TotalStorage Network Attached Storage 300G

IBM

User's Reference

Version 1 Release 1

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> **Note**
>
> Before using this information and the product it supports, be sure to read the general information in "Appendix A. Notices" on page 43.

First Edition (March 2001)

This edition applies to version 1, release 1, of the IBM 5196 TotalStorage Network Attached Storage 300G (Model G00) (product number 5196-G00) and to all subsequent releases and modifications until otherwise indicated in new editions.

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Contents

Figures

Tables

About this book

This book provides information necessary to configure and administer the software for the IBM 5196 TotalStorage Network Attached Storage 300G (Model G00).

Who should read this book

This book is for Model G00 software 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 in an IBM Network Attached Storage Appliance. The bays could be physically located in a separate rack from the appliance.
Engine	The processor that responds to requests for data from clients. This is where the operating software for the 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 G00 product library

The Model G00 library consists of the following publications:

* *Installation Guide* GA27-4270

  This book describes hardware physical specifications, electrical specifications, cabling, environmental specifications, and networking specifications for installing the Model G00.

* *User's Reference* GA27-4271

  This book describes such operational and administrative activities as:

- Using the configuration utilities
- Administering Model G00
- Troubleshooting
- Using the Recovery and Supplementary CDs

Hardcopy publications shipped with the Model G00

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

- *Model G00 Installation Guide*, GA27-4270
- *Release Notes*

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

Related publications

The following publications contain additional information about the Model G00:
- IBM IBM 5196 TotalStorage Network Attached Storage 300G (Model G00) Installation Guide GA27–4270
- IBM IBM 5196 TotalStorage Network Attached Storage 300G (Model G00) Service Guide GA27–4274
- IBM TotalStorage IBM 5196 TotalStorage Network Attached Storage 300G (Model G00) Introduction and Planning Guide GA27–4261
- 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 G00:

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

Chapter 1. Introduction

The IBM 5196 TotalStorage Network Attached Storage 300G (Model G00) allows you to easily attach storage to your network. Because the Model G00 is an appliance, you do not need to know the internal workings of its operating system. The appliance performs only one specialized job, so all the complex software needed to handle other applications does not exist in it.

The appliance is comprised of hardware and software that allows any system to access files through the network fabric by making requests to the appliance. The appliance parses the requests, locates the files in its pool of storage devices, and then sends a response to the requestor. To accelerate access to recently used data, the appliance caches that information within its memory. Caching increases the throughput of the Model G00.

Because the Model G00is 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 system, which is very similar to Microsoft® Windows® 2000 Advanced Server. Preloaded software includes:

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

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 are purchased separately.

Setting up your appliance

The following sections will detail how to quickly set up your Model G00 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.

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 more recent version) or Windows 2000 workstation that is attached to the same IP subnetwork to which the appliance is attached. The Advanced Appliance Configuration icon will be placed on the workstation desktop.

For information on how to install the Advanced Appliance Configuration Utility Console, see "Using the Supplementary CD" on page 42.

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 9.

Accessing Universal Management Services

1. You will be prompted to authenticate with administrative user name ("Administrator") and password (initially "password", but you will need to change this later).

   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 Windows Powered NAS Admin home page.

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 Windows Powered NAS Admin home page 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 5
- "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 administration home page 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 appears to allow 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 appears to allow 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 appears. You would use this page primarily to change IP addresses from dynamic (DHCP, which is the system default) to static.

You can then select the network adapter you want to modify, and then choose one of the following tasks related to that 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. You will need to get the MAC address 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 MAC address, you need to go into Terminal Services. For information on how to access Terminal Services, see "Connecting to Terminal Services" on page 18. After connecting to Terminal Services, you need to 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 25.

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 user
- Set the general properties for users
- Grant access to user data

There are three basic types of users: administrator, guest, and supervisor.

On the Local Groups on Server Appliance page, you can:
- Create new groups
- Delete groups
- Set the general properties for groups

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)

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 G00 appliance comes with configuration programs that you can use to configure, manage, and maintain the appliance. These configuration programs include:

- **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 G00 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.

   – 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 G00 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 G00, enables you to remotely administer the

appliance using the Model G00 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 G00 appliance, as well as other IBM appliances. The Advanced Appliance Configuration Utility agent, preinstalled on your IBM Model G00 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 G00 appliances on the network. Once the Model G00 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 G00. 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 configures and reports the TCP/IP settings of the first adapter on each appliance only. The first adapter is typically the built-in Ethernet controller. Be sure to connect the built-in Ethernet connector 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 G00 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 address, and primary gateway address if these are configured on the system.

The Advanced Appliance Configuration Utility agent is preinstalled on your Model G00 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 42.

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 G00 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 appliance 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 G00 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) appears 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 appears 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 all of the Model G00 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 G00 Appliances

Any Model G00 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 11.

    - 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 13.

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 are displayed in the Information Pane. If you select an appliance from a Family in the Tree View Pane, the selected appliance network settings are displayed 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 13.

  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 or 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 appears.

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 Domain Name 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 Domain Name 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 specific 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 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 appears 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 G00 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, and if you have never used UM Services from this system previously 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:

`http://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 appears in the Information Pane. A **Start Web-Based Management** button appears 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 16 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 system-management software on your administrator console.

In addition to point-to-point system-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 system-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 G00 appliance. However, you must have a Web browser installed on your system 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:

      `http://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 G00 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 G00, and then press **Enter**.

   Or, type:

   http://*computer_name***:1411**

   where *computer_name* is the computer name of the Model G00. The computer name is predefined as: IBM5196-xxxxxxx, where *xxxxxxx* 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 form the predefined value, use that name instead. After you have entered the computer name, press **Enter**.

2. A user log in window appears. 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, use Windows Powered to 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 surname/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 G00 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 G00 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 G00 using Terminal Services described in "Terminal Services and the IBM NAS Administration Console" on page 17.

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 16.
2. From a Web browser, by entering **http://**<*ip_address*>**:8099** or **http://**<*computer_name*>**:8099** and then logging on to the Model G00.
3. From the Model G00 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 16.
2. By using the Terminal Services Client software.

To use the UM Services browser, go to "Connecting to Terminal Services" on page 18.

To use Terminal Services Client on your workstation and have not yet installed it, do the following steps to install it on the remote workstation and connect to your Model G00 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 step 6. However, if the network interface card for the workstation is configured to use a static IP address, you must set the IP Address and Subnet mask properties as follows:

a. Set the IP address.

    If the workstation's network interface card is configured to use a static IP address, you must configure it to obtain an IP address automatically.

b. Set the Subnet mask to: 255.255.0.0

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 G00 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 18. 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 16.

2. In the Server field, enter the IP address or the computer name of the Model G00. The computer name is predefined as IBM5196-xxxxxxx, where *xxxxxxx* 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 G00 desktop will appear, then click **Connect** to start the Terminal Services Client session. A user log in window appears.

    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 G00.

Once you have logged into Terminal Services, you can perform administrative tasks on the Model G00, as if your keyboard, mouse, and monitor were directly attached to it. The Model G00 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 G00:

*   NAS Backup Assistant
*   Persistent Storage Manager

- Tivoli SANergy
- FastT Check

These functions are described in detail in "Chapter 4. Advanced administrative functions" on page 21.

Chapter 4. Advanced administrative functions

This chapter describes the advanced administrative functions that you can do on the Model G00.

The following functions are available:
- "NAS Backup Assistant", accessed through IBM NAS Admin icon
- "Persistent Images" on page 22, accessed through the Windows 2000 for Network Attached Storage user interface
- "Tivoli SANergy" on page 24, accessed through the IBM NAS Admin icon
- "FastT Check" on page 25, 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 G00 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 privilege (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 22.

- 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. Now that 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 on page 21.

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 preserved in time. The Persistent Image 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 peristent image of the file system.

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

one-time events or regularly repeated events. You access the Persistent Storage Manager in the Disks and Volumes task group found 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 the same 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.

To set up a persistent image, click on **Persistent Storage Manager**. Detailed descriptions and instructions for each of the control panels and topics are contained in the online help. In general, here are some important points about persistent images:

- In the Persistent Storage Manager, you can
  - Add persistent images
  - Delete persistent images
  - Schedule a persistent image independently of the backup and restore functions.
  - Set the persistent image to span multiple volumes.
  - Customize persistent images on a per-drive basis. For instance, you could set a persistent image for one drive to occur every hour, and for another drive to occur only once a day.
  - Change the properties of persistent images, such as start time, repetition rate, the drive, and so on.
  - Configure attributes of the persistent image system, such as maximum number of persistent images (up to 250), cache-full warning threshold, cache size, persistent image directory name, and so on.
  - List the persistent images that have been taken, and then delete, configure, or create new ones.
  - Take an immediate persistent image.
- 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.
- 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 Schedule New Persistent Image 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 Configuration 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.
- You cannot take a persistent image of the maintenance drive. Hence, you will not see it as a choice in the Schedule New Persistent Image Panel.
- The first persistent image ever taken will take longer than succeeding persistent images because the cache file will need to be created. After this a persistent images directory is established and future persistent images take place quickly.
- The warnings that are issued when the cache is approaching a full state are sent to the system log. You will not see pop-up warnings.

- Persistent image deletion takes place when the cache reaches a percentage full that you set. Oldest files are deleted first. Should the cache reach 100 percent full, all persistent images are deleted.

Attention: If you plan to use the Recovery CD, you must first delete all persistent images. For more information on using the Recovery CD see "Using the Recovery Enablement Diskette and Recovery CD" on page 41.

Granting User Access to Persistent Image Files

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 17. Once you are in Terminal Services, click the **My Computer** icon. Next you must click the volume on which you want to enable persistent image access. Then you 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.

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.

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Tivoli SANergy

Note: Model G00 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 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. Therefore, this reduces 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 G00 is to obtain diagnostic information about the Fibre Channel connection to the SAN. Specifically, you use it to obtain connectivity status of the Fibre Channel adapter that connects the gateway to the SAN.

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.

Chapter 5. 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 45 for more information.

Diagnostic tools overview

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

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

   The power-on self-test (POST) generates beep codes and messages to indicate successful test completion or the detection of a problem. See "Power-on self-test" on page 51 for more information.

   POST error messages and descriptions are given in "Appendix D. POST error messages" on page 51.

* **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 62 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 light-path 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 28 for more information.

* **Networking adapter diagnostic tools**
   * **Intel PROSet II**

      See "Intel PROSet II" on page 33.
   * **FastT Check**

      See "FastT Check" on page 33

* **Troubleshooting charts**

   These charts list problem symptoms, along with suggested steps to correct the problems. See "Troubleshooting charts" on page 34 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:

   `http://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 1 describes the ac and dc power LEDs.

Table 1. Power supply LEDs

AC power LED	DC power LED	Description and action
On	On	The power supply is on and operating correctly.
On	Off	There is a dc power problem. Possible causes: 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. If the problem persists, have the system serviced.
Off	Off	There is an ac power problem. Possible causes: 1. There is no ac power to the power supply. **Action:** Verify that: • 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. If the problem persists, have the system serviced.

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 on page 29 shows the LEDs on the diagnostics panel on the system board. See "Light-path diagnostics" for information on identifying problems using these LEDs.
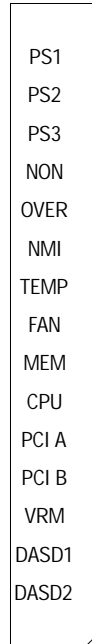
```
┌──────────┐
│          │
│   PS1    │
│   PS2    │
│   PS3    │
│   NON    │
│   OVER   │
│   NMI    │
│   TEMP   │
│   FAN    │
│   MEM    │
│   CPU    │
│   PCI A  │
│   PCI B  │
│   VRM    │
│  DASD1   │
│  DASD2   │
│          │
│         ╱
└────────┘
```

Figure 1. Diagnostics panel LEDs

Light-path diagnostics

Table 2 describes the light-path diagnostics LEDs. The system-error LED on the operator information panel is lit when certain system errors occur. Table 2 helps determine the cause of the error and the action you should take.

Table 2. 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 LEDs 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.
NMI	A nonmaskable interrupt occurred.	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. If the problem persists, have the system serviced.

Table 2. Light-path diagnostics (continued)

Lit LED on diagnostics panel	Cause	Action
TEMP	The system temperature has exceeded a threshold level.	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- • 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.) If the problem persists, have the system serviced.
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.	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.	1. Check the microprocessor failure LEDs on the system board. 2. If a microprocessor failure LED is lit, make sure that 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. If the problem persists, have the system serviced.
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.	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. If the problem persists, have the system serviced.

Table 2. Light-path diagnostics (continued)

Lit LED on diagnostics panel	Cause	Action
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.	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. If the problem persists, have the system serviced.

VRM	One of the VRMs on the system board has failed.	Check the VRM failure LEDs on the system board.
		• If the VRM1 failure LED is on, have the system serviced.
		• If the VRM2 failure LED is on:
		  1. Turn off the appliance, reseat the VRM, and restart the appliance.
		  2. If the problem persists, replace the VRM.
		
		If the problem still persists, have the system serviced.

DASD1	SCSI channel A has failed.	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. If the problem still persists, have the system serviced.
DASD2	SCSI channel B has failed.	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. If the problem still persists, have the system serviced.

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

  `http://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 shows the location of the boot block jumper on the system board.

Boot block jumper (J37)

System board switch block (SW1)
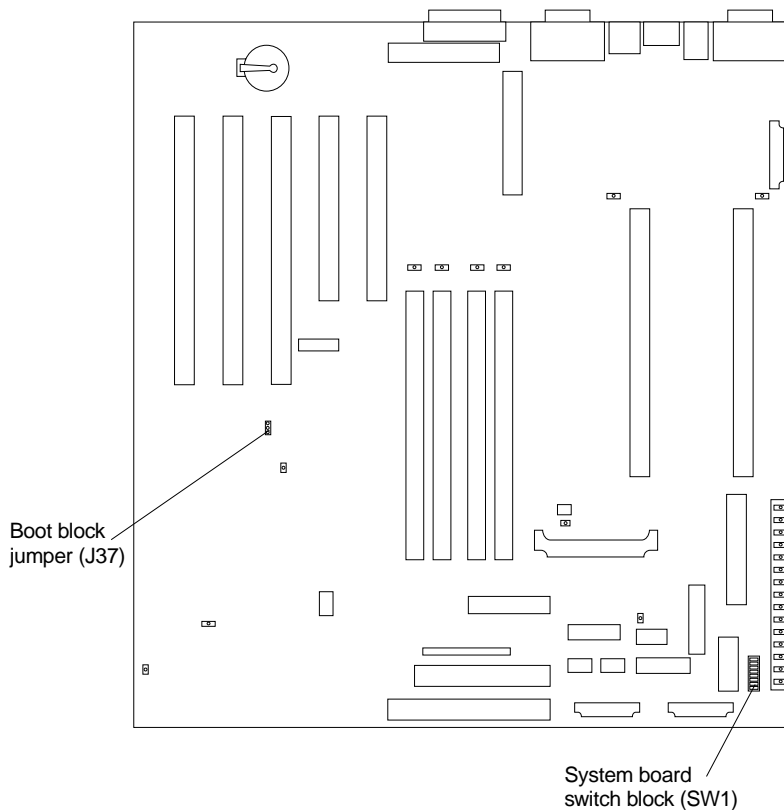
Figure 2. Boot block jumper location

To recover the BIOS:

1. Turn off the appliance and peripheral devices and disconnect all external cables and power cords; then, remove the cover.
2. Locate the boot-block jumper block (J37) on the system board.
3. Place a jumper on pins 2 and 3 to enable BIOS recovery mode.
4. Insert the BIOS flash diskette into the diskette drive.
5. Restart the appliance.

   The Recovery Boot screen will appear. A progress report, `Loading data from diskette xx%`, is displayed. When programming is underway, a further progress

report, `Programming block` *`n of 7 yy%`*, is displayed. When the procedure completes, the following message is displayed:

`Recovery complete, remove the diskette and return boot block switch to the off position before rebooting.`

6. Remove the flash diskette from the diskette drive.
7. Turn the appliance off.
8. Remove the jumper from the boot-block jumper block or move it to pins 1 and 2 to return to normal startup mode.
9. Restart the appliance. The system should start up normally.

Intel PROSet II

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

To access the PROSet 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 17. 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:
- 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, 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 25.

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 3 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 63 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 3. Troubleshooting symptoms and actions

Device	Suggested action
CD-ROM drive CD-ROM drive is not recognized.	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.
Diskette drive Diskette drive in-use light stays on, or the system bypasses the 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. If the diskette drive in-use light stays on, or the system continues to bypass the diskette drive, call for service.
General problems Problems such as broken cover locks or indicator lights not working.	Call for service.
Intermittent problems A problem occurs only occasionally and is difficult to detect.	Verify that: 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.

Table 3. Troubleshooting symptoms and actions (continued)

Device	Suggested action
Memory problems The amount of memory displayed is less than the amount of memory installed.	Verify that: 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 appliance emits a continuous tone during POST.	The startup (boot) microprocessor is not working properly. Verify that the startup microprocessor is seated properly. If it is, replace the startup microprocessor. If the problem remains, call for service.
Option problems An IBM option that was just installed does not work.	Verify that: 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.
The number of parallel ports displayed is less than the number of parallel ports installed.	
Power problems The appliance does not power on.	Verify that: 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. If the problem remains, call for service.

Troubleshooting

Table 3. Troubleshooting symptoms and actions (continued)

Device	Suggested action
Serial port problems The number of serial ports identified by the operating system is less than the number of serial ports installed.	Verify that: 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. If the problem still exists, call for service.
Service processor problems Netfinity Service Processor Manager reports a general monitor failure	Disconnect the appliance from all electrical sources, wait for 30 seconds, reconnect the appliance to the electrical sources, and restart the appliance. If a problem remains, call for service.
Software problem Suspected software problem.	To determine if problems are caused by the software, verify that: 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. 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. If the items above are correct and the problem remains, contact your place of purchase.

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 illuminates 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 illuminates 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.

  – The Ethernet speed 100 Mbps light illuminates when the Ethernet controller LAN speed is 100 Mbps.

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

  How you test the Ethernet controller depends on which operating system you are using (see the Ethernet controller device driver README file).

Ethernet controller troubleshooting chart

Table 4 provides solutions to 10/100 Mbps Ethernet controller problems that have the described symptoms.

Table 4. Ethernet problems and actions

Ethernet controller problem	Suggested Action
The appliance stops running when loading device drivers.	The PCI BIOS interrupt settings are incorrect. Check the following: • Determine if the interrupt (IRQ) setting assigned to the Ethernet controller is also assigned to another device in the Configuration/Setup Utility program. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet controller or the other device. • Make sure that you are using the most recent device driver available from the World Wide Web. • Run the network diagnostic program. If the problem remains, call for service.
Ethernet Link Status light does not light.	Check the following: • Make sure that the hub is turned 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, make sure that you also manually configure the speed. • Run diagnostics on the LEDs. If the problem remains, call for service.

Troubleshooting

Table 4. Ethernet problems and actions (continued)

Ethernet controller problem	Suggested Action
The Ethernet Transmit/Receive Activity light does not light.	Check the following: **Note:** The Ethernet transmit/receive activity LED illuminates only when data is sent to or by this Ethernet controller. • Make sure 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: • Make sure that you are using Category 5 cabling when operating the appliance at 100 Mbps. • Make sure that the cables do not run close to noise-inducing sources like fluorescent lights.
The Ethernet controller stopped working when another adapter was added to the appliance.	Check the following: • Make sure that the cable is connected to the Ethernet controller. • Make sure that your PCI system BIOS is current. • Reseat the adapter. • Determine if the interrupt (IRQ) setting assigned to the Ethernet adapter is also assigned to another device in the Configuration/Setup Utility program. Although interrupt sharing is allowed for PCI devices, some devices do not function well when they share an interrupt with a dissimilar PCI device. Try changing the IRQ assigned to the Ethernet adapter or the other device. If the problem remains, call for service.
The Ethernet controller stopped working without apparent cause.	Check the following: • 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 ServerGuide information. If the problem remains, call for service.

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.
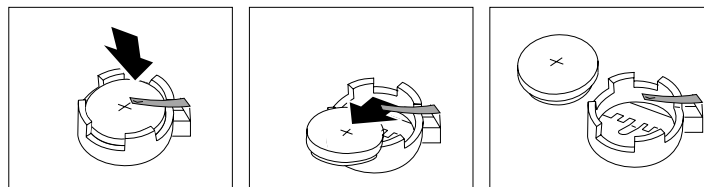

Figure 3. Battery removal

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.
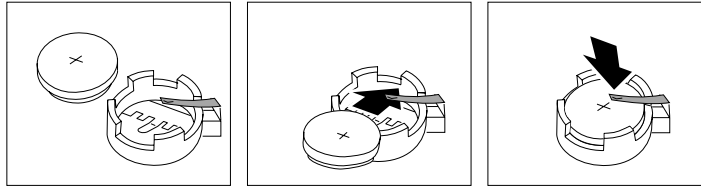
Replacing the battery

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 6. 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

http://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 22.

Using the Recovery Enablement Diskette and Recovery CD

The Recovery CD is a startable CD that contains the preload image for your Model G00 and is used to recover the preloaded image on your appliance. You must start your appliance using the Recovery Enablement Diskette before you will be able to use the Recovery CD.

Important

The Recovery Enablement Diskette enables the Model G00 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 G00. 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 G00 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 G00 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 G00. Table 5 includes the names of the directories found on the Supplementary CD and a description of the contents of the directory.

Table 5. 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 G00. 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) and the ServeRAID Configuration Reset diskette. 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. **Attention:** Starting your system with the ServeRAID Configuration Reset diskette will reset your ServeRAID adapter to factory default settings. All data stored in your ServeRAID array will be lost. Use this diskette only if you want to reset the Model G00 to factory default settings.
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 G00 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 6 lists some of these pages.

Table 6. 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 47 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.[1]

Table 7 provides the telephone numbers.

Table 7. 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

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

Table 7. 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 error messages

This appendix identifies and describes the common POST error messages that you might encounter, and gives corrective actions.

Power-on self-test

When you turn on your Model G00, 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 54 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 8 on page 53 describes the codes and specifies the action to take.

POST beep codes

Table 8. 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 9 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.

Table 9. POST error messages

POST message	Description
062	The appliance failed to boot on three consecutive attempts. All caches are disabled. Repeatedly turning the appliance on and then off or resetting the appliance might cause this problem. **Action:** Start the Configuration/Setup Utility program and verify that all settings are correct. Use the **Cache Control** selection in the Advanced Setup menu of the Configuration/Setup Utility program to enable the caches. If the problem persists, call for service. When the problem is corrected, be sure to enable the caches.
101 102 106	An error occurred during the system board and microprocessor test. **Action:** Call for service.
114	An adapter read-only memory (ROM) error occurred. **Action:** Remove the options. If you can start the appliance without the options installed, reinstall each option one at a time and retest after each is reinstalled. When an option fails, replace it. If you cannot isolate and correct the problem, call for service.

129	An error was detected in the L1 cache of one of the microprocessors.
	Action:
	1. If you just installed a microprocessor, verify that the microprocessor is installed and seated correctly.
	2. If the problem persists, check to see if the system has isolated the problem to a microprocessor:
	  • If the system error light on the operator information panel is on, check to see if the CPU LED on the diagnostic LED panel is on. If it is on, check the microprocessor error LEDs next to the microprocessor sockets.
	    – If a microprocessor LED is on, run the diagnostic program for the microprocessor indicated by the LED. If the tests fail, replace the indicated microprocessor.
	    – If the microprocessor tests do not fail, call for service.
	  • If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information about the microprocessor error.
	
	If the problem persists, call for service.

151	A real-time clock (RTC) error occurred. **Action:** Call for service.
161	The real-time clock battery has failed. **Action:** Replace the battery yourself or call for service. You can use the appliance until you replace the battery. However, you must run the Configuration/Setup Utility program and set the time and date and other custom settings each time you turn on the appliance.

Table 9. POST error messages (continued)

POST message	Description
162	A change in device configuration occurred. This error occurs under one or more of the following conditions: • A new device has been installed. • A device has been moved to a different location or cable connection. • A device has been removed or disconnected from a cable. • A device is failing and is no longer recognized by the appliance as being installed. • An external device is not turned on. • An invalid checksum is detected in the battery-backed memory. **Action:** Verify that all external devices are turned on. You must turn on external devices before turning on the appliance. If you did not add, remove, or change the location of a device, a device is probably failing. Running the diagnostic program might isolate the failing device. If you cannot isolate and correct the problem, call for service.
163	The time of day has not been set. **Action:** Set the correct date and time. If the date and time are set correctly and saved, but the 163 error message reappears, call for service. You can use the appliance until the system is serviced, but any application programs that use the date and time will be affected.
164	A change in the memory configuration occurred. This message might appear after you add or remove memory. **Note:** The appliance can be used with decreased memory capacity. **Action:** 1. If POST error message 289 also occurred, follow the instructions for that error message first. 2. If you just installed or removed memory, run the Configuration/Setup Utility program; then, exit, saving the new configuration settings. If the message appears again, shut down the appliance, reseat the memory modules, and restart the appliance. 3. If the problem persists, check to see if the system has isolated the problem to a memory module: • If the System Error light on the operator information panel is on, check to see if the MEM LED on the diagnostic LED panel is on. If it is on, check the DIMM error LEDs next to the memory sockets. If a DIMM error LED is on, run the diagnostic program for the memory. – If the tests fail, replace the DIMM. If the problem persists after you replace the DIMM, call for service. – If the memory tests do not fail, call for service. • If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the memory error. If the problem persists, call for service.
175	A vital product data (VPD) error occurred. **Action:** Call for service.
176 177 178	A security hardware error occurred. **Action:** Check for indications that someone has tampered with the appliance. If no one has tampered with the appliance, call for service.
184	The power-on password information stored in your appliance has been removed. **Action:** From the Configuration/Setup Utility program main menu, select **System Security.** Then, follow the instructions on the screen. If this information cannot be restored, call for service.

Table 9. POST error messages (continued)

POST message	Description
185	A power failure damaged the stored information about the drive-startup sequence. **Action:** From the Configuration/Setup Utility program main menu, select **Start Options**; then, follow the instructions on the screen. If this information cannot be restored, call for service.
186	A system board or hardware error occurred. **Action:** Call for service.
187	The VPD serial number is not set. **Action:** The system serial number is set in the VPD EEPROM at the time of manufacturing. If the system board has been replaced, the system serial number will be invalid and should be set. From the main menu of the Configuration/Setup Utility program, select **System Information**, then select **Product Data.** If the problem persists, call for service.
188	A vital product data (VPD) error occurred. **Action:** Call for service.
189	An attempt has been made to access the appliance with invalid passwords. After three incorrect attempts, the appliance locks up; that is, the logon data fields are no longer available to the user.

201	An error occurred during the memory controller test. This error can be caused by:
	• Incorrectly installed memory
	• A failing memory module
	• A processor-board problem
	• A system board problem
	
	Action:
	1. If you just installed memory, verify that the new memory is correct for your appliance. Also verify that the memory is installed and seated correctly.
	2. If the problem persists, check to see if the system has isolated the problem to a memory module:
	  • If the system error light on the operator information panel is on, check to see if the MEM LED on the diagnostic LED panel is on. If it is on, check the DIMM error LEDs next to the memory sockets. If a DIMM error LED is on, run the diagnostic program for the memory.
	  • If the tests fail, replace the DIMM. If the problem persists after you replace the DIMM, call for service.
	  • If the memory tests do not fail, call for service.
	3. If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the memory error.
	
	If the problem persists, call for service.

229	An error was detected in the L2 cache of one of the microprocessors.
	Action:
	1. If you just installed a microprocessor, verify that the microprocessor is installed and seated correctly.
	2. If the problem persists, check to see if the system has isolated the problem to a microprocessor:
	  • If the system error light on the operator information panel is on, check to see if the CPU LED on the diagnostic LED panel is on. If it is on, check the microprocessor error LEDs next to the microprocessor sockets.
	    – If a microprocessor LED is on, run the diagnostic program for the microprocessor indicated by the LED. (If the microprocessor 2 error LED is on, run the "Alt CPU" diagnostic program.) If the tests fail, replace the microprocessor.
	    – If the microprocessor tests do not fail, call for service.
	  • If no error LED is on, the error logs in the Configuration/Setup Utility program might provide additional information on the microprocessor error.
	
	If the problem persists, call for service.

Table 9. POST error messages (continued)

POST message	Description
289	An error occurred during POST memory tests and a failing DIMM was disabled. **Note:** You can use the appliance with decreased memory. **Action:** 1. If you just installed memory, verify that the new memory is correct for your appliance. Also verify that the memory is installed and seated correctly. Start the Configuration/Setup Utility program and select **Memory Settings** from the Advanced Setup menu to enable the DIMM. 2. If the problem remains, replace the failing DIMM. If the problem persists, call for service.
301 303	An error occurred during the keyboard and keyboard controller test. These error messages also might be accompanied by continuous beeping. **Action:** 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.
602	Invalid diskette boot record **Action:** 1. Replace the diskette. 2. If the problem persists, make sure that the diskette drive cables are correctly and securely connected. 3. If the problem remains, replace the diskette drive. If the problem persists, call for service.
604	An error occurred during a diskette drive test. **Action:** 1. Verify that the Configuration/Setup Utility program correctly reflects the type of diskette drive that you have installed. 2. Run the diagnostic tests. If the diagnostic tests fail, call for service.
662	A diskette drive configuration error occurred. **Action:** If you removed a diskette drive, make sure that the diskette drive setting is correct in the Configuration/Setup Utility program. If the setting is not correct, change it. If the problem persists, call for service.
962	A parallel port configuration error occurred. **Action:** If you changed a hardware option, make sure that the parallel port setting is correct in the Configuration/Setup Utility program. If the setting is not correct, change it. If the problem persists, call for service.

Table 9. POST error messages (continued)

POST message	Description
11*xx*	An error occurred during the system-board serial port test. **Action:** If you have a modem, serial printer, or other serial device attached to your appliance, verify that the serial cable is connected correctly. If it is, use the following procedure: 1. Turn off the appliance. 2. Disconnect the serial cable from the serial port. 3. Wait five seconds; then, turn on the appliance. If the POST error message does not reappear, either the serial cable or the device is probably failing. See the documentation that comes with the serial device for additional testing information. If the POST error message reappears, call for service.
1162	The serial port configuration conflicts with another device in the system. **Action:** 1. Make sure the IRQ and I/O port assignments needed by the serial port are available. 2. If all interrupts are being used by adapters, you might need to remove an adapter to make an interrupt available to the serial port, or force other adapters to share an interrupt.
1301	Cable to Information LED panel not detected. **Action:** Make sure that the cable to the operator information panel is connected. If the problem persists, call for service.
1302	Cable to Power and Reset push-buttons not detected. **Action:** Make sure that the cable to the Power and Reset push-buttons is connected. If the problem persists, call for service.
1303	I2C cable to Power Backplane not detected. **Action:** Make sure that the cable to the power backplane is connected. If the problem persists, call for service.
1304	Cable to Diagnostic LED panel not detected. **Action:** Make sure that the cable to the diagnostic LED panel is connected. If the problem persists, call for service.
1600	The Netfinity Advanced System Management processor is not functioning. **Action:** 1. Verify that the jumpers for the system-management processor are set correctly. 2. Disconnect the appliance from all electrical sources, wait for 30 seconds, reconnect the appliance to the electrical sources, and restart the appliance. If the problem persists, call for service.
1601	The BIOS needs to be updated. **Action:** 1. Disconnect the appliance from all electrical sources, wait for 30 seconds, reconnect the appliance to the electrical sources, and restart the appliance. 2. If the problem persists, update the BIOS. If the problem persists, call for service.
1800	A PCI adapter has requested a hardware interrupt that is not available. **Action:** 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the interrupt resource settings are not correct, change the settings. 2. If all interrupts are being used by other adapters, you might need to remove an adapter to make an interrupt available to the PCI adapter, or force other adapters to share an interrupt.

Table 9. POST error messages (continued)

POST message	Description

1962	No valid startup devices were found. The system cannot find the startup drive or operating system.
	Action: Be sure that the drive you want to start from is in the startup sequence.
	1. Select **Start Options** from the Configuration/Setup Utility program main menu. If you are unable to set the startup sequence, call for service.
	2. Check the list of startup devices in the **Startup device** data fields. Is the drive you want to start from in the startup sequence?
	    Yes Exit from this screen; then, select **Exit Setup** to exit the Configuration/Setup menu. Go to step 3.
	    No Follow the instructions on the screen to add the drive; then, save the changes and exit the Configuration/Setup menu. Restart the appliance.
	3. Is an operating system installed?
	    Yes Turn off the appliance. Go to step 4.
	    No Install the operating system in your appliance; then, follow your operating system instructions to shut down and restart the appliance.
	4. During appliance startup, watch for messages indicating a hardware problem.
	
	If the same error message appears, call for service.

2400	An error occurred during the testing of the video controller on the system board. This error can be caused by a failing monitor, a failing system board, or a failing video adapter (if one is installed). **Action:** Verify that the monitor is connected correctly to the video connector. If the monitor is connected correctly, call for service.
2462	A video memory configuration error occurred. **Action:** Make sure that the monitor cables are correctly and securely connected to the appliance. If the problem persists, call for service.
5962	An IDE CD-ROM configuration error occurred. **Action:** Check the signal and power cable connections to the CD-ROM drive. If the problem persists, call for service.
8603	An error occurred during the mouse (pointing device) controller test. The addition or removal of a mouse, or a failing system board can cause this error. **Note:** This error also can occur if electrical power was lost for a very brief period and then restored. In this case, turn off the appliance for at least 5 seconds; then, turn it back on. **Action:** Ensure that the keyboard and mouse (pointing device) are attached to the correct connectors. If they are connected correctly, use the following procedure: 1. Turn off the appliance. 2. Disconnect the mouse from the appliance. 3. Turn on the appliance. If the POST error message does not reappear, the mouse is probably failing. See the documentation that comes with the mouse for additional testing information. If the problem remains, replace the mouse or pointing device. If the POST error message reappears, run the diagnostic tests to isolate the problem. If the diagnostic tests do not find a problem and the POST error message remains, call for service.
00012000	Processor machine check. **Action:** 1. Update the system BIOS. 2. If the problem persists, replace the microprocessor.

Table 9. POST error messages (continued)

POST message	Description
00019501	Processor 1 is not functioning. **Action:** Replace microprocessor 1. (The microprocessor 1 error LED will be on.) If the problem persists, call for service.
00019502	Processor 2 is not functioning. **Action:** Replace microprocessor 2. (The microprocessor 2 error LED will be on.) If the problem persists, call for service.
00019701	Processor 1 failed the built-in self test. **Action:** Replace microprocessor 1. (The microprocessor 1 error LED will be on.) If the problem persists, call for service.
00019702	Processor 2 failed the built-in self-test. **Action:** Replace microprocessor 2. (The microprocessor 2 error LED will be on.) If the problem persists, call for service.
00180100	A PCI adapter has requested memory resources that are not available **Action:** 1. Make sure that the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 2. If all memory resources are being used, you might need to remove an adapter to make memory available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.
00180200	A PCI adapter has requested an I/O address that is not available, or the PCI adapter might be defective. **Action:** 1. Make sure that the I/O address for the PCI adapter and all other adapters are set correctly in the Configuration/Setup Utility program. 2. If the I/O port resource settings are correct, the PCI adapter might be defective. Call for service.
00180300	A PCI adapter has requested a memory address that is not available, or the PCI adapter might be defective. **Action:** 1. Make sure that the memory address for all other adapters are set correctly in the Configuration/Setup Utility program. If the memory resource settings are not correct, change the settings. 2. If the memory resource settings are correct, the PCI adapter might be defective. Call for service.
00180400	A PCI adapter has requested a memory address that is not available. **Action:** If all memory addresses are being used, you might need to remove an adapter to make memory address space available to the PCI adapter. Disabling the adapter BIOS on the adapter might correct the error. Refer to the documentation provided with the adapter.

Table 9. POST error messages (continued)

POST message	Description
00180500	A PCI adapter ROM error occurred. **Action:** Remove the PCI adapters. If you can start the appliance without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it. If you cannot isolate and correct the problem, call for service.
00180600	A PCI-to-PCI bridge error occurred. More than one PCI bus tried to access memory below 1 MB. **Action:** Remove the PCI adapter that has the PCI bridge. If you can start the appliance without the adapter, reinstall and retest the adapter. If the adapter fails, replace it. If you cannot isolate and correct the problem, call for service.
00180700	*xxxxyyyy* Planar PCI device does not respond. (Where *xxxx* is the PCI vendor ID and *yyyy* is the PCI device ID.) **Action:** Call for service.
00180800	An unsupported PCI device is installed. **Action:** Remove the PCI adapters. If you can start the appliance without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it. If the problem persists, call for service.
00181000	PCI error. **Action:** Remove the PCI adapters. If you can start the appliance without the adapters, reinstall each adapter one at a time and retest after each is reinstalled. When an adapter fails, replace it. If the problem persists, call for service.
01295085	The ECC checking hardware test failed. **Action:** Call for service.
01298001	No update data is available for processor 1. **Action:** Update the system BIOS to a level that supports the microprocessors installed in the appliance.
01298002	No update data is available for processor 2. **Action:** Update the system BIOS to a level that supports the microprocessors installed in the appliance.
01298101	The update data for processor 1 is incorrect. **Action:** Update the system BIOS to a level that supports the microprocessors installed in the appliance.
01298102	The update data for processor 2 is incorrect. **Action:** Update the system BIOS to a level that supports the microprocessors installed in the appliance.
01298200	Microprocessor speed mismatch **Action:** The microprocessors installed do not run at the same speed; install microprocessors with identical speeds.
I9990301	A hard disk drive error occurred. **Action:** Call for service.
I9990305	POST could not find an operating system. **Action:** Install an operating system. If you have already installed the operating system, check the drive startup sequence. If the drive sequence is correct, run the diagnostic tests to verify that the hard disk drive is functioning correctly. If there is a problem with the hard disk drive (such as a bad sector), you might need to reinstall the operating system. If you cannot reinstall the operating system, call for service.

Table 9. POST error messages (continued)

POST message	Description
I9990650	AC power has been restored. **Action:** No action is required. This message appears each time AC power is restored to the appliance after an AC power loss.
Other Numbers	POST found an error. **Action:** Follow the instructions on the screen.

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.

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

Note: To run the diagnostic programs, you must start the appliance 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.

To start the diagnostic programs:

1. Turn on the appliance and watch the screen.
2. When the message `F2 for Diagnostics` appears, press **F2**.
3. Type in the appropriate password; then, press **Enter**.
4. Select either **Extended** or **Basic** from the top of the panel.
5. When the Diagnostic Programs panel appears, select the test you want to run from the list that appears; then, follow the instructions.

   Notes:

   a. To obtain help information while running the diagnostic programs, press **F1**. To obtain online Help, press **F1** from within a Help panel. To exit Help, press **Esc**.

   b. If the appliance stops during testing and you cannot continue, restart the appliance and try running the diagnostic programs again. If the problem persists, call for service.

c. The keyboard and mouse (pointing device) tests assume that a keyboard and mouse are attached to the appliance.

   d. If you run the diagnostic programs with no mouse attached to your appliance, 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.

   e. You can test the USB keyboard by using the regular keyboard test. Also, you can run the USB hub test only if there are no USB devices attached.

   f. You can view appliance 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 panel.

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

If the hardware checks out OK but the problem persists during normal appliance 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 are already running the diagnostic programs, begin with step 3 .

To view the test log:

1. Turn on the appliance and watch the screen.

   If the appliance is on, shut down your operating system and restart the appliance.

2. When the message `F2 for Diagnostics` appears, press **F2**.

   If a power-on password or administrator password is set, the appliance prompts you for it. Type in the appropriate password; then, press **Enter**.

3. When the Diagnostic Programs screen appears, select **Utility** from the top of the screen.

4. 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 appliance is powered on. When you turn off the power to the appliance, the test log is cleared.

Diagnostic error message tables

Table 10 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 10, make sure that your appliance has the latest levels of BIOS, Advanced System Management Processor, and diagnostics microcode.

Table 10. 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.	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 #*n* is bad (where *n* 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.	Make sure the tab and latch on hot-plug PCI slot *n* are closed correctly. If the problem persists, call for service.
030	SCSI interface	Failed	SCSI adapter in slot *n* failed register/counter/power test (where *n* is the slot number of the failing adapter)	Refer to the information provided with the adapter for instructions. If the problem persists, call for service.
			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 10. 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)	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. 3. If the problem remains, replace the *xyz* microprocessor and run the test again. If the problem persists, call for service.
			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.	1. Reseat the microprocessor. 2. If the problem remains, replace the microprocessor. If the problem persists, call for service.
			Processor in socket id *xyz* is defective (where *xyz* identifies the microprocessor that is causing the error message)	Replace the microprocessor. If the problem persists, call for service.

Table 10. Diagnostic error messages (continued)

Code	Function	Result	Text message	Action
089	Microprocessor	Failed	Test setup error: Application microprocessor not installed or BIOS setup problem	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. If the problem persists, call for service.
			VRM corresponding to Microprocessor in socket *xyz* is defective (where *xyz* identifies the microprocessor whose VRM is causing the error message)	Replace the VRM. If the problem remains, call for service.
			VRM corresponding to Microprocessor in socket id *xyz* is not installed (where *xyz* identifies the microprocessor whose VRM is causing the error message)	Install a VRM. If the problem persists, call for service.
165	Service processor	Failed	Netfinity Advanced System Management Processor on system board	Call for service.
175	System thermal	Failed	Fan # *n* (where *n* 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 10. Diagnostic error messages (continued)

Code	Function	Result	Text message	Action
201	System memory	Failed	DIMMs in location DIMM *n* (where *n* is the number of the socket that contains the failing DIMM)	1. Reseat the failing DIMM. 2. If the problem remains, replace the DIMM. If the problem persists, call for service.
			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. If the problem persists, call for service.
			Test setup error: Corrupt DMI BIOS, information in BIOS is not as expected	

Table 10. 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)	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.	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 # *n* (where n is the drive bay number)	Call for service.

Table 10. Diagnostic error messages (continued)

Code	Function	Result	Text message	Action
301	Keyboard	Failed	On system board keyboard test failed	1. Verify that the keyboard cable is connected. 2. If the problem remains, replace the keyboard cable. If the problem persists, call for service.
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 *n* (where *n* is the PCI slot number in which the failing Ethernet adapter is installed)	Replace the Ethernet adapter in slot *n*. If the problem persists, call for service.
			On system board	Call for service.

Index

T

Terminal Services and the IBM NAS Administration
 Console   17
Terminal Services Client   7
test log   64
Tivoli SANergy   1, 24
Tivoli Storage Manager Client   1
trademarks   44
troubleshooting   27
troubleshooting charts   34

U

UM Services
   launching   14, 15
   starting   15
   using   15
Universal Manageability Services   7

W

Windows 2000 for Network Attached Storage,
 administration tasks   17
Windows 2000 for Network Attached Storage
 (Web-based interface)   7

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