Software Operation Manual

Preface

Notice

Product features and specifications described in this manual are subject to change without notice.

The manufacturer shall not be liable for any damage, or for the loss of information resulting from the performance or use of the information contained herein

Trademarks

Product names used herein are for identification purposes only and may be the trademarks of their respective companies. All trademarks or registered trademarks are properties of their respective owners.

Regulatory information

$C \epsilon$ **For Europe**

This drive is in conformity with the EMC directive.

FC **Federal Communications Commission (FCC) Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

Those limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antennas.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circlet different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Warning:

A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.

Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Using this manual

This guide contains all the information you need to set up and start using your Demon/Brownie RAID and to monitor its performance in real time. It is intended to be read in a linear manner, though some instructions may not be applicable to all users. Users may prefer to skip more familiar sections, but each of the steps below must be completed.

The setup process follows these steps:

Step 1

Prepare: ◆ Familiarize yourself with the features and capabilities of DEMON/BROWNIE RAID *(Refer to both Hardware and software manual)*

◆ Make sure you have everything *(Refer to hardware manual)*

Step 2

Install: ◆ Turn on *(Refer to hardware manual)*

Step 3

Configure: ◆ Perform Quick Setup (**Chapter 2** *optional*)

◆ Open Monitor Utility (**Chapter 3**, *recommended*)

◆ Configure (**Chapter 4**)

> **Note**
>
> *DEMON/BROWNIE RAID is available in two configurations differing in their host interfaces:*
>
> ⇨ *SCSI (host) to Serial ATA/PATA (disk)*
> ⇨ *Fibre (host) to Serial ATA/PATA (disk)*
>
> *This manual contains the information necessary to set up both configurations. Where procedures for the two configurations differ, they are described separately and clearly marked.*

Guide to conventions

Important information that users should be aware of is indicated with the following icons:

⚠ **Caution**

This icon indicates the existence of a potential hazard that could result in personal injury, damage to your equipment or loss of data if the safety instruction is not observed.

💡 **Note**

This icon indicates useful tips on getting the most from your Demon/Brownie RAID.

Important terms, commands and programs are put in **Boldface** font.

Screen text is given in `screen` font.

Table of Contents

Introduction

This chapter introduces the features and capabilities of **DEMON/BROWNIE RAID.**

You will find:

⇨ **A full introduction to your DEMON/BROWNIE RAID**
⇨ **Details of key features and supplied accessories**

Overview

Congratulations on your selection of the DEMON/BROWNIE RAID – a high-performance and extremely flexible RAID (Redundant Array of Independent/Inexpensive Disks) system. RAID is a storage technology used to improve the processing capabilities of the storage system, providing a combination of reliability and performance.

DEMON/BROWNIE RAID is designed to meet today's demand for higher storage solutions. Ideally suited for integration with databases, e-mail, web servers and imaging systems, DEMON/BROWNIE RAID provides maximum data protection and exceptional performance. DEMON/BROWNIE RAID is designed for easy integration, smooth data expansion and server migration.

DEMON/BROWNIE RAID is the ultimate flexible RAID solution. It can manage seven different RAID levels , plus JBOD, NRAID, providing functions including

● Striping (RAID 0)

● Striping with Mirroring (RAID 0+1)

● Mirroring and Duplexing (RAID 1)

● Striping with Parity on Dedicated Disk (RAID 3)

● Striping with Parity on Dedicated Disk plus Block Striping (RAID 30)

● Striping with Interspersed Parity (RAID 5)

● Striping with Interspersed Parity plus Block Striping (RAID 50)

● Spanning (JBOD)

● Disk spanning (NRAID)

As a result, the DEMON/BROWNIE RAID offers a higher range of choices and better security.

Note

> *DEMON/BROWNIE RAID is available in two configurations differing in their host interfaces:*
>
> ⇨ *SCSI (host) to Serial ATA/PATA (disk)*
> ⇨ *Fibre (host) to Serial ATA/PATA (disk)*
>
> *This manual contains the information necessary to set up both configurations. Where procedures for the two configurations differ, they are described separately and clearly marked.*

Key Features

DEMON/BROWNIE RAID features the following:

- Support for RAID levels 0, 1, 0+1, 3, 30, 5 and 50 as well as JBOD
- Independence from host system
- Independence from operating system
- Processor
  - Demon RAID P model -Intel i80321 64-bit RISC high performance processor
  - Brownie RAID - Intel i80303 64-bit RISC high performance processor
- IDE hard disk drive
  - Demon RAID supports high performance PATA/SATA hard disk drives,
  - Brownie RAID supports PATA hard disk drives only.
- Host interface
  - Demon RAID P model supports Dual Ultra 320 SCSI or 2G fibre channel
  - Brownie RAID supports Dual Ultra 160 SCSI or 2G fibre channel
- Bay number
  - Demon RAID supports 8,12 & 16 SATA1/PATA channels
  - Brownie RAID supports 8,12, &16 PATA channels
- RAIDCare GUI supported
- Cache size
  - Demon RAID P model supports flexible cache size of up to 1GB
  - Brownie RAID supports flexible cache size of up to 512MB
- Multiple Arrays
  - Demon RAID P model supports up to 8 Arrays
  - Brownie RAID supports up to 4 Arrays
- LUNs
  - Demon RAID P model supports up to 128 Luns per channel
  - Brownie RAID supports up to 16 Luns per channel
- Supports on-line capacity expansion.
- Automatic Hot Swap, Hot Spare and Drive Rebuild Support
- Bad sector reassignment
- Programmable FAX event notification
- Remote monitoring through RS232 terminal interface
- UPS support through standard UPS interface
- Support Disk Cloning & SMART & Scrubbing **(Demon RAID P model only)**
- Support over 2TB per slice for Windows base **(DemonRAID P model only)**

Serial ATA Compatible

DEMON RAID is designed for use with the latest generation of high performance HDDs. The serial ATA disk interface offers 150 MByte/s data transfer, the capacity for hot-plugging, and compatibility with parallel ATA standards.

Three Operating Modes

DEMON/BROWNIE RAID operates in three modes: Self-Diagnostic Mode, Configuration Mode and Operation Mode.

Self-Diagnostic Mode

To ensure flawless operation, DEMON/BROWNIE RAID has a built-in self-diagnostic utility. Self-diagnostic Mode is entered automatically upon power up, or after the DEMON/BROWNIE RAID has been reset. In this mode, all components are tested, and any potential problems are reported. Once the tests are complete, DEMON/BROWNIE RAID switches automatically to Operation Mode.

Self-Diagnostic Mode runs three major tests. The first diagnostic test covers the CPU and supporting core logic chips, the internal bus, memory, SCSI controller, Serial ATA controllers, and RS-232 controllers. The second diagnostic test checks for the presence of disks on each individual disk channel and the functionality of each disk found. The final diagnostic test checks RAID functionality.

Configuration Mode

Configuration Mode enables the RAID administrator to configure and modify the settings of DEMON/BROWNIE RAID and fine-tune the configuration. Configuration Mode is entered from Operation Mode:

1.   When the Enter button on the control panel is pressed, or:
2.   When the Monitor Utility is invoked from the remote terminal.

⚠ **Caution**

DEMON/BROWNIE RAID should be off-line and not being accessed by any application when Configuration Mode is run.

💡 **Note**

DEMON/BROWNIE RAID will automatically switch from Configuration Mode to Operation Mode after 3 minutes if no buttons are pressed on the controller box control panel and no action is taken on the Monitor Utility

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Full details on changing configurations are given in Chapter 4

Operation Mode

Operation Mode is the default state of DEMON/BROWNIE RAID. In this mode, the controller box front panel LCD continuously displays the current status of DEMON/BROWNIE RAID. A typical display looks like the following:

```
DEMON/BROWNIE RAID
111111111111111 S → 1 → [Raid No.]
```

A full explanation of control panel LCD messages is given in Appendix D.

Three Configuration Utilities

There are three ways to configure DEMON/BROWNIE RAID:

1. Control Panel
2. Monitor Utility
3. RaidCare GUI (Refer to Raidcare Manual)
   /Web browser (It only supports on Raid system with network port)

Control Panel

DEMON/BROWNIE RAID can be configured directly using the LCD control panel.

Monitor Utility

This embedded menu-based configuration utility is accessed through the host computer.

RaidCare

RaidCare is a Graphical User Interface that empowers you to configure your RAID Controllers through a local or remote terminal.

Web Browser

DEMON/BROWNIE RAID with networking port can be configured directly by using web browser.

Array Management

The unique DEMON/BROWNIE RAID array management firmware utilizes multitasking real-time kernel technology to manage the controller. Additional features are real-time I/O load analysis, on-line diagnostics, event logging and broadcasting, and device inventory management. These features can be accessed locally or via modem to allow centralized monitoring and control of the DEMON/BROWNIE RAID.

Hard Drive Hot Swapping

Hot Swapping allows for the removal and installation of disk drives without interruption of data access while the DEMON/BROWNIE RAID system is in use. This is usually performed when there is no Hot Spare drive configured. There is no need to power down the system.

Automatic Global Hot Spare

Hot Spare allows for the automatic replacement of a failed drive without requiring intervention from the administrator. When a disk fails the DEMON/BROWNIE RAID will automatically replace the faulty drive with the configured hot spare disk.

The Global Spare Drive does not serve only a specified logical drive. When a member drive from any of the logical drives fails, the Global Spare Drive will join that logical drive and automatically start to rebuild.

Automatic Drive Rebuild

If a member drive fails, the controller will search for a **Global Spare Drive** ,and it will automatically rebuild the logical drive.

Instant Remote Notification

DEMON/BROWNIE RAID supports but does not require additional software for system monitoring and analysis. The DEMON/BROWNIE RAID array management firmware continuously monitors the system activity and immediately launches the fax event notification feature if any failure occurs. Up to two pager numbers and two fax numbers can be notified instantaneously and repeatedly for extra insurance.

Chapter 2

Quick setup

Once DEMON/BROWNIE RAID is set up and connected, the array should be initialized. The initialization process is automatic.

By performing Quick Setup, users can establish an array in seconds. There are two ways to perform Quick Setup:

⇨ **Using the control panel**
⇨ **Using the embedded Monitor Utility**

Both methods are explained in this chapter.

The control panel can be accessed immediately and Quick Setup can be completed very quickly using it. The Monitor Utility is easier to use once set up. It requires a connection to be established first between the host terminal and DEMON/BROWNIE RAID.

Note

Quick Setup can only be used to establish a single array. To establish a multiple array, turn to Chapter4.

Note

Quick Setup cannot be used to reconfigure an existing array. To do this, turn to Chapter4

Quick Setup with the control panel

1. Turn on DEMON/BROWNIE RAID. The controller will first enter Self-Diagnostic Mode, then Operation Mode. A typical Operation Mode screen is shown.

DEMON/BROWNI
E RAID ☐

×××JJJ×××××××××
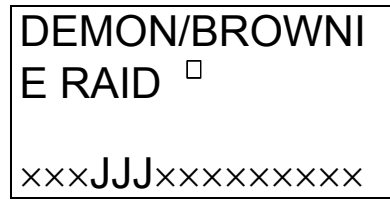
> **Note**
>
> *Full explanation of the control panel messages is given in Appendix D.*
>
> *NOTE: Instructions on using the control panel are given in the section* ***Control Panel*** *in Chapter 1*

2. Press **Enter** to enter Configuration Mode. You will be prompted to enter the Password. The default password is **00000000** (eight zeros). To enter this, simply press **Enter** eight times. Press **Enter** again to submit.

Enter Passwd: ☐

0▓▓▓▓▓▓▓▓▓

3. You enter the main menu. The first item on the main menu is the Quick Setup submenu. Press **Enter** to select.

Main menu
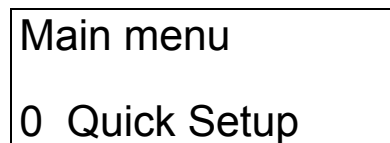
0 Quick Setup

> **Note**
>
> *The contents of other submenus are explained in detail in Chapter 4.*

4. The Quick Setup submenu lists the RAID levels available (0, 1, 3, 5, 30, 50, 0+1and NRAID). Scroll through the list until the appropriate level for the RAID you want to set up is showing. Press **Enter**.

0 Quick Setup

  Level 0+1
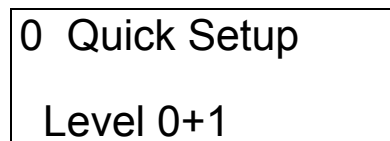
> **Note**
>
> *Full explanation of the different RAID levels available is given in Appendix B.*

> **Note**
>
> *A JBOD array cannot be setup using the Quick Setup option*

Quick Setup with the monitor utility

> **Note**
>
> *This section is intended as a Quick Setup guide only. Full instructions on accessing and using the Monitor Utility are given in Chapter 4.*

Users wishing to perform Quick Setup via the monitor utility must first establish a connection between the host terminal and DEMON/BROWNIE RAID. Follow the instructions in Chapter4, *Accessing the Monitor Utility*. Then:

1. Press **Ctrl** and **D** together to launch the monitor utility.
2. Press **Enter**. You will be prompted to enter a password.
3. Enter the default password **00000000** (eight zeros). Press **Enter**.
4. The main menu will appear.
5. Use the arrow keys to select **0 Quick Setup**. Press **Enter**.

6. The Quick Setup submenu lists the RAID levels available (5, 3, 1, 0, 0+1, 50, 30 and NRAID). Scroll through the list until the appropriate level for the RAID you want to set up is highlighted. Press **Enter**.
7. You will be prompted for confirmation of your selection. Select **Yes** and press **Enter**.

> **Note**
>
> *A JBOD array cannot be setup using the Quick Setup option*

Accessing the Monitor Utility

Configuration of DEMON/BROWNIE RAID can be accomplished using either the control panel or the embedded Monitor Utility, a convenient menu-based configuration utility, which is accessed though a dedicated terminal or host computer.

This chapter explains how to establish a connection between DEMON/BROWNIE RAID and the host computer so that the Monitor Utility can be used. If you do not intend to access the Monitor Utility, this chapter can be ignored.

Establishing a terminal connection

The Monitor Utility can be accessed from a dedicated terminal or a host PC with third party communication software that supports ANSI terminal emulation.

To use a dedicated terminal, simply connect the terminal to the RS232 head of the RAID controller's combo cable.

To access the Monitor Utility from a host PC, ensure that the RS232 head of the RAID controller's combo cable is attached to the host computer's COM port before. A connection must then be established between the host computer and the DEMON/BROWNIE RAID. This is done by means of a terminal program, such as HyperTerminal. This section outlines the process to set up a HyperTerminal connection.

Other terminal programs may be used in place of HyperTerminal to communicate with the RAID controller. However, the setup process for other terminal software may differ from that outlined in this chapter.

> **Note**
>
> *HyperTerminal is bundled as standard with Microsoft Windows operating systems. It will be found in the Communications folder. The program can also be downloaded from Hilgraeve Software at http://www.hilgraeve.com/htpe/*

1. Launch HyperTerminal from the desktop of the host computer (**Start** > **Programs** > **Accessories** > **Communications** > **HyperTerminal**).

2. The **Connection Description** dialog box will appear (if this is the first time you have run HyperTerminal, you will first be prompted to enter information about your location). Enter a name to identify the RAID controller connection and select an icon to represent the connection. Press **OK**.
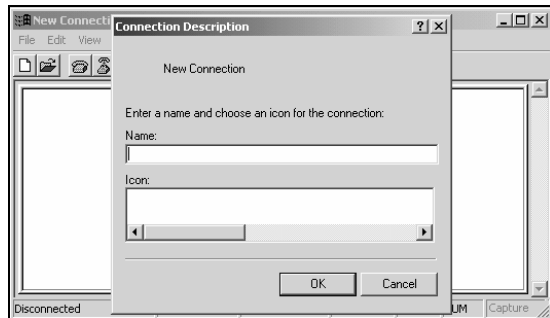
3. The **Connect to** dialog box appears. Select **COM1** or **COM2** from the **Connect using:** dropdown menu, depending on which port is linked to DEMON/BROWNIE RAID. Click **OK**.

4. The **COM Properties** dialog box will appear. Set the following values:

   Bits per second: 115,200

   Data bits: 8

   Parity: None

   Stop bits: 1

   Flow Control: None
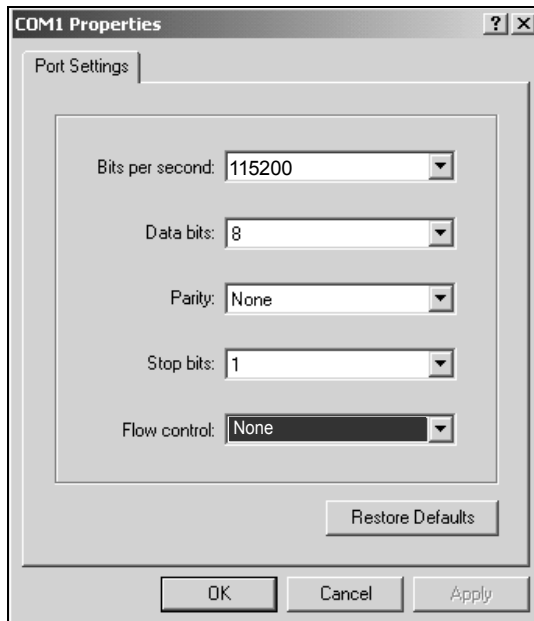
5. Click **OK**. The HyperTerminal connection to DEMON/BROWNIE RAID is now established.

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Using the Monitor Utility

Once a connection has been set up between DEMON/BROWNIE RAID and the host computer, first make sure DEMON/BROWNIE RAID is turned on.

When DEMON/BROWNIE RAID boots up, it enters Self-Diagnostic Mode and runs diagnostic tests. The first test covers the CPU and supporting core logic chips, the internal bus, memory, SCSI controller, Serial ATA controllers, and RS-232 controllers. The second diagnostic test checks for the presence of disks on each individual disk channel and the functionality of each disk found. The final diagnostic test checks RAID functionality.

The messages shown on the right will display as DEMON/BROWNIE RAID runs through the tests. When complete, DEMON/BROWNIE RAID will enter Operation Mode and the Monitor Utility window will show.

```
LCD initialize OK

Memory sizing...256MB

Memory testing.......OK

Move ROM code to System Memory...OK

Jump to System Memory

Startup system, please wait...
```

> **Note**
>
> *To enlarge the size of the Monitor Utility window in HyperTerminal, select **Font**... from the **View** menu and increase the font size.*

RAID controller and Monitor Utility firmware model numbers

Control Panel LCD output

Menu window   Control keys   Output window
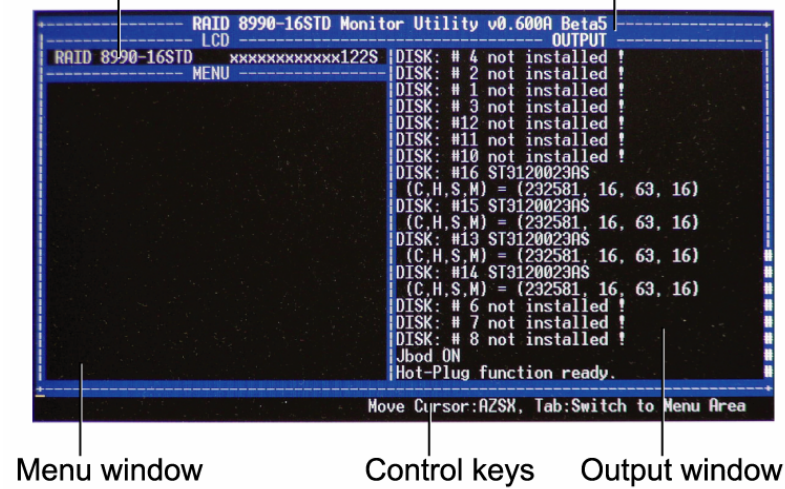
The Monitor Utility has four sections:

The **Top Bar** lists the RAID controller model number and the firmware (Monitor Utility) model number.

The **Control Panel LCD Output** panel mirrors the appearance of the controller box LCD. Full explanation of LCD messages is given in Appendix D.

The **Menu window** is the space into which menus are called up.

The **Output window** displays the current status of the RAID controller and RAID.

The **Control keys** enable the user to navigate through and between the output and menu areas.

Monitor utility control keys

The monitor utility control keys differ depending on which area is active: Menu area or Output area. The control keys are listed at the bottom of the Monitor Utility screen.

Menu area controls

A / ↑   Move cursor up

Z / ↓   Move cursor down

Esc   Cancel a selection / return to previous menu

Enter   Select an option

Tab   Switch to Output area

Output area controls

A / ↑   Move cursor up

Z / ↓   Move cursor down

S / ←   Scroll to top of output list

X / →   Scroll to bottom of output list

Tab   Switch to Output area

> ☀ Note
>
> *The Monitor Utility and control panel cannot be used at the same time.*

Chapter 4

Configuration

This chapter explains how to access and implement the complete suite of **DEMON/BROWNIE RAID** configuration options using either the Monitor Utility or control panel. It contains:

- ⇨ **An outline of the configuration process**
- ⇨ **An explanation of the configuration menu structure**
- ⇨ **Instructions on accessing the configuration menus**
- ⇨ **Diagrams of all menu options**
- ⇨ **Explanations of menu options**
- ⇨ **Instructions on how to update the DEMON/BROWNIE RAID firmware**

Configuration overview

There are two aspects to configuration:

- Configuration of the RAID system and communication parameters
- Setting up and configuration of arrays within the RAID system

Users are advised to attend first to the system, then to the arrays.

System configuration
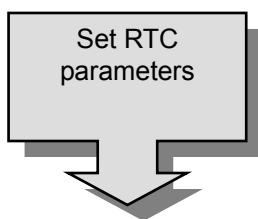
Set RTC parameters

- When using the DEMON RAID for the first time, users will need to set the "**RTC parameters**". Setting the **RTC** parameters will enable the controller to have **RTC** function. When an event occurs, the Log Event will therefore be able to record the event real time.

Set host connection parameters
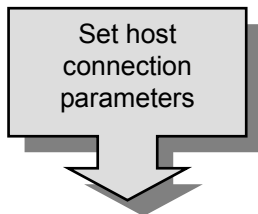
- Set host connection parameters. Users of the fibre host interface configuration of DEMON/BROWNIE RAID should turn to *Setting fibre parameters*. Users of the SCSI host interface configuration of DEMON/BROWNIE RAID should turn to *Setting SCSI parameters*.

Set port parameters
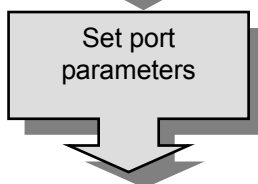
- Specify *communication* protocols between DEMON/BROWNIE RAID and the external modem and between DEMON/BROWNIE RAID and the remote terminal or terminal emulation software (if used). Turn to *Setting port parameters*.

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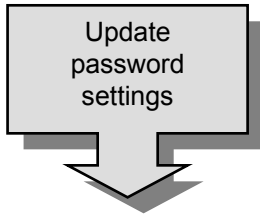
| Update password settings | ● The administrator should replace the default password. Turn to *Password security*. |

| Enter alert settings | ● The administrator can specify up to two fax numbers and two pager numbers to which alert messages will be sent in the event of an error with DEMON/BROWNIE RAID. Turn to *Entering and editing alert settings*. |

| Check and adjust advanced settings | ● The default settings are appropriate for most users. Turn to *Advanced settings*. Then proceed with RAID configuration. |
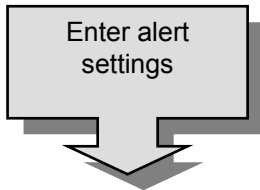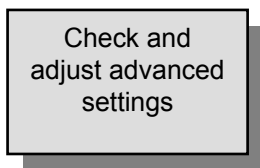
RAID configuration – simple
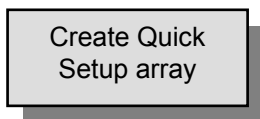
| Create Quick Setup array | ● Use the Quick Setup facility to set up an array using as many connected drives as possible. Turn to Chapter 3, *Quick Setup*. |

RAID configuration – standard
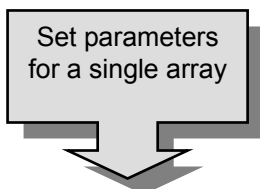
| Set parameters for a single array | ● Create a single array then set the following individual parameters: |

- ● RAID level

- ● Number of disks

- ● Number and size of slices

Turn to *Setting array parameters*
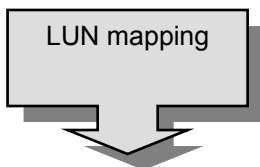
| LUN mapping | ● Map each slice to a LUN.
Users of the SCSI interface model should turn to *Setting SCSI parameters*. Users of the fibre channel interface model should turn to *Setting fibre channel parameters*. |

| Restart | ● Save settings and restart. Turn to *saving configurations*. |

RAID configuration – advanced
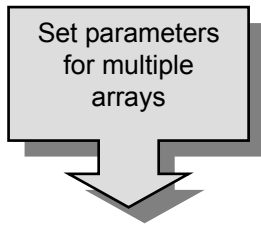
Set parameters for multiple arrays	• Create several arrays. For each in turn set the following individual parameters:
	
	  • RAID level
	
	  • Number of disks
	
	  • Number and size of slices
	
	Turn to *Setting array parameters*
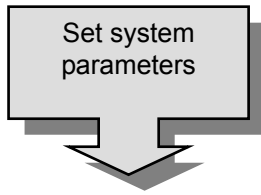
Set system parameters	• Set the following parameters for the RAID system:
	
	  • Striping block size
	
	  • Write buffer (enable/disable)
	
	  • Writing method (random / sequential)
	
	Turn to *Setting array parameters*
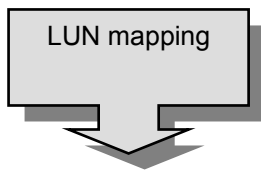
LUN mapping	• Map each slice to a LUN Users of the SCSI interface model should turn to *Setting SCSI parameters*. Users of the fibre channel interface model should turn to *Setting fibre channel parameters*.
Restart	• Save settings and restart. Turn to *Saving configurations*.

How to configure DEMON/BROWNIE RAID

There are three ways to configure DEMON/BROWNIE RAID:

- Using the Control Panel
- Using the Monitor Utility
- Using RaidCare GUI / Web browser **(Refer to Raidcare manual)**

These two methods are functionally identical. Only the interface differs. In each, the user scrolls through menus and submenus to locate and select the desired configuration option.

> **Note**
>
> *For instructions on navigating through menus using the control panel, turn to the section **Control Panel** in Chapter 1.*

> **Note**
>
> *A full list of Control Panel LCD messages is given in Appendix D.*

> **Note**
>
> *For instructions on using the Monitor Utility, turn to the section **Using the Monitor Utility** in Chapter 4.*

> **Note**
>
> *The control panel cannot be used in configuration mode while a Monitor Utility connection is running. If you wish to configure using the control panel, first exit the remote terminal.*

Finding your way around the menus

The main menu is the hub for all configuration choices. It consists of seven submenus and one hidden submenu. All configuration options are exercised from within these submenus. The main menus, as viewed from the Monitor Utility, for the two available hardware configurations of DEMON/BROWNIE RAID are shown below:

```
+---Main Menu---+
|0 Quick Setup  |
|1 RAID Params  |
|2 SCSI Params  |
|3 RS232 Params |
|4 System Params|
|5 NVRAM        |
|6 RAID Funcs   |
+---------------+
```

```
+---Main Menu---+
|0 Quick Setup  |
|1 RAID Params  |
|2 FC Params    |
|3 RS232 Params |
|4 System Params|
|5 NVRAM        |
|6 RAID Funcs   |
+---------------+
```

SCSI host interface configuration   Fibre host interface configuration

The table below is a quick reference resource to help you find your way around the submenus:

Name of submenu	Functions
▪ **Quick setup**	▪ Quickly establish a single RAID– see Chapter 3
▪ **RAID params**	▪ Set parameters for a single or multiple arrays
▪ **SCSI params***	▪ Set SCSI parameters such as SCSI ID, speed and LUN mapping
▪ **FC params****	▪ Set fibre channel parameters, such as hard loop ID, connection mode, data rate and LUN mapping and enable/disable SAN masking
▪ **RS232 params**	▪ Set parameters for modem connection and RS232 connection to terminal
▪ **System params**	▪ Set / enable / disable password security ▪ Configure fax and pager alert settings
▪ **NVRAM**	▪ Save new configurations and restart RAID controller
▪ **RAID funcs**	▪ Initialize and check RAID 5 / 3 / 50/ 30 arrays ▪ Add and remove disks to existing arrays ▪ View system statistics ▪ Cancel error messages ▪ Alarm settings ▪ Expand array ▪ Update firmware

*SCSI host interface configuration only
**Fibre host interface configuration only

Accessing the main menu

The section describes in detail the steps needed to call up the main menu using both the Monitor Utility and Control Panel.

Accessing the main menu using Monitor Utility

1. Run HyperTerminal (or the terminal program used to establish an RS232 connection with DEMON/BROWNIE RAID) and open the connection established with DEMON/BROWNIE RAID in Chapter 4.

2. Press Ctrl D to launch the Monitor Utility.

   When DEMON/BROWNIE RAID boots up, it enters Self-Diagnostic Mode and runs diagnostic tests. The first test covers the CPU and supporting core logic chips, the internal bus, memory, SCSI controller, Serial ATA controllers, and RS-232 controllers. The second diagnostic test checks for the presence of disks on each individual disk channel and the functionality of each disk found. The final diagnostic test checks RAID functionality.

The messages shown on the right will display as DEMON/BROWNIE RAID runs through the tests. When complete, DEMON/BROWNIE RAID will enter Operation Mode and the Monitor Utility window will show. The menu area will be blank.

```
LCD initialize OK

Memory sizing...256MB

Memory testing.......OK

Move ROM code to System Memory...OK

Jump to System Memory

Startup system, please wait...
```

3. The Output area is active, press **Tab** once to switch to the Menu area.

4. With the Menu area active, press **Enter**. You will be prompted to enter a password.

```
+-------------- RAID 8990-16 STD Monitor Utility v0.600A Beta11 --------------+
|--------------- LCD ---------------------------------- OUTPUT ---------------|
| RAID 8990-16 STD   xxxxxxxxxxxxxxxx |Use LBA Mode                           |
|--------------- MENU ---------------|Marvell 0: 64 bit PCI-X 100 MHz B0      |
|                                    |Marvell 1: 64 bit PCI-X 100 MHz B0      |
|         +---Password:----+        |DISK: #15 not installed !               |
|         |  00000000      |        |DISK: #16 not installed !               |
|         +----------------+        |DISK: #12 not installed !               |
|                                    |DISK: #11 not installed !               |
|                                    |DISK: #10 not installed !               |
|                                    |DISK: # 9 not installed !               |
|                                    |DISK: #14 not installed !             # |
|                                    |DISK: #13 not installed !             # |
|                                    |DISK: # 4 not installed !             # |
|                                    |DISK: # 2 not installed !             # |
|                                    |DISK: # 1 not installed !             # |
|                                    |DISK: # 3 not installed !             # |
|                                    |DISK: # 6 not installed !             # |
|                                    |DISK: # 7 not installed !             # |
|                                    |DISK: # 8 not installed !             # |
|                                    |DISK: # 5 not installed !             # |
|                                    |Hot-Plug function ready.              # |
+----------------------------------------------------------------------------+
```

5. Enter the password.

🔆 **Note**

*The default password is **00000000** (eight zeros). The system administrator should change this on first login. The password can be changed under the **System params** menu.*

---

6. Press **Enter**. The **Main Menu** will appear.

```
+--------------- RAID 8990-16 STD Monitor Utility v0.600A Beta11 ---------------+
|--------------- LCD ----------------------------------- OUTPUT ----------------|
| RAID 8990-16 STD   xxxxxxxxxxxxxxxx |Use LBA Mode                             |
|--------------- MENU ---------------|Marvell 0: 64 bit PCI-X 100 MHz B0       |
| +---Main Menu---+                  |Marvell 1: 64 bit PCI-X 100 MHz B0       |
| |0 Quick Setup |                   |DISK: #12 not installed !                |
| |1 RAID Params |                   |DISK: #11 not installed !                |
| |2 SCSI Params |                   |DISK: #10 not installed !                |
| |3 RS232 Params|                   |DISK: # 9 not installed !                |
| |4 System Params|                  |DISK: #14 not installed !                |
| |5 NVRAM       |                   |DISK: #13 not installed !                |
| |6 RAID Funcs  |                   |DISK: #15 not installed !              # |
| +--------------+                   |DISK: #16 not installed !              # |
|                                    |DISK: # 4 not installed !              # |
|                                    |DISK: # 2 not installed !              # |
|                                    |DISK: # 1 not installed !              # |
|                                    |DISK: # 3 not installed !              # |
|                                    |DISK: # 6 not installed !              # |
|                                    |DISK: # 7 not installed !              # |
|                                    |DISK: # 8 not installed !              # |
|                                    |DISK: # 5 not installed !              # |
|                                    |Hot-Plug function ready.               # |
+------------------------------------------------------------------------------+
AZ:Move Cursor, ESC:Exit, Enter:Enter, Tab:Switch to Output Area
```

🔆 **Note**

The main menu varies slightly depending on the hardware configuration of the model purchased. The main menu of the fibre host interface configuration has a FC (fibre channel) submenu. The main menu of the SCSI host interface configuration has a SCSI params submenu. These submenus are dealt with separately in this chapter.

Accessing the main menu using the control panel

DEMON/BROWNIE
RAID-16 STD □

××111×××××××××××

Enter Passwd: □

00000000

1. Turn on DEMON/BROWNIE RAID. The controller will first enter Self-Diagnostic Mode and then enter Operation Mode. A typical Operation Mode screen is shown

2. Press **Enter** to enter Configuration Mode. You will be prompted to enter the password. The default password is **00000000** (eight zeros). To enter this, simply press **Enter** eight times. Press **Enter** again to submit.

Note

*The default password is **00000000** (eight zeros). The system administrator should change this on first login. The password can be changed under the **System params** menu. See Password Security.*

Main menu

0 Quick Setup

3. You enter the main menu. Use the scroll keys to highlight the names of submenus and press **Enter** to select.

Note

The main menu varies slightly depending on the hardware configuration of the model purchased. The main menu of the fibre host interface configuration has an FC (fibre channel) submenu. The main menu of the SCSI host interface configuration has a SCSI params submenu. These submenus are dealt with separately in this chapter.

Setting array parameters

The parameters of the single or multiple DEMON/BROWNIE RAID RAIDs are set and reconfigured from the **RAID params** submenu located at Main menu > RAID Params menu.

1 RAID params	**1.1 Array 1**	**1.1.1** Re-Conf RAID	No / Yes
		1.1.2 RAID Level	0 / 1 / 3 / 5 / 0+1 / 30 / 50 /NRAID/None
	1.2 ~ 1.8 Array 2 ~ Array 8*	**1.1.3** Disk Number	*Choices dependent on RAID level*
		1.1.4 Slice	*Create slices, set slice size*
		1.1.5 Online Init	Enable / Disable

*Submenus as for Array 1

1.9 Stripe Size	1024 / 512 / 256 / 128 / 64 / 32 / 16 / 8 sectors	
1.1A Write Buffer	Enable / Disable	
1.1B Performance	Random / Sequential	
1.1C Slice over 2TB	NO	
	Yes	
	16 CDB	
	Variable Sector Size	1k/sector (4T)
		2k/sector (8T)
		4k/sector (16T)
1.1D Sector Per Track	128	
	255	

31

To create one or several arrays and to set their parameters:

1. If you have no existing arrays that you wish to keep, select Array 1 (1.1). Otherwise, select the next available array (1.2 ~ 1.8)
2. Signal intent to reconfigure the selected array (1.x.1)
3. Choose a RAID level for the selected array (1.x.2)
4. Indicate the number of disks to be included in the selected array (1.x.3). Remember to leave at least 1 disk free if you want a hot spare disk to be automatically configured
5. Partition the array into one or more slices (1.x.4)
6. If you wish to create another array, repeat from step one. If not, continue

Next, make sure these parameters are set for the arrays collectively:

5. Set the striping block size (1.9)
6. Enable or disable the buffer for write operations to memory (1.1A)
7. Set writing method as random or sequential (1.1B)

Finally,

8. Go to the NVRAM menu to save the new configuration (5.1). Then restart (5.3)

RAID params menu

1.1 Array 1

Configure / reconfigure array 1

1.1.1 Re-Conf RAID

Select **No** or **Yes**.

> Note
>
> *To avoid accidental erasure of an existing RAID, **Yes** must be selected prior to saving of any RAID configuration*

> ⚠ Caution
>
> *Data lost during reconfiguration cannot be recovered. You are strongly advised to backup all data before reconfiguring.*

1.1.2 RAID Level

Select **0**, **1**, **0+1**, **3**, **5, 30, 50 , NRAID** or **None**.

> Note
>
> *To remove an existing RAID, reconfigure the array with RAID level set to **None**. The disks will be configured as a JBOD array. If, for instance, four disks are connected, the Control Panel / Monitor Utility readout will show* xxxxxxxxxxxxJJJJ.

1.1.3 Disk Number

Select the number of disks in the RAID.

> Note
>
> *Ensure the required number of disks for all arrays is connected before configuring an array. RAID Levels 3 and 5 require a minimum of 3 disks, RAID Level 1 a minimum of 2 disks, RAID Level 0 a minimum of 1 disk, RAID 0+1 a minimum of 4 disks and RAID 30 and RAID 50 each a minimum of six disks.*

> Note
>
> *The number of disks in the array does not include the "hot spare" disk. A hot spare disk will automatically be added to an array if extra disks are connected. If, for instance 4 disks are connected and a RAID 0 is set up with just three disks, the extra disk will be added to the array as a hot spare. The Control Panel / Monitor Utility readout will show* xxxxxxxxxxxx111S *signaling that three disks are configured in array 1 and a fourth disk is a spare.*

1.1.4   Slice

Open this submenu to partition the array into different slices (identified as Slice 0, Slice 1 etc.). All RAID capacity is assigned by default to Slice 0 – i.e. to a single partition.

1.1.4.1~   Slice 0~
1.1.4.G   Slice 15

Input the size in MB of each slice. All RAID capacity is assigned by default to Slice 0. If the user reduces the size of Slice 0, all excess capacity will be assigned automatically to Slice 1, and so on through the list. Slices (partitions) are created in this way. If no capacity is allocated to a slice, that slice will not be created.

> **Note**
>
> *A slice must be mapped to a LUN before it can be accessed. After creating slices, users should go to the FC (fibre channel) / SCSI Params menu (depending on DEMON/BROWNIE RAID model) to map each to a LUN.*
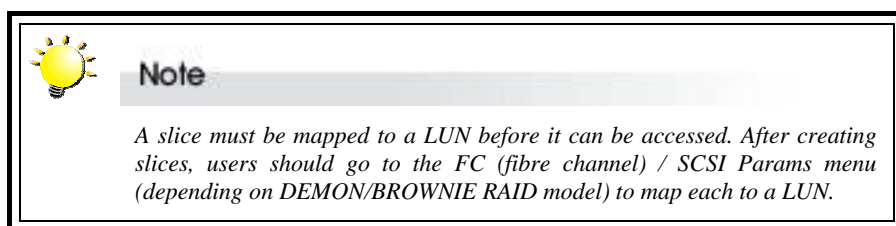
1.1.5   Online Init

Host can access data while array is in initiation

1.2   Array 2
~ 1.8   ~ Array 8

Configure / reconfigure arrays 2, 3, 4, 5, 6, 7 and 8 (ignore if a single array is sufficient)

> **Note**
>
> *The Control Panel / Monitor Utility readout shows which disks are part of which array. If the readout shows* xxxxxxxxxxx1112S *, five disks are connected: three in array 1, one in array 2 and one as a spare.*
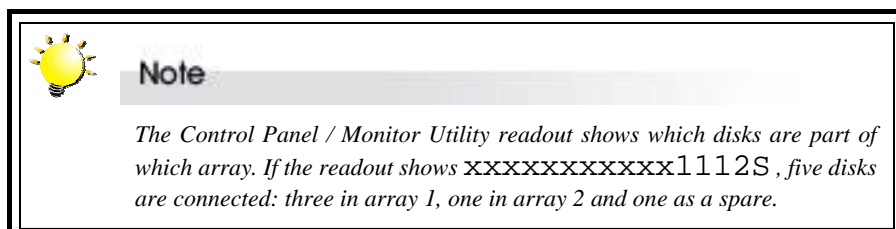
1.9   Stripe Size

Set the striping block size, either **8**, **16**, **32**, **64**, **128**, **256**, **512** or **1024** sectors (Default: 128 sectors).

> **Note**
>
> *Stripe size is constant for any RAID system, whether it consists or a single or multiple arrays.*

> **Note**
>
> *Smaller stripe sizes provide faster access for small randomly-accessed files. Larger stripe sizes increase transfer rates for large sequentially-accessed files (such as video).*

1.1A   Write Buffer

Enable or **Disable** buffer for write operations to memory (Default: Enable).

1.1B   Performance

Set writing method as **Random** or **Sequential**.

> **Note**
>
> ***Sequential*** *is best suited to saving large amount of data,* ***Random*** *to saving smaller amounts of data.*

> **Note**
>
> *Configuration changes made in the RAID Params menu must be saved to the DEMON/BROWNIE RAID non-volatile memory and DEMON/BROWNIE RAID restarted for the changes to take effect. This is done in the NVRAM menu accessed from the Main menu.. See Saving Configurations later in this chapter.*

1.1C   Slice Over 2TB

No or Yes. The default is "NO" , If you select " Yes",You will get " variable sector size or 16 Byte CDB" menu.

Select "16 Byte CDB" or "Variable Sector Size" to create the slice over 2TB

16 Byte CDB (Command description block): It's a standard SCSI command to create a slice greater then 2TB.

Variable Sector Size menu, you have the following three options:
1.1K/Sector(4T)
2.2K/Sector(8T)
3.4K/Sector(16T)
If your total capacity of one slice will be over 2 TB but less than 4 TB, please   select   1K/Sector(4T).
If your total capacity of one slice will be over 4 TB but less than 8 TB, please   select   2K/Sector(8T).
If your total capacity of one slice will be over 8 TB but less than 16 TB, please   select   4K/Sector(16T).
After finished the above settings, you can proceed the normal array setup procedure

1.1D   Sectors Per Track

The default is 128 sectors per Track. The 255 setting is only for Solaris on X86 while user needs the volume greater than 500GB.

Setting SCSI parameters

The parameters of the SCSI connection(s) to the host(s) are set and reconfigured from the SCSI Params submenu located at Main menu > SCSI Params menu. The settings are needed to avoid conflict with the SCSI adapter or other SCSI devices

> **Note**
>
> *DEMON/BROWNIE RAID is available in two hardware configurations: With a fibre channel interface and with a SCSI interface. The SCSI Params menu is only present on the SCSI interface configuration. User of the fibre channel interface model should ignore this section.*

2 SCSI params	2.1 Primary SCSI	2.1.1 Set SCSI ID	0 ~ 15/ Multiple
		2.1.2 Speed	Ultra 320 / Ultra 3 / Ultra 2 / Ultra / Fast
		2.1.3 Wide	Enable / Disable
	2.2 Secondary SCSI*	2.1.4 Lun Map	*Lun 0 ~ Lun #*
	*submenus as for Primary SCSI	2.1.5 QAS	Enable / Disable / Don't care
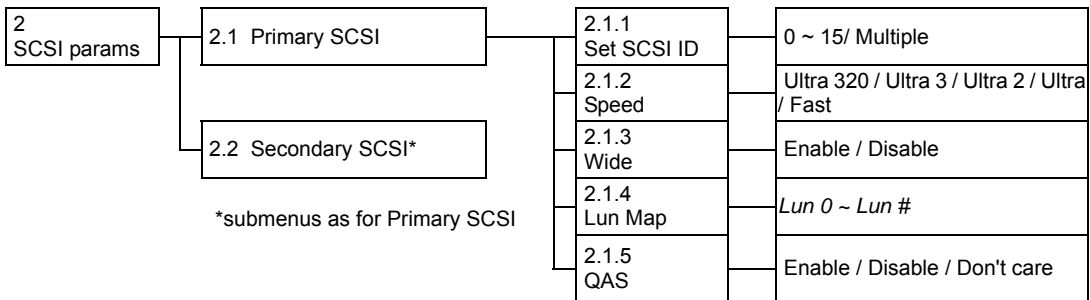
SCSI params menu

2.1   Primary SCSI

Submenu for configuring Primary SCSI settings

2.1.1   Set SCSI ID

Select **0** to **15** or **Multiple** (Default: 0). ID 7 is reserved for the SCSI card.

2.1.2   Speed

Ultra 320, **Ultra 3**, **Ultra 2**, **Ultra** or **Fast** (Default: Ultra 320). See table below for settings.

2.1.3 Wide

Enable or **Disable** (Default: Enable).

SCSI Interface	Wide	Fast	Ultra	Ultra2	Ultra 3	Ultra 320
SCSI-2	Disable	[ENT]				
Wide SCSI	Enable	[ENT]				
Ultra SCSI	Disable		[ENT]			
Ultra Wide SCSI	Enable		[ENT]			
Ultra 2 SCSI	Enable			[ENT]		
Ultra 160 SCSI	Enable				[ENT]	
Ultra 320 SCSI	Enable					[ENT]

2.1.4 Lun Map

Select a *Logical Unit Number* (**LUN 0** to **LUN 7**) or enter the desired LUN (**LUN #,** up to LUN 127) and a corresponding slice on which to map it.

> **Note**
>
> *A RAID may be divided into several logical units (that portion of a disk array seen by the host system as a single logical device). DEMON/BROWNIE RAID can support up to 16 logical units in total.*

2.1.5 QAS

Enable or **Disable** (Default: Enable).

Quick Arbitration and Selection provides increased overall system performance by allowing arbitration to occur without incurring the overhead of intervening BUS FREE phases, saving up to microseconds per operation. This is significant when compared to the 1.6 microseconds it takes to transfer each 512-byte sector of data at 320MB/sec. Rather than waiting for a BUS FREE phase, a target may initiate arbitration by issuing a QAS REQUEST message. The devices on the bus may "SNOOP" the message and participate in the arbitration. QAS can only be enabled if information unit transfers are **enabled**.

Because of ACS7485 (LSI53C1030T SCSI chip) had some compatible issue with other HBA vendor, so F/W had created a QAS menu item to avoid this issues.

HBA Vendor   QAS setting

Adaptec   Enable (Default)

LSI   Disable

ATTO   Don't care

Please follow above table to match your test environment.

> **Note**
>
> *Please turn on the QAS option if HBA vendor is Adaptec.*
> *Please turn off the QAS option if HBA vendor is LSI.*

2.2 Secondary SCSI

Submenu for configuring Secondary SCSI settings for use in multiple host topology (submenu items as above)

> **Note**
>
> *Configuration changes made in the SCSI Params menu must be saved to the DEMON/BROWNIE RAID non-volatile memory and DEMON/BROWNIE RAID restarted for the changes to take effect. This is done in the NVRAM menu accessed from the Main menu.. See Saving Configurations later in this chapter.*

Setting fibre channel parameters

The parameters of the fibre channel connection(s) to the host(s) are set and reconfigured from the FC (fibre channel) params submenu located at Main menu > FC params menu.

> **Note**
>
> *DEMON/BROWNIE RAID is available in two hardware configurations: With a fibre channel interface and with a SCSI interface. The FC Params menu is only present on the fibre channel interface configuration. User of the SCSI interface model should ignore this section.*

2 Fibre paramn	2.1 Primary FC	2.1.1 Enable Hard Loop ID	Enable / Disable
		2.1.2 Set Hard Loop ID	
	2.2 Secondary FC*	2.1.3 Set Connection Mode	Arbitration Loop / Point-To-Point
	*submenus as for Primary FC	2.1.4 Set Data Rate	1 Giga Bits / 2 Giga Bits / Auto-Negotiated
		2.1.5 Lun map	*Match slices in existing arrays to up to 128 LUNs*

- 2.3 SAN Mask
  - 2.3.1 Visible for all hosts
    - 2.3.1.1 Port1 → Enable / Disable
    - 2.3.1.2 Port2 → Enable / Disable
  - 2.3.2 SAN Mapping
    - 2.3.2.1 Port1 → 2.3.2.1.1~2.3.2.1.9 Select Host → Select LUN → Yes / No
    - 2.3.2.2 Port2*
  - 2.3.3 Edit WWN Table
    - 2.3.3.1~2.3.3.9 Select Host   *Submenus a for 2.3.2.1 Port1
  - 2.3.4 View WWN Table
  - 2.3.5 View SAN Mapping
    - 2.3.5.1 Port1
    - 2.3.5.2 Port2

FC params menu

2.1   Primary Fibre

Submenu for configuring Primary Fibre settings

2.1.1   Enable Hard Loop ID

Enable Hard Loop ID if you wish to enter the ID manually. **Disable** to have the ID set by the controller (Default: Disable).

2.1.2   Set Hard Loop ID

Enter the Hard Loop ID for this controller (only applicable if 2.1.1 is set to Enable).

2.1.3   Set Connection Mode

Arbitration Loop or **Point-to-Point** (Default: Arbitration Loop).

2.1.4   Set Data Rate

1 Giga-bits, **2 Giga-bits** or **Auto-negotiated** (Default: Auto-negotiated).

2.1.5   Lun Map

Select a *Logical Unit Number* (**LUN 0** to **LUN 7**) or enter the desired LUN (**LUN #,** up to LUN 127) and a corresponding slice on which to map it.

2.2   Secondary FC

Submenu for configuring Secondary Fibre Channel settings for use in multiple host topology (submenu items 2.2.1 to 2.2.5 as above)

> **Note**
>
> *Configuration changes made in the FC Params menu must be saved to the DEMON/BROWNIE RAID non-volatile memory and DEMON/BROWNIE RAID restarted for the changes to take effect. This is done in the NVRAM menu accessed from the Main menu.. See Saving Configurations later in this chapter.*

2.3   SAN Mask

SAN Mask (LUN Masking) is a differentiation tool for use on fibre networks based on the unique Worldwide Name (WWN) of each fibre card. SAN Masking allows an administrator to specify which hosts are able to see the RAID controller.

2.3.1   Visible For All Hosts

Use this submenu to select whether the RAID controller is visible to connected hosts.

2.3.1.1 /   Select Port
2.3.1.2

Port 1 or **Port 2**. The two ports are equivalent to the two host channels. Then choose **Enable** (to allow hosts on that channel to view DEMON/BROWNIE RAID) or **Disable** (to make DEMON/BROWNIE RAID invisible to hosts on that channel).

2.3.2   SAN Mapping

SAN Mapping allows the administrator to map individual LUNs to a specified host thereby limiting access to certain slices to single hosts even in a dual host configuration.

2.3.2.1 /   Select Port
2.3.2.2

Port 1 or **Port 2**. The two ports are equivalent to the two host channels.

2.3.2.x.1   Select Host

~
2.3.2.x.9   Select **Host 1 ~ Host 8** or enter host number (**Host #**, up to 32), then select LUN (**LUN 0 ~ LUN 7**, **LUN #**, up to 127) and confirm selection.

2.3.3   Edit WWN Table

This submenu allows the administrator to enter individual host WWNs to the controller.

2.3.3.1 ~   Select Host
2.3.3.9   Select **Host 1 ~ Host 8** or enter host number (**Host #**, up to 32).

2.3.4   View WWN Table

Select to view a list of host WWNs in the output window (this information cannot be viewed from the control panel).

2.3.5   View SAN Mapping

Use this submenu to view a table indicating mapping of LUNs to hosts in the output window (this information cannot be viewed from the control panel).

2.3.5.1 /   Select Port
2.3.5.2

Port 1 or **Port 2**. The two ports are equivalent to the two host channels.

Setting port parameters

RS232 Params menu

The administrator should specify the communication protocols between DEMON/BROWNIE RAID and the external modem and between DEMON/BROWNIE RAID and the remote terminal or terminal emulation software. This is done in the **Modem Port menu** located at Main menu > RS232 Params menu > Modem Port menu and the **Terminal Port menu** located at Main menu > RS232 Params menu > Terminal Port menu.

3 RS232 params	3.1 Modem Port	3.1.1 Baud Rate	2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 or 115200
		3.1.2 Stop Bit	1 / 2
	3.2 Terminal Port*	3.1.3 Data Bit	7 / 8
	*submenus as Modem Port	3.1.4 Parity	None / Odd / Even
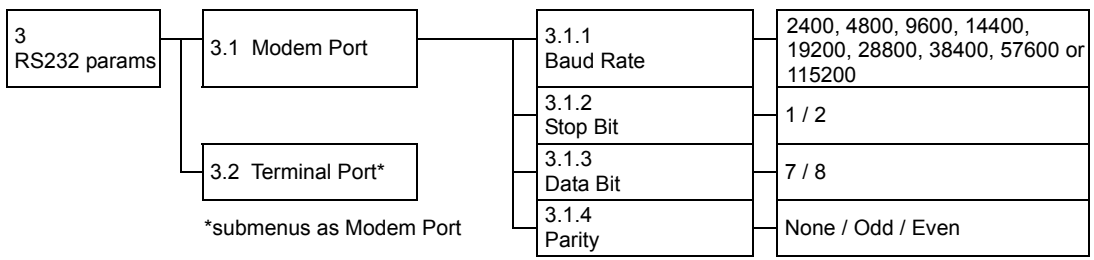
Modem Port menu

3.1 Modem port

Set the baud rate, Stop bit, data bit and parity parameters for the modem port to match those of the modem (see modem product documentation).

3.1.1 Baud Rate

2400, **4800**, **9600**, **14400**, **19200**, **28800**, **38400**, **57600** or **115200** (Default: 19,200)

3.1.2 Stop Bit

1 or **2** (Default: 1)

3.1.3 Data Bit

7 or **8** (Default: 8)

3.1.4 Parity

None, **Odd** or **Even** (Default: None)

Terminal Port menu

3.2 Terminal Port

Set the baud rate, Stop bit, data bit and parity parameters for the terminal port to match those of the host.

3.2.1 Baud Rate

2400, **4800**, **9600**, **14400**, **19200**, **28800**, **38400**, **57600** or **115200** (Default: 115,200)

3.2.2 Stop Bit

1 or **2** (Default: 1)

3.2.3 Data Bit

7 or **8** (Default: 8)

3.2.4 Parity

None, **Odd** or **Even** (Default: None)

> Note
>
> *The remote terminal settings and those of DEMON/BROWNIE RAID must match. So, if the administrator increases the baud rate of the DEMON/BROWNIE RAID port, the baud rate of the terminal emulation software (e.g. HyperTerminal) connection must likewise be increased.*

Password security

The administrator can enable password security and set the password from the **Password Info** submenu located at Main menu > System Params menu > Password Info

| 4
System params | 4.1 Passwd info | 4.1.1
Passwd Check | Enable / Disable |
| | | 4.1.2
Set Passwd | |
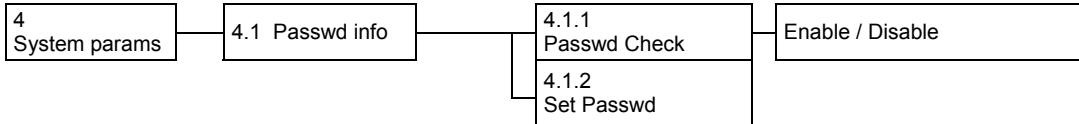
Password Info menu

4.1.1 Passwd check

Enable or **Disable** the Password security feature. When enabled, users will be asked to enter the password when first accessing the main menu (Default: Disable).

4.1.2 Set Passwd

Enter a password of up to eight alphanumeric figures. The default password is **00000000** (eight zeros).

> **Note**
>
> *Configuration changes made in the Password Info menu must be saved to the DEMON/BROWNIE RAID non-volatile memory to take effect. This is done in the NVRAM menu accessed from the Main menu.. See Saving Configurations later in this chapter.*

Entering and editing alert settings

The administrator can specify two fax numbers and two pager numbers to which alert messages will be sent in the event of an error with DEMON/BROWNIE RAID. To configure alert settings, follow the instructions in succeeding sections to:

1. Configure pager settings
2. Configure fax settings
3. Configure modem

Update settings in the NVRAM submenu

> **Note**
>
> *A modem must be connected to DEMON/BROWNIE RAID via the combo cable modem connector for the alert feature to work.*

Pager alert settings

Pager alert settings are all entered and edited from the **Pager Info** submenu, located at Main menu > System Params menu > Pager Info

4 System params	4.2 Pager Info		
		4.2.1 Paging	Enable / Disable
		4.2.2 Pager1 No.	4.2.2.1 Tel No.
			4.2.2.2 Pin No.
		4.2.3 Pager2 No.	4.2.3.1 Tel No.
			4.2.3.2 Pin No.
		4.2.4 Code	4.2.4.1 Part 1
			4.2.4.2 Part 2
		4.2.5 Repeat #	5 / 10 / 15 / 20
		4.2.6 Interval	5 / 10 / 15 / 20
		4.2.7 Page Now	No / Yes
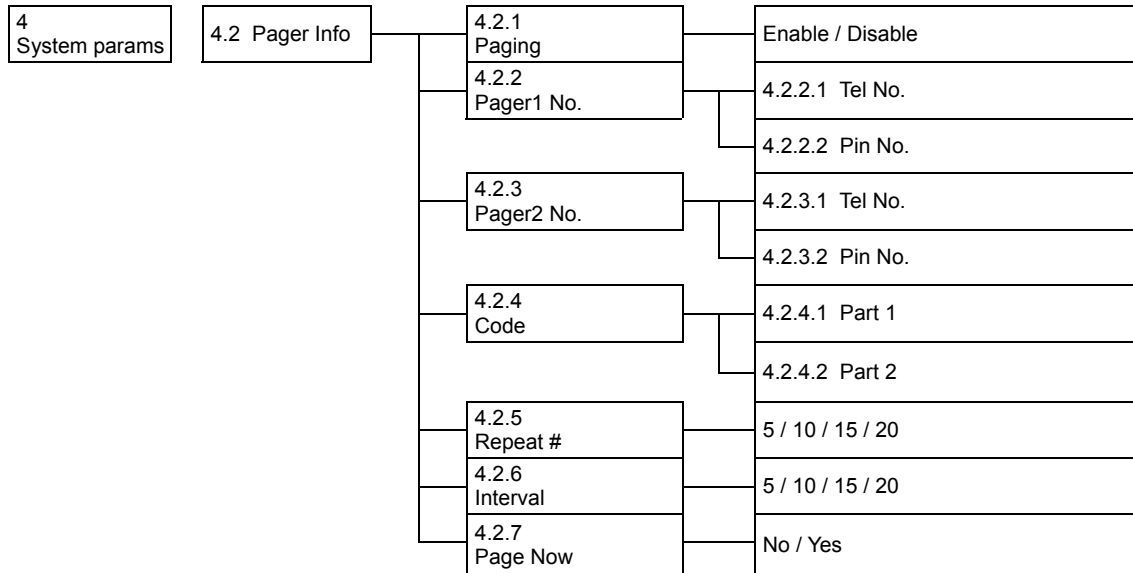
Pager Info menu

4.2.1 Paging

Enable or **Disable** the Pager alert function (Default: Disable)

4.2.2 Pager1 No.

Enter the first pager's terminal **telephone number** (also called the 'port number' or 'TAP port number') and the pager **pin number** (if required for pager). Maximum 16 characters.

4.2.3 Pager2 No.

Enter the second pager's terminal telephone number (also called the 'port number' or 'TAP port number') and the pager pin number (if required for pager). Maximum 16 characters.

4.2.4 Code

Enter the alert message for pager 1 under **Part 1**.
Enter the alert message for pager 2 under **Part 2**.

> ### Note
>
> *Pager alert messages may be up to 16 alphanumeric characters in length for part 1 and may be up to 12 alphanumeric characters in length for part 2.*

4.2.5 Repeat

Select how many times the alert message(s) should be sent: **5**, **10**, **15** or **20** times (Default: 5).

4.2.6   Interval

Select the interval between dispatch of repeated alert messages: **5**, **10**, **15** or **20** minutes (Default: 5).

4.2.7   Page Now

Select **Yes** to instruct DEMON/BROWNIE RAID to send a test pager alert immediately.

> **Note**
>
> *When the above data has been entered appropriately, go to the NVRAM submenu to update settings so that the configuration changes are saved.*

Fax alert settings

Fax alert settings are entered and edited from the **Fax Info** submenu, located at Main menu > System Params menu > Fax Info

4 System params	4.3 Fax Info	4.3.1 Fax	Enable / Disable
		4.3.2 Fax Class	1 / 2
		4.3.3 Fax 1 No.	
		4.3.4 Fax 2 No.	
		4.3.5 Retry #	5 / 10 / 15 / 20 times
		4.3.6 FAX Now	No / Yes

The fax content is the system data displayed from the **Statistic** submenu (7.7)

Fax Info menu

4.3.1   FAX

Enable or **Disable** the Fax alert function (Default: disable).

4.3.2   FAX Class

Define the Fax class supported by the modem, either **1** or **2**.

4.3.3   FAX1 No.

Enter the first fax number (two alert fax numbers can be input).

4.3.4   FAX2 No.

Enter the second fax number (two alert fax numbers can be input).

4.3.5   Retry #

Select how many times the alert message(s) should be sent: **5**, **10**, **15** or **20** times (Default: 5).

4.3.6   FAX Now

Select **Yes** to instruct DEMON/BROWNIE RAID to send a test fax alert immediately.

The alert fax header should be input in the **Company Info** submenu, located at Main menu > System Params menu > Company Info

4 System params	4.4 Company Info	4.4.1 String 1
		4.4.2 String 2
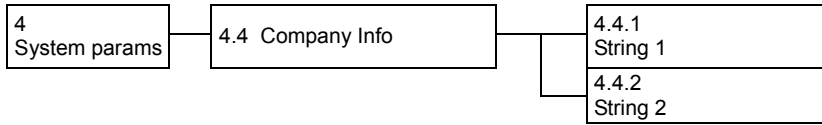
Company Info menu

4.4.1   String 1

Enter the first line of information to be used as the alert fax header (up to 16 alphanumeric characters).

4.4.2   String 2

Enter the second line of information to be used as the alert fax header (up to 16 alphanumeric characters).
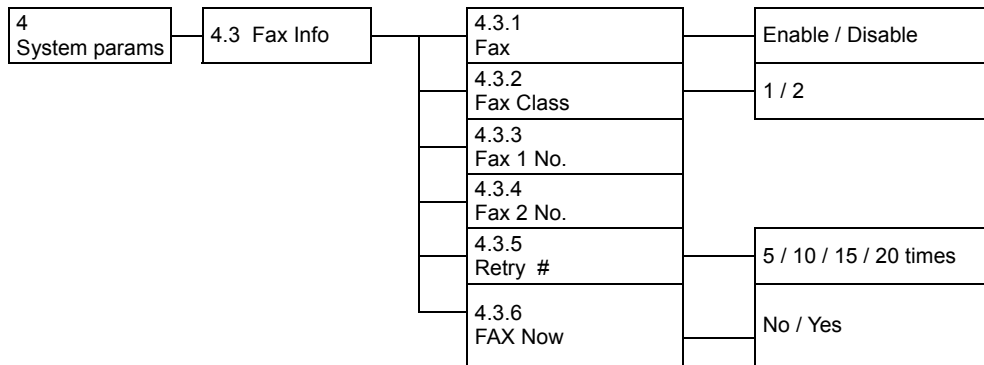
> **Note**
>
> *When the above data has been entered appropriately, go to the NVRAM submenu to update settings so that the configuration changes are saved.*

Modem settings

Before the fax and pager alerts are used the default Modem Initialization string should be confirmed or a new string entered. Do this in the **Modem Init St** submenu, located at Main menu > System Params menu > Modem Init St

4 System params	4.5 Modem Init St
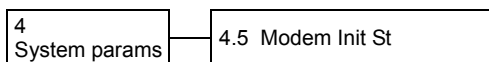
Modem Init St menu

4.5   Modem Init St

Configures the modem you are using for the remote notification feature.

> **Note**
>
> *The default string is a generic string compatible with most modems. Refer to your modem user's guide to check if your modem requires a different string.*

> **Note**
>
> *Configuration changes made in the System Params menu must be saved to the DEMON/BROWNIE RAID non-volatile memory for the changes to take effect. This is done in the NVRAM menu accessed from the Main menu.. See Saving Configurations later in this chapter.*

Saving configurations

Any configuration changes made by the administrator must be saved to the non-volatile memory (NVRAM). This is done in the **NVRAM menu** accessed from the Main menu

⚠ **Caution**

Any changes made in this menu will cause data on the drives to be permanently erased. DEMON/BROWNIE RAID should be offline before configuration changes are saved.

5 NVRAM	5.1 Update NVRAM	No / Yes
	5.2 Erase NVRAM	No / Yes
	5.3 Shut Down	No / Yes
	5.4 Restart	No / Yes
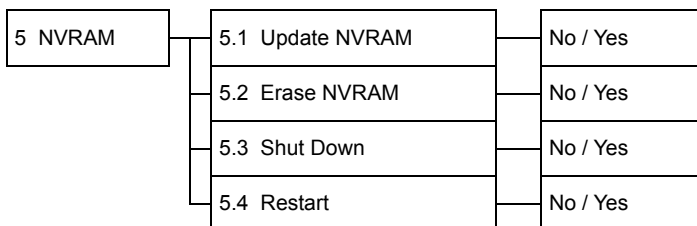
NVRAM menu

5.1   Update NVRAM

Yes or **No** (default: No)
Select Yes to store latest configuration settings in NVRAM

5.2   Erase NVRAM

Yes or **No** (default: No)
Select **Yes** to clear contents of NVRAM and restore configuration defaults

5.3   Shut Down

Yes or **No** (default: No)
To ensure that data is not lost or corrupted, always turn off DEMON/BROWNIE RAID using the Shut Down command. To shut down, first shutdown host system, then select Shut Down from the NVRAM menu. Finally, power off DEMON/BROWNIE RAID. PS (If BBM is installed, Shut Down function must be used before powering off DEMON/BROWNIE RAID)

5.4   Restart

Yes or **No** (default: No)
Select **Yes** to restart DEMON/BROWNIE RAID.

💡 **Note**

DEMON/BROWNIE RAID must be restarted for any configuration changes made within the Quick Setup, RAID params and SCSI//FC params menus to take effect.

Configuration changes made from the RS232, System Params and RAID Funcs menus do not require restart.

Advanced settings

RAID Functions menu

6 RAID Functions	6.1 Init Parity	*Select Array*	Stop / Start
	6.2 Parity Check	*Select Array*	Stop / Start
	6.3 Beeper	Clear / Enable / Disable	
	6.4 Stop Modem	No / Yes	
	6.5 Add Disk	*Select disk number*	
	6.6 Remove Disk	*Select disk number*	
	6.7 **Statistic**		
	6.8 Expand array	Select Array	Select number of disks	Yes / No
	6.9 Log Event	6.9.1 Erase	
		6.9.2 Statistic	
		6.9.3 RTC	6.9.3.1 Set RTC
			6.9.3.2 Show RTC
			6.9.3.3 Stop RTC

6.A Utility	6.A.1 Disk Self Test	6.A.1.1 Short Self Test
		6.A.1.2 Extended Self Test
		6.A.1.3 Stop DST

	6.A.2 Disk scrubbing	6.A.2.1 Overwrite Parity	No/Yes
		6.A.2.2 Scrub Mode	Manual Scrubbing/Schedule Scrubbing/View Schedule

	6.A.3 Disk Clone	6.A.3.1 Start Disk Clone	Source Disk/Target Disk/Start Permanent Clone/Start Swap after Clone
		6.A.3.2 Stop Disk Clone	Disk 1 ~ Disk 16
		6.A.3.3 Replace Source Disk	Disk 1 ~ Disk 16

6.A.4 SMART	6.A.4.1 Test Disk SMART	Seleck disk number
	6.A.4.2 SMART Mode	Disable/Enable (Alert only)/Enable(Permenant clone)/Enable(Start Swap after Clone)
	6.A.4.3 SMART Check Time	60 mins/30 mins/15 mins/1 min
	6.A.4.4 Bad Blocks	6.A.4.4.1 View Statistics
		6.A.4.4.2 Threshold for Clone
		6.A.4.4.3 Threshold for Swap

6.B IDE Timeout
6.C Update ROM

6.1   **Init Parity**

Select an **Array** and then **Stop** or **Start** (Default: Stop) to initialize an existing RAID 5 or RAID 3 array

6.2   **Parity Check**

Select an **Array** and then **Stop** or **Start** (Default: Stop) to check a RAID 5 or RAID 3 array for errors.

6.3   **Beeper**

Clear (to silence a sounding beeper), **Enable** or **Disable** beeper function (Default: Enable).

6.4   **Stop Modem**

No or **Yes**
Select **Yes** to halt the transmission of subsequent alert faxes / pager messages when the message has been received and acknowledged (Default: No).

6.5   **Add Disk**

Select disk number (1 to 16)
Add a disk to an existing configuration while DEMON/BROWNIE RAID is online (Default: None).

6.6   **Remove Disk**

Select disk number (1 to 16)
Remove a disk from an existing configuration while DEMON/BROWNIE RAID is online. This function enables the administrator to shut down a potentially faulty disk. If a spare drive is present, it will automatically be added (Default: None).

6.7   # Statistic

Display system data in Monitor Utility output window (this information cannot be viewed from the control panel). Data includes:

- Current settings saved in NVRAM
- Statistical analysis of read and write operations plus percentage of cache hits

For full details of the **Statistics** output, see Appendix G, *Statistics*.

6.8   **Expand Array**

Select array to be expanded and then the number of disks in the new array.

Note

Ensure that new disk capacity is equal to or larger than current on-line capacity. To expand an array. To expand disk capacity:

⇨ *Connect new disk*
⇨ *Use Expand Array menu to select the number of disks in the array*
⇨ *Go to the Slice menu (1.1.4). The new capacity will appear in a new slice. So if you have already set up Slice0, Slice1and Slice2, the new capacity will form Slice3. If no slices have been formed before (i.e. there is only one partition: Slice0), the new capacity will be in Slice1.*

Caution

You are strongly advised to make a backup before expanding an array.

6.9   **Log Event**

6.9.1   **Erase**
Erase event log

6.9.2   **Statistic**

6.9.3   **RTC**
Adjust Real Time Clock Settings.

Note

When using the DEMON/BROWNIE RAID for the first time, users will need to set the "RTC parameters". Setting the RTC parameters will enable the controller to have RTC function. When an event occurs, the Log Event will therefore be able to record the event real time.

6.9.3.1   **Set RTC**

Enter time in MM/DD/YY W HH:MM format.

MM: Month; DD: Day; YY: Year; W: Week; HH: Hour; MM: Minute.

6.9.3.2   **Show RTC**

Select to have time displayed on control panel

6.9.3.3   **Stop RTC**

Select to turn off RTC

6.A.1   Disk Self Test (DST)

To detect the disk's status

6.A.1.1~6.A.1.2   Short Self Test or Extended Self Test

Choose one of the two functions to do all disks or Disk 1~Disk 16 detection

6.A.1.3   Stop DST

6.A.2   Disk Scrubbing

To prevent unrecoverable data loss & recover bad blocks & fix parity errors

It provides below advantage:

1. without halting normal access, but it has impact to the system's overall performance.

2. disk scrubbing can be started and processed simultaneously for multiple array

---

Note

1. *Before disk scrubbing starts, the array must be in optimal state, that means, there is no failed member disk and no background task, such as adding a disk or expanding array.*

2. *After disk scrubbing starts, users can not start any other background task and the array cannot be deleted. But, the disk scrubbing could be stopped by users manually or by the controller exception conditions.*

6.A.2.1   Overwrite Parity

No or Yes (Default:No)

If parity inconsistency is detected during the disk scrubbing, the controller will overwrite the parity

6.A.2.2   Scrub Mode

6.A.2.2.1   Manual Scrubbing

Users can select one or all arrays for start disk scrubbing or stop it any time

6.A.2.2.2   Schedule Scrubbing

Users can set up the disk scrubbing schedule for one or all arrays to execute disk scrubbing function. The schedule could be specified to be :

●   Frequency in weeks (Once per 0 week/ Once per 1 week~Once per 52 weeks)

●   Date (Monday~Sunday)

●   Time (0:00~23:00)

> **Note**
>
> 1. *If the frequency is set to zero, controller will start disk scrubbing ONCE only at the specified time.*
>
> 2. *When the array is not in the optimal state, the controller will give up disk scrubbing and record this event in the event log. Or,*
>
> 3. *If the controller is not in power-on state at the schedule time, when restart, the controller will record this event to notify users that the disk scrubbing is not executed.*

6.A.2.2.3   View Schedule

User could select this function to check the disk scrubbing schedule

6.A.3   Disk Clone

Disk Clone is like as mirroring, it's to prevent failure of hard disks from data loss and unscheduled performance degradation.

It provides below advantage:

1. Disk cloning can be started and process without halting the host's normal access, it will impact the system's overall performance.

2. Disk cloning can be started and process for multiple array simultanelously.

> **Note**
>
> *Before disk cloning starts, the array must be in optimal state:*
>
> ✓ *No failed member disk*
>
> ✓ *No background task, such as adding a disk, disk scrubbing, or array expanding*
>
> *After disk cloning starts,*
>
> ✓ *No background task can be started for the array of the selected source disk*
>
> ✓ *Array cannot be deleted*
>
> ✓ *User could stop disk cloning manually or by controller cause of some exception conditions such as controller power off, disk failures, array failure, or unrecoverable bad blocks on source disk.*
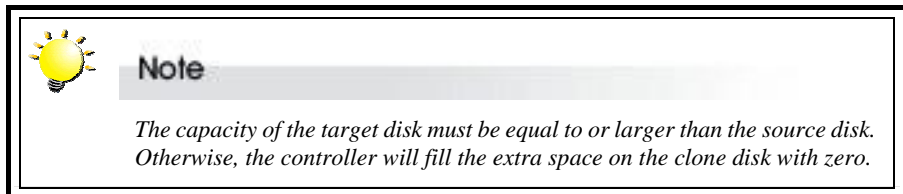
6.A.3.1   Start Disk Clone

Users can select this function if they want to do disk clone

6.A.3.1.1~6.A.3.1.2   Source Disk & Target Disk

Choose the source disk first from the displayed array member and then choose which one disk will be the target disk to be cloned.

The capacity of the target disk must be equal to or larger than the source disk. Otherwise, the controller will fill the extra space on the clone disk with zero.

6.A.3.1.3   Start Permanent Clone

YES or NO

After the background copying is done, the disk cloning will remain in the mirroring state . If select YES, the controller will keep both disks synchronized permanently and replace the source disks when needed.

6.A.3.1.4   Start Swap after Clone

After execute this function, the source disk array will be replaced by the clone disk, and it will be taken off-line, shown "not array"

6.A.3.2   Stop Disk Clone

The disk cloning operation could be stopped any time by users manually.

6.A.3.3   Replace Source Disk

Users can manually replace the source disk by the clone disk when a clone disk has completed the background copying task, and stays in the mirroring state.

6.A.4   SMART (Self-Monitoring, Analysis, and Reporting Technology)

It is to protect user data and minimize the likelihood of unscheduled system downtime that may be caused by predictable degradation and/or fault of the drive. By monitoring and storing critical performance and calibration parameters, drives with SMART / DST feature enabled attempt to predict the likelihood of near-term degradation or fault condition. Providing the host system the knowledge of a negative reliability condition allows the host system to warn the user of the impending risk of a data loss and advise the user of appropriate action.

6.A.4.1   Test Disk SMART

Users can check if a hard disk supports SMART and the current status of one or all disks.

6.A.4.2   SMART Mode

➢   Disable:if users select Disable, the SMART function of all hard disks will be disabled. If a hard disk warn, users could not get the warning message and check the hard disks' health status.

➢   Enable(Alert only):if this mode be selected, the controller will enable the SMART function to check the health status of all disks, but, it won't have clone function. When disks signal SMART warning, the controller will alert users through beeper and display "W" in the LCD panel.

➢   Enable(Permenant Clone): In this mode, the controller will select one spare disk and execute clone activity when disks warn. If there is no spare disk, no action will be taken. And, after the disk cloning done, the source disk still keep in the mirroring state without replacement.

➢   Enable(Start Swap after Clone):In this mode, all operations are same as "Enable (Permenant Clone), the difference is after the disk cloning done, the clone disk will replace the source disk.

6.A.4.3   SMART Check Time

Users could select how long to execute the SMART function 60mins or 30 mins or 15 mins or 1 min.

6.A.4.4   Bad Blocks

6.A.4.4.1   View statistics

Users could get the disk status from this function

6.A.4.4.2   Threshold for clone

Disable/ 2 per GB/ 3 per GB/ 5 per GB/ 10 per GB

Users could set how many time to execute disk cloning when the number of bad sectors in the remap area is over the threshold specified by users.

6.A.4.4.3   Threshold for Swap

Disable/ 3 per GB/ 5 per GB/ 8 per GB/ 14 per GB

Users could set how many time to execute swap of disk cloning when the number of bad sectors in the remap area is over the threshold specified by users.

> **Note**
>
> *The number of threshold for swap must bigger than threshold for clone*
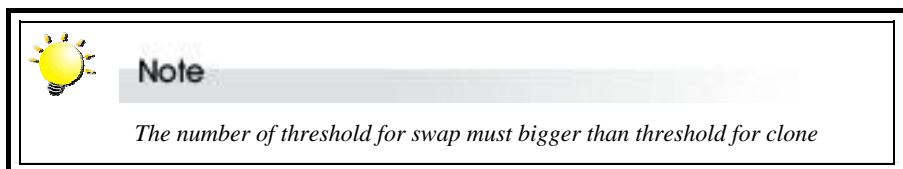
6.B   IDE Timeout

To set the hard drive response waiting time on the controller the default value is 7 seconds.

6.C   Update Rom

Use this option to update the DEMON/BROWNIE RAID programmable firmware. See Appendix H, *Updating the Firmware*.

> 💡 **Note**
>
> *Configuration changes made in the RAID Functions menu must be saved to the DEMON/BROWNIE RAID non-volatile memory for the changes to take effect. This is done in the NVRAM menu accessed from the Main menu.. See Saving Configurations earlier in this chapter.*

Appendix A

Troubleshooting

Problems setting up

Newly installed memory fails during Self-Test or is not detected.

Possible Cause: The SO-DIMM memory module may not be properly seated or may not be supported by DEMON/BROWNIE RAID.

Fix: Re-sit the memory module in the socket and retry. If it continues to fail try moving it to the other memory socket. Make sure the correct memory type is being installed. DEMON/BROWNIE RAID supports 200-pin DDR SODIMM.

Unable to access DEMON/BROWNIE RAID after the operating system boots up.

Possible Cause: DEMON/BROWNIE RAID is not configured.

Fix: Make sure DEMON/BROWNIE RAID is configured for a RAID level. If no RAID level is configured the operating system will not detect DEMON/BROWNIE RAID as a disk drive.

I try to set up an array using Quick Setup but fail. Why?

Possible Cause: If the error message Array1 Exists! appears, an array has already been configured. Quick Setup can only be used to set up new RAIDs.

Fix: Reconfigure the array from the RAID params submenu

Why does disk scrubbing function noneffective ?

Possible Cause:

1. Controller is shut down during disk scrubbing and restarted.:Under this situation, the controller will record the event in the event log, but the disk scrubbing will not be renew and all information related to disk scrubbing is cleared.

2. Disk failure or been removed: If any disk of an array under disk scrubbing operation fails or been removed, the disk scrubbing will stop immediately.

3. Remap area failures: If any write to remap area fails , the disk scrubbing operation stops immediately.

Why will controller do when controller power-off and there is clone disk exist ?

1. The controller will keep the state of a clone disk in the NVRAM and after the controller restart, the operation will be renew from previous stopping point.

Why will controller do when controller power-off and change disk's location?

Fix:the controller will result in incorrect operation and then prohibited.

When controller power off, the data will be changed ?

Ans:If controller is powered off, the data will still be guaranteed identically between the source disk and the clone disk. All wirtes are saved in the NVRAM, and when controller restart, the cloning process will be continuous

If a source disk fail, what will controller do ?

Ans:If a source disk fails during the background copying operation, the cloning process will be aborted. And the controller will use the clone disk for data rebuilding.

If a clone disk fail, what will controller do?

Ans:If a clone disk fail, the clone disk will be taken off-line and select a spare disk as the new clone disk to start the background copying operation. If there is no spare disk or the spare disk without enough capacity, the controller will report warning messages.

If member disk fail and with spare disk , what will controller do?

Ans:If a disk besides the source disk in the same array fails, the controller will select a spare disk for rebuilding data of the failed disk. But,If the failed disk is in different array, the state and the operations of the clone disk are not afftected.

If member disk fail and without spare disk , what will controller do?

Ans:If there is no spare disk for disk adding, a clone disk will be selected for the rebuilding. This can ensure the array to return to optimal mode ASAP so as to avoid array failure. If there is more than one clone disk, the controller will select the clone disk with the least copying progress. If all clone disks are in the mirroring state, the clone disk with the smallest disk number will be used.

If an array fail, what will controller do?

Ans; If an array with clone disks fails, the background copying tasks will be aborted, and the clone disks will become a spare disk.

If there is unrecoverable bad blocks on source disk, what will controller do ?

Ans:If the data is unrecoverable , the copying task will writes zero to the corresponding block on the source disk.

.

Problems during operation

The front panel LCD displays alternating "Zz" characters.

Possible Cause: These characters are displayed when the cache is full with write request data that have not been processed. Requests from the host are halted to flush the data in the cache.

Fix: None needed.

The front panel LCD displays alternating "Ww" characters.

Possible Cause: These characters are displayed to indicate that write requests in the cache are being processed. When these characters are displayed, DEMON/BROWNIE RAID will halt requests from the host (see above).

Fix: Make sure the *Write Buffer* option of the *RAID Params* menu is enabled. In addition, more cache memory may be required. By increasing the cache memory, the write buffer space increases and will be able to handle the higher write requests.

LCD display shows OWOOOS

Possible Cause: "W" means "warning" - there are many bad sectors on your HDD.

Fix: Change hard drives.

Invalid NVRAM **message appears**

Possible Cause: NVRAM error or malfunction.

Fix: Save settings and restart the controller. If the problem persists, contact your vendor.

What is the correct system shutdown procedure?

Fix Step 1: Shut down host OS.

Fix Step 2: Select "Shut Down" from the NVRAM menu.

Fix Step 3: When shutdown is complete, turn off controller system power.

Remote terminal problems

Unable to access Configuration Mode using the remote terminal interface.

Possible Cause 1: The terminal communication settings do not match the settings of the DEMON/BROWNIE RAID RS-232 interface.

Fix: The default settings for the RS-232 port are 115,200 Baud rate, 8 Data bits, 1 Stop bit, No Parity, and None Flow control. Make sure the terminal is configured for these settings. If the settings were changed in Configuration Mode, verify the settings of the DEMON/BROWNIE RAID in the RS-232 Params, Terminal option and change the terminal settings accordingly.

Possible Cause 2: Incompatible RS232 cable.

Fix: Cross pins on the RS-232 cable as shown below (or use a null modem cable). The only pins used are 2 3 & 5.

```
1 2 3 4 5 6 7 8 9
   X    I
1 2 3 4 5 6 7 8 9
```

Alert message problems

I am unable to send a Page or FAX using the modem port.

Possible Cause 1: The Page and Fax options are not enabled.

Fix: Go to the Configuration Mode and enable Page and FAX notification via the System Params menu option.

Possible Cause 2: The default modem initialization string is not compatible with your modem.

Fix: Change the modem initialization string in the System Params option. Refer to your modem manual for its initialization string.

The following modem models require their own initialization strings.

Modem Model	Initialization String	Baud Rate	FAX Class
Motorola ModemSURFR V.34 28.8	AT&D\Q1E	Up to 38400	1 & 2
Multitech Multimodem 2834ZDX	AT&D0&E5E0	Up to 38400	2 only
Hayes Accura 288 V.34+FAX	AT&D0&K4E0	38400 only	1 & 2
Practical Peripherals PM144MT II	AT&K4	Up to 38400	2 only
GVC F-1128V/T2	AT&D0&B1&H2	38400 only	1 & 2
US Robotics Sportster 28800	AT&H2&I1&R1&B1	38400 only	1 only

SCSI problems

DEMON/BROWNIE RAID is not properly identified by the SCSI adapter during initialization of the computer system.

Possible Cause: The SCSI ID set for the DEMON/BROWNIE RAID is being used by another SCSI device attached to the same SCSI card.

Fix: Select the Set SCSI ID option from the SCSI Params menu and specify a different SCSI ID. Most SCSI host adapters provide an onboard ROM BIOS, or software utility, that displays the devices attached and their SCSI IDs. Disconnect DEMON/BROWNIE RAID from the SCSI host adapter card and during the system boot, or by running the utility, note the SCSI IDs already in use.

The DEMON/BROWNIE RAID is identified as all SCSI IDs.

Possible Cause: The SCSI ID set for DEMON/BROWNIE RAID is identical to the reserved SCSI ID used by the SCSI card in your system.

Fix: Select the Set SCSI ID option from the SCSI Params menu and specify a different SCSI ID. Most SCSI host adapter cards reserve SCSI ID 7 for the card ID.

The SCSI host adapter card does not detect DEMON/BROWNIE RAID.

Possible Cause: Incorrect termination in a daisy chain configuration or a loose cable in a stand-alone configuration.

Fix: In a daisy chain configuration, verify that only the SCSI host adapter and the last SCSI device is terminated.

Introduction to RAID levels

The DEMON/BROWNIE RAID can support the following RAID levels: 0, 1, 3, 5, 0+1, 30, 50 , NRAID and JBOD.

Which is the right level for you? The answer depends on the application you use your RAID for.

RAID Level 0 offers high transfer rates, and is ideal for large blocks of data where speed is of importance. Computer Aided Design, Graphics, Scientific Computing, Image and Multimedia applications are all good examples. If one drive in a RAID 0 array fails however, the data on the whole array is lost.

RAID Level 1 may be an appropriate choice if cost and performance are of significantly less importance than fault tolerance and reliability.

RAID Level 0+1 offers a compromise between the reliability and tolerance of level 1 and the high transfer rates provided by level 0.

RAID Level 3 is similar to the more commonly used level 5. Both offer a good level of fault tolerance and overall system reliability at a reasonable cost for redundancy overhead.

RAID Level 30 offers a compromise between the reliability and tolerance of level 3 and the high transfer rates provided by level 0.

RAID Level 5 arrays offer high I/O transaction rates, and are the ideal choice when used with on-line transaction processing applications, such as those used in banks, insurance companies, hospitals, and all manner of office environments. These applications typically perform large numbers of concurrent requests, each of which makes a small number of disk accesses. If one drive in a RAID 5 array fails, the lost data can be rebuilt from data on the functioning disks.

RAID Level 50 offers a compromise between the reliability and tolerance of level 5 and the high transfer rates provided by level 0.

JBOD is a method of arranging multiple disks that is not technically a RAID at all. Under JBOD ("Just a Bunch of Disks") all disks are treated as a single independent volume JBOD providing no fault tolerance, or performance improvements over the independent use of its constituent drives.

NRAID (Non-RAID) combines the space of all physical disks and forms a large logical disk. The space presented by the NRAID starts sequentially from the first member disk to the last member disk without striping, mirroring, or parity. The capacity of the logical disk is the direct sum of all physical hard disks .

This appendix provides a summary of the features of each RAID level to enable users with differing requirements to makes the best choice.

RAID 0

RAID 0 links each drive in the array as one huge drive. Storage capacity is determined by the smallest drive in the array. That capacity is then applied to format all other drives in the array. If using a 40 GB, 60 GB, and 50 GB drive in a RAID 0 array, your system will see one huge drive of 120 GB (40 GB×3).

RAID 0 offers double or more performance under sustained data transfers when one drive per ATA port is used. In such a configuration, unlike SCSI, ATA drives are always available to the system. SCSI requires more management of the SCSI bus.

RAID 0: *Striped disk array without fault tolerance*	
Characteristics:	**Recommended use:**
▪ RAID 0 implements a striped disk array, the data is broken down into blocks and each block is written to a separate disk drive. ▪ I/O performance is greatly improved by spreading the I/O load across many channels and drives. ▪ Fastest and most efficient array type but offers no fault-tolerance. ▪ Storage capacity = (No. of disks) × (capacity of smallest disk)	▪ Video production and editing ▪ Image editing ▪ Pre-press applications ▪ Any application requiring high bandwidth

The diagram below represents the writing of data on a RAID 0 array composed of four HDDS connected to the controller. Data blocks are distributed across all disks in the array.
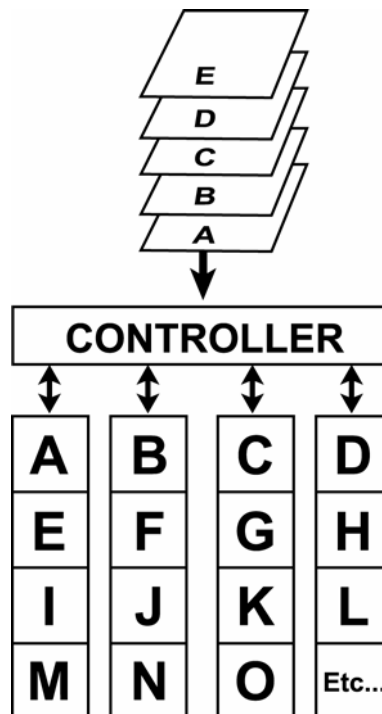
Arrangement of data blocks saved on a Level 0 RAID

RAID 1

RAID 1 is commonly referred to as Disk Mirroring, Disk Shadowing or Disk Duplexing as all data is duplicated across all disks. As data is identical on all disks, storage capacity is that of the smaller disk. RAID 1 has poor performance for write operations but very high performance for read intensive operations.
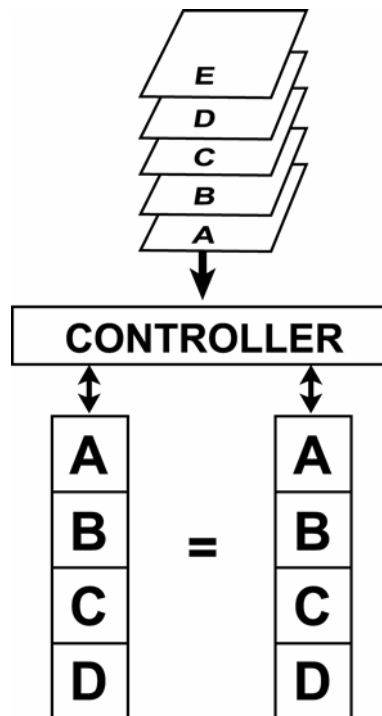
RAID 1: *Mirroring*	
Characteristics:	**Recommended use:**
▪ Better Read transaction rate then single disks, same Write transaction rate as single disks. ▪ 100% redundancy of data means no rebuild of data is necessary in case of disk failure, just a copy to the replacement disk. ▪ All the disks have the same data. ▪ Raid level 1 requires at least two drives. ▪ Storage capacity = Capacity of smallest disk	▪ Accounting ▪ Payroll ▪ Financial ▪ Any application requiring high availability

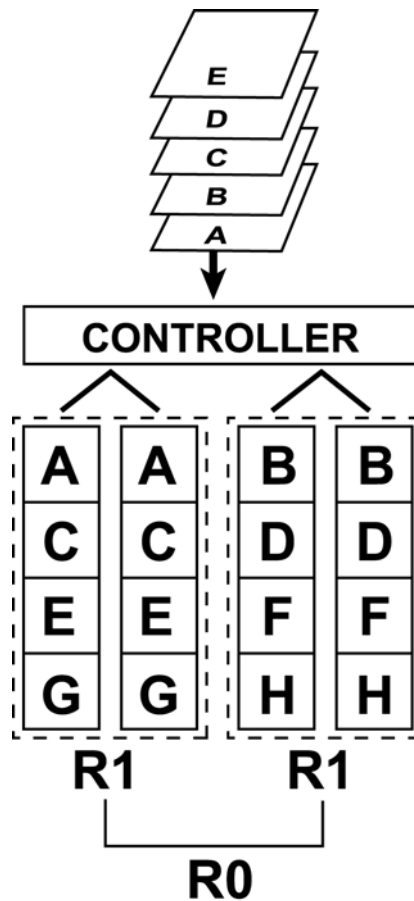**Arrangement of data blocks saved on a Level 1 array**

RAID 0+1

RAID 0+1 combines mirroring and striping functions on a minimum of four hard disks. Mirroring provides full redundancy and protects data in case of multiple drive failure (providing that data on one of each mirrored pair of drives is intact).

RAID 0+1: *Combination of mirroring and striping*

Characteristics:
- This configuration provides optimal speed and reliability.
- Requires even number of disks (minimum 4 disks)

The diagram below represents the writing of data on a RAID 0+1 array composed of four HDDS connected to the controller. The controller creates a RAID 0 array from two RAID 1 sub-arrays.

Arrangement of data blocks saved on a Level 0+1 array

RAID 3

RAID 3 uses a mathematical expression that compares data from two drives and calculates a third piece of data called "parity". Should one of the drives fail, parity data can be used to rebuild the failed data. Under RAID 3, parity data is stored on a dedicated parity disk. If two or more disks were to fail however, data would be lost. Data on RAID 3 is byte-interleaved. While the low ratio of parity disks to data disks ensures high efficiency, the parity disk is accessed more than the others and so is also more likely to fail.

RAID 3: *Parallel transfer with parity*	
Characteristics:	**Recommended use:**
▪ The data block is subdivided, i.e. striped, and written on the data disks. Stripe activity is generated on Writes, recorded on the parity disk, and checked on Reads. ▪ Very high Read and Write data transfer rates. ▪ Disk failure has a low impact on throughput. ▪ Low ratio of ECC (Parity) disks to data disks means high efficiency. ▪ Requires a minimum of three drives.	▪ Video production and live streaming ▪ Image editing ▪ Video editing ▪ Any application requiring high throughput
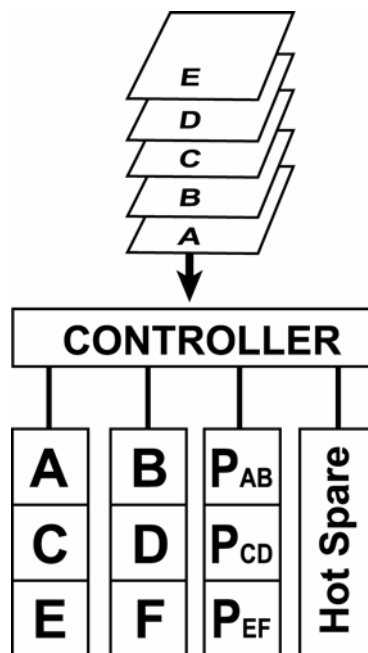
Arrangement of data blocks saved on a Level 3 array

RAID 30

RAID 30 arrays are formed by striping data across RAID 3 sub-arrays. They offer better performance than RAID 3 alone but do not have the speed of a pure RAID 0 array. Storage efficiency and fault tolerance vary depending on the number and size of sub-arrays compared to the array as a whole. RAID 30 resembles RAID 50 in its characteristics. RAID 30 is better suited for use with larger files.

RAID 30: *Byte striping with parity combined with block striping*	
Characteristics:	**Recommended use:**
- Capacity: (Size of smallest drive) × (No. of drives in each subarray - 1) × (No. of subarrays). - Requires a minimum of six drives. Number of drives must be divisible by two numbers: 2 or higher (no. of subarrays) and 3 or higher (drives within each RAID 3 subarray) - Excellent fault tolerance, increasing with the number of RAID 3 subarrays (and hence the number of parity disks)	Critical multimedia / file servers requiring speed, resilience and high capacity.
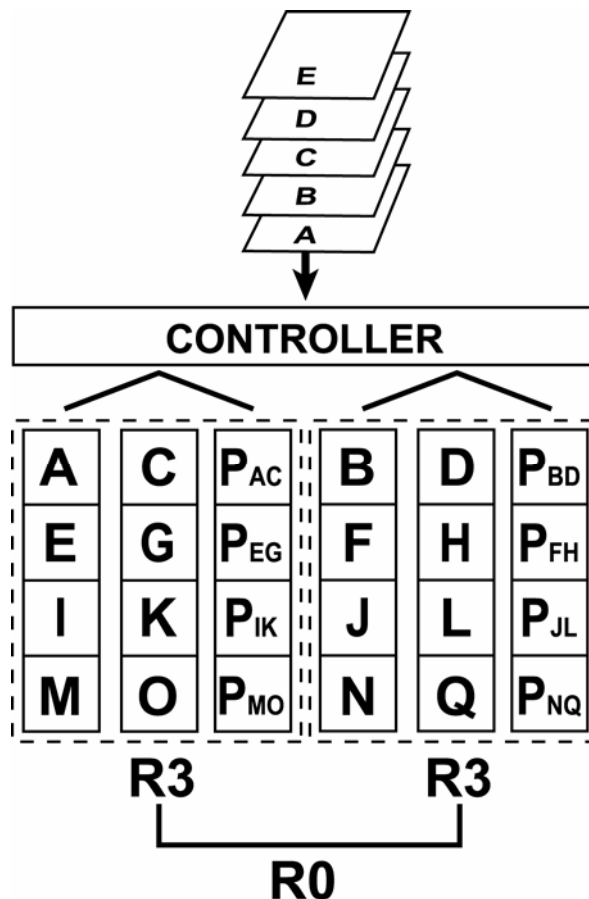
Arrangement of data blocks saved on a six-drive Level 30 array

65

RAID 5

RAID 5 uses a mathematical expression that compares data from two drives and calculates a third piece of data called "parity". Should one of the drives fail, parity data can be used to rebuild the failed data. Under RAID 5, parity data is stored across all drives in the array. This maximizes the amount of storage capacity available from all drives in the array while still providing data redundancy. Data on RAID 5 is block-interleaved.

| **RAID 5:** *Independent data disks with distributed parity blocks*	
Characteristics:	**Recommended use:**
▪ Each entire data block is written on a data disk. Parity for blocks in the same rank is generated on Writes, recorded in a distributed location and checked on Reads. ▪ Highest Read data transaction, medium Write data transaction rate. ▪ Relatively low ratio of ECC (Parity) disks to data disks means high efficiency (compared to other RAID levels). ▪ Good aggregate transfer rate. ▪ Storage capacity = (No. of disks – 1) × (capacity of smallest disk)	▪ File and application servers ▪ Database servers ▪ WWW, E-mail and News servers ▪ Intranet servers ▪ Most versatile Raid level

The diagram below represents the writing of data on a RAID 5 array composed of four HDDS connected to the controller. Parity blocks are represented by the letter P.
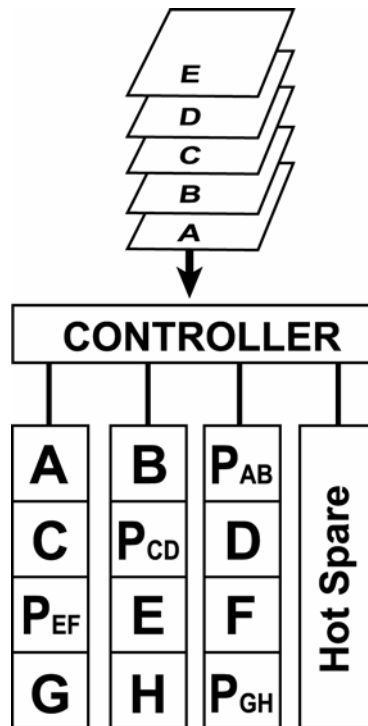
Arrangement of data and parity blocks saved on a Level 5 RAID

RAID 50

RAID 50 arrays are formed by striping data across RAID 5 sub-arrays. They offer better performance than RAID 5 alone, particularly in write speed, but do not have the speed of a pure RAID 0 array. Storage efficiency and fault tolerance vary depending on the number and size of sub-arrays compared to the array as a whole. RAID 50 resembles RAID 30 in its characteristics. RAID 50 is better suited for use with smaller files.

RAID 50: *Block striping with interspersed parity combined with block striping*	
Characteristics:	**Recommended use:**
▪ Capacity: (Size of smallest drive) × (No. of drives in each subarray - 1) × (No. of subarrays). ▪ Requires a minimum of six drives. Number of drives must be divisible by two numbers: 2 or higher (no. of subarrays) and 3 or higher (disks within each RAID 3 subarray) ▪ Excellent fault tolerance, increasing with the number of RAID 5 subarrays (and hence the number of parity disks)	▪ Critical databases requiring speed, resilience and high capacity.
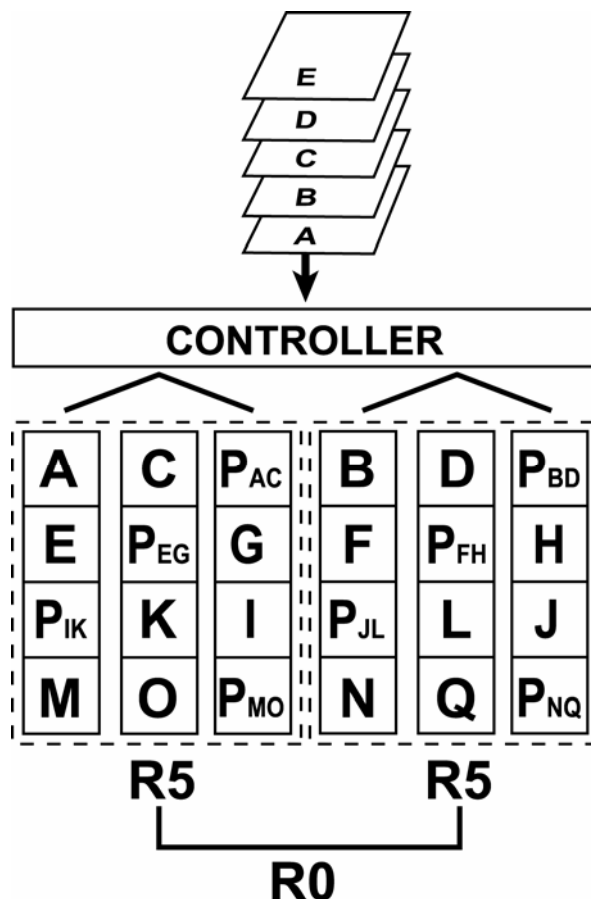
Arrangement of data blocks saved on a six-drive Level 50 array

JBOD

JBOD ("Just a Bunch of Disks") reports the individual drives. The operating system will see each drive in the JBOD mode as a individual drive. There is no RAID protection in the JBOD mode. The JBOD mode allows the user to connect more hard drives without taking up IDE connections on the motherboard.

JBOD: *Spanned disk array without fault tolerance*	
Characteristics: ▪ JBOD reports individual disks. ▪ No fault-tolerance. ▪ Storage capacity = Sum of constituent drive capacities	**Recommended use:** ▪ For most uses not requiring fault tolerance, RAID 0 is better. JBOD has the advantage if you are using several drives of different capacities.
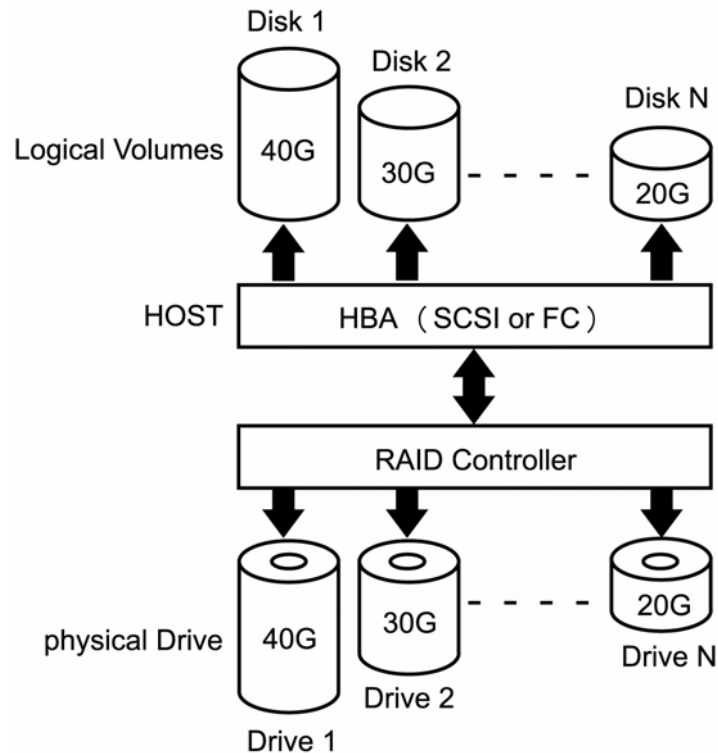
Arrangement of data saved on a JBOD array

NRAID

NRAID ("Non-RAID") , the capacity of all the drives is combined to become one logical drive (no block striping). That is to say, the capacity of the logical drive is the total capacity of the physical drives. NRAID does not provide data redundancy

NRAID: *Disk spanning*	
Characteristics: ▪ No fault-tolerance. ▪ Minimum no. of drives:1 ▪ Storage capacity = Sum of constituent drive capacities	**Recommended use:** ▪ For most uses not requiring fault tolerance, RAID 0 is better. ▪ Mass data, NRAID is only good for applications where large and expandable capacity is required while performance is of no concern and the capacity of disks is different. ▪ Storage
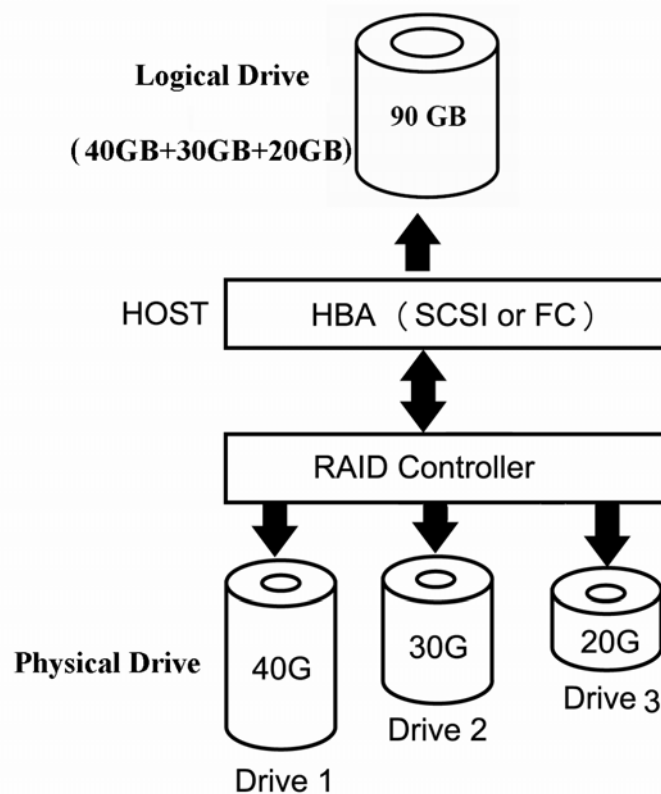
Arrangement of data saved on a NRAID

Appendix C

Introduction to Serial ATA

Serial ATA is a disk-interface technology that is an evolutionary advance on Parallel ATA (IDE). Compatible with today's software and OS-transparent, Serial ATA offers several compelling advantages for RAID storage solutions. These include cables that are easier to route and install; smaller connectors; faster and more reliable performance; and backwards compatibility. This section introduces and gives an overview of the advantages of using Serial ATA in RAID.

Simplicity of configuration

Serial ATA is based around point-to-point connections with a single cable for each drive. The master/slave, "daisy-chaining", and termination issues associated with Parallel ATA are eliminated.

Hot-Swap capability

Serial ATA drives can be connected and disconnected at any time with no need to power down the system. RAID system administrators benefit from a more flexible and scalable system. Upgrades and expansion of arrays can be performed in an instant.

Serial ATA HDD — Data connector — Power connector
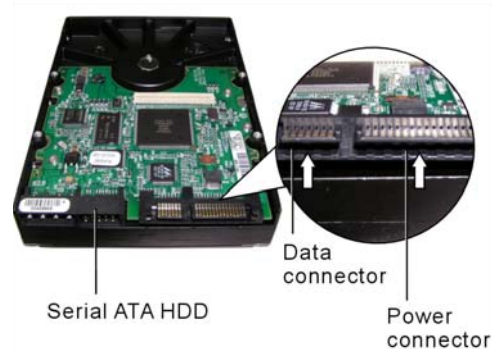
Performance

Serial ATA technology delivers up to 1.5Gb/sec of performance to each drive within a disk drive array – more than enough to help you get the most out of the current generation of hard drives.

Serial ATA is also more reliable than Parallel ATA: instructions as well as data are checked for errors, resulting in higher reliability, and less frequent corruption of data.

Electrical interference is reduced by the use of differential signaling (which also reduces the need for grounding).

Cost effectiveness

The scalability of Serial ATA solutions means that RAIDs can be built, expanded and reconfigured according to requirements with minimal cost to the administrator.

Serial ATA-compatible HDDs are priced similarly to Parallel ATA equivalents, their improved performance notwithstanding.

Serial ATA is also fully backwards compatible. Users can swap easily between formats and use Parallel ATA drive in a Serial ATA drive array (this may require use of a cabling adapter). Such flexibility ensures that Serial ATA can provide low cost solutions.

Appendix D
Control Panel Messages

Status messages

When DEMON/BROWNIE RAID is in operation mode, scroll buttons ▼ and ▲ can be used to display the following system data:

- Installed Memory
- RAID Capacity
- Firmware Version
- Serial Number
- CPU Type
- RAID Members
- RAID Level
- SCSI ID

The table below explains the meaning of status messages:

Field / Symbol	Description
DEMON/BROW NIE RAID	The DEMON/BROWNIE RAID model number.
OOOOOOOS	The 8 or 16 disks channel status. The first left O is channel 1. You can press [▼] button to view the next page. Other symbols are:
x	Disk not installed
A	Disk being Added
1	Array 1 Disk On-line (Multiple array)
2	Array 2 Disk On-line (Multiple array)
3	Array 3 Disk On-line (Multiple array)
4	Array 4 Disk On-line (Multiple array)
5	Array 5 Disk On-line (Multiple array)
6	Array 6 Disk On-line (Multiple array)
7	Array 7 Disk On-line (Multiple array)
8	Array 8 Disk On-line (Multiple array)
J	JBOD (Just a Bunch of Disks)
S	Spare disk
R	Disk removed
I	Disk is being checked
R5	RAID level (0, 1,0+1,3, 5, 30, 50, NRAID)
ID:0	SCSI ID (0 - 15) Multiple
	Alternating cursor indicating operational status.

Appendix E

Glossary

Array

See Disk Array.

Array Management Software

The body of software that provides common control and management for a disk array. Array Management Software most often executes in a disk controller or intelligent host bus adapter, but may also execute in a host computer. When it executes in a disk controller or adapter, Array Management Software is often referred to as Firmware.

Cache

Controller memory used to speed up data transfer to and from a disk.

Disk Array

A collection of disks from one or more commonly accessible disk controllers, combined with a body of Array Management Software. Array Management Software controls the disks and presents them to the array operating environment as one or more virtual disks.

Disk Striping

The practice of dividing data into blocks and writing the blocks across several drives for increased performance.

Disk Mirroring

The practice of duplicating data on different sets of disks in an array.

Firmware

See Array Management Software.

Host Computer

Any computer system to which disks are directly attached and accessible for I/O. Mainframes, and servers, as well as workstations and personal computers, can all be considered host computers in the context of this manual, as long as they have disks attached to them.

Hot Spare

A physical drive, not part of an array, on which the controller can rebuild data if an array drive malfunctions.

Hot Swap

The substitution of a (usually defective) unit by a replacement that takes place while the system is online.

Logical Unit

Disk storage space on one or more physical drives that appears to the host computer as a single drive.

LUN (Logical unit number)

The number assigned to a logical unit. Slices of a RAID are assigned (mapped to) LUNs by which they appear to the host computer.

Mirroring

See Disk Mirroring.

Parity

Parity information is redundancy information calculated from actual data values. If any single piece of data is lost, the data remaining and the parity information can be used together to compute the lost data. Parity information can either be stored on a separate, dedicated drive, or be mixed with the data across all the drives in the array.

RAID (Redundant Array of Independent / Inexpensive Disks)

A disk array in which part of the storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. The redundant information enables regeneration of user data in the event that one of the array member disks or the access path to it fails. See Parity. Different RAID levels offer different data throughput speeds and fault tolerance (data redundancy). RAID 0 does not feature redundant information but is nonetheless considered a special type of RAID.

SCSI

Small Computer System Interface.

Slice

A partition of an array. See LUN.

Striping

See Disk Striping.

Appendix F

Specifications

Item	Specifications
Operation System	OS Independent and Transparent
CPU	Intel i80321 64-bit RISC microprocessor
SCSI or FC I/O Processor	LSI 53C1030T or Qlogic ISP2312
RAID Level	0, 1, 3, 5, 0+1,30,50,and JBOD,NRAID
Cache Memory	PC 200 DDR 64 1G memory with ECC support
SCSI Channel to Host	2(Max) Ultra 320 SCSI LVD
Fibre Channel to Host	2(Max) Optional for 2Gb FC
Serial ATA1 Channel to Device	16(Max) SATA1 with Ultra DMA 150
Data Transfer Rate	Up to 320MB (dual CH.)
Tagged Command Queuing	Yes, up to 256 Commands
Stripe Size	Variable
Write Option	Write through or Write back
Hot Swap	Yes
On Line Expansion	Yes
Battery Backup Module (BBM)	Yes
Hot Spare	Yes (Rebuild Transparently & Automatically)
Remote Management	RS-232 terminal emulation for configuration and monitoring
Remote Alerts	Fax, Pager
Local Alerts	Built-in buzzer

Note

Specifications subject to change without notice.

Appendix G

Statistics

System and array settings and statistics can be viewed by selecting the submenu RAID funcs > Statistic

Information is displayed in the Monitor Utility output window (this information cannot be viewed from the control panel) under the following headings:

- System information
- RAID information
- SCSI / Fibre information (depending on daughterboard fitted)
- RS232 information
- Company information
- Fax information
- Pager information
- IO statistics

As usual in the Monitor Utility, use the keys AZSX to scroll through the information.

System information

Firmware version: keep track abd ensure you are up to date with the latest firmware release. To update firmware, consuilt the following section.

Serial number: serial number of controller (if any)

Installed memory: capacity of SODIMM installed on controller

Status: View the current status of each disk channel. The status statistic is given in the form of a string such as xxxxxxxxxx11222S. Each character represents a disk channel:

A number (1,2 etc) indicates the array to which a disk belongs

S signifies that the disk is a hot spare

J signifies that the disk is part of a JBOD array

x signifies that the disk channel is empty

Beneath the status string, the status of each disk channel is given separately. If a disk is installed, the serial number is shown. Otherwise, the message Not Installed is displayed.

RAID information

RAID number: the array number. RAID information is given for each exisitng array

RAID capacity: the capacity, in megabytes, of the array.

RAID level: the RAID level of the array

Stripe size: the strip size, in sectors, of the array

Write buffer: Enable or Disable

RAID member: the disks, identified by disk channel number, which are part of the array.

Slice information: the size of each slice in the array is given. If no extra slices have been created, the entire RAID capacity is assigned to a single slice (Slice 0) by default.

SCSI information

> **Note**
>
> *SCSI information is given only for controllers with a SCSI interface daughterboard. Equivalent fibre statistics are given for controllers with fibre daughterboards. See following section.*

SCSI information is listed separately for the primary SCSI channel and secondary channel, if a second channel is being used. The following data are shown. Refer to *Setting SCSI parameters* earlier in Chapter 4 for configuration details.

- **SCSI ID**

- **Speed**

- **Wide**

- **LUN map**

LUN map: DEMON/BROWNIE RAID supports up to 16 logical units in total. Slices must be mapped to logical units to be accessible by the operating system. The LUN map shows which slices map to logical units. A typical readout may show:

```
LUN Map:      (10 11 20 21 12 x x x x x x x

x x x x x x x x x x x x x x x x x x x x x

x x x x x x x x x x x x x x x x x x x x x)
```

In this case, five slices have been mapped. The operating system will be able to access each of these as a distinct logical unit. Furthermore, the LUN map shows that the operating system can access two separate arrays. Array 1 contains three logical units / mapped slices denoted 10, 11 and 12. Array two has two logical units / mapped slices, 20 and 21.

Fibre information

> **Note**
>
> *Fibre information is given only for controllers with a Fibre interface daughterboard. Equivalent SCSI statistics are given for controllers with SCSI daughterboards. See preceding section.*

Fibre information is listed separately for the primary fibre channel and secondary channel, if a second channel is being used. The following data are shown. See *Setting fibre parameters* in Chapter 4 for configuration details.

- **Hardloop ID**

- **Mode**

- **Data Rate**

- **LUN map**

LUN map: DEMON/BROWNIE RAID supports up to 16 logical units in total. Slices must be mapped to logical units to be accessible by the operating system. The LUN map shows which slices map to logical units. A typical readout may show:

```
LUN Map:     (10 11 20 21 12 x x x x x x x
x x x x x x x x x x x x x x x x x x x x x
x x x x x x x x x x x x x x x x x x x x x)
```

In this case, five slices have been mapped. The operating system will be able to access each of these as a distinct logical unit. Furthermore, the LUN map shows that the operating system can access two separate arrays. Array 1 contains three logical units / mapped slices denoted 10, 11 and 12. Array two has two logical units / mapped slices, 20 and 21.

RS232 information

RS232 information applies to the modem and terminal connection. The following data are shown. Refer to *Setting port parameters* in Chapter 4 for details.

- **Baud Rate**
- **Data Bit**
- **Stop Bit**
- **Parity**

Company information

Two company string numbers are listed. Refer to *Company info menu* in *Fax alert settings* in Chapter 4 for details.

Fax information

The following data are shown. Refer to *Fax info menu* in *Fax alert settings* in Chapter 4 for details.

- **Fax mode**
- **Fax number:**
- **Retry count**

Pager information

The following data are shown. Refer to *Pager alert settings* in Chapter 4 for details.

- **Paging mode**
- **Pager numbers**
- **Paging count**
- **Repeat count**

- **Repeat interval**

IO statistics

Host Read, Host Write and Total Disk I/O statistics are listed.

Battery Backup Module information

If a BBM is installed the following data are shown

- **Battery temperature**
- **Battery capacity**
- **Battery status**
- **Battery serial number**
- **Battery device chemistry**

Appendix H

Updating the Firmware

DEMON/BROWNIE RAID is shipped with firmware installed. The user may however wish to download new or upgraded editions of the firmware to the controller. Ask your vendor about the latest firmware edition .

A terminal emulation program, such as HyperTerminal, is required to download firmware.

> ⚠ **Caution**
>
> *Shut down the host computer system(s) before downloading the new firmware.*

> 💡 **Note**
>
> *Array data and configurations are not affected by updating of firmware.*

To update the firmware:

1.   Open the Update ROM submenu (6B) located at Main menu > RAID funcs > Update ROM menu.

```
+---Main Menu---+
|0 Quick Setup  |
|1 RAID Params  |
|2 SCSI Params  |
|3 RS232 Params |
|4 +---RAID Funcs--+
|5 |61 Init Parity |
|6 |62 Parity Check|
+--|63 Beeper      |
   |64 Stop Modem  |
   |65 Add Disk    |
   |66 Remove Disk |
   |67 Statistic   |
   |68 Expand Array|
   |69 Log Event   |
   |6A Utility     |
   |6B Update ROM  |
   +---------------+
```

2.   You will be asked:
     `Are you ready to download the new firmware? (Y/N)`

     Type **Y** to continue.

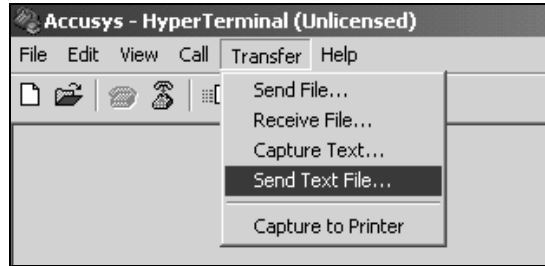3.   When asked: `Are you sure? (Y/N)`, type **Y** to confirm.

```
Before downloading the new firmware,
shutdown the host computer system.
Are you ready to download the new firmware?(Y/N) Y
Are you sure? (Y/N) Y
Boot flash type: AM29LV040
System flash type: AM29LV017
Begin firmware file transfer now.
To abort download restart the RAID system.
```

4. Locate the updated firmware file to send. If using HyperTerminal, go to the **Transfer** menu and select **Send Text File…**

5 Send firmware file as a text file. The file will start to download. When prompted, enter **Go** (case sensitive) to update the firmware.

6. When prompted, enter **Go** (case sensitive) to reconfirm. The firmware will start to update.

7. If asked whether you want to replace the existing file, enter **Yes**

Appendix I

Configuration Table

1. Fill in the following table item by item according to the configuration of your , this table will help you to rescue the data in case of RAID controller fail up.

Configuration Table.

Item		Your Setting Value			
Password					
Array 1	**RAID Level**				
	Array Members				
	Slice	Slice 0	MB	Slice 4	MB
		Slice 1	MB	Slice 5	MB
		Slice 2	MB	Slice 6	MB
		Slice 3	MB	Slice 7	MB
Array 2	**RAID Level**				
	Array Member				
	Slice	Slice 0	MB	Slice 4	MB
		Slice 1	MB	Slice 5	MB
		Slice 2	MB	Slice 6	MB
		Slice 3	MB	Slice 7	MB
Array 3	**RAID Level**				
	Array Members				
	Slice	Slice 0	MB	Slice 4	MB
		Slice 1	MB	Slice 5	MB
		Slice 2	MB	Slice 6	MB
		Slice 3	MB	Slice 7	MB
Array 4	**RAID Level**				
	Array Members				
	Slice	Slice 0	MB	Slice 4	MB
		Slice 1	MB	Slice 5	MB
		Slice 2	MB	Slice 6	MB
		Slice 3	MB	Slice 7	MB
Hot Spare Numbers					
Stripe Size		Block (1Block = 512KB)			
Primary SCSI/ Fibre	**SCSI/Fibre ID**				
	LUN Map	LUN 0		LUN 4	
		LUN 1		LUN 5	
		LUN 2		LUN 6	
		LUN 3		LUN 7	
Secondary SCSI/Fibre	**SCSI/Fibre ID**				
	LUN Map	LUN 0		LUN 4	
		LUN 1		LUN 5	
		LUN 2		LUN 6	
		LUN 3		LUN 7	

Table A.

Example :

There is Demon/Brownie RAID which is configured as :

RAID Level 5, by 5 x 160GB HDDs which install in Disk Slot#1, Disk Slot#2, Disk Slot#3, Disk Slot#5 and Disk Slot#6 , there are 2 of hot spare Disks.

Password		00000000			
Array 1	**RAID Level**	**RAID level 5**			
	Array Members	**Disk# 1, Disk# 2, Disk# 3, Disk# 5, Disk#6**			
	Slice	Slice 0	**640000** MB	Slice 4	MB
		Slice 1	MB	Slice 5	MB
		Slice 2	MB	Slice 6	MB
		Slice 3	MB	Slice 7	MB
Hot Spare Numbers		**2 of HDDs**			
Stripe Size		**128** Block (1Block = 512KB)			
Primary SCSI/Fibre	**SCSI/Fibre ID**	**SCSI ID #2**			
	LUN Map	LUN 0	**Array 1 Slice 0**	LUN 4	
		LUN 1		LUN 5	
		LUN 2		LUN 6	
		LUN 3		LUN 7	