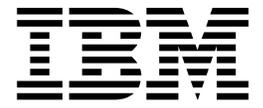


TotalStorage™ Network Attached Storage 300G



User's Reference

Version 1 Release 1

Note

Before using this information and the product it supports, be sure to read the general information in "Appendix A. Notices" on page 63.

First Edition (April 2001)

This edition applies to Version 1, Release 1, of the IBM 5196 TotalStorage Network Attached Storage 300G (Model G25, product number 5196-G25) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About this book

This book provides information necessary to configure and administer the IBM 5196 TotalStorage Network Attached Storage 300G.

Hereafter, the IBM 5196 TotalStorage Network Attached Storage 300G is referred to as the Model G25.

Who should read this book

This book is for Model G25 administrators.

Frequently used terms

This document contains certain notices that relate to a specific topic. The caution and danger notices also appear in the multilingual Safety Information on the Documentation CD that came with the appliance. Each notice is numbered for easy reference to the corresponding notices in the Safety Information.

The following terms, used within this document or within the Safety Information, have these specific meanings:

Term	Definition in this document
Drive bay	A receptacle into which you insert a hard drive. The bays could be physically located in a separate rack from the appliance.
Engine	The processor that responds to requests for data from clients. This is where the operating software for the appliance resides.
Notes	These notices provide important tips, guidance, or advice.
Attention	These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
Caution	These notices indicate situations that can be potentially hazardous to you. A caution notice is placed just before descriptions of potentially hazardous procedure steps or situations.
Danger	These notices indicate situations that can be potentially lethal or extremely hazardous to you. A danger notice is placed just before descriptions of potentially lethal or extremely hazardous procedure steps or situations.

Publications

The latest versions of the following product publications are available in softcopy at:
www.ibm.com/storage/support/nas

Model G25 product library

The Model G25 library consists of the following publications:

- *Installation Guide GA27-4270-01*

This book describes hardware physical specifications, electrical specifications, cabling, environmental specifications, and networking specifications for installing the Model G25.

- *User's Reference* GA27-4271-01
This book describes such operational and administrative activities as:
 - Using the configuration utilities
 - Administering the Model G25
 - Troubleshooting
 - Using the Recovery and Supplementary CDs

Hardcopy publications shipped with the Model G25

The following publications are shipped in hardcopy and are also provided in softcopy (PDF) form at:

www.ibm.com/storage/support/nas/techdocs

- *IBM 5196 TotalStorage Network Attached Storage 300G Installation Guide*, GA27-4270-01
- *Release Notes*

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

Note that the *User's Reference* is provided in softcopy only.

Related publications

The following publications contain additional information about the Model G25:

- *IBM 5196 TotalStorage Network Attached Storage 300G Installation Guide* GA27-4270-01
- *IBM 5196 TotalStorage Network Attached Storage 300G (Model G25) Service Guide* GA27-4274-01
- *UM Services User's Guide* (on the Documentation CD that came with the appliance)

Web sites

The following Web site has additional and up-to-date information about the IBM Model G25:

- www.storage.ibm.com/nas/index.html

Chapter 1. Introduction

The Model G25 is a two-node appliance server. It features:

- Two engines, each with dual 933 MHz processors for increased performance. Communication between the two engines takes place through an integrated 10/100 Mbps Ethernet port on each engine's planar board.
- Redundant 270 watt, auto-ranging power supplies
- 1-port Fibre Channel adapter for storage area network (SAN) connection
- Four high-performance PCI adapter slots for plugging in optional 10/100 and Gigabit Ethernet, Fibre Channel, and management adapters

In addition, the two-node Model G25 provides clustering and failover protection. This fault-tolerant design helps protect against appliance server failure and increases uptime to provide continuous access to data. See "Chapter 5. Clustering" on page 33 for more information on clustering and failover protection.

Because the Model G25 is a modular, single-use appliance, it has a specifically defined hardware and software configuration. The preloaded software stack is based on the Windows Powered OS operating system¹, which is very similar to Microsoft® Windows® 2000 Advanced Server. Included in the operating system is Microsoft Cluster Services and Microsoft Windows Terminal Services.

Preloaded software includes:

- Columbia Data Products® Persistent Storage Manager (PSM)
- IBM FastT Check
- IBM (Netfinity)® Director Agent
- Intel PROSet II
- Microsoft Windows® 2000 for Network Attached Storage (a graphical user interface [GUI])
- Tivoli SANergy
- Tivoli® Storage Manager Client

Note: The information in this book applies to both engines of the Model G25.

1. Note that the Windows Powered OS preload is tuned for network attached storage functions. In this preload, the capability to be a domain controller, DNS server, DHCP server, or WINS server is disabled.

Chapter 2. Quick start

This chapter presents a recommended minimal procedure to quickly set up, configure, and administer your appliance. These instructions refer specifically to a base configuration as shipped and do not cover the setup of additional storage units, which can be purchased separately.

Note: You will need to follow these procedures for both nodes.

Setting up your Model G25

The following sections will detail how to quickly set up your Model G25 appliance. You first need to ensure that the network recognizes the new appliance. The IBM Advanced Appliance Configuration utility handles this task. Next you will use Universal Management Services in conjunction with the Windows 2000 for NAS GUI to administer the appliance.

Note: It is recommended that you use the IBM Advanced Appliance Configuration Utility first to configure the Model G25. After the initial configuration, the recommendation is to use Terminal Services, if you need full administrative function, or the Windows 2000 for Network Attached Storage, a Web-based GUI that offers a subset of the Terminal Services functions.

Installing the IBM Advanced Appliance Configuration Console

These instructions assume that you have installed and powered on the appliance according to the installation guide procedures. You are now ready to install the IBM Advanced Appliance Configuration Console application from the Supplementary CD.

Note: The Advanced Appliance Configuration Utility creates a private database that is specific to the IP subnetwork to which it is attached. Therefore, do not install it on more than one systems management console residing on the same IP subnetwork.

Install the Advanced Appliance Configuration console application from the Supplementary CD onto a Windows NT 4.0 or Windows 2000 workstation that is attached to the same IP subnetwork to which the appliance is attached.

For information on how to install the Advanced Appliance Configuration Utility Console, see "Using the Supplementary CD" on page 62.

After you have installed the Advanced Appliance Configuration console application, the following steps will take you to the point where you can administer the appliance.

1. Start the Advanced Appliance Configuration console application by clicking its icon.
2. On the left pane of the Advanced Appliance Configuration console, select the appliance you want to administer. Initially, the appliance will be named **IBM5196-serial number**, which is located in the lower right corner of the bezel on the front of the appliance.
3. Click the **Start Web Management** button at the bottom of the right pane of the Advanced Appliance Configuration console to start the Universal Manageability (UM) Services browser. This will open a separate Web browser.

To read more information on the Advanced Appliance Configuration Utility, see “Advanced Appliance Configuration Utility Console” on page 11.

Accessing Universal Management Services

1. You will be prompted to authenticate with the administrative user name (“Administrator”) and password (initially “password”, but you will need to change this later; note that the password is case-sensitive, but the user name is not).
If this is the first time you have accessed the UM Services browser (on any appliance) from this workstation, you will also be prompted to install the Swing and XML Java libraries in your Web browser.
2. The UM Services browser will start. In the left pane, Microsoft Windows 2000 for NAS will be automatically selected, on the Appliance tab. In the right pane, Windows 2000 for NAS will start.
3. Again, you will be prompted to authenticate with administrative user name (“Administrator”) and password (initially “password”, but you will need to change this later).
4. Click **Administer this server appliance** to bring up the Microsoft Windows 2000 for NAS GUI.

You are now ready to begin administering the appliance. Details for this task are described in “Administering the appliance”.

Administering the appliance

At this point, you have started the Microsoft Windows 2000 for NAS GUI and are ready to make the appliance accessible to the end users. You do this by adjusting information contained in the following task groups:

- “Maintenance (Date and Time)”
- “Network Setup” on page 5
- “Disks and Volumes” on page 5
- “Users and Groups” on page 6
- “Folders and Shares” on page 6

Although you can modify multiple appliance and network attributes in each task group, the information given here is the minimum you need to know to administer the appliance and network.

You can find more information on administration elsewhere in this book and in the online help.

Note that the icons for the task groups on the Windows 2000 for NAS GUI are not in the same order as presented here.

You can access these task groups in one of three ways:

1. Click the **Home** tab and then select the task group link.
2. Click the top tab associated with that task group.
3. Click the **Back** button on your browser until you arrive Home and then select the task group link.

Maintenance (Date and Time)

In the Maintenance task group, you will need to change the date and time. To do so, click on **Date and Time** or the green arrow. (Remember that you can also

access all of these task groups by clicking on the titled tabs at the top of the page.) The Set Date and Time page displays, allowing you adjust information as necessary.

Network Setup

Note: All appliances have an initial default user name of “administrator” and password of “password.”

In the Network Setup task group, you are required to change the administrator password. Optionally, you can configure the properties of each network interface that resides on the appliance.

To change the administrator password, click on **Change Administrator Password** or the green arrow. The Change Administrator Password page displays, allowing you to change the password. Note the warning on the page that any information you enter can be viewed by others on the network. To prevent others from seeing your information, set up a secure administration Web site as described in the online help.

To optionally change interface properties such as IP addresses, click on **Interfaces** or the green arrow. The Network Adapters on Server Appliance page displays. You would use this page primarily to change IP addresses from dynamic (DHCP, which is the system default) to static.

Note: During the initial setup, you should configure the non-planar Ethernet adapter only. The Model G25 uses the planar (onboard) Ethernet adapter as the interconnect private network for clustering. If you want to use an Ethernet adapter other than the default Ethernet adapter (in slot 2) as the network interface to be attached to the subnet, then you can change the order of precedence later with the Windows Networking Properties option. The order of precedence for the initial configuration is: PCI slot 2, then PCI slot 3.

You can then modify the adapter by choosing one of the following tasks related to the adapter:

- **IP**, to modify IP configurations
- **DNS**, to modify DNS configurations
- **WINS**, to modify WINS configurations

Disks and Volumes

In the Disks and Volumes task group, you can optionally repartition the user data drive.

Attention: Note that although you will be using files in the system and maintenance drives, it is strongly recommended that you do not repartition them. Doing so could wipe out important data and seriously impair the functioning of your system. Repartitioning is advised **ONLY** for the user data drive.

The user data drive is not established when you first bring up the system. Certain SAN devices require the World Wide Name (WWN) of the Fibre Channel card to set up an association between the appliance and the external storage located on the storage area network (SAN). To get the WWN, open Terminal Services. For information on how to access Terminal Services, see “Connecting to Terminal Services” on page 20. After opening Terminal Services, click on the **IBM NAS**

Admin icon. Next, select **NAS Management**, then **Storage**, then **NAS Utilities** and finally, **FastT Check**. For additional information on FastT Check, please see “FastT Check” on page 29.

Note: This task applies to locally attached resources and fibre-attached drives, and is not intended for the clustering function.

Users and Groups

In the Users and Groups task group, you create and manage local users and groups on the appliance. Clicking on **Users and Groups** takes you to the Users and Groups page. From this page you can create, edit, and delete local users and groups on the appliance by clicking either **Users** or **Groups**.

On the Local Users on Server Appliance page, you can:

- Create new users
- Delete users
- Set passwords for users
- Set the general properties for users
- Grant access to user data

On the Local Groups on Server Appliance page, you can:

- Create new groups
- Delete groups
- Set the general properties for groups

Note: This task applies to local users and groups. Cluster users and groups need to be created with the Cluster Administration function.

Folders and Shares

In the Users and Groups task group, you define who your users are. In the Folders and Shares task group, you define what they can access.

Clicking on **Folders and Shares** takes you to the Folders and Shares page where you can manage local folders and create or modify file shares by clicking either **Folders** or **Shares**.

Clicking **Folders** takes you to the Volumes on Server Appliance page. You can then select which drive you want to modify, and open it by clicking **Open**. Then you can:

- Create new folders
- Delete folders
- Change the system volume properties such as name and attributes (read-only, ready for archiving, and hidden).
- Set the general properties for users

Clicking **Shares** takes you to the Shared Folders on Server Appliance page. Then you can:

- Create new shared folders
- Delete shared folders
- Change the shared folders properties such as name, path, and accessibility from various clients (Windows, UNIX, FTP, HTTP)

Note: This task is for non-clustered folders and shares. Clustered folders and shares need to be created with the Cluster Administration function.

Chapter 3. Configuration, administration, and management

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, may not be supported and could cause unpredictable results. For updated compatibility information, please see www.storage.ibm.com/nas/index.html

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

The Model G25 appliance comes with the following configuration programs that you can use to configure, manage, and maintain the appliance.

Note: It is recommended that you use the IBM Advanced Appliance Configuration Utility first to configure the Model G25. After the initial configuration, the recommendation is to use Terminal Services, if you need full administrative function, or the Windows 2000 for Network Attached Storage, a Web-based GUI that offers a subset of the Terminal Services functions.

- **IBM Advanced Appliance Configuration Utility**

The Advanced Appliance Configuration Utility aids in setting up and reconfiguring the network configuration on your appliances. The Advanced Appliance Configuration Utility agent, preinstalled on your IBM Model G25 appliance, works with the Advanced Appliance Configuration Utility console to automatically detect the presence of appliances on the network.

Once the appliance is detected by the Advanced Appliance Configuration Utility console, you can use the Advanced Appliance Configuration Utility to:

- Set up and manage the appliance's network configuration, including assigning the IP address, default gateway, network mask, and DNS server to be used by the appliance. (See the note in "Network Setup" on page 5, regarding the planar Ethernet adapter.)
- Start Universal Manageability Services on the appliance, enabling you to do more advanced systems-management tasks

- **Universal Manageability Services**

Universal Manageability Services (UM Services) provides point-to-point remote management of client systems through a Web browser window. You can use UM Services to:

- Learn detailed inventory information about your computers, including operating system, memory, network cards and hardware
- Track your computers with features such as power management, event log, and system monitor capabilities
- Upwardly integrate with Tivoli Enterprise, Tivoli NetView®, Computer Associates Unicenter, Microsoft SMS, and Intel® LANDesk Management Suite

In addition, you can link to Windows 2000 for Network Attached Storage (a GUI) and Terminal Services from UM Services.

- **Windows 2000 for Network Attached Storage**

For administrators who are not familiar with administering Windows operating systems, the Model G25 provides a Web-based GUI, Microsoft Windows 2000 for Network Attached Storage (Windows 2000 for NAS). Using Windows 2000 for

NAS, you navigate through various administrative task categories by clicking on the appropriate links on pages, or buttons at the top of the page, and then selecting a task from that category.

- **Terminal Services Client**

The Terminal Services Client, when installed on a workstation that is attached to the same network as the Model G25, enables you to remotely administer the appliance using the Model G25 desktop, which is a Windows Powered desktop that is identical to a Windows 2000 Advanced Server desktop. If you are familiar with administrative tasks using a Windows desktop, you can use Terminal Services.

Information about each of these appliance configuration programs follows.

IBM Advanced Appliance Configuration Utility

The IBM Advanced Appliance Configuration Utility helps you to set up and reconfigure the network configuration on your Model G25 appliance, as well as other IBM appliances. The Advanced Appliance Configuration Utility agent, preinstalled on your IBM Model G25 appliance, works with the Advanced Appliance Configuration Utility console, a Java™-based application that is installed on a network-attached system. You can use this system as a systems-management console to automatically detect the presence of Model G25 appliances on the network. Once the Model G25 appliance is detected by the Advanced Appliance Configuration Utility console, use the Advanced Appliance Configuration Utility to set up and manage the appliance's network configuration, including assigning the IP address, default gateway, network mask, and DNS server to be used by the appliance. You can also use the Advanced Appliance Configuration Utility to start Universal Manageability Services (UM Services) on the appliance, enabling you to perform more advanced systems-management tasks.

For networks that are not currently running DHCP servers, the Advanced Appliance Configuration Utility is useful for automatically configuring network settings for newly added appliances, such as the Model G25. However, networks with DHCP servers will also benefit from using the Advanced Appliance Configuration Utility because it enables you to reserve and assign the appliance IP address in an orderly, automated fashion. Even when you use DHCP and do not reserve an IP address for the appliance, you can still use the Advanced Appliance Configuration Utility to discover appliances and to start UM Services Web-based systems-management.

Notes:

1. The Advanced Appliance Configuration Utility configures and reports the TCP/IP settings of the first adapter (excluding the built-in Ethernet controller which is used for the interconnection of the two engines) on each appliance only. If there is an adapter in slot 2, it is considered the first adapter. Otherwise, if there is an adapter in slot 3, it is considered the first adapter. Be sure to connect the first adapter as defined by the preceding rule to the same physical network as your systems-management console.
2. The Advanced Appliance Configuration Utility must be running to configure newly installed appliances automatically.
3. The system running the Advanced Appliance Configuration Utility console automatically maintains a copy of its database (ServerConfiguration.dat) in the Advanced Appliance Configuration Station installation directory. To remove previous configuration data, close the Advanced Appliance Configuration Utility, delete this file, and then restart the utility. This deletes all previously configured

Families. However, the Advanced Appliance Configuration Utility will automatically discover connected appliances and their network settings.

Advanced Appliance Configuration Utility Agent

Once you connect the Model G25 appliance to your network, the Advanced Appliance Configuration Utility agent automatically reports the appliance's MAC address (of the onboard Ethernet controller), serial number, type of appliance, and whether DHCP is in use by the appliance or not. Furthermore, it will report the hostname, primary IP address, subnet mask, primary DNS server address, and primary gateway address if these are configured on the system.

The Advanced Appliance Configuration Utility agent is preinstalled on your Model G25 appliance.

Note: The Advanced Appliance Configuration Utility agent periodically broadcasts the appliance IP settings. To prevent the service from broadcasting this data periodically, stop the `iaaconfig` service.

Advanced Appliance Configuration Utility Console

The Advanced Appliance Configuration Utility Console is a Java application that you install on one system in your network for use as a systems-management console. For information on how to install the Advanced Appliance Configuration Utility Console, see "Using the Supplementary CD" on page 62.

Note: The Advanced Appliance Configuration Utility creates a private database that is specific to the IP subnetwork to which it is attached. Therefore, do not install it on more than one systems-management console residing on the same IP subnetwork.

The Advanced Appliance Configuration Utility Console enables you to:

- Automatically discover Model G25 appliances, as well as other IBM appliances, that run the Advanced Appliance Configuration Utility agent and are attached to the same physical subnet as the Advanced Appliance Configuration Utility Console.

When you start the Advanced Appliance Configuration Utility Console, it automatically detects all appliances on your physical subnet that are running the Advanced Appliance Configuration Utility agent.

- Use a GUI-based application to configure the appliance network settings. Use the Advanced Appliance Configuration Utility to assign network parameters such as IP addresses, DNS and gateway server addresses, subnet masks, and hostnames.
- Group discovered appliances into function-specific Families. Appliances are added to a Family based on the appliance type. Appliances that perform the same function appear in the same Family.
- Start UM Services Web-based systems-management console. Launch UM Services on your appliances and perform advanced systems-management tasks on a selected appliance with a single mouse click.

The Advanced Appliance Configuration Utility Console is divided into two panes:

- **The Tree View Pane**

The Tree View Pane, located on the left side of the Advanced Appliance Configuration Utility Console window, presents a list of all discovered Model G25 appliances and includes any Families you have previously defined. The Tree

View Pane also includes groups for appliances that do not fit any of the defined Families, that were not configured using the Advanced Appliance Configuration Utility, or that have IP addresses that conflict with other devices on your network. When you click on any item in the Tree View, information about that item (and any items that are nested below that item in the tree view) displays in the Information Pane.

- **The Information Pane**

The Information Pane, located at the right side of the Advanced Appliance Configuration Utility Console, displays information about the item that is currently selected in the Tree View Pane. The information that displays in the Information Pane varies depending on the item that is selected. For example, if you select the All Appliances item from the Tree View Pane, the Information Pane displays configuration information (IP settings, hostname, serial number, and so on) about each of the Model G25 appliances that have been discovered by the Advanced Appliance Configuration Utility Console. However, if you select a Family, the Information Pane displays information about the Family settings for the selected Family.

The Advanced Appliance Configuration Utility Console also features the following menus:

- **File:** Use the File menu to import or export the Advanced Appliance Configuration Utility Console configuration data, to scan the network, or to exit the program.
- **Family:** Use the Family menu to add or delete Families, or to move Families up or down in the tree view.
- **Appliance:** Use the Appliance menu to remove a previously discovered appliance from a Family or group, and to add an appliance to the first matching Family in the tree view.
- **Help:** Use the Help menu to display product information.

Discovering Model G25 Appliances

Any Model G25 appliance, or other IBM appliance, that is running and is connected to the same subnet as the system running the Advanced Appliance Configuration Utility console is automatically discovered when you start the Advanced Appliance Configuration Utility console. Discovered appliances appear in the Advanced Appliance Configuration Utility console tree view (in the left pane of the Advanced Appliance Configuration Utility console window). Each appliance will appear in two locations in the tree view:

1. Every discovered appliance is listed in the tree view under All Appliances.
2. Each discovered appliance will also appear in one of the following portions of the tree view:
 - In a *Family*

If the discovered appliance fits the requirements of a Family, it will automatically appear as part of a Family.

Note: If a discovered appliance fits the requirements of more than one Family, it is automatically added to the first appropriate Family that is listed in the tree view, starting from the top of the tree. For information on how to move appliances between families, see “Using Families and Groups in the Tree View” on page 13.

- In the *Orphaned Appliances* group
If the discovered appliance does not fit a previously configured Family, it is placed in the *Orphaned Appliances* group.
- In the *Orphaned Externally Configured Appliances* group

Appliances that are running the Advanced Appliance Configuration Utility agent, but that have a network configuration that was not set by the Advanced Appliance Configuration Utility agent or console, will appear in the *Orphaned Externally Configured Appliances* group. If an appliance is contained in the Orphaned Externally Configured Appliances group, you can use the Adopt By First Matching Family function to add it to a previously defined Family. For more information, see “Using the Adopt by First Matching Family Function” on page 16.

Using Families and Groups in the Tree View

Families are important elements of the Advanced Appliance Configuration Utility. They specify the parameters that the Advanced Appliance Configuration Utility uses to automatically categorize discovered appliances and to configure them with the appropriate network settings. Family rules are defined solely by appliance type or purpose. Each Family can contain only one type of appliance. The only way to automatically apply predetermined network settings to newly installed and discovered appliances is to create and use Families.

Appliances that match the rules criteria for a Family group can be automatically configured to use predefined network settings. A Family can be configured to allow appliances to use DHCP to configure their IP settings, or can be defined to automatically assign IP settings (such as primary gateway and DNS server addresses, assigning an IP address from a specified IP address range, and specifying a subnet mask). Host names for discovered appliances can also be defined so that they are allocated using either a prefix or appliance serial number.

The Advanced Appliance Configuration Utility is not the only way to configure network settings. For example, network settings can be configured using Terminal Services for Windows or by attaching a keyboard and mouse to the appliance and using Windows Control Panel. If the appliance network settings have been configured by a method other than using the Advanced Appliance Configuration Utility, the appliance will be discovered by the Advanced Appliance Configuration Utility and it will be added to an appropriate Family, if one exists. Appliances that have been configured using a method other than the Advanced Appliance Configuration Utility for which no appropriate family exists will appear in the Orphaned Externally Configured Appliances group.

The Tree View Panel contains the following items:

- **All Appliances**

Every discovered appliance is listed in the tree view under All Appliances.

- **Families**

The Families group in the Tree View Pane shows all Families that have been defined, with appliances that have already been assigned to each Family nested beneath the Family name in the tree view. Families are defined by appliance purpose, so all appliances that appear in a given family are of the same type. If you select a Family from the Tree View Pane, a description of the Family and the rules that are used to define the selected Family display in the Information Pane. If you select an appliance from a Family in the Tree View Pane, the selected appliance network settings display in the Information Pane.

If you are not using DHCP, the Advanced Appliance Configuration Utility automatically assigns one IP address per appliance, using available addresses within the range defined in the Family rules. When a Family's IP address range has been exhausted, the Advanced Appliance Configuration Utility automatically searches for other Families that have rules matching the appliance being configured. If a matching Family with an available address is found, the appliance

will automatically be assigned to the Family that has available IP addresses. This enables you to define multiple Families, each of which uses a set of non-contiguous IP address ranges.

When an appliance is discovered on the network, the Advanced Appliance Configuration Utility automatically searches all previously defined Families, starting with the first Family listed in the Families tree view and moving downward. Appliances are automatically added to the first defined Family that matches the appliance purpose. Therefore, the order in which Families appear is important. To adjust this search order, right-click on a Family and then select **Move Up** or **Move Down** to adjust its position within the Families list.

- **Orphaned Appliances**

Any discovered appliances that have been configured using the Advanced Appliance Configuration Utility but that do not meet the rules for any existing Family are automatically added to the Orphaned Appliances group.

- **Orphaned Externally Configured Appliances**

Any discovered appliance that has been configured without using the Advanced Appliance Configuration Utility tool and that does not meet the rules for any existing Family is automatically added to the Orphaned Externally Configured Appliances group. Appliances configured without the Advanced Appliance Configuration Utility that meet the rules for any existing Family are automatically added to the matching Family. To add an Orphaned Externally configured Appliance to an appropriate Family that was created after the orphaned appliance was discovered, right-click on the orphaned appliance and select **Adopt by First Matching Family**. For more information, see “Using the Adopt by First Matching Family Function” on page 16.

Note: The Advanced Appliance Configuration Utility will not change manually configured network settings of discovered appliances. If the manually configured IP and Subnet addresses fit an existing Family, the Advanced Appliance Configuration Utility will place that appliance into that Family, but will not change any other settings (such as Host Name, DNS, or gateway addresses).

- **Conflicting Network Addresses**

Any discovered appliance that has the same IP address as a previously discovered appliance will be listed in the Conflicting Network Addresses group.

Creating a Family: To create a Family:

1. Select **Create Family** from the Family menu.

The Advanced Appliance Configuration Utility Family Setup window displays.

2. Select the Appliance Family Rules.

The Appliance Family Rules determine what purpose an appliance must serve to be included in the Family. You can select one of the following values:

- IBM TotalStorage NAS Appliances
- IBM xSeries 130 and 135

3. Specify a Family name.

In the Family Name field type the name that will be used for this Family.

4. Specify network resources to be used by members of the Family.

You can use the Advanced Appliance Configuration Utility to assign network resources for members of this Family, or you can use a DHCP server to assign network resources.

- To use the Advanced Appliance Configuration Utility to assign network resources, uncheck the **Use DHCP** checkbox and fill in the following fields:

Min IP Address

The lowest IP address in a range of IP addresses that can be assigned to an appliance that is a member of this Family

Max IP Address

The highest IP address in a range of IP addresses that can be assigned to an appliance that is a member of this Family

Subnet Mask

The subnet mask value that will be used by appliances that are members of this Family

Default Gateway

The IP address of the default gateway that will be used by appliances that are members of this Family (optional)

DNS The IP address of the DNS server that will be used by appliances that are members of this Family (optional)

- To use a DHCP server to assign network resources, check the **Use DHCP** checkbox. This will allow a DHCP server on your network to assign an IP address and subnet mask and to specify the default gateway address and address of the DNS server that will be used by appliances that are members of this Family.

5. Select a Host Name Allocation Type.

The Host Name Allocation Type enables you to automatically specify a Host Name that members of this Family will use. You can select one of the following Host Name Allocation Types:

No Allocation

No preconfigured host name format will be assigned to appliances that are members of this family.

Use Serial Number

The Serial Number of the discovered appliance will be used as a host name for the appliance.

Use Prefix Name

A user-specified prefix, along with an incremental number for each appliance, will be used for the host name of each appliance that is a member of this Family. Type the desired prefix in the **Host Name Prefix** field.

6. Click **OK to save this Family.**

Removing Appliances from Families: Use the Remove Appliance function to delete an appliance from the Advanced Appliance Configuration Utility console database and view panel. Removing an appliance that is no longer in use allows the IP address that was assigned to the appliance to be allocated to another appliance. You can also remove an appliance from a family and then rescan the network to add it to an appropriate Family that appears higher in the Tree View pane.

To remove an appliance, right-click on the appliance, and then select **Remove Appliance** from the pop-up menu.

- If the Advanced Appliance Configuration Utility is unable to communicate with the selected appliance (because, for example, it has been removed from the network or has failed), the appliance is removed immediately.

- If the Advanced Appliance Configuration Utility is able to communicate with the selected appliance, you will be asked to confirm removal of the appliance before the appliance removal task is completed. This helps prevent accidental removal of an active and functional appliance.

Using the Adopt by First Matching Family Function: Use this function to:

- Add an *Orphaned Externally Configured Appliance* to an appropriate Family. Appliances that have been configured without using the Advanced Appliance Configuration Utility tool and that do not meet the rules for any existing Family are automatically added to the Orphaned Externally Configured Appliances group. If, after the orphaned appliance is discovered, you create a Family that is appropriate for the orphaned appliance, right-click on the orphaned appliance and select **Adopt by First Matching Family** to move the appliance from the Orphaned Externally Configured Appliances group to the newly created Family.
- Move an appliance from one Family to another appropriate Family that occurs higher in the list of previously defined Families. If there is more than one appropriate Family for a newly discovered appliance, it automatically appears in the first appropriate Family in the list of Families. If you want to move a discovered appliance from one appropriate Family to another appropriate Family:
 1. Right-click on the Family that you want the appliance moved to.
 2. Select **Move Up in List** to move the selected Family up in the list of families. Repeat steps 1 and 2 until the Family that you want to add the appliance to displays above the Family that currently contains the appliance.
 3. Right-click on the appliance that you want to move to another Family and then select **Adopt by First Matching Family**.

Launching UM Services from the configuration utility

You can use the Advanced Appliance Configuration Utility to quickly and easily launch UM Services on your Model G25 appliances.

Note: The selected appliance must be running Universal Manageability (UM) Services as a UM Services client. Also, the systems-management console (the system that is running the Advanced Appliance Configuration Utility Console) must use a Web browser that is supported for use with UM Services. If you have not used UM Services from this system, you will need to install several plug-ins before proceeding. If you are using an unsupported browser, or if your browser does not have the necessary plug-ins, you will be notified when you attempt to launch UM Services on the appliance. For more information on UM Services, go to:

www.ibm.com/pc/ww/software/applications/ums/library.html

To use the Advanced Appliance Configuration Utility Console to start UM Services on an appliance:

1. Click on the appliance in the Advanced Appliance Configuration Utility Console Tree View Pane.

When you select the appliance from the tree view, information about the selected appliance displays in the Information Pane. A **Start Web-Based Management** button displays as well.

2. Click **Start Web-Based Management**.

Your default Web browser starts, loading the UM Services browser automatically.

3. Log in to the UM Services browser. Refer to step 2 on page 18 for log in instructions.

For more information on using UM Services to manage your appliances, see the *Universal Manageability Services User's Guide*, included on the Documentation CD that came with the appliance.

Universal Manageability Services

Universal Manageability Services (UM Services) is a suite of GUIs that enhances the local or remote administration, monitoring, and maintenance of IBM systems. UM Services is a lightweight client that resides on each managed computer system. With UM Services, you can use a Web browser and UM Services Web console support to inventory, monitor, and troubleshoot IBM systems on which UM Services is installed.

This “point-to-point” systems-management approach, in which you use a Web browser to connect directly to a remote client system, enhances support and enables you to effectively maintain IBM systems without requiring the installation of additional systems-management software on your administrator console.

In addition to point-to-point systems-management support, UM Services also includes support for UM Services Upward Integration Modules. These modules enable systems-management professionals who use any supported systems-management platform (including Tivoli Enterprise, CA Unicenter TNG Framework, and Microsoft Systems Management Server [SMS]) to integrate portions of UM Services into their systems-management console. Because it was designed to use industry-standard information-gathering technologies and messaging protocols, including Common Information Model (CIM), Desktop Management Interface (DMI), and Simple Network Management Protocol (SNMP), UM Services adds value to any of these supported workgroup or enterprise systems-management platforms.

Complete documentation on how to use UM Services is included on the Documentation CD that came with the appliance.

System requirements

The UM Services client is preinstalled on the Model G25 appliance. However, you must have a Web browser installed on your systems-management console. Supported browsers include:

- Microsoft Internet Explorer 5.x or later

Notes:

1. You must install the optional Java Virtual Machine (VM) support to access a client system running UM Services.
2. If you reinstall Internet Explorer after installing UM Services, you must reapply the Microsoft VM update. The UM Services client requires Microsoft VM Build 3165 or later. Download the latest Microsoft VM from:

www.microsoft.com/java

- Microsoft Management Console (MMC) 1.1 or later

Note: If you install UM Services before you install MMC 1.1 or later, you will not have an icon for Microsoft Management Console in the IBM Universal Manageability Services section of your Start menu.

Starting UM Services

Before you can use UM Services, you must configure the network settings (such as IP address, subnet mask, and so on) on your Model G25 appliance. You can use IBM Advanced Appliance Configuration Utility or Terminal Services Client to configure the network setting remotely, or you can attach a keyboard and mouse to your appliance and configure the Network settings using the Windows Control Panel. Once you have configured the network settings for your appliance, you are ready to use UM Services.

To start UM Services:

1. Start your Web browser and then, in the **Address** or **Location** field of the browser, enter:

```
http://ip_address:1411
```

where *ip_address* is the IP address of the Model G25, and then press **Enter**.

Or, type:

```
http://computer_name:1411
```

where *computer_name* is the computer name of the Model G25. The computer name is predefined as: IBM5196-xxxxxxx, where xxxxxx is the serial number located in the lower right corner of the bezel on the front of the appliance.

If you have changed the computer name from the predefined value, use that name instead. After you have entered the computer name, press **Enter**.

2. A user log in window displays. Type *Administrator* in the Username field, and type *password* in the Password field. You can leave the Domain field blank. Make sure the "Save this password in your password list" checkbox is not checked, and then click **OK**.

Note: To ensure system security, change the Administrator password from "password" to something else. Once you do, or if you create another user in the Administrator group in the future, use your new username/password combination instead of the default username/password combination.

The first time you connect you may be prompted to install XML and Swing components. Follow the on-screen instructions to install these components and then close and restart Internet Explorer before you proceed.

3. You are now connected to the Model G25 through UM Services. In addition to the standard UM Services functionality, your appliance includes functionality for administering the appliance, available from the Appliances tab in the left pane of the UM Services browser. The default view (in the right pane of the UM Services browser) when you connect to your appliance is Windows 2000 for NAS. The other selectable view in the Appliances tab is Windows 2000 Terminal Services, which displays a Terminal Services Web Connection page.

To start Windows 2000 for NAS, click **Administer this server appliance** in the right pane of the UM Services browser. To connect to the Model G25 and manage it as though you were running Terminal Services Client from your desktop, select **Terminal Services** in the Appliances tab of the UM Services browser, and then follow the instructions for connecting to the Model G25 using Terminal Services described in "Terminal Services and the IBM NAS Administration Console" on page 19.

These administration tools are described further in the remainder of this chapter.

Windows 2000 for Network Attached Storage

You can perform the appliance administration tasks with the Windows 2000 for NAS GUI. You navigate through various administrative task categories by clicking on the appropriate links on pages or buttons at the top of the page, and then selecting the task from that category.

Online help is available for Windows 2000 for NAS. This online help can be accessed in two ways:

1. By clicking the **Help** button at the top of any Web page. This will display a table of contents which you can navigate to find help for any Windows 2000 for NAS task.
2. By clicking the question mark (?) button at the top of any Web page. This will display context-sensitive help for the task you are currently performing.

While you can perform most administrative tasks using Windows 2000 for NAS, there are some advanced tasks for which you must use Terminal Services Client. See "Terminal Services and the IBM NAS Administration Console" for more information.

You can start Windows 2000 for NAS in one of three ways:

1. Through UM Services, as described in step 3 on page 18.
2. From a Web browser, by entering **http://<ip_address>:8099** or **http://<computer_name>:8099** and then logging on to the Model G25.
3. From the Model G25 desktop while using Terminal Services Client and starting a browser.

Terminal Services and the IBM NAS Administration Console

If you are familiar with Windows operating systems, you can use Terminal Services. In some cases, you must use Terminal Services to complete administrative tasks.

You can access Terminal Services in two ways:

1. Through the UM Services browser, as described in step 3 on page 18.
2. By using the Terminal Services Client software.

To use the UM Services browser, go to "Connecting to Terminal Services" on page 20.

To use Terminal Services Client, complete the following steps to install it on the remote workstation and connect to your Model G25 appliance:

1. Insert the Supplementary CD into the workstation CD-ROM drive.
2. Click **Start** → **Run**.
3. In the **Open** field, type (with quotes)

```
"x:\Terminal Services Client\Disk 1\setup.exe"
```

where x is the drive letter assigned to the CD-ROM drive. Then click **OK** to begin the Terminal Services Client Setup program.

4. Accept the defaults in each window that opens or refer to the Microsoft Windows documentation for more instructions. When the Terminal Services Client Setup program is completed, proceed to the next step.

5. Check the workstation network TCP/IP protocol configuration settings.
The IP address used by the workstation must be obtained automatically. If the network interface card for the workstation is configured to obtain an IP address automatically, go to “Connecting to Terminal Services”. If the network interface card for the workstation is configured to use a static IP address, you must configure it to obtain an IP address automatically before going to “Connecting to Terminal Services”.

Notes:

- a. You might be prompted to restart the workstation after you have changed the configuration.
- b. Do not be concerned if you do not have a DHCP server on your network. This configuration automatically assigns an unused IP address to the workstation that is on the same subnet as the Model G25 appliances attached to the LAN.
- c. If you are not certain how to check the workstation network TCP/IP protocol configuration settings, refer to the Microsoft Windows documentation that came with your workstation for network configuration instructions.

Connecting to Terminal Services

To connect to Terminal Services from your workstation, do the following:

1. If you will be using the Terminal Services Client, start the Terminal Services Client and go to step 2 on page 20. Otherwise, if you will be using the Windows 2000 Terminal Services Web Connection page in the UM Services browser, start the UM Services browser, log in, and then select **Windows 2000 Terminal Services** in the Appliances tab in the left pane of the UM Services browser. This procedure is described in step 3 on page 18.
2. In the Server field, enter the IP address or the computer name of the Model G25. The computer name is predefined as IBM5196-xxxxxxx, where xxxxxx is the serial number located in the lower right corner of the bezel on the front of the appliance. If you have changed the computer name from the predefined value, use that name instead.

For Size, select a size other than full screen in which the Model G25 desktop will appear, then click **Connect** to start the Terminal Services Client session. A user log in window displays.

Log in. Type *Administrator* in the Username field, type *password* in the password field, and then click OK to log in. Once you have logged in, you can begin using Terminal Services Client to configure and manage your Model G25.

Once you have logged into Terminal Services, you can perform administrative tasks on the Model G25, as if your keyboard, mouse, and monitor were directly attached to it. The Model G25 desktop contains a shortcut, titled **IBM NAS Admin**, to a special console, the IBM NAS Administration console.

IBM NAS Administration console

The IBM NAS Administration console contains all of the standard functions that are contained in the standard Computer Management console available on any Windows 2000 desktop, plus the following functions specific to the Model G25:

- NAS Backup Assistant
- Persistent Storage Manager
- Tivoli SANergy
- FastT Check

These functions are described in detail in “Chapter 4. Advanced administrative functions” on page 23.

Chapter 4. Advanced administrative functions

This chapter describes the advanced administrative functions that you can do on the Model G25.

The following functions are available:

- “NAS Backup Assistant”, accessed through IBM NAS Admin icon
- “Persistent Images” on page 24, accessed through the Windows 2000 for Network Attached Storage user interface
- “Tivoli SANergy” on page 28, accessed through the IBM NAS Admin icon
- “FastT Check” on page 29, accessed through the IBM NAS Admin icon

NAS Backup Assistant

The NAS Backup Assistant is a preloaded utility that helps you create and schedule backup batch files, and maintain log files. It can be used for backing up either the Model G25 operating system or user data.

You invoke the NAS Backup Assistant by clicking on the **IBM NAS Admin** desktop icon to open the IBM NAS Administration console. Select **Backup and Restore** to expand that tree, then select **IBM NAS Backup Assistant**. Once you have selected this option, a logon prompt appears. You will need to log on as a user who has backup operator privileges (that is, as an administrator or backup administrator).

Because NAS Backup Assistant only creates and launches scripts, and is not a comprehensive backup application, it does not support interactive error messages. To check status of jobs, you must either view the Backup Logs or view the Windows Event Viewer. If a logon prompt does not appear, right-click on the **IBM NAS Backup Assistant** link, and select refresh. Once you log on, the main panel appears.

There are four tabs on the main panel:

Backup Operations

Is the main window where you create and schedule backup batch jobs.

Scheduled Jobs

Displays a list of backup batch jobs that you scheduled.

Backup Logs

Displays a list of log files for each backup that has run.

Displayed Logs

Displays the text contained in the log files that you can select from the **Backup Logs** tab.

All of the options on each tab are described in detail in the online help. To access the online help, click on the **IBM NAS Admin** icon, then expand the Backup and Restore directory, then select **IBM NAS Backup Assistant Help** and log in.

Restoring using the NT Backup panel

To restore backups, use the following procedure:

1. Note these two conditions:
 - If you are restoring a backup that you created using the standard backup method, go to step 2 on page 24.

- If you are restoring a backup that you created using Persistent Images in the NAS Backup Assistant, the NT Backup file (*.BKF) was created for the persistent image virtual drive letter instead of the original drive letter. For example, if you selected drive C for backup, a persistent image was created on the next available drive letter in the system, and that drive was backed up instead of drive C. If you do not remember the original drive letter, you can view the backup log files in NAS Backup Assistant. The top section of the log file gives you the original drive letter, and the bottom section gives you the persistent image drive letter. When you have the original drive letter, go to step 2.
2. Click on the **Restore using NT Backup** link in the Backup and Restore section of the IBM NAS Admin console to open the backup GUI.
 3. Click **Restore Wizard**, then click **Next**.
 4. You are asked what you want to restore. Select the appropriate media that you are restoring from.
 5. If you are restoring from tape, expand the backup media pool name, and then double-click on the media (this will normally be named *media created on {date - time}*). This action will read the set list from the tape.
If you are restoring from file, click the **Import File...** button, then click **Browse** and find the .BKF file created for this backup. If you do not know the .BKF file name, refer to the backup log in NAS Backup Assistant. Click **OK**. You will now have a *Media created on {date - time}* listed under file. Click on the plus sign (+) to the left of this media to see the set list. You may be prompted to enter the path to the file you want to catalog; if so, select the same file that you just imported. This will build a set list.
 6. Select the files and directories you want to restore by placing a check in the corresponding check box.
 7. In the bottom left corner of the window, there is an option called **Restore files to:**. Using the pull-down, select **Alternate Location**. In the alternate location window, select the root directory of the original backup drive letter you determined in step 1 on page 23.
 8. If desired, select **Tools** from the menu bar at the top of the window, then select **Options** to change restore options. Refer to NTBackup online help (see **Restore files from a file or a tape**) for use of these options.
 9. Once you have selected the files or directories for restore, the alternate location, and options, click the **Start Restore** button in the lower right corner.
 10. You will now be prompted to confirm that you want to begin the restore. You can click the **Advanced** button to select advanced options (see the NTBackup online help for details), then click **OK** to begin the restore.

Persistent Images

A persistent image is a copy you make of an entire file system during a specified period. The Persistent Images function allows the recovery of a file or file system to the exact state it was in at the time you created the persistent image. Usually, persistent images are maintained in a way that minimizes the storage required to keep a second (or third or fourth, and so on) copy of the file system. This is done by using a copy-on-write technique that uses additional storage only for data blocks that are different between the time of the active file system and the time you made a persistent image of the file system.

The Persistent Storage Manager (PSM) allows you to create and preserve images of appliance drives. You can take a persistent image immediately or schedule

persistent images as one-time events or regularly repeated events. You access the Persistent Storage Manager in the Disks and Volumes task group within the Windows 2000 for Network Attached Storage user interface.

Once you create a persistent image, it appears as a directory on the original drive. Each persistent image is mounted as a volume on the file system. Access rights and permissions from the original drive are inherited by the persistent image. Persistent images are used in the same way as read-only system drives. However, unlike conventional drives, persistent images are static records of the content of the originating drive at the time you created the persistent image. Persistent images are retained following shutdown and reboot.

There are five PSM tasks in the Disks and Volumes group:

- PSM Setup
- PSM Volume Setup
- Persistent Images
- PSM Schedules
- Volume Restore

Each of these tasks are described in the following sections. More detailed descriptions and instructions for each of the control panels and topics are contained in the online help.

PSM Setup

On this panel you can configure the following attributes of the persistent image system:

- Maximum number of persistent images (up to 250)
- Quiescent period
- Quiescent period wait timeout
- Persistent image directory name

PSM Volume Setup

This panel displays statistics for each volume, such as total volume capacity, free space, and cache file size and usage. You can also select any volume and configure volume-specific PSM attributes for that volume, such as:

- Cache-full warning threshold
- Cache-full persistent image deletion threshold
- Cache size

Persistent Images

This panel lists all of the persistent images that exist on all volumes. On this panel you can:

- Create a new persistent image immediately (without scheduling it via the PSM Schedules panel). When you create the persistent image, you can specify properties for the persistent image, including:

Volume(s)

The persistent image can contain a single volume, or span multiple volumes. To select multiple volumes, hold down the Ctrl key while clicking on the volumes you wish to select. For multi-volume persistent images, a virtual directory containing data for a volume will appear under

the persistent image directory in the top level of each volume in the persistent image (the name of the persistent image directory is configured in the PSM Setup panel).

Name You can name the persistent image. This will be the name of the virtual directory containing the persistent image, underneath the persistent image directory in the top level of the volume (the name of the persistent image directory is configured in the PSM Setup panel).

Read-only or read-write

A persistent image can be made read-only, so that no modifications can be made to the persistent image itself, or read-write, which permits modifications to be made to the persistent image. When a persistent image is written, the modifications made are also persistent (they survive a reboot of the system). Changing a persistent image from read-write to read-only resets the persistent image back to its pristine state, as does selecting Undo Writes for a read-write persistent image from the Persistent Images panel.

Retention value

A persistent image can be given a relative retention value or weight. This is important when PSM needs to delete some persistent images for a volume because the cache file for the volume for which the persistent image was taken capacity has reached a certain threshold, as described later in this section. If the volume cache file completely fills, then all persistent images for that volume are deleted regardless of the retention values. By default, a new persistent image is assigned a "Normal" retention value (there are other higher and lower values which can be selected).

- Delete an existing persistent image.
- Modify properties of an existing persistent image, including read-only or read-write, and retention value.

PSM Schedules

Use this panel to schedule persistent images to be taken at specific times (this is independent of the scheduled backup function via NAS Backup Assistant described earlier). Each PSM schedule entry defines a set of persistent images to be taken starting at a specified time and at a specified interval, with each image having the set of properties defined in the entry. This allows you to customize scheduled persistent images on a per-volume basis.

For instance, you could set a persistent image for one volume to occur every hour, and for another volume to occur only once a day. The set of properties you can define are the same properties described in the Persistent Images panel description above; when you define these properties, all persistent images created according to this schedule entry will be given those properties. Once a scheduled persistent image is created, certain properties of that persistent image can be modified via the Persistent Images panel, independently of other persistent images created according to the schedule.

Once a schedule entry is created, it appears in the list of scheduled persistent images. Subsequently you can modify the properties of an existing entry, such as start time, repetition rate, the volume(s), and so on. For a schedule you can name the persistent images based on a pattern you configure; format specifiers (defined on the New Persistent Image Schedule panel under the Persistent image name(s) entry field) allow you to customize variable portions of the name.

Volume Restore

On this panel, you can select an existing persistent image and quickly restore the volume(s) contained in the image back to the state they were in at the time the selected persistent image was taken. This is useful if you need to recover entire volumes, as opposed to just a few files. The volume restore function is available for the system volume as well as the data volumes.

Granting User Access to Persistent Image Files

You can give end-users access to files in the persistent images. For example, this would be helpful to a user who has accidentally corrupted a file and needs to get an uncorrupted copy of that file.

To enable end-user access to persistent image files, go into Terminal Services. For instructions on how to start Terminal Services, see “Terminal Services and the IBM NAS Administration Console” on page 19. Once you are in Terminal Services, click the **My Computer** icon. Next, click the volume on which you want to enable persistent image access. Then, go into the persistent images directory and right-click the mouse on your desired persistent image mount point, select **Sharing**, then specify sharing as desired. If you want to enable the same access to all persistent images on the volume, you can right-click on the persistent images directory (from the top level of the volume), select **Sharing**, and then specify sharing as desired.

Note: The share settings are maintained in a persistent image. Therefore, granting access to all end-users only permits those users to access files and directories within the persistent image that they would have been able to access originally on the actual drive.

PSM notes

Notes:

1. As mentioned, you can take and keep a maximum of 250 persistent images. These can be taken on local drives, or drives over a SAN that are logically local. Note that on various panels, such as the New Persistent Image Schedule panel, you will see a field, *Keep the last: (number of persistent images)*. The total number of persistent images that you enter in these fields will not override the maximum number of persistent images that you set in the PSM Setup panel. For example, if your maximum number of persistent images is 10, and you enter in numbers in other fields that add up to greater than 10, only 10 persistent images will be taken.
2. You cannot take a persistent image of the maintenance drive (D:). Hence, you will not see it as a choice in either the New Persistent Image Schedule panel or the Create Persistent Image panel
3. The first persistent image taken on a particular volume will take longer than succeeding persistent images on that volume because the PSM cache file for that volume will need to be created. After this a persistent images directory is established on that volume and future persistent images on that volume take place much more quickly.
4. When a shared volume is failed over from one engine in the Model G25 to the other engine, the persistent images for that volume will move over with the volume. The Persistent Images panel on a particular engine will only display those persistent images which are on volumes that the engine owns at a point in time. If persistent images are scheduled for a volume, on a particular engine, a scheduled persistent image will only be created as long as that engine owns

the volume at the time the scheduled persistent image is to occur. To ensure that a scheduled persistent image will take place regardless of which engine owns the volume, you must do the following:

- a. Use the PSM Schedules panel to create the schedule on the engine that currently owns the volume.
- b. Use Cluster Administrator to move the disk group that contains the volume to the other engine.
- c. Use the PSM Schedules panel on the other engine to create the same schedule that you created on the original engine, with all of the same parameters (start time, frequency, number to keep, etc.).

In the previous step you had to move the volume to the other engine. The reason is that you can only create or edit a schedule for a volume on the engine that currently owns the volume. If an engine does not own the volume, you cannot select the volume when creating a new schedule via the New Persistent Image Schedule panel (under PSM Schedules).

- d. Use Cluster Administrator to move the disk group that contains the volume back to the original engine.
5. The warnings that are issued when a cache is approaching a full state are sent to the system log. You will not see pop-up warnings.
 6. Persistent image deletion on a volume takes place when the cache for that volume reaches a percentage full that you set in the PSM Volumes panel. The lowest priority images (according to their retention values as defined in the PSM Schedules panel and/or Persistent Images panel) are deleted first; persistent images with the same retention value are deleted starting with the oldest. Should the cache reach 100 percent full, all persistent images on the volume are deleted.

Attention: If you plan to use the Recovery CD, you must first delete all persistent images on the system. For more information on using the Recovery CD, see “Using the Recovery Enablement Diskette and Recovery CD” on page 61.

Tivoli SANergy

Note: Model G25 is enabled for SANergy use. Although the SANergy component is included in the product, you will need to obtain additional licenses from Tivoli to use SANergy client with this appliance.

Tivoli SANergy allows you to deliver shared data access at the speed of a SAN, using Fibre Channel, SCSI, or SSA. It gives multiple computers the power to dynamically share file and data access on SAN-based storage, using standard networks and file systems.

SANergy combines LAN-based file sharing with the very high data transfer speeds of the Fibre Channel, SCSI, and SSA storage networks. The result is high-speed, heterogeneous data sharing without the performance-limiting bottlenecks of file servers and traditional networking protocols.

SANergy extends standard file systems and network services provided by the operating systems that it supports. As an operating system extension built on standard systems interfaces, SANergy fully supports the user interface, management, access control, and security features native to the host platforms. Therefore, it provides you with all the file system management, access control, and security you expect in your network.

With SANergy, applications you have configured into your network can access any file at any time, and multiple systems can transparently share common data. SANergy ensures maximum compatibility with existing and future operating systems, applications, and management utilities.

In addition to the SAN, SANergy also uses a standard LAN for all the meta data associated with file transfers. Because SANergy is based on standard file systems, if your SAN fails, you can continue to access your data through the LAN.

With SANergy, you can reduce or even eliminate the expense of redundant storage and the overhead of data synchronization in multi-host environments. These environments include large-scale web, video, or file servers. Because each system has direct access to the SAN-based storage, SANergy can eliminate your file server as a single point of failure for mission-critical enterprise applications, reducing costly down-time. Also, with SANergy, you can readily manage all your data backup traffic over the storage network, while users have unimpeded LAN access to your existing file servers.

To set up SANergy on your network, use the following steps:

1. Make sure your network is correctly configured for LAN and SAN.
2. Configure your storage system, including disk formatting, partitioning, and volume configuration.
3. Enable SANergy bus management and device assignments. The Meta Data Controller will then be enabled for the appliance operating system.
4. Install additional SANergy licenses on properly configured hardware clients.

You can read further details on SANergy in the online help.

FastT Check

FastT Check allows you to manage and control host bus adapter(s). With FastT Check, you can:

- Retrieve and display general information about the adapters
- Request and display the real-time statistics of adapters
- Diagnose operations on the adapters and attached devices
- Display the NVRAM parameters of adapters, and accept and execute changes on these parameters
- Monitor alarms and indications of the adapters

The primary purpose of FastT Check in the Model G25 is to obtain diagnostic information about the Fibre Channel connections.

You start FastT Check by double-clicking the **IBM NAS Admin** icon. Then, under the **NAS Management** icon, double-click **Storage**, then **NAS Utilities**. And finally, you select **FastT Check**. Once the FastT Check opens, click **Connect**.

For further details on FastT Check, see the online help.

Advanced System Management Adapter

The optional Advanced System Management (ASM) PCI Adapter allows you to connect via LAN or modem from virtually anywhere for extensive remote management. The ASM PCI adapter works in conjunction with the ASM processor that is integrated into the base planar board of the Model G25 and an interconnect

cable that connects both engines to the ASM adapter. Remote connectivity and flexibility with LAN capability is provided by Ethernet connection. The ASM adapter enables more flexible management through a Web browser interface, in addition to ANSI terminal, Telnet, and Netfinity Director.

Table 1 on page 31 provides a summary of the features of the ASM PCI adapter and the integrated ASM processor.

Table 1. Integrated ASM processor compared to the ASM PCI adapter

Feature	Integrated ASM processor	ASM PCI adapter
Location	On planar	Separate PCI adapter option
Light path diagnostics	Displays	Displays
LED status of engine	Displays	Displays
LED status of HDD in engine	No	No
LED status of SCSI-attached JBOD	No	No
Remote update of system BIOS	Yes	Yes
Remote update of ASM BIOS	Yes	Yes
Remote power on/off	Yes	Yes
Remote POST (including all POST message ids)	Yes	Yes
Remote access to VPD and sn	Yes	Yes
Multiple login IDs	Yes	Yes
Connect to LAN	No	Yes
TELNET interface over IP	No	Yes (via LAN connection)
Web-browser interface over IP	No	Yes (via LAN connection)
Forwarding of SNMP traps	Yes, to the ASM PCI adapter	Yes (via LAN connection)
Automated server restart	Yes	Yes
Remote Alerts	Yes	Yes
Configuration	By DOS utility	By DOS utility
Aggregate from other ASM processors	No	Yes, up to 12

Remote status includes information on power supply voltages, VRM readings, temperatures of system components, system power status, power-on hours, fan status, and system state.

To remotely determine the status of the 10/100 Ethernet or Gigabit Ethernet adapters, run the diagnostics in the PROSet II application from a remote Terminal Services connection. If an Ethernet connection is not available through one of the 10/100 Ethernet adapters or through the Gigabit Ethernet adapter, then you can attach a monitor and keyboard to the Model G25 engine to access the PROSet II application to diagnose Ethernet failures.

There are two ways to remotely determine the status of the Fibre Channel host bus adapters.

- You can run the Fast!UTIL diagnostics which are available during POST (remotely visible via the ASM processor). The Model G25 can then be rebooted to load the operating system.
- After you have booted the operating system, you can run the diagnostics in the FastT Check application from a remote Terminal Services connection.

The lightpath diagnostics LED status that is available via ASM includes: power-supply failure, insufficient power for power-supply redundancy, exceeded power-supply capabilities, non-maskable interrupt occurred, over temperature, fan failure, memory error, microprocessor failure, PCI-bus error, voltage-regulator module failure, SCSI for internal tape drive (if any) failure.

Chapter 5. Clustering

The Model G25 uses Microsoft's Cluster Server (MSCS) software to provide clustering technology for your SAN. Clustering ensures availability of your SAN, regardless of individual component failure.

After installing the clustering function, you can use Cluster Administration to set up the failover function. Then, if a node or a node's component were to fail, the Model G25 detects the failure and begins a failover process in less than 10 seconds, and completes the process within 60 seconds. Failover/Failback will include Active/Active support for the CIFS protocol and Active/Active support for the NFS protocol.

This chapter gives the details for installing and initially configuring MSCS on the Model G25. Administrative concepts and procedures are provided in the online help and at the following Web sites:

<http://www.microsoft.com/windows2000/library/technologies/cluster/default.asp>

http://www.microsoft.com/ntserver/support/faqs/clustering_faq.asp

Note: Please use the Release Notes for the Model G25 in conjunction with the information presented in this chapter.

Cluster configuration requirements

Before you configure the Model G25 nodes for clustering function, ensure that the following requirements are met:

Network Requirements

- A unique NetBIOS cluster name
- At least three unique, static IP Addresses for the public network: one for each node (for client access through the PCI NIC adapter) and one for the cluster itself (the administration IP Address)
Table 2 on page 34 shows a summary of the networking information you will need for the public connection.
- Two static IP addresses for the cluster interconnect on a private network or crossover, through the onboard Ethernet adapter. The default IP addresses for the private network adapters are 10.1.1.x.

Notes:

1. If you are not the system administrator, contact that person for the applicable IP addresses.
2. One additional static IP address will be required for creating each clustered group.
3. All nodes must be a member of the same domain, but it is not required that the nodes log into the domain.
4. Each node in the cluster must have at least two network adapters: at least one for the public network and the other for the private interconnect.

Shared Disk Requirements

- All shared disk arrays and devices, including the Quorum Disk, must be physically attached to a shared storage bus
- All shared disks must be configured as **basic** (not dynamic) disks

- All shared disks must have the same drive letter on each node
- All partitions on these disks must be formatted with NTFS
- All partitions on these disks must also be Primary Partitions

Although not required, the use of a fault-tolerant RAID configuration is recommended for the shared storage disk arrays. Clustering provides fault-tolerant support for the resources you set up to be used by the Cluster Server, and building in additional support will increase the cluster's availability.

Table 2. Networking information worksheet for the public connection

Cluster component	Information needed
Cluster	<p>Cluster name:</p> <p>IP address:</p> <p>Subnet:</p>
First node:	<p>Computer name: (For example: IBM5196-23H1234)</p> <p>IP address:</p> <p>Subnet:</p> <p>Gateway:</p> <p>Preferred DNS:</p>
Second node	<p>Computer name:</p> <p>IP address:</p> <p>Subnet:</p> <p>Gateway:</p> <p>Preferred DNS:</p>

Cluster installation

There are four basic steps to follow when you install cluster services on the first and second nodes and create the cluster.

After you have completed the steps for the first node (by referring to the appropriate section), complete the steps for the second node.

First node creation steps:

- 1. Networking setup** See “Networking setup (step 1 of 4)” on page 36. Note the cautionary statement at the beginning of this section.
- 2. Shared storage setup** See “Shared storage setup (step 2 of 4)” on page 38.
- 3. Domain setup** See “Joining a domain or verifying domain membership (step 3 of 4)” on page 39.
- 4. Cluster configuration** See “Cluster configuration (step 4 of 4)” on page 40.

Second node creation steps:

- 1. Networking setup** See “Networking setup (step 1 of 4)” on page 36.
- 2. Shared storage setup** This step is not required when creating the second node. However, if you are having trouble with the Fibre Channel connection, you can use the steps in “Check the FastT host-bus adapter settings and fibre-channel connectivity” on page 39 to diagnose the problem.
- 3. Domain setup** See “Joining a domain or verifying domain membership (step 3 of 4)” on page 39.
- 4. Cluster configuration** See “Cluster configuration (step 4 of 4)” on page 40.

Note: You can carry out the following steps with a keyboard, monitor, and mouse, or you can use the IBM Advanced Appliance Configuration Utility (that is, in “headless” mode) to detect the node for initial network configuration. For details on the utility, see “IBM Advanced Appliance Configuration Utility” on page 10.

Networking setup (step 1 of 4)

CAUTION:

Before you begin installing cluster services on the first node, power off the second node. This is required to prevent corruption of data on the shared storage devices. Corruption can occur if both nodes were to try to simultaneously write to the same shared disk that is not yet protected by the clustering software.

Configuring the public local area connection

Note: While the public network adapter's IP address can be automatically obtained if a DHCP server is available, this is not recommended for cluster nodes. It is strongly recommended that you set static IP addresses for all network adapters in the cluster. If IP addresses are obtained through DHCP, access to cluster nodes could become unavailable if the DHCP server goes down.

Do the following steps on both nodes to configure the public local area connections.

1. Right-click **My Network Places**, then click **Properties**.
2. Right-click the active **Local Area Connection** (the one without the red X, and the one that is not the IBM 10/100 Netfinity Fault Tolerant Adapter).
When you do this step, the connection that uses the IBM 10/100 Netfinity Fault Tolerant Adapter is the private connection. The other active connection is the public connection. Use that other active connection for this step and the next step.
3. Click **Rename**, and then type **Public**, and press **Enter**.
When you do these renaming steps for the second node, ensure that the local area connection name for each physically connected network is identical on each server. See Table 3 on page 37 for an example.
4. Use the networking information in Table 2 on page 34 to enter the networking addresses:
 - Right-click **My Network Places**
 - Click **Properties**
 - Right-click the **Public** icon, then click **Properties**.
 - Select **Internet Protocol (TCP/IP)**
 - Click **Properties**, select **Use the following IP address:**, and enter the addresses for the IP, subnetmask, default gateway, and preferred DNS server.
5. If needed, configure the WINS, HOSTS, or whichever method you will be using for names resolution. You can view this information by clicking the **Advanced** button on the **Properties** window.
6. Click **OK** on each panel to back up to the Properties window, then continue with "Configuring the interconnect (Private) network adapter".

If you are using multiple public networks, do not place additional paired adapters on the same IP network, unless you are going to use adapter teaming or adapter load balancing. Without adapter teaming or adapter load balancing, the additional paired adapters will not show up in the Cluster Server Administrator that you will set up later.

Configuring the interconnect (Private) network adapter

Do the following steps on both nodes to configure the interconnect (Private) network adapter. The **Private** connection is the heartbeat interconnect for the cluster.

1. Right-click **My Network Places** and then select **Properties**.

2. Select the network connection that uses the IBM 10/100 Netfinity Fault Tolerant Adapter.
3. Right-click the adapter icon and click **Properties**.
4. Click **Configure**, select the **Advanced** tab, and verify that the following characteristics are set:

External PHY	100 Mbps Full Duplex
Full Duplex	UTP - Full Duplex
TP Mode	On (Default)
5. Click **OK**.
6. If prompted to restart the node, select **NO**.

After you return to the Properties panel for **My Network Places**, do the following:

1. Rename the connection to **Private**.
2. Go to the Properties panel for the connection, select **Internet Protocol (TCP/IP)** from the components section, and click **Properties**.
3. Set the IP address to 10.1.1.1 for the first node, or 10.1.1.2 for the second node, depending on which node you are installing.
4. Ensure a Subnet Mask of 255.0.0.0.
5. Click on **Advanced**, and select the **WINS** tab.
6. Select the **Disable NetBIOS over TCP/IP** radio button.
7. Click **OK**.
8. Select **YES** when you are asked if you want to continue using an empty Primary WINS address.
9. Click **OK** on the Internet Protocol (TCP/IP) Properties panel.
10. Click **OK** on the Local Area Connection Properties (Private) panel.

Verify Network Connectivity and Names Resolution

To verify that the private and public networks are communicating properly, open an MS-DOS command prompt and type **ping ipaddress** where *ipaddress* is the IP address for the corresponding network adapter in the other node, and press **Enter**.

For example, assume that the IP addresses are set as follows:

Table 3. Example of local area connection names and network adapter IP addresses

Node	Local area connection name	Network adapter IP address
1	Private Cluster Connection	10.1.1.1
1	Public Cluster Connection 1	192.168.1.12
1	Public Cluster Connection 2	192.168.2.12
2	Private Cluster Connection	10.1.1.2
2	Public Cluster Connection 1	192.168.1.13
2	Public Cluster Connection 2	192.168.2.13

In this example, you would type **ping 192.168.1.12** and **ping 192.168.2.12** for the first node, and you would type **ping 192.168.1.13** and **ping 192.168.2.13** for the second node. You can do this from any machine that is physically connected to each node's networks.

In case you need to view the addresses, retrieve them using the **ipconfig** command on each node:

- Click **Start**, click **Run**, type **cmd** in the text box, and click **OK** to bring up an MS-DOS prompt.
- Type **ipconfig /all** and press **Enter**. IP information should display for all network adapters in the machine.

To check or change the Network Binding order

1. Right-click **My Network Places** and then select **Properties**
2. Select **Advanced, Advanced Settings**.

The top-most connection is first in the binding order. Typically, this will be the most used network adapter. You can reorder the position of the adapters by selecting them, then pressing the **up** or **down** arrow keys, then pressing **OK**.

Shared storage setup (step 2 of 4)

The following steps need to be followed if your shared storage is not configured, and only for the first node. If your shared storage is configured, the only steps you need to do are to create the Quorum disk and ensure that the disks are labeled the same on each node.

Configure the fibre-attached storage

You can configure the fibre-attached storage with the following steps or contact your disk administrator to have them done.

1. Double-click the **IBM NAS Admin** icon, then click **Storage**, then **Disk Management**.
2. Create a logical drive for the Quorum disk (RAID 5 is recommended for performance and redundancy). The drive should be at least 500 MB in size, but no larger than 1 GB. Also, the Quorum disk requires its own LUN.
3. Do not create any arrays that are RAID 0, as this is not supported.
4. If needed, see “Check the FastT host-bus adapter settings and fibre-channel connectivity” on page 39.
5. Rescan the disks. The **Rescan** function is located under the **Action** menu.

Note: You cannot dynamically add storage to a defined volume when that volume is in a cluster.

Format the logical drives

Follow this procedure to format logical drives.

Note: Do **NOT** upgrade any disks to dynamic. Only basic disks are supported for clustering. In addition, all partitions used for clustering must be primary partitions.

1. After rebooting, open **IBM NAS Admin** and select **Disk Management (Local)**, in the **Storage** folder.
2. You will see a Write Signature and Upgrade Disk Wizard pop up on the screen. Click **Cancel**.
3. Right-click on the bottom right, where it says **Disk 1**, and select **Write Signature**.
4. Write Signature to all disks that will be accessed by the NOS (All disks in view).

On the Quorum drive, right-click and select **Format**. Enter the following parameters:

- File System of *NTFS*

- Volume Label of *Quorum Disk*
- Drive Letter of *Q* (suggested)

Do **not** enable disk compression, and select **Finish**.

Format all other drives, but do **not** enable compression. Use all space available for each drive for each logical drive assigned by the operating system. Assign a drive letter of *F* for the first drive, *G* for the second drive, and so on.

At this point, you have set up shared storage (if this is the first node). You can now close IBM NAS Admin and continue with “Joining a domain or verifying domain membership (step 3 of 4)”.

Check the FastT host-bus adapter settings and fibre-channel connectivity

FastT Check is provided for diagnostic purposes. You can use it to determine if your physical fibre channel connections are in place.

1. Go to **IBM NAS Admin**, expand **Storage** and select **NAS Utilities**. Then click on **FastT Check** on the left hand side.
2. Connect using the *hostname* of the system you are using with Terminal Services.
3. Once connected, select the **QLA2200 Adapter**, and verify that you see all Fibre Controllers that you are physically connected to.

If you see a red “X” on the QLA2200 Adapter icon, check the fibre connection. (A green icon means connections are in place.) If, after checking the connection, the QLA2200 adapter still does not connect, go through the hardware diagnostics.

4. Click the **Utilities** button on the bottom right-hand side.
5. Change from **Link Status** to **NVRAM Settings**.
6. Under **Advanced Adapter Settings** (about half-way down), look at **Luns per Target**. It should be set to 0. If not, change the value to 0. Do this for any other installed adapters.

Joining a domain or verifying domain membership (step 3 of 4)

All nodes in the cluster must be members of the same domain and be able to access a Primary Domain Controller (PDC) and a DNS Server.

Documentation suggests that you can configure each node in the cluster as a domain controller. However, in some instances, configuring each node as a domain controller might make them unusable. This could happen if a failure occurred on a PDC and the Backup Domain Controller (BDC) took over. Then, if the PDC were to come back up before the BDC can finish Active Directory updating, both systems would be in a state of conflicting controlling memberships.

To join a node to a domain or to check the domain membership

1. Right-click **My Computer**, and click **Properties**.
2. Click **Network Identification**. The System Properties dialog box displays the full computer name and workgroup or domain.
3. If are already part of a domain, you can go to “Check the FastT host-bus adapter settings and fibre-channel connectivity”. If you are part of a workgroup, you need to join a domain at this time. Click **Properties** and do these steps to join a domain:
 - a. Select the **Domain** radio button

- b. Type in the name of your domain and click **OK**.
- c. When prompted, enter the Administrator user id and password and press **OK**.
4. Close the **System Properties**
5. Restart the computer.

Cluster configuration (step 4 of 4)

At this point, you have completed the preparation steps for cluster installation and are ready to configure the cluster. Do the following steps:

1. Start the Cluster Configuration Wizard: open **IBM NAS Admin**, then the **Cluster Tools** folder, and click the **Cluster Setup** icon.
2. You will be asked to verify that you have completed the three steps that precede the cluster configuration step. If you have, click the **Continue** button.
3. Depending on whether you are configuring the first node or the second (joining) node, click the **First Node** or **Joining Node** button.
4. If you are configuring the first node, do the following steps, otherwise go to step 5.
 - a. The Cluster Information panel appears. Enter the data for the following fields (some of this data comes from Table 2 on page 34):
 - Administrator's ID
 - Password
 - Domain name
 - Cluster name
 - Cluster IP address
 - Subnet mask
 - b. After you have entered the data, click **Continue**.
 - c. You will be asked to verify the information. If it is correct, click **Yes** to start the configuration. You will see a message that configuration takes a few minutes.
 - d. If you are asked by the Cluster Service Configuration Wizard to select a user account, enter the user name and password for the domain account you want the cluster service to use. If you are not asked, cluster configuration completes.
 - e. If you are asked to select a disk on which to store cluster checkpoint and log files, do the following:
 - 1) Select the disk on which the Quorum is located and click **Next**.
 - 2) The Cluster Information panel displays. Click **Finish**.

If you are not asked, cluster configuration completes.
 - f. Cluster configuration completes, the Cluster Administrator opens, and you can now go through the four steps for the joining node, starting with "Networking setup (step 1 of 4)" on page 36.
5. If you are configuring the joining node:
 - a. Click the **Joining Node** button.
 - b. The First Node Information panel appears. Enter the name of the **first** node.
 - c. You may be asked to confirm the Administrator name and password. Enter that information and click **Finish**.
 - d. You will see a message that configuration takes a few minutes. When configuration completes, the Cluster Administration function starts.

Chapter 6. Troubleshooting

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

If you cannot locate and correct the problem using the information in this section, refer to “Appendix B. Getting help, service, and information” on page 65 for more information.

Note: The information in this chapter needs to be applied to both engines in the Model G25. As an example, when the text reads, “Your appliance has light-emitting diodes (LEDs) to help you identify problems with appliance components,” this means that each engine in the Model G25 has LEDs which require your attention.

As another example, the information contained in “Troubleshooting charts” on page 48 applies to each of the two engines.

Diagnostic tools overview

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

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

The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. POST error messages and descriptions are given in “Appendix D. POST messages” on page 71.

- **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 appliance. See “POST diagnostic programs” on page 79 for more information.

- **Light-path diagnostics**

Your appliance has light-emitting diodes (LEDs) to help you identify problems with appliance components. These LEDs are part of the lightpath diagnostics that are built into your appliance. By following the *path of lights*, you can quickly identify the type of system error that occurred. See “Light-path diagnostics” on page 42 for more information.

- **Networking adapter diagnostic tools**

- **Intel PROSet II**

See “Intel PROSet II” on page 47.

- **FastT Check.**

See “FastT Check” on page 48

- **Troubleshooting charts**

These charts list problem symptoms, along with suggested steps to correct the problems. See “Troubleshooting charts” on page 48 for more information.

- **Support**

You can register with the following support site to subscribe to e-mail notification of new technical tips and frequently asked questions, obtain downloads, and join forum discussions:

www.storage.ibm.com/support/nas

Identifying problems using LEDs

Your appliance has LEDs to help you identify problems with some appliance components. These LEDs are part of the light-path diagnostics built into the appliance. The LEDs help you identify the type of system error that occurred. See the following sections for more information.

Power-supply LEDs

The ac and dc power LEDs on the power supply provide status information about the power supply.

Table 4 describes the ac and dc power LEDs.

Table 4. Power supply LEDs

AC power LED	DC power LED	Description and action
On	On	The power supply is on and operating correctly.
On	Off	<p>There is a dc power problem.</p> <p>Possible causes:</p> <ol style="list-style-type: none">1. The power control button on the front of the appliance is in the Off position. Action: Press the power control button to start the appliance.2. The power supply has failed. Action: Replace the power supply. <p>If the problem persists, have the system serviced.</p>
Off	Off	<p>There is an ac power problem.</p> <p>Possible causes:</p> <ol style="list-style-type: none">1. There is no ac power to the power supply. Action: Verify that:<ul style="list-style-type: none">• The power cord is properly connected to the appliance.• The power outlet functions properly.2. The power supply has failed. Action: Replace the power supply. <p>If the problem persists, have the system serviced.</p>

Light-path diagnostics

You can use the light-path diagnostics built into your appliance to identify the type of system error that occurred. Your appliance is designed so that any LEDs that are illuminated remain illuminated when the appliance shuts down as long as the ac power source is good and the power supplies can supply +5V dc current to the appliance. This feature helps you isolate the problem, if an error causes the appliance to shut down. See “Light-path diagnostics”.

Diagnostics panel

Figure 1 shows the LEDs on the diagnostics panel on the system board. See “Light-path diagnostics” on page 42 for information on identifying problems using these LEDs.

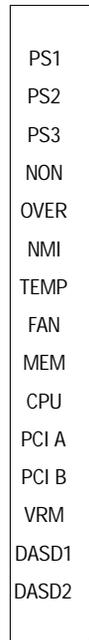


Figure 1. Diagnostics panel LEDs

Light-path diagnostics

Table 5 describes the lightpath diagnostics LEDs. The system-error LED on the operator information panel is lit when certain system errors occur. Table 5 helps determine the cause of the error and the action you should take.

Table 5. Light-path diagnostics

Lit LED on diagnostics panel	Cause	Action
None	The Advanced System Management Processor has failed.	Verify that the Advanced System Management Processor LED on the system board is on. Have the system serviced.
PS1	Power supply 1 has failed.	Replace power supply 1.
PS2	Power supply 2 has failed.	Replace power supply 2.
NON	Power supply redundancy has been lost. Note: This LED will not be lit if your appliance has only one power supply; however, the power is not redundant with only one power supply installed.	Check the PS1 and PS2 LEDs and replace the indicated power supply. If neither LED is lit, you can remove optional devices from the appliance to restore power supply redundancy.
OVER	The system has exceeded the power capabilities of the installed power supply.	Remove optional devices from the appliance to reduce the power requirements.

Table 5. Light-path diagnostics (continued)

Lit LED on diagnostics panel	Cause	Action
NMI	A nonmaskable interrupt occurred.	<ol style="list-style-type: none"> 1. If the PCI A or PCI B LED is on, follow the instructions for that LED. 2. If neither the PCI A or PCI B LED is on, restart the appliance. <p>If the problem persists, have the system serviced.</p>
TEMP	The system temperature has exceeded a threshold level.	<ol style="list-style-type: none"> 1. Check to see if a fan has failed. If it has, replace the fan. 2. Make sure the room temperature is within an acceptable range- <ul style="list-style-type: none"> • Appliance on: 10° to 35° C (50.0° to 95.0° F). Altitude: 0 to 914 m (2998.7 ft.) • Appliance on: 10° to 32° C (50.0° to 89.6° F). Altitude: 914 m (2998.7 ft.) to 2133 m (6998.0 ft.) • Appliance off: 10° to 43° C (50.0° to 109.4° F). Maximum altitude: 2133 m (6998.0 ft.) <p>If the problem persists, have the system serviced.</p>
FAN	A fan has failed or is operating too slowly. Note: A failing fan can also cause the TEMP LED to be on.	Check the LEDs on the fan assemblies and replace the indicated fan assembly.
MEM	A memory error occurred.	<ol style="list-style-type: none"> 1. Check the DIMM failure LEDs on the system board. 2. Replace the DIMM indicated by the lit DIMM failure LED.
CPU	One of the microprocessors has failed or a microprocessor is installed in the wrong connector.	<ol style="list-style-type: none"> 1. Check the microprocessor failure LEDs on the system board. 2. If a microprocessor failure LED is lit, make sure that the microprocessor is installed correctly and seated correctly. See information on installing a microprocessor in the hardware installation guide that came with the appliance. 3. If the problem persists, replace the microprocessor. <p>If the problem persists, have the system serviced.</p>

Table 5. Light-path diagnostics (continued)

Lit LED on diagnostics panel	Cause	Action
PCI A	An error occurred on PCI bus A. Either an adapter in PCI slot 1 or 2 or the system board caused the error.	<ol style="list-style-type: none"> 1. Check the error log for additional information. If the error log indicates a problem with the integrated Ethernet controller or the integrated SCSI controller, have your system serviced. 2. If you cannot isolate the failing adapter from the information in the error log, try to determine the failing adapter by removing one adapter at a time from PCI bus A (PCI slots 1 and 2) and restarting the appliance after each adapter is removed. <p>If the problem persists, have the system serviced.</p>
PCI B	An error occurred on PCI bus B. Either an adapter in PCI slot 3, 4, or 5 or the system board caused the error.	<ol style="list-style-type: none"> 1. Check the error log for additional information. 2. If you cannot isolate the failing adapter from the information in the error log, try to determine the failing adapter by removing one adapter at a time from PCI bus B (PCI slots 3, 4, and 5) and restarting the appliance after each adapter is removed. <p>If the problem persists, have the system serviced.</p>
VRM	One of the VRMs on the system board has failed.	<p>Check the VRM failure LEDs on the system board.</p> <ul style="list-style-type: none"> • If the VRM1 failure LED is on, have the system serviced. • If the VRM2 failure LED is on: <ol style="list-style-type: none"> 1. Turn off the appliance, reseal the VRM, and restart the appliance. 2. If the problem persists, replace the VRM. <p>If the problem still persists, have the system serviced.</p>
DASD1	SCSI channel A has failed.	<ol style="list-style-type: none"> 1. If an amber LED on a hot-swap hard disk drive is on, replace the hard disk drive. 2. Run the diagnostics programs. Replace any identified failing device. 3. If the error log indicates a temperature problem and the fans are working correctly, have the system serviced. <p>If the problem still persists, have the system serviced.</p>

Table 5. Light-path diagnostics (continued)

Lit LED on diagnostics panel	Cause	Action
DASD2	SCSI channel B has failed.	<ol style="list-style-type: none"> 1. If an amber LED on a hot-swap hard disk drive is on, replace the hard disk drive. 2. Run the diagnostics programs. Replace any identified failing device. 3. If the error log indicates a temperature problem and the fans are working correctly, have the system serviced. <p>If the problem still persists, have the system serviced.</p>

Recovering BIOS

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

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

- Use the ServerGuide program to make a BIOS flash diskette.
- Download a BIOS flash diskette from the World Wide Web. Go to www.storage.ibm.com/support/nas

and make the selections for your appliance.

- Contact your IBM service representative.

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

Figure 2 on page 47 shows the location of the boot block jumper on the system board.

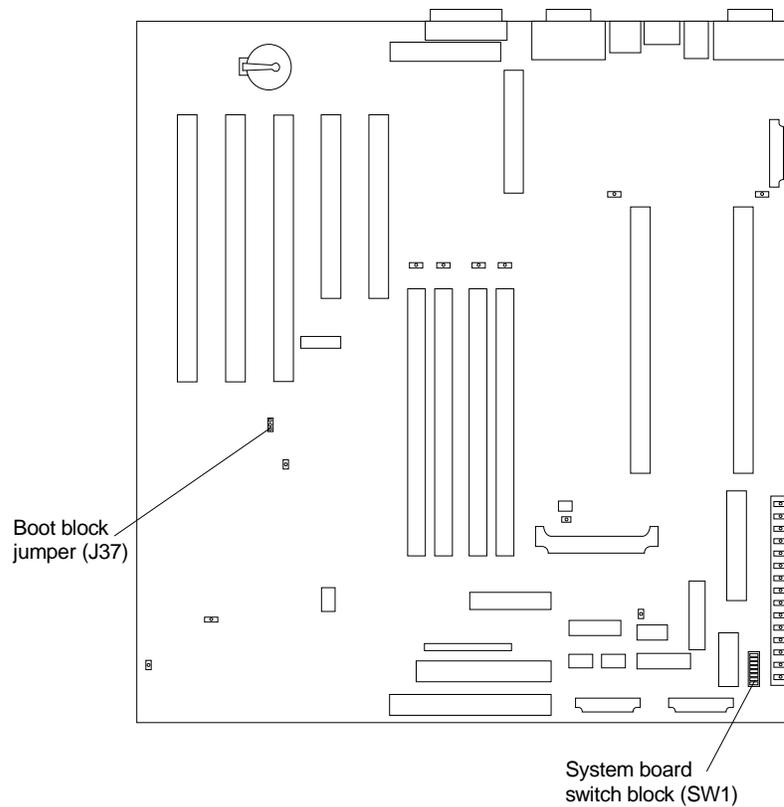


Figure 2. Boot block jumper location

Intel PROSet II

Your appliance comes equipped with Intel PROSet II for monitoring the status of the Ethernet adapter PCI cards. PROSet II performs a loopback test on 10/100 and GB Ethernet PCI cards.

To access the PROSet II utility, you must first go into Terminal Services. For instructions on how to invoke Terminal Services, please see “Terminal Services and the IBM NAS Administration Console” on page 19. Once you are in Terminal Services, you then go to the **Start** menu, select **Settings**, then **Control Panel**, and finally, you double-click the icon for **Intel PROSet II**.

You can view the following using PROSet II:

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

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

FastT Check

Your appliance also comes with FastT Check for viewing the status of your Fibre Channel connection. You access FastT Check by going into the **IBM NAS Admin** console, clicking **NAS Management**, then **Storage**, then **NAS Utilities**, and finally **FastT Check**.

After clicking **Connect** on the FastT Check interface, a diagnostic panel displays the following general information related to your Fibre Channel adapter:

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

The above information is especially useful should you need to place a support call. FastT Check also provides the appliance MAC address as detailed in “FastT Check” on page 29.

For additional information relating to FastT Check’s diagnostic functions, please refer to the online help accessed from its panels.

Troubleshooting charts

You can use Table 6 to find solutions to problems that have the described symptoms.

If you cannot find the problem in the table, go to “Starting the diagnostic programs” on page 80 to test the appliance. If you have run the diagnostic test programs or if running the tests does not reveal the problem, call for service.

The symptom appears in the left column of the table. Instructions and probable solutions to the problem are in the right column. If you have just added new software or a new option and your appliance is not working, do the following before using the troubleshooting charts:

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

Table 6. Troubleshooting symptoms and actions

Device	Suggested action
CD-ROM drive	Verify that: 1. The primary IDE channel is enabled in the Configuration/Setup Utility program. 2. All cables and jumpers are installed correctly. 3. The correct device driver is installed for the CD-ROM drive. If the problem remains, call for service.
CD-ROM drive is not recognized.	

Table 6. Troubleshooting symptoms and actions (continued)

Device	Suggested action
Diskette drive	If there is a diskette in the drive, verify that: 1. The diskette drive is enabled in the Configuration/Setup Utility program. 2. The diskette is good and not damaged. (Try another diskette if you have one.) 3. The diskette contains the necessary files to start the appliance. 4. Your software program is OK.
Diskette drive in-use light stays on, or the system bypasses the diskette drive.	If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, call for service.
General problems	Call for service.
Problems such as broken cover locks or indicator lights not working.	
Intermittent problems	Verify that:
A problem occurs only occasionally and is difficult to detect.	1. All cables and cords are connected securely to the rear of the appliance and attached options. 2. When the appliance is turned on, air is flowing from the rear of the appliance at the fan grill. If there is no air flow, the fan is not working. This causes the appliance to overheat and shut down. If the items above are correct, call for service.
Memory problems	Verify that:
The amount of memory displayed is less than the amount of memory installed.	1. The memory modules are seated properly. 2. You have installed the correct type of memory. 3. If you changed the memory, you updated the memory configuration with the Configuration/Setup Utility program. 4. All banks of memory on the DIMMs are enabled. The appliance might have automatically disabled a DIMM bank when it detected a problem or a DIMM bank could have been manually disabled. If the above items are correct, run the memory diagnostic program. The system might have detected a bad memory module and automatically reallocated memory to enable you to continue to operate. If the memory tests fail, call for service or replace the failing DIMM.
Microprocessor problems	The startup (boot) microprocessor is not working properly.
The appliance emits a continuous tone during POST.	Verify that the startup microprocessor is seated properly. If it is, replace the startup microprocessor. If the problem remains, call for service.
Option problems	Verify that:
An IBM option that was just installed does not work.	1. The option is designed for the appliance. Refer to the hardware installation guide that came with this appliance for a list of supported options. 2. You followed the installation instructions that came with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. You updated the configuration information in the Configuration/Setup Utility program. Whenever memory or an option is changed, you must update the configuration. If the problem remains, call for service.
An IBM option that used to work does not work now.	Verify that all of the option hardware and cable connections are secure. If the option comes with its own test instructions, use those instructions to test the option. If the problem remains, call for service.

Troubleshooting

Table 6. Troubleshooting symptoms and actions (continued)

Device	Suggested action
<p>Power problems</p> <p>The appliance does not power on.</p>	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The power cables are properly connected to the appliance. 2. The electrical outlet functions properly. 3. The type of memory installed is correct. 4. If you just installed an option, remove it, and restart the appliance. If the appliance now powers on, you might have installed more options than the power supply supports. 5. The LEDs on the power supply are on. <p>If the problem remains, call for service.</p>
<p>Serial port problems</p> <p>The number of serial ports identified by the operating system is less than the number of serial ports installed.</p>	<p>Verify that:</p> <ol style="list-style-type: none"> 1. Each port is assigned a unique address by the Configuration/Setup Utility program and none of the serial ports are disabled. Note: The management C connector is the same as a serial port connector, but it is used only by the integrated Netfinity Advanced System Management Processor, and is not available for use by the operating system. This port does not appear in the Configuration/Setup Utility program menus; it can be configured using Netfinity Manager. 2. The serial-port adapter, if you installed one, is seated properly. <p>If the problem still exists, call for service.</p>
<p>Service processor problems</p> <p>Netfinity Service Processor Manager reports a general monitor failure</p>	<p>Disconnect the appliance from all electrical sources, wait for 30 seconds, reconnect the appliance to the electrical sources, and restart the appliance.</p> <p>If a problem remains, call for service.</p>
<p>Software problem</p> <p>Suspected software problem.</p>	<p>To determine if problems are caused by the software, verify that:</p> <ol style="list-style-type: none"> 1. Your appliance has the minimum memory requirements needed to use the software. For memory requirements, refer to the information that comes with the software. Note: If you have just installed an adapter or memory, you might have a memory address conflict. 2. The software is designed to operate on your appliance. 3. Other software works on your appliance. 4. The software that you are using works on another system. <p>If you received any error messages when using the software program, refer to the information that comes with the software for a description of the messages and solutions to the problem.</p> <p>If the items above are correct and the problem remains, contact your place of purchase.</p>

Troubleshooting the Ethernet controller

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

Network connection problems

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

- Make sure 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.

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

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

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

- Determine if the hub supports auto-negotiation. If not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller lights on the operator information panel.
 - These lights indicate whether a problem exists with the connector, cable, or hub.
 - The Ethernet Link Status light is On when the Ethernet controller receives a LINK pulse from the hub. If the light is Off, there might be a bad connector or cable, or a problem with the hub.
 - The Ethernet Transmit/Receive Activity light is On when the Ethernet controller sends or receives data over the Ethernet Network. If the Ethernet Transmit/Receive Activity light is Off, make sure that the hub and network are operating and that the correct device drivers are loaded.
- Make sure that you are using the correct device drivers, supplied with your Model G25.
- Check for operating system-specific causes for the problem.
- Make sure that the device drivers on the client and the Model G25 are using the same protocol.
- Test the Ethernet controller by running the diagnostic program.

Ethernet controller troubleshooting chart

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

Table 7. Ethernet troubleshooting chart

Ethernet controller problem	Suggested Action
Ethernet Link Status light is not On.	Check the following: <ul style="list-style-type: none"> • Ensure that the hub is powered on. • Check all connections at the Ethernet controller and the hub. • Check the cable. A crossover cable is required unless the hub has an X designation. • Use another port on the hub. • If the hub does not support auto-negotiation, manually configure the Ethernet controller to match the hub. • If you manually configured the duplex mode, ensure that you also manually configure the speed. • Run diagnostics on the LEDs. If the problem remains, go to “Starting the diagnostic programs” on page 80 to run the diagnostic programs.
The Ethernet Transmit/Receive Activity light is not On.	Check the following: <p>Note: The Ethernet Transmit/Receive Activity LED is On only when data is sent to or by this Ethernet controller.</p> <ul style="list-style-type: none"> • Ensure that you have loaded the network device drivers. • The network might be idle. Try sending data from this workstation. • Run diagnostics on the LEDs. • The function of this LED can be changed by device driver load parameters. If necessary, remove any LED parameter settings when you load the device drivers.
Data is incorrect or sporadic.	Check the following: <ul style="list-style-type: none"> • Ensure that you are using Category 5 cabling when operating the Model G25 at 100 Mbps. • Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.

Troubleshooting

Table 7. Ethernet troubleshooting chart (continued)

Ethernet controller problem	Suggested Action
The Ethernet controller stopped working when another adapter was added to the Model G25.	Check the following: <ul style="list-style-type: none">• Ensure that the cable is connected to the Ethernet controller.• Ensure that your PCI system BIOS is current.• Reseat the adapter.• Ensure that the adapter you are testing is supported by the Model G25. Go to “Starting the diagnostic programs” on page 80 to run the diagnostic programs.
The Ethernet controller stopped working without apparent cause.	Check the following: <ul style="list-style-type: none">• Run diagnostics for the Ethernet controller.• Try a different connector on the hub.• Reinstall the device drivers. Refer to your operating-system documentation and to the <i>User’s Reference</i> information. If the problem remains, go to “Starting the diagnostic programs” on page 80 to run the diagnostic programs.

10/100 Ethernet Adapter troubleshooting chart

You can use Table 8 on page 53 to find solutions to 10/100 Mbps Ethernet adapter problems that have definite symptoms.

Table 8. Ethernet troubleshooting chart

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

Troubleshooting

Table 8. Ethernet troubleshooting chart (continued)

Ethernet adapter problem	Suggested Action
The ACT LED is not On.	Check the following: <ol style="list-style-type: none"> 1. Ensure that you loaded the correct network drivers. 2. The network might be idle. Try accessing a server. 3. The adapter is not transmitting or receiving data. Try another adapter. 4. Ensure that you are using two-pair cable for TX wiring.
Adapter stops working without apparent cause.	Check the following: <ol style="list-style-type: none"> 1. Run the diagnostics. 2. Try reseating the adapter in its slot, or try a different slot if necessary. 3. The network driver files might be corrupt or missing. Remove and then reinstall the drivers.
The LNK LED is not On when you connect the power.	Check the following: <p>Ensure that the network cable is securely attached at both ends.</p>

Gigabit Ethernet SX adapter troubleshooting chart

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

Table 9. Ethernet troubleshooting chart

Gigabit adapter problem	Suggested Action
No Link or TX/RX Activity	<p>If you cannot link to your switch, check the following:</p> <ol style="list-style-type: none"> 1. Check the following LED lights on the adapter: <ul style="list-style-type: none"> TX — On The adapter is sending data RX — On The adapter is receiving data. Link — On The adapter is connected to a valid link partner and is receiving link pulses. Link — Off Link is inoperative. <ul style="list-style-type: none"> • Check all connections at the adapter and link partner • Make sure the link partner is set to 1000 Mbps and full-duplex • Ensure the required drivers are loaded PRO — Programmable LED Identifies the adapter by blinking. Use the Identify Adapter push-button in INTEL PROSet II to control blinking. 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.
Your computer cannot find the Gigabit Ethernet SX adapter	Check the following: <ol style="list-style-type: none"> 1. Verify that the adapter is seated firmly in the slot. 2. Try a different Gigabit Ethernet SX adapter.
Diagnostics pass but the connection fails	Check the following: <p>Ensure the network cable is securely attached.</p>

Table 9. Ethernet troubleshooting chart (continued)

Gigabit adapter problem	Suggested Action
Another adapter stopped working after you installed the Gigabit Ethernet SX Adapter	<p>Check the following:</p> <ol style="list-style-type: none"> 1. Verify that the cable is connected to the Gigabit Ethernet SX Adapter and not to another adapter. 2. Check for a resource conflict. 3. Ensure both adapters are seated firmly in the slot. 4. Check all cables.
The adapter stopped working without apparent cause	<p>Check the following:</p> <ol style="list-style-type: none"> 1. Try reseating the adapter. 2. The network driver files might be damaged or deleted. Reinstall the drivers. 3. Try a different Gigabit Ethernet SX Adapter.
LINK LED is not On	<p>Check the following:</p> <ol style="list-style-type: none"> 1. Ensure that you have loaded the adapter driver. 2. Check all connections at the adapter and the buffered repeater or switch. 3. Try another port on the buffered repeater or switch. 4. Ensure that the buffered repeater or switch port is configured for 1000 Mbps and full-duplex. 5. Try changing the auto-negotiation setting on the link partner, if possible.
RX or TX LED is no On	<p>Check the following:</p> <ol style="list-style-type: none"> 1. Ensure that you have loaded the adapter driver. 2. Network might be idle; try logging in from a workstation. 3. The adapter is not transmitting or receiving data; try another adapter.

Running adapter diagnostics

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

Testing Ethernet adapters

Your Model G25 comes equipped with Intel PROSet II for monitoring the status of the Ethernet adapter PCI cards. PROSet II software also lets you test the Ethernet adapter to see if there are any problems with the adapter hardware, the cabling, or the network connection. You can also use diagnostics to isolate problems during troubleshooting. To access the PROSet II 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” on page 19. 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 INTEL PROSet II utility, select the Ethernet adapter you want to test (Gigabit Ethernet SX Server adapter or 10/100 Ethernet Adapter).
3. Select the **Diagnostics** tab. A list of available tests is displayed.
4. Select **Run Tests**.
You can also select or deselect individual tests with the check boxes. If an error is detected, information about the error is displayed.
5. Repeat steps 2 through 4 for each Ethernet adapter installed in the computer.

Testing the Fibre Channel connection

Your Model G25 also comes with FastT Check for viewing the status of your Fibre Channel connection as well as testing the adapter. You access FastT Check by

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going into the IBM NAS Admin console, selecting **NAS Management > Storage > NAS Utilities > FastT Check**. 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 - Serial number (in hex)
- 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 the Diagnostic push-button.

Testing the Advanced System Management adapter

1. Insert the Advance System Management Utility CD-ROM into the CD-ROM drive and restart the Model G25. If your Model G25 does not boot from the CD-ROM, use POST/BIOS setup to configure the CD-ROM drive as a boot device.
2. After your Model G25 boots, the main option menu appears. The main menu contains the following selections:

- Hardware Status and Information
- Configuration Settings
- Update System Management firmware

3. Use the up and down arrow keys to select **Hardware Status and Information** and press **Enter**. The Hardware Status and Information menu contains the list of Advanced System Management devices with the following diagnostic test results:

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

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

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

Current System Management Processor Status

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

Current System Management Adapter Status

```
Current BIST Results:
SRAM Memory Test:           Passed
```

```

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

- When you are finished viewing this information, press **Esc** to return to the main option menu. Remove the CD, then restart the Model G25.

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:

- Power off the system and disconnect the AC cord(s).
- Check for loose cables in the power subsystem. Also check for short circuits, for example, if there is a loose screw causing a short circuit on a circuit board.
- Remove adapters and disconnect the cables and power connectors to all internal and external devices until the Model G25 is at minimum configuration required for power on.
- Reconnect the AC cord and power on the Model G25. If the unit powers up successfully, replace adapters and devices one at a time until the problem is isolated. If the Model G25 does not power up from minimal configuration, replace FRUs of minimal configuration one at a time until the problem is isolated.

Table 10 lists the power error messages that you might encounter.

Table 10. Power error messages

Message	Action
Power supply "X" current share fault (level-critical; excessive current demand on power supply "X")	See "Power checkout"
Power supply "X" DC good fault (level-critical; power good signal not detected for power supply "X")	Replace power supply "X"
Power supply "X" temperature fault	Replace fan "X"
Power supply "X" removed	No action required - information only
Power supply "X" fan fault (level-critical; fan fault in power supply "X")	Replace power supply "X"
Power supply "X" 12V fault (level-critical; overcurrent condition detected)	See "Power checkout"
Power supply "X" 3.3V fault (level-critical; 3.3V power supply "X" had an error)	See "Power checkout"
Power supply "X" 5V fault (level-critical; 5V power supply "X" had an error)	See "Power checkout"

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Table 10. Power error messages (continued)

Message	Action
System over recommended "X" current (level-non-critical; system running too much current on that voltage)	See "Power checkout" on page 57
System running non-redundant power (level-non-critical; system does not have redundant power)	<ol style="list-style-type: none"> 1. Add another power supply 2. Remove options from system 3. System can continue to operate without redundancy protection if 1 and 2 above are not followed.
System under recommended voltage for "X" v (level-warning; indicated voltage supply under nominal value; value for "X" can be +12, -12, or +5)	<ol style="list-style-type: none"> 1. Check connections to power subsystem 2. Replace power supply 3. Replace power backplane
System under recommended voltage on 3.3 v (level-warning; 3.3 volt supply under nominal value)	<ol style="list-style-type: none"> 1. Check connections to power subsystem 2. Replace power supply 3. Replace power backplane
System under recommended X current (level-non-critical; system drawing less current than recommended on voltage "X")	<ol style="list-style-type: none"> 1. See "Power checkout" on page 57
"X" V bus fault (level-critical; overcurrent condition on "X" voltage bus)	<ol style="list-style-type: none"> 1. Check for short circuit on "X" voltage bus 2. See "Power checkout" on page 57
12V "X" bus fault (level-critical; overcurrent condition on 12 volt "X" voltage bus)	<ol style="list-style-type: none"> 1. Check for short circuit on 12 volt "X" voltage bus 2. See "Power checkout" on page 57
5V fault (level-critical; overcurrent condition on 5 V subsystem)	<ol style="list-style-type: none"> 1. Check for short circuit on 5 v bus 2. See "Power checkout" on page 57
240 VA fault (level-critical; overcurrent or overvoltage condition in power subsystem)	<ol style="list-style-type: none"> 1. See "Power checkout" on page 57

Replacing the battery

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

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

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

To order replacement batteries, call 1-800-772-2227 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM reseller or IBM marketing representative.

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

CAUTION:



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

Do not:

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

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

Note: For translations of the safety notice, refer to the multilingual Safety Information on the Documentation CD that came with the appliance.

To replace the battery:

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

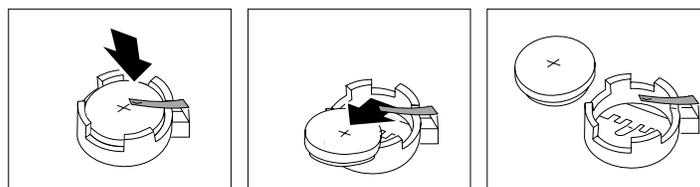


Figure 3. Battery removal

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

Troubleshooting

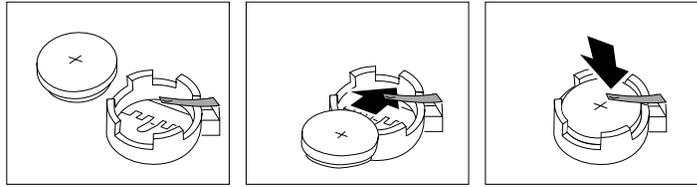


Figure 4. Battery replacement

5. Reinstall the appliance cover and connect the cables.

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

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

Chapter 7. Using the Recovery and Supplementary CDs

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

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, may not be supported and could cause unpredictable results. For updated compatibility information, please see www.storage.ibm.com/support/nas

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

Attention: If there are any persistent images present on your system, you need to delete them before loading the recovery CD. For more information on persistent images, see “Persistent Images” on page 24.

Using the Recovery Enablement Diskette and Recovery CD

The Recovery CD contains the preload image for your Model G25 and is used to recover the preloaded image on your appliance. You must start your appliance using the Recovery Enablement Diskette before you can boot the Recovery CD.

Important

The Recovery Enablement Diskette enables the Model G25 to start from the CD-ROM drive. You will not be able to restore the preload image from the Recovery CD without first restarting the appliance using the Recovery Enablement Diskette.

To recover the preloaded image on your appliance:

1. Insert the diskette into the diskette drive and restart the appliance.
When the Recovery Enablement Diskette has completed loading and modifying your appliance startup sequence, the appliance will begin a continuous beep. Do not continue with this procedure until the appliance begins the beep.
2. Remove the Recovery Enablement Diskette from the diskette drive.
3. Place the Recovery CD in the CD-ROM drive and restart the appliance.

The recovery process will begin automatically and the original manufacturing preload will be restored. After the preload image is restored, the system restarts automatically and all final operating system configuration changes are performed.

Important

After the appliance restarts, a series of configuration and system preparation programs that finish configuring the system are 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 your Model G25. 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 G25 is started after using the Recovery CD.

Note: Logical Disk 0 will be configured to a 3GB NTFS boot partition. Any other previously configured logical disk drives will be left unchanged.

Attention: The Model G25 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 the Recovery CD will, without visually prompting the user, automatically destroy all data on the system drive. Use the Recovery Enablement Diskette and Recovery CD only when it is absolutely necessary to restore the preloaded system image.

Using the Supplementary CD

The Supplementary CD contains documentation and copies of key software applications that are preinstalled on your Model G25. Table 11 includes the names of the directories found on the Supplementary CD and a description of the contents of the directory.

Table 11. Supplementary CD directories

Directory Name	Contents
IBM Advanced Appliance Configuration	IBM Advanced Appliance Configuration console and agent installation files. The IBM Advanced Appliance Configuration agent is preinstalled as a Windows Powered service on the Model G25. To install the Advanced Appliance Configuration console, run setup.bat from the x:\IBM Advanced Appliance Configuration directory, where x is the drive letter assigned to your CD-ROM drive.
DiskImages	Self-extracting diskette images for the Recovery Enablement Diskette (RecovDsk.exe) . To make a diskette, run the executable file and insert 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.
I386	Windows Powered installation files. If you add device drivers, OS features, and so on, you may be prompted to insert your Windows Powered CD-ROM. If so, insert the Supplementary CD, and specify path x:\i386 where x is the drive letter assigned to your CD-ROM drive.
Services for UNIX 2.0	SFU 2.0 installation files. If you add features that are not preloaded, you will be prompted for this CD.
Terminal Services Client	The stand-alone Win32 Terminal Services Client application. The Model G25 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.
readme.txt	This is a text file that describes the contents of the Supplementary CD.

Appendix A. Notices

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Appendix B. Getting help, service, and information

If you need help, service, technical assistance, or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

IBM maintains pages on the World Wide Web where you can get information about IBM products and services and find the latest technical information.

Table 12 lists some of these pages.

Table 12. IBM Web sites for help, services, and information

www.ibm.com	Main IBM home page
www.ibm.com/storage	IBM Storage home page
www.ibm.com/storage/support/nas	IBM NAS Support home page

You might also want to visit the Web pages of other companies for information about other operating systems, software, and accessories. The following are some other Web sites you might find helpful:

www.tivoli.com
www.cdpi.com

Services available and telephone numbers listed are subject to change without notice.

Service support

With the original purchase of an IBM hardware product, you have access to extensive support coverage. During the IBM hardware product warranty period, you may call the IBM Support Center (1-800-426-7378 in the U.S.) for hardware product assistance covered under the terms of the IBM hardware warranty. See “Getting help by telephone” on page 67 for Support Center telephone numbers in other countries.

The following services are available during the warranty period:

- Problem determination - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- IBM hardware repair - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service.
- Engineering change management - Occasionally, there might be changes that are required after a product has been sold. IBM or your reseller, if authorized by IBM, will make Engineering Changes (ECs) available that apply to your hardware.

Be sure to retain your proof of purchase to obtain warranty service.

Please have the following information ready when you call:

- Machine Type and Model
- Serial numbers of your IBM hardware products

- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

If possible, be at your computer when you call.

A compatible monitor, keyboard, and mouse are required for many service activities. Before you have the computer serviced, be sure to have these components attached to your computer, either directly or through a console switch.

The following items are not covered:

- Replacement or use of non-IBM parts or nonwarranted IBM parts

Note: All warranted parts contain a 7-character identification in the format IBM FRU XXXXXXX.

- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to your IBM hardware warranty for a full explanation of IBM's warranty terms.

Before you call for service

Many computer problems can be solved without outside assistance, by using the online help or by looking in the online or printed documentation that comes with your Network Attached Server appliance. Also, be sure to read the information in any README files that come with your software.

Your Network Attached Server appliance comes with documentation that contains troubleshooting procedures and explanations of error messages. The documentation that comes with your appliance also contains information about the diagnostic tests you can perform.

If you receive a POST error code or beep code when you turn on your Network Attached Server appliance, refer to the POST error-message charts in your hardware documentation. If you do not receive a POST error code or beep code, but suspect a hardware problem, refer to the troubleshooting information in your hardware documentation or run the diagnostic tests.

If you suspect a software problem, consult the documentation (including any README files) for the operating system or application program.

Getting customer support and service

Purchasing an IBM Network Attached Storage appliance entitles you to standard help and support during the warranty period. If you need additional support and services, a wide variety of extended services are available for purchase that address almost any need.

Getting help online: www.ibm.com/storage/support/nas

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

Getting help by telephone

During the warranty period, you can get help and information by telephone through the IBM Support Center. Expert technical-support representatives are available to assist you with questions you might have on the following:

- Setting up your Network Attached Storage appliance
- Arranging for service
- Arranging for overnight shipment of customer-replaceable parts

In addition, if you purchased a Network Attached Storage appliance, you are eligible for IBM up and running support for 90 days after installation. This service provides assistance for:

- Setting up your Network Attached Server appliance
- Limited configuration assistance

Please have the following information ready when you call:

- Machine Type and Model
- Serial numbers of your appliance and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information for your system

If possible, be at your computer when you call.

In the U.S. and Canada, these services are available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9:00 a.m. to 6:00 p.m.²

Table 13 provides the telephone numbers.

Table 13. Telephone numbers for warranted help and information

Country		Number
Austria	Österreich	1-546 585 075
Belgium - Dutch	Belgie	02-717-2504
Belgium - French	Belgique	02-717-2503
Canada	Canada	1-800-565-3344
Denmark	Danmark	03-525-6905
Finland	Suomi	9-22-931805
France	France	01-69-32-40-03
Germany	Deutschland	069-6654-9003
Ireland	Ireland	01-815-9207
Italy	Italia	02-4827-5003
Luxembourg	Luxembourg	298-977-5060
Netherlands	Nederland	020-504-0531
Norway	Norge	2-305-3203
Portugal	Portugal	01-791-5147
Spain	España	091-662-4270

² Response time will vary depending on the number and complexity of incoming calls.

Table 13. Telephone numbers for warranted help and information (continued)

Sweden	Sverige	08-632-0063
Switzerland - German	Schweiz	01-212-1810
Switzerland - French	Suisse	022-310-0418
Switzerland - Italian	Svizzera	091-971-0523
United Kingdom	United Kingdom	01475-555555
U.S.A. and Puerto Rico	U.S.A. and Puerto Rico	1-800-426-7378

In all other countries, contact your IBM reseller or IBM marketing representative.

Appendix C. Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for IBM and non-IBM hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and name might vary by country.

Warranty and repair services

You can upgrade your standard hardware warranty service or extend the service beyond the warranty period.

Warranty upgrades in the U.S. include:

- On-site service to premium on-site service

If your warranty provides for on-site service, you can upgrade to premium on-site service (4-hour average on-site response, 24 hours a day, 7 days a week).

You also can extend your warranty. Warranty and Repair Services offers a variety of post-warranty maintenance options. Availability of the services varies by product.

For more information about warranty upgrades and extensions:

- In the U.S., call 1-800-426-4343.
- In Canada, call 1-800-465-7999.
- In all other countries, contact your IBM reseller or IBM marketing representative.

Appendix D. POST messages

This appendix identifies and describes POST messages that you might encounter, and gives corrective actions where applicable.

Note: The information in this appendix applies to each engine in the appliance. For example, when the text reads, “When a monitor and keyboard is attached to the appliance,” that means that a monitor and keyboard has been attached to either of the two engines.

Power-on self-test

When you turn on your Model G25, it performs a power-on self-test (POST) to check the operation of appliance components and some of the options installed in the appliance.

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

POST beep code descriptions

Beep codes are sounded in a series of beeps. For example, a 1-2-4 beep code sounds like one beep, a pause, two consecutive beeps, another pause, and four more consecutive beeps.

The possible types of beep codes that your appliance might emit include the following:

No beeps

If no beep occurs after your appliance completes POST (that is, after the system POST complete (OK) light on the operator information panel is illuminated), call for service.

Continuous beep

The recovery enablement disk has booted, your startup (boot) microprocessor has failed, or your system board or speaker subsystem might contain a failing component. If the system continues through POST with no errors, call for service. If no video appears, the startup processor has failed; replace the startup processor.

One short beep

When a monitor and keyboard is attached to the appliance, one beep indicates that your appliance successfully completed POST. POST detected no configuration or functional errors. One beep also occurs after your appliance completes POST if you enter an incorrect power-on password.

Two short beeps

POST encountered an error. The Configuration/Setup Utility program will display additional information; follow the instructions that appear on the screen. See “POST error messages” on page 74 for descriptions of the text messages that might appear.

Three short beeps

A system memory error has occurred. This combination occurs only if the video Basic Input/Output System (BIOS) cannot display the error message. Replace the failing memory module.

Repeating short beeps

The system board might contain a failing component, your keyboard might be defective, or a key on the keyboard might be stuck. Ensure that:

1. Nothing is resting on the keyboard and pressing a key.
2. No key is stuck.
3. The keyboard cable is connected correctly to the keyboard and to the correct connector on the appliance.

Running the diagnostic tests can isolate the appliance component that failed, but you must have your system serviced. If the error message remains, call for service.

Note: If you just connected a new mouse or other pointing device, turn off the appliance and disconnect that device. Wait at least 5 seconds; then, turn on the appliance. If the error message goes away, replace the device.

One long and one short beep

POST encountered an error on a video adapter. If you are using the integrated video controller, call for service. If you are using an optional video adapter, replace the failing video adapter.

One long and two short beeps

A video I/O adapter ROM is not readable, or the video subsystem is defective. If you hear this beep combination twice, both the system board and an optional video adapter have failed the test. This beep combination might also indicate that the system board contains a failing component.

One long and three short beeps

This series of beeps has two meanings. The first means that the POST has completed without detecting errors, when a monitor and keyboard is not attached. However, when a monitor is attached, and you hear this series, it means the system-board video subsystem has not detected a monitor connection to the appliance. Ensure that the monitor is connected properly to the appliance. If the problem persists, replace the monitor.

Two long and two short beeps

POST does not support the optional video adapter. This beep combination occurs when you install a video adapter that is incompatible with your appliance. Replace the optional video adapter with one that the appliance supports or use the integrated video controller.

Table 14 on page 73 describes the codes and specifies the action to take.

POST beep codes

Table 14. POST beep codes

Beep code	Description	Action	
1-1-2	Microprocessor register test has failed.	Call for service.	
1-1-3	CMOS write/read test has failed.		
1-1-4	BIOS ROM checksum has failed.		
1-2-1	Programmable Interval Timer test has failed.		
1-2-2	DMA initialization has failed.		
1-2-3	DMA page register write/read test has failed.		
1-4-3	Interrupt vector loading test has failed.		
2-1-1	Secondary DMA register test has failed.		
2-1-2	Primary DMA register test has failed.		
2-1-3	Primary interrupt mask register test has failed.		
2-1-4	Secondary interrupt mask register test has failed.		
2-2-1	Interrupt vector loading has failed.		
2-2-2	Keyboard controller test has failed.		
2-2-3	CMOS power failure and checksum checks have failed.		
2-2-4	CMOS configuration information validation has failed.		
2-3-2	Screen memory test has failed.		
2-3-3	Screen retrace tests have failed.		
2-3-4	Search for video ROM has failed.		
2-4-1	Screen test indicates the screen is operable.		
3-1-1	Timer tick interrupt test has failed.		
3-1-2	Interval timer channel 2 test has failed.		
3-1-3	RAM test has failed above address hex 0FFFF.		
3-1-4	Time-of-day clock test has failed.		
3-2-1	Serial port test has failed.		
3-2-2	Parallel port test has failed.		
3-2-3	Math coprocessor test has failed.		
3-2-4	Comparison of CMOS memory size against actual has failed.		
2-3-1 3-3-2	Screen initialization has failed. I2C bus has failed.		Turn off the appliance and then restart the appliance. If the problem persists, call for service.
1-2-4	RAM refresh verification has failed.		Reseat the memory modules or install a memory module. If the problem persists, call for service.
1-3-1	First 64 KB RAM test has failed.		
1-3-2	First 64 KB RAM parity test has failed.		
3-3-1	A memory size mismatch has occurred.		
3-3-3	No memory has been detected in the system.		

POST error messages

Table 15 provides information about the POST error messages that can appear during startup.

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

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

Table 15. POST error messages

Error Code/Symptom	Action
062 (Three consecutive boot failures using the default configuration.)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board 4. Processor
101, 102 (System and processor error)	<ol style="list-style-type: none"> 1. System Board
106 (System and processor error)	<ol style="list-style-type: none"> 1. System Board
111 (Channel check error)	<ol style="list-style-type: none"> 1. Failing 15A adapter 2. Memory DIMM 3. System Board
114 (Adapter read-only memory error)	<ol style="list-style-type: none"> 1. Failing Adapter 2. Run Diagnostics
129 (Internal cache error)	<ol style="list-style-type: none"> 1. Processor
151 (Real time clock error)	<ol style="list-style-type: none"> 1. Run Diagnostics 2. Battery 3. System Board
161 (Real time clock battery error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board
162 (Device Configuration Error) Note: Be sure to load the default settings and any additional desired settings; then, save the configuration.	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. Failing Device 4. System Board
163 (Real-Time Clock error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Battery 3. System Board
164 (Memory configuration changed.)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. DIMM
175 (Hardware error)	<ol style="list-style-type: none"> 1. System Board
176 (Model G25 cover or cable cover was removed without a key being used)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board 3. C2 Security Switch
177, 178 (Security hardware error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board

Table 15. POST error messages (continued)

Error Code/Symptom	Action
184 (Power-on password corrupted)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
185 (Drive startup sequence information corrupted)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
186 (Security hardware control logic failed)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
187 (VPD serial number not set.)	<ol style="list-style-type: none"> 1. Set serial number in Setup 2. System Board
188 (Bad EEPROM CRC #2)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. System Board
189 (An attempt was made to access the server with invalid passwords)	<ol style="list-style-type: none"> 1. Run Configuration/Setup, enter the administrator password
201 (Memory test error.) If the server does not have the latest level of BIOS installed, update the BIOS to the latest level and run the diagnostic program again.	<ol style="list-style-type: none"> 1. DIMM 2. System Board
229 (Cache error)	<ol style="list-style-type: none"> 1. Processor
262 (DRAM parity configuration error)	<ol style="list-style-type: none"> 1. Run configuration /setup 2. Battery 3. System Board
289 (DIMM has been disabled by the user or system.)	<ol style="list-style-type: none"> 1. Run Configuration/Setup, if disabled by user 2. Disabled DIMM, if not disabled by user.
301 (Keyboard or keyboard controller error)	<ol style="list-style-type: none"> 1. Keyboard 2. System Board
303 (Keyboard controller error)	<ol style="list-style-type: none"> 1. System Board
602 (Invalid diskette boot record)	<ol style="list-style-type: none"> 1. Diskette 2. Diskette Drive 3. Cable 4. System Board
604 (Diskette drive error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup and Diagnostics 2. Diskette Drive 3. Drive Cable 4. System Board
605 (Unlock failure)	<ol style="list-style-type: none"> 1. Diskette Drive 2. Drive Cable 3. System Board
662 (Diskette drive configuration error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup and Diagnostics 2. Diskette Drive 3. Drive Cable 4. System Board

Table 15. POST error messages (continued)

Error Code/Symptom	Action
762 (Coprocessor configuration error)	<ol style="list-style-type: none"> 1. Run configuration setup 2. Battery 3. Processor
962 (Parallel port error)	<ol style="list-style-type: none"> 1. Disconnect external cable on parallel port. 2. Run Configuration/Setup 3. System Board
11XX (System board serial port 1 or 2 error)	<ol style="list-style-type: none"> 1. Disconnect external cable on serial port. 2. Run Configuration/Setup 3. System Board
0001200 (Machine check architecture error)	<ol style="list-style-type: none"> 1. Processor 1
1301 (I ² C cable to front panel not found)	<ol style="list-style-type: none"> 1. Cable 2. Front Panel 3. Power Switch Assembly 4. System Board
1302 (I ² C cable from system board to power on and reset switches not found)	<ol style="list-style-type: none"> 1. Cable 2. Power Switch Assembly 3. System Board
1303 (I ² C cable from system board to power backplane not found)	<ol style="list-style-type: none"> 1. Cable 2. Power Backplane 3. System Board
1304 (I ² C cable to diagnostic LED board not found)	<ol style="list-style-type: none"> 1. Power Switch Assembly 2. System Board
1600 (The Service Processor is not functioning) Do the following before replacing a FRU: <ol style="list-style-type: none"> 1. Ensure that a jumper is not installed on J45. 2. Remove the ac power to the Model G25, wait 20 seconds; then, reconnect the ac power. Wait 30 seconds; then, power-on the Model G25. 	<ol style="list-style-type: none"> 1. System Board
1601 (The Model G25 is able to communicate to the Service Processor, but the Service Processor failed to respond at the start of POST.) Do the following before replacing a FRU: <ol style="list-style-type: none"> 1. Remove the ac power to the Model G25, wait 20 seconds; then, reconnect the ac power. Wait 30 seconds; then, power-on the Model G25. 2. Flash update the Service Processor. 	<ol style="list-style-type: none"> 1. System Board

Table 15. POST error messages (continued)

Error Code/Symptom	Action
1762 (Fixed Disk Configuration error)	<ol style="list-style-type: none"> 1. Fixed Disk Drive 2. Fixed Disk Cables 3. Run Configuration/Setup 4. Fixed Disk Adapter 5. SCSI Backplane 6. System Board
178X (Fixed Disk error)	<ol style="list-style-type: none"> 1. Fixed Disk Cables 2. Run Diagnostics 3. Fixed Disk Adapter 4. Fixed Disk Drive 5. System Board
1800 (No more hardware interrupt available for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
1962 (Drive does not contain a valid boot sector)	<ol style="list-style-type: none"> 1. Verify a bootable operating system is installed 2. Run Diagnostics 3. Hard Disk Drive 4. SCSI Backplane 5. Cable 6. System Board
2400 (Video controller test failure)	<ol style="list-style-type: none"> 1. Video Adapter (if installed) 2. System Board
2462 (Video memory configuration error)	<ol style="list-style-type: none"> 1. Video Adapter (if installed) 2. System Board
5962 (IDE CD-ROM configuration error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. CD-ROM Drive 3. CD-ROM Power Cable 4. IDE Cable 5. System Board 6. Battery
8603 (Pointing Device Error)	<ol style="list-style-type: none"> 1. Pointing Device 2. System Board
00019501 (Processor 1 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> 1. VRM 1, VRM 2 2. Processor 1 3. System Board
00019502 (Processor 2 is not functioning - check VRM and processor LEDs)	<ol style="list-style-type: none"> 1. VRM 2 2. Processor 2
00019701 (Processor 1 failed)	<ol style="list-style-type: none"> 1. Processor 1 2. System Board
00019702 (Processor 2 failed)	<ol style="list-style-type: none"> 1. Processor 2 2. System Board

Table 15. POST error messages (continued)

Error Code/Symptom	Action
00180100 (No room for PCI option ROM)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180200 (No more I/O space available for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180300 (No more memory (above 1MB for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Failing Adapter 3. System Board
00180400 (No more memory (below 1MB for PCI adapter)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
00180500 (PCI option ROM checksum error)	<ol style="list-style-type: none"> 1. Remove Failing PCI Card 2. System Board
00180600 (PCI to PCI bridge error)	<ol style="list-style-type: none"> 1. Run Configuration/Setup 2. Move the failing adapter to slot 1 or 2 3. Failing Adapter 4. System Board
00180700, 00180800 (General PCI error)	<ol style="list-style-type: none"> 1. System Board 2. PCI Card
01295085 (ECC checking hardware test error)	<ol style="list-style-type: none"> 1. System Board 2. Processor
01298001 (No update data for processor 1)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 1
01298002 (No update data for processor 2)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 2
01298101 (Bad update data for processor 1)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 1
01298102 (Bad update data for processor 2)	<ol style="list-style-type: none"> 1. Ensure all processors are the same stepping level and cache size. 2. Processor 2
I9990301 (Fixed boot sector error)	<ol style="list-style-type: none"> 1. Hard Drive 2. SCSI Backplane 3. Cable 4. System Board
I9990305 (Fixed boot sector error, no operating system installed)	<ol style="list-style-type: none"> 1. Install operating system to hard drive.

Table 15. POST error messages (continued)

Error Code/Symptom	Action
I9990650 (AC power has been restored)	<ol style="list-style-type: none"> 1. Check cable 2. Check for interruption of power supply 3. Power Cable

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 Netfinity Advanced System Management Processor.

To view the contents of the error logs, start the Configuration/Setup Utility program; then, select **Event/Error Logs** from the main menu.

POST diagnostic programs

The appliance 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 appliance.

Diagnostic program error messages indicate that a problem exists; they are not intended to be used to identify a failing part. Troubleshooting and servicing of complex problems that are indicated by error messages should be performed by trained service personnel. For a list of error messages and associated actions that you can take, see Table 15 on page 74.

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

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

The error code format is as follows:

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

where:

fff is the three-digit function code that indicates the function being tested when the error occurred. For example, function code 089 is for the microprocessor.

ttt is the three-digit failure code that indicates the exact test failure that was encountered. (These codes are for trained service personnel and are described in the *Hardware Maintenance Manual*.)

iii is the three-digit device ID. (These codes are for trained service personnel and are described in the *Hardware Maintenance Manual*.)

date is the date that the diagnostic test was run and the error recorded.

cc is the check digit that is used to verify the validity of the information.

text message

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

Text messages

The diagnostic text message format is as follows:

Function Name: Result (test specific string)

where:

Function Name

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

Result can be one of the following:

Passed

The diagnostic test has completed without any errors.

Failed The diagnostic test has discovered an error.

User Aborted

You stopped the diagnostic test before it is 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 when a device that is to be tested is not installed.

Test Specific String

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

Starting the diagnostic programs

To start the diagnostic programs:

1. Ensure you have connected a monitor, keyboard, and mouse to your Model G25.

Notes:

- a. When you *do not* have a monitor, keyboard, and mouse attached and the Model G25 passes POST, one long and three short beeps sound.
 - b. When you *have* a monitor, keyboard, and mouse attached and the Model G25 passes POST, one beep sounds. If the Model G25 fails POST, a series of beeps sound (see "POST beep code descriptions" on page 71 for more details) and an error message appears on the monitor screen.
2. Power on the Model G25 and watch the screen.
 3. When the message F2 for Diagnostics appears, press F2. If a POST error is encountered, a series of beeps sound and an error message appears on the monitor screen.
 4. Type in the appropriate password; then, press Enter. If a system error is encountered, the Configuration/Setup screen appears. Press **Esc** to start the Diagnostic program.

Note: To run the diagnostic programs, you must start the Model G25 with the highest level password that is set. That is, if an administrator password is set, you must enter the administrator password, not the power-on password, to run the diagnostic programs.

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

Notes:

- a. Press F1 while running the diagnostic programs to obtain Help information. Also press F1 from within a help screen to obtain online documentation from which you can select different categories. To exit Help and return to where you left off, press **Esc**.
- b. If the Model G25 stops during testing and you cannot continue, restart the Model G25 and try running the diagnostic programs again.
- c. If you run the diagnostic programs with either no mouse or a USB mouse attached to your Model G25, you will not be able to navigate between test categories using the **Next Cat** and **Prev Cat** buttons. All other functions provided by mouse-selectable buttons are also available using the function keys.
- d. You can test the USB keyboard by using the regular keyboard test. The regular mouse test can test a USB mouse. Also, you can run the USB hub test only if there are no USB devices attached.
- e. You can view Model G25 configuration information (such as system configuration, memory contents, interrupt request (IRQ) use, direct memory access (DMA) use, device drivers, and so on) by selecting **Hardware Info** from the top of the screen.
- f. You cannot use the diagnostics program to test adapters. Use the procedure outlined in "Running adapter diagnostics" on page 55.

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

If the hardware checks out OK but the problem persists during normal Model G25 operations, a software error might be the cause. If you suspect a software problem, refer to the information that comes with the software package.

Viewing the test log

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

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

To view the test log:

1. Ensure a monitor, keyboard, and mouse is connected to the Model G25.
2. Power on the Model G25 and watch the screen.
If the Model G25 is on, shut down your operating system and restart the Model G25.
3. When the message F2 for Diagnostics appears, press F2.
If a power-on password or administrator password is set, the Model G25 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 Model G25 is powered on. When you power off the power to the Model G25, the test log is cleared.

Diagnostic error message tables

Table 16 describes the error messages that might appear when you run the diagnostic programs.

Important: If diagnostic error messages appear that are not listed in Table 16, make sure that your appliance has the latest levels of BIOS, Advanced System Management Processor, and diagnostics microcode.

Table 16. Diagnostic error messages

Code	Function	Result	Text message	Action
001	Core system	Failed	Processor board, ECC Test	Call for service.
			System board	
005	Video port		Processor and system boards	
011	Serial port		Integrated serial port	
014	Parallel port		Integrated parallel port	
015	USB interface	Aborted	Can not test USB interface while it is in use. Note: If you have a USB keyboard or mouse attached, you cannot run the diagnostic program for the USB interface.	<ol style="list-style-type: none"> 1. Turn off the appliance. 2. Replace the USB keyboard and mouse with a standard keyboard and mouse. 3. Turn on the appliance. 4. Run the diagnostic test again.
		Failed	System board	Call for service.
020	PCI interface	Failed	System board	Call for service.
			Tab on PCI Hot Swap slot number <i>n</i> is bad (where <i>n</i> is the number of the failing PCI slot) Note: For normal operation, the Power LED for the hot-plug PCI slot will be on and the Attention Led will be off.	<p>Make sure the tab and latch on hot-plug PCI slot <i>n</i> are closed correctly.</p> <p>If the problem persists, call for service.</p>
030	SCSI interface	Failed	SCSI adapter in slot <i>n</i> failed register/counter/power test (where <i>n</i> is the slot number of the failing adapter)	<p>Refer to the information provided with the adapter for instructions.</p> <p>If the problem persists, call for service.</p>
			SCSI controller on system board failed register/counter/power test	Call for service.
			Logical drive on system board adapter	
075	Power supply	Failed	Voltage sensed by the system is out of range	Call for service.

Table 16. Diagnostic error messages (continued)

Code	Function	Result	Text message	Action
089	Microprocessor	Failed	Invalid microprocessor in slot xyz or BIOS setup problem (where xyz identifies the microprocessor that is causing the error message)	<ol style="list-style-type: none"> 1. Check the system error log for the related error messages. 2. If your appliance does not have the latest level BIOS installed, update the BIOS.
			Processor in socket id xyz is installed but not functioning (where xyz identifies the microprocessor that is causing the error message)	
			Microprocessor in socket id xyz (where xyz identifies the microprocessor that is causing the error message) Note: The microprocessor error LED associated with the microprocessor will be lit.	<ol style="list-style-type: none"> 1. Reseat the microprocessor. 2. If the problem remains, replace the microprocessor. <p>If the problem persists, call for service.</p>
			Processor in socket id xyz is defective (where xyz identifies the microprocessor that is causing the error message)	<p>Replace the microprocessor.</p> <p>If the problem persists, call for service.</p>

Table 16. Diagnostic error messages (continued)

Code	Function	Result	Text message	Action
089	Microprocessor	Failed	Test setup error: Application microprocessor not installed or BIOS setup problem	<ol style="list-style-type: none"> 1. Verify that the Application microprocessor is installed and seated correctly. 2. Check the system error log for related error messages. 3. If your appliance does not have the latest level BIOS installed, update the BIOS. 4. If the problem remains, replace the application microprocessor and run the test again. <p>If the problem persists, call for service.</p>
			VRM corresponding to Microprocessor in socket xyz is defective (where xyz identifies the microprocessor whose VRM is causing the error message)	<p>Replace the VRM.</p> <p>If the problem remains, call for service.</p>
			VRM corresponding to Microprocessor in socket id xyz is not installed (where xyz identifies the microprocessor whose VRM is causing the error message)	<p>Install a VRM.</p> <p>If the problem persists, call for service.</p>
165	Service processor	Failed	Netfinity Advanced System Management Processor on system board	Call for service.
175	System thermal	Failed	Fan number <i>n</i> (where <i>n</i> is the number of the failing fan) Note: The fan LED on the diagnostic LED panel will be lit.	Replace the indicated fan
			Temperature sensed on processor board is out of range	If one of the fan LEDs on the diagnostic LED panel is on, replace the indicated fan. If the problem persists, call for service.
180	Status display	Failed	Diagnostic LED panel	Call for service.
			Operator information panel	
			LED on hot-swap SCSI backplane	
			LED on processor board	
			LED on system board	

Table 16. Diagnostic error messages (continued)

Code	Function	Result	Text message	Action
201	System memory	Failed	DIMMs in location DIMM <i>n</i> (where <i>n</i> is the number of the socket that contains the failing DIMM)	<ol style="list-style-type: none"> 1. Reseat the failing DIMM. 2. If the problem remains, replace the DIMM. <p>If the problem persists, call for service.</p>
			Test setup error: Corrupt BIOS in ROM	If your appliance does not have the latest level BIOS installed, update the BIOS to the latest level.
			Test setup error: Corrupt DMI BIOS, information in BIOS is not as expected	If the problem persists, call for service.

Table 16. Diagnostic error messages (continued)

Code	Function	Result	Text message	Action
202	System cache	Aborted	Test setup error: BIOS cannot access VPD information	If your appliance does not have the latest level BIOS installed, update the BIOS to the latest level and run the diagnostic program again. If the problem persists, call for service.
			Test setup error: Corrupt DMI BIOS. Information in BIOS is not as expected	
			Test setup error: No L2 cache detected on microprocessor socket id xyz or BIOS setup problem (where xyz identifies the microprocessor that is causing the error message)	<ol style="list-style-type: none"> 1. If your appliance does not have the latest level BIOS installed, update the BIOS to the latest level 2. Run the diagnostic program again. 3. If the problem remains, replace the failing processor. If the problem persists, call for service.
		Test setup error: Unknown hardware problem associated with microprocessor in socket id xyz. (where xyz identifies the microprocessor that is causing the error message)		
Failed	Microprocessor in socket ID xyz (where xyz identifies the microprocessor that is causing the error message) Note: The indicated microprocessor LED will be on.	<ol style="list-style-type: none"> 1. Reseat the identified microprocessor. 2. If the problem remains, replace the microprocessor. If the problem persists, call for service.		
Warning	Test setup error: Cache is disabled. Use system setup to enable before retrying the test	Use the Cache Control choice from the Advanced Setup menu to enable the cache. If the problem persists, call for service.		
206	Diskette drive	Failed	Internal diskette drive bay	Call for service.
215	CD-ROM	Aborted	The CD-ROM drive is not present.	Verify that the cables are properly connected to the CD-ROM drive. If the problem persists, call for service.
		Failed	On system board.	Call for service.
217	Hard disk drive	Failed	BIOS drive number <i>n</i> (where <i>n</i> is the drive bay number)	Call for service.

Table 16. Diagnostic error messages (continued)

Code	Function	Result	Text message	Action
301	Keyboard	Failed	On system board keyboard test failed	<ol style="list-style-type: none"> 1. Verify that the keyboard cable is connected. 2. If the problem remains, replace the keyboard cable. <p>If the problem persists, call for service.</p>
302	Mouse	Failed	On system board pointing device test failed.	Replace the pointing device. If the problem persists, call for service.
305	Video monitor		Any message	Refer to the information that came with the monitor.
405	Ethernet	Failed	In PCI slot <i>n</i> (where <i>n</i> is the PCI slot number in which the failing Ethernet adapter is installed)	Replace the Ethernet adapter in slot <i>n</i> . If the problem persists, call for service.
			On system board	Call for service.

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