodes.

**path group.** A collection of equivalent paths. Storage devices may have one -  $n$  path groups.

**PCI.** See *Peripheral Component Interconnect*.

**Peripheral Component Interconnect (PCI).** A local bus for PCs from Intel that provides a high-speed data path between the CPU and up to 10 peripherals (video, disk, network, and so on). The PCI bus coexists in the PC with the industry standard architecture (ISA) or extended industry standard architecture (EISA) bus. ISA and EISA boards plug into an ISA or EISA slot, while high-speed PCI controllers plug into a PCI slot.

**Persistent Storage Manager (PSM).** Columbia Data Products software that creates multiple, point-in-time, persistent, TruImage data views of any or all system and data volumes residing on network-attached storage. All persistent images survive system power loss, or a planned or unplanned reboot. Each instance of PSM seamlessly handles 250 concurrent images of up to 255 independent volumes for a total of 63 750 independent data images.

**port.** See *socket*.

**PSM.** See *Persistent Storage Manager*.

## R

**RAID.** See *redundant array of independent disks*.

**RAM.** See *random access memory*.

**random access memory (RAM).** A temporary storage location in which the central processing unit (CPU) stores and executes its processes. Contrast with *direct access storage device (DASD)*.

**redundant array of independent disks (RAID).** A method of protecting data loss due to disk failure based on the Redundant Array of Independent Disks specification published by the University of California in 1987. See also *device parity protection*.

## S

**SAN.** See *storage area network*.

**SCSI.** See *small computer system interface*.

**server.** In a network, a node that provides facilities to other stations; examples of servers are a file server, a printer server, and a mail server.

**shielded twisted pair (STP).** A cable medium consisting of a telephone wire wrapped in a metal sheath to eliminate external interference.

**Simple Network Management Protocol (SNMP).** In the Internet suite of protocols, a network management protocol that is used to monitor routers and attached networks. SNMP is an application-layer protocol. Information on devices managed is defined and stored in the application's Management Information Base (MIB).

**small computer system interface (SCSI).** A standard hardware interface that enables a variety of peripheral devices to communicate with one another.

**SNMP.** See *Simple Network Management Protocol*.

**storage area network (SAN).** A dedicated storage network tailored to a specific environment, combining servers, storage products, networking products, software, and services.

**storage client network.** A classic, interconnected, Fibre Channel fabric with a single, Fibre Channel, fabric name.

**storage controller.** A device (such as a RAID controller) that creates and manages other storage devices.

**storage network.** An arrangement that provides shared access to a set of logical unit numbers (LUNs) across one - *n* storage client networks.

**storage port.** An engine's connection point to a storage client network. A storage port is a member of a single fabric. See also *engine*.

**storage unit.** Hardware that contains one or more drive bays, power supplies, and a network interface. Some storage units contain RAID controllers; their storage unit is accessed by the appliance.

**STP.** See *shielded twisted pair*.

## T

**target.** A collection of logical units that are directly addressable on the network. The target corresponds to the server in a client-server model.

**TCP.** See *Transmission Control Protocol*.

**TCP/IP.** See *Transmission Control Protocol/Internet Protocol*.

**teaming.** The grouping of two to four ports or adapters to increase transmission and reception throughput. Teaming creates a single, high-speed, fault-tolerant link that provides load balancing for both outbound and inbound traffic.

**Tivoli Storage Manager (TSM).** A client/server product that provides storage management and data access services in a heterogeneous environment.

**Transmission Control Protocol (TCP).** In TCP/IP, a host-to-host protocol that provides transmission in an internet environment. TCP assumes Internet Protocol (IP) is the underlying protocol.

**Transmission Control Protocol/Internet Protocol (TCP/IP).** The Transmission Control Protocol and the Internet Protocol, which together provide reliable end-to-end connections between applications over interconnected networks of different types.

**True Image data view.** A data view that allows the file to be restored in the event of accidental deletion. It consists of point-in-time images that provide a near-instant virtual copy of an entire storage volume.

**TSM.** See *Tivoli Storage Manager*.

## U

**universal serial bus (USB).** A serial-interface standard for telephony and multimedia connections to personal computers.

**unshielded twisted pair (UTP).** A cable medium with one or more pairs of twisted insulated copper conductors bound in a single plastic sheath.

**USB.** See *universal serial bus*.

## V

**virtual local area network (VLAN).** A logical association of switch ports based upon a set of rules or criteria such as MAC addresses, protocols, network address, or multicast address. This concept permits resegmentation of the LAN without requiring physical rearrangement.

**virtual logical unit number (VLUN).** A subset of a logical drive.

**VLAN.** See *virtual local area network*.

**VLUN.** See *virtual logical unit number*.

**volume.** (1) A unit of storage on disk, tape, or other data-recording media. (2) A logical disk visible to an appliance over a storage network. A volume is a member of a single storage network of 1 - *n* fabrics. It can have 1 - *n* path groups of 1 - *n* equivalent paths.

## W

**Windows Internet Naming Service (WINS).** A Microsoft program that provides a distributed database for registering and querying dynamic NetBIOS names to IP address mapping in a routed network environment.

**WINS.** See *Windows Internet Naming Service*.

**Windows networking.** A networking file-system protocol for the Windows operating system.

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Model G27  
Hardware Service Guide

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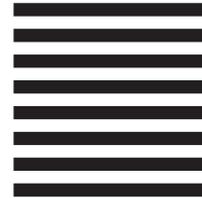
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