Sun™ StorEdge™ RAID Manager 6.2 Installation and Support Guide

for Windows NT

THE NETWORK IS THE COMPUTER™

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Contents

Figures

Tables

CHAPTER 1

Introduction

This chapter gives an overview of the RAID Manager storage management software, the hardware and software requirements, and steps you must take before installing the software.

Note – See “Common Definitions” in the *User Guide* for an explanation of important RAID Manager terms.

About this Guide

The *Sun™ StorEdge™ RAID Manager 6.2 Installation and Support Guide for Windows NT* provides installation and setup information for RAID Manager software version 6.2 in a Microsoft Windows NT environment. After you install the RAID Module hardware, you should use this *Installation and Support Guide* to do the following:

- Determine the hardware and software required to install the RAID Manager software
- Install the software
- Set up software parameters
- Identify storage management features unique to the NT operating system
- Troubleshoot the installation and NT operation

After you install and set up the software, refer to the *Sun StorEdge RAID Manager User Guide* for further information about using the software and maintaining the RAID Modules.

Note – Some procedures in that book may be affected by information given in this book (for example, see the information in this guide on creating and deleting LUNs).

About this Software

The software supports the following new/enhanced features:

- **Dynamic Expansion Capabilities.** The Modify Group/LUN feature in the `Configuration` application allows you to change the RAID Level, add more capacity to drive groups, restore data storage space, and change the LUNs' segment size.

Note – The new dynamic capacity options require controller firmware level 3.0 or higher.

- **Performance Monitor.** This new feature in the `Status` application allows you to monitor I/O activity on selected controllers and LUNs for a selected RAID Module while it is in use. This allows you to gather information that may be useful in evaluating system performance and determining possible methods for improvement.
- **Weekly auto parity check.**

Additionally, the software continues to support the features from the 6.01 version:

- **Support of new configuration.** In addition to the single host connection into the RAID Modules, we now support an independent controller configuration (two different SCSI hosts, each connected to a different one of two controllers in the same RAID Module). See the *User Guide* for more details.
- **RAID Module selection enhancements (included in a new Select Module option):**
  - Support for assigning a user-supplied name to a RAID Module and also providing comments for easier identification.
  - Ability to easily remove a RAID Module and its association to the storage management software.
  - A RAID Module selection window that allows you to select a RAID Module before you enter an application.

- A Find feature to easily select a RAID Module from a list.

- **Additional battery management functions via the** `raidutil` **command line.** (For more information, read the `raidutil` help file.)
- **Additional failure types detected and appropriate recovery procedures added in the** `Recovery Guru`**.**
- **Several enhancements to caching features:**
  - The write caching operating status is now displayed in the caching parameters option and in `Module Profile` → `LUNs` to let you know when write caching has been enabled but is currently not active.
  - `Module Profile` → `Controllers` now includes the microprocessor cache size of the controller.
- **Support for Windows NT Server 4.0 and Windows NT 4.0 Enterprise Edition.**

Understanding the Restrictions

Note – Be sure to read the *Release Notes: Sun StorEdge RAID Manager 6.2 for Windows NT* and any `readme` file on the installation media. They may contain important information that was not available at the time this *Installation and Support Guide* was prepared.

Restrictions for Windows NT

TABLE 1-1 Windows NT Restrictions and Notes *(1 of 3)*

Restriction/Note	Application	Workaround
The storage management software is *not* certified for use with the 2.*x* version drivers for the Adaptec host adapter. The Adaptec driver 1.25c is unreliable in the event a cable is pulled.	Installation and Setup	If you are using the Adaptec host adapters, use only the models and drivers described in Appendix A "Specifications". If you have a data path problem and find a cable disconnected, reconnect it and run `Recovery Guru/Health Check`. If the data path problem is still reported, you may have to restart the operating system.
The SymArray driver must be loaded *before* the Windows NT SCSI class driver or RDAC will not work.	Installation and Setup	None. The installation procedure sets up the SymArray driver to load before the native NT SCSI class driver. This is necessary to provide RDAC protection in the event of a connection failure. Note that this means that internal SCSI drives appear after RAID Module drives in the Disk Administrator utility. Also, "sticky" drive letters must be assigned before the storage management software is loaded. Care must be taken when using applications that expect the internal SCSI drives to be mapped first (see also "Accessing Raw Partitions" on page 6-5). If you require that the NT SCSI driver be loaded first, RDAC must be disabled.
If you want to use a RAID Module as a boot device (that is, install the Windows NT operating system and the storage management software on LUN 0 of the RAID Module), you must prepare the host machine to boot from the module *before* installing any software. **Note:** The storage management software has been tested with the RAID Module as the boot device *only* for a single host-RAID Module configuration.	Installation and Setup	Follow the guidelines in Chapter 3 "Installing the Boot Device on a RAID Module". **Caution:** If you use the RAID Module as a boot device, you must *never* delete LUN 0 or use `File` → `Reset Configuration` (`Configuration` application) or you will lose your boot device and operating system.

TABLE 1-1 Windows NT Restrictions and Notes *(2 of 3)*

Restriction/Note	Application	Workaround
RDAC failover does not work during system dump if the dump/swap device is a RAID Module LUN different from the LUN used for the boot device.	Installation and Setup	Do not create a RAID Module LUN having only dump/swap areas. It is acceptable to put the dump/swap area on the same LUN as the boot device.
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	If you have the Network Monitor service installed, stop it before using the storage management software: 1. Select `Control Panel` → `Services`. 2. Highlight the `Network Monitor` service. 3. Select `Stop`.
The `raidutil` command does not always generate an error message when an operation fails. For example, using `raidutil -R` to reset the controller battery age fails if LUN 0 has not been created; however, there is no error message.	General	Anytime you use `raidutil` to perform an operation, it is a good idea to verify that the operation was completed successfully. For example, after creating LUNs, you might want to use the `lad` command to verify your configuration.

TABLE 1-1 Windows NT Restrictions and Notes *(3 of 3)*

Restriction/Note	Application	Workaround
You can not reliably change font size in the storage management software's displays.	General	None.
Selecting certain operations may result in an error message indicating that I/Os were occurring or filesystems were present on the selected RAID Module. This occurs when a second application/option requests exclusive access to LUNs and Windows NT drive letters that are already locked by another operation.	Configuration, Recovery, Maintenance/ Tuning	1. Wait for any operation that requires exclusive access to finish before performing another operation on the affected RAID Module or drive group/LUNs. 2. If no other storage management operations are running, then some other Windows NT application may be using/displaying the drive letters. If you suspect this is the case, close other Windows NT applications, such as File Manager, then reselect the storage management software and try the operation again. 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).
When creating or deleting LUNs, or using `File` → `Reset Configuration`, the Windows NT host requires a restart in order to see the configuration changes properly.	Configuration	Restart the host system anytime you create or delete drive groups/LUNs.

Hardware and Software Requirements

Before installing the storage management software, make sure that you have the following components installed:

Hardware Configuration

The following hardware is required:

- At least an 800 x 600 resolution graphics card and mouse.
- RAID Modules with Series 3 controller(s) (see Appendix A “Specifications” for a list of supported controllers and firmware requirements).
- A minimum controller firmware version depending on your controller model (see TABLE A-3 on page A-3 for a list of firmware levels).
- One or two host machines with a Host-RAID Module configuration supported by this software (see “Host-RAID Module Configurations” on page A-1 for information about supported configurations).

Operating System

Windows NT Server 4.0 operating system with Microsoft Service Pack 3 installed on *one* of the following:

- The host machines connected via SCSI cable to the RAID Modules, *or*
- LUN 0 of a RAID Module *if* you want to use the module as a boot device. This involves preparing the host system to boot from the RAID Module and installing all your software.

Note – This software was tested with, and requires, Microsoft Service Pack 3.

Host Adapters

See “SCSI Host Adapters and Driver Revisions” on page A-2 for a list of the host adapters tested with this software.

Checking the Hardware

Use the following checklist to make sure that the RAID Modules have been connected correctly to your host system. If necessary, refer to the documentation supplied with your RAID Module:

- Are all cable connections correct and secure?
- Is the termination correct and secure?

- Are the host-side IDs set properly? Each controller in each RAID Module must have a unique host-side ID (that is, no two devices on the same SCSI Bus can have the same host-side ID).

Tip – For the greatest level of I/O path protection, provide each controller in a RAID Module with its own data path connection (that is, cable and host adapter) into the host system.

Continue with the next section, “Selecting the Correct Installation Procedure”.

Selecting the Correct Installation Procedure

The procedure you need to use to install the storage management software depends upon your system’s configuration.

If You Want To:	See
Install the software on a standard, Host-RAID Module configuration.	Chapter 2 “Installing the Software on a Standard Configuration”.
Install the software and make the RAID Module the boot device.	Chapter 3 “Installing the Boot Device on a RAID Module”.

CHAPTER 2

Installing the Software on a Standard Configuration

This chapter describes how to install or upgrade the storage management software on a standard configuration (single host or independent controller configuration).

Where to Start

Note – After you install and set up the software, refer to the *Sun StorEdge RAID Manager User Guide* for further information about using the software and maintaining the RAID Modules.

Are you upgrading from a previous version of the storage management software?

No	Yes
Go to “Assigning Drive Letters” on page 2-3.	Continue with the next section, “Upgrading from a Previous Installation”.

Upgrading from a Previous Installation

If you are upgrading from a previous version of storage management software, read the following notes and use the *current* version of the storage management software to perform the tasks given in TABLE 2-1 on page 2-3.

Note – `rmparams` and `rmscript.bat` files — 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 with any changes you may have made. See "Changing the `rmparams` File" on page 5-6 and "Setting up Scriptable Notification Options" on page 5-8. Do *not* copy the old files over the new; doing so may destroy new parameters or script that was installed with the new version.

Upgrading from RAID Manager 6.00 — If you are upgrading from RAID Manager 6.00, the RAID Module numbers/names will change. Any labels that you have placed on your RAID Modules will *not* correspond to the list of modules in the new version of this software. In this new version, the module name is derived from the name of the host machine where the storage management software is installed. RAID Manager 6.00 labeled the modules "RAID Module *XX*"; the new version labels them "*hostname_XXX*". For example, if the host machine running this software is called "sonne," a module connected to the host would be named "sonne_*XXX*" (see "Module Names" on page 6-2).

TABLE 2-1 Upgrading the Storage Management Software (Standard Installation)

Task to Perform	Why Perform This Task?
1. From any RAID Manager application, select `File` → `Save Module Profile`. 2. Make sure that `All information types` is selected, and select `OK`. **Tip:** Be sure to save this information file to the *same* disk drive where the storage management software is installed (such as, `c:\`). However, you should place it in a different directory than the software's installation, so that this file is not removed during the installation procedure.	To retain a copy of your current configuration for each RAID Module and the current module names. This copy can be used for reference, but cannot be used to automatically reload the configuration.
3. Exit the storage management software completely, making sure the previous version is not currently open or running.	To avoid problems with overwriting or deleting old files during installation.
4. Continue with "Installing the Storage Management Software" on page 2-5.	To upgrade to the new version.

Assigning Drive Letters

To ensure RDAC functionality, the installation procedure loads the SymArray driver before the native NT class driver. However, this means that the system will see the RAID Module's LUNs first, before it sees any local SCSI drives, and will assign drive letters accordingly. Therefore, *before* you install this software, you *must* have "sticky" drive letters assigned to your existing local drives.

Tip – The storage management software can not be installed unless drive letters are assigned to existing drives.

Use the following procedure to assign "sticky" drive letters:

1. **Start Disk Administrator (select** `Start` → `Programs` → `Administrative Tools` → `Disk Administrator`**) and view the disk configuration on your system. Check the number of partitions.**

If you have 2 or more partitions:	If you have only one partition:
Go to Step 2.	Go to Step 3.

2. **If you have** *at least two* **partitions (the boot partition and one other partition) and** *both* **of the following conditions apply:**
   - The last partition you created was created with Disk Administrator, *and*
   - The partition has a drive letter assigned and has a status of "Unknown" or has a file system on it (that is, it has a status other than "Unformatted").

   You are finished with this procedure; continue with "Installing the Storage Management Software" on page 2-5. If both conditions do not apply, proceed to Step 3.

3. **Create a new partition.**
   a. Select a drive containing some free disk space.
   b. Select `Partition` → `Create`. The partition is created (a drive letter is assigned and the partition status is "Unformatted").
   c. Select `Partition` → `Commit Changes Now`. The partition status changes to "Unknown," and sticky drive letters are assigned to all your existing partitions.

4. **Continue with the next section, "Installing the Storage Management Software".**

Installing the Storage Management Software

Use the following procedure to install the storage management software in a standard configuration.

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

If you are using the independent controller configuration, you must perform this procedure on both hosts.

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.

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1. **Insert the Installation CD into your CD-ROM drive.**
2. **To begin the installation program**:
   a. Select `Start` → `Settings` → `Control Panel` → `Add/Remove Programs`.
   b. Select `Install` and follow the instructions on the screen.
   c. Select `Browse` to find the drive containing the CD you are installing.
   d. When you see `d:\Raidmgr\setup.exe`, select `Finish`.
3. **Follow the instructions on the screen to complete the installation procedure.**

Tip – During installation, you will be prompted to define the directory path where you want this software installed; the default path is `\program files\Raidmgr` on your boot drive. If you are defining your own directory path, do *not* use special characters (such as #, $, or +) for the directory name. For the purpose of providing examples of the installation requirements, this *Installation Guide* will refer to the default directory on drive `c:`.

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

Note – If you are not using the A3x00 or A1000 as a boot device, the SCSI BIOS must be disabled. Refer to your adapter's Installation Manual for information about disabling the BIOS.

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5. **Verify that the storage management software is installed and the** `Disk Array Monitor` **service is running:**

   a. Select `Start` → `Programs`. `Raid Manager` should appear in the list.

   b. Select `Start` → `Settings` → `Control Panel` → `Services`. The `Disk Array Monitor` should be running if this service's status is Started.

   c. Select `Close` to exit this dialog box.

6. **Continue with Chapter 4 "Initial Startup Procedures".**

CHAPTER 3

Installing the Boot Device on a RAID Module

This chapter describes how to install or upgrade the storage management software on a RAID Module boot device.

Where to Start

Are you upgrading from a previous version of the storage management software?

No	Yes
Go to “Preparing the New Installation” on page 3-3.	Continue with the next section, “Upgrading from a Previous Installation”.

Upgrading from a Previous Installation

If you are upgrading from a previous version of storage management software, read the following notes and use the *current* version of the storage management software to perform the tasks given in TABLE 3-1 on page 3-2.

Note – `rmparams` **and** `rmscript.bat` **files** — 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 with any changes you may have made. See "Changing the `rmparams` File" on page 5-6 and "Setting up Scriptable Notification Options" on page 5-8. Do *not* copy the old files over the new; doing so may destroy new parameters or script that was installed with the new version.

Upgrading from RAID Manager 6.00 — If you are upgrading from RAID Manager 6.00, the RAID Module numbers/names will change. Any labels that you have placed on your RAID Modules will *not* correspond to the list of modules in the new version of this software. In this new version, the module name is derived from the name of the host machine where the storage management software is installed. RAID Manager 6.00 labeled the modules "RAID Module *XX*"; the new version labels them "*hostname_XXX*". For example, if the host machine running this software is called "sonne," a module connected to the host would be named "sonne_*XXX*" (see "Module Names" on page 6-2).

TABLE 3-1 Upgrading The Storage Management Software (Boot Device Installation)

Task to Perform	Why Perform This Task?
1. From any RAID Manager application, select `File` → `Save Module Profile`. 2. Make sure that `All information types` is selected, and select `OK`. **Tip:** Be sure to save this information file to the *same* disk drive where the storage management software is installed (such as, `c:\`). However, you should place it in a different directory than the software's installation, so that this file is not removed during the installation procedure.	To retain a copy of your current configuration for each RAID Module and the current module names. This copy can be used for reference, but cannot be used to automatically reload the configuration.
3. Exit the storage management software completely, making sure the previous version is not currently open or running.	To avoid problems with overwriting or deleting old files during installation.
4. Continue with "Installing the Storage Management Software" on page 3-6.	To upgrade to the new version using the existing RAID Module boot device.

Preparing the New Installation

If you want to use the RAID Module as a boot device (that is, install the Windows NT operating system and the storage management software on LUN 0 of the RAID Module), you must prepare the module and the host machine *before* installing any software. Use the following guidelines along with the appropriate host machine documentation.

If you need more information about RAID Modules, drive groups, or logical units, see the "Common Definitions" section in the *User Guide* or the Online Help glossary.

Caution – If the RAID Module you want to assign as a boot device has a single-controller, dual controllers on the same host bus, or an independent controller configuration, you do *not* have RDAC failover protection. If the boot-path controller fails or has connection problems, it could result in the loss of your boot device. For this reason, you should *not* use a controller with any of these configurations as a boot device.

Also, if you use the RAID Module as a boot device, you must *never* delete LUN 0 or use `Reset Configuration` (in the `Configuration` application) or you will lose your boot device and operating system.

In the independent controller configuration, only *one* host machine can boot because only one controller will own LUN 0.

Tip – See "Boot Device Host Adapters" on page A-2 for a list of the host adapters that support RAID Modules as boot devices.

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

You *must* use LUN 0 as the boot device because the boot device must be the first logical device the Windows NT system sees. In addition, the host machine names drive `c:` as the first device it sees at startup (boot).

For best results, make sure that LUN 0 is a RAID Level 1, 3, or 5 LUN to ensure data protection for the drive group.

Prepare the RAID Module

1. **Using RAID configuration software (such as RAID Manager for DOS), configure LUN 0 on the RAID Module, or verify that your module's current configuration (or factory default configuration) for LUN 0 will be sufficient.**

   For Windows NT, LUN 0 needs to be a maximum of 4 GB, or you must use Windows NT (during its installation) to create a partition no larger than 4 GB on the LUN.

2. **Make sure that there is at least one other configured LUN on the RAID Module. If not, use DRM to create one (you will need an additional LUN to assign drive letters later in the installation procedure).**

3. **Continue with the next section, "Prepare the Host Machine".**

Prepare the Host Machine

1. **Consult your host system and host adapter documentation for detailed procedures. Make sure that the first host adapter with enabled BIOS is connected to the default boot path and that the next host adapter with enabled BIOS is connected to the alternate boot path.**

Tip – You should begin the Windows NT installation in the next step from floppy diskette because you may need to manually install drivers for your host adapters during the installation process.

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2. **On the host machine, install the Windows NT operating system, and follow the setup procedures provided on screen. (See "Operating System" on page 1-7 and "SCSI Host Adapters and Driver Revisions" on page A-2 for information about the Service Pack and host adapter drivers used for testing.)**

   After the installation is completed, Windows NT automatically shuts down and restarts.

3. **From the root directory, view the Windows NT** `boot.ini` **file to verify that the default ARC (Advanced RISC Computing) name entry begins with a "**`multi`**" designator. You should see an entry similar to the following example:**

   ```
   multi(0)disk(0)rdisk(0)partition(1)\WINNT="Windows NT Server Version
   4.00"
   ```

Note – If you do *not* see the `multi` designator, return to Step 1 of this procedure to verify that the BIOS is enabled properly.

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4. **Continue with the next section, "Assigning Drive Letters".**

Assigning Drive Letters

To ensure RDAC functionality, the installation procedure loads the SymArray driver before the native NT class driver. However, this means that the system will see the RAID Module's LUNs first, before it sees any local SCSI drives, and will assign drive letters accordingly. Therefore, *before* you install this software, you *must* have "sticky" drive letters assigned to your existing local drives.

Tip – The storage management software can not be installed unless drive letters are assigned to existing drives.

Use the following procedure to assign "sticky" drive letters:

1. **Start Disk Administrator (select** `Start` → `Programs` → `Administrative Tools` → `Disk Administrator`**), and view the disk configuration on your system. Check the number of partitions.**

If you have 2 or more partitions:	If you have only one partition:
Go to Step 2.	Go to Step 3.

2. **If you have** *at least two* **partitions (the boot partition and one other partition) and** *both* **of the following conditions apply:**
   - The last partition you created was created with Disk Administrator, *and*
   - The partition has a drive letter assigned and has a status of "Unknown" or has a file system on it (that is, it has a status other than "Unformatted").

   You are finished with this procedure; continue with "Installing the Storage Management Software" on page 3-6. If both conditions do not apply, proceed to Step 3.

3. **Create a new partition (either on a local drive or on a RAID Module LUN).**
   a. Select a drive containing some free disk space.
   b. Select `Partition` → `Create`. The partition is created (a drive letter is assigned and the partition status is "Unformatted").
   c. Select `Partition` → `Commit Changes Now`. The partition status changes to "Unknown," and sticky drive letters are assigned to all your existing partitions.

4. **Continue with the next section, "Installing the Storage Management Software".**

Installing the Storage Management Software

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.

1. **Insert the Installation CD into your CD-ROM drive.**
2. **To begin the installation program:**
   a. Select `Start` → `Settings` → `Control Panel` → `Add/Remove Programs`.
   b. Select `Install` and follow the instructions on the screen.
   c. When you see `d:\Raidmgr\setup.exe`, select `Finish`.
3. **Follow the instructions on the screen to complete the installation procedure.**

Tip – During installation, you will be prompted to define the directory path where you want this software installed; the default path is `\program file\Raidmgr` on your boot drive. If you are defining your own directory path, do *not* use special characters (such as #, $, or +) for the directory name. For the purpose of providing examples of the installation requirements, this *Installation Guide* will refer to the default directory on drive `c:`.

4. **When installation is completed, remove the CD and restart the system.**
5. **Verify that the storage management software is installed and the** `Disk Array Monitor` **service is running:**
   a. Select `Start` → `Programs`. `Raid Manager` should appear in the list.
   b. Select `Start` → `Settings` → `Control Panel` → `Services`. The `Disk Array Monitor` should be running if this service's status is Started.

6. **Are you using a single-controller or independent controller RAID Module as the boot device?**

No	Yes
Continue with the next section, "Testing Controller Failover".	Go to Chapter 4 "Initial Startup Procedures".

Testing Controller Failover

Caution – Do *not* perform the procedure in this section if you have used a single-controller or independent controller RAID Module as the boot device. Failing the controller in these configurations will cause you to lose your boot device. For this reason, these configurations are *not* recommended for using a module as boot device. If you are using one of these configurations, skip this section and go to Chapter 4 "Initial Startup Procedures".

With the storage management software installed, verify that the alternate boot path works in a controller failover scenario. For best results, make sure that there is no I/O going to the boot module during this procedure.

Note – For more complete information about the fail-over procedure described here, see the Recovery chapter in the *User Guide*.

1. **Select** `Start` → `Programs` → `Raid Manager`**.**
2. **Select the** `Recovery` **application.**
3. **Select the RAID Module that you created as the boot device.**
4. **Select** `Recovery Guru/Health Check` **to verify that the RAID Module is Optimal (that is, it has no component or data path problems).**

Tip – If you see any Failure type reported, select `Show Procedure` and follow the instructions provided to correct the problem. When the problem is corrected, select `Recovery Guru/Health Check` again to verify the module is now Optimal.

5. **Select** `Options` → `Manual Recovery` → `Controller Pairs`**.**
6. **Highlight the controller you created as the default boot path device and select** `Place Offline`**.**

7. **When the controller is Offline, select** `Recovery Guru/Health Check`**. You should see an Offline Controller for the module. Do** *not* **fix the problem at this time.**
8. **Exit the storage management software.**
9. **Shut down and restart Windows NT.**
10. **Do you see the boot menu when the operating system restarts?**

No	Yes
Return to Step 1 in "Prepare the Host Machine" on page 3-4 to verify the host adapter's BIOS is properly enabled.	Select the default boot path and continue with Step 11.

11. **Does the Windows NT system restart?**

No	Yes
There is a problem with the `boot.ini` file entry. Return to Step 1 in "Prepare the Host Machine" on page 3-4 and consult your Microsoft documentation.	Continue with Step 12 to restore the default boot path controller.

12. **Start the storage management software.**
13. **Select the** `Recovery` **application.**
14. **Select the RAID Module you created as the boot device, and select** `Recovery Guru/Health Check`**. You should see an Offline Controller for the module.**
15. **Select** `Show Procedure` **and follow the instructions provided.**
16. **When the recovery procedure is completed, select** `Recovery Guru/Health Check` **again to verify that the module is now Optimal.**
17. **Select the** `Maintenance/Tuning` **application.**
18. **Select the RAID Module that you created as the boot device, and then select** `LUN Balancing`**. Verify that the default boot-path controller owns LUN 0. If it does not, change the ownership now (see the "Balancing LUNs" section in the** *User Guide* **for more information).**
19. **Continue with Chapter 4 "Initial Startup Procedures".**

CHAPTER 4

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:

Starting the Software

Tip – You must have administrator privileges to access this software.

1. **Start Windows NT if it is not already running.**
2. **Start the RAID Manager software. Select** `Start` → `Programs` → `Raid Manager`**.**
3. **The application names appear under Raid Manager:** `Configuration`**,** `Maintenance and Tuning`**,** `Recovery`**, and** `Status`**. For a description of some key terms used in the applications, see the "Common Definitions" section in the** *User Guide* **or the Online Help glossary.**

4. **Do your modules have an Independent Controller configuration?**

   For a definition of the Independent Controller configuration, see "Host-RAID Module Configurations" on page A-1.

No	Yes
Go to "Assigning Names to the Modules" on page 4-3.	Continue with the next section, "Setting up Independent Controllers".

Setting up Independent Controllers

If your RAID Modules are using an Independent Controller configuration, you need to perform the procedure below to indicate the configuration to the storage management software.

1. **Start any storage management software application.**
2. **When the Module Selection screen appears, highlight the module that has independent controllers, and select Edit.**
3. **Click the box next to "Independent Controllers?" and select OK.**

   You return to the main Module Selection screen, and the "Indep. Cntrls?" column now says Yes.
4. **Assign names to the modules, if desired, and add any comments (such as location details or other unique information to further clarify the module name).**

Note – If you upgraded the storage management software from version 6.00, the RAID Module names may have changed from RAID Module *XX* to *hostname_XXX*. Using the Module Profile you saved at the beginning of the upgrade installation process, reassign the original names, if desired.

---

5. **Repeat this procedure for all modules using this configuration.**
6. **Continue with "Verifying and Upgrading the Controller Firmware" on page 4-3.**

Assigning Names to the Modules

The installation procedure assigns default names to each RAID Module (in the form *hostname_XXX*). You can assign other names to the modules, if desired, to aid in identifying them.

Note – If you upgraded the storage management software from version 6.00, the RAID Module names may have changed from RAID Module *XX* to *hostname_XXX*. Using the Module Profile you saved, reassign the original names, if desired.

If you do not want to assign names to the modules at this time, continue with the next section, "Verifying and Upgrading the Controller Firmware". Otherwise, perform the following procedure:

1. **Start any storage management software application.**
2. **When the Module Selection screen appears, highlight the module that has independent controllers, and select** `Edit`**.**
3. **Assign a name to the module and add any comments (such as location details or other unique information to further clarify the module name).**
4. **Perform this procedure on each RAID Module that you want to assign a name to.**
5. **Continue with the next section, "Verifying and Upgrading the Controller Firmware".**

Verifying and Upgrading the Controller Firmware

Note – The most recent controller firmware version and NVSRAM file are documented in "Latest Versions" on page A-3. If your RAID Modules do not contain the most recent version of controller firmware, you will need to download the correct firmware version and new NVSRAM file to the RAID Module controllers (including any previously installed RAID Modules).

Use the following procedures to determine the current firmware level and to download new firmware, if necessary.

Verifying the Controller Firmware Version

Note – If your RAID Modules have an Independent Controller configuration, be sure to perform these steps from *each* host machine. In addition, be sure to check the firmware level on *all* RAID Modules attached to the host system.

You can quickly see what controller firmware version a RAID Module's controllers have by using Module Profile:

1. **Start the** `Configuration` **application.**

   The Module Selection screen appears. If you have more than one RAID Module connected to your host system, each RAID Module appears in the list.

2. **Select the RAID Module you want to check, then select** `Module Profile` → `Controllers`**.**

3. **Verify that the firmware level is the most recent version. (See "Firmware Specifications" on page A-3 for a list of the firmware levels and controllers supported by this software.)**

4. **Select** `OK` **when finished viewing.**

5. **Check** *all* **the RAID Modules on your system.**

6. **Do** *all* **the controllers on your system have the required version of firmware?**

No	Yes
You *must* upgrade to the most recent version immediately. Continue with the next section, "Upgrading the Controller Firmware Version".	Go to "Setting the NVSRAM Values" on page 4-8.

7. **Close all windows.**

Upgrading the Controller Firmware Version

Note – For complete details on the *Firmware Upgrade* option, see the "Upgrading Controller Firmware" procedure in the Maintenance/Tuning Chapter of the *User Guide*.

Perform the following steps to download new controller firmware:

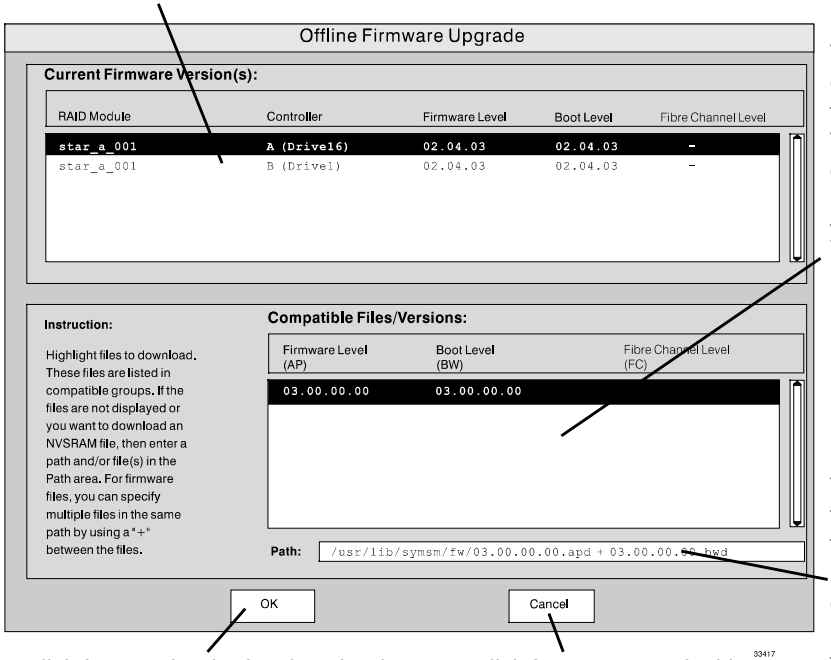
1. **Copy the firmware files, the** `fwcompat.def` **file, and the NVSRAM files to the** `\program files\Raidmgr\lib` **directory.**
2. **Determine whether you can upgrade the firmware using the Online (RAID Module receiving I/O) or Offline (RAID Module** *not* **receiving I/O) method.**

Note – If you need to download an NVSRAM file, you *must* use the Offline method (because you will have to restart the RAID Module before the new settings take effect). You must also use the Offline method if your RAID Modules have an Independent Controller configuration.

If you must use the Offline method, make sure that you stop all I/O to the controllers you are going to upgrade.

3. **Start the** `Maintenance and Tuning` **application.**
4. **Select the RAID Module containing the controllers you want to upgrade. Select** `All RAID Modules` **to download firmware to all controllers in all RAID Modules.**
5. **Click on the** `Firmware Upgrade` **button or select** `Options` → `Firmware Upgrade` **from the pull-down menus.**
6. **Read the Important Notes screen and then select** `OK`**.**
7. **A screen appears asking you to select the Online or Offline procedure. Select either:**
   - `Online` – to upgrade firmware while the selected RAID Module receives I/O.
   - `Offline` – to upgrade firmware when the selected RAID Module is not receiving I/O.
8. **After selecting** `Online` **or** `Offline`**, the screen displays "Verifying the controller state" while the software checks the selected RAID Modules for restrictions based on the type of firmware upgrade you selected. If there are no restrictions, a screen like** FIGURE 4-1 **is displayed.**

This display shows the controllers in the selected RAID Modules and their current firmware levels. Make sure that both controllers are highlighted here if you want to download firmware to both controllers.



This screen displays the compatible firmware files found by `fwcompat.def`. That program checks the default subdirectory for files. Highlight the version level you want to download.

The path is updated to show the files currently selected in the Compatible Files/Versions display. You can also enter file names here to download additional files (such as an NVSRAM file).

Click here to begin the download after you have selected the firmware files to load or entered the name of the NVSRAM file in the path box.

Click here to cancel without downloading any new files.

FIGURE 4-1 Firmware Upgrade Screen

9. **If you need to download** *both* **new NVSRAM files** *and* **upgraded firmware files, you must download the NVSRAM files** *first***, before downloading the new firmware files. Depending on your needs, do one of the following:**

Download an NVSRAM file?	Download upgraded controller firmware?
Type its complete path information (see "Latest Versions" on page A-3) in the Path box and then select OK. Go to Step 11.	Continue with Step 10.

10. **Highlight the firmware version level that you want to download and then select** `OK`**.**

    You either receive notification that a problem occurred, or you have a final confirmation that the upgrade process is about to begin.

11. **Select** `OK` **and follow the upgrade progress. The upgrade will take approximately 5 minutes, although the Status bar may show 100% almost immediately.**

Tip – Do *not* select any other options or exit the `Maintenance/Tuning` application until the upgrade process is complete. You can, however, monitor the upgrade progress.

A histogram for the selected RAID Module indicates the download progress of the NVSRAM or firmware files. This graphic shows the amount of progress as a percentage and starts over at 0% for each file, if you have more than one. If you selected All RAID Modules, the module number is updated as each module begins its upgrade process.

When the NVSRAM download or the firmware upgrade is finished, you see a summary report indicating whether the upgrade was Successful or Failed. TABLE 4-1 shows the information this screen displays.

Note – If you selected All RAID Modules, it is possible that the upgrade was successful for some modules, but not for others. The final summary report should indicate which modules were not successful and give an appropriate cause. For more information, see the *User Guide*.

TABLE 4-1 Firmware Confirmation Screen Elements

Screen Element	Description
Summary Report for Files	Lists the files used to upgrade the firmware. These are the files loaded in the Path line when you selected files at the Compatible Files / Versions screen (FIGURE 4-1 on page 4-6).
RAID Module	Identifies the specific RAID Module.
Download Status	Indicates whether the download process completed successfully. The status will be either “Successful” or “Failed” (with a reason why the upgrade was unsuccessful). See the *User Guide* if there are any Failed download statuses.

12. **After the download is completed, select** `OK` **to return to the Maintenance/ Tuning screen.**

13. **Did you download an NVSRAM file or new firmware?**

New Firmware	NVSRAM file
You are finished with this procedure. Continue with the next section, "Setting the NVSRAM Values" on page 4-8	Continue with Step 14.

14. **At the command line, type:**

    `nvutil -vf`

    This utility checks and corrects any settings on all controllers in your RAID Modules to ensure that certain settings in the NVSRAM are setup correctly for this software.

15. **Establish the new NVSRAM settings:**

    - If the RAID Module contains the boot device, you must shut down the system and then turn the power to the RAID Module off and then on again to establish the new NVSRAM settings.
    - Otherwise, turn the power to the RAID Module off and then on again to establish the new NVSRAM settings.

16. **Go back to Step 9 and download any new firmware files.**

    End of Procedure

Setting the NVSRAM Values

If the following condition applies, you need to change NVSRAM settings so that the RAID Modules perform correctly on your configuration:

- Your RAID Modules are *not* connected to a network

If your RAID Modules do not need updating, continue with the next section, "Running the Recovery Guru / Health Check". Otherwise, perform the following procedure:

1. **Determine which `.def` file you need to use.**

   The `.def` files are located in `\program files\Raidmgr\lib` directory. At this time, you need to use:

   - `networkoff.def` — If the RAID Module has no network connections.

Note – You will see other `.def` files in the directory. These files can be used to restore the original NVSRAM settings.

2. **From the command line, enter:**

   `nvutil -vf` *def_file_name*

   where *def_file_name* is the name of the required `.def` file (determined in Step 1).

3. **Turn the power to the RAID Module off and then on again to establish the new NVSRAM settings.**
4. **Perform this procedure from each host attached to an affected RAID Module.**
5. **Continue with the next section, "Running the Recovery Guru/Health Check".**

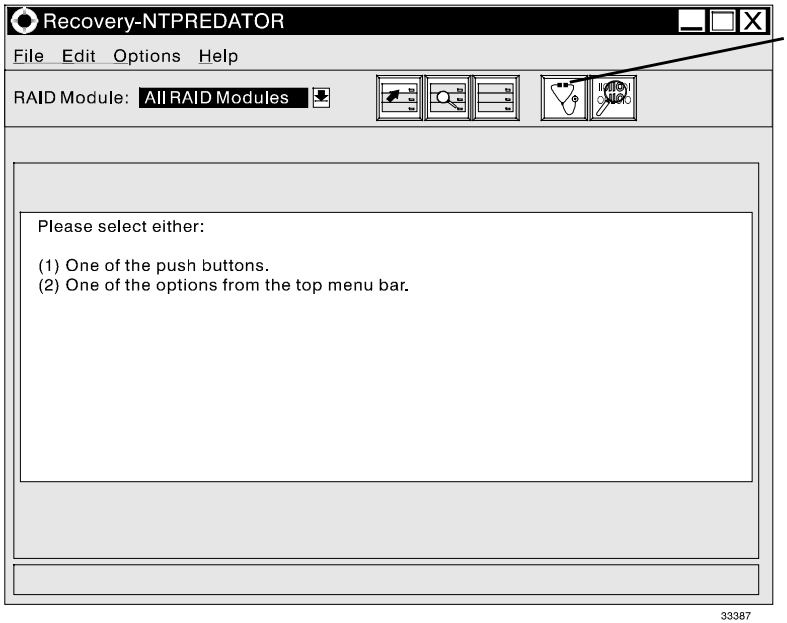
Running the Recovery Guru / Health Check

Use the following steps to ensure that all of the RAID Modules attached to your host system are operational.

Note – Be sure to perform this step from *each* host machine if you are using the Independent Controller configuration.

Use the following procedure to run the `Recovery Guru/Health Check`.

1. **Start the** `Recovery` **application.**
2. **Select** `All RAID Modules` **to check all of the modules on your system.**
3. **A screen like** FIGURE 4-2 **is displayed.**



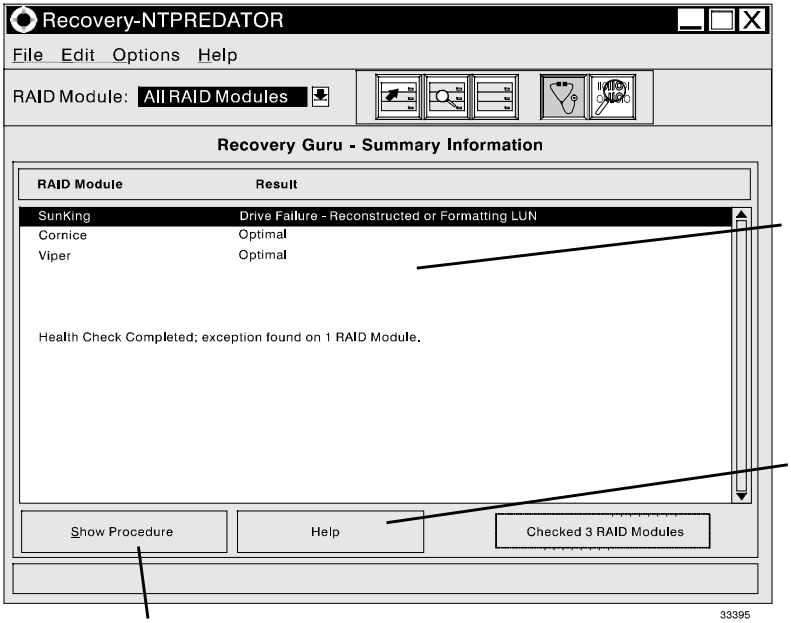
Click here to start the `Recovery Guru/Health Check` on the selected modules. Alternately, you can select `Options` → `Recovery Guru`.

FIGURE 4-2 Recovery Main Screen

4. **Click on the `Recovery Guru/Health Check` button or select `Options` → `Recovery Guru` from the pull-down menus. The software checks all selected modules for non-optimal statuses.**

5. **Were non-optimal statuses (exceptions) found?**

No	Yes
You are finished with this procedure. Continue with the next section, "Determining the Current Configuration" on page 4-13.	A screen like FIGURE 4-3 is displayed. Continue with Step 6.



This area displays the results of the check. If a non-optimal status is found, highlight the line and click Show Procedure for recovery information

Click here for help.

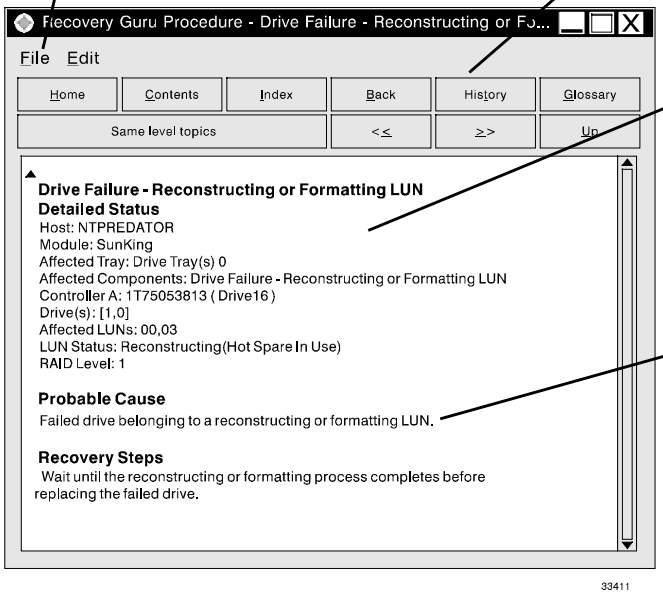
Click here to display information about the highlighted failure. This information includes recovery information. See FIGURE 4-4 on page 4-12 for a sample screen.

FIGURE 4-3 Recovery Screen / Exceptions Found

6. **Highlight the first exception and click on** Show Procedure **for recommendations on how to fix the problem (see** FIGURE 4-4**).**

Select `File` here to print the information displayed in the procedure screen, or to set up the printer before printing. Select `Edit` to copy text to the clipboard.

Although this looks like a standard Help screen, these buttons are grayed out.



The first part of this area gives detailed status information about the failure. In this case, the message indicates that drive [1,0] has failed. A hot spare drive has taken over for the failed drive and is currently reconstructing. LUNs 0 and 3 are affected by this failure.

The rest of this area gives information about the cause of the failure and how to recover from it. Read the instructions carefully. If necessary, print them out by selecting `File` → `Print Topic` from the pull-down menus.

In this case, there is no action to take until the reconstruction is finished. Then you should run Health Check again for information about replacing the failed drive.

FIGURE 4-4 Recovery Procedure Screen

7. **Print out the procedure, if desired.**
8. **Follow the procedure given to recover from the component failure.**
9. **Reselect** `Recovery Guru/Health Check`**.**
10. **Repeats Step 5 through Step 9 until all RAID Modules are Optimal.**
11. **Continue with the next section, “Determining the Current Configuration”.**

Determining the Current Configuration

Now that you have successfully installed the software, you need to use it to identify each RAID Module connected to your host system and determine the module's current configuration (number of drives, number of controllers, logical units, etc.).

Tip – Most RAID Modules come pre-configured with logical units already defined. This logical unit configuration may or may not work for your particular environment.

Be sure to perform this step from *each* host machine if using the Independent Controller configuration.

The RAID Manager software has assigned a number for each RAID Module connected to your host system. These designations are shown in the RAID Module selection list near the top of each application's screen (see FIGURE 4-5 on page 4-14).

Perform the following steps for each RAID Module to identify the module and determine its current configuration. If you need a definition of a Drive Group, RAID Module, or Logical Unit, see the "Common Definitions" section in the *User Guide* or the Online Help glossary.

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

   a. Select the `Configuration` application.

      The Module Selection screen appears. If you have more than one RAID Module connected to your host system, each RAID Module appears in the list.

   b. Highlight the first RAID Module in the list, and select `OK`.

      The main Configuration screen is displayed (see FIGURE 4-5). TABLE 4-2 on page 4-14 describes the items in the display.

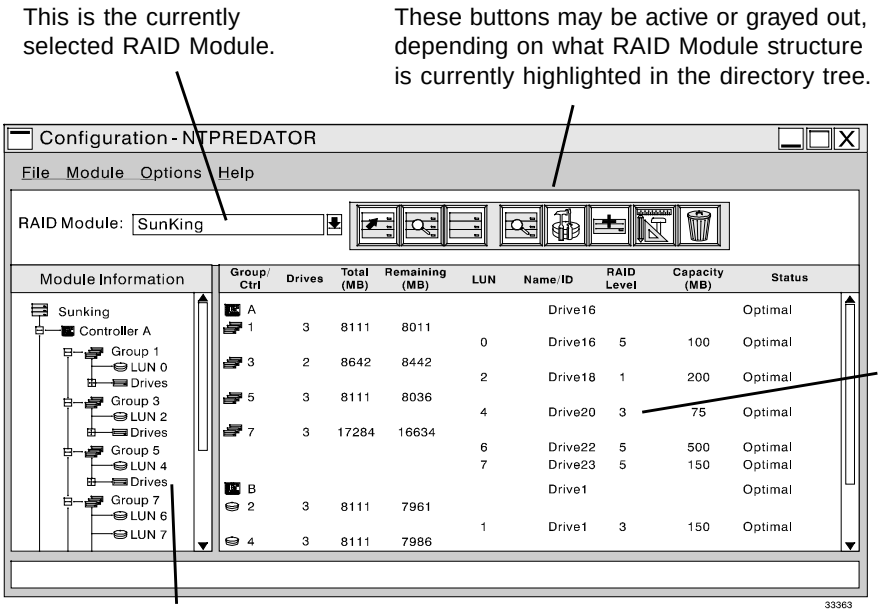


FIGURE 4-5 Main Configuration Screen

TABLE 4-2 Configuration Display Columns *(1 of 2)*

Column Heading	Explanation
Group / Ctl	The controller (A or B) or drive group.
Drives	The number of drives in the drive group.
Total (MB)	The total capacity of the drive group, after accounting for RAID level.
Remaining (MB)	The total capacity remaining in the drive group.
LUN	The logical units (LUNs) in the drive group.

TABLE 4-2 Configuration Display Columns *(2 of 2)*

Column Heading	Explanation
Name/ID	The name or ID of the controller, logical unit, or drive, depending on the display. • Controller and logical unit names are assigned by the operating system and can't be changed. • Drive IDs are the channel number and SCSI ID of the drives.
RAID Level	The RAID level of the logical unit.
Capacity (MB)	The capacity of the logical unit.
Status	The current status of the logical unit. If a status other than Optimal appears here, run Recovery Guru/Health Check to determine what the problem is, and, if necessary, what action to take.

c. View the current drive groups and logical units.

As you highlight an element in the Module Information display on the left of the screen, the display on the right changes to show those elements. You *cannot* select or highlight any item in right side of the display; it is information only.

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

a. Click on the `Locate Module` button, select `Module` → `Locate` from the pull-down menus, or right-click on a module or group item in the Module tree (if in the `Configuration` application).

b. Click `Start` on the Locate Module screen. The activity lights flash on the drive canisters in this module. Remember that the RAID Module is the *entire unit* and not a particular set of drives.

c. Physically locate the RAID Module with the flashing activity lights.

d. Once you have identified the RAID Module, place a sticker label on it for future reference.

The label should correspond to the name of the RAID Module (for example, *hostname*_001, *hostname*_002, etc.).

e. Click `Stop` to stop the flashing of the activity lights.

Tip – It is very important that you save the profile of each RAID Module during initial installation and any time you change your configuration. You can use this information as a reference if you need to perform any recovery or maintenance tasks. See Step 3.

---

3. **Use the following steps to save and print a RAID Module's profile information.**

   a. Select the desired RAID Module and then select `File` → `Save Module Profile`.

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

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

      A screen display prompts you to enter a filename.

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

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

   d. 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 Module's profile. (Optional)**

   a. Select the desired RAID Module and then select `Module` → `Profile`.

      A summary information screen appears (see FIGURE 4-6) showing information about the controllers, drives, and logical units in the RAID Module.

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

   c. Select `OK` to exit the profile information.

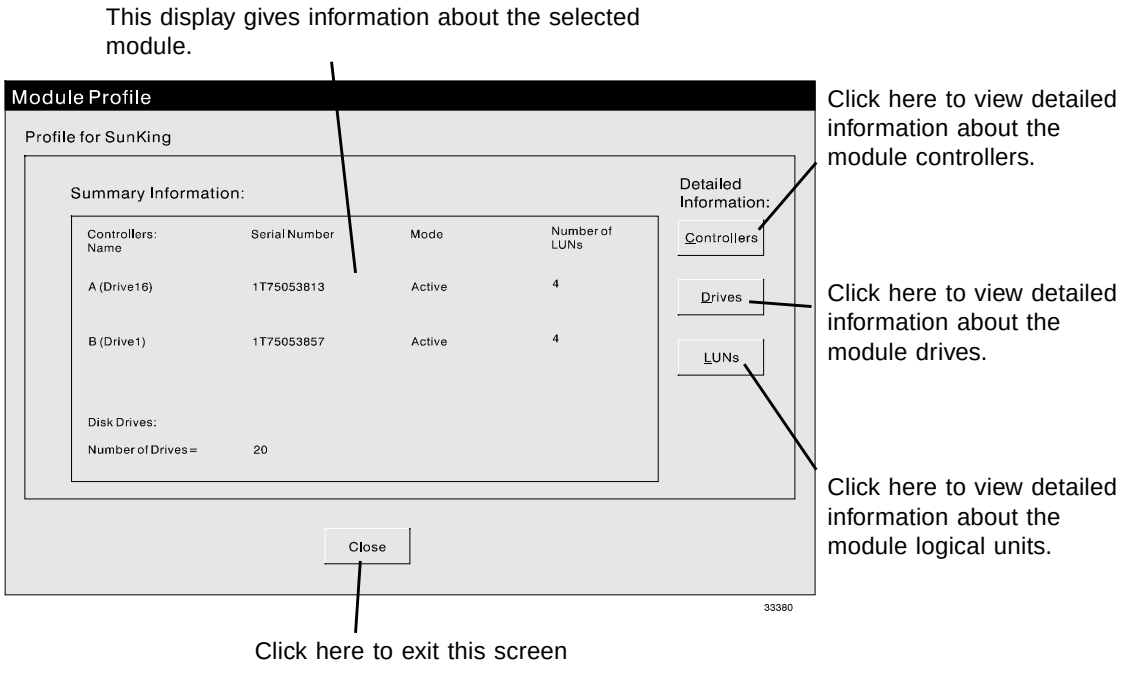


FIGURE 4-6 Main Module Profile Screen

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

   a. Highlight the drive group or individual drives you want to locate.

   b. Click on the `List/Locate Drives` button or select `Options` → `List/Locate drives` from the pull-down menus.

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

      [*x*,*y*] corresponds the channel number and SCSI ID of the specified drive in the RAID Module. You can also select `Locate` to flash the drive's activity lights in the RAID Module.

   d. Select `OK` to exit the drive information.

6. **Repeat Step 1 through Step 3 (and Step 4 through Step 5, if desired) for each RAID Module connected to your host system.**

   You should have enough information to understand the configuration for each RAID Module.

7. **Continue with the next section, "Determining whether any Changes are Necessary".**

Determining whether any Changes are Necessary

In the previous section ("Determining the Current Configuration") you should have performed the following tasks for each RAID Module connected to your host system:

Reviewed each module's current configuration (controllers, drives, and logical units / drive groups).	Step 1 on page 4-13.
Identified each RAID Module using `Locate Module`, and then placed a sticker label on it.	Step 2 on page 4-15.
Saved the Module Profile information to a file using `File` → `Save Module Profile`, and then printed the information.	Step 3 on page 4-16.

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

1. **Use** TABLE 4-3 **and the Module Profile information you saved and printed to assist you in determining whether any changes are necessary.**

TABLE 4-3 Possible Parameters to Change *(1 of 3)*

Parameter	Description	Why Change?	For More Details,
General Parameters			
Controller Mode	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 Guide*. • Use the Online help for the `Maintenance/Tuning` application.
Auto Parity Check/Repair	An automatic parity check/repair process runs each day or once a week at a specific time. Default is auto parity disabled.	If you want to enable the check/repair or change the time when it runs.	
Hot Spare Drives	A hot spare drive is a drive 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 Module.	If you want to create new or additional hot spare drives for added protection.	• See the Configuration chapter in the *User Guide*. • Use the Online help for the `Configuration` application.
Polling Interval	The array monitor checks the RAID Modules 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 polling 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 Guide*. • Use the Online help for the `Status` application.

TABLE 4-3 Possible Parameters to Change *(2 of 3)*

Parameter	Description	Why Change?	For More Details,
Logical Unit Parameters			
RAID Level	Specifies how the data is striped across the drive and whether or not the drive group has redundancy.	If the current RAID Level is not appropriate for your environment, or if you need to change the number of drives.	• See the Configuration chapter in the *User Guide*. • Use the Online help for the `Configuration` application.
Segment Size	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.	
LUN Capacity	Specifies in megabytes (MB) how much capacity is available on the logical unit.	If you want to increase the capacity of the LUN. **Note:** You will have to delete the LUN and recreate it.	
Number of Drives in the Drive Group	Specifies the number of drives in the drive group. Adding drives increases the drive group's capacity, but not the capacity of the LUNs within the drive group.	If you want to add drives to the drive group. **Note:** You can not *reduce* the number of drives in a drive group; to reduce the number of drives, you must delete the LUNs and then recreate them.	• See the Configuration chapter in the *User Guide*. • Use the Online help for the `Configuration` application.

TABLE 4-3 Possible Parameters to Change *(3 of 3)*

Parameter	Description	Why Change?	For More Details,
Caching Parameters	Specifies the caching parameters for each logical unit.	If you want to enable or disable any of these parameters.	• If you are creating *new* logical units, see the Configuration chapter in the *User Guide* or use the Online help. • To change caching parameters on *existing* logical units, see the Maintenance/Tuning chapter in the *User Guide* or use the Online help.
LUN Assignment and LUN Balancing	Determines which controller owns which logical units or drive groups.	To reassign or balance the logical units and drive groups between controllers in an active/active controller pair.	• If you are creating *new* logical units, see the Configuration chapter in the *User Guide* or use the Online help. • To change LUN Assignments on *existing* logical units, see the Maintenance/Tuning chapter in the *User Guide* or use the Online help.
Reconstruction Rate	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.

2. Continue with the next section, “Configuring RAID Modules”.

Configuring RAID Modules

Perform the following procedures to change the logical unit/drive group configuration of your RAID Modules.

Configuring Logical Units on Your RAID Module

Use the `Configuration` application of the storage management software to view the current logical unit configuration and to make any necessary changes.

Note – Refer to the *User Guide* for detailed information about using the `Configuration` application. Also, you can make configuration changes after completing the installation process. You don't have to make all your changes now.

---

1. **Select** `Start` → `Programs` → `Raid Manager` → `Configuration`**.**

   The main Configuration screen is displayed.

2. **Set up the logical units with the desired drives, RAID Levels and parameters.**

Tip – In Windows NT, you are limited to creating 8 LUNs. In addition, by default the software is limited to 16 RAID controllers. If you have more than 16 controllers attached to the host system, configure 16 controllers now, and then see "Controller Limits" on page 5-1 after you complete the installation procedure for information about customizing the installation to access the additional controllers.

Note – If you add, change, or delete logical units, you will need to restart your system.

---

3. **Continue with the next section, "Partitioning Logical Units and Assigning Drive Letters".**

Partitioning Logical Units and Assigning Drive Letters

1. **Use the Windows NT Disk Administrator to partition the logical units and assign drive letters. Refer to your Windows NT Online help for further details.**

2. **Continue with the next section, "What's Next?".**

What's Next?

Now that you have successfully completed the installation of the software, do one of the following, as applicable:

- If you want to set up SNMP notification or make other changes to support the software, go to Chapter 5 "Customizing the Installation".
- Refer to the *User Guide* for detailed information about how to use each application. For information specific to the NT operating system, refer to Chapter 6 "Operating System Support" of this *Installation and Support Guide*.
- For troubleshooting tips on common problems that you may encounter as you use this software with the Windows NT operating environment go to Chapter 7 "Troubleshooting".

CHAPTER 5

Customizing the Installation

This chapter describes how to customize your software installation.

Controller Limits

Note – In order to change the number of available controllers, you must edit the `\program files\Raidmgr\rmparams` file. Read this section and the "Disabling the Module Selection Screen" and "Setting up SNMP Notification" sections in this chapter before modifying the `rmparams` file so that you can make all your `rmparams` changes at the same time.

At installation, the storage management software is limited to 16 RAID controllers. This limit is determined by the System_MaxControllers parameter setting in the `rmparams` file. If your system has more than 16 RAID controllers, you will need to change the parameter in the `rmparams` file to reflect the actual value (see "Changing the `rmparams` File" on page 5-6).

Disabling the Module Selection Screen

Note – In order to disable the Module Selection screen, you must edit the `\program files\Raidmgr\rmparams` file. Read this section and the "Controller Limits" and "Setting up SNMP Notification" sections in this chapter before modifying the `rmparams` file so that you can make all your `rmparams` changes at the same time).

By default, the Module Selection screen is displayed every time you start a storage management application. See the "Selecting A Module" section in the *User Guide* for information about this screen.

If you want to disable this screen, you must change the System_DefaultModuleSelect parameter in the `rmparams` file (see "Changing the `rmparams` File" on page 5-6).

Setting up SNMP Notification

Enabling SNMP Notification

Note – In order to enable or disable the SNMP notification option, you must edit the `\program files\Raidmgr\rmparams` file. Read this section and the "Controller Limits" and "Disabling the Module Selection Screen" sections in this chapter before modifying the `rmparams` file so that you can make all your `rmparams` changes at the same time).

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

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

1. **Set up the NMS. You only need to set up your designated NMS *once*. Use the following procedure to compile this software's Management Information Base (MIB) into your NMS.**

Note – The MIB was written to standard version 1 SNMP syntax. It was designed specifically for the RAID Manager software. It is *not* applicable to other vendors' RAID products.

---

   a. Copy the `\program files\Raidmgr\rm6traps.mib` file to the network management station.

   b. Follow the steps required by your specific network management station to compile 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 that the host system is connected to the network with the NMS station.**

3. **Enable this notification on your host. You must edit three parameters in the `\program files\Raidmgr\rmparams` file so that the software will know where to direct the SNMP trap messages when a RAID Event occurs (see "Changing the `rmparams` File" on page 5-6).**

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

Contents of an SNMP Trap Message

Refer to TABLE 5-1 for a description of the contents of an SNMP trap message.

Tip – If the trap type is anything other than informational, you should use the `Status` or `Recovery` applications to get more information or specific 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 5-1 Contents of an SNMP Trap Message

Item	Description
Host IP Address	The standard IP address dot notation for the host where the RAID Module is attached.
Host Name	The text name assigned to the host.
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 Module 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 Module	Indicates which RAID Module had the event (for example, sonne_001).
Condition Description	A brief description of the event.

Disabling SNMP

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

1. **In the** `\program files\Raidmgr\rmparams` **file, change the value of the SNMP_Action_Number line to 0 (see “Changing the `rmparams` File” on page 5-6).**
2. **Save the** `rmparams` **file and copy it to the backup directory. It is critical that you have a backup copy of this file.**

End of Procedure

Changing the rmparams File

The \program files\Raidmgr\rmparams file stores several configurable options available through this software. TABLE 5-2 on page 5-7 shows a list of the parameters in the file that you may need to change.

Tip – Before you edit the rmparams file, make sure that you read the "Controller Limits", "Disabling the Module Selection Screen", and "Setting up SNMP Notification" sections in this chapter. Decide which of these parameters you want to change and make all the changes at the same time.

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

Most of the options in the rmparams file (other than the ones shown in TABLE 5-2 on page 5-7) should *not* be changed except through the graphical user interface (GUI).

For more information about the rmparams file, read the text file about rmparams. From the installation directory, type:

```
help rmparams
```

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 before you modify the current file. 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 once you are sure that the changes work.

TABLE 5-2 Changeable Parameters in the *rmparams* File

Description	When To Change	How To Change
SNMP_Target_IP_Address=*xxx.xx.xx.xx*		
Provides the SNMP IP Address for remote notification.	If you want to enable SNMP.	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.	Add the community name. The most commonly used community name is public; however, your network environment may require another name.
SNMP_Action_Number=0		
Indicates the SNMP trap notification option you want to use.	If you want to enable SNMP.	Change this value to either 1 or 2. 1 will send SNMP traps to the designated NMS station. 2 means that all the relevant data is written to the file `trap.dat`. **Tip:** Setting this parameter to 0 will completely disable the SNMP option.
System_DefaultModuleSelect=TRUE		
Determines whether or not the Module Selection screen is displayed each time you open an application.	If you want to disable the Module Selection screen (see "Disabling the Module Selection Screen" on page 5-2).	Change TRUE to FALSE.
System_MaxControllers=16		
Determines the maximum number of RAID Controllers supported by this software.	If you have more than 16 RAID Controllers (see "Controller Limits" on page 5-1).	Change the 16 to the appropriate number.

1. *Before* **making any changes to the** `rmparams` **file for the first time, save the original file and copy it to the backup directory.**
2. **Make any necessary changes to the** `rmparams` **file using** TABLE 5-2 **as a guide.**
3. **Save the** `rmparams` **file, and copy it to the backup directory.**

End of Procedure

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; however, 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 (making sure the del %1 remains the last line in the file). Consult the third-party's 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 the old file.

For more information, read the text file about `rmscript.bat`. From the storage management software's installation directory, type:

```
help rmscript
```

CHAPTER 6

Operating System Support

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

Operating System Information

This section contains information about storage management software elements unique to the Windows NT operating system. See “Understanding the Restrictions” on page 1-3 for other important notes about using this software in an NT environment.

Number of LUNs

There are two limits on the number of logical units you can have.

- Your host adapter has a maximum number of LUNs it can support. Consult your host adapter documentation for more information.
- Windows NT limits the maximum number of logical units (LUNs) per RAID Module to eight (8) (whether the module has a single controller or redundant controllers). Therefore, if you have a RAID Module with two active controllers, the total number of LUNs *between them* cannot be more than eight.

Module Names

By default, module names are assigned in the order in which the system detects the module. The default name displayed is derived from the name of the host machine where the storage management software is installed (for example, *hostname*_001, *hostname*_002, and so on).

The controllers and logical units within the module have unique device names. See the next section, "Controller/LUN Names" for more information.

Controller/LUN Names

The storage management software uses device names in the form Drive#, where # is a device number, to identify controllers and logical units (LUNs). These device names appear in various screen displays, usually related to a controller's identification.

Note – These names do *not* match the disk# used in the Disk Administrator utility, which represents configured logical units and corresponding filesystems.

The device numbers are assigned on a per-controller basis, eight to a controller, representing the maximum number of LUNs allowed on a RAID Module in Windows NT. The device numbers assigned to a controller depend (in descending order) on the port, path, and SCSI ID of the controller.

For example, assume RAID Module 1 has only one controller: controller A (port 0, path 1, SCSI ID 3). RAID Module 2 has two active controllers on different ports: controller A (port 0, path 1, SCSI ID 2) and controller B (port 1, path 0, SCSI ID 1). Device numbers are assigned to these controllers in groups of eight in the order they are detected on the system:

- RAID Module 2, controller A (port 0, path 1, SCSI ID 2) uses device names Drive0 through Drive7. The controller is Drive0.
- RAID Module 1, controller A (port 0, path 1, SCSI ID 3) uses device names Drive8 through Drive15. The controller is Drive8.
- RAID Module 2, controller B (port 1, path 0, SCSI ID 1) uses device names Drive16 through Drive23. The controller is Drive16.

  Within the numbers assigned to a controller, the controller itself always uses the lowest assigned number. The lowest numbered logical unit also uses this number. After that, logical units are assigned device names sequentially, even if the logical unit doesn't exist. For example, if a controller is assigned device names Drive8 through Drive15, and contains logical units 0, 3, 4, and 6, the following device names are used:

Module Element	Device Name
Controller	Drive8
LUN 0	Drive8
LUN 3	Drive11
LUN 4	Drive12
LUN 6	Drive14

Note – In a redundant controller configuration, a maximum of 8 LUNs can exist between the two controllers, even though 16 numbers are available.

Redundant Controller Support (RDAC)

The storage management software supports redundant controllers on a Windows NT system using the Redundant Disk Array Controller (RDAC) driver. The RDAC driver is part of the storage management software package and is installed automatically.

For RAID Modules with redundant controllers, this host-based driver manages the I/O data paths. If a component on the data path (cable, controller, host adapter, etc.) fails and the host loses communication with a controller, the RDAC driver automatically reroutes all I/O operations to the other controller.

FIGURE 6-1 on page 6-4 illustrates how RDAC provides this redundancy when the host application generates a request for I/O to Controller A, but Controller A fails. Use the information in the Legend to follow the I/O data path.

For more information about the redundant controller feature, see the *User Guide.*

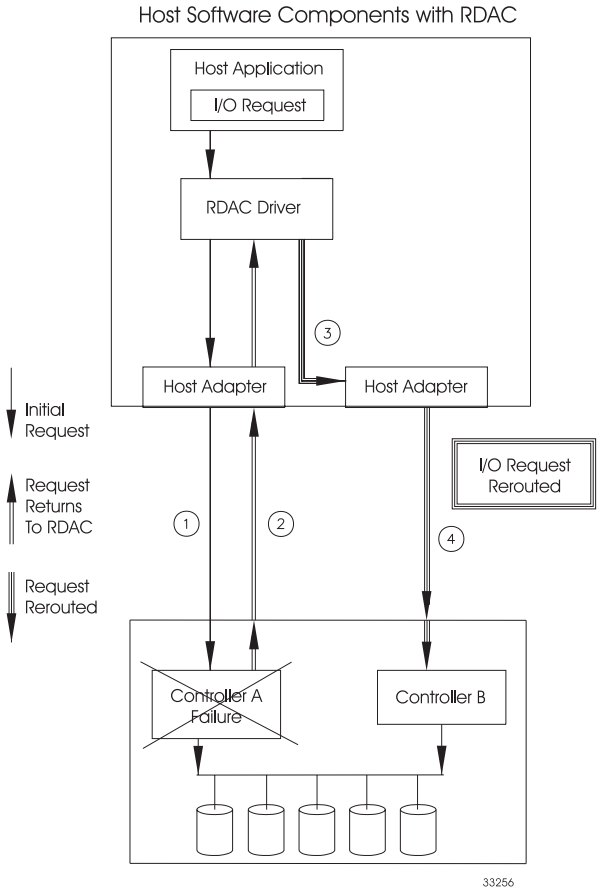


FIGURE 6-1 Example of RDAC I/O Data Path Redundancy

Legend:

1. I/O request fails.
2. Failed I/O goes back to RDAC driver.
3. RDAC driver performs failover and transfers logical units to other controller (controller B).
4. RDAC driver resends I/O request back down to controller B, where it is serviced. (The host application is unaware of the transactions that have taken place to complete the I/O.)

Creating Logical Units

After creating logical units (LUNs) using the `Configuration` application, you have to add them to the operating system. See your Windows NT documentation for details on adding a drive. Remember each logical unit (*not* a drive group) is seen by the operating system as one drive.

Note – You *must* restart Windows NT in order for it to recognize any configuration changes (such as LUN creations and deletions).

Deleting Logical Units

Caution – If you are using the RAID Module as a boot device (Chapter 3), do *not* delete LUN 0 or use `File` → `Reset Configuration`; if you do, you will lose your boot device!

Before deleting LUNs with this software or using `File` → `Reset Configuration`, you should stop I/Os to the affected RAID Module and then use the Disk Administrator utility to delete any partitions and deassign drive letters associated with those LUNs. If you do *not* do this first, registry information will be corrupted.

Note – You *must* restart Windows NT in order for it to recognize any configuration changes (such as LUN creations and deletions).

Accessing Raw Partitions

Many database applications address raw partitions for their data. In the Disk Administrator utility, the partition information for raw partitions is shown as "Unknown."

Caution – The order of these partitions could be rearranged, possibly causing data corruption, whenever a dead LUN is present and the system is rebooted without first restoring the LUN. (To Windows NT, rebooting with a dead LUN present is the same as removing a physical drive and booting).

Data corruption occurs because the raw partition's namespace in the registry that the application is addressing has now been changed/moved. The application, however, will continue to write to that partition/device as though it were the correct one. The work-around for this is to be sure that all LUNs are Optimal and fully reconstructed before running any utilities that re-address the raw partition namespaces (rearranging their order in Disk Administrator).

The Background Monitor

The storage management software has a background monitor that automatically polls all RAID Modules 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 polling 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 too small could cause the check to affect system I/O performance. However, setting this value too large could cause delayed 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 the `Recovery Guru`, the troubleshooting documentation, or your Customer Services Representative. However, doing so means that *none* of the RAID Modules connected to the host will be checked during this time. Be sure to restart the monitor when instructed.

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.**

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.

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.**

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.

Command Line Interface

Although you can perform most necessary storage management tasks through the storage management software's graphical user interface there is a also a command line interface that allows you to perform some of these tasks through the DOS command line. For a list of these commands and their uses, see the "Command Line Interface" chapter in the *User Guide*.

To access the help files for these utilities, type **help** *filename* from the command line in the installation directory. For example, to read the file on the drivutil program, from the installation directory, type:

```
help drivutil
```

Adding New RAID Modules to the Configuration

If you need to add new RAID Modules to your system after installing the storage management software, use the following procedure to be sure that the storage management software recognizes the new module and that the new module's configuration meets your needs.

1. **Physically connect the RAID Module to your system. Consult the appropriate hardware documentation for this procedure.**
2. **Close all open applications and restart Windows NT.**
3. **Go to Chapter 4 "Initial Startup Procedures to perform the following steps:**
   - "Verifying and Upgrading the Controller Firmware" on page 4-3.
   - "Running the Recovery Guru / Health Check" on page 4-9.
   - "Determining the Current Configuration" on page 4-13.
   - "Determining whether any Changes are Necessary" on page 4-18.
   - "Configuring RAID Modules" on page 4-22.

Uninstalling the Storage Management Software

If you are upgrading the storage management software, you do *not* need to use this procedure first. The previous version's files are removed or overwritten as needed.

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

Tip – This procedure requires that you shutdown and restart the operating system. Therefore, close all other applications and make sure that other users are *not* on the system while you are uninstalling this software.

---

1. **If you do *not* intend to reinstall this software and you are *not* removing your RAID Module from the system, you may need to download your original NVSRAM file to restore your controllers' configuration.**

   a. **As a precautionary measure, you should begin the uninstall process by running** `nvutil` **and executing** `rdacoff.def`**. This will ensure that the LUN configurations residing on the A3x00 or A1000 will remain intact in the event that you later reinstall the storage management software.**

   b. **Obtain a copy of the correct NVSRAM values from your Customer Services Representative (it will be part of the controller firmware's release media).**

   c. **Download the new NVSRAM values to the controllers in your RAID Modules using the** `fwutil` **command-line utility.**

   d. **If you set NVSRAM parameters during installation with the** `networkoff.def` **file (see "Setting the NVSRAM Values" on page 4-8), you may want to run** `networkon.def` **to restore these settings to their original values.**

Caution – Do not restart the storage management software again after performing Step 1, or the software will reset the NVSRAM values it needs to operate.

2. **Select** `Start` → `Settings` → `Control Panel` → `Add/Remove Programs` **and then scroll the list to find** `Raid Manager`**.**

3. **With** `Raid Manager` **highlighted, select** `Add/Remove`**.**

4. **At the "Uninstall software" screen, select** `Yes`**.**

   You will see screens indicating that this program is removing the appropriate service, registry information, and files.

5. **At the "Uninstall Complete" screen, select** `OK` **to shutdown and restart the Windows NT system.**

   End of Procedure

CHAPTER 7

Troubleshooting

This chapter describes the restrictions that apply when using this software and gives information to help you solve problems that may occur. The last section gives important information you may need when replacing failed controllers.

Introduction

The troubleshooting tables that follow provide probable cause and action to take for specific problems you may have as you use the storage management software with the Windows NT operating system.

Tip – If you cannot find the problem you are looking for, read the *Release Notes: Sun StorEdge RAID Manager 6.2 for Windows NT* and consult the Online Help for additional troubleshooting information. Also, see “Understanding the Restrictions” on page 1-3 for additional information.

Locating Solutions

To quickly find the 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 7-2).
- **"Component Search"** — organizes problems by hardware components, such as controllers, drives, modules, etc. (page 7-3).
- **"Application Search"** — organizes problems for each storage management application, including a group for options common to all applications (page 7-5).
- **"Software Search"** — organizes problems by operating system, storage management software, or command-line utility (page 7-7).

Category

TABLE 7-1 groups problems into sections for general use or specific options.

TABLE 7-1 Troubleshooting Entries Organized by Category

Category	See Page
• "`Configuration` Application Problems"	• page 7-8
• "Firmware Upgrade Problems"	• page 7-9
• "General Problems"	• page 7-10
• "Recovery Guru / Health Check Problems"	• page 7-14

Component Search

TABLE 7-2 organizes individual problems by hardware components (such as controllers, drives, LUNs, RAID Modules, and so on).

TABLE 7-2 Troubleshooting Entries Organized by Component *(1 of 2)*

Component	Problem	See Details On
Batteries	Age did not reset for both controllers	page 7-12
Controllers	Failed during alternate replacement	page 7-10
	Firmware upgrade failed	page 7-9
	LUN creation error after deleting all LUNs or using `Reset Configuration`	page 7-8
	Not visible to storage management software	page 7-11
	Not visible to either operating system or storage management software	page 7-11
	Passive, no LUNs owned after replacement	page 7-17
Fans	Failure detected after replacement	page 7-14
Drives	Activity lights don't flash (`Configuration` → `List/Locate Drives`)	page 7-8
	All drives failed in a drive group	page 7-17
	Failed status, but LUN is Optimal	page 7-15
	Fault light comes on after replacing failed drive	page 7-15
	Fault lights lit (drives continue to fail)	page 7-15
	Missing information in `Manual Recovery` → `Drives` screen	page 7-17
	Number of drives incomplete or wrong during LUN creation	page 7-8
	Removed drive; no failure reported	page 7-14
	Status other than Optimal	page 7-16

TABLE 7-2 Troubleshooting Entries Organized by Component *(2 of 2)*

Component	Problem	See Details On
LUNs	Error message during LUN creation after deleting all LUNs or using Reset Configuration	page 7-8
	Less capacity shows than selected during configuration	page 7-8
	Missing information in `Manual Recovery` → `LUNs` screen	page 7-18
	Not visible to storage management software	page 7-11
	Number of drives incomplete or wrong during LUN creation	page 7-8
	Optimal LUN status with failed drives	page 7-15
	Reconstructing status appears, but no drives replaced	page 7-16
	Status other than Optimal	page 7-16
	Status remains Reconstructing	page 7-17
RAID Modules	Failure detected after replacing fan or power supply	page 7-14
	Listed after being removed	page 7-12
	Not visible to either operating system or storage management software	page 7-11
	Status other than Optimal	page 7-13
	Status doesn't update after a recovery procedure	page 7-18
Power Supplies	Failure detected after replacement	page 7-14

Application Search

TABLE 7-3 organizes individual problems for each storage management application, including a group for options common to all applications.

TABLE 7-3 Troubleshooting Entries Organized by Application *(1 of 2)*

Application	Problem	See Details On
common to any RAID Manager application	Can't select some options	page 7-12
	"Cannot secure access to LUNs" message	page 7-13
	Select `Module` lists a RAID Module removed from the system	page 7-12
	Status doesn't update after a recovery procedure	page 7-18
Configuration	Less capacity shows than selected during configuration	page 7-8
	`List/Locate Drives` doesn't work	page 7-8
	LUN creation error after deleting all LUNs or using `Reset Configuration`	page 7-8
	Number of drives incomplete or wrong during LUN creation	page 7-8
	`Reset Configuration` doesn't work	page 7-8
Status	Reconstructing status appears, but no drives replaced	page 7-16
	Status remains Reconstructing	page 7-17

TABLE 7-3 Troubleshooting Entries Organized by Application *(2 of 2)*

Application	Problem	See Details On
Recovery	All drives failed in a drive group	page 7-17
	Controller mode is Passive, no LUNs owned after replacement	page 7-17
	Drive fault lights lit (drives continue to fail)	page 7-15
	Drive status other than Optimal	page 7-15
	Failed status, but LUN is Optimal	page 7-15
	Fault light comes on after replacing failed drive	page 7-15
	Failure detected after replacing fan or power supply	page 7-14
	LUN status other than Optimal	page 7-16
	Missing information in `Manual Recovery` → `Drives` screen	page 7-17
	Missing information in `Manual Recovery` → `Logical Units` screen	page 7-18
	Reconstructing status appears, but no drives replaced	page 7-16
	`Recovery Guru` takes a long time	page 7-14
	Removed drive; but `Recovery Guru` doesn't report a failure	page 7-14
	Status doesn't update after a recovery procedure	page 7-18
	Status other than Optimal	page 7-13
	Status remains Reconstructing	page 7-17
Maintenance/Tuning	Controller mode is Passive, no LUNs owned after replacement	page 7-17
	Firmware upgrade failed	page 7-9

Software Search

TABLE 7-4 organizes individual problems by operating system, storage management software, and command-line utility.

TABLE 7-4 Troubleshooting Entries Organized by Software

Software	Problem	See Details On
Storage Management	"Cannot secure access to LUNs" message	page 7-13
	Can't select some options	page 7-12
	Can't start the software	page 7-10
	Controllers/LUNs not visible	page 7-11
	Controllers/RAID Modules not visible	page 7-11
	Failure detected after replacing fan or power supply	page 7-14
	"Not all files removed" message when uninstalling the software	page 7-10
	RAID Module listed after being removed	page 7-12
Windows NT	Controllers/RAID Modules not visible	page 7-11
Command Line	Batch file commands fail	page 7-10
	Battery age doesn't reset for both controllers	page 7-12

Configuration Application Problems

This section describes problems that you may have as you use options in the Configuration Application.

TABLE 7-5 Configuration Application 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 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.

Less capacity shows than I selected during configuration.

When using 5 or more 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` **doesn't work.**

Action: 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.
Cause: 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` **doesn't work.**

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.

Cause: If this software detects any drives as removed or unresponsive, `Reset Configuration` will not work. Also, if the selected RAID Module 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.

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 Module. Turn the power back on and try the LUN creation procedure again.

Firmware Upgrade Problems

This section describes problems that you may have while upgrading firmware.

TABLE 7-6 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. **Note:** 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 the `Maintenance/Tuning` application. • If it occurs, turn off power to the RAID Module and turn it back on; then, immediately try to upgrade the firmware again. **Tip:** If you are not upgrading the firmware again immediately, check the firmware version of the module's 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 Problems

This section describes general problems that you could have in any RAID Manager application.

TABLE 7-7 Troubleshooting Generally Applicable to all Applications *(1 of 4)*

Can't 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\Raidmgr`).
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 4-1 if you need more information about starting this software.)
2. If you had previously saved a backup `rmparams` file, copy it to the installation directory (default is `\program files\Raidmgr` – be sure to select the appropriate directory on your system) and try to start the software again.

> **Tip:** The `rmparams` file is required for normal operation of this software's 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 `.mnf`, `mutex`, and `lock` files that are associated with RAID Manager and 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 Module 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 6-8), 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 7-7 Troubleshooting Generally Applicable to all Applications *(2 of 4)*

Some controllers/logical units are *not* visible to the 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\Raidmgr\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. 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 `File` → `Reset Configuration` (`Configuration` application); formatting a LUN with `Options` → `Manual Recovery` → `Logical Units` (`Recovery` application); and `Firmware Upgrade` → `Offline method` (`Maintenance/Tuning` application).
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 Module.
2. If you *still* do not see controllers or LUNs that you know exist, do the following:

• Close all your applications and exit the storage management software completely.
• Run the `clean.bat -all` script to delete certain `.mnf`, `mutex`, and `lock` files that are associated with RAID Manager and 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.

Some controllers/RAID Modules are not visible at all

Cause: If controllers or RAID Modules are not displayed and you know they exist, there could be some faulty connection between the RAID Module and the host adapter/network card. It also possible that the storage management software or your operating system doesn't recognize the devices yet. Less likely, the NVSRAM settings for the module's controllers may not be set properly to run this software. Normally, these settings are changed automatically during installation and any incorrect settings are detected and corrected by the software.

Action:

1. Verify there is no problem on the data path:

• Check the interface cables and host-side IDs of the controllers. If they appear OK, turn off power to the module, and turn it back on.
• Check the I/O connection cables for bent pins in the connectors, for connectors that are not on straight, or for cables that are kinked or crimped. Select `Recovery Guru/Health Check` and follow the recovery procedures for any component problem detected.

2. If you have replaced or added controllers/RAID Modules after installing this software, be sure to follow the procedures for your operating system to recognize the new devices (see your operating system documentation).
3. If you see a message (on the console) that incorrect NVSRAM settings have been fixed, immediately restart the RAID Module so that the new settings can take effect. If you suspect that the NVSRAM settings for the module's controllers may not be set properly to run this software, use RAID Manager For DOS to verify your NVSRAM settings or call your Customer Services Representative.

TABLE 7-7 Troubleshooting Generally Applicable to all Applications *(3 of 4)*

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

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 Module Selection box and the Module Selection screen.

Action: If you wish to remove a RAID Module, do the following:

1. Physically remove the module from your host system.
2. Choose `Select Module`.
3. Highlight the module you wish to remove.
4. Select `Remove`. The RAID Module no longer appears in the Module Selection screen or the RAID Module Selection Box.

I cannot select some options.

Cause: Some options are grayed out or are unavailable because:

- The selected RAID Module does not support that option.
- The controller firmware version does not support that option.
- The option cannot be performed for the item you selected.
- The option is not active until you select some item.
- 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?"

Battery age did not reset for both controllers.

Cause: When using `raidutil` to reset a battery's age, this command affects only one controller at a time.

Action: Perform the battery reset command (with `raidutil`) for each controller in a RAID Module as needed. For details, read the `raidutil` help file. From the storage management software's installation directory, type:

```
help raidutil
```

TABLE 7-7 Troubleshooting Generally Applicable to all Applications *(4 of 4)*

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

Cause: Most likely a second application has requested exclusive access to the selected RAID Module when some other application has already secured access. Many operations require exclusive access to the affected drive group/LUNs until the operation is completed; this software "locks" these components to secure this access. Also, if the affected LUNs are under some other software's control, the storage management software cannot gain exclusive access. Either this message is displayed, or the second request is denied and you see an error message indicating that the module has I/Os occurring or that filesystems are present.
Operations requiring exclusive access include: Delete for LUNs and `File` → `Reset Configuration` (`Configuration` application); formatting a LUN with `Options` → `Manual Recovery` → `Logical Units` (`Recovery` application); and `Firmware Upgrade` → `Offline method` (`Maintenance/Tuning` application).

Action:

1. Wait for any operation that has secured exclusive access to the LUNs to be completed before performing another operation on the same RAID Module.
2. If no other storage management software operations are running, and you think another application may be accessing the LUNs (from your operating system or third-party software), close the other application and then reselect the storage management software and try again.

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 (such as a power supply or fan) had failed.

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.

> **Tip:** 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 Module 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

This section describes problems that you may have while using the Recovery Guru/Health Check or the Manual Recovery options in the Recovery application.

TABLE 7-8 Recovery Guru/Health Check Troubleshooting *(1 of 5)*

Recovery Guru/Health Check **results take a long time to display.**
Cause: Normally you see Recovery Guru/Health Check's results in a few seconds. However, if you have selected All RAID Modules 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 Module 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 Modules (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 **doesn't 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 reports 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's polling interval. **Action:** Wait for the controller to poll the module (default is ten minutes) after performing this recovery procedure before re-selecting Recovery Guru.

TABLE 7-8 `Recovery Guru/Health Check` Troubleshooting *(2 of 5)*

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 Module as Optimal. If this occurs, you need to manually begin the format process for the LUN / drive group (`Options` → `Manual Recovery` → `LUNs` → `Format`).

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's status changes to Replaced and the logical unit's 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's drive status is either In Use or Standby (not being used).

Action: Select `Recovery Guru/Health Check` and follow the procedure provided.

TABLE 7-8 `Recovery Guru/Health Check` Troubleshooting *(3 of 5)*

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, or the LUN is Inaccessible because it is owned by the other controller (possible if the RAID Module has an Independent Controller configuration). 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 Module as Optimal. If this occurs, you need to manually begin the format process for the LUN / drive group (`Options` → `Manual Recovery` → `LUNs` → `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's status returns to Optimal as soon as reconstruction is completed.

TABLE 7-8 Recovery Guru/Health Check Troubleshooting *(4 of 5)*

LUN status doesn't 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).

Tip: 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:
- Re-select the RAID Module.
- 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.

Tip: If you turn the power to the RAID Module 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 Health Check to recreate the deleted LUNs.

Controller mode is Passive and it doesn't own any LUNs after replacing a Failed controller.

Cause: After using Recovery Guru 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 Module 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 7-8 `Recovery Guru/Health Check` Troubleshooting *(5 of 5)*

No LUN information appears in the `Options` → `Manual Recovery` → `Logical Units` screen. **Cause:** There are no configured logical units for the selected RAID Module (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 Module, then switching back and re-selecting `Options` → `Manual Recovery`, or exit, then reselect the `Recovery` application.

Replacing Controllers

Use `Recovery Guru/Health Check` (`Recovery` application) to diagnose and correct problems with your RAID Module components. If you are replacing a failed controller and experience problems, use the following procedures as recommended:

- Problems Bringing the New Controller Online—page 7-18
- Incompatible Firmware Detected—page 7-18

Problems Bringing the New Controller Online

You have replaced a controller and saw a message while trying to bring the new controller Online that told you to check your controller connections and, if still having problems, to consult this section.

The recommended procedure is to contact your Customer Services Representative.

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.

The recommended procedure is to contact your Customer Services Representative.

APPENDIX **A**

Specifications

This appendix describes the configuration specifications for this software.

Hardware Specifications

Host-RAID Module Configurations

The following Host-RAID Module configurations are supported.

- **Single-Host Configuration** — One host machine is connected by two SCSI Buses to each controller in a RAID Module.
- **Independent Controller Configuration** — Two host machines are connected to a dual-controller RAID Module. One host machine is connected by a SCSI Bus to one controller, and a second host machine is connected by another SCSI Bus to the other controller.

Note – For an explanation of a RAID Module, see the “Common Definitions” section in the *User Guide* or the Online Help glossary. For more information on the types of Host-RAID Module configurations supported by the storage management software, see the “Module Configurations” section in the *User Guide*.

Host Adapter Information

For the latest information on supported host adapters, drivers, installation procedures, and so on, consult the `readme` file in the `\hba` folder on the installation CD.

SCSI Host Adapters and Driver Revisions

The following SCSI host adapters have been tested with the storage management software:

TABLE A-1 Tested Adapters, BIOS Revisions, and Driver Revisions

Adapter	BIOS Revision	Driver Revision
SYM22802 Dual Ultra-Wide Differential	V4.0 PCI SCSI BIOS	FLINT 4.05.00
Adaptec 2944W	1.25 through 1.32	4.0 from Microsoft Service Pack 3
Adaptec 2944UW	1.25 through 1.32	4.0 from Microsoft Service Pack 3

Boot Device Host Adapters

The SYM22802, Adaptec 2944W, and Adaptec 2944UW host adapters have been tested with RAID Module boot devices.

Firmware Specifications

Latest Versions

TABLE A-2 documents the most recent controller firmware version and the location (on the RAID Manager CD) of the most recent NVSRAM file.

TABLE A-2 Latest Firmware and NVSRAM File Versions

Firmware version	3.0
NVSRAM file	`Firmware/sie3621F.dl` on the RAID Manager CD

Controller Firmware Requirements

TABLE A-3 shows the controller firmware levels for the RAID Module controllers that support the storage management software.

TABLE A-3 Controller Firmware Requirements

Controller Type	Required Firmware Level
3201	2.04.20; does not support 3.0
3620, 3622	2.05.04 or later; does not support 3.0
3240, 3621	2.05.04, 3.0, or later

Upgrade Notes

- If you are upgrading to firmware level 3.0, you may need to upgrade to an intermediate level first.

TABLE A-4 Controller Firmware Upgrade

If you have this firmware version:	You should upgrade:
2.05.04 to 2.05.05	directly to 3.0 on both controllers
2.04.04 to 2.05.03	• to 2.05.04 • then 3.0
2.04.03	• to 2.04.04 • then 2.05.04 • then 3.0

Note – This software's CD contains firmware versions 2.04.04, 2.05.04, and 3.0 (appware and bootware).

- Note that firmware level 3.0 or higher is required for some storage management features documented in the *User Guide*; these features are not available on controllers that do not support firmware level 3.0.

Index

D

E

F

G

H

I

L

S

T

U

W