IBM   Netfinity Networked SYMplicity Storage Manager

Installation and User's Handbook

Before using this information and product it supports, be sure to read the general information under "Appendix B. Notices" on page 87.

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Chapter 1. Introduction

About this Handbook

This *Installation and User's Handbook* provides installation and setup information for the SYMplicity™ Storage Management software in a networked Microsoft® Windows NT™, Windows 95, or Windows 98 environment. Use this *Installation and User's Handboo* to do the following:

- Determine the hardware and software required to install this softwar

- Install the software

- Identify features unique to the networked operating environment

- Set up software parameters

- Troubleshoot the installation and networked operation

This guide is accompanied by the *SYMplicity Storage Manager User's Handboo* . The *User's Handbook* describes how to use the storage management software after installation. Some parts of that book may be affected by information given in this book.

You should use this *Installation and User's Handbook* after installing the RAID Controller hardware. After you install and set up the software, go to the *User's Handbook* for furthe information on using the software and maintaining the RAID Controllers.

New Software Features

This release of the storage management software contains the following new features:

- Windows 98 support. The storage management software now supports the networked Windows 98 operating environment.

- Faster LUN creation. The controller now performs background formatting to creat logical unit numbers (LUNs) faster.

- SMART/PFA support. Through the use of Self-Monitoring Analysis and Reporting Technology (SMART), the storage management software now reports predictive failure analysis (PFA) flags on drives.

- Firmware autosynch. When you replace a controller with firmware level 3.00.X or higher, the firmware on the new controller automatically synchronizes with the firmware on the remaining controller.

- Fibre Channel Loop ID. For Fibre Channel topologies, a new nvutil option allows you to set the Fibre Channel Loop ID for the controller.

- Backup log redirection. When the threshold limit is reached, you now can set the location for your old log file.

- Windows NT Event Log capability. You can use the new putntlog command-line utility to write the contents of a RAID event to the Windows NT Event Log.

Understanding the Restrictions

Table 1 "Restrictions and Notes" on page 2 details the restrictions and important notes that apply to using the storage management software in the Windows environment.

NOTE   Always check for a readme file on any installation media. This file may contain important information that was not available at the time this *Installation andUser's Handbook* was prepared.

Table 1: Restrictions and Notes

Restriction/Note	Application	Workaround
Do not use Microsoft's Network Monitor™ service with the storage management software. Monitoring the network connections with this service can result in problems, such as blue screens.	Installation and Setup	Stop the Network Monitor Service if you have it installed before using the storage management software: **1** Select Control Panel → Services. **2** Highlight the Network Monitor Service. **3** Select Stop.
Do not install the RDAC driver before installing the storage management software. This driver is available for installation on a Windows NT host machine connected to the RAID Controllers with Fibre Channel connection.	Installation and Setup	None. Do *not* install the RDAC driver before upgrading or installing the storage management software. The installation procedure will remove any version of the RDAC driver. The RDAC driver will need to be installed from this software's installation CD. See "Installing the Driver" on page 46 for more information.

Table 1: Restrictions and Notes (continued)

Restriction/Note	Application	Workaround
raidutil does not always generate an error message even when an operation fails. For example, using raidutil -R to reset the controller battery age without LUN 0 created causes the operation to fail. However, there is no error message.	General	Anytime you use raidutil to perform an operation, it is a good idea to verify that it completes successfully. For example, after creating LUNs, you might want to use lad to verify your configuration.
The networked storage management software does not have any knowledge of the I/O data path; therefore, the following restrictions apply: • **Configuration** — cannot check for I/Os before deleting LUNs. • **Recovery/Status** — Recovery Guru/Health Check does not detect any problems with the data path/connection. If any Data Path Failure is displayed, it indicates that there are problem with the network connection or one of the controllers in the affected RAID Controller. • **Maintenance/Tuning** — does not check for I/Os or verify LUNs are Optimal before upgrading firmware, balancing LUNs, or changing controller mode.	All Applications	**Configuration** — make sure you stop I/Os and no other users are on the system before selecting Delete LUN. **Recovery/Status** — make certain there are no network problems *before* proceeding with the Data Path Failure recovery procedure. Proceeding with the recovery procedure could cause an operational controller to be failed when the problem may be with the network or its connection. **Maintenance/Tuning** • **Firmware Upgrade** — the Online method for Firmware Upgrade is grayed out. Before selecting the Offline method of Firmware Upgrade, you must stop I/Os. • **LUN Balancing/Controller Mode** — make sure you stop I/Os because they could fail. Also, if the host machine (connected to your RAID Controllers via I/O data connection) does not have RDAC installed, you may have to make changes to mounted filesystem (UNIX only). • **Caching Parameters** — Before saving changes to your caching parameters, you must stop I/Os.

Table 1: Restrictions and Notes (continued)

Restriction/Note	Application	Workaround
The host's operating system could hang and I/Os could fail if a host machine (connected to your RAID Controllers via I/O data connection) is issuing I/Os to the modules when you use the software to: • Delete or format LUNs. • Change controller mode or LUN assignments between controllers. • Upgrade controller firmware.	Configuration, Recovery Maintenance/ Tuning	**Configuration** Make sure that you stop I/Os and that no other users are on the host machine's operating system before deleting logical units (Delete) or using File → Reset Configuration. **Recovery** Make sure you stop I/Os and that no other users are on the host machine's operating system before performing any procedure that will format a LUN (such as Options → Manual Recovery → Logical Unit → Format). **Maintenance/Tuning** Make sure that you stop I/Os and that no other users are on the host machine's operating system before performing tasks that transfer LUN ownership between controllers, such as using Controller Mode, using LUN Balancing, or upgrading controller firmware (Firmware Upgrade, Offline method).
If you have more than one station with this software installed, you should open *only one* Configuration session at a time. Operations could fail or hang if I/Os are occurring and LUN creation or deletion will fail for all but one station.	Configuration	You must be very careful not to use more than one Configuration Application at a time. Also, be sure to stop I/Os before deleting or formatting logical units.
When creating multiple LUNs that will use the full capacity of the drive group, the last LUN is not created.	Configuration	Do *one* of the following: • Specify 10 LUNs (or less) in the Create LUN panel. • Recreate the last LUN individually after the failure message. • Determine what size of the remaining drive group capacity to allocate to each of the LUNs, and create the LUNs one at a time.

Table 1: Restrictions and Notes (continued)

Restriction/Note	Application	Workaround
When a LUN is Dead and ALL its drives are Failed (for example, 2 drive Raid 1), Recovery Guru reports that the first replaced drive is still Failed. CAUTION If the controllers in the module containing the Dead LUNs are reset (bus reset or turning the module off and on again), the dead LUNs will be lost. In this instance, use the Configuration Application or raidutil to re-create them.	Recovery Guru	You should select OK when asked, "Are you certain you have replaced it and that it has enough capacity?" and continue the recovery process.
Manual Recovery → LUN → Format does not work while new LUNs are formatting on different drive groups.	Recovery	Wait for LUNs on other drive group to complete formatting before starting manual recovery.

Hardware and Software Requirements

Check to make sure you have the following components installed:

- Windows 95, Windows 98, Windows NT Server 4.0, Windows NT 4.0 Enterprise Edition Operating System, or Windows NT Workstation 4.0 installed on each Remot Management Station (RMS) where you intend to install the storage management software.

- Microsoft Service Pack 4 or newer for Windows NT 4.0.

- A BOOTP or DHCP server (se "Appendix A. Specifications" for further information).

- RAID Controllers with Series 4 controllers.

- The network enable bit (an NVSRAM setting) is set to on (default).

- At least an 800 x 600 resolution graphics card and mouse.

Selecting the Correct Installation Procedur

The procedure you need to use to install the storage management software depends on whether this is an upgrade to a previously installed version or whether you are installing the software for the first time.

Upgrade Installation	First Time Installation
Continue with "Chapter 2. Upgrading the Software".	Continue with "Chapter 3. Installing the Software for the First Time".

Chapter 2. Upgrading the Software

This chapter gives the following procedures for installing an upgrade version of the storage management software.

If you have not installed this software before, go to "Chapter 3. Installing the Software for the First Time".

Preparing for an Upgrade Installation

This section provides the following procedures for preparing for your upgrade installation:

Retaining Your Previous Configuration Information

During the upgrade/installation procedure, your current rmparams and rmscript.bat files will be saved as rmparams.ori and rmscript.ori. You can refer to these old files after installation to determine if you want to customize the new files.

Upgrading the RDAC Driver

Do *not* install the RDAC driver before upgrading the storage management software. Th installation procedure will remove any version of the RDAC driver. The new version of the RDAC driver will need to be installed from this software's installation C . See "Installing the Driver" on page 46 for more information.

Downloading the NVSRAM Files

IMPORTANT   In most cases, you have to download a new NVSRAM file befor upgrading controller firmware, especially if you are upgrading from one major firmware release to another. The NVSRAM file specifies certain default settings for the controller (it will be part of the controller firmware's release media).

---

1. Select Maintenance/Tuning → Firmware Upgrade.

2. Be sure to specify the NVSRAM file on the Path line because the fwcompat.def file does not recognize NVSRAM files and will not place them in the Compatible Files/ Versions list.

3. When finished, run nvutil -vf from the command line to ensure the controller receives the new settings.

4. Turn power off, then back on to the affected RAID Controllers to ensure the new NVSRAM settings take effect.

5. Continue with "Upgrading the Controller Firmware."

Upgrading the Controller Firmware

1. Determine if you need to upgrade to the required controller firmware version:

    a. Select RAID Controlle → Module Profile → Controllers.

    b. Verify the boot and firmware levels meet the minimum requirement (se Table 19 on page 85).

    c. Select OK when finished viewing.

2. Upgrade your controller firmware now.

    a. Select Maintenance/Tuning → Firmware Upgrade.

    b. Select Offline.

    c. Download the firmware files from this software's CD-ROM. For example, at the path line (assuming d: is your CD-ROM drive) type:
    d:\networkd\firmware\03000105.apd + 03000103.bwd
    where the numbers match the firmware level to which you need to upgrade.

Installing the Software

Use the following procedure to install the storage management software.

IMPORTANT	You must have administrator privileges to access this software. This installation procedure requires you to restart the operating system. Therefore, make sure that other users are *not* on the system when installing this software.

CAUTION	Do *not* install the RDAC driver before upgrading the storage management software. The installation procedure will remove any version of the RDAC driver. The storage management software's installation CD contains a new version of the RDAC driver, which you will need to install after upgrading the software.

1. Insert the Installation CD into your CD-ROM drive.

NOTE	In the following examples, c:\ is designated as your boot drive and d:\ is designated as the CD-ROM device drive. Be sure to select the correct drives for your system.

2. To begin the installation program:

    a. Select Start → Settings → Control Panel → Add/Remove Programs.

    b. Select Install, and then browse.

    c. When you see d:\networkd\netsymsm\setup.ex , select Finish.

3. Follow the instructions on screen to complete the installation procedure.

IMPORTANT	During installation, you will be prompted to define the directory path where you want this software installed. If you are defining your own directory path, do *not* use special characters for the directory name (such as, #, $, or +). The default path is c:\Program Files\NetSYMsm. For th purpose of providing examples of the installation requirements, this *Installation Guide* will refer to the default directory.

4. When the installation is completed, remove the CD and restart the system.

5. After your system restarts, continue with .

Verifying the Installation

Verify the storage management software is installed, and that the Disk Array Monitor service is running.

1. Select Start → Programs. Networked SYMplicity Storage Manager appears in the list.

2. To verify that the Disk Array Monitor is running:

Windows NT	Windows 95 and Windows 98
Select Start → Settings → Control Panel → Services. The Disk Array Monitor is running if this service's status is Started.	An icon appears in the service tray in the lower right corner of your screen. Move your cursor over the icon. A status message pops up indicating that the Disk Array Monitor is Running.

3. Continue with .

Editing the RAID Controller Information

Your existing RAID Controller configuration has been retained.

Use the following procedure to add or change information about your RAID Controllers:

1. Select the Recovery Application.

   The Select Module main screen appears.
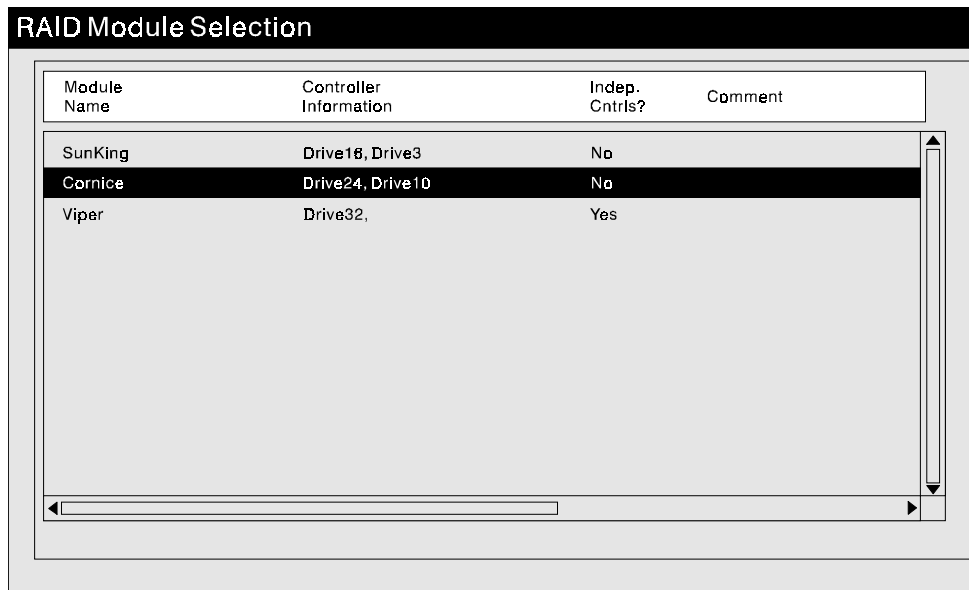
Figure 1. Select Module Main Screen

2. Verify that this screen contains the correct number of RAID Controllers. You may want to refer to the table (similar to Table 4 on page 16) you created when you originally installed the software.

3. If you want to add or change information for a RAID Controller, highlight that module and select Edit.

The Edit screen appears.

Figure 2. Edit Screen

4. In the Edit screen, make the following changes:

- Change the module name if desired. Remember, there is a 1 6character limit. The new name might include the host machine's name, the module's location, and unique number for the module.

- For RAID Controllers using the independent controller configuration, click the box next to Independent Controllers. This indicates the RAID Controllers are using the independent controller configuration. (Two different Fibre hosts are each connected to both controllers in a RAID Controller.)

- In the Comment field, add information that might help you identify the module. You may want to add location details, host-RAID Controller configuration type, machine type, or other unique information to further clarify the module for future identification.

5. Select OK when done.

   The Select Module main screen now reflects any changes you made.

6. Repeat Step 3. through Step 5. until you have added/changed information for each RAID Controller you want to change.

7. Continue with "What's Next?" on page 12.

What's Next?

The remainder of the book contains information that you may need to review after you have completed your upgrade installation.

If you want to	Continue with
Read background information relating to operating the storage management software in the Windows environment	"Chapter 4. Operating System Support"
Customize the installation to run on your system	"Chapter 5. Customizing the Installation"
Ensure that the storage management software operates properly and determine if the system configuration meets your needs	"Chapter 6. Initial Startup Procedures"

Chapter 3. Installing the Software for the First Time

This chapter gives the procedures for installing the storage management software for the first time. If you have a previously installed version of the software, go to "Chapter 2. Upgrading the Software".

Sample Network

Figure 3 shows a sample setup of two networks. Each network contains a BOOTP server and at least one host machine connected to two or more RAID Controller modules. Remember that if the network spans multiple subnets, you may need one BOOTP server for each subnet that has a networked RAID Controller Unit.

Also in Figure 3, the host machines are connected to the RAID Controllers via an I/O data connection (Fibre Channel). This storage management software is unaware of these host machines, the operating system installed on them, and the I/O data connection. The software management station has no way to talk with the host system or to monitor the connection. Therefore, you need to follow the operating system's documentation when

using the host's operating system with your controllers. Furthermore, you do not see messages displayed on the host's console, nor does this software receive or display any messages from the host. They are entirely independent systems.
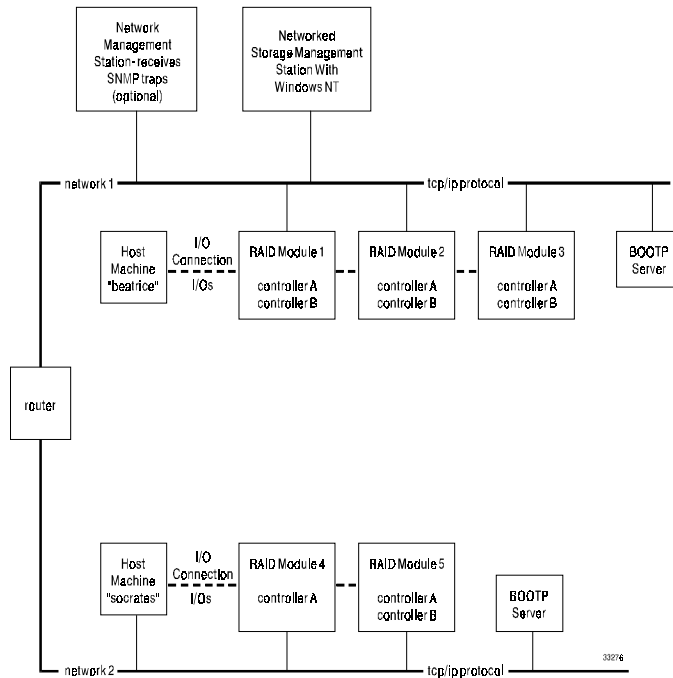
Figure 3. Sample Network System and Hardware Components

Summary of Preparation Tasks

Before you install the storage management software, you must perform the tasks described in Table 2 to ensure the components on the network are set up and operating properly, and you have all the controller information needed for the software to operate correctly.

Perform the tasks in through and use to record information such as RAID Controller and controller names, hardware ethernet and IP addresses, and host machine configuration type.

Table 2: Summary of Tasks for Configuring Controllers on the Network

Task To Perform	Why Perform This Task?	For More Details, See:
1 Install all hardware components (host machines, RAID Controllers, cables, etc.) that you want connected to the network. **NOTE** You need the proper type of transceiver when connecting your RAID Controllers to the network.	To ensure the network hardware is present.	The *Installation Guide* specific to your hardware components.
2 Determine the hardware ethernet address for each controller in all the RAID Controllers connected to the network.	To configure the BOOTP server on the network.	"Determining the Hardware Ethernet Address" on page 17.
3 Establish and record a naming scheme for each RAID Controller and for each controller in the RAID Controllers connected to the network.	To help when assigning names and addresses to your controllers and host machines.	"Determining Names for RAI Controller Units and Controllers" on page 18.
4 Obtain IP addresses from your network administrator for each controller in all the RAID Controllers connected to the network.	To configure the BOOTP server on the network and to set up the host (or DNS) table.	"Obtaining IP Addresses" on page 19.
5 Configure the hardware and I addresses on the BOOTP server on the network.	To set up the network address information for the BOOTP server.	"Setting Up the BOOT Server" on page 19.
6 Verify the TCP/IP Protocol i installed and set up the host (or DNS) table.	To verify your Windows machine is configured to reach the controllers over the network.	"Verifying the TCP/IP Protocol and Setting Up the Host or DNS Table" on page 32.
7 Power up the component connected to the network.	To ensure all devices and links are operational.	The *Installation Guide* specific to your hardware components.

Table 3 provides samples for both a single and a dual-controller RAID Controller.

Table 3: Sample Table for Recording Controller Addresses, Names, and Information

RAID Controller Name	Hardware Ethernet Addres	IP Address	Controller Name	Host Machine Configuration Type
Example: (The first RAID Controller on host machine *socrates*.) *RAID Controller Name:* socrates_ks_001	00a0b802042c	153.79.144.17	soc_7	Single-host
Example: (The first RAID Controller on host machine *beatrice*.) *RAID Controller Name:* beatrice_fl_001	00a0b8020420 00a0b80000d8	153.79.144.13 153.79.144.14	beatr_1 beatr_2	Single-host

Table 4 provides a place for you to record controller and controller information. Keeping this record will help you properly set up the BOOTP table for the network server and th host or DNS (Domain Name Server) table to use the storage management software. It will also help you correctly add additional RAID Controllers after initial installation. The first four column headings show a reference to the page where you can go for detailed instructions on obtaining this information.

Table 4: Table for Recording Controller Addresses, Names, and Information

RAID Controller Name (See page 19)	Hardware Ethernet Addres (See page 17)	IP Address (See page 19)	Controller Name (See page 19)	Host Machine Configuration Type
RAID Controller Name:				
RAID Controller Name:				
RAID Controller Name:				

Table 4: Table for Recording Controller Addresses, Names, and Information

RAID Controller Name (See page 19)	Hardware Ethernet Addres (See page 17)	IP Address (See page 19)	Controller Name (See page 19)	Host Machine Configuration Type
RAID Controller Name:				
RAID Controller Name:				
RAID Controller Name:				
RAID Controller Name:				
RAID Controller Name:				
RAID Controller Name:				
RAID Controller Name:				

Determining the Hardware Ethernet Address

Use the following procedure to record the correct hardware ethernet address for each controller in all RAID Controllers connected to the network.

1. Turn the power off to all the RAID Controllers on the network.

IMPORTANT   Consult the manual shipped with your RAID Controller Unit for specific procedures on removing/replacing controllers.

---

2. Remove the controller (one at a time for redundant controllers) from the RAID Controller.

3. Record the ethernet address as it appears on the label on the controller back underneath the canister.

   The Ethernet ID (or hardware ethernet address) is shown in Figure 4. Use Table 4 on page 16 to record the IDs.
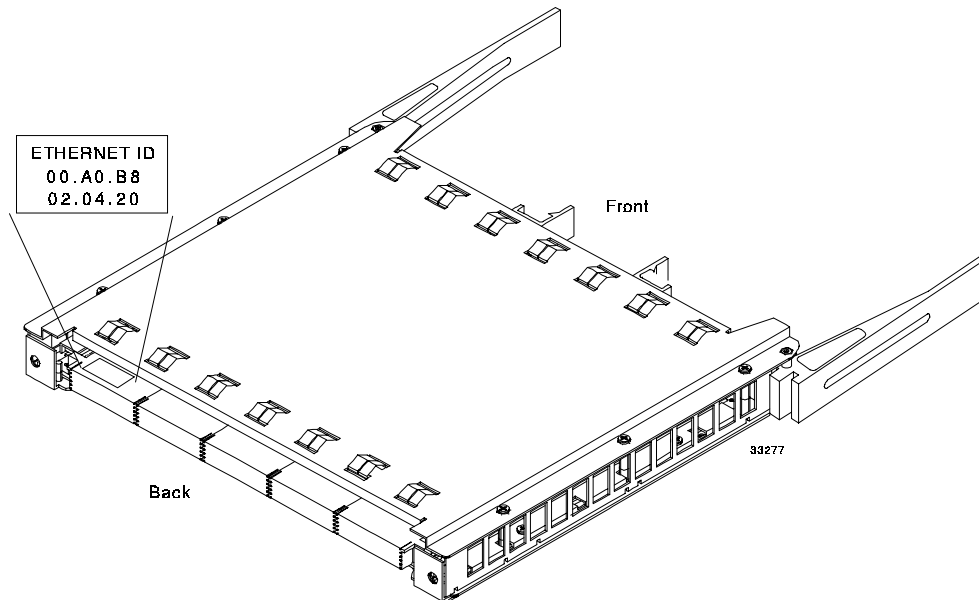
Figure 4. Location of Ethernet Address on the Back of the Controller

4. Replace the controller in the RAID Controller Unit.

5. Repeat Step 2 through Step 4 for *each* controller in *ever* RAID Controller Unit.

6. Continue with "Determining Names for RAID Controller Units and Controllers" on page 18.

Determining Names for RAID Controller Units and Controllers

When you open any storage management application for the first time after installation, you will be required to add information about the controllers in each RAID Controller Unit to allow the software to recognize them. You will also be able to provide a unique name for each RAID Controller Unit and controller. Use the information below and Table 4 on page 16 to record the information you will need to add the RAID Controller Units.

RAID Controller Unit Names

The RAID Controller Unit name can be anything you want; however, the software allows only 16 characters. You can provide a unique name for each controller (see Example Names in Table 3), or you can accept the default name which will be Net Module xxx (where xxx is a sequential number). If you choose to rename the controllers, the new nam might include the name of the host machine, an indication of its location, and a uniqu number.

Controller Names

* The controller names can also be anything you want; however, the name should be meaningful to you in the first eight characters because the software only displays th first eight characters in its device-name display.

* Furthermore, you need to provide a *unique* name for each controller in all RAID Controller Units (see Example Names in Table 3). Therefore, we suggest that the name identifies the name of the host machine (connected to your RAID Controllers via I/O data connection) and a number representing the controller or its host-side ID. However, keep in mind the eight-character display limit. Because names for host machines could be much longer than the character limit allows, you may need to be creative when creating or abbreviating them.

Obtaining IP Addresses

Each controller in every RAID Controller Unit on the network needs a unique IP address. Contact your network administrator to get the IP addresses you need and record them in Table 4 on page 16. You can also use Table 4 to provide a list for your network administrator.
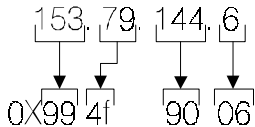
Setting Up the BOOTP Server

Regardless of whether BOOTP is UNIX or DHCP, you have some required and optional settings to consider. Review Table 5, then select the correct procedure for the type of BOOTP Server you are using.

.

Table 5: Required and Optional Entries for Setting Up the BOOTP Server

Entry	Description	Format /(Example) In BOOTP Server
Required Entries		
subnet mask	Mask used to route packets to defined subnets.	dot notation (sm=255.255.248.0)
router	IP address of machine that routes packets to other locations or networks.	dot notation (gw=153.79.144.2)
controller name	Controller name you created for the controller (such as beatr_1 and soc_ks9). (Refer to Table 4 on page 16.)	controller name (beatr_1)
IP address	IP address of controller. (Refer to Table 4 on page 16.)	dot notation (ip=153.79.144.13)
ethernet address	Hardware ethernet address of controller. (Refer to Table 4 on page 16.)	hexadecimal notation (ha=00a0b8020420)

Table 5: Required and Optional Entries for Setting Up the BOOTP Server

Entry	Description	Format /(Example) In BOOTP Server
tag 164	The remote management station (RMS) tag; includes a tag and IP address for each Windows station where you are installing the storage management software. **IMPORTANT** You may have a maximum of *four* remote management and SNMP network management stations (NMS); that is, the combined total of tags 164 (T164=) and 165 (T165=). **1** From each station, select Start → Settings → Control Panel → Network → Protocols → TCP/IP Protocol → IP Address to locate this IP address. **NOTE** If the IP address information is blank and Obtain An IP Address From A DHCP Server is selected, you will need to go to either your network administrator or to the DHCP Server to obtain the IP address. Remember, this IP address must be reserved for *only* this station. **2** You must then convert the dot notation (IP address) to a hexadecimal notation (see example below). **NOTE** Select Start → Program → Accessories → Calculator. Use the Scientific view to assist with numerical conversion. This is not required for DHCP. 153. 79. 144. 6 0X99 4f 90 06 Figure 5. Sample Conversion of Dot to Hexadecimal Notation **3** Enter the hexadecimal notation in the BOOTP server.	hexadecimal notation (T164=0x994F9006)

Table 5: Required and Optional Entries for Setting Up the BOOTP Server

Entry	Description	Format /(Example) In BOOTP Server
Optional Entries		
vm=rfc 1084	Some BOOTP servers require this vendor tag in order to return vendor-specific configuration information for controller operations.	vm=rfc 1084
tag 163	The network timeout tag sets a value on the controller for the amount of time (in seconds) it will wait for a reply from this software. The default is 30.	T163=30
tag 165	The Simple Network Management Protocol (SNMP) tag; includes a tag and the IP address of the Network Management Station (NMS). Set this tag if you want the controller to send traps directly to the designated NMS. You can also enable the storage management software to send traps to the designated NMS. This procedure is explained later in "Enabling SNMP" on page 3-8. **1** Contact your network administrator or use the operating system on the NMS to locate this IP address. Consult your operating system documentation for directions. **2** You must then convert the dot notation (IP address) to a hexadecimal notation (see Figure 5 on page 21 for an example). **3** Enter the hexadecimal notation in the BOOTP table.	hexadecimal notation (T165=0x994F8004)

Select the correct procedure for setting up your BOOTP server.

UNIX	DHCP
Continue with "Using a UNIX BOOTP Server" on page 23	Go to "Using a DHCP Server" on page 24.

Using a UNIX BOOTP Server

1. Use Table 4 on page 16 and Table 5 on page 20 to set up the BOOTP table and mak
    the required entries for supporting the controllers in the RAID Controllers connected to
    the network.

    A sample entry for editing the BOOTP table follows.

    > **NOTE** To set up this BOOTP server, you would use a text editor to edit the
    > bootptab file in the */etc* directory.

2. Turn on power, or cycle power to the RAID Controllers on the network in order for the
    parameters in the BOOTP table to take effect.

3. Continue with "Verifying the TCP/IP Protocol and Setting Up the Host or DNS Table"
    on page 32.

> **EXAMPLE** The following sample entry for a BOOTP table assumes you are
> configuring a UNIX BOOTP server, such as a server on network 1 as
> shown in Figure 3 on page 14. The s3.default:\ entry denotes settings that
> are common to all controllers. The tc=s3.default:\ entry associates this
> common setting group to a specific controller.

```
s3.default:\  (common settings)

    ht=ether:\

    sm=255.255.248.0:\

    gw=153.79.144.2:\

    T164=0x994F9006:\

    T165=0x994F8004:\

    hn:

beatr_1:\

    tc=s3.default:\  (refers to common settings)

    ip=153.79.144.13:\

    ha=00a0b8020420:




beatr_2:\

    tc=s3.default:\
```

```
        ip=153.79.144.14:\

        ha=00a0b80000d8:

    beatr_3:\

        tc=s3.default:\

        ip=153.79.144.11:\

        ha=00a0b80000e5:

    beatr_4:\

        tc=s3.default:\

        ip=153.79.144.12:\

        ha=00a0b802007c:

    beatr_5:\

        tc=s3.default:\

        ip=153.79.144.15:\

        ha=00a0b80200d7:

    beatr_6:\

        tc=s3.default:\

        ip=153.79.144.16:\

        ha=00a0b802008e:
```

Using a DHCP Server

You must have a DHCP Manager installed before you can set up the DHCP Server. If you
have this installed, continue with "Setting Up a DHCP Server." If a DHCP Manager is not
installed, you need to install it now.

> **NOTE**   The following steps and screen examples assume you are configuring a
> Windows NT DHCP Server using its DHCP Manage .

Installing the DHCP Manager

Use the following procedure to install the DHCP Manager.

1. Select Start → Settings → Control Panel.

2. Select the Network icon.

3. Select the Services tab.

4. Select DHCP Server Network Services → Add.

5. Re-install the service pack.

6. Continue with "Setting Up a DHCP Server" on page 25.

Setting Up a DHCP Server

Refer to Table 5 on page 20 and Table 4 on page 16 when using the following steps to set up your DHCP/BOOTP server:

1. Select Start → Programs → Administrative Tools → DHCP Manager.

The DHCP Manager Screen appears.

2. Create a scope.

A scope defines a group of controllers you want to configure using the DHCP/BOOTP server.

a. Double-click Local Machine.

b. Select Scope → Create (Figure 6 displays).
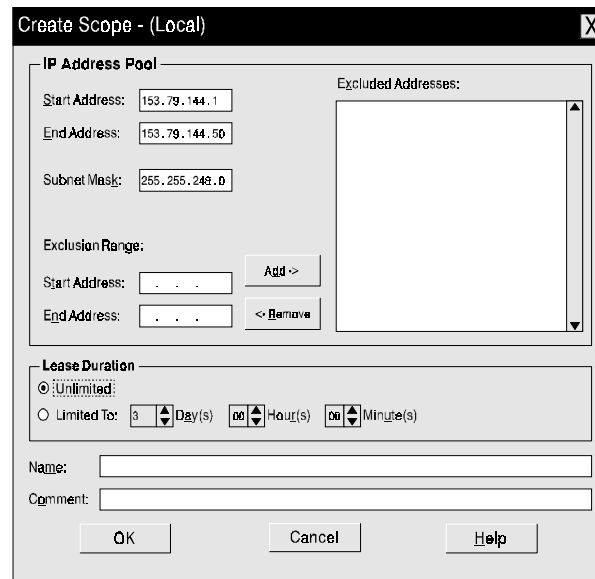
Figure 6. Create Scope Screen

c. Enter the starting and ending IP addresses of the controllers you are configuring on your network.

For example, if you are configuring 50 controllers on a 153.79.144.0 subnet, your starting address should be set to 153.79.144.1 and your ending address should be set to 153.79.144.50.

> **NOTE** If each field does *not* contain a *least* three characters, you must press the period key to advance to the next field. If you have only one controller, you still must add its address for both the starting and ending addresses.

   d. Enter your subnet mask (obtained from your network administrator).

   e. Set the Lease Duration to Unlimited. This makes the DHCP connection permanent.

   f. If you wish, you can add a Scope Name and Comment.

   g. Select OK.

   h. When you see that the scope has been successfully completed, select Yes to activate.

You are returned to the DHCP Manager screen.

3. Create vendor unique option entries.

You will need to add all controller configuration options that are vendor specific in th DHCP Server's options list.

   a. Select DHCP Options → Defaults. The Default Value screen displays.

   b. Select New (Figure 7 displays).
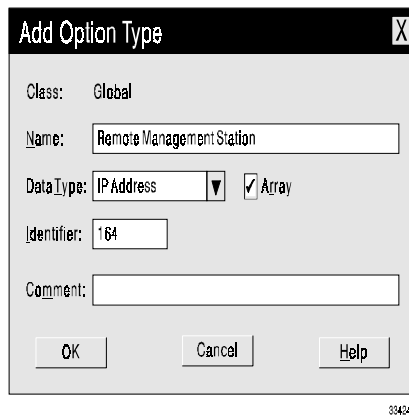
Figure 7. Add Option Type Screen

   c. Fill in the option's Name, Data Type, and Identifier fields.

For example, the following options should be added:

Name	Data Type	Identifier (Tag)
Remote Management Station	IP address	164
Network Management Station	IP address	165

NOTE   Typically, the entries listed above will be all that you need to configure the controllers. However, there are other configuration options available. Consult th Table 5 on page 20 for a list of required and optional entries for the BOOTP server. Remember, you may have a maximum of *four* remote management and SNMP network management stations (NMS); that is, the combined total of tags 164 and 165.

d. Make sure the Array box is checked whenever the option you add is an IP address.

e. Select OK. You are returned to Default Value screen.

f. Repeat Step b through Step e until all options are added.

g. When you have added all Vendor Unique Options, select OK at the Default Value screen.

You are returned to the DHCP Manager screen.

4. Configure global scope options.

The scope options will allow you to configure settings that will be applicable to all your controllers. Refer to Table 5 on page 20 to determine what parameters you want to apply to the entire group.

> **NOTE** You can apply some options to specific controllers later using Step 6 on page 30.

a. Select DHCP Options → Global (Figure 8 displays).
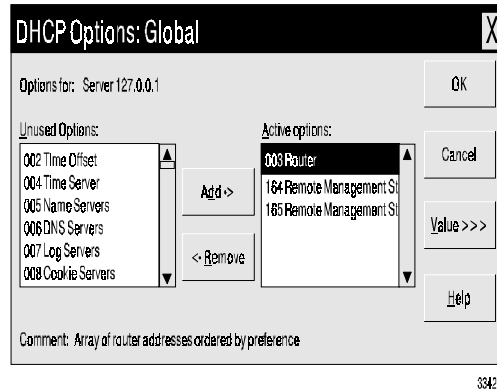
Figure 8. Global Options Screen

b. Highlight any entry in th Unused Options list and select Add to move it to the Activ Options list.

> **NOTE** Each option is preceded by its tag number. A typical installation may include the following Global Options:
>
> 003 Router
> 164 Remote Management Station (RMS)
> 165 Network Management Station (NMS)

c. Select Value to assign a value to the active option.

The Value option greys out and the Edit Array option box appears in the lower part of the screen.

d. Select Edit Array if the value you need to add is an IP address (such as for a router, RMS, or NMS) (Figure 9 displays).
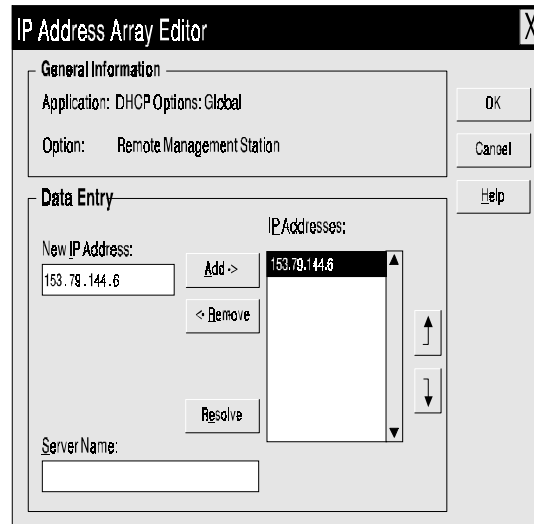
Figure 9. IP Address Array Editor Screen

e. Enter the unique IP address for the option you added. Figure 9 shows an example o adding the IP Address for an RMS.

> **NOTE**   If you do not know the IP address, but you know the Server name, you can use this field and the Resolve option to determine the correct IP address.

f. Select Add to move it to the IP Address list.

g. Select OK. You are returned to the DHCP Options: Glo balscreen.

h. Repeat Step b through Step g until all global options are added.

i. When you have added all Global Scope Options, select OK at the DHCP Options: Global screen.

You are returned to the DHCP Manager screen.

5. Create a reservation for each controller.

Use Table 4 on page 16 to make sure you include all the controllers for every RAID Controller in your network. This table contains your controller names and IP addresses.

a. Select Scope → Add Reservations.

b. In the IP Address field, enter the IP address for the first controller (in your table).

c. In the Unique Identifier field, enter the hardware ethernet address for the sam controller.

d. In the Client Name field, enter the controller's eight-character name.

e. Select Add. The screen resets and is ready for the next entry.

    f. Repeat Step b through Step e for each controller in Table 3.

    g. When all controllers have been entered, select Close.

       You are returned to the DHCP Manager screen.

6. Configure Controller Specific Options.

Creating a controller specific option allows you to associate a controller configuration entry with a specific controller added in Step 5.

IMPORTANT   If you already set an option as Global Scope, it applies to every controller in this group and does not need to be added again here.

---

    a. Select Scope → Active Leases Figure 10 displays).
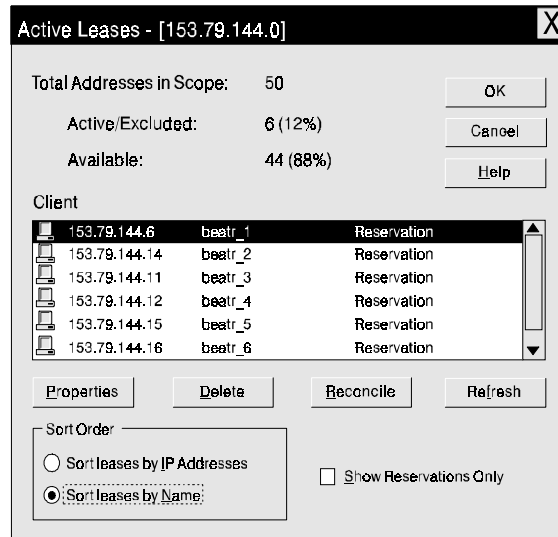
Figure 10. Active Leases Screen

b. Highlight any controller in the list.

c. Select Properties (Figure 11 displays).
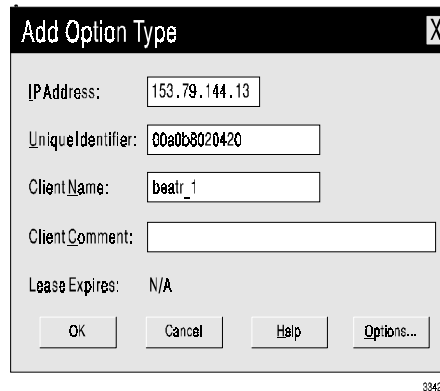
Figure 11. Client Properties Screen

d. Select Options. The DHCP Options: Reservations screen displays.

e. Highlight an entry in the Unused Options list and select Add to move it to the Activ Options list.

f. Select Value to assign a value to the active option.

IMPORTANT   You must add Option 012 Host Name for each controller, and enter th controller's name for the value.

---

g. Enter the information for the value of the option.

For example, for Host Name enter the controller name from Table 3 on page 16 in the String box. Or, select Edit Array if the value you need to add is an IP address (such as for a router, RMS, or NMS).

h. Repeat Step e through Step g until all specific options for this controller are added.

i. Select OK.

You are returned to the Client Properties screen.

j. Select OK.

You are returned to the Active Leas esscreen.

k. Repeat Step b through Step h until all Controller Specific Options for every controller are added.

l. When you selected all controllers you want and added specific options, select OK at the Active Leases screen.

You are returned to the DHCP Manager screen.

7. Continue with .

Verifying the TCP/IP Protocol and Setting Up the Host or DNS Table

Use the following procedure to verify the TCP/IP Protocol is installed and to set up the host or DNS (Domain Name Service) table. This is necessary to correspond your network controller name for the controllers with their IP addresses.

1. Verify the TCP/IP Protocol is installed and configured properly.

> **NOTE** If the TCP/IP Protocol software is not installed, load it from your Windows N , Windows 95, or Windows 98 CD-ROM. Select Start → Settings → Control Panel → Network → Protocols → Add Programs.

2. You must edit either the DNS (Domain Name Service) or your host table to add the IP address and controller name for each controller on the network. Edit the two host tables found in the following directory/paths:

Windows NT	Windows 95 and Windows 98
c:\winnt\system32\drivers\etc\hosts	c:\windows\host
c:\winnt\system32\drivers\etc\lmhosts	c:\windows\hosts\lmhosts

For example, to set up the host tables for the controllers connected to network 1 (Figure 3 on page 14), use a text editor to create the following controller name and IP address entries:

127.0.0.01	localhos
153.79.144.13	beatr_1
153.79.144.14	beatr_2
153.79.144.11	beatr_3
153.79.144.12	beatr_4
153.79.144.15	beatr_5
153.79.144.16	beatr_6

3. Continue with .

Installing the Software

Use the following procedure to install the storage management software.

IMPORTANT   You must have administrator privileges to access this software. This installation procedure requires you to restart the operating system. Therefore, make sure that other users are *not* on the system when installing this software.

---

1. Insert the Installation CD into your CD-ROM drive.

> **NOTE**   In the following examples, c:\ is designated as your boot drive and d:\ is designated as the CD-ROM device drive. Be sure to select the correct drives for your system.

2. To begin the installation program:

   a. Select Start → Settings → Control Panel → Add/Remove Programs.

   b. Select Install, and then browse.

   c. When you see d:\networkd\netsymsm\setup.ex , select Finish.

3. Follow the instructions on screen to complete the installation procedure.

IMPORTANT   During installation, you will be prompted to define the directory path where you want this software installed. If you are defining your own directory path, do *not* use special characters for the directory name (such as, #, $, or +). The default path is c:\Program Files\NetSYMsm. For th purpose of providing examples of the installation requirements, this *Installation Guide* will refer to the default directory.

---

4. When the installation is completed, remove the CD and restart the system.

5. After your system restarts, continue with .

Verifying the Installation

Verify that the storage management software is installed, and that the Disk Array Monito service is running.

1. To verify that the software has been installed, select Start $\rightarrow$ Programs. Networked SYMplicity Storage Manager appears in the list.

2. To verify that the Disk Array Monitor is running:

Windows NT	Windows 95 and Windows 98
Select Start $\rightarrow$ Settings $\rightarrow$ Control Panel $\rightarrow$ Services. The Disk Array Monitor is running if this service's status is Started.	An icon appears in the service tray in the lower right corner of your screen. Move your cursor over the icon. A status message pops up indicating that the Disk Array Monitor is Running.

3. Continue with .

Adding RAID Controller Information

Since you are installing the storage management software for the first time, there are no RAID Controllers defined at this point. When you first select an application, you are prompted to add RAID Controllers. Using the information you compiled in Table 4 on page 16, define the RAID Controllers on your network by performing the following procedure:

1. Select the Maintenance/Tuning Application.

   The No RAID Controllers Are Currently Defined screen appears.

2. Select OK to add RAID Controllers.

   The Add screen appears (Se Figure 12).

Add

Instruction:

Add a host name for each controller in your
RAID Modules. If a module has a single
controller, specify only one host name.

Controller Information (8 characters max.):

Controller A: [   ]

Controller B: [   ]

Comment (60 characters max.):

[   ]

[OK]   [Cancel]

33305

Figure 12. Add Module Screen

3. Enter the controller names for the first RAID Controller you defined in Table 4 on page 16.

> **NOTE** Now is also a good time to add information in the Comment field for each RAID Controller. You may want to add location details, host-RAID Controller configuration, machine type, or other unique information to further clarify the controller for future identification.

4. Select OK when the information is complete.

The Add Name screen appears (See Figure 13). The first RAID Controller will show the default name, Net Module 001.
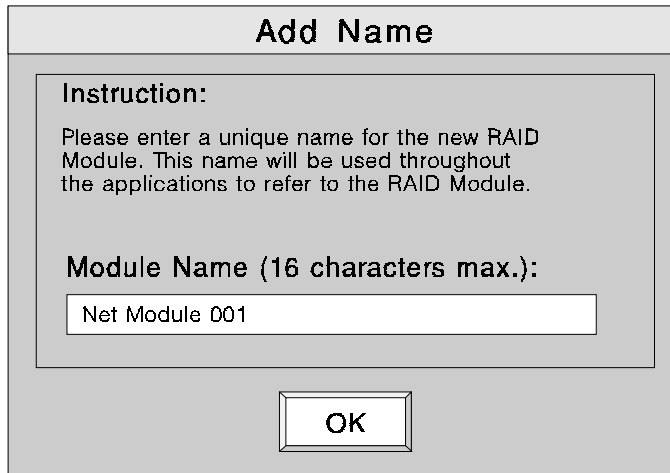
Figure 13. Add Module Name Screen

5. Do one of the following:

To accept the default name, select OK	To define a new name for the module, enter the name (up to 16 characters) and select OK. Refer to Table 4 on page 16.

After selecting OK, the Add screen appears again.

6. Repeat Step 3 through Step 5 for all the RAID Controllers on your network until you have completed the list in Table 4 on page 16.

> **NOTE** If you receive an error message when adding a new controller, you should use the symping utility to display possible reasons and suggestions fo correcting the problem.

7. When you have entered all controller and controller names from Table 4, select Cancel at the final Add screen.

The Select Module main screen appears (Se Figure 14).

RAID Module Selection

Module Name	Controller Information	Indep. Cntrls?	Comment
SunKing	Drive16, Drive3	No	
Cornice	Drive24, Drive10	No	
Viper	Drive32,	Yes	

Find	Add	Remove	Edit	OK	Exit

33384
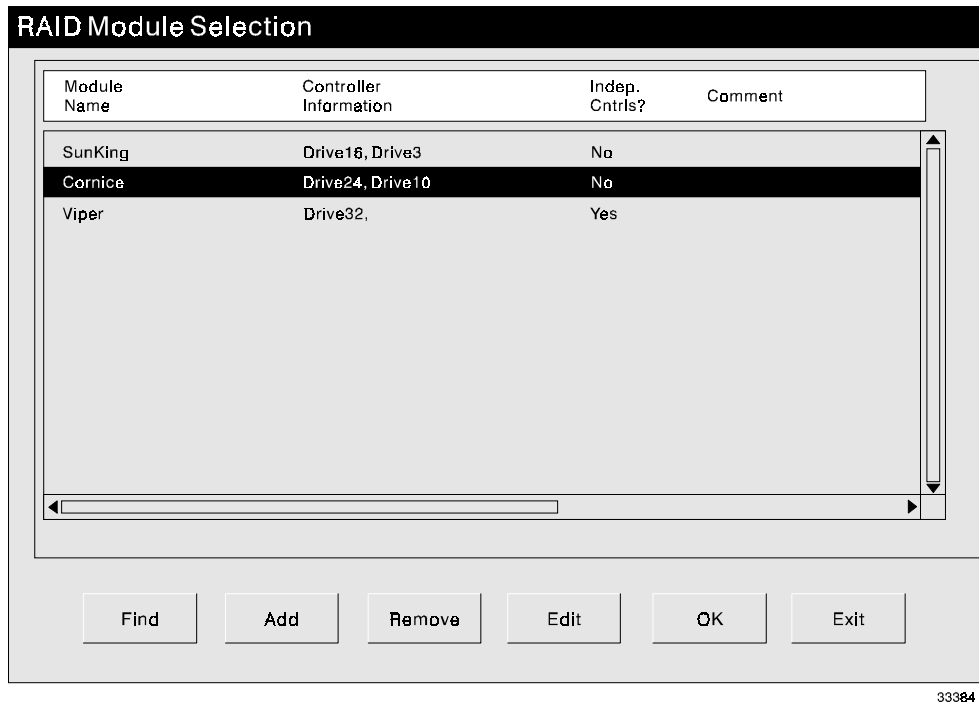
Figure 14. Select Module Main Screen

8. Verify that this screen contains the correct number of RAID Controllers (us Table 4).

9. Continue with "Upgrading the Controller Firmware" on page 37.

Upgrading the Controller Firmware

1. Determine if you need to upgrade to the required controller firmware version:

   a. Select RAID Controlle → Module Profile → Controllers.

   b. Verify the boot and firmware levels meet the minimum requirement (se Table 19 on page 85).

   c. Select OK when finished viewing.

2. Do you have the minimum firmware version?

Yes	No
Go to Step 4 on page 38.	Continue with Step 3 on page 38.

3. Upgrade your controller firmware now.

    a. Select Maintenance/Tuning → Firmware Upgrade.

    b. Select Offline.

    c. Download the firmware files from this software CD-ROM. For example, at the path line (assuming d: is your CD-ROM drive) type d:\networkd\firmware\03000105.apd + 03000103.bwd WHERE the numbers match the firmware level to which you need to upgrade.

4. Continue with Chapter 4, "Operating System Support."

Chapter 4. Operating System Support

This section contains information related to operating this software in the Windows operating environment.

Logical Units Supported

Understanding Logical Unit Support

The networked storage management software supports the creation of up to 32 logical units per RAID Controller. However, in most cases, not all of them will be visible to th I/O host machine (connected to the RAID Controllers with Fibre Channel connection). The actual number of logical units (LUNs) you can configure on a RAID Controller depends on two separate limits:

- **Operating System** — The operating system installed on the I/O host machine has a maximum number of logical units (LUNs) per RAID Controller that it supports. Fo example, Windows NT limits the maximum number of LUNs per RAID Controller Unit to 32 (whether the module has a single controller or redundant controllers). Therefore, if you have a RAID Controller Unit with two active controllers, the total number of LUNs between them *cannot* be more than 32.

  This limit is set with the System_MaxLunsPerController parameter in the rmparams file and is set to support 32 LUNs by default. You should NOT change this parameter setting unless *every* I/O host is limited to eight LUNs.

CAUTION   Remember that with the System_MaxLunsPerController parameter in the rmparams file set to 32, the Configuration Application (Create LUN option) allows you to configure up to 32 LUNs for every RAID Controller configured on the network whether the I/O host machine can support 32 LUNs or not.

If you have more than one I/O host machine connected to your modules and *any* of them do *not* support 32 LUNs, you must be careful not to configure more LUNs on those modules than the host machine allows. If you do, the host machine cannot send or receive data from those LUNs.

- **Host Adapter** — The host adapter (in the host machine) also has a maximum number of LUNs it can support. For example, if you have four RAID Controllers and an eight LUN-per-module limit, your host adapter needs to be able to support the total number of LUNs (32 in this example).

Supporting 32 Logical Units

You need to first determine how many logical units are supported by the operating system on the I/O host machines connected to your RAID Controllers. Second, you need to determine how many LUNs are supported by the type of host adapters in the system.

NOTE   If you have another operating system on your host machine (other than Windows NT), consult the documentation appropriate to that operating system to determine the maximum number of LUNs supported.

Creating and Deleting Logical Units

After creating or before deleting logical units (LUNs) using the Configuration Application in the networked storage management software, the I/O host operating system needs to recognize the changes. For example, with Windows NT, a reboot is necessary.

Creating Logical Units

After creating LUNs you have to make them part of the I/O host operating system. See your I/O host documentation for details on adding a drive. Remember each logical unit (not a drive group) is seen by the operating system as *one* drive.

CAUTION   Remember that the Configuration Application (Create LUN option) allows you to configure up to 32 LUNs for every RAID Controller configured on the network whether the I/O host machine can support 32 LUNs or not. If you have more than one I/O host machine connected to your modules and *any* of them do *not* support 32 LUNs, you must be careful not to configure more LUNs on those modules than the host machine allows. If you do, the host machine cannot send or receive data from those LUNs.

Deleting Logical Units

Before deleting LUNs with this software or using File → Reset Configuration, stop I/Os to the affected RAID Controller. Then, unmount any filesystems, delete any partitions, and deassign any drive letters associated with the LUNs on your I/O host.

Background Monitor

The storage management software has a background monitor that automatically polls all RAID Controllers and checks for problems/events at a specified interval. If any problems or events are detected, the information is written to the default log file. This becomes an historical record of past component failures, general status changes, and configuration changes.

The checking interval can be changed from the default of every five minutes. For best results, use the default value or smaller to ensure that you are notified about problems/events as close as possible to when they occur.

CAUTION	Setting this value (Status → Options → Log Settings) too small could cause the check to affect system I/O performance. However, setting this value too large could delay notification of serious problems.

Stopping the Disk Array Monitor Service

CAUTION	You should *only* stop this monitoring service if you are specifically instructed to do so by Recovery Guru, the troubleshooting documentation, or your Customer Services Representative. However, doing so means that *none* of the RAID Controllers connected to the host will be checked during this time. Be sure to restart the monitor when instructed.

Windows NT	**Windows 95 and Windows 98**
1 Select Start → Settings → Control Panel → Services. **2** Highlight the Disk Array Monitor Service **3** Select Stop. When the status changes to Stopped, close the Services Application.	**1** Double-click the icon in the service tray in the lower right corner of your screen. The icon changes and will now have the universal no symbol indicating that the monitoring service has been stopped.

Starting the Disk Array Monitor Service

This background monitor automatically starts when you run the storage management software. However, it will be necessary to manually start this process if you have stopped it for some reason.

Windows NT	Windows 95 and Windows 98
1 Select Start → Settings → Control Panel → Services **2** Highlight the Disk Array Monitor Service. **3** Select Start. When the status changes to Started, close the Services Application.	**1** Double-click the icon in the service tray in the lower right corner of the screen. When you move your cursor over the icon, a message will pop up indicating that the Disk Array Monitor Service is Running.

When you have manually stopped the background monitor, you have not been monitoring for some period of time. We recommend that you run Recovery Guru/Heath Check to make sure that no problems have occurred while you had the disk array monitor stopped.

Terms to Know

BOOTP Server

A network machine running the service that provides startup information. See "Setting Up the BOOTP Server" on page 19 for the required and optional entries.

Controller Name/ID

Also known as the device name, the controller name/ID is the controller name you created after the software installation procedure. The software uses these names to gain access to each controller in the RAID Controllers connected to the network. Because each controller name must be unique, you can record its correspondence to a specific controller in a RAID Controller. See "Determining Names for RAID Controller Units and Controllers" on pag 18 for specific details and examples of creating these names.

Hardware Ethernet Address

The hardware identification assigned by the manufacturer, also known as the MAC address. This number is located on the back of the controller (see Figure 4 on page 18). This unique address is required for configuring the BOOTP Server on your network. Se "Determining the Hardware Ethernet Address" on page 17 for specific details on obtaining this address.

IP Address

The 32-bit identification defined by the Internet Protocol. It is usually represented in dotted decimal notation and can be obtained from your network administrator. This unique address is required for configuring the BOOTP Server on your network and setting up th host (or DNS) table. Se "Setting Up the BOOTP Server" on page 19 and "Verifying th TCP/IP Protocol and Setting Up the Host or DNS Table" on page 32 for more information on using this address.

Module Names

By default, module names are assigned in the order in which the system detects th module. The default name displayed is Net Module xxx, where xxx is a sequential number. You can choose to rename the modules; however, the software allows only 16 characters, and each name must be unique. See "Determining Names for RAID Controller Units and Controllers" on page 18 for specific details and examples of creating these names.

NMS

Network Management Station, also known as a target. A remote network manager you can assign to receive SNMP traps.

RMS

Remote Management Station. The Windows N , Windows 95, or Windows 98 system where the storage management software is installed and executed for the configuring and monitoring of RAID devices.

SNMP

The Simple Network Management Protocol (SNMP) notification is an option you may enable when installing this software. It allows this software to send remote notification of RAID events to a designated NMS using SNMP traps.

SNMP Traps

An SNMP message type sent to an assigned NMS.

Command Line Interface

Certain text files were copied to the default installation directory (*netsymsm*) during this software installation. These files provide supplementary information for storage management and administration. Some tasks are carried out automatically by service processes that run from system startup to system shutdown. There are also command line utilities that make it possible to embed customized and/or interactive operations.

You can access these text files by typing (from the installation directory) help <filename> or by using any text editor to open and read them. For example, to read the file on the drivutil command, from the installation directory, type: help drivutil.

For a list of these files and a description of the utility or program they describe, see the *User's Handboo* .

What's Next?

Continue with "Chapter 5. Customizing the Installation" to make specific changes to the storage management software.

Chapter 5. Customizing the Installation

This chapter describes how to customize your installation to run on your system.

Protecting Data with RDAC over the I/O Data Connection

It is possible to have failover protection over the I/O data connection if your host machine is running Windows NT, is connected to the RAID Controller Units by Fibre Channel connection, and has the Redundant Disk Array Controller (RDAC) Driver installed. Th RDAC driver is available for installation from the software CD-ROM.

IMPORTANT   RDAC protection is *only* available on host machines running Windows NT.

For RAID Controllers with redundant controllers, this host-based driver manages the I/O data path. If a component fails on the data path (interface cable/terminator, controller, host adapter, etc.) that causes the host to lose communication with a controller, the RDAC driver automatically reroutes all I/O operations to the other controller.

CAUTION   Do *not* install the RDAC driver before upgrading or installing the storage management software. The installation procedure will remove any version of the RDAC driver. The RDAC driver will need to be installed from this software installation CD.

Setting Up the Fibre Channel Host Adapters

If you are using a Fibre Channel connection to your RAID Controllers, you must set up the host adapters using the following procedure:

1. Go to the HBA directory on this software installation CD.

2. Consult any readme file in that folder.

   This file will give specific instructions on what you need to do to set up your Fibre Channel host adapter as well as the latest information on supported host adapters and drivers.

3. Continue with "Installing the Driver."

Installing the Driver

To provide RDAC failover protection, you need to install the RDAC driver on any Fibr Channel host machine (using either the single-host or multi-host RAID Controller configuration) that is connected to the RAID Controller. This host machine *must* have Windo wsNT installed.

IMPORTANT   Close all other applications, and make sure that other users are *not* on the system when installing this driver.

---

1. Insert the installation CD into your CD-ROM drive on the host machine attached via I/O data path connection to the RAID Controllers. (Depending on your network configuration, this machine may *not* be the same place where you installed the Networked storage management software.)

   NOTE   In the following examples, c:\ is designated as the boot drive and d:\ is designated as the CD-ROM drive. Be sure to select the correct drive for your system.

2. To begin the installation program:

   a. Select Start → Settings → Control Panel → Add/Remove Programs

   b. Type d:\networkd\rdac\SETUP.EXE

   c. Select Finish.

3. Follow the screen instructions.

4. Remove the CD when you see the Restart screen and select YES.

5. Select Start → Settings → Control Panel → Devices to verify the RDAC driver is installed.

   The RDAC driver (symarray) is installed if this driver status is Started.

IMPORTANT	Before changing any NVSRAM values, it is a good idea to record the existing values for the offsets you are changing. Should you ever uninstall the RDAC driver, you may need to refer to these values.

6. Use the Networked storage management software to change several NVSRAM settings after you install the RDAC driver. (Remember that this station may *not* be the same as the host where you installed the RDAC driver.) Type the following from the command line:

a. nvutil -n rdacon.def -vf <device_name>

WHERE

<device_name> is the name for the controller you designated when you added th RAID Controller to the Select Module list.

b. Make sure to issue this command to *every* controller in *each* module connected to the host where you installed the RDAC driver.

c. Turn off power to each RAID Controller, then turn it back on again for these settings to take effect.

d. Repeat this procedure for every host machine (running Windows NT) where you want the RDAC driver installed.

Uninstalling the Driver

Use the following procedure *only* if you want to remove the RDAC driver from your host machine.

IMPORTANT	Close all other applications and make sure that other users are *not* on the system when uninstalling this driver.

1. If you do not intend to re-install this software and are *not* removing the RAID Controller from the network, you may need to restore your controller NVSRAM configuration. Refer to the values you recorded before installing the RDAC driver and download them to the controllers in your RAID Controller using fwutil.

2. To begin the uninstall program:

a. Select Start → Settings → Control Panel → Add/Remove Programs and scroll th list to find SYMplicity RDAC Driver.

b. With SYMplicity RDAC Driver highlighted, select Add/Remove.

c. At the Uninstall Application screen, select OK to remove the software.

You will see screens indicating the uninstall program is removing the appropriat service, registry information, and files.

3. At the Restart screen, select OK to shutdown and to restart the Windows NT system.

Setting Up Scriptable Notification Options

The rmscript.bat file is accessed by the status monitor and automatic parity check whenever these utilities find an exception. By default, no action is taken. You can edit this file to specify a set of actions to take when an error is found.

For example, if you want to install third-party notification software to perform various events (such as faxing or paging), you would add the appropriate script for each event near the end of this file. Consult the third party software documentation for specific details.

> **NOTE**   If you installed an upgrade of the storage management software, you may want to refer to the rmscript.ori file to determine if you want to make additional customized changes to the new file. Remember, the new file contains new script for this version, so you must *not* replace it with th old file.

For more information, read the text file about rmscript.bat. From this software installation directory, type: help rmscript.

Understanding SNMP Notification

Enabling SNMP

This software can provide remote notification of RAID events to a designated network management station (NMS) using Simple Network Management Protocol (SNMP) traps.

You want to enable SNMP	You do not want to enable SNMP at this time
Continue with Step 1.	Go to "Changing the rmparams File" on page 50.

Use the following procedure to set up the NMS, to understand the contents of an SNMP trap message, and to enable or disable this notification option for each host.

1. Set up the NMS.

You only need to set up your designated NMS *one time*. Use the following procedure to compile this software Management Information Base (MIB) into your NMS.

> **NOTE** The MIB was written to standard version 1 SNMP syntax. It was designed specifically for the storage management software. It is *not* applicable to other vendors' RAID products.

a. Copy the *\netsymsm\rm6traps.mib* file to the network management station.

b. Follow the steps required by your specific network management station to compil the MIB.

> **NOTE** For details on the required steps, consult your network administrator or the documentation specific to the NMS product you are using.

2. Make sure the host system is connected to the network that has the NMS station.

3. Enable this notification on your host. You must edit three parameters in th *\netsymsm\rmparams* file so that the software will know where to direct the SNMP trap messages when a RAID Event has occurred.

4. Continue with .

Contents of an SNMP Trap Message

Refer to Table 6 for a description of the contents of an SNMP trap message.

> **IMPORTANT** If the trap type is anything other than informational, you should use th Status or Recovery Applications to get more information or specifi instructions on how to remedy the problem. Do *not* remove the SNMP message until the problem has been corrected since most trap notifications associated with this software are not persistent.

Table 6: Contents of an SNMP Trap Message

Item	Description
Storage Management Software Station IP Address	The standard IP address dot notation for the storage management software station.
Host Name	The text name assigned to the host.

Table 6: Contents of an SNMP Trap Message (continued)

Item	Description
Trap Type	There are four trap types: • **Informational** — No failure has occurred. Information is provided that an event, such as a logical unit creation, has occurred. • **Degraded Array** — A subsystem component failure has occurred. The module is still operational but now lacks redundancy in some area. (For example, a drive failure resulting in a degraded logical unit, a power supply failure, or a failure of one controller in a controller pair.) • **Failed Array** — A failure has occurred that leaves a module or logical unit unable to communicate. (For example, a failure of the controller in a single-controller RAID Controller or a multiple drive failure resulting in a dead logical unit.) • **Critical** — This is a small category of failures that may require timely intervention to correct. (For example, the two-minute warning from an uninterruptible power supply or a warning that write-back cache has been disabled due to a low battery.)
Affected RAID Controller	Indicates which RAID Controller had the event (for example, sonne_001).
Condition Description	A brief description of the event that has occurred.

Disabling SNMP

Perform the following steps to disable this notification on your host and stop this software from sending SNMP traps:

1. In the *\netsymsm\rmparams* file, change the value of the SNMP_Action_Number line to 0.

2. Save the rmparams file and copy it to the backup directory. It is critical that you have a backup copy of this file.

3. Continue with "Changing the rmparams File" on page 50.

Changing the *rmparams* File

The *\netsymsm\rmparams* file is used to store several configurable options available through this software. Review Table 7 on page 51 for a list of the parameters in the file that you may need to change after initial installation.

IMPORTANT   Most of these options (other than the ones shown in Table 7) should *not* be changed and many of the other options should only be changed through the graphical user interface (GUI). For more information, read

the help file about rmparams. From this software installation directory, type: help rmparams.

You must edit the rmparams file to increase logical unit support and to enable/disable SNMP notification.

Because of the critical nature of the rmparams file, you should make a backup copy of the file in a directory other than the installation directory. If this file becomes corrupted or missing, you should copy the backup rmparams file to the installation directory to resume normal operation. Furthermore, if you make any changes to this file directly or use the options in the GUI that write to this file (such as log settings), always copy the new version of the file to the backup directory.

1. Make any necessary changes to the *\netsymsm\rmparams* file using Table 7.

2. Save the rmparams file, and copy it to a backup directory.

3. Continue with "What's Next?" on page 52.

Table 7: Changeable Parameters in rmparams File

Description	When To Change	How To Change
SNMP_Target_IP_Address=127.0.0.1		
Provides the SNMP IP Address for remote notification.	If you want to enable SNMP.	Edit the rmparams file and change this value to the dotted notation IP address of the network management system where the MIB has been compiled. On most systems, this IP address can also be a dotted notation multicast address or broadcast address.
SNMP_Community_Name=NONE		
Provides the community name to be used for SNMP remote notification.	If you want to enable SNMP.	Edit the rmparams file and add the community name. The most commonly used community name is public; however, your network environment may require another name.

Table 7: Changeable Parameters in rmparams File (continued)

Description	When To Change	How To Change
SNMP_Action_Number=0		
Indicates the SNMP trap notification option you want to use.	If you want to enable SNMP.	Edit the rmparams file and change this value to either 1 or 2.

Value 1 will send SNMP traps to the designated NMS station. Value 2 means that all the relevant data is written to the file trap.dat.

IMPORTANT Setting this parameter to 0 will completely disable the SNMP option. |
System_DefaultModuleSelect=TRUE		
Determines whether or not the Select Module main screen displays each time you open an application.	If you want to change the default so that the Select Module main screen doe *not* display each time you open an application.	Edit the rmparams file and change TRUE to FALSE.
System_MaxControllers=200		
Determines the maximum number of RAID Controllers supported by the software.	If you have more than 200 RAID Controllers.	Edit the rmparams file and change the 200 to the appropriate number.

What's Next?

Continue with to ensure that the software operates correctly and to determine if the current configuration meets your needs.

Chapter 6. Initial Startup Procedures

This chapter contains the following procedures to ensure that the storage management software operates properly and to determine if your system configuration meets your needs:

Setting the Preferred Fibre Channel Loop ID

If you are using a fibre channel arbitrated loop configuration, you can use the nvutil utility to set the preferred loop IDs for the controllers on the loop.

IMPORTANT   You must specify a device name for the controller for which you want to set the preferred loop ID. Otherwise, the loop ID you specify will be assigned to every controller on the loop.

To set the preferred loop ID, type the following on the command line:

```
nvutil -i <Loop ID number> <device name>
```

Notes:

 1 The <Loop ID number> is the preferred loop ID you want to set.

 2 The <device name> is the device name for the controller.

You can select a value between 0 and 125 in hexadecimal. Loop ID 126 is reserved for an FL Port or an N/FL Port. Loop ID 127 indicates that the device does not have a hard or preferred address. The loop ID is assigned an arbitration priority with 0 being lowest and 126 being highest. Note that the loop ID is not the same thing as the Arbitrated Loop Physical Address (AL PA), but rather an index to valid AL PAs.

Bit 7 of Byte 3 is used to indicate one of two modes of operation. If bit 7 is set to 0, then bits 6-0 specify a base value that is added to the Host Bus SCSI ID to create the Loop ID. If bit 7 is set to 1, then bits 6-0 indicate the loop ID.

Table 8: Fibre Channel Loop ID Byte Definition

Bit	7	6	5	4	3	2	1	0	Result
Value	0	0x00 - 0x7f							Loop ID Base (added to Host Bus SCSI ID)
	1	0x00 - 0x7d							Loop ID (Host Bus SCSI ID ignored)
	1	0x7e							No Loop operation (initializes as Point-to-Point or Fabric only)
	1	0x7f							No preferred address

Starting the Software

IMPORTANT   You must have administrator privileges to access this software.

Start Windows if it is not already running. Select Start $\rightarrow$ Programs $\rightarrow$ Networked SYMplicity Storage Manager.

The application names appear in the Start menu. For a description of some key terms used in the applications, se .

Continue with .

Verifying Component Status

Run Recovery Guru/Health Check

Use the following steps to ensure that the RAID Controllers (connected to the network) are all operational.

1. In the Select Module main screen, highlight All RAID Controllers and select OK.

The main Status screen appears (see Figure 15) showing All RAID Controllers and Message Log selected.

NOTE   With a new installation, you will be prompted to create a message log. Your default log file is new and no messages will appear until after an event has occurred.
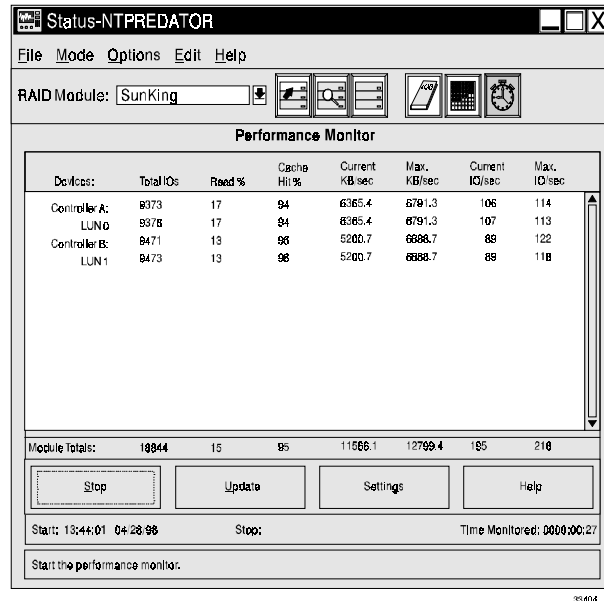

Figure 15. Main Status Screen

2. Select Recovery Guru/Health Check.

The display area (see Figure 16) shows the summary results of the Recovery Guru/Health Check on all of the RAID Controllers.

• If all of the RAID Controllers report an Optimal status, you are finished with this procedure. Go to "Determining the Current Configuration" on page 56.

• If any of the RAID Controllers report a status other than Optimal, continu with Step 3.

3. Highlight that RAID Controller and select Show Details to determine the appropriate action to take.

4. After correcting any problems, reselect Recovery Guru/Health Check until all RAID Controllers are Optimal.

5. Continue with "Determining the Current Configuration" on page 56.
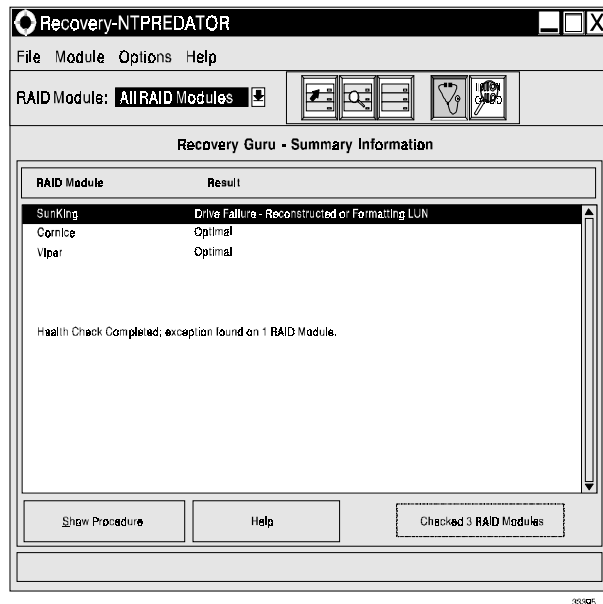
Figure 16. Health Check Screen

Determining the Current Configuration

Now that you have successfully installed the software, you need to use it to identify each RAID Controller connected to the network and determine the current modul configuration (number of drives, number of controllers, logical units, etc.).

The software has assigned a name for each RAID Controller connected to the network based on the information you supplied after installation. These designations are shown in the RAID Controller selection list near the top of each application screen (see).

Perform the following steps for each RAID Controller to identify the module and determine its current configuration.

1. Use the following steps to view the current drive groups and logical units in a RAID Controller.

   a. Select the Configuration Application.

      The Select Module Main screen appears. If you have more than one RAID Controller connected to the network, each RAID Controller appears in the list.

   b. Make sure that the first RAID Controller is highlighted and select OK.

The main configuration screen appears (se). The main configuration screen is composed of the following major areas:

- **Module Information Area** — a directory tree structure showing RAID Controllers, controllers, drive groups, and LUNs. Clicking on the different items changes the display in the detailed information area on the right of the screen.

- **Detailed Information Area** — provides information about the drive groups and logical units in the RAID Controller. The information displayed depends on what is highlighted in the Module Information area.
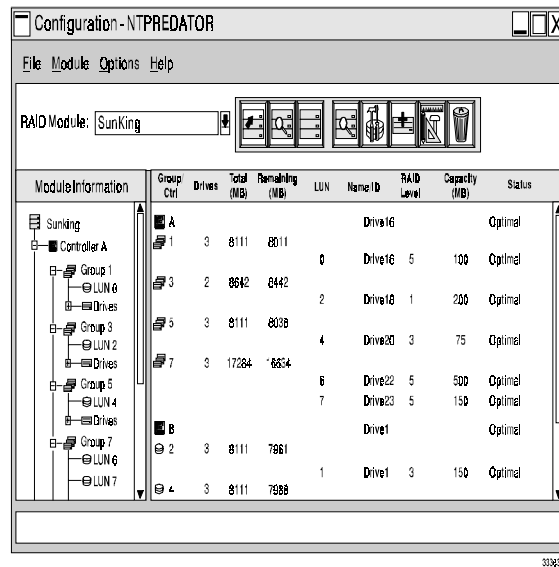
Figure 17. Main Configuration Screen

- **Logical Unit (LUN) Information Area** — provides a summary of the logical units configured on the selected RAID Controller Unit. The Device Nam column shows the controller name you assigned after installation.

c. At the main Configuration screen, view the current drive groups and logical units.

As you highlight a drive group in the list on the left side of the main screen, the corresponding logical units are highlighted in the Logical Unit Information area on the right side of the screen. You can only highlight one drive group at a time. You *cannot* select or highlight any item in the logical unit information list (it is information only).

2. Use the following steps to locate and label a RAID Module.

a. Select Locate Module → Start.

The activity lights flash on the appropriate drive modules.

b. Physically locate the RAID Module that has its activity lights flashing. Once you have identified the RAID Module, place a sticker label on it for future reference.

For best results, have the module label include both the controller name (see Table 4 on page 16) and the IP address for each controller in the module. For example, the RAID Controller called sonne_002 with two controllers might have the following label:

sonne_002
son_ks1; 153.79.144.13
son_ks2; 153.79.144.14

c. Select Stop to stop the flashing of the activity lights.

3. Use the following steps to save and print RAID Controller profile information.

a. Select the desired RAID Controlle $\rightarrow$ File $\rightarrow$ Save Module Profile.

A screen shows the different types of information you can save.

b. Make sure All is selected (all of the buttons should be depressed), and select OK to save all of the types of information.

A screen display prompts you to enter a filename.

CAUTION   When using the Save Module Profile option in Step c., save the file to the same disk drive where the storage management software is installed (fo example, c:\). This is important because saving to a different disk drive causes that disk drive to remain "open" which can cause the application you are using to terminate or return error messages.

---

c. Enter an appropriate path and filename on the Selection line, and select OK.

d. The information is saved to the path and filename you specified.

e. Print the Module Profile information you saved in Step c. using your host system's printer utility.

4. Use the following steps to view a RAID Controller profile. (Optional)

a. Select the desired RAID Controlle $\rightarrow$ Module Profile.

A summary information screen appears (see Figure 18 on page 59) showing information about the controllers, drives, and logical units in the RAID Controller.

b. Select Controllers, Drives, or LUNs for more detailed information on these components.

c. Select OK to exit the profile information.

5. Use the following steps to view details on specific drives in a drive group. (Optional)

    a. If you want to know which specific drives comprise a particular drive group, highlight the drive group (in the Drive Groups area on the main screen) and select List/Locate Drives.

    b. Use the drive location information [x,y] provided in the list to physically locate individual drives in the module.

       Remember that [x,y] corresponds to a specific drive in the RAID Controller, and indicates the channel number and host-side ID for that drive, where the channel number is always listed first. You can also select Locate to flash the drive activity lights in the RAID Controller.

    c. Select OK to exit the drive information.
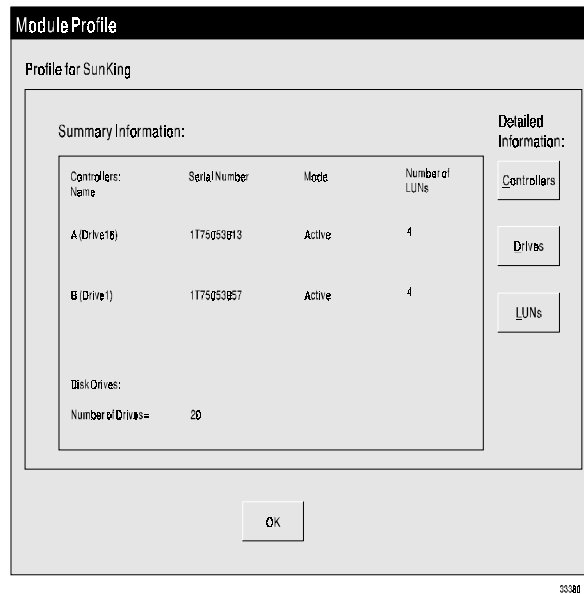
Figure 18. Main Module Profile Screen

6. Repeat Steps 1. through 3. (then 4. and 5. if desired) for each RAID Controller connected to the network.

7. You should have enough information to understand the current configuration for each RAID Controller.

8. Continue with "Determining if Configuration Changes are Needed" on page 60.

Using the putntlog Utility

The putntlog command line utility included in the storage management software lets you write RAID events to the Windows NT Event Log. Use the following procedure to enabl putntlog:

1. Open the rmscript.bat file using a text editor.

2. Scroll down through the file until you find the following line:

    ```
    rem putntlog %1
    ```

3. Delete the rem comment line.

4. Save and close the file

Determining if Configuration Changes are Needed

In the previous section ("Determining The Current Configuration) you should have performed the following tasks for each RAID Controller connected to the network:

Reviewed each module's current configuration (controllers, drives, and logical units/drive groups).	Step 1. on page 56.
Identified each RAID Controller using Locate Module, and placed a sticker label on it.	Step 2. on page 57.
Saved the Module Profile information to a file using File → Save Module Profile, and printed the information.	Step 3. on page 58.

Now, you need to determine if you need to make any changes to the configuration to meet the requirements of your environment.

Use Table 9: and the Module Profile information you saved and printed to assist you in determining if any changes are necessary.

Table 9: Possible Parameters to Change

Parameter	Description	Why Change?	For More Details
General Parameters			
Controller Mode Maintenance/ Tuning	Applicable controller modes are single active, active/passive, or active/ active.	If you have an active/ passive controller pair, you should consider changing it to active/ active for best performance.	• See the Maintenance/ Tuning chapter in the *User's Handbook*. • Use the online help for the Maintenance/ Tuning Application.

Table 9: Possible Parameters to Change (continued)

Parameter	Description	Why Change?	For More Details
Auto Parity Check/Repair Maintenance/ Tuning → Options	An automatic parity check/ repair process runs each day at a specific time, or once a week. Default is auto parity disabled.	If you want to enable the check/repair or change the time when it runs	• See the Maintenance/ Tuning chapter in the *User's Handbook*. • Use the online help for the Maintenance/ Tuning Application.
Monitoring Interval Status → Options → Log Settings	The array monitor checks the RAID Controllers periodically looking for events and failures. The default is to check every 5 minutes.	If you want to increase or decrease the frequency of the checking interval. If you have a lot of modules, you may need to increase this interval because the amount of time needed to check and return results can increase.	• See the Status chapter in the *User's Handbook*. • Use the online help for the Status Application.
Hot Spare Drives Configuration → Create Hot Spare	A hot spare drive is a drive containing no data that acts as a standby in case a drive fails in a RAID 1, 3, or 5 logical unit. The hot spare adds another level of redundancy to your RAID Controller.	If you want to create new or additional hot spare drives for added protection.	• See the Configuration chapter in the *User's Handbook*. • Use the online help for the Configuration Application.
Logical Unit Parameter			
RAID Level Or Number Of Drives Configuration → Modify Group/ LUN → RAID Level *or* Configuration → Delete, then Create LUN	Specifies how the data is striped across the drive and how many drives comprise a drive group/ LUN.	If the current RAID Level is not appropriate for your environment, or you need to change the number of drives. **NOTE** If you do not have the minimum controller firmware level, this feature will not be available.	• See the Configuration chapter in the *User's Handbook*. • Use the online help for the Configuration Application.

Table 9: Possible Parameters to Change (continued)

Parameter	Description	Why Change?	For More Details
Segment Size Configuration → Modify Group/ LUN → Segment Size *or* Configuration → Delete, then Create LUN → Options	Specifies in 512-byte blocks how much data is written to one drive before data is written to another drive in the group.	If the segment size is not appropriate for your environment. **NOTE** If you do not have the minimum controller firmware level, this feature will not be available.	• See the Configuration chapter in the *User's Handbook*. • Use the online help for the Configuration Application.
Capacity Configuration → Modify Group/ LUN → Capacity *or* Configuration → Delete, then Create LUN → Options	Specifies in megabytes how much capacity is available on the logical unit.	If you want to increase or decrease the capacities. **NOTE** If you do not have the minimum controller firmware level, this feature will not be available.	• See the Configuration chapter in the *User's Handbook*. • Use the online help for the Configuration Application.
Caching Parameters Configuration → Create LUN → Options Maintenance/ Tuning	Specifies the caching parameters for each logical unit.	If you want to enable or disable any of these parameters.	• See the Configuration chapter in the *User's Handbook* if you are creating new logical units, or use the online help. • See the Maintenance/ Tuning chapter in the *User's Handbook* to change caching parameters on existing logical units, or use the online help.

Table 9: Possible Parameters to Change (continued)

Parameter	Description	Why Change?	For More Details
LUN Assignment and LUN Balancing Configuration → Create LUN → Options Maintenance/ Tuning	Determines what controller owns which logical units/ drive groups.	To reassign or balance the logical units/drive groups between controllers in an active/ active pair.	• See the Configuration chapter in the *User Guide* if you are creating new logical units, or use the online help. • See the Maintenance/ Tuning chapter in the *User Guide* to change LUN Assignments on existing logical units, or use the online help.
Reconstruction Rate Maintenance/ Tuning	Determines how quickly reconstruction occurs on a logical unit when a failed drive is replaced.	To increase or decrease the reconstruction performance.	• See the Maintenance/ Tuning chapter in the *User Guide*. • Use the online help for the Maintenance/ Tuning Application.

Changing Your Hardware Configuration

Adding RAID Controllers

When you add a new RAID Controller to the network, you must follow many of the sam procedures you would use when installing the software for the first time. These tasks include setting up the module and controller information for your BOOTP server and your host table, and adding this information to the storage management software module list. See the software online help for the procedure to follow.

Removing RAID Controllers

Be sure to remove the RAID Controllers using the storage management software befor physically removing them from the network. Otherwise, the software will continue trying to contact the controllers in that module. This is especially important because missing modules could cause the software to have long delays or even system hangs while trying to contact the removed module. Also, if you are permanently removing a module from your network, you should edit your BOOTP server and host (or DNS) table to remove this module. See the software online help for the procedure to follow.

Adding Controllers

Always set up new RAID Controllers and their controllers in the BOOTP server and host (or DNS) table. See "Summary of Preparation Tasks" on page 14 for the procedure to follow. Physically connect the new module to your network system and use Select Modul → Add to enter the required information for the module. See the software online help fo the procedure to follow.

Removing Controllers

Before you remove any RAID Controller Unit (and its controllers) from the network, us Select Module → Remove to remove the module information from the softwar configuration. If you are permanently removing this module from your network, you should edit your BOOTP server and host (or DNS) table to remove this module. See the software online help for the procedure to follow.

Replacing Controllers

If you replace a failed controller, you need to determine its unique hardware ethernet address and replace only this entry in the BOOTP table. You should keep the same controller name and IP address to ensure that the host table remains correct. See th software online help for the procedure to follow.

What's Next?

Troubleshooting

You can continue with "Chapter 7. Troubleshooting" for troubleshooting tips or common problems you may encounter as you use this software in the Windows operating environment.

User's Handbook/Online Help

Now that you have successfully completed the installation of the software, refer to the *User's Handboo* and the online help for detailed information on how to use each application, and to make any changes that you determined are necessary in the previous sections.

Chapter 7. Troubleshooting

This chapter contains the following sections:

Troubleshooting

The troubleshooting tables that follow provide probable cause and action to take fo specific problems you may have as you use the storage management software in the networked operating environment.

IMPORTANT   If you cannot find the problem you are looking for, consult the Online Help for additional troubleshooting information. Also, see "Understanding the Restrictions" on page 2 for additional information.

Locating Solutions

To quickly find the problem-solution you are looking for, use the following tables to locate the problem you are having. It is possible for an entry to appear in more than one table:

- Category — organizes problems into general use or specific option groups page 66).

- Component — organizes problems by hardware components, such as controllers, drives, modules, etc. (page 66).

- Application — organizes problems for each storage management application, including a group for options common to all applications (page 68).

- Software — organizes problems by operating system, storage management software, or command line options (page 70).

Category

Groups problems into sections for general use or specific options.

Table 10: Troubleshooting Entries by Category

Category	See Page
"Configuration Application"	70
"Firmware Upgrade"	72
"General"	73
"Networked Troubleshooting Only"	79
"Recovery Guru/Health Check"	76

Component Search

Organizes individual problems by hardware components, such as controllers, drives, LUNs, RAID Controllers, and so on.

Table 11: Troubleshooting Entries Organized by Component

Componen	Problem	See Details
Controllers	Failed during alternate replacement	73
	Firmware upgrade failed	72
	LUN creation error after deleting all LUNs or using Reset configuration	71
	Not visible to storage management software	74
	Passive, no LUNs owned after replacement	78
	Verify the network enable bit setting	
Fans	Failure detected after replacement	76

Table 11: Troubleshooting Entries Organized by Component (continued)

Componen	Problem	See Details
Drives	Activity lights don't flash (Configuration → List/Locate Drives)	71
	All drives failed in a drive group	78
	Failed status, but LUN is Optimal	77
	Fault light comes on after replacing failed drive	77
	Fault lights lit (drives continue to fail)	77
	Missing information in Manual Recovery → Drives screen	78
	Number of drives incomplete or wrong during LUN creation	70
	Removed drive; no failure reported	76
	Status other than Optimal	77
LUN	Error message during LUN creation after deleting all LUNs or using Reset Configuration	71
	Less capacity shows than selected during configuration	71
	Missing information in Manual Recovery → LUNs screen	79
	Not visible to storage management software	74
	Number of drives incomplete or wrong during LUN creation	70
	Optimal LUN status with failed drives	77
	Reconstructing status appears, but no drives replaced	77
	Status other than Optimal	77
	Status remains Reconstructing	78
NVSRAM Settings	Verify the network enable bit setting	

Table 11: Troubleshooting Entries Organized by Component (continued)

Componen	Problem	See Details
RAID Controllers	Failure detected after replacing fan or power supply	76
	Listed after being removed	74
	Network station cannot talk to the Module	79
	Status other than Optimal	75
	Status does not update after a recovery procedure	79
Power Supplies	Failure detected after replacement	76

Application Search

Organizes individual problems for each storage management application, including a group for options common to all applications.

Table 12: Troubleshooting Entries Organized by Application

Application	Problem	See Details On
Common To Any Application	Cannot select some options	74
	"Cannot secure access to LUNs" message	75
	Select Module lists a RAID Controller removed from the system	74
	Status does not update after a recovery procedure	79
Configuration	Less capacity shows than selected during configuration	71
	List/Locate Drives does not work	71
	LUN creation error after deleting all LUNs or using Reset Configuration	71
	Number of drives incomplete or wrong during LUN creation	70
	Reset Configuration does not work	71
Status	Reconstructing status appears, but no drives replaced	77
	Status remains Reconstructing	78

Table 12: Troubleshooting Entries Organized by Application (continued)

Application	Problem	See Details On
Recovery	All drives failed in a drive group	78
	Controller mode is Passive, no LUNs owned after replacement	78
	Drive fault lights lit (drives continue to fail)	77
	Drive status other than Optimal	76
	Failed status, but LUN is Optimal	77
	Fault light comes on after replacing failed drive	77
	Failure detected after replacing fan or power supply	76
	LUN status other than Optimal	77
	Missing information in Manual Recovery $\rightarrow$ Drives screen	78
	Missing information in Manual Recovery $\rightarrow$ Logical Units screen	79
	Reconstructing status appears, but no drives replaced	77
	Recovery Guru takes a long time	76
	Removed drive, but Recovery Guru does not report a failure	76
	Status does not update after a recovery procedure	79
	Status other than Optimal	75
	Status remains Reconstructing	78
Maintenance/Tuning	Controller mode is Passive, no LUNs owned after replacement	78
	Firmware upgrade failed	72

Software Search

Organizes individual problems by operating system, storage management software, and command line options.

Table 13: Troubleshooting Entries Organized by Software

Software	Problem	See Details On
Storage Management	"Cannot secure access to LUNs" message	75
	Cannot select some options	74
	Cannot start the software	73
	Controllers/LUNs not visible	74
	Failure detected after replacing fan or power supply	76
	Network station cannot talk to the Module	79
	"Not all files removed" message when uninstalling the software	73
	RAID Controller listed after being removed	74
Command Line	Batch file commands fail	73
	Battery age does not reset for both controllers	75

Configuration Application

Includes problems you may have as you use options in the Configuration Application.

Table 14: Configuration Changes Troubleshooting

Number of Drives field (in the main Create LUN screen) show less than the number of drives in the unassigned drive group.

CAUSE   There are two main reasons this number could be different than expected:

- This list shows *only* the maximum number allowed, which is a maximum of 30 drives in a drive group.
- There could be failed or unresponsive drives in the unassigned drive group. Failed drives are not available for configuration; therefore, they are not displayed in this list.

Table 14: Configuration Changes Troubleshooting (continued)

Less capacity shows than I selected during configuration.

When using 5+ drives to create a LUN, you could see a capacity slightly less than you selected during configuration; for example, you see 1.97 GB instead of 2 GB on a RAID 5, 9-drive LUN. This can occur because the capacity you select is based on stripe size which depends on segment size times the number of drives.

List/Locate Drives → Locate does not work.

CAUSE It is not possible to flash the drive activity lights for a particular drive group if any of the drives has a status other than Optimal. For an explanation of possible drive statuses and recommended action to take, see the Online help.

ACTION   Use Module Profile to verify that all drives are Optimal and try again. If any of the drives are not Optimal, select Recovery Guru/Health Check (in the Recovery Application) to correct the problem.

Reset Configuration does not work.

CAUSE If this software detects any drives as removed or unresponsive, Reset Configuration will not work. Also, if the selected RAID Controller has an Independent Controller configuration, this option is grayed out.

ACTION   Use Module Profile to verify that all drives are Optimal and that the controller is not in an Independent Controller configuration (neither controller is marked Inaccessible). Try File → Reset Configuration again.

CAUTION   Any time you use Reset Configuration, you will lose all data on your drives. *Only select this option as a last resort* if your configuration is inaccessible or you want to start over. You will need to use Create LUN to re-configure your drive groups/LUNs.

LUN Creation error message is displayed after deleting all LUNs or using File → Reset Configuration.

CAUSE Most likely, the controller has 256 MB cache and requires a reset after deleting all LUNs/drive groups before re-creating new LUNs/drive groups.

ACTION   Turn off power to the affected RAID Controller. Turn power back on and try the LUN creation procedure again.

Firmware Upgrade

Problems you may have in upgrading firmware.

Table 15: Controller Firmware Upgrade Troubleshooting

Firmware upgrade does not complete successfully

CAUSE   This should *not* happen unless you try to perform some other activity on the module while upgrading controller firmware. If you are upgrading firmware to a redundant controller pair, the progress bar reaches 50% very quickly after downloading a file to the first controller. However, it may take another couple of minutes to reach 100% if it is downloading to a second controller in the module. Do *not* assume the controller has hung unless the firmware upgrade has not completed after ten minutes or so.

ACTION

- To avoid this problem, *wait* for the controller firmware upgrade to be completed before selecting any other option or exiting Maintenance/Tuning.

- If it occurs, turn off power to the RAID Controller and turn it back on; then, immediately try to upgrade the firmware again.

IMPORTANT   If you are not upgrading the firmware again immediately, check the firmware version of the module controllers using Module Profile. The controller firmware could be in an unusable state if some files completed the download process before the controller hung. In this case, your module will not perform properly until the firmware is upgraded.

General

General problems you could have in all applications.

Table 16: Troubleshooting Generally Applicable to All Applications

Cannot start the software.

CAUSE   If the software does not load when you try to start it, the rmparams file may be corrupted or missing from the installation directory (*\program files\netsymsm*).

ACTION

You may want to view the Windows NT Event Log ("Applications" log). This log might contain specific information about missing files and/or executables.

1 Start Windows NT and try to start the software again. (See "Starting the Software" on page 54 if you need more information on starting this software.)

2 If you had previously saved a backup rmparams file, copy it to the installation directory (default is *\program files\netsymsm* – be sure to select the appropriate directory on your system) and try to start the software again.

IMPORTANT   The rmparams file is required for normal operation of this software applications. Therefore, it is strongly advised that if you make any changes to this file, you should make a backup by copying the edited file to another directory.

3 If you still cannot start the software, run the clean.bat -all script to delete certain files that could be hiding information from this software.

4 If you still cannot start the software, reinstall the software.

Controller failed while bringing its alternate Online.

CAUSE   You have a RAID Controller with two controllers, one is Offline and the other is Online (Optimal). When you bring the offline controller online, you could see the alternate controller Fail or go Offline.

ACTION   Bring the newly failed controller Online using the same procedure.

While uninstalling this software, "not all files were removed" message is displayed.

CAUSE   If you see this message after performing the uninstall procedure (page 64), the auto parity check/ repair service was probably running. The software has been successfully uninstalled; however, there may be some files that were not removed from the installation directory.

ACTION   Delete any remaining files from the installation directory, then delete the directory.

Commands run in a batch file fail unexpectedly

CAUSE   Utility commands such as fwutil or rdacutil -u that require a controller reboot may return before the controller is ready to accept commands. If the next command is executed before the controller is ready to accept commands, the controller will return an error status.

ACTION   Include a delay command in the batch file to allow enough time for the controller to finish its action.

Table 16: Troubleshooting Generally Applicable to All Applications (continued)

Some controllers/logical units are not visible to storage management software, but are visible to the host

CAUSE   It is possible that controllers or logical units might *not* be visible to the storage management software, but will remain visible to Windows NT. Any time an operation is being performed that requires exclusive access to the logical units (LUNs), these LUNs may not appear on the screen *except* in the application where the operation was initiated. The software uses a file (*program files\\netsymsm\\lunlocks*) to hide these LUNs from the other applications, so that no other operations can be performed on them until the current operation is complete.

IMPORTANT   For example, if you started a format in the Recovery Application, these LUNs show a "Formatting" status in Recovery, but may not appear in any other application. Operations that require exclusive access include Delete for LUNs and Reset Configuration (Configuration); formatting a LUN with Options → Manual Recovery → Logical Units (Recovery); and Firmware Upgrade → Offline method (Maintenance/Tuning).

Should the utility/application holding the LUN lock come to an abnormal termination, these LUNs may remain hidden from the other applications.

ACTION
1 Wait for the operation to be completed, or perform operations on a different RAID Controller.
2 If you still do *not* see controllers or LUNs that you know exist, do the following:

   a Close all your applications and exit the storage management software completely.

   b Run the clean.bat script to delete certain files that could be hiding information from this software.
3 Restart the application where you had the problem and verify that the controller/LUNs are now visible.

A RAID Controller is listed that I have removed from my system.

CAUSE   The storage management software does *not* automatically remove modules from configuration; thus, a module you remove will continue to be listed in the RAID Controller Selection box and the Module Selection screen.

ACTION   Use Select Module → Remove before physically removing the Module. See the online help for the specific procedure to follow.

I Cannot select some options.

CAUSE   Some options are grayed out or are unavailable because:

• The selected RAID Controller does not support that option.

• The option cannot be performed for the item you selected.

• The option is not active until you select some ite   .

• The option is no longer applicable because a maximum has been reached.

ACTION   Recheck your selection and try again.

For more specific information, see the Procedures section in the *User Guide* that describes the particular option, or consult Online Help, "Why Are Some Options Grayed Out?"

Table 16: Troubleshooting Generally Applicable to All Applications (continued)

Battery age did not reset for both controllers.

CAUSE   When using raidutil to reset the battery age, this command affects only one controller at a time.

ACTION   Perform the battery reset command (with raidutil) for each controller in a RAID Controller as needed.

"Cannot secure access to the LUNs" message is displayed (operations won't run for a selected RAID Controller).

CAUSE   Most likely a second application has requested exclusive access to the selected RAID Controller when some other application has already secured access. Many operations require exclusive access to the affected drive group/LUNs until its operation is completed (this software "locks" these components to secure this access).

ACTION   Wait for any operation that has secured exclusive access to the LUNs to be completed before performing another operation on the same RAID Controller.

Operations requiring exclusive access include: Delete for LUNs and File → Reset Configuration (Configuration); formatting a LUN with Options → Manual Recovery → Logical Units (Recovery); and Firmware Upgrade → Offline method (Maintenance/Tuning).

CAUTION   If you are using more than one network management station, you must use caution when performing the tasks that need exclusive access to ensure that the two hosts do not send conflicting commands to the controllers in the RAID Controllers.

Component/module status other than Optimal.

CAUSE   Statuses other than Optimal can indicate many things and usually warrant attention because the module is *not* operating in a normal condition.

The most common causes are:

• At least one drive has failed.

• A drive has been replaced and is reconstructing.

• A logical unit is formatting.

• A controller has been placed offline or has failed.

• A module component had failed, such as a power supply or fan.

ACTION   For Failed or Offline drives, Dead or Degraded logical units, or Dead controllers (or Offline controllers that you did not place offline), select Recovery Guru/Health Check and follow the step-by-step procedure it provides. For an explanation of the possible drive, LUN, or controller statuses and any recommended action to take, see the online help.

IMPORTANT   Do not rely only on logical unit (LUN) status information to determine if a recovery procedure is necessary. For example, if you have hot spares configured for a RAID Controller and a drive fails, the hot spare takes over for the failed drive. Therefore, you have an Optimal LUN with a failed drive. Depending on how many hot spares you have configured for the module, you can have multiple failed drives and still have an Optimal LUN or only a Degraded LUN.

Recovery Guru/Health Check

Problems you may have in running Recovery Guru/Health Check or the Manual Recovery Options in the Recovery Application.

Table 17: Recovery Guru/Health Check Troubleshooting

Recovery Guru/Health Check results take a long time to display.

CAUSE Normally you see Recovery Guru/Health Check results in a few seconds. However, if you have selected All RAID Controllers or there are I/O operations running, you might notice a delay. Also, there could be instances where an unresponsive component or other status change affects the controller's ability to provide a result in Recovery Guru/Health Check, although such occurrences are rare.

ACTION If you experience long delays in performing Recovery Guru/Health Check, you might try checking one RAID Controller at a time or selecting Recovery Guru/Health Check at a time of low system I/O.

NOTE A background check occurs at regular intervals for all RAID Controllers (results are logged to Message Log); the default setting is five minutes. You can change the frequency of this check by using Options → Log Settings.

Recovery Guru/Health Check does not report a drive failure when I remove a drive.

If there is no I/O occurring for that drive, Recovery Guru/Health Check reports an Unresponsive Drive. If there is I/O occurring, the controller will fail the drive (and Recovery Guru/Health Check report this, too).

CAUTION You should *never* remove drives from a module unless the controller has marked them as failed. Doing so could result in data loss for the affected logical unit/drive group. If you suspect problems with a drive, it is best to select Recovery Guru/Health Check and follow the instructions provided.

Software detects a failure even *after* I replaced a fan or power supply (recover from a Module Component Failure).

CAUSE The software continues to report the condition as a failure for approximately ten minutes after replacing a fan or power supply due to the controller polling interval.

ACTION Wait for the controller to poll the module (default is ten minutes) after performing this recovery procedure before reselecting Recovery Guru.

Drive status other than Optimal.

CAUSE You have a Failed, Offline, or Replaced drive (which is reconstructing), or a logical unit is being formatted. For an explanation of possible drive statuses and any recommended action to take, see the online help.

ACTION For Failed or Offline drives, select Recovery Guru/Health Check and follow the step-by-step procedures provided. No action is required if the drives are Replaced or the LUN is Reconstructing or Formatting. However, if the drives remain Replaced and the LUN status was Dead, Recovery Guru/ Health Check may report the RAID Controller as Optimal. If this occurs, you need to manually begin the format process for the LUN/drive group (Options → Manual Recovery → LUN → Format).

Table 17: Recovery Guru/Health Check Troubleshooting (continued)

Drives continue to fail (fault lights lit).

CAUTION   It is possible that a drive channel has failed. A drive channel failure is indicated when all the drives on the same channel are Failed and/or Unresponsive. Depending how the logical units have been configured across these drives, the status of the logical units may be Dead, Degraded, or Optimal (if hot spare drives are in use).

ACTION   Select Recovery Guru/Health Check and follow the step-by-step procedure given.

Drive fault light came on *after* I replaced a failed drive.

CAUSE   This light may come on momentarily when a drive in a RAID 1, 3, or 5 LUN begins reconstruction.

ACTION   Wait a few minutes for the fault light to go off and the drive activity lights to begin flashing steadily. This indicates that reconstruction is occurring. The drive status changes to Replaced and the logical unit status changes to Reconstructing.

However, if the fault remains on, select Recovery Guru/Health Check and follow the procedure provided.

Failed Drive status appears, but logical unit status is still Optimal.

CAUSE   A drive on the logical unit has failed and a hot spare has taken over for it.

NOTE   To see if a hot spare is being used, use List/Locate Drives in the Configuration Application. The hot spare drive status is either In Use or Standby (not being used).

ACTION   Select Recovery Guru/Health Check and follow the procedure provided.

Logical unit status other than Optimal.

CAUSE   You have a Failed drive or a Replaced drive which is reconstructing, a logical unit is being formatted. For an explanation of possible logical unit statuses and any recommended action to take, see the online Help.

ACTION   For Dead or Degraded logical units, select Recovery Guru/Health Check and follow the step-by-step procedures it provides for restoring the logical units. However, if the drives remain Replaced and the LUN status was Dead, Recovery Guru may report the RAID Controller as Optimal. If this occurs, you need to manually begin the format process for the LUN/drive group (Options $\rightarrow$ Manual Recovery $\rightarrow$ LUN $\rightarrow$ Format).

LUN status changed to Reconstructing, but no drives have been replaced.

CAUSE   A hot spare has taken over for a failed drive and the data is being reconstructed on it. The logical unit status returns to Optimal as soon as reconstruction is completed.

Table 17: Recovery Guru/Health Check Troubleshooting (continued)

LUN status does not change from Reconstructing.

CAUTION   This could occur after a Manual Recovery task is completed, especially LUN Reconstruction, or because data was reconstructed on a hot spare (the hot spare drive becomes In Use, the LUN status changes to Reconstructing, but may not return to Optimal when reconstruction is completed).

IMPORTANT   If reconstruction was interrupted on a hot spare drive because another drive failed in the same drive group/LUN, the LUN is probably Dead (with two Failed drives) and you have lost data. You should select Recovery Guru/Health Check and follow the procedure provided to replace the newly failed drive.

ACTION   Wait for the background monitor to run (default is five minutes) and to update the status, *or*

To update immediately, do *one* of the following:

- Reselect the RAID Controller.

- Exit and re-enter the application.

All Drives in a Drive Group fail.

CAUSE   If *all* the drives in a configured drive group fail and are then physically replaced, Recovery Guru/Health check will still show the replaced drives as failed. Their status is not upgraded to Replaced, although the LUN status will show Dead LUN.

ACTION   In this case, follow the Recovery Guru/Health Check procedure to reformat the LUNs in the drive group.

IMPORTANT   If you turn the power to the RAID Controller off and then on again, the LUNs in the drive group are deleted, and the replaced drives are returned to the unassigned drive group, still failed. Follow the procedure given in Recovery Guru/Health Check to recreate the deleted LUNs.

Controller mode is Passive and it does not own any LUNs after replacing a Failed controller.

CAUSE   After using Recovery Guru/Health Check to replace the failed controller and Options → Manual Recovery → Controller Pairs to place it back Online, the controller is Optimal but in the Passive mode rather than Active. This is most likely to occur for controller B.

ACTION   With the newly replaced controller Optimal, use Controller Mode → Change To Active/ Active (Maintenance/Tuning Application) to make the controller Active. You can either redistribute drive groups/LUNs during this mode change, or later you can use LUN Balancing (Maintenance/Tuning Application) to assign specific drive group/LUNs to each active controller.

Information is missing in the Options → Manual Recovery → Drives screen.

CAUSE   The drives for the selected RAID Controller are unassigned (that is, they are not part of a configured drive group). For these drives, there is no LUN, RAID Level, or logical unit status to report. However, you should still see information for the drives' location and status.

ACTION   Select another module, or use the Configuration Application to create logical units using those unassigned drives.

Table 17: Recovery Guru/Health Check Troubleshooting (continued)

No LUN information appears in the Options → Manual Recovery → Logical Units screen.

CAUSE   There are no configured logical units for the selected RAID Controller (that is, all the drives are unassigned). There is no LUN, drive group, RAID Level, or logical unit status to report.

ACTION   Select another module, or use the Configuration Application to create logical units using those unassigned drives.

Component status isn't updated after a recovery procedure has been performed.

CAUSE   A configuration change may not be detected yet. For example, a drive is failed, then replaced and its status becomes Replaced, but does not return to Optimal after reconstruction is completed.

ACTION   Try selecting a different RAID Controller, then switching back and reselecting Option → Manual Recovery, or exit, then reselect the Recovery Application.

Networked Troubleshooting Only

Problems related to working in the networked environment

Table 18: Troubleshooting Applicable to Working in the Networked Environment

The storage management software from a particular Remote Management Station (RMS) cannot make the connection to a RAID Controller.

CAUSE   Remember that you can have a *maximum* of four RMS and SNMP stations. Each controller allows only four connections at once, and these connections last 24 hours since the last time the connection was used. Therefore, if a controller has already been contacted by four remote management stations, a fifth station requesting access within 24 hours would be rejected.

ACTION   Turn off and turn on the RAID Controller. Remember, it is best to only configure a total of four RMS and NMS stations for any RAID Controller.

Table 18: Troubleshooting Applicable to Working in the Networked Environment

Takes a long time to start the software, and/or screens do not display any information for the selected RAID Controller.

CAUSE   In the network environment, response time may be slower, so be patient. However, if it takes several minutes to load the program group or launch an application, then it is likely that some controller is Offline, Failed, or not configured properly in the network setup.

- If you do not see any information provided on screen, a controller in the selected module is not set up properly for the network.

- If you see information provided, some other module controller is not set up properly.

IMPORTANT   If you ever physically remove a RAID Controller (and its controllers) from the network, make sure you also use Select Module → Remove to remove the module information from the software configuration.

ACTION   Verify that both controllers are present (controller names appear in Module Profile):

- If they are *not* present, verify the network path, and ensure the BOOTP table and host (or DNS) tables are set up correctly for the network. See page 19 for detailed procedures.

- If they are present, run Recovery Guru/Health Check (Recovery Application) on All RAID Controllers to determine the status of the modules' components.

A connect error message displays when trying to add a RAID Controller, such as, "Could not connect to the selected RAID Controller. Verify your host names and/or check your network connection."

CAUSE   The remote management station is unable to connect to the specified controller.

ACTION   Use symping (the network connection verification utility) to attempt to contact the RAID Controller or controller. The symping utility will display possible reasons for, or actions to take to resolve these problems.

1 From the command line, type:

symping beatr_1

WHERE

beatr_1 is the name of the controller you designated when you added the RAID Controller to the Select Module list.

2 If symping does not help resolve connecting the module, check the physical network connections and correct any associated problems.

Table 18: Troubleshooting Applicable to Working in the Networked Environment

The system takes a long time to complete some operations, or you receive error messages that the operation failed.

CAUSE   In the network environment, response time may be slower, so be patient. However, if you notice many error messages (indicating that operations are not completing successfully), you should verify that a controller is *not* Offline or Failed, and that it is configured properly for the network (set up in the BOOTP table and host tables).

IMPORTANT   If you ever physically remove a RAID Controller (and its controllers) from the network, make sure you also use Select Module → Remove to remove the module information from the software configuration.

ACTION

1 Allow sufficient time for operations to complete. Remember that the network response time may be slower, especially if you have 24 or more LUNs configured on the RAID Controller.

2 If you receive operation-failed error messages, use Message Log to verify there are no component problems on your modules.

3 Verify the controller is present (controller name appears in Module Profile). If it is not present, verify the network path, and ensure the BOOTP table and host (or DNS) tables are set up correctly for the network. See page 19 for detailed procedures.

4 If no other problems are indicated, try increasing the System_NetworkTimeout parameter in the rmparams file (this parameter determines the amount of time allowed for operations to complete successfully before the operation is failed):

   • Edit the rmparams file to increase the amount of time allowed for operations to complete.

   • Save the rmparams file and copy it to a backup directory.

NOTE   If you change the System_NetworkTimeout parameter, you may want to change the network timeout tag (tag=163) set for the controller in the BOOTP table as well (see Table 5 on page 20).

"Another application has failed to release locked resources" message.

CAUSE   If a storage management application has an abnormal termination while performing an operation, it is possible that the operation did not complete and resources remain locked. This means that drive groups/LUNs or even controllers might not be visible or might have unknown states.

ACTION   If you see this message, exit all applications and restart Windows.

Table 18: Troubleshooting Applicable to Working in the Networked Environment

Controller names disappear from the Active Leases window when the Reservation becomes Reservation in use.

CAUSE Normally, when an administrator has set up a reservation for a BOOTP controller on a DHC server, the Active Leases list includes the IP address, controller name, and Reservation. When a BOOT controller gets an IP address, the Reservation changes to Reservation in Use, and the controller name is removed from the list. As a result, there is no identifier in the list to differentiate which IP address belongs to which controller.

ACTION Call Microsoft Technical Support to obtain the fix for this problem (Article ID: Q167708). Or you can refer to where you recorded the controller name and IP address.

An operation failed.

CAUSE If you have more than one network management station trying to gain exclusive access at the same time to the same drive group/LUN, one operation will fail.

ACTION Wait for any operation that has secured exclusive access to the LUNs to be completed before performing another operation on the same RAID Controller.

To prevent the problem, before beginning an operation that requires exclusive access, make sure that you stop all I/Os going to the RAID Controller and that no other users are on the system.

Operations requiring exclusive access include: Delete for LUNs and File → Reset Configuration (Configuration); formatting a LUN with Options → Manual Recovery → Logical Units (Recovery); and Firmware Upgrade → Offline method (Maintenance/Tuning).

Replacing Controllers (Networked)

General Guidelines

Use Recovery Guru/Health Check (Recovery Application) to diagnose and correct problems with your RAID Controller components.

If you are replacing a failed controller, you need to determine the unique hardwar ethernet address of the new controller and replace *only* this entry for the BOOTP Server. You should keep the same controller name and IP Address to ensure that the host (or DNS) table remains correct.

Incompatible Firmware Detected

You have replaced a controller and saw a message after the new controller was brought Online telling you that incompatible firmware has been detected and to consult this section.

Problem Summary

The correct procedure for upgrading the controller firmware depends on the controller firmware versions of both controllers and the controller slot location of the replaced controller. Use the following steps to determine the correct procedure.

1. Using the Recovery Application, select Module Profile → Controllers and do the following:

   - Record the controller name/ID for both controllers. Be sure to note which is currently controller A and which is controller B. You will need this information to identify the controllers during this procedure.

   - Record the firmware version of both controllers. Be sure to note which version applies to the old controller and which to the new, replaced controller. You will need this information to determine the correct procedure to follow for upgrading the controller firmware.

   - Record the ethernet and IP addresses for both controllers. You can use Select Module if you have this information in the Comments field, or you can use the tabl where you recorded this information during this software installation. You may also want to record all other comments added for this module because this procedure requires you to remove and add the module.

2. Which controller slot location is the new, replaced controller placed in

In Slot A	In Slot B
You may want to call your Customer Services Representative for additional support on this procedure.	Select *only* the replaced controller to upgrade the 3.X firmware using the normal procedure (Maintenance/ Tunin → Firmware Upgrade → Offline method).
	Consult the *User Handbook* or online help for further details.

Uninstalling the Software

Use the following procedure only if you want to remove the storage management softwar from your system.

IMPORTANT	Close all other applications and make sure that other users are not on the system when uninstalling this software.

1. To begin the uninstall program:

   a. Select Start Settings Control Panel Add/Remove Programs and scroll the list to find Networked SYMplicity Storage Manager.

   b. With Networked SYMplicity Storage Manager highlighted, select Add/Remove.

   c. At the Uninstall Application screen, select OK to remove the software.

   You will see screens indicating the uninstall program is removing the appropriat service, registry information, and files.

2. At the Uninstall Complete screen, select Yes to shutdown and restart the Windows system.

Appendix A. Specifications

This appendix contains the following information:

Hardware Specifications

This software has been tested with the following **BOOTP servers**:

- Microsoft DHCP BOOTP for Windows NT Server 4.0 with Service Pack 3 or later. See "Using a DHCP Server" on page 24.

- A UNIX BOOTP Server (most of the examples and terminology in this book relating to a BOOTP server assume the UNIX Example).

Firmware Specifications

The storage management software requires a minimum controller firmware version depending on your controller model.

Table 19: Controller Firmware Requirements

Controller Type	Required Firmware Level
4766	3.0 or later

Appendix B. Notices

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