

ASUS[®] PCI-DA2100
PCI-to-SCSI RAID Controller

USER'S MANUAL

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FCC & DOC COMPLIANCE

Federal Communications Commission Statement

This device complies with FCC Rules Part 15. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

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. These 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 manufacturer's 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:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING! The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

ASUS® PCI-DA2100
PCI-to-SCSI RAID Controller

PART I
**HARDWARE
INSTALLATION**

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I. INTRODUCTION

ASUS PCI-DA2100 RAID Controller

The ASUS PCI-DA2100 is a PCI-to-SCSI RAID controller specifically designed to provide RAID 0, 1, 3 or 5 capability to any host system equipped with Little Endian PCI Local Bus interface. (For a description of RAID, see *I. RAID Management* under *Part IV: Appendices*.) All the RAID functions of ASUS PCI-DA2100 are performed by a 486 CPU coupled with high-speed DRAMs and firmware in Flash Memory. In effect, it endows the host system with the high performance and fault-tolerant disk storage operation of RAID technology. It is also an ideal solution for weaving several hard disks into one contiguous volume.

The ASUS PCI-DA2100 has a comprehensive drive failure management that allows automatic bad block reassignment when a bad sector is encountered during a write. Hot-swapping is supported through automatic detection of failed drives, followed by either automatic background rebuilding onto a spare if a spare is assigned or manual replacement of failed drive and manually initiated background rebuilding. All these failure recovery operations are performed in a way transparent to the host.

The controller has been designed with the ease of integration and maintenance in mind. The major features are described in the following section. The ASUS PCI-DA2100 already includes all the major operational requirements for a RAID subsystem. The final features of a fully-built RAID subsystem will, however, depend on the actual components used and the creativity of the integrator.

II. FEATURES

Features of the ASUS PCI-DA2100

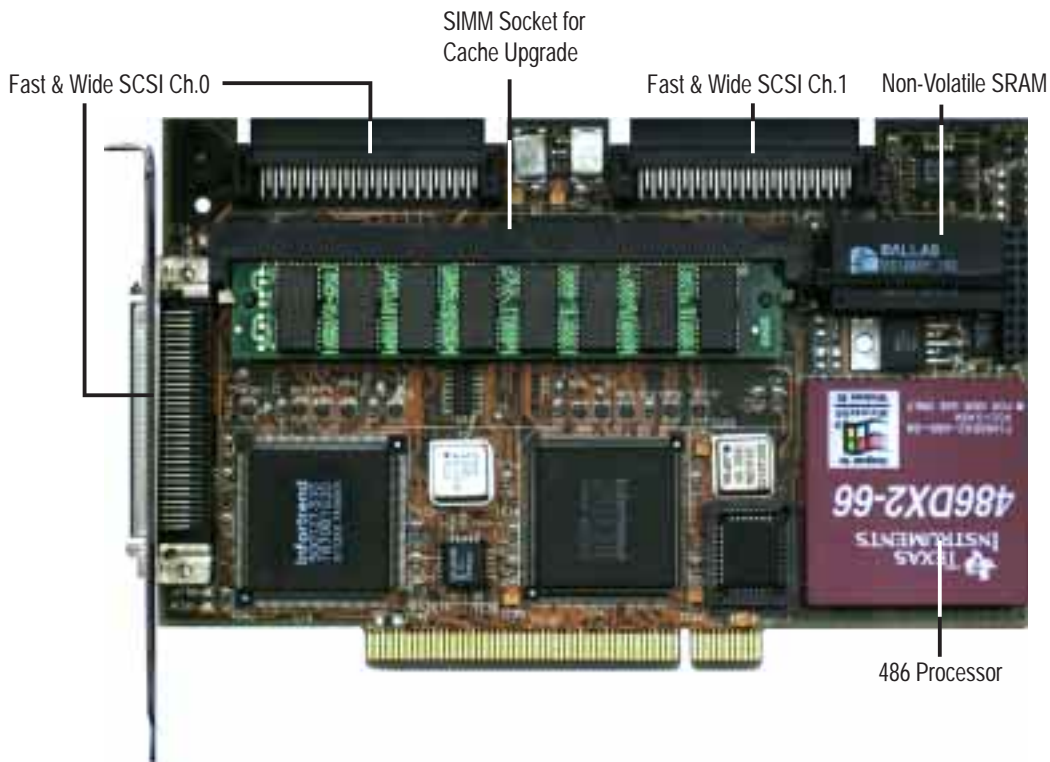
- Five operating modes:
 - Non-RAID Disk Spanning (including JBOD)
 - RAID-0 Striping
 - RAID-1 Mirroring and Striping (RAID 0+1)
 - RAID-3 Block Striping with Dedicated Parity
 - RAID-5 Multiple Block Striping with Distributed Parity
- Comprehensive failure management including:
 - Automatic bad sector reassignment
 - Hot-swapping
 - Spare drive operation (Global Spare and Local Spare support)
 - Background rebuilding (rebuild priority selectable)
- PCI Rev. 2.1 compliance
- PCI Standard length form factor: 17.5 (L) x 10.7 cm (W) (6.87" x 4.2").
- Up to 15 SCSI IDs per channel.
- Up to 8 logical drives, each with independent RAID modes.
- Up to 8 partitions per logical drive.
- Logical drive can be assigned a name for ease of identification.
- Unlimited drive quantities for each logical drive.
- Dynamic mapping of LUNs to logical drives. Two or more LUNs can be mapped to the same logical drive for redundant host operation.
- Concurrent/Background logical drive initialization.
- Performance optimization for Sequential or Random I/O.
- Allows multiple drive failure in RAID 1 and concurrent multiple drive rebuild for multiple-drive failed RAID 1 logical drives.
- Configuration of individual SCSI target parameters.
- Controller can be assigned a name for ease of identification.

II. FEATURES

- Allows adjustment of delay prior to first disk access during controller initialization to enhance compatibility with slow-initial drives.
- All channels are Ultra Wide SCSI-2 (downward compatible to SCSI-1) and can be configured as either host or drive interface.
- Compatibility and automatic matching of any SCSI hard disks complying with SCSI-1, SCSI-2, or (Ultra)-Wide-SCSI (1 or 2) specifications.
- Full Ultra Wide SCSI-2 implementation including Tagged Command Queuing and Multi-Threaded I/O.
- Uses 486 CPU with all executable firmware downloaded into high-speed DRAM.
- BIOS INT 13 support.
- EDO RAM support for enhanced performance.
- Up to 64 MB of intelligent Read-Ahead/Write-Back cache with backup battery option.
- Flash Memory for easy firmware and BIOS updates.
- Easy-to-use Text or GUI RAID Manager for RAID management.

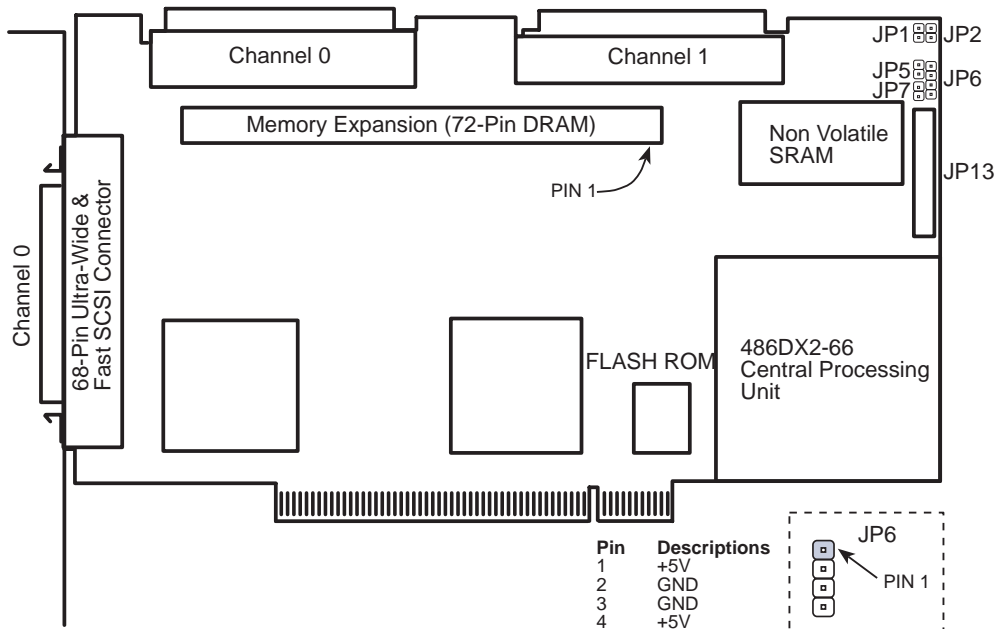
III. INSTALLATION

ASUS PCI-DA2100 RAID Controller



III. INSTALLATION
ASUS PCI-DA2100

Layout of the ASUS PCI-DA2100



JP1, JP2, JP5, JP7: Factory use. Open for normal operation.

JP6: LED Connector for hard disk drive activity light.

JP13: Connector for manufacturing diagnostic.

III. INSTALLATION

Installing DRAM SIMM

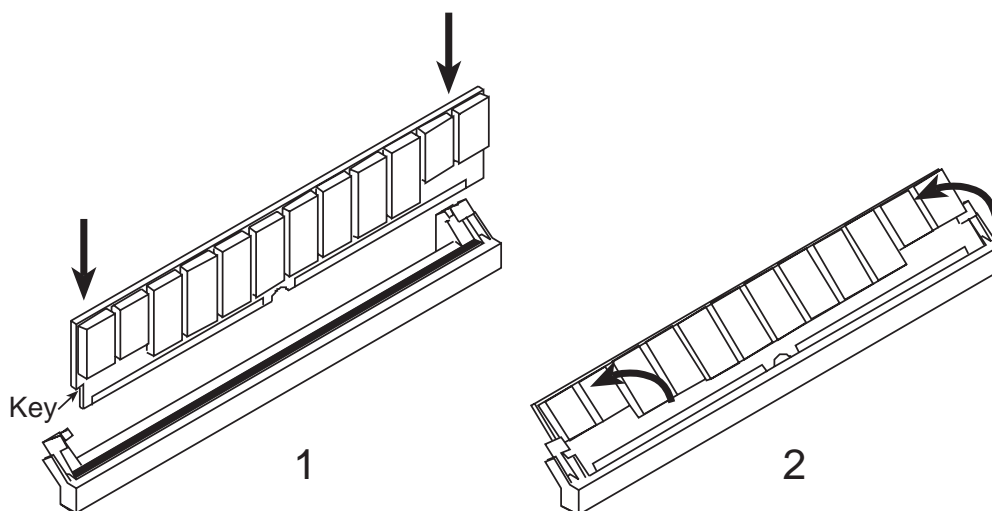
IMPORTANT: The ASUS PCI-DA2100 requires a minimum of 4MB of DRAM in one SIMM (with or without parity function) installed in SIMM socket to operate. The controller is normally delivered without any DRAM installed.

Guidelines

- Use **72-pin 60 ns DRAM** or **60 ns EDO RAM SIMM module**. EDO RAM is recommended to improve performance.
- DRAM with or without parity is autodetected by ASUS PCI-DA2100, but DRAM with parity is recommended for security.
- Minimum DRAM required is 4 MB installed in SIMM socket. 8MB is, however, recommended.
- ASUS PCI-DA2100 supports 4MB, 8MB, 16MB, 32MB, 64MB DRAM SIMM module. Maximum DRAM size is 64 MB.

Installation

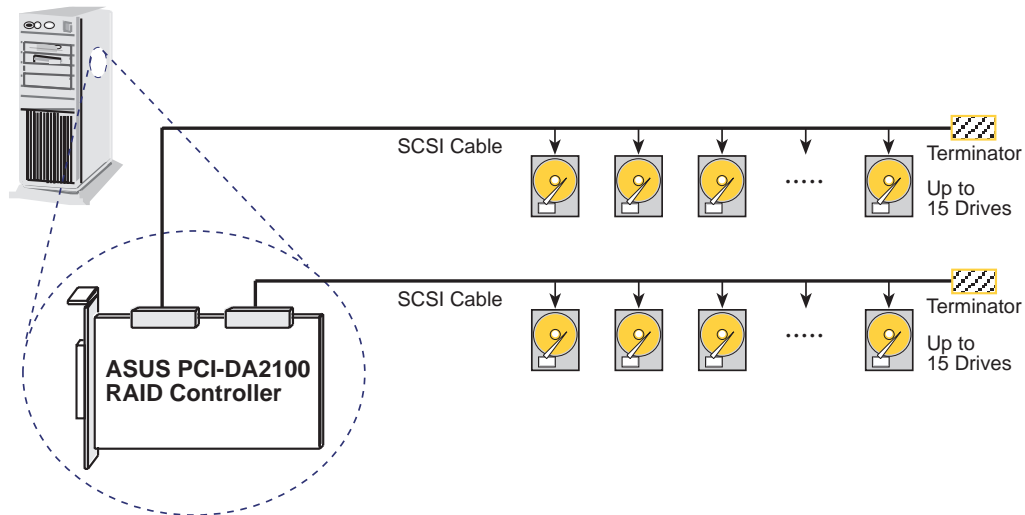
- 1 Power off the system and disconnect the power connector.
- 2 Insert the DRAM SIMM paralleled with the key to the left (1). Then, push toward the back until the hooks on both sides of the socket snap into place (2).



III. INSTALLATION

Basic Operational Set-up

Sample Operational Set-up

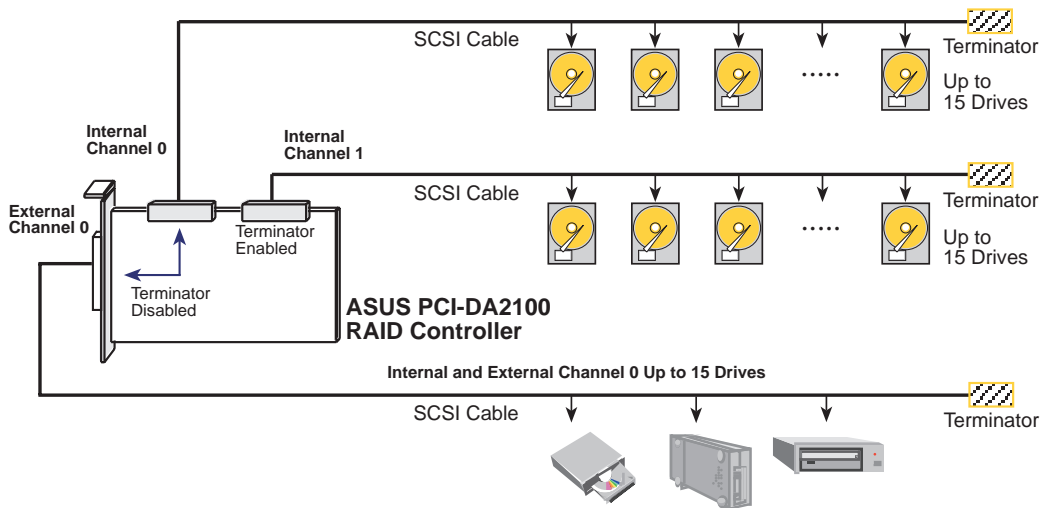


To connect the components:

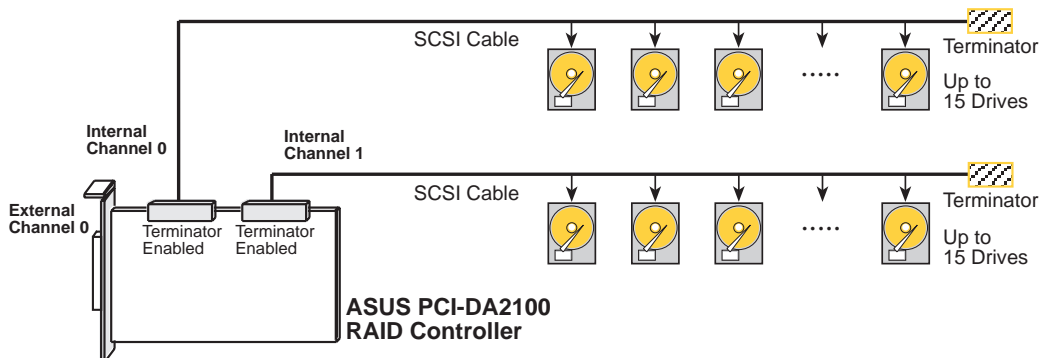
- Make sure the system power has turned off and the power connector is disconnected.
- Install the ASUS PCI-DA2101 RAID controller in a vacant PCI slot.
- Plug one end of the drive SCSI cable to one of the drive channel on the controller.
- Connect the hard disk(s) to the drive SCSI cable.
- Total length of SCSI cable must not be more than 1.5 meters.
- Drives connected to channel 0 and/or channel 1.
- SCSI nodes on the same channel have unique ID number. SCSI ID 7 is reserved for the ASUS PCI-DA2100 adapter and thus no drives should use ID 7.
- Both ends of all SCSI cables are properly terminated. The external channel 0 and internal channel are the same channel — the total devices on external and internal channel 0 should not exceed 15.
- Enable the termination of channel 0 if no external devices connected.
- Disable the termination of channel 0 if external devices are connected.
- Enable the termination of channel 1.

III. INSTALLATION

- Terminate the SCSI cable by either installing a terminator on the farthest hard disk from the controller or by installing an external terminator on the end connector. **Installing an external terminator on the end connector is, however, preferred because removal of the hard disk will not affect cable termination.** All other terminators must be removed making sure that only one terminator is installed.
- Power supply attached to all the devices.
- All operation parameters properly set.
- The default state of terminators embedded on the ASUS PCI-DA2100 controller are enabled, which can be changed by running the Text RAID Manager (RAIDMAN.EXE).



The external channel 0 and internal channel are the same channel — the total devices on external and internal channel 0 should not exceed 15. Disable the termination of channel 0 if external devices are connected.



Enable the termination of channel 0 if no external devices are connected.

IV. BIOS SOFTWARE

BIOS Configuration Utility

At system bootup, the ASUS PCI-DA2100 BIOS displays a message similar to the following:

```
ASUS PCI-DA2101 (PCI-TO-SCSI RAID) BIOS v1.14A
PCI Bus # = 00 Device # = 0C Port = D400 IRQ = 12 EDORAM=8 MB FW=1.22X
!! Press <Ctrl><I> for Configuration Utility, <Q> to Skip !!
```

NOTE: ASUS PCI-DA2100 BIOS waits 3 seconds for a keystroke. You can press [**Ctrl-I**] to enter the configuration utility, or press **Q** to skip waiting for a keystroke.

If [**Ctrl-I**] is pressed to enter configuration utility, the main menu will appear. There are two functions in the main menu: Configuration and Color/Monochrome.

PCI Bus # / Device #

Show the PCI bus and PCI device number assigned to your ASUS PCI-DA2100. The numbers are in hexadecimal.

Port

Shows the I/O port base address assigned to your ASUS PCI-DA2100.

IRQ

Shows the Interrupt level, in decimal, assigned to your ASUS PCI-DA2100.

EDO RAM DRAM

Displays the cache RAM type and size installed on your ASUS PCI-DA2100.

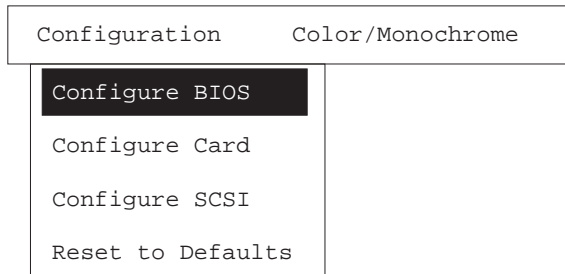
FW

Shows the firmware version of your ASUS PCI-DA2100.

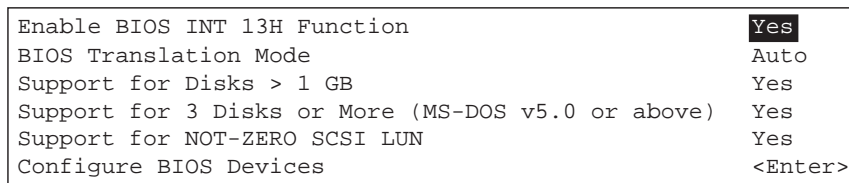
IV. BIOS SOFTWARE

Configuration

Four options are available under the **Configuration** menu: *Configure BIOS*, *Configure Card*, *Configure SCSI*, and *Reset to Defaults*.



Configure BIOS



Enable BIOS INT 13H Function

Press **[Space]** to toggle between Yes or No.

BIOS Translation Mode

Press **[Space]** to toggle between Auto and Fixed. Use fixed mode together with disabling “Support for Disks > 1GB” for UNIX/DOS or UNIX/OS2 dual boot system. Use Auto mode for other operating systems.

Auto mode

- BIOS detects the existing CHS mapping from the disk.
- If any valid CHS mapping is found, BIOS uses it.
- If no valid CHS mapping is found, BIOS uses Fixed mode.

Fixed mode

- If option “Support for Disks > 1 GB” is disabled, BIOS uses SectorsPerTrack = 32, TotalHeads = 64.
- If option “Support for Disks > 1 GB” is enabled, For disk size ≤ 1GB, BIOS uses SectorsPerTrack = 32, TotalHeads = 64. For disk size > 1GB, BIOS uses SectorsPerTrack = 63, TotalHeads = 255.

IV. BIOS SOFTWARE

Support for Disks > 1 GB

Press [Space] to toggle between Yes or No.

Support for 3 Disks or More (MS-DOS v5.0 or above)

Don't set this option to "Yes" for MS-DOS versions earlier than 5.0, which only supports up to 2 disks.

Support for NOT-ZERO SCSI LUN

Set this option to "Yes", if you want the BIOS to support all SCSI Target LUNs, 0 to 7.

Configure BIOS Devices

Logical Device SCSI ID	#0	#1	#2	#3	#4	#5	#6	#7
Scanned By BIOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Logical Device SCSI ID	#8	#9	#10	#11	#12	#13	#14	#15
Scanned By BIOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

If this option is selected, a status list of SCSI device scanned by BIOS at BIOS initialization will appear. If a SCSI device is not scanned by BIOS, then it will not be installed by BIOS.

Configure Card

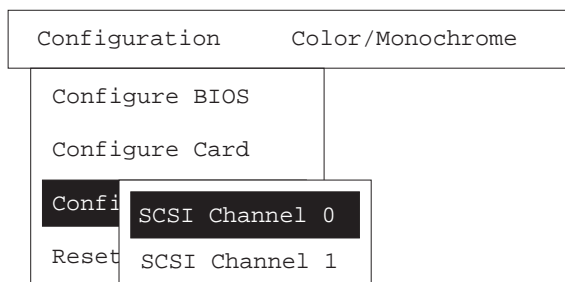
ISA Emulation Mode IO Port Address	Disabled
Disk Access Delay on Power-up (Sec)	15

You can select an IO Port address by pressing **[Enter]**.

NOTE: If you want to use the device driver provided by ASUS, you **MUST** set the I/O port address to *Disabled*.

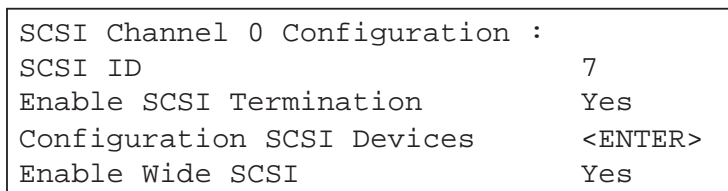
IV. BIOS SOFTWARE

Configure SCSI



If this option is selected, a list of physical SCSI channels will appear.

Select a SCSI channel that you want to configure, then a new dialog box of SCSI Channel Configuration will appear.



SCSI ID

Use this option to change SCSI ID of SCSI Channel.

Enable SCSI Termination

Use this option to enable/disable SCSI termination.

Configure SCSI Devices

Use this option to change the low-level SCSI features of SCSI devices.

Device SCSI ID	#0	#1	#2	#3	#4	#5	#6	#7
Sync Transfer Period (4ns)	12	12	12	12	12	12	12	12
Enable SCSI Disconnect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enable SCSI Parity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enable Wide SCSI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Device SCSI ID	#8	#9	#10	#11	#12	#13	#14	#15
Sync Transfer Period (4ns)	12	12	12	12	12	12	12	12
Enable SCSI Disconnect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enable SCSI Parity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enable Wide SCSI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

IV. BIOS SOFTWARE

Refer to *Synchronous Transfer Period* under **V. Appendices of Part I: Hardware Installation** to calculate the transfer clock rate for the transfer period calculation.

Enable Wide SCSI

Use this to enable/disable wide SCSI.

Reset to Defaults

If this option is selected, all the configurations are reset to the factory defaults.

Color/Monochrome

Switches display mode of the utility software between color and monochrome.

V. APPENDICES

Specifications

RAID level	0, 1, 3, 5 (or non-RAID disk spanning)
Operation	Firmware on Flash Memory and DRAM running on 486 CPU
Failure management	Bad sector reassignment, hot-swapping, hot spare drive operation, background rebuilding
Failure indicator	Via Text RAID Manager, GUI RAID Manager and onboard buzzer
Cache size	Up to 64 MB
Host interface	PCI Rev. 2.0
Hard disk interface	Ultra Wide SCSI 2
Hard disk channels	Up to 2
Channel Terminator	Active, software programmable
SCSI protocol	SCSI-1, SCSI-2, Fast Wide SCSI-1 or Fast Wide SCSI-2 (auto-match), Ultra-Wide SCSI-1 or Ultra-Wide SCSI-2
SCSI transfer rate	40MB/sec synchronous 10MB/sec asynchronous
Max. SCSI drives	14
No. of logical drives	8 with different RAID levels
Partitions	8 per logical drive, total of 64
No. of LUNs	8 per channel, total of 64 (dynamic mapping to logical drives or partitions)
Control	Via Text RAID Manager or GUI RAID Manager
SCSI connectors	68-pin header for internal channels, 68-pin High-Density female connector for external channel
SCSI cabling	Single-ended
Voltage	+5 Volts
Current	2 Amp
Operating Temperature	0° to 45° C
Relative Humidity	10–96%, non-condensing
Operating Altitude	Sea level to 3000 m (10,000 ft)
Dimensions	17.5 cm (L) x 10.7 cm (W) (6.87 in x 4.2 in)

V. APPENDICES

Updating BIOS, Firmware, and Boot Record

The BIOS, firmware and boot-record (the section of code that boots the controller and allows for temporary download of firmware) of the ASUS PCI-DA2100 stored in Flash Memory can be updated via Text RAID Manager under DOS. New releases of the BIOS/firmware/boot-record are available on the ASUS BBS and the Internet (see *ASUS Contact Information* on page 3).

To perform the download, the following must be available:

- ASUS PCI-DA2100 plugged into a host PCI slot and properly functioning.
- RAIDMAN.EXE running under DOS.

To perform the download, follow the following procedures:

- 1 Select “Controller Maintenance” under “System Functions” via the Text RAID Manager.
- 2 Select the desired download option. If upgrading both firmware and boot-record, select “Advanced Maintenance Functions” menu item then select “Download Boot Record with Firmware”.
- 3 When the prompt for operation confirmation appears, select” Yes” to confirm.
- 4 When prompted for a filename, enter the name of the file containing the code to be downloaded. If both firmware and boot-record are being downloaded, enter the name of the boot-record file.
- 5 If both firmware and boot-record are being downloaded, when downloading of boot-record is complete, repeat step 4, then, when prompted for a filename, enter the name of firmware file.
- 6 When file transfer is complete, wait for a moment while the ASUS PCI-DA2100 burns the code into the EEPROM-Flash.

IMPORTANT: Be sure to allow the EEPROM-Flash programming (burning) stage to complete. Do not reset or turn off the computer or the controller while EEPROM-Flash programming is in progress. Doing so may result in an unrecoverable error that requires the service of the manufacturer.

V. APPENDICES

SCSI-related Information

The Ultra-Wide SCSI-2 recommendation for a SCSI cable operating at a transfer rate of 20 MB/sec is as follows:

- **Maximum length** 1.5 meters
- **Impedance** Between 90 Ω to 132 Ω
- **Signal Attenuation** 0.095 dB/meter @ 5 MHz (max.)
- **Pair-Pair Propagation Delay Delta** 0.2 ns/meter (max.)
- **DC Resistance** 0.23 Ω /meter @ 20° C (max.)

SCSI Standards, Cable Length and Corresponding Maximum Possible Drive Connections

	Single-Ended	Differential	Maximum Drives
SCSI-1	6.0 m	25 m	8
SCSI-2	3.0 m	25 m	8
Wide SCSI-2	3.0 m	25 m	16
Ultra SCSI-2	1.5 m	25 m	8
Ultra SCSI-2	3.0 m	–	4
Ultra Wide SCSI-2	–	25 m	16
Ultra Wide SCSI-2	1.5 m	–	8
Ultra Wide SCSI-2	3.0 m	–	4

SCSI Bus Width and Maximum Throughput

	Bus Width	SCSI Bus Sync. Frequency	Max. Bus Throughput	SCSI ID Up to
SCSI-1	8-bit	Asynchronous	5 MB/Sec	7
(Fast) SCSI-2	8-bit	10 Mhz	10 MB/Sec	7
(Fast) Wide SCSI-2	16-bit	10 Mhz	20 MB/Sec	15
Ultra SCSI-2	8-bit	20 Mhz	20 MB/Sec	7
Ultra Wide SCSI-2	16-bit	20 Mhz	40 MB/Sec	15

V. APPENDICES

Synchronous Transfer Period

In the Text RAID Manager or in the SCSI ROM BIOS settings, when changing the SCSI Synchronous Transfer Period of each SCSI target, it is a low-level control to the SCSI controller chip, there is no options selectable, only the Synchronous Transfer Period is available in this field.

To calculate the Synchronous Transfer Period, refer to the “Sample equation” to get the correct Synchronous Transfer Period.

Sample equation:

$$\frac{1}{208\text{Mhz} \times 4\text{ns}} = \frac{1}{208 \times 10^6 \times 4 \times 10^9} = 12$$

$$\frac{1}{12 \times 4\text{ns}} = \frac{1}{12 \times 4 \times 10^9} = 208\text{Mhz}$$

In this example, where “20.8Mhz” is called the Synchronous Clock Frequency, “12” is called the Synchronous Transfer Period.

Synchronous Transfer Period	Synchronous Clock Frequency	Synchronous Transfer Period	Synchronous Clock Frequency
12	20.8	62	4.0
15	16.6	75	3.3
18	13.8	88	2.8
25	10.0	100	2.5
31	8.0	110	2.2
37	6.7	120	2.0
43	5.8	135	1.8
50	5.0	0	Asynchronous

V. APPENDICES

Troubleshooting

This section is a checklist of problems commonly encountered during installation. For failures that occur during operation, refer to the section on “Disk Failure Management.”

Problem	Check
7-segment is off or not flashing	<ol style="list-style-type: none">1. PCI slot contact quality.2. Minimum of 4MB DRAM SIMM installed.
SCSI channel failure detected upon start-up with SCSI cables connected Buzzer continuously beeps	<ol style="list-style-type: none">1. ID numbers (must be unique for each device on the same SCSI channel).2. Terminators are properly installed.3. Check the voltage output of the power supply.
Initialization failure	<ol style="list-style-type: none">1. ID numbers (must be unique for each device on the same SCSI channel).2. Terminators are properly installed.
Cannot detect SCSI drive	<ol style="list-style-type: none">1. Drive power connections.2. Drive SCSI cable connections.3. ID numbers (must be unique for each device on the same SCSI channel).
BIOS displays “No Disk Installed by BIOS!”	<ol style="list-style-type: none">1. This error does not indicate that the controller cannot detect the hard disks.2. Has the logical drive been created?3. Has the logical drive been mapped to a SCSI ID?
BIOS shows no drive connection	<ol style="list-style-type: none">1. SCSI port to LUN assignment.2. Logical drive mapping to LUN.
Parity error detected	<ol style="list-style-type: none">1. DRAM SIMM should be replaced.
Logical drive failure detected during boot-up	<ol style="list-style-type: none">1. Proper installation or connection of one or more of the drives (use <i>View And Edit SCSI Drives</i> to help locate the problem).

V. APPENDICES

Problem	Check
System is not stable after running a period of time	<ol style="list-style-type: none"> 1. SCSI cable must be shorter than 3 meters. 2. Terminators are properly installed. 3. Power supply voltage is within the specifications. 4. Enclosure inner temperature.
When using <i>Scan New SCSI Drive</i> , if the desired ID is empty, an empty drive entry appears.	<ol style="list-style-type: none"> 1. See <i>Scan New SCSI Drives</i> under II. Text RAID Manager of Part II: Management Utilities.
The logical drive states “INVALID”	<ol style="list-style-type: none"> 1. The “Optimization for... I/O” in the Caching Parameters (under <i>View And Edit Configuration Parameters</i>) when creating the logical drive is different from the current setting. 2. Change the “Optimization for... I/O” to the opposite setting and reset the controller.
In <i>View And Edit SCSI Logical Drives</i> or <i>View And Edit SCSI Channels</i> , the speed states “20.8MHz”, not “40MHz”	<ol style="list-style-type: none"> 1. The “20.8MHz” is SCSI sync frequency, not transfer rate. 2. See <i>SCSI-related Information</i> under V. Appendices of Part I: Hardware Installation.

ASUS® PCI-DA2100
PCI-to-SCSI RAID Controller

PART II
**MANAGEMENT
UTILITIES**



I. INTRODUCTION

About this Section

This section of the manual describes the installation and use of the management utilities for the ASUS PCI-DA2100, which is the product model name for the PCI-to-SCSI RAID controller from ASUS.

ASUS provides two easy-to-use interfaces to control and manage your disk array systems incorporating the ASUS PCI-DA2100.

Overview

- **Text RAID Manager**
Provides information about the Text RAID Manager menu-driven system, installation, basic operations, array management, and terminal operation command summary.
- **GUI RAID Manager**
Provides information about the GUI RAID Manager, installation, basic operations, array management, notification configuration, demo mode, command summary, and troubleshooting.

II. TEXT RAID MANAGER

Introduction

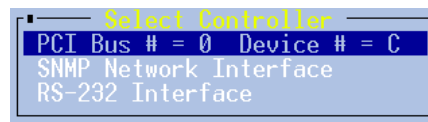
The Text RAID Manager utility, RAIDMAN.EXE, provides a user-friendly menu-driven system for configuring and managing the ASUS PCI-DA2100 RAID Controller. RAIDMAN.EXE can be run under DOS, NetWare, Windows 95, and Windows NT.

NOTE: Depending on your system configuration, the screen displays on this manual may be different from your system.

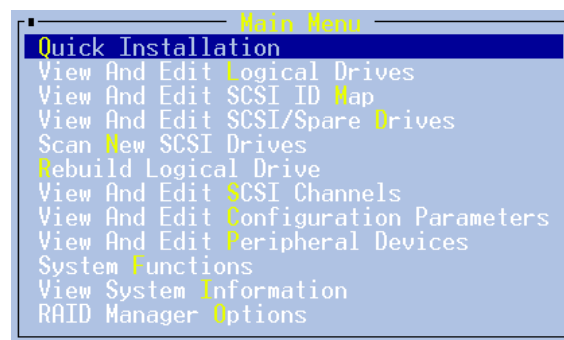
Starting the Text RAID Manager

On execution of RAIDMAN.EXE under DOS, the screen will display a list of target controllers. Use the ↑↓ keys to position the cursor over the desired controller and press **[Enter]** to select it.

NOTE: The RS-232 Interface selection requires an RS-232 port. Thus this selection cannot be used on the ASUS PCI-DA2100, which does not have an RS-232 port on board.



The Main Menu will now be displayed.



II. TEXT RAID MANAGER

The keys used in the Text RAID Manager are as follows:

<ARROW KEY>: move cursor, <ENTER>: select, <ESC>: exit, <F2>: Toggle Display

<ARROW KEY> Left ←, right →, up ↑ and down ↓ arrow keys to select options.

[Enter] To go into a submenu or to execute an option.

[Esc] To exit or escape and go back to the preceding menu.

[F2] To toggle display color.

[Ctrl-l] To refresh terminal screen.

NOTE: If the password feature is enabled, you will be prompted to enter the password before commands that affect configuration or operation are executed.

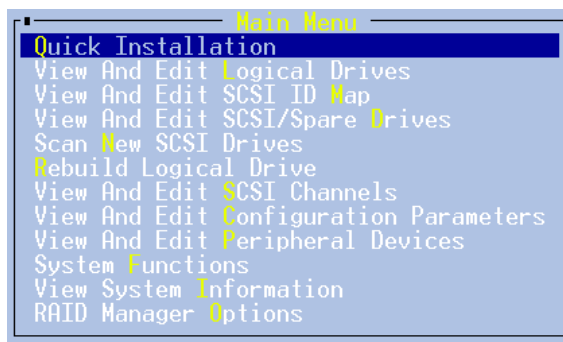
II. TEXT RAID MANAGER

Quick Installation

New RAID System Initialization

NOTE: A “Logical Drive” is a set of drives grouped together to operate under a given RAID level and appears as a single contiguous drive. The ASUS PCI-DA2100 RAID controller is capable of grouping connected drives into as many as 8 logical drives, each configured to the same or different RAID levels. A logical drive can be further divided into a maximum of 8 partitions. During operation, the host sees an unpartitioned logical drive or a partition of a partitioned logical drive as one single contiguous drive.

- 1 Go to Main Menu.

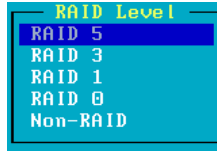


- 2 Type **Q** or use the $\uparrow\downarrow$ keys to select “Quick Installation” and press **[Enter]**.

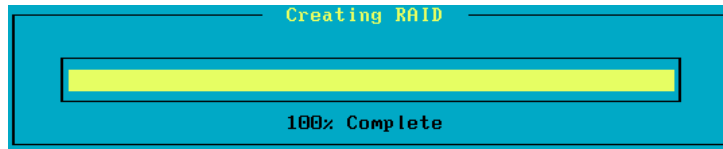
NOTE: “Quick Installation” will (1) create a logical drive using free drives and (2) map the logical drive to SCSI 0 LUN 0. If no free drives exist, “Logical drive already exists!” will appear. See “Maintaining an Existing Logical Drive” for reassignment of current drives.

II. TEXT RAID MANAGER

- 3 Use the ↑↓ keys to select a RAID level and press **[Enter]**. (See *I. Raid Management* under **Part IV: Appendices** for a functional description of the different RAID levels.)



- 4 If a fault-tolerant RAID level has been selected, drive parity initialization will be performed at this point. A progress indicator similar to the one shown below will be displayed. When initialization is complete, the controller will automatically map the entire capacity of the logical drive to SCSI ID 0 LUN 0.

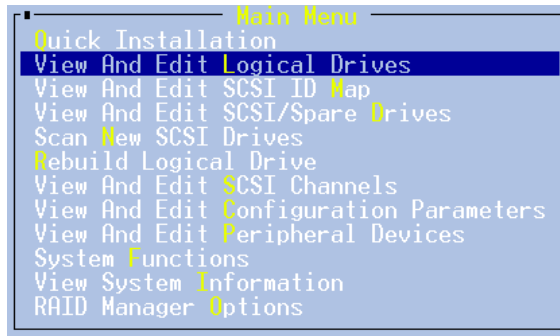


II. TEXT RAID MANAGER

View And Edit Logical Drives

Creating A New Logical Drive

- 1 Go to Main Menu.



- 2 Type **L** or use the $\uparrow\downarrow$ keys to select “View And Edit Logical Drives” and press **[Enter]**.
- 3 The screen will display the current Array configuration and status.

LG	RAID	Size(MB)	Status	#OnLine	#STB	#Fail
0	RAID5	13018	GOOD	4	0	0
1	NONE					
2	NONE					
3	NONE					
4	NONE					
5	NONE					
6	NONE					
7	NONE					

- 4 Select a logical drive number which has not yet been defined by typing the logical drive number or using the $\uparrow\downarrow$ keys to select the choice and press **[Enter]**. A prompt “Create Logical Drive?” will appear.



- 5 To confirm creation of a new logical drive, type **Y** or use the $\leftarrow\rightarrow$ to select “Yes” and press **[Enter]**.
- 6 A list of supported RAID level will appear. Chose a level by typing **5, 3, 1, 0** or **N** or use the $\uparrow\downarrow$ keys to select a level and press **[Enter]**.

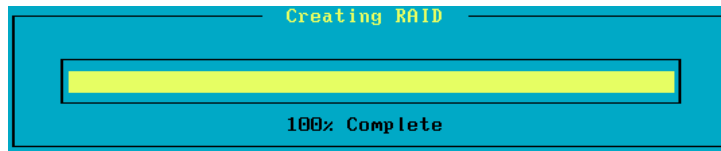


II. TEXT RAID MANAGER

- 7 A list of available drive will appear. Mark (*) the drives to be included in the current logical drive by using the $\uparrow\downarrow$ to select the drive and pressing **[Enter]**.

Slot	Chl	ID	Size(MB)	Speed	SCSI Drive LG DRV	Status	Vendor and Product ID
0	1	0	4339	41 MB	XX	USED-DRV	SEAGATE ST34501W
0	1	1	4339	41 MB	XX	USED-DRV	SEAGATE ST34501W
0	1	2	4339	41 MB	XX	USED-DRV	SEAGATE ST34501W
0	1	3	4339	41 MB	XX	USED-DRV	SEAGATE ST34501W

- 8 Press **[Esc]** after selecting the drives and if a fault-tolerant RAID level (1,3 or 5) has been selected, the controller will start parity initialization. A progress indicator similar to the one shown below will be displayed. When initialization has finished, logical drive creation is complete.

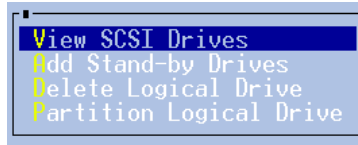


- 9 At this point, the logical drive has been partitioned into a single partition covering the entire drive capacity and is inaccessible to the host.
- 10 If different partitioning is desired, select “**Partition Logical Drive**” to do the partitioning (see the subsection on “**Partition Logical Drive**” under the next section, “**Maintaining an Existing Logical Drive**”).
- 11 When the Logical Drive is properly partitioned, select “**View And Edit SCSI ID Map**” to map the Logical Drive Partitions to LUNs (see the section on “**View And Edit SCSI ID Map**”).

II. TEXT RAID MANAGER

Maintaining an Existing Logical Drive

In step 4 of the “Creating A New Logical Drive” section, if you select an existing logical drive, then the following menu will appear on the screen:



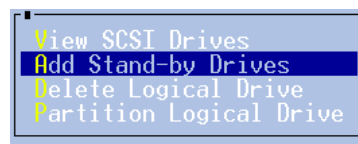
View SCSI Drives

- 1 Type **V** or use the $\uparrow\downarrow$ keys to select “View SCSI Drives” and press **[Enter]**.
- 2 The screen will display all the drives currently assigned to the logical drive as follows:

Slot	Chl	ID	Size(MB)	Speed	LG DRV	Status	Vendor and Product ID
0	1	0	4339	41 MB	0	ON-LINE	SEAGATE ST34501W
0	1	1	4339	41 MB	0	ON-LINE	SEAGATE ST34501W
0	1	2	4339	41 MB	0	ON-LINE	SEAGATE ST34501W
0	1	3	4339	41 MB	0	ON-LINE	SEAGATE ST34501W

Add Stand-By Drives

- 1 Type **A** or use the $\uparrow\downarrow$ keys to select “Add Stand-by Drives” and press **[Enter]**.



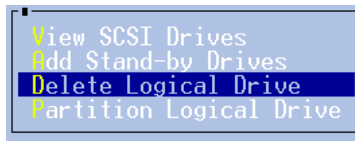
- 2 A list of available drives will appear. Use the $\uparrow\downarrow$ to select the drive and press **[Enter]**.
- 3 The screen will redisplay the logical drive information indicating a spare drive has been assigned.

NOTE: Drives cannot be added or removed from existing logical drives. Free drives can only be added as “stand-by drives.” The logical drives have to be deleted to make a drive free.

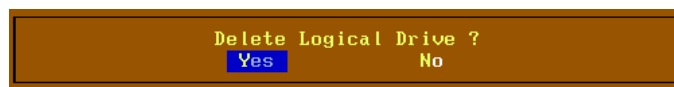
II. TEXT RAID MANAGER

Delete Logical Drive

- 1 Type **D** or use the $\uparrow\downarrow$ keys to select “Delete Logical Drive” and press **[Enter]**.



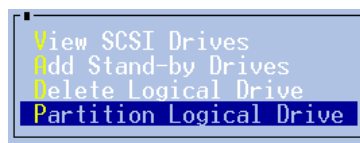
- 2 When the following prompt appears, type **Y** to confirm deletion or use the $\leftarrow\rightarrow$ to select “Yes” and press **[Enter]**.



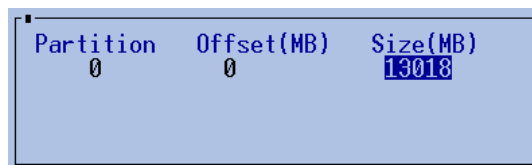
WARNING! All data on the logical drive will be lost when you confirm the deletion.

Partition Logical Drive

- 1 Type **P** or use the $\uparrow\downarrow$ keys to select “Partition Logical Drive” and press **[Enter]**.



- 2 The screen will display a partition table of up to 8 partitions with the last partition selected. Press the **[Enter]** key and type the desired size for the selected partition followed by **[Enter]**. The remaining size will be allotted to the next partition as displayed.



Partition	Offset(MB)	Size(MB)
0	0	13018

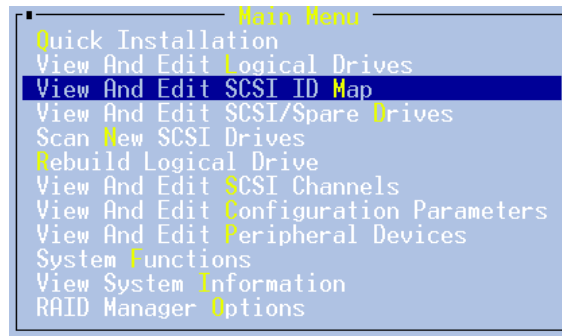
- 3 Repeat Step 2 for all the other partitions to be created.

II. TEXT RAID MANAGER

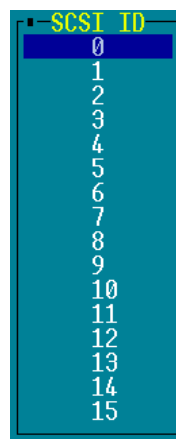
View And Edit SCSI ID Map

NOTE: Mapping a SCSI ID allows the BIOS to see the logical drive as a unique SCSI ID.

- 1 Go to Main Menu.



- 2 Type **M** or use the \uparrow \downarrow keys to select “View And Edit SCSI ID Map”.
- 3 A list of host SCSI-IDs will be displayed similar to the following:



Type or use the \uparrow \downarrow keys to select the SCSI ID to be mapped/unmapped and press **[Enter]**

II. TEXT RAID MANAGER

- 4 A list of LUNs and their respective mapping will be displayed similar to the following:

LUN	LG_DRV	SCSI ID	Partition	Size(MB)	RAID
0	0	0	0	13018	RAID5
1					
2					
3					
4					
5					
6					
7					

- 5 To map a LUN to a Logical Drive partition, select an available LUN (one not already mapped) and type the number of the selected LUN or use the \uparrow \downarrow keys to select the desired LUN and type **[Enter]**

- 5.1 A list of available logical drives will be displayed similar to the following. Select a Logical Drive by typing the Logical Drive number or using the \uparrow \downarrow keys to select the choice and press **[Enter]**

LG	RAID	Size(MB)	Logical Drive	Status	#OnLine	#STB	#Fail
0	RAID5	13018		GOOD	4	0	0

- 5.2 If the Logical Drive has been partitioned into multiple partitions, a list of partitions will be displayed similar to the following:

Partition	Offset(MB)	Size(MB)
0	0	13018

Use the \uparrow \downarrow keys to select a partition number and press **[Enter]**

- 5.3 At the following prompt, type **Y** to confirm the mapping operation or use the \leftarrow \rightarrow keys to select “Yes” and press **[Enter]**.

```
Map Logical Drive 0 Partition 0 to ID 0 Lun 1 ?
  Yes                               No
```

- 6 To delete a host LUN mapping, use the \uparrow \downarrow keys to select the desired LUN and type **[Enter]**.

- 6.1 At a prompt for confirmation similar to the following, type **Y** or use \uparrow \downarrow keys to select “Yes” and press **[Enter]**.

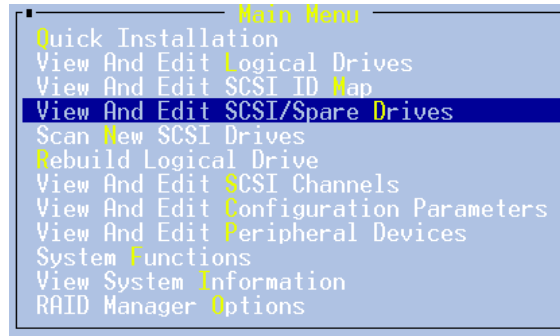
```
Delete Host LUN ?
  Yes                               No
```

NOTE: Deleting the ID map does not delete the data in the logical drive but a new SCSI ID must be assigned for the logical disk drive to be usable.

II. TEXT RAID MANAGER

View And Edit SCSI/Spare Drives

- 1 Go to Main Menu.



- 2 Type **D** or use the \uparrow \downarrow keys to select “View And Edit SCSI/Spare **D**rives” and press **[Enter]**. The screen will display all drives assigned to the logical drive.

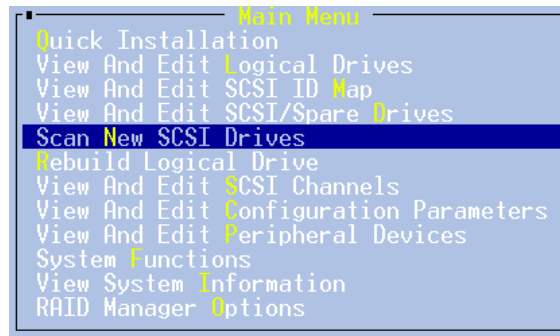
Slot	Chl	ID	Size(MB)	Speed	LG DRV	Status	Vendor and Product ID
0	1	0	4339	41 MB	0	ON-LINE	SEAGATE ST34501W
0	1	1	4339	41 MB	0	ON-LINE	SEAGATE ST34501W
0	1	2	4339	41 MB	0	ON-LINE	SEAGATE ST34501W
0	1	3	4339	41 MB	0	ON-LINE	SEAGATE ST34501W

II. TEXT RAID MANAGER

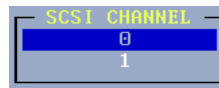
Scan New SCSI Drives

NOTE: This is necessary only if a drive was not automatically detected due to a slow start-up or insertion of drives.

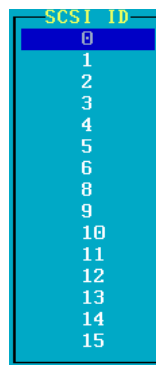
- 1 Go to Main Menu.



- 2 Type **N** or use the \uparrow \downarrow keys to select “Scan New SCSI Drives” and press **[Enter]**.
- 3 Use the \uparrow \downarrow keys to select the SCSI channel where the new drive is installed and press **[Enter]**.



- 4 Use the \uparrow \downarrow keys to select the SCSI ID number (only available IDs will be displayed) of the new drive and press **[Enter]**.

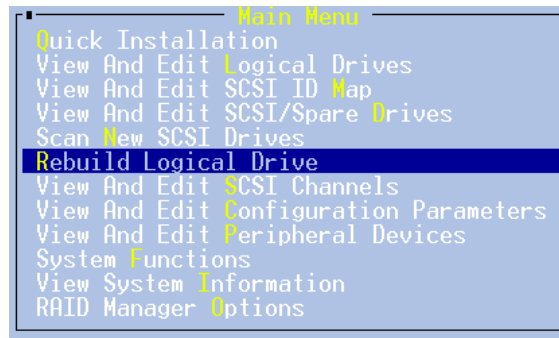


II. TEXT RAID MANAGER

Rebuild Logical Drive


NOTE: This step is necessary if the logical drive was damaged due to a failed disk drive.

- 1 Go to Main Menu.



NOTE: Replace the bad drive or add a stand-by drive for the rebuilding to function.

- 2 Type **R** or use the \uparrow \downarrow keys to select “**Rebuild Logical Drive**” and press **[Enter]**.
- 3 The controller will check for a spare drive and display the failed drive information.
- 4 To initiate rebuilding, press **Y** or use the \leftarrow \rightarrow keys to select “**Yes**” and press **[Enter]**.
- 5 Rebuilding for any other logical drives that needs rebuilding will continue. Otherwise, the following message will appear:

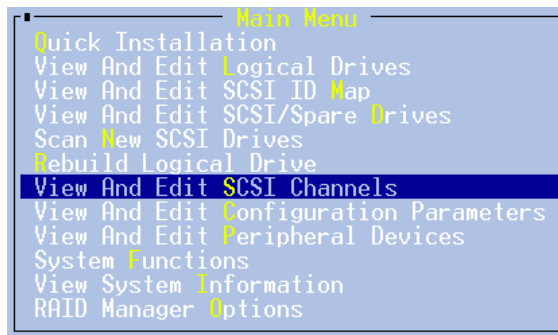


No Failed Logical Drive Found !

II. TEXT RAID MANAGER

View And Edit SCSI Channels

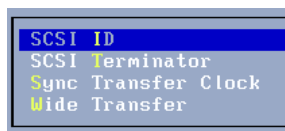
- 1 Go to Main Menu.



- 2 Type **S** or use the \uparrow \downarrow keys to select “View And Edit SCSI Channels” and press **[Enter]**.
- 3 Use the \uparrow \downarrow keys to select a channel and press **[Enter]**.

Chl	ID	DefSyncClk	DefWid	Terminator	CurSyncClk	CurWid
0	7	20.8 MHz	Narrow	On	10.0 MHz	Narrow
1	7	20.8 MHz	Wide	On	20.8 MHz	Wide

The screen will now show the following menu:



SCSI ID

- 1 To change the SCSI ID, type **I** or use the \uparrow \downarrow keys to select “SCSI ID” and press **[Enter]**.
- 2 Use the \uparrow \downarrow keys to select the SCSI ID number and press **[Enter]**.



II. TEXT RAID MANAGER

- 3 When the following prompt appears, type “Y” to confirm or use the ← → keys to select “Yes” and press [Enter].



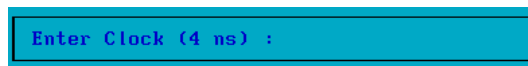
SCSI Terminator

- 1 To enable or disable a SCSI channel's active termination, type **T** or use the ↑ ↓ keys to select “SCSI Terminator” and press [Enter].
- 2 Type **Y** or use the ← → keys to select “Yes” and press [Enter] to toggle the channel termination function.



Synch Transfer Clock

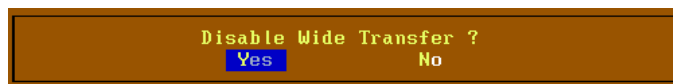
- 1 To change the default (4 ns) synchronous transfer clock rate that is negotiated by the ASUS PCI-DA2100, type **S** or use the ↑ ↓ keys to select “Sync Transfer Clock” and press [Enter].
- 2 Type the desired clock rate. (See *Synchronous Transfer Period* under **V. Appendices of Part I: Hardware Installation.**)



Wide Transfer

This function serves to enable or disable wide transfer for the SCSI bus.

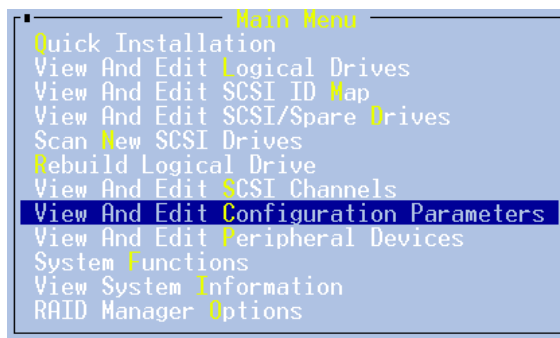
- 1 Type **W** or use the ↑ ↓ keys to select “Wide Transfer” and press [Enter].
- 2 Type **Y** or use the ← → keys to select “Yes” and press [Enter] to disable the Wide transfer.



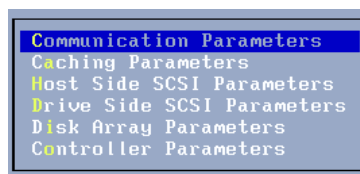
II. TEXT RAID MANAGER

View And Edit Configuration Parameters

- 1 Go to Main Menu.

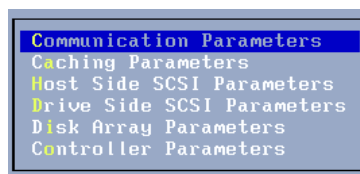


- 2 Type **C** or use the \uparrow \downarrow keys to select “View And Edit Configuration Parameters” and press [**Enter**]. The screen will display the following menu:

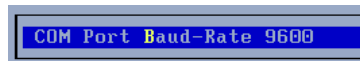


Communication Parameters

- 1 To modify the baud rate used for the RS-232 Terminal Interface Operation, type **C** or use the \uparrow \downarrow keys to select “Communication Parameters” and press [**Enter**].



- 2 Press [**Enter**] or type **B** to select “COM Port Baud-Rate”.

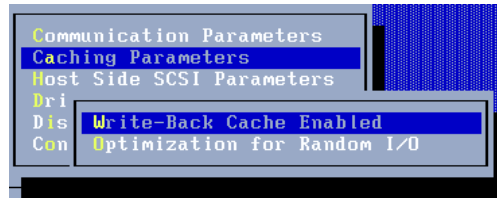


- 3 Type the initial unit (highlighted, for example, “9” for 9600 or “3” for 38400) or use the \uparrow \downarrow keys to select the desired baud rate and press [**Enter**].
- 4 When prompted, type **Y** to confirm the change in the setting or use the \leftarrow \rightarrow keys to select “Yes” and press [**Enter**].

II. TEXT RAID MANAGER

Caching Parameters

- 1 To modify the cache parameters, type **a** or use the $\uparrow \downarrow$ keys to select “Caching Parameters” and press **[Enter]**. The screen will display the following menu:



Write-Back Cache

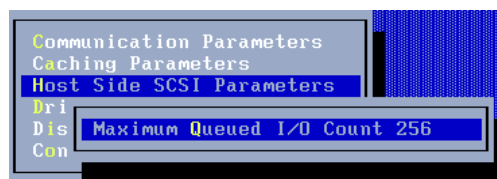
- 1 To toggle the Write-Back Cache setting, type **W** or use the $\uparrow \downarrow$ keys to select “Write Back Cache” and press **[Enter]**.
- 2 When the corresponding prompt is displayed, type **Y** to confirm the change in setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]** to enable data write-back caching or vice versa.

Optimization for Random I/O

- 1 To toggle between the Optimization for Random or Sequential I/O setting, type **O** or use the $\uparrow \downarrow$ keys to select desired setting and press **[Enter]**.
- 2 When the corresponding prompt is displayed, type **Y** to confirm the change in setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]** to enable optimization for either random or sequential I/O.

Host Side SCSI Parameters

- 1 To set host side SCSI parameters, type **H** or use the $\uparrow \downarrow$ keys to select “Host Side SCSI Parameters” and press **[Enter]**. The screen will display the following menu:



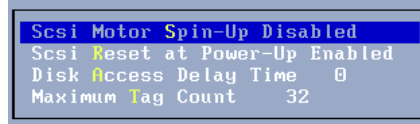
Maximum Queued I/O Count

- 1 To set the maximum queued I/O count, type **Q** and press **[Enter]** or just press **[Enter]** to select “Maximum Queued I/O Count”.
- 2 Type or use the $\uparrow \downarrow$ keys to select the desired count and press **[Enter]**.
- 3 When prompted, type **Y** to confirm the change in the setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]**.

II. TEXT RAID MANAGER

Drive Side SCSI Parameters

- 1 To modify the drive side SCSI parameters, type **D** or use the $\uparrow \downarrow$ keys to select “Drive Side SCSI Parameters” and press **[Enter]**. The screen will display the following menu:



SCSI Motor Spin-Up

This option determines whether or not the ASUS PCI-DA2000 Series sequences the drives to start spinning in succession at five second intervals. Enabling such sequencing can help to prevent overloading the power supply when several drives spin up at the same time.

- 1 To toggle the current setting Use the $\uparrow \downarrow$ keys to select “SCSI Motor Spin-Up” and press **[Enter]**.
- 2 When the corresponding prompt is displayed, type **Y** to confirm the change in setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]** to enable sequential motor spin-up.

SCSI Reset At Power-Up

This option determines whether or not the ASUS PCI-DA2000 Series asserts SCSI bus reset during power-up initialization.

- 1 To toggle the setting use the $\uparrow \downarrow$ keys to select “SCSI Reset At Power-Up” and press **[Enter]**.
- 2 When the corresponding prompt is displayed, type **Y** to confirm the change in setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]** to enable power-up reset.

Disk Access Delay Time

- 1 To set the disk access delay time, type **A** and press **[Enter]** or use the $\uparrow \downarrow$ keys to select “Disk Access Delay Time”.
- 2 Type or use the $\uparrow \downarrow$ keys to select the desired time and press **[Enter]**.
- 3 When prompted, type **Y** to confirm the change in the setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]**.

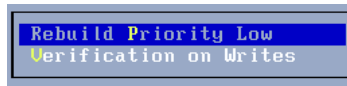
II. TEXT RAID MANAGER

Maximum Tag Count

- 1 To set the maximum tag count, type **T** and press **[Enter]** or use the $\uparrow \downarrow$ keys to select “Maximum Tag Count”.
- 2 Type or use the $\uparrow \downarrow$ keys to select the desired count and press **[Enter]**.
- 3 When prompted, type **Y** to confirm the change in the setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]**.

Disk Array Parameters

- 1 To modify the disk array parameters, type **i** or use the $\uparrow \downarrow$ keys to select “Disk Array Parameters” and press **[Enter]**. The screen will display the following menu:



Rebuild Priority

- 1 To change the rebuild priority setting, type **P** and press **[Enter]** or use the $\uparrow \downarrow$ keys to select “Rebuild Priority”.
- 2 Type or use the $\uparrow \downarrow$ keys to select the desired setting and press **[Enter]**.
- 3 When prompted, type **Y** to confirm the change in the setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]**.

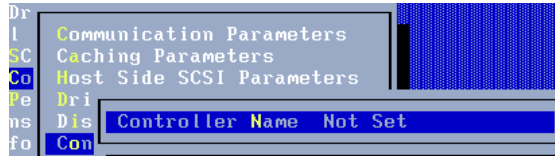
Verification on Writes

- 1 To change the verification on writes setting, type **V** and press **[Enter]** or use the $\uparrow \downarrow$ keys to select “Verification on Writes”.
- 2 Type or use the $\uparrow \downarrow$ keys to select and enable or disable the desired verification mode (Verification on LD Initialization Writes, Verification on LD Rebuild Writes, Verification on LD Normal Drive Writes, Verification Write Data with Reads) and press **[Enter]**.
- 3 When prompted, type **Y** to confirm the change in the setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]**.

II. TEXT RAID MANAGER

Controller Parameters

- 1 To modify the controller parameters, type **o** or use the $\uparrow \downarrow$ keys to select “Controller Parameters” and press **[Enter]**. The screen will display the set controller name, otherwise it will display the following menu:



Controller Name

- 1 To change the controller name, type **N** and press **[Enter]** or use the $\uparrow \downarrow$ keys to select “Controller Name”.
- 2 Type new or desired name and press **[Enter]**.
- 3 When prompted, type **Y** to confirm the change in the setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]**.

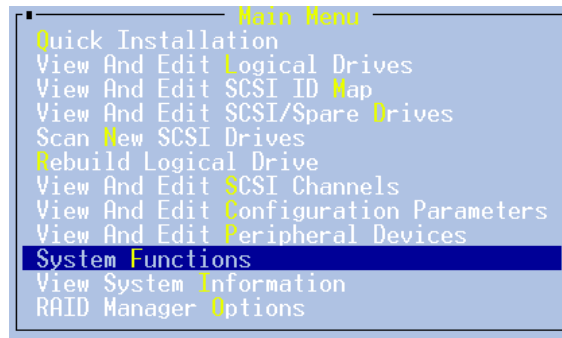
View And Edit Peripheral Devices

NOTE: This feature is not supported

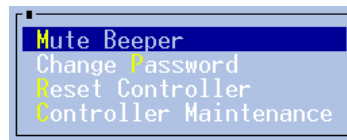
II. TEXT RAID MANAGER

System Functions

- 1 Go to Main Menu.



- 2 Type **F** or use the \uparrow \downarrow keys to select “System Functions” and press **[Enter]**.
- 3 The screen will display the following menu:



Mute Beeper

- 1 To disable the beeper setting, type **M** or use the \uparrow \downarrow keys to select “Mute Beeper” and press **[Enter]**.
- 2 When the corresponding prompt is displayed, type **Y** to confirm the change or use the \leftarrow \rightarrow keys to select “Yes” and press **[Enter]** to disable beeper.

Change Password

- 1 To set or change the password, type **P** or use the \uparrow \downarrow keys to select “Change Password” and press **[Enter]**.
- 2 If a password was set previously, you will be prompted to enter the old password. Type the old password and press **[Enter]**.
- 3 A prompt to enter a new password will appear. Type the new password followed by **[Enter]**. You will be prompted to enter the new password twice.
- 4 When the prompt to enter the new password a second time appears, type the new password followed by **[Enter]** again.

II. TEXT RAID MANAGER

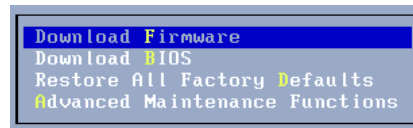
Reset Controller

- 1 To reset the controller, type **R** or use the $\uparrow \downarrow$ keys to select “**R**eset Controller” and press [**Enter**].
- 2 When the corresponding prompt appears, type **Y** to confirm reset or use the $\leftarrow \rightarrow$ keys to select “**Y**es” and press [**Enter**].

Controller Maintenance

This menu item includes maintenance functions such as new firmware on BIOS downloading,

- 1 Use the $\uparrow \downarrow$ keys to select “**C**ontroller Maintenance” and press [**Enter**]. The following submenu will be displayed:



- 2 Use the $\uparrow \downarrow$ keys to select the desired function and press [**Enter**].
- 3 A prompt for confirmation similar to the following will be displayed. Type **Y** to confirm or use $\leftarrow \rightarrow$ keys to select “**Y**es” and press [**Enter**].

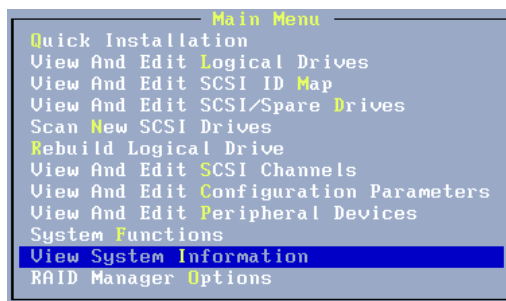


- 4 With the other submenus, such as “**A**dvanced Maintenance Functions”, a filename may be required. In this case, type the filename to be downloaded and the full path or location of the drivers and press [**Enter**].

II. TEXT RAID MANAGER

View System Information

- 1 Go to Main Menu.



- 2 Type **I** or use the \uparrow \downarrow keys to select “View System Information” and press **[Enter]**.
- 3 The screen will display information about your system, similar to the following:

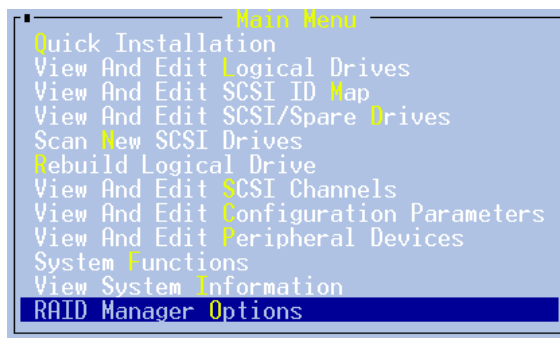
CPU Type	486DX2-66
Total Cache Size	8MB EDORAM
Firmware Version	1.22K
Boot Record Version	1.11
Serial Number	65401
Battery Backup	Not Supported

NOTE: The information displayed — **CPU Type**, **Total Cache Size**, **Firmware Version**, **Boot Record Version**, **Serial Number**, and **Battery Backup** — are not user-configurable.

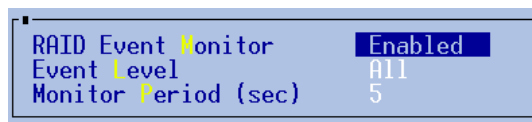
II. TEXT RAID MANAGER

RAID Manager Options

- 1 Go to Main Menu.



- 2 Type **O** or use the $\uparrow \downarrow$ keys to select “RAID Manager Options” and press **[Enter]**.
- 3 The screen will display options to manage your disk array systems, similar to the following:



RAID Event Monitor

- 1 To toggle the setting, type **M** or use the $\uparrow \downarrow$ keys to select “RAID Event Monitor” and press **[Enter]**.
- 2 When the corresponding prompt is displayed, type **Y** to confirm the change in setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]** to enable or disable monitoring of RAID events.

Event Level

- 1 To toggle the setting, type **L** or use the $\uparrow \downarrow$ keys to select “Event Level” and press **[Enter]**.
- 2 Use the $\uparrow \downarrow$ keys to select the desired event level (All, Warning, and Alert) and press **[Enter]**.
- 3 When prompted, type **Y** to confirm the change in the setting or use the $\leftarrow \rightarrow$ keys to select “Yes” and press **[Enter]**.

II. TEXT RAID MANAGER

Monitor Period (sec)

- 1 To change the monitoring period, type **P** or use the \uparrow \downarrow keys to select “Monitor Period” and press [**Enter**].
- 2 When prompted, enter a new value, in seconds, and press [**Enter**].

III. GUI RAID MANAGER

Introduction

The GUI RAID Manager allows you to control and monitor disk array systems, using an easy-to-use graphical interface.

System Description

The GUI RAID Manager is a Windows-based program specifically designed for use in managing disk array systems implemented using any of the ASUS line of PCI-to-SCSI controllers. The GUI RAID Manager provides a user-friendly graphical interface that facilitates understanding of the relationship between disk array elements and simplifies the normally complicated process of array configuration. The GUI RAID Manager also provides real-time reporting on the status of the entire array, thus making the task of monitoring disk arrays virtually effortless.

The GUI RAID Manager complements the text-based RAID Managers providing the same functionality, but with greater ease of use.

Feature Summary

- User-friendly graphical interface running under Windows NT or Windows 95.
- Supports the new line of ASUS PCI-to-SCSI RAID controllers.
- Communicates with the controllers via the Local Area Network (LAN), telephone line, Internet, or PCI bus (PCI-to-SCSI controllers only).
- Supports multiple instances of RAID managers over the network, allowing multiple management sessions with a disk array system.
- Illustrates graphically and clearly the relationship between disk array elements.
- At-a-glance monitoring of the entire disk array status.
- Supports remote management over the network of host/agent running Windows NT or Windows 95 via the Simple Network Management Protocol (SNMP).
- Provides standard disk array functions, including examining and modifying controller configuration; viewing and monitoring configuration and status of physical drives; scanning in new physical drives; creating, deleting, and monitoring configuration and status of logical drives; rebuilding logical drives; defining spare drives; creating, deleting, and partitioning logical volumes; and mapping logical volume partitions to specific host channels/LUNs.
- Enclosure management functions, including defining multiple customizable enclosures, dimensions, and number of drives; monitoring physical drives, power supply, fan, and temperature status; displaying relative location of failed physical drives for reduced risk of replacing the wrong drives.

III. GUI RAID MANAGER

- Provides a log file for logging in various event occurrences, including the time when an event occurs, event severity, and event description; log file can be accessed using any text editor program.
- Supports statistics monitoring for displaying I/O throughput history.
- Provides innovative, user-configurable event notification functions.
 - Configurable severity level qualifying the event severity that will initiate the selected notification sequence
 - Configurable latency time between event occurrence and notification sequence initiation provides local administrator the option to abort issuance of the notification sequence
 - Pager/telephone notification via a local modem
 - Provides user-configurable address book for keeping names and numbers to be paged/called, and message to be sent.
 - Optional notification retransmission until addressee responds locally at the console or remotely over the LAN, Internet, or modem.
 - Configurable latency time between notification retransmission; can be set to different values at different times of the day.
 - E-Mail notification via the MAPI service of Windows NT or Windows 95
 - Provides user-configurable address book for keeping names, E-mail addresses, and messages to be sent.
 - Broadcast notification over the LAN
 - Provides user-configurable address book containing names/groups and network addresses to which the specified message will be broadcast.
 - Broadcasts user-configurable message along with the event description.
 - Facsimile (FAX) notification via a local FAX/modem
 - Provides user-configurable address book containing names, FAX numbers, and messages to be sent.
 - User-configurable FAX messages sent along with the event description.
 - Automatic message retransmission if previous transmission attempts fail.
- Provides password protection for guarding against unauthorized modification of disk array configuration
- Provides Demo mode for use as a learning tool and for demonstration purposes. You can perform experimentation on various disk array configuration and monitor the performance of the system under such condition.

III. GUI RAID MANAGER

Feature Highlights

Graphical User Interface

The GUI RAID Manager's graphical interface is based on the Windows specifications. It draws symbolic icons representing physical and logical drives, and logical volumes on the screen to identify the current configuration of a disk array system. Pull-down and pop-up menus are used with all command options listed. You just point and click the mouse button to select an icon or command. The program also identifies the current status of various drives by changing the colors of their respective icons.

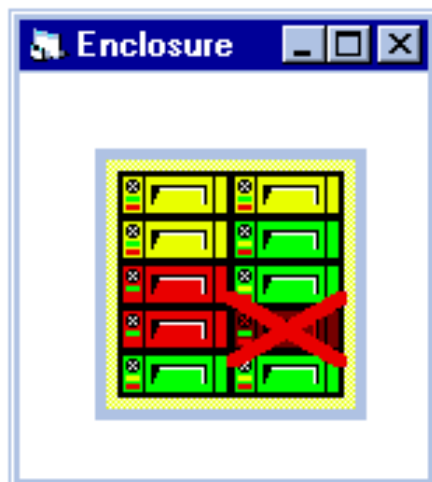
With the Windows interface, complicated disk array operations such as logical drive and logical volume creation, drive partitioning, and drive partition mapping to host channels/LUNs only involve a few mouse clicks.

Enclosure Management

The GUI RAID Manager provides a window dedicated to enclosure management. Multiple customizable enclosures can be defined within this window, including the number of drives per row and column, and drive orientation. Once an enclosure is defined, drives can be dragged and dropped into their respective drive bays corresponding to their actual locations. In this way, drives can be monitored in an enclosure-relative context.

The enclosure window provides real-time reporting of the status of the connected physical drives. When a drive fails, the system highlights the corresponding icon of the failed drive by placing a red X mark on it; when you remove a drive, its icon is removed from the enclosure window. This feature is particularly useful in cases where a drive fails, and you need to identify its exact location for subsequent replacement.

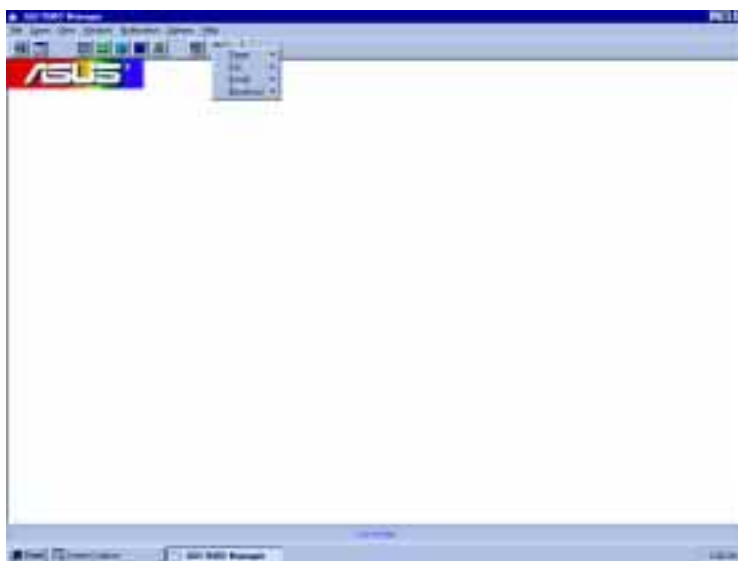
In addition to monitoring drives in the enclosure, the enclosure window also allows you to monitor the status of the power supply, fan, temperature inside the enclosure, and uninterruptible power supply (UPS) supplying power to the enclosure.



III. GUI RAID MANAGER

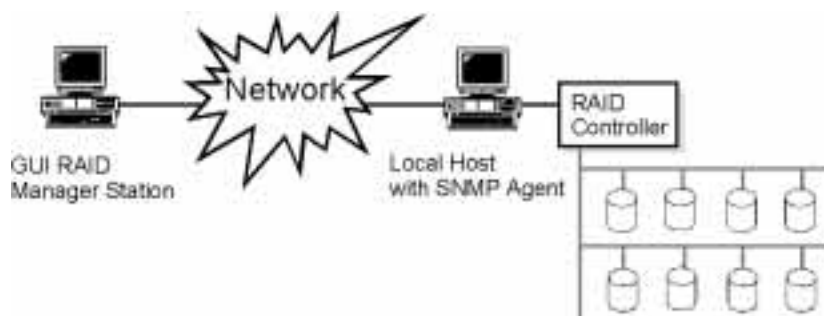
Powerful Event Notification Function

The GUI RAID Manager sends notifications to administrators for reporting event occurrences and status changes of the disk array system. These notifications can be sent via a local modem to a pager or telephone, via the Internet as E-mail messages, via a LAN as broadcast packets, or via FAX/modem as FAX messages. Any number of notification destinations can be set with messages user-configurable through the address book. Optional notification retransmission can be activated for each destination to ensure message reception by the intended addressee. Furthermore, you can specify retry periods depending on your specific needs.



Remote Management via SNMP or Modem

The GUI RAID Manager supports remote management of the disk array controllers over a LAN using SNMP, or over the telephone line using a dial-up modem. Management over the LAN is achieved through the exchanges of SNMP management packets between the remote GUI RAID Manager station and the SNMP agent on the Windows NT or Windows 95 local host. The remote GUI RAID Manager sends management requests to the SNMP agent, which in turn checks the connected controller, and then sends back a reply to the requesting manager. The following figure shows a typical SNMP connection:



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Password Protection

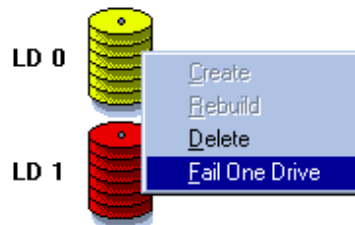
The GUI RAID Manager comes with password protection to prevent unauthorized users from maliciously modifying the configuration of the disk array system. This security feature is put into effect the first time an attempt is made to modify the disk array configuration after turning on the GUI RAID Manager station or after the station comes back from a period of inactivity.

With the password security feature, you have the luxury of leaving your GUI RAID Manager station unattended knowing that the currently managed disk array system is safe from any unauthorized modifications.

Demo Mode

The GUI RAID Manager provides a Demo program for use as a learning tool and for demonstration purposes. This tool allows you to experiment on various disk array configuration and monitor how the system responds and operates under such condition without connecting to a real disk array.

This Demo program supports all management functions available in the GUI RAID Manager, making your imaginary system as real as possible. You can select the controller for your imaginary system and drive channels, the number of physical drives, configure your logical drives and volumes, partition logical volumes, and map partitions to hosts. You can even force drives to fail and observe the system's reaction.



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III. GUI RAID MANAGER

Installation

This section contains information about hardware and software setup for local and remote management and downloading the latest version of the GUI RAID Manager.

System Requirements

The minimum hardware and software requirements for the GUI RAID Manager depends on the conditions it will be run.

Systems Running the GUI RAID Manager

- IBM-compatible 386 or above running Windows NT or Windows 95
- At least 8 MB of RAM
- At least 3 MB of free hard disk space
- VGA monitor
- Microsoft-compatible mouse
- At least one available RS-232 port (if remote management over the telephone line is desired)
- Hayes-compatible modem (if pager/telephone event notification is desired) or FAX/modem (if FAX event notification is desired)
- SNMP service for Windows NT (if SNMP remote management is desired)

Local Hosts Running the ASUS SNMP Agent (For SNMP Remote Management Only)

- IBM-compatible 386 or above running Windows NT or Windows 95
- SNMP service for Windows NT/Windows 95 (if SNMP agent is under Windows NT or Windows 95 environment)

III. GUI RAID MANAGER

Hardware Setup

The GUI RAID Manager supports both local and remote management of the disk array systems from ASUS. Local management refers to management of the disk array from a local host — management transactions traverse the PCI bus (for PCI-to-SCSI controller). Remote management refers to management of the disk array from a remote station connected to the controller either via a modem or through a network cable.

NOTE: Management through the RS-232 interface requires an RS-232 port. Thus this interface cannot be used on the ASUS PCI-DA2100, which does not have an RS-232 port on board.

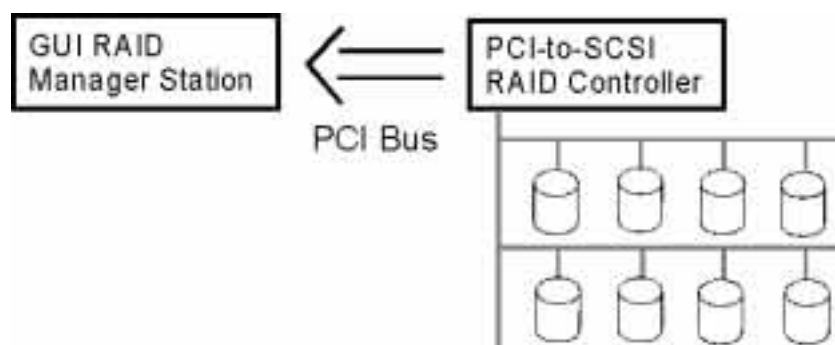
Typically, management will be done locally. A local host runs the GUI RAID Manager to configure and monitor the connected controller. Local management is simpler than remote management for it requires less hardware in its configuration. Remote management is more complicated than local management but provides the following benefits:

- Allows management even at distant remote places. Since remote management utilizes the network cable or the telephone line, management anywhere around the globe is possible. All you need is a simple attachment to an existing network where the disk array's host exists, or dial up the number of the modem connected to the controller.
- Allows multiple instances of GUI RAID Manager stations over the network managing concurrently a particular disk array system.

Depending on your specific needs and configuration requirements, you may perform management either from a local host or from a remote station. The following sections describe how to set up your hardware for local and remote management.

Local Management

For local management, the controller is either installed in (for PCI-to-SCSI controller) or connected to (for SCSI-to-SCSI controller) the host. The following figure illustrates a typical setup for a PCI-to-SCSI controller:



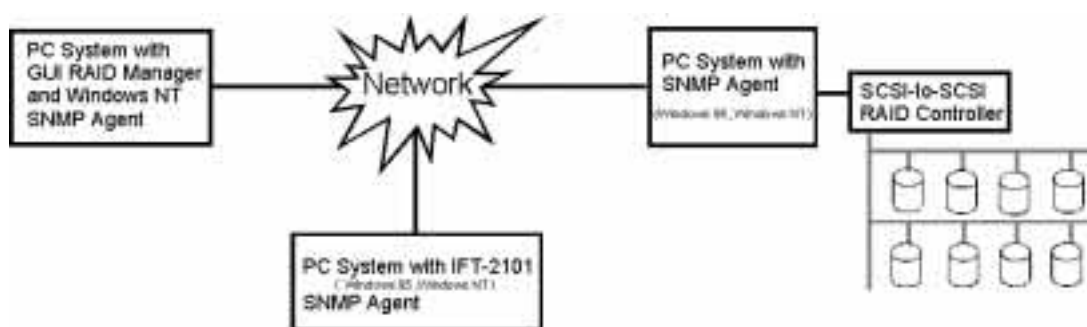
III. GUI RAID MANAGER

Since the controller is already installed in the host, no extra connection is necessary. Just load the necessary driver for the controller and then run the GUI RAID Manager from the local host to start management of the disk array system.

Remote Management

You can set up your hardware two ways in remote management: network and telephone. Network setup provides a faster data transfer rate than the telephone setup because it utilizes the network bandwidth, for example, 10 Mbps (million bits per second) for Ethernet and 100 Mbps for Fast Ethernet. Another advantage of using the network is you can have your GUI RAID Manager station manage other disk array systems on the network. Alternatively, you can manage the disk array system from other GUI RAID Manager stations on the network.

Network setup requires running the GUI RAID Manager on the target manager station(s), and enabling the SNMP service on the local host. The following figure illustrates a typical network setup:



The PCI-to-SCSI controller does not support direct connection to a modem for remote management. To manage this controller using the modem, you will need to connect the modem instead to the local host's serial interface. This user's guide does not provide information on this type of configuration.

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III. GUI RAID MANAGER

Software Setup

This section discusses how to set up the GUI RAID Manager in your system. Before proceeding with the setup procedure, read through the notes listed in the *Before You Start* section. You will need the information provided in this section to complete setup successfully.

Before You Start

Before starting with setup, read through the notes listed below, and ensure that you understand each. These notes will help facilitate the setup process for you. If you need additional information, see the *Hardware Setup* section.

- Ensure that your system meets the minimum hardware and software requirements listed in the *System Requirements* section.
- Ensure that the disk array system is installed properly. For the installation procedure, see the documentation that came with the controller.
- For local management (that is, management from the local host) and remote management via the telephone line, you will only need to set up for a Local Manager Site. For fast setup, just accept the default values presented by the setup program.
- For remote management over the network using SNMP, ensure that the remote manager station has Windows NT. You will need to set up for an SNMP Manager Site on the remote station, and SNMP Agent Site on the local host. The setup program helps you achieve these tasks by providing setup options.

Setting Up the GUI RAID Manager

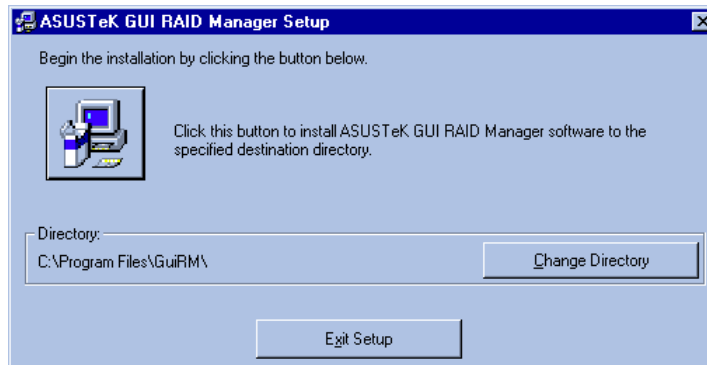
Follow these steps to set up the GUI RAID Manager on your system:

1. Insert DISK1 into the appropriate disk drive.
2. Run SETUP.EXE from DISK1. The setup welcome screen appears:

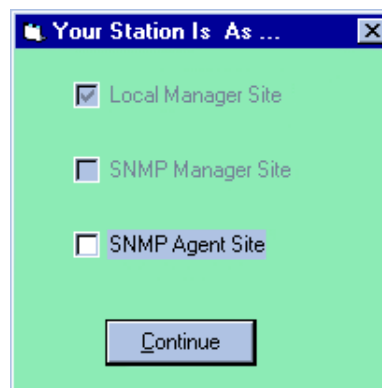


III. GUI RAID MANAGER

3. If you are currently running other applications, close them first before proceeding with the setup process. This will minimize the possibility of encountering system errors during setup. Then, click OK to continue.



4. To accept the default destination directory, click on the setup button at the top left portion of the screen; to specify a different directory, click on the Change Directory button and then specify the directory you want. The following screen will then appear:

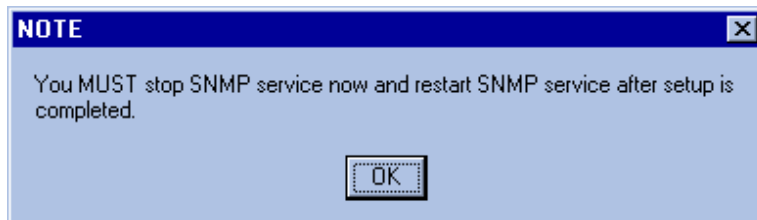


5. Select the appropriate option for the type of system on which you are setting up the GUI RAID Manager. If you are setting up on a host where array management will be performed, you only need the Local Manager Site option (selected by default); for a local host where SNMP transactions from remote manager stations will be processed, you need the SNMP Agent Site option; for a remote manager station where array management will be performed over the network, you need the SNMP Manager Site option.

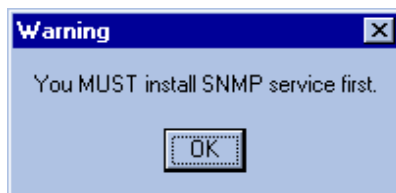
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To select an option, just check its corresponding check box. You may select more than one option if you want; be reminded though that the more options you select, the bigger the disk space requirement will be. Click Continue to proceed.

6. If you select the SNMP Agent Site option, the following message will appear:



If you select the same option, and the SNMP service is not installed to your system, this message appears:



Follow the instruction displayed on the screen. Click OK to continue. Setup will then start copying the necessary files to the selected directory. After copying the files, the following screen will be displayed:



7. Click OK.
8. If necessary, restart the SNMP service.

Setup is complete. You may now start managing the disk array system. For information on first time operating instructions, see “Basic Operations at Startup.”

Software Upgrades

As a valuable customer of ASUS, you are entitled to free program upgrades. You can download the latest GUI RAID Manager either from our BBS or any of our Internet sites (WWW/Gopher/FTP). For more information about this service, see the contact information on page 3 or call your local distributor or dealer.

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Basic Operations at Startup

This section discusses the basic operations you may want to learn first and tasks you may want to take care of when you start the GUI RAID Manager for the first time.

Starting the GUI RAID Manager

Depending on your hardware setup, you can start the GUI RAID Manager in various ways. For local management, your task is quite simple. Refer to the appropriate section below for information.

Under Windows 95 or Windows NT 4.0

1. From the **Start** menu, select **Programs** → **ASUS GUI RAID Manager**.

-or-

Double-click the ASUS GUI RAID Manager icon. The ASUS GUI RAID Manager main window appears on the screen.

2. Connect to the disk array system. For information on how to connect, see the *Connecting and Disconnecting from a Disk Array System* section.

Under Windows NT 3.5x

1. Open the ASUS GUI RAID Manager group window from the Program Manager, if not yet open.
2. From the ASUS GUI RAID Manager group window, double-click the ASUS GUI RAID Manager icon. The ASUS GUI RAID Manager main window appears on the screen.
3. Connect to the disk array system. For information on how to connect, see the *Connecting and Disconnecting from a Disk Array System* section.

For remote management, see the appropriate section below.

For Remote Management Via Network

1. Turn on the local host and enable the appropriate SNMP service. For information on how to enable the SNMP service for Windows NT, Windows 95, or Novell NetWare, see their respective manuals.
2. Check to ensure that the local host is properly connected on the network. Take note of its IP address (or SNMP agent's name) and community names.

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3. Run the GUI RAID Manager on the remote station. If you are using Windows 95 or Windows NT 4.0, follow these steps:
 - 3a. From the **Start** menu, select **Programs** → **ASUS GUI RAID Manager**.

-or-

Double-click on the ASUS GUI RAID Manager icon. The ASUS GUI RAID Manager main window appears on the screen.

If you are using Windows NT 3.5x, perform these steps:

 - 3a. Open the ASUS GUI RAID Manager group window from the Program Manager, if not yet open.
 - 3b. From the ASUS GUI RAID Manager group window, double-click on the ASUS GUI RAID Manager icon. The ASUS GUI RAID Manager main window appears on the screen.
4. Connect to the disk array system. For information on how to connect, see the *Connecting and Disconnecting from a Disk Array System* section.

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Connecting and Disconnecting from a Disk Array System

The GUI RAID Manager provides a feature that facilitates connection and disconnection from disk array systems. Before management can be performed on a particular disk array system, you need to establish first a connection between your GUI RAID Manager station and the target system. Once a connection is established successfully, management can be started.

Disconnection is used for breaking the link between the GUI RAID Manager station and the array system. This option is particularly useful in cases where multiple disk array systems are being managed at the same time — instead of restarting the GUI RAID Manager every time you need to switch to another system, you just need to disconnect from the current system and then connect to a new one.

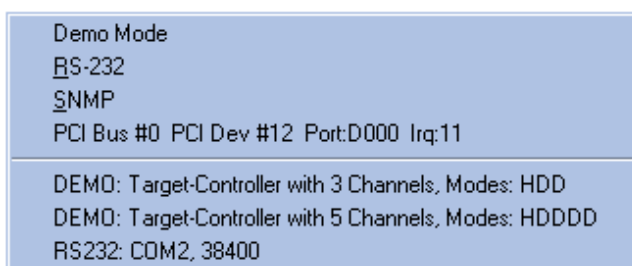
The following discusses the various ways of connecting to a disk array system. Information on disconnection is provided at the latter part of this section.

Connecting to a PCI-to-SCSI Controller from the Local Host

1. From the **File** menu, select **Connect**.

-or-

Click on the **Connect/Open** command button. The following submenu appears on the screen:



Note that there will be one *PCI Bus* entry for each PCI-to-SCSI controller installed. If none are installed, then no *PCI Bus* entries will be displayed.

2. Select the corresponding entry for a PCI-to-SCSI controller. Based on the previous figure, the entry should be **PCI Bus #0 PCI Dev#12 Port:D000 Irq:11**.

The enabling of the toolbar buttons signifies a successful connection.

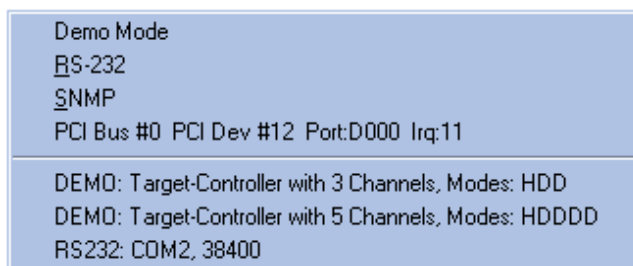
III. GUI RAID MANAGER

Connecting to a PCI-to-SCSI Controller from a Remote Station (Via Network)

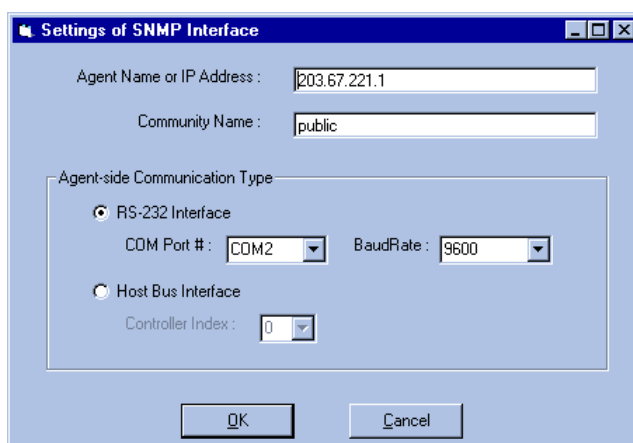
1. From the **File** menu, select **Connect**.

-or-

Click on the **Connect** command button. The following submenu appears on the screen:



2. Select **SNMP**. The Settings of SNMP Interface dialog box appears on the screen:



3. In the **Agent Name or IP Address** text box, type in the IP address of the local host where the target disk array system is connected. Alternatively, you may specify the host name of the local host.
4. In the **Community Name** text box, type in one of the community names of the SNMP agent. Community names act as passwords that screen accesses to the SNMP agent of a particular network device. Before access is granted to a requesting station, this station must incorporate a valid community name to its request; otherwise, the SNMP agent will deny access to the system.

By default, most network devices use “public” as one of their community names. This value is case-sensitive.

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5. In the **Agent-side Communication Type** section, click on the **Host Bus Interface** option button. Then, select the corresponding index of the controller in the **Controller Index** drop-down list box. To select, click on the down-arrow button at the right of the box, then select the option you need.
6. Click OK.

The enabling of the toolbar buttons signifies a successful connection.

Disconnecting from the Disk Array System

1. From the **File** menu, select **Disconnect**.

All toolbar buttons, except the **Connect** and **Notification** command buttons, turn gray signifying disconnection from the current disk array system.

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III. GUI RAID MANAGER

Setting Up Security

The GUI RAID Manager provides password protection to prevent unauthorized modification of the system configuration. This protection, which is implemented on the GUI RAID Manager station, prompts a user for the station password the first time he or she attempts to modify the disk array settings after turning on the GUI RAID Manager station or after the station comes back from a period of inactivity. Specifying the correct password gives the user full control over the disk array system; specifying otherwise, only allows the user to view the current configuration of the system.

By default, the GUI RAID Manager station comes without any password, thus when prompted for the password for the first time, just press ENTER. After gaining control, set a password to provide security to the managed disk array system. The set password will be saved into the memory of the GUI RAID Manager station.

You can also set an inactivity time, which will determine when to reactivate the password security feature after a period of station inactivity. If, within the specified period, there is no activity from the keyboard or mouse, this security feature will be put back into effect - prompting again for the station password the first time there is an attempt to modify the disk array configuration. This feature is particularly useful in protecting unattended GUI RAID Manager stations.

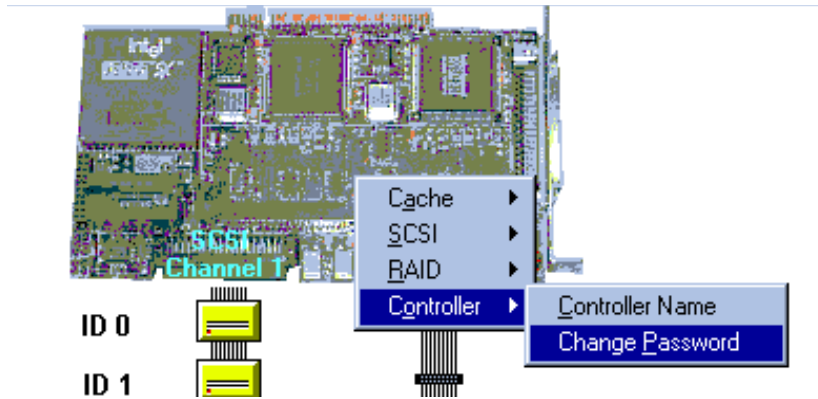
Setting a Password for the GUI RAID Manager Station

1. Display the Physical Drives window by clicking the **Physical Device** command button or selecting the **Physical Drive** command from the **Open** menu.
2. From the Physical Drive window, double-click the displayed controller (that is, the card layout for the ASUS PCI-DA2100 RAID controller). The Controller Settings window appears.

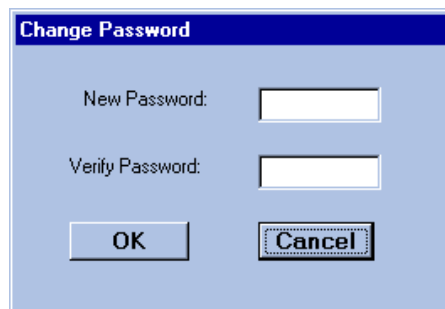


III. GUI RAID MANAGER

3. Click **Controller** → **Change Password**. The Change Password dialog box appears.



4. Type the password you want in the **New Password** text box taking note that the password is case-sensitive. Retype the password in the **Verify Password** text box to confirm.



5. Click OK.

Displaying and Hiding the Toolbar

The GUI RAID Manager provides a toolbar located just beneath the menu bar for displaying the available command buttons. These buttons serve various purposes, which are described in detail in the *Working with Windows* section.

You have the option to display or hide the toolbar depending on your specific needs. If you need bigger working space for viewing the various disk array elements or for executing various management operations, hide the toolbar; if you need to use the command buttons for simplified operations, unhide the toolbar.

You also have the option to hide the status bar located beneath the windows display area for even bigger working space. For information about this option, see the *Displaying and Hiding the Status Bar* section next.

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Hiding the Toolbar

- From the **View** menu, click on **Toolbar** until the check mark ✓ next to this command disappears.

The toolbar will disappear from the ASUS GUI RAID Manager main window.

Redisplaying the Toolbar

- From the **View** menu, click on **Toolbar** until a check mark ✓ appears next to this command.

The toolbar is displayed back in the ASUS GUI RAID Manager main window.

Displaying and Hiding the Status Bar

The status bar at the bottom of the windows display area supplies information about the results of the different disk array operations, and errors that occur on the system.

You can hide or display the status bar depending on your particular needs. If you need bigger working space, you can hide the status bar; if you are closely monitoring the status of the disk array system, unhide the status bar for a real-time report on the condition of the system.

You also have the option to hide the toolbar found just beneath the menu bar for even bigger working space. For information about this option, see the previous section, *Displaying and Hiding the Toolbar*.

Hiding the Status Bar

- From the **View** menu, click on **Status Bar** until the check mark ✓ next to this command disappears.

The status bar will disappear from the ASUS GUI RAID Manager main window.

Redisplaying the Status Bar

- From the **View** menu, click on **Status Bar** until a check mark ✓ appears next to this command.

The status bar will reappear in the ASUS GUI RAID Manager main window.

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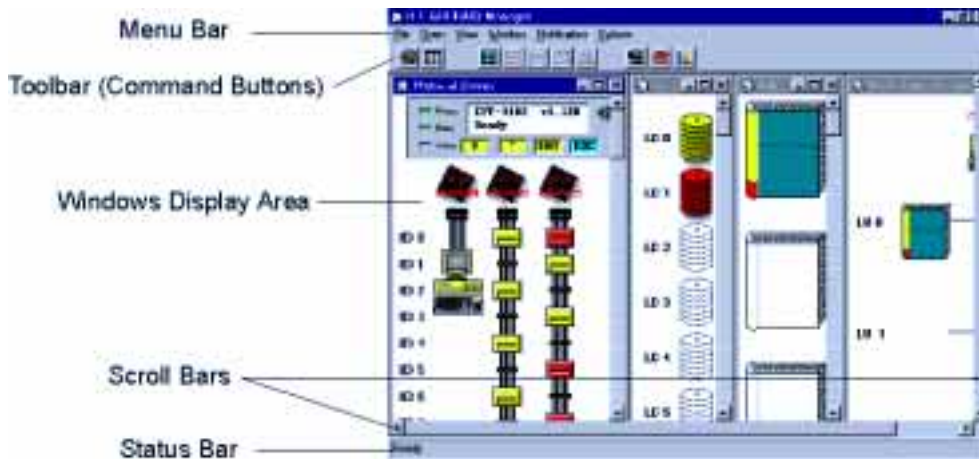
Working with Windows

Just like any other Windows-based applications, the GUI RAID Manager works entirely with windows to facilitate various disk array operations. These windows follow the standard MS Windows specifications, thus steps for manipulating elements and windows within any GUI RAID Manager windows conform to the standard MS Windows procedures.

This section describes how to work with the GUI RAID Manager windows.

Using the Main Window

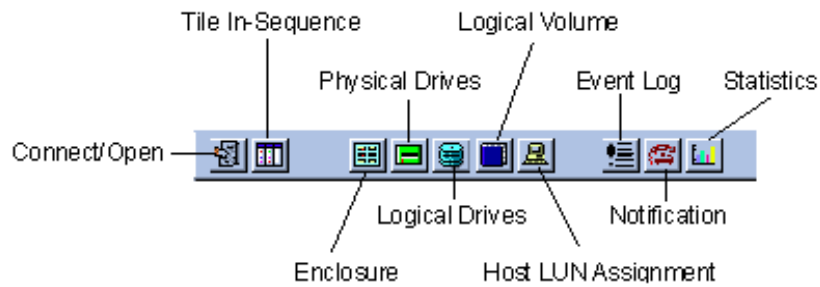
After starting the GUI RAID Manager, the ASUS GUI RAID Manager main window appears on the screen. All management operations pertaining to the disk array system will be performed within the main window. The following describes the various components found on the main window:



- The *menu bar* displays the available menus. Except for **Options**, all menus provide a list of commands for invoking various disk array and Windows-related operations. Most commonly used commands such as **Statistics** and **Event Log** come with command buttons to facilitate their execution - you can either select the command from the menu, or click on its respective command button on the toolbar. For a summary of the available commands, see Appendix A, *Command Summary*.
- The GUI RAID Manager provides *command buttons* to assist in the execution of most commonly used commands. These buttons are displayed on the toolbar, which can be hidden if bigger working space is required for certain management operations. For information on how to hide the toolbar, see the *Displaying and Hiding the Toolbar* section.

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The following figure displays the command buttons on the toolbar:



- The **Connect/Open** command button is used for connecting to a disk array system when you start the GUI RAID Manager. This button has the same function as the **Connect** command in the **File** menu. After establishing a connection with the target disk array system, this button changes to an **Open** button; this time, providing the same function as **Open** in the menu bar.
- The **Tile In-Sequence** command button arranges the displayed windows next to each other, with arrangement based on their uses, and each window reduced to fit all elements within its width. This button, however, only affects the Enclosure, Physical Drives, Logical Drives, Volume, Host LUN Assignment, and Statistics windows. This button has the same function as the **Tile In-Sequence** command in the **Window** menu.
- The **Enclosure** command button displays the Enclosure window for defining customizable enclosures. This button provides the same function as the **Enclosure** command in the **Open** menu.
- The **Physical Drives** command button displays the Physical Drives window for configuring the controller and the physical drives included in the disk array system. This button provides the same function as the **Physical Drive** command in the **Open** menu.
- The **Logical Drives** command button displays the Logical Drives window for creating and configuring logical drives in the disk array system. This button provides the same function as the **Logical Drive** command in the **Open** menu.
- The **Logical Volume** command button displays the Volume window for defining and configuring logical volumes in the disk array system. This button provides the same function as the **Logical Volume** command in the **Open** menu.

III. GUI RAID MANAGER

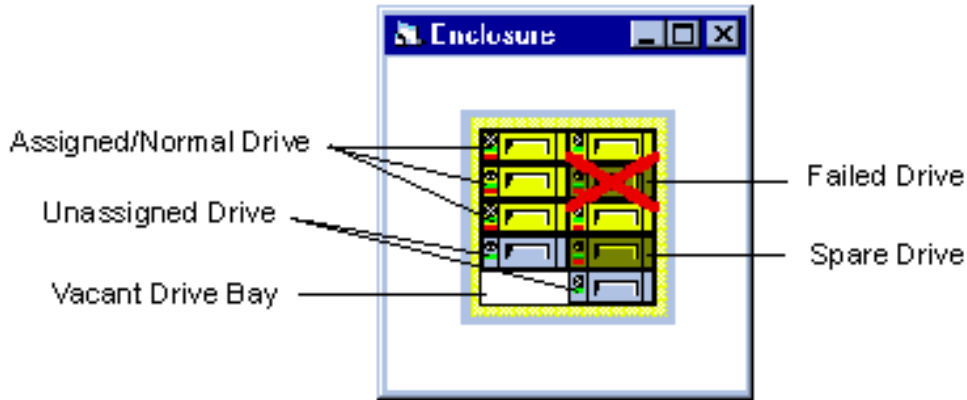
- The **Host LUN Assignment** command button displays the Host LUN Assignment window for assigning logical volume partitions to various host LUNs. This button provides the same function as the **Host LUN Assignment** command in the **Open** menu.
- The **Event Log** command button displays the Event Log window for viewing the contents of the log file. This button provides the same function as the **Event Log** command in the **Open** menu.
- The **Notification** command button allows you to specify the notification configuration of the disk array system. This button provides the same function as **Notification** in the menu bar.
- The **Statistics** command button displays the Statistics window for monitoring the performance of the disk array system. This button has the same function as the **Statistics** command in the **Open** menu.
- The *windows display area* is where the system displays the GUI RAID Manager windows. You have the option to arrange the displayed windows on this area in various ways depending on your specific needs. The **Window** menu provides you with the commands you will need to arrange these windows. For information on how to do this, see the *Arranging Windows* section.
- The *status bar* displays results of various disk array operations, error messages, and information about specific elements in the system. You have the option to hide the status bar to free some space on the windows display area. For information on how to hide the status bar, see the *Displaying and Hiding the Status Bar* section.
- The *scroll bars* let you move parts of a window into view when the entire window does not fit into the windows display area.

Using the Enclosure Window

The Enclosure window appears when you click on the **Enclosure** command button or select the **Enclosure** command from the **Open** menu. The Enclosure window allows you to define customizable enclosures for creating an exact replica of the disk array's drive bays, displaying the exact location of the physical drives, power supply, and fan. In addition, the Enclosure window helps you monitor the temperature inside the drive bays. ("Array Management" provides detailed information on how to create enclosures.)

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The Enclosure window is particularly useful in monitoring the status of the physical drives. It provides you with a real-time report on the drive status, using symbols and colors to represent various conditions. The following figure illustrates how the GUI RAID Manager represents the various drive conditions:



The system places an **X** mark on the icon of a failed drive. Spare drives appear with their colors darker (shaded) than normal drives (for example, for the first logical drive, normal drives appear in yellow while the spare appears in dark yellow). When you remove a drive from the drive bay, its corresponding icon on the Enclosure window disappears.

NOTE: The Physical Drives window also provides you with a real-time report on the drive status, using the same symbols and colors to represent various conditions. What you see on the Enclosure window is also reflected on the Physical Drives window. These windows though differ in the way physical drives are presented; in the Enclosure window, the drives are arranged according to their actual locations in the drive bays, while in the Physical Drives window, the drives are arranged according to the connectors they connect onto.

You can also display some information about a particular drive by simply placing the mouse pointer on its respective icon. A table similar to the following appears:

Slot	Chl	ID	Capacity	Status	Xfer Rate	LD	Vendor / Product ID
	2	6	1010MB	On-line	10MB	0	

III. GUI RAID MANAGER

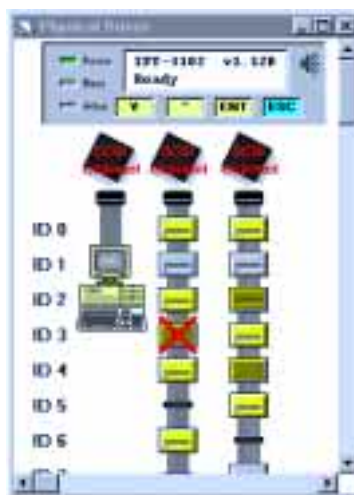
This table displays the current configuration of the drive, including the drive's slot number, the channel number of the connector on the controller to which the drive's SCSI cable is connected, the ID number of the connector on the SCSI cable where the drive is installed, the drive's capacity, status, transfer rate, the ID number of the logical drive where the drive belongs (if there is one), and the drive's manufacturer (if available).

To facilitate management of the Enclosure window, the GUI RAID Manager supports the drag-and-drop function for moving objects within the Enclosure window. If you need to move an object to a different location within the window, just drag its corresponding icon to the target destination.

Using the Physical Drives Window

The Physical Drives window is where you view and modify the configuration of the controller and manage physical drives. This window provides almost the same function as the Enclosure window, using the same symbols and colors to represent various drive conditions (for information about these symbols and colors, see the previous section, *Using the Enclosure Window*). The main difference between these two windows is in the way they present the physical drives; the Enclosure window presents the drives according to their actual locations in the drive bays, while the Physical Drives window presents them based on the connectors they connect onto.

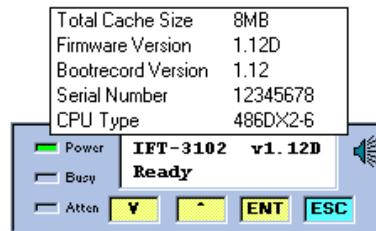
To display the Physical Drives window, you can either click on the **Physical Drives** command button or select the **Physical Drives** command from the **Open** menu. A window similar to the following will appear on the screen:



Depending on the controller you are using, this window displays either the front panel of a SCSI-to-SCSI controller or the card layout of a PCI-to-SCSI controller. The front panel display reflects what appears on the actual front panel of a SCSI-to-SCSI controller.

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Also shown in this window are the physical drives and hosts (for SCSI-to-SCSI controllers only) connected to the controller. How they are connected and configured, including their current status (for drives only), are all depicted on the screen. If you need information about a particular object in this window, simply place the mouse pointer on its respective icon. Letting the mouse pointer hover over the front panel displays the following table:



This table shows some information about the controller, including the total cache size, the version of the firmware currently stored in the Flash memory, the boot record version, serial number, and the CPU type.

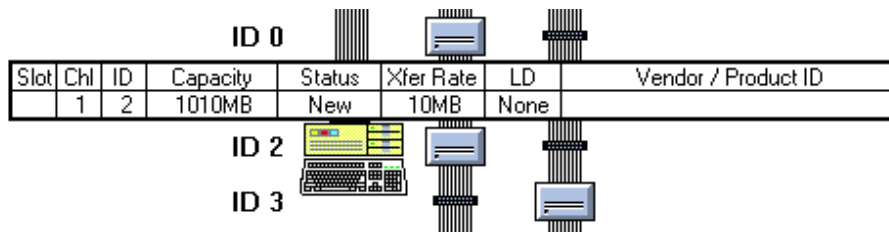
Letting the mouse pointer hover over a SCSI Channel displays a table similar to the following:

Chl	Mode	ID	DefClk	DefWid	Term	CurClk	CurWid
1	Drive	7	10.0MHz	Wide	Off	10.0MHz	Wide



This table provides information pertaining to the current configuration of the SCSI channel. This includes the channel number, channel mode (that is, host or drive), SCSI ID, the default and current transfer clock rate, and the default and current transfer width.

Letting the mouse pointer hover over a drive displays a table similar to the following:



This table displays the current configuration of the drive, including the drive's slot number, the channel number of the SCSI channel to which the drive is connected, the SCSI ID of the drive, the drive's capacity, current status, transfer rate, the ID number of the logical drive to which the drive belongs (if it belongs to one), and the drive vendor and product identifier strings (if available).

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The Physical Drives window also allows you to modify the configuration of the controller and the SCSI channels, and scan in newly added or replaced physical drives. For more information about this feature, see “Array Management.”

Using the Logical Drives Window

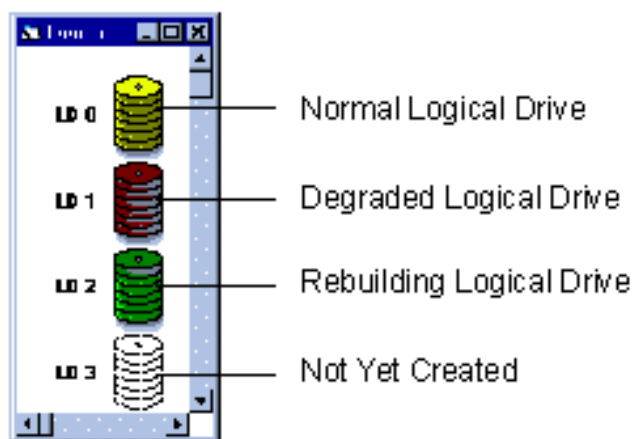
The Logical Drives window is where you perform management on the logical drives of the disk array system. Logical drives are combinations of physical drives, which are used to create logical volumes. These volumes (or their partitions) can then be mapped to various host LUNs.

The Logical Drives window allows you to create logical drives, delete existing ones, and rebuild failed drives. It uses unique colors to distinguish between logical drives. When a physical drive within a logical drive fails, the system notifies you by darkening the color of the affected logical drive. The logical drive will remain in this state until either a spare is detected and rebuilding is automatically started, or the drive is replaced and rebuilding is manually initiated.

While rebuilding a logical drive, the GUI RAID Manager reports the progress of the rebuilding process by filling in the color of the logical drive accordingly. After rebuilding is complete, the logical drive will display its normal color, signifying on-line condition.


To facilitate management of the Logical Drives window, the GUI RAID Manager supports drag-and-drop operations to establish certain associations. For example, to assign a particular physical drive as a spare to a logical drive, just drag the desired physical drive over to the logical drive window and drop it into the target logical drive.

To display the Logical Drives window, you can either click on the **Logical Drives** command button or select the **Logical Drives** command from the **Open** menu. A window similar to the following will appear on the screen:



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If you need information about a particular logical drive, just let the mouse pointer hover over its corresponding icon. A table similar to the following will appear:



ID	RAID Level	Capacity	Status	# Drives	# Spares	# Failed
2	RAID 5	2020MB	Good	3	0	1

This table displays the ID number of the logical drive, the RAID level, total capacity, current status, total number of physical drives combined to create this logical drive, number of spare drives, and number of failed drives.

For more information on how to create, delete, and rebuild logical drives, see “Array Management.”

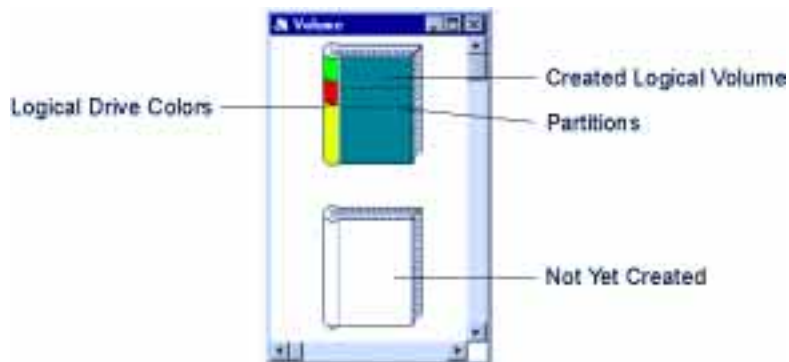
Using the Volume Window

The GUI RAID Manager provides a Volume window for use in the management of logical volumes in the disk array system. Logical volumes are a grouping of multiple logical drives combined together into one large unit. This unit is, in turn, mapped entirely or by parts (that is, by partitions) to various host LUNs.

NOTE: A logical volume can contain a maximum of eight logical drives with dissimilar RAID levels.

The Volume window helps you create logical volumes, delete existing ones, and define partitions. It supports the drag-and-drop operation to simplify management of these disk array elements — you simply drag logical drives over to the Volume window and drop them into the logical volume being created.

To display the Volume window, you can either click on the **Logical Volume** command button or select the **Logical Volume** command from the **Open** menu. A window similar to the following will appear on the screen:

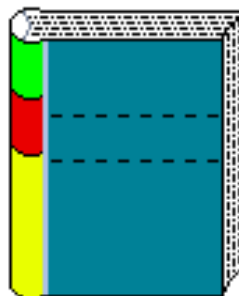


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The GUI RAID Manager uses a book icon to represent a particular volume, with the binding displaying the respective colors of the logical drives used to create this particular volume. The relative size of the colored area reflects the capacity of the respective logical drive relative to the total capacity of the logical volume.

Logical volumes that have been partitioned appear with dotted lines on them. The relative position of a dotted line indicates the location of the boundary between partitions within the volume. Moving this line will change the location of the boundary thereby changing the size of the partitions so bounded.

If you need information about a particular logical volume, simply let the mouse pointer hover over its corresponding icon. A table similar to the following will appear:



Logical Volume Partition Table		
Volume ID:1 Capacity:9090MB		
Idx	Base Offset	Part Size
0	0MB	4848MB
1	4848MB	1616MB
2	6464MB	2626MB

This table displays information about the existing partitions of a logical volume. These include the total number of partitions into which the volume has been divided and their respective sizes. This table also displays the volume ID and its total capacity.

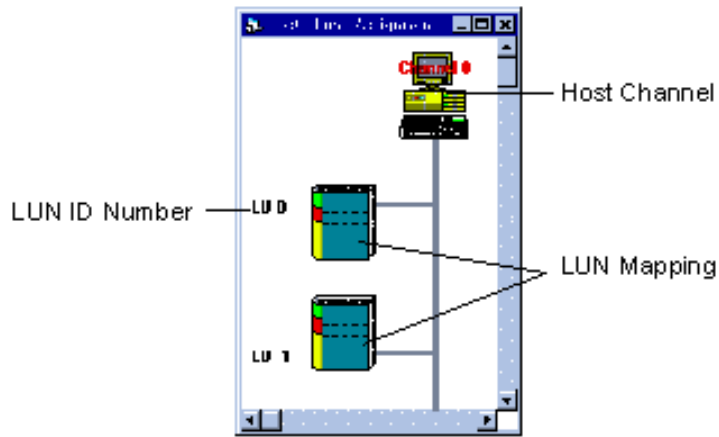
For information on how to create, delete, and set partitions for logical volumes, see “Array Management.”

Using the Host LUN Assignment Window

The Host LUN Assignment window depicts the Logical Unit Numbers (LUNs) for the existing host channels in the disk array system with their current logical volume and/or partition assignments. Depending on the type of controller used in the system, this window displays one or more host channels; the PCI-to-SCSI controller only supports one host channel (that is, the PCI bus itself). Each host LUN appears to the host on one access letter with a capacity equal to the mapped volume (or partition).

To display the Host LUN Assignment window, you can either click on the **Host LUN Assignment** command button or select the **Host LUN Assignment** command from the **Open** menu. A window similar to the following appears on the screen:

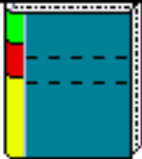
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This window displays the available host channels and their respective LUN assignments. LUNs with mapped volumes or partitions appear with book icons on their connectors. These icons are similar to those used for logical volumes only that they appear smaller. If you need information on any of these mappings, just place the mouse pointer on the target book icon. A table similar to the following appears on the screen:

Scsi Chl	LUN	LV Idx	Part Idx	Capacity
0	0	0	2	2626MB

LU 0



This table displays the SCSI number for the respective host channel, the LUN number, the index number of the logical volume used in this mapping, the partition index, and the capacity.

For information on mapping logical volumes and/or partitions to host LUNs, and deleting existing mappings, see "Array Management."

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Arranging Windows

The Window menu provides you with commands for rearranging the displayed GUI RAID Manager windows (excluding the main window) in various ways. You have the option to cascade these windows so that they will overlap with each other making their title bars visible, arrange the open windows in smaller sizes to fit next to each other on the screen, or display the windows in such a way that they appear according to their uses and the maximum number of elements are displayed.

All commands in the **Window** menu are standard MS Windows commands, except for **Tile In-Sequence**. The **Tile In-Sequence** command is specifically designed for disk array management. It arranges the open windows based on their uses, with each window reduced to fit all elements within its width. Since all elements within the width are displayed, a horizontal scroll bar is not necessary for each window; however, for the main window, it might be necessary specially when multiple windows are displayed.

Arranging Windows Using the Tile In-Sequence Command

- From the **Window** menu, select **Tile In-Sequence**.
- or-
- Click on the **Tile In-Sequence** command button.

Cascading the Displayed Windows

- From the **Window** menu, select **Cascade**.

Arranging Windows Using the Tile Horizontal Command

- From the **Window** menu, select **Tile Horizontal**.

Arranging Windows Using the Tile Vertical Command

- From the **Window** menu, select **Tile Vertical**.

Exiting GUI RAID Manager

Exiting from the GUI RAID Manager terminates the current management session with the disk array system. When you exit, the system automatically saves the disk array configuration for use later when connecting to the same system. The system also releases all used or occupied resources for use by other applications.

Exiting from the GUI RAID Manager

- From the **File** menu, select **Exit**.

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Disk Array Management

This section describes the steps on managing a disk array system.

If this is your first time to manage a disk array system, we recommend that you read through the first section, *Background Information*, to get basic information about disk array management. You will need this basic knowledge to be able to use effectively the GUI RAID Manager.

Background Information

Redundant Arrays of Independent Disks (RAID) is a storage technology used to improve the processing capability of storage systems. This technology is designed to provide reliability in disk array systems and to take advantage of the performance gains multiple disks can offer.

RAID comes with a redundancy feature that ensures fault-tolerant, uninterrupted disk storage operations. In the event of a disk failure, disk access will still continue normally with the failure transparent to the host system.

RAID has six levels: RAID 0–RAID5. RAID levels 1, 3 and 5 are the most commonly used levels, while RAID levels 2 and 4 are the less popular ones. In the appendices, *RAID Levels* gives information about these levels, including the benefits of each.

Infortrend disk array controllers support hot-swapping where a failed drive can be replaced while the disk array system continues to function. Spares can also be assigned so that, as soon as a drive fails, the spare will be automatically configured into the array and reconstruction will commence.

Definition of Terms

- **Physical drives.** These are the actual SCSI drives installed on the connectors of the SCSI cables. These drives are displayed on the Physical Drives window.
- **Spare drives.** These are physical drives that serve as backups. When a drive fails, the spare is automatically configured into the array, and data reconstruction will immediately commence. Spare drives appear in darker (shaded) colors than normal drives.
- **Replacement drives.** These are physical drives that are manually configured into the array to replace failed drives. In the absence of spare drives, you will need to use replacement drives to replace defective drives before rebuilding can be performed.

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- **Failed drives.** These are physical drives that fail due to errors of some type. Failed drives appear with **X** marks on their respective icons.
- **Logical drives.** These drives are created using physical drives. Combining physical drives into one logical drive gives you a disk array with a certain RAID level. To view logical drives, use the Logical Drives window.
- **Logical volumes.** These volumes are created using logical drives. Combining logical drives into one logical volume gives you a single logical unit with even larger capacity. Logical volumes or their partitions are mapped to various host LUNs. To view logical volumes, use the Volume window.

Operation With Spare Drives

You can assign spare drives to a particular logical drive to serve as backup drives. When a drive fails within the logical drive, one of the spares will be automatically configured into the logical drive, and data reconstruction onto it will immediately commence.

The following are guidelines for disk failure recovery when a spare drive is available:

- If a spare drive exists in the same logical drive, the controller will automatically mount the spare drive and start data rebuilding in the background.
- Depending on the design of the system external to the controller, it may be possible to remove a defective drive and replace it with a new drive without shutting down the system (hot-swapping). Alternatively, the system can be shut down at a convenient time and the failed drive replaced.
- The replacement drive must then be assigned as a new spare drive.

Operation Without Spare Drives

The following are guidelines for disk failure recovery when a spare drive is available:

- Depending on the design of the system, it may be possible to remove a defective drive and replace it with a new drive without shutting down the system (hot-swapping). Alternatively, the system can be shut down at a convenient time and the failed drive replaced.
- If the replacement drive is installed on the same channel and SCSI ID, you can then proceed with data rebuilding.
- If the replacement drive is installed on a different channel or SCSI ID, you need to scan in the new drive first then assign it as a spare drive of the logical drive. Data rebuilding will have to be manually initiated.

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IMPORTANT: Although the RAID system provides uninterrupted disk access even after a disk failure, do not leave a failed drive unattended to. Without replacement, the system will not survive a failure of a second drive on the same logical drive. A defective drive must be promptly replaced and data rebuilt.

CAUTION: When performing hot-swapping, be sure to remove only the defective drive. Removing the wrong drive will result in unrecoverable data loss. Use the Enclosure or Physical Drives window to locate the exact location of the failed drive.

Before You Start

The GUI RAID Manager station comes with password protection that prevents unauthorized modification of the disk array configuration. During first attempts at modifying the system configuration after starting up the GUI RAID Manager or after the GUI RAID Manager comes back from a period of inactivity, the configuration will be password protected. After specifying the correct password, all subsequent configuration modifications will be permitted without any password protection; however, if there is no station activity within a specified period of time, the password will be put back into effect.

By default, the GUI RAID Manager station comes without any password. For information on how to set a password and other security features, see the *Setting Up Security* section under “Basic Operations at Startup.”

Defining Enclosures

You create custom enclosures to facilitate management of the physical drives in the disk array system. These enclosures can replicate closely real enclosures with real drive bays, depicting the exact locations and positions of the physical drives. When a drive fails, determining which drive to replace is simply a matter of checking the Enclosure window for the exact location of the failed drive (a failed drive appears with an **X** mark on its icon).

Creating an Enclosure

1. Display the Enclosure window, if not yet displayed. To display it, click on the **Enclosure** command button or select the **Enclosure** command from the **Open** menu.

If you have not defined an enclosure yet for the disk array system, the Enclosure window will be blank; otherwise, the existing enclosures appear in the window. If you want to delete an existing enclosure, see the instructions below.

2. Double-click on an empty space within the Enclosure window. The following menu will appear:

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Create Vertical Enclosure
Create Horizontal Enclosure
Delete Enclosure

3. Depending on the orientation of your drive bays, select either **Create Vertical Enclosure** or **Create Horizontal Enclosure**. One of the following enclosure icons will appear on the screen:



4. Resize the enclosure icon to display the exact number of drive bays you need. To resize, place the mouse pointer on the bottom-side or right-side of the icon and press and hold the left mouse button. When the mouse pointer changes to a double-headed arrow, drag the mouse pointer until the desired number of drive bays is displayed. As you drag the mouse pointer, the number of drive bays will change dynamically.
5. Repeat the same procedure for the other drive bays you may still have in your configuration.
6. To fill in the drive bays in the enclosure just created, display the Physical Drives window. To display this window, click on the **Physical Drives** command button or select the **Physical Drives** command from the **Open** menu.
7. From the Physical Drives window, drag the physical drives to their respective drive bays in the Enclosure window.
8. Check to ensure that all drives are in their respective drive bays. To check, let the mouse pointer hover over each drive icon. A table will appear displaying some information about the drive.

NOTE: If you have placed the wrong drive in a drive bay, just drag over the correct drive from the Physical Drive window over and drop it into the correct drive bay.

III. GUI RAID MANAGER

Removing a drive bay from an enclosure

1. Double-click on the target drive bay. The following menu will appear on the screen:



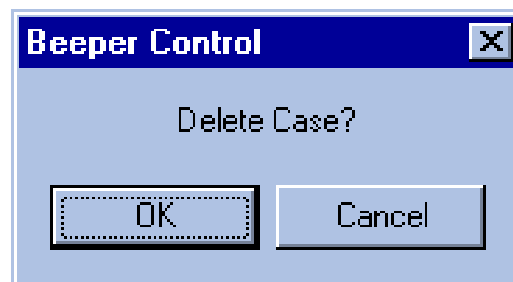
2. Select **Remove Bay from Enclosure**.

Moving an enclosure

1. Place the mouse pointer on the left-side or top-side of the enclosure icon and press and hold the left mouse button.
2. Drag the icon to the desired location within the Enclosure window. When you have reached the target location, release the mouse pointer to drop the enclosure icon.

Deleting an enclosure

1. Double-click on any area of the enclosure icon, except on occupied drive bays. The following message will appear on the screen:



2. Click OK to delete the entire enclosure.

III. GUI RAID MANAGER

Setting Controller Configuration

The GUI RAID Manager enables you to modify the configuration of the disk array controller from your manager console. You can enable or disable the write-back cache of the system, set whether or not the controller will reset the SCSI bus during power-on, stagger the drives' motor spin-up sequence, set the baud rate of the controller's RS-232 port, and modify the station password.

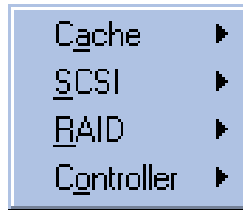
The following describes the user-configurable parameters:

- **Write-Back.** This parameter allows you to enable or disable the write-back cache of the system. The write-back cache allows write data to be stored in the cache memory prior to writing to the disk, thereby pipelining the I/O write process.
- **SCSI Reset on Power-up.** This parameter determines whether or not the controller will assert SCSI bus reset during power-on initialization.
- **Staggered Drive Spin-Up.** This parameter determines whether or not the controller will sequence the drives to start spinning in succession at five-second intervals. Enabling staggered drive spin-up can help prevent overloading the power supply when many drives spin up at the same time.
- **RS-232 Baud Rate.** This parameter sets the baud rate of the RS-232 port on the controller. When connecting a host computer, terminal, or other device (such as a modem) onto this port, ensure that their baud rates are set accordingly; otherwise, there will be communication problems.
- **Change Password.** This parameter allows you to modify the current password of the GUI RAID Manager station. This password prevents any unauthorized modifications on the system configuration. For more information about the station password and other security issues, see the *Setting Up Security* section under "Basic Operations at Startup."

Setting the controller configuration

1. Display the Physical Drives window by clicking the **Physical Device** command button or selecting the **Physical Drive** command from the **Open** menu.
2. From the Physical Drives window, double-click the displayed controller (that is, the card layout for the ASUS PCI-to-SCSI controller). The Controller Settings dialog box will appear:

III. GUI RAID MANAGER



3. From the **Write-Back** drop-down list box, select the write-back cache state. To select, click on the down-arrow button at the right of the box, then select the option you need. To enable the write-back cache, select **Enabled**; to disable, select **Disabled**.
4. If you want a SCSI bus reset to be issued on the drive channels every time you power on or reset the disk array system, set the **SCSI Reset on Power-Up** parameter to **Enabled**. Otherwise, set this parameter to **Disabled**.
5. To avoid overloading the power supply when several drives spin up at the same time, set the **Staggered Drive Spin-Up** parameter to **Enabled**. If a fast system startup is needed, and the power supply is capable of handling all the power requirements of the drives at the same time, set this parameter to **Disabled**.
6. Use the **RS-232 Baud Rate** drop-down list box to set the baud rate of the RS-232 port on the controller. If you have a host computer, terminal, or other device (such as a modem) connected to this port, specify here the baud rate of the connected device, or set the port's baud rate here and make the baud rate of the device correspond to this value.
7. If you want to modify the password, check the **Change Password** check box, and then specify the new password in the provided text box. You will need to confirm your password.
8. Click OK to save the new controller configuration. If you specified a new password, this value will be saved into the non-volatile memory on the disk array controller.

III. GUI RAID MANAGER

Setting Channel Configuration

From within the GUI RAID Manager, you can modify the configuration of any channel on the controller. You can set the channel operation mode to host or drive, enable or disable the channel termination, set its SCSI ID, set the transfer clock rate for synchronous communication, and select the transfer width.

The following describes the user-configurable parameters:

- **Channel Mode.** This parameter sets the operation mode of a particular channel on the SCSI-to-SCSI controller. It configures the operation mode to either host or drive, where a host channel is used when connecting to a host, while a drive channel is for connecting to SCSI drives. Any SCSI channel on the SCSI-to-SCSI controller can serve as either a host or a drive channel. Channel 0 is the default host channel with SCSI ID number 0.

For a PCI-to-SCSI controller, this parameter is permanently set to **Drive**.

- **Termination.** This parameter enables or disables SCSI channel termination. SCSI cables must be properly terminated at both ends; that is, when connecting one end of a SCSI cable to a channel, the termination of the channel must be enabled. Note that the other end of the cable must also be properly terminated.

You can terminate the other end of the cable by installing or enabling termination on the SCSI drive farthest from the controller or by installing an external terminator on the end connector. The latter method is recommended so that removal of the drives will not affect cable termination. All other terminators must be removed or disabled making sure that only one terminator is installed on each end.

- **SCSI ID.** This parameter sets the SCSI ID of the channel. Each channel must have a unique SCSI ID in order to work properly. SCSI ID ranges from 0 up to 15, with 0 assigned as the default value for host channels, and 7 for drive channels.
- **Default Sync Clock (MHz), Default Xfer Width.** These parameters set the data transfer clock rate for synchronous communication over the SCSI bus, and enable or disable wide transfer, respectively. For a detailed description of these parameters, see the discussion below.

III. GUI RAID MANAGER

Data that is transferred across the SCSI bus in synchronous transfer mode is clocked using a synchronous transfer clock signal. The frequency of this signal determines the rate at which data is transferred. If, for example, the synchronous transfer clock is 10 MHz, data transfer rate will be 10 million bytes per second (assuming narrow transfer).

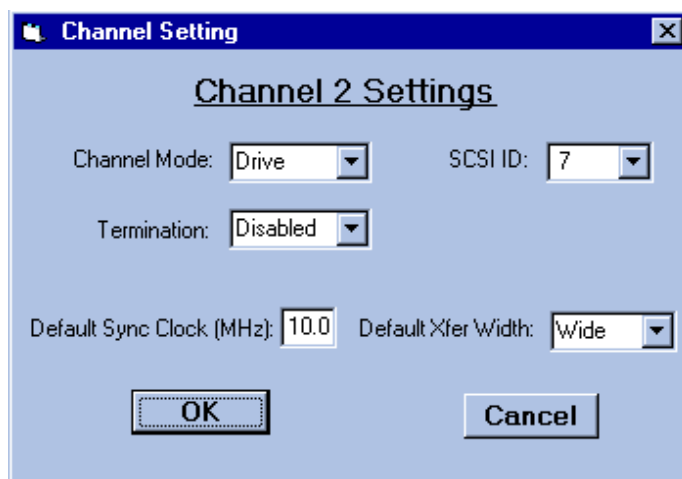
Data transfer across the SCSI bus can be either 8 bits or 16 bits at a time. The former is referred to as *narrow* transfer, while the latter is referred to as *wide* transfer. At the same synchronous transfer clock rate, data transfer rate using *wide* transfer will be double that using *narrow*. With synchronous transfer clock of 10 MHz, data transfer rate will be 10 Mbytes/second under *narrow* transfer, and 20Mbytes/second for *wide*.

Occasionally, under conditions in which SCSI signal quality is poor, such as long cables, poor connections, or bad termination, it may be necessary to reduce the synchronous transfer clock to allow the SCSI channel to function normally. Under worst conditions, it may be necessary to switch to asynchronous communication mode.

Furthermore, certain older SCSI devices may only support *narrow* transfer and behave abnormally when an attempt to negotiate *wide* transfer is made. Under such conditions, *wide* transfer may need to be disabled, forcing the controller to use *narrow* transfer mode with that device.

Setting the configuration of a channel

1. Display the Physical Drives window by clicking on the **Physical Drives** command button or selecting the **Physical Drives** command from the **Open** menu.
2. From the Physical Drives window, double-click on the corresponding SCSI Channel icon of the target channel. SCSI Channel icons are displayed on the card layout of a PCI-to-SCSI controller, or just below the front panel of a SCSI-to-SCSI controller. The Channel Setting dialog box will appear:



III. GUI RAID MANAGER

3. If you are using a SCSI-to-SCSI controller, select the channel mode from the **Channel Mode** drop-down list box. To select, click on the down-arrow button at the right of the box, then select the option you want. If you want to configure the selected channel as a host channel, select **Host**; to configure as a drive channel, select **Drive**.
4. From the **Termination** drop-down list box, specify whether to enable the channel termination or not. To enable, select **Enabled**; to disable, select **Disabled**.
5. If you want to assign a different SCSI ID to the selected channel, specify the new ID in the **SCSI ID** drop-down list box. When selecting a value, be sure that it does not conflict with the other SCSI devices on the channel.
6. To change the speed of the SCSI bus synchronous transfer clock, type in the new value in the **Default Sync Clock (MHz)** text box.
7. From the **Default Xfer Width** drop-down list box, select whether to use *narrow* or *wide* transfer. To use *narrow* transfer, select **Narrow**; to use *wide* transfer, select **Wide**.
8. Click OK to save the new channel configuration into the non-volatile memory of the controller.

Scanning in Drives

Disk scanning is a process in which a newly installed drive is introduced to the disk array system. You need to scan in a drive when:

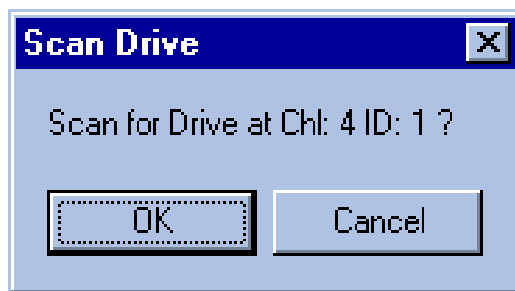
- The drive is a new one. A drive is considered a new drive if it is not yet displayed in the Physical Drives window.
- The drive is a replacement for a failed drive which is installed on a different channel or has a different SCSI ID.

If you do not scan in the drive on such occasions, the system will not be able to see the drive, rendering the drive useless.

Scanning in a drive

1. Display the Physical Drives window by clicking on the **Physical Drives** command button or selecting the **Physical Drives** command from the **Open** menu.
2. From the Physical Drives window, double-click on the connector corresponding to the SCSI ID of the drive being scanned. A confirmation message similar to the following will appear on the screen:

III. GUI RAID MANAGER



3. Click OK. The system will scan for a drive with the specified ID and then will display either a successful message or an error message.
4. Click OK.

The GUI RAID Manager will place a drive icon on the respective connector if the scanning process is successful.

Creating and Deleting Logical Drives

You can create logical drives by simply combining physical drives together. The GUI RAID Manager provides you with two options for creating logical drives: automatic and manual. In the automatic method, the GUI RAID Manager automatically selects all available (that is, unassigned) drives in the system and then recommends the appropriate RAID level. Drives can be manually deselected and/or a different RAID level can be selected if so desired.

In the manual method, you select the drives you want to be included in and the RAID level of the logical drive. To assist in the selection of the RAID level, the GUI RAID Manager recommends a RAID level based on the number of drives you have selected. You can either accept the recommended RAID level or specify the one you prefer.

The GUI RAID Manager also provides you with the option to delete logical drives. Before deleting though, be sure that the stored data on the target logical drive is no longer needed. Deleting a logical drive erases all stored information.

NOTE: When you delete a logical drive, all assigned physical drives to this drive will be released, making them available again for logical drive creation.

To create a logical drive

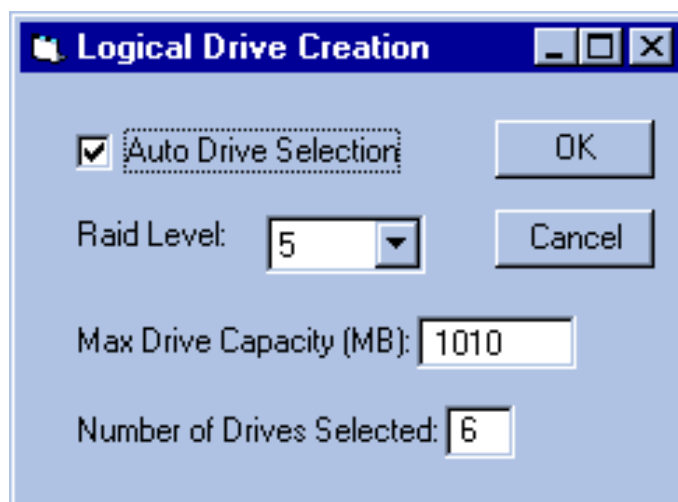
1. Display the Logical Drives window by clicking on the **Logical Drives** command button or selecting the **Logical Drives** command from the **Open** menu. If you intend to use the manual method, display also the Physical Drives window by clicking on the **Physical Drives** command button or selecting the **Physical Drives** command from the same menu.

III. GUI RAID MANAGER

2. From the Logical Drives window, double-click on an unused logical drive icon.

-or-

Double-click the right mouse button on an unused logical drive icon and then select **Create** from the displayed menu. The Logical Drive Creation dialog box will appear:



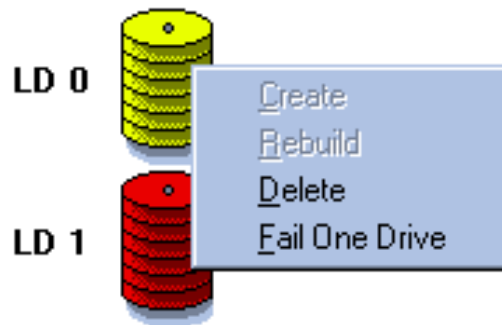
3. If you want to use the automatic method, check the **Auto Drive Selection** check box and then proceed to step 8.
4. If you want to use the manual method, uncheck the **Auto Drive Selection** check box.
5. From the Physical Drives window, click on the target drives. Be sure to select only unassigned drives (those that appear in gray). The **Number of Drives Selected** field displays the number of selected drives.
6. If you want to modify the recommended RAID level, specify the level you prefer in the **RAID Level** drop-down list box. To select, click on the down-arrow button at the right of this box and then select the option you want. The **1+Spare**, **3+Spare**, and **5+Spare** options are RAID 1, RAID 3, and RAID 5 levels respectively, each with a spare drive. For information on the various RAID levels, see the appendices for the “RAID Levels.”

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7. The value in the **Max Drive Capacity (MB)** text box determines how much capacity from each drive will be used in the logical drive. It may be useful to utilize this parameter to restrict capacity when the possibility exists that replacement drives acquired in the future might have slightly less capacity than the drives to be included in the logical drive. Type in the desired capacity in this box.
8. Click OK.

To delete a logical drive

1. Display the Logical Drives window by clicking on the **Logical Drives** command button or selecting the **Logical Drives** command from the **Open** menu.
2. From the Logical Drives window, double-click the right mouse button on the target logical drive. The following menu will appear on the screen:



3. Select **Delete**.

Assigning Spare Drives

You can assign spare drives to a logical drive to serve as backups for failed drives. In the event of a drive failure, the spare drive will be automatically configured into the array and reconstruction (or rebuilding) will immediately commence.

Logical drives can support multiple spare drives; this configuration however is rarely used due to its high cost and uncommon occurrences of drive failures. A practical configuration calls for one spare drive per logical drive - after rebuilding on this drive, just replace the failed drive and then configure the replacement as the new spare drive of the logical drive.

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NOTE: Adding a spare drive can be done automatically by selecting the **1+Spare**, **3+Spare** or **5+Spare** option from the Logical Drive Selection dialog box when creating a logical drive. These options however only apply to RAID 1, RAID 3, and RAID 5 levels respectively.

Assigning a spare drive

1. Display the Physical Drives and Logical Drives windows. To display the former, click on the **Physical Drives** command button or select the **Physical Drives** command from the **Open** menu. To display the Logical Drives window, click on the **Logical Drives** command button or select the **Logical Drives** command from the same menu.
2. From the Physical Drives window, position the mouse pointer on the icon of the drive you wish to be the spare drive and press and hold the left mouse button.
3. Drag the drive icon over to the destination logical drive and then release the mouse button. The following message will appear on the screen:



4. Click OK.

Rebuilding Logical Drives

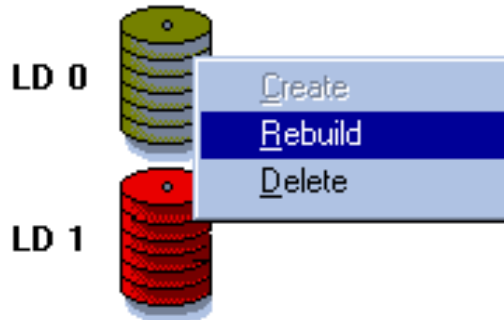
Depending on whether or not there is a spare drive, rebuilding is initiated automatically or manually. In the presence of a spare drive, the system automatically rebuilds onto the spare drive. This process is done in the background, thus it appears transparent to the user.

In the absence of a spare drive, rebuilding must be initiated manually. Before initiating a manual rebuild, you need to first replace the failed drive. If you install the replacement drive on the same connector (that is, same channel and SCSI ID), then you can proceed with the rebuilding process; otherwise, you need to scan in the drive first.

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To rebuild a logical drive

1. Display the Logical Drives window by clicking on the **Logical Drives** command button or selecting the **Logical Drives** command from the **Open** menu.
2. From the Logical Drives window, double-click the right mouse button on the degraded logical drive. The following menu will appear on the screen:



3. Select **Rebuild**.

Creating and Deleting Logical Volumes

You can create and delete logical volumes from your GUI RAID Manager station. Logical volumes are created by simply combining unassigned logical drives together. You can combine logical drives with different capacities and RAID levels into one logical volume. Alternatively, you can delete existing logical volumes. Before deleting though, be sure that the data stored in the logical volume is no longer needed. Deleting a logical volume erases all stored information.

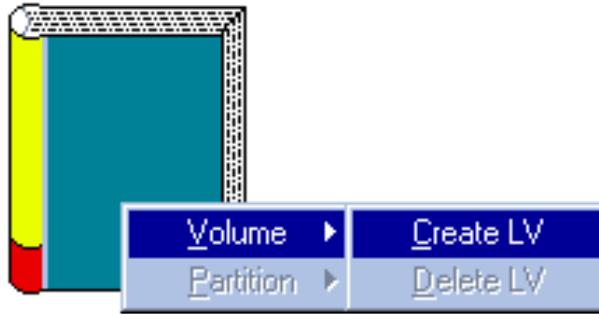
NOTE: When you delete a logical volume, all assigned logical drives to this volume will be released, making them available again for logical volume creation.

To create a logical volume

1. Display the Logical Drives and Volume windows. To display the former, click on the **Logical Drives** command button or select the **Logical Drives** command from the **Open** menu. To display the Volume window, click on the **Logical Volume** command button or select the **Logical Volume** command from the same menu.
2. From the Logical Drives window, position the mouse pointer on the icon of a logical drive you wish to include in creating the logical volume and press and hold the left mouse button.

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3. Drag the icon over to the target logical volume and then release the mouse button.
4. Repeat steps 2–3 for the remaining logical drives you want to include in the logical volume.
5. Double-click the right mouse button on the target logical volume. The following menu will appear:

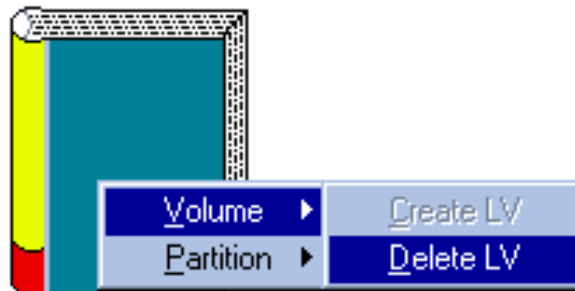


6. Select **Volume**. Then, from the next menu, select **Create LV**.

The logical volume is now created. You may now define its partitions. See *Creating and Deleting Partitions* on the following page.

To delete a logical volume

1. Display the Volume window by clicking on the **Logical Volume** command button or selecting the **Logical Volume** command from the **Open** menu.
2. Double-click the right mouse button on the target logical volume. The following menu will appear:



3. Select **Volume**. Then, from the next menu, select **Delete LV**.

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Creating and Deleting Partitions

Depending on your specific needs, you can either partition a logical volume into smaller sizes or just leave it at its default size (that is, one large partition covering the entire volume). If you intend to map the entire logical volume to a single host LUN, then partitioning becomes irrelevant; however, if the volume is to be mapped to multiple host LUNs, then you need to define partitions for later mapping to specific LUNs.

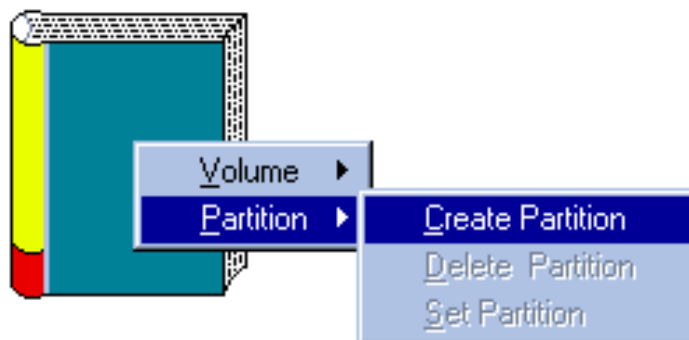
NOTE: You can create a maximum of eight partitions per logical volume.

Creating partitions for a logical volume

1. Display the Volume window by clicking on the **Logical Volume** command button or selecting the **Logical Volume** command from the **Open** menu.
2. Double-click the right mouse button on the target logical volume. The following menu will appear:

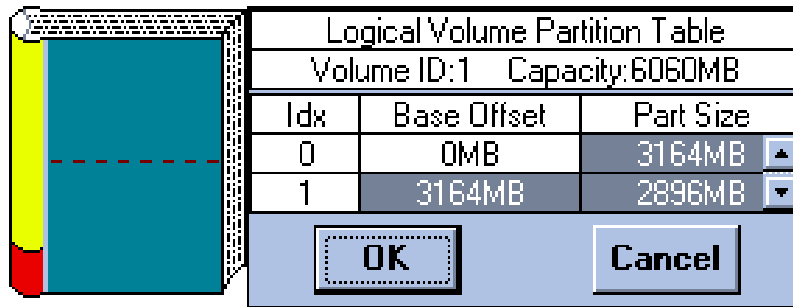


3. Select **Partition**. The following menu will appear on the screen:



4. Select **Create Partition**. A table similar to the following will appear displaying the current partition layout:

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5. Adjust the partition size using the vertical scroll bar on the displayed table. Click OK when the desired size is achieved.

You can also adjust the partition size by placing the mouse pointer on the logical volume icon and then moving the displayed dotted line. As you move the line, the partition size changes accordingly. The table reflects the changes on the size of the affected partition. Click the mouse button when the desired size is reached or move the mouse pointer over to the vertical scroll bar for micro adjustment then click OK.

6. If you wish to create a subpartition for an already existing partition, double-click the right mouse button anywhere within its area. Then, repeat steps 3–5.

You can create up to eight partitions per logical volume.

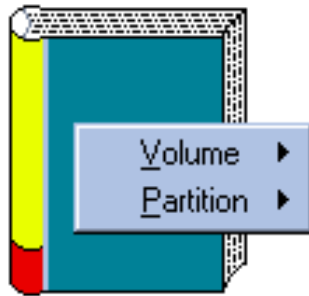
7. After defining the desired partitions, double-click the right mouse button on the current logical volume.
8. From the displayed menu, select **Partition**. Then, select **Set Partition**.

The logical volume is now ready for mapping to host LUNs. See *Mapping Logical Volumes/Partitions to Host LUNs* later in this section.

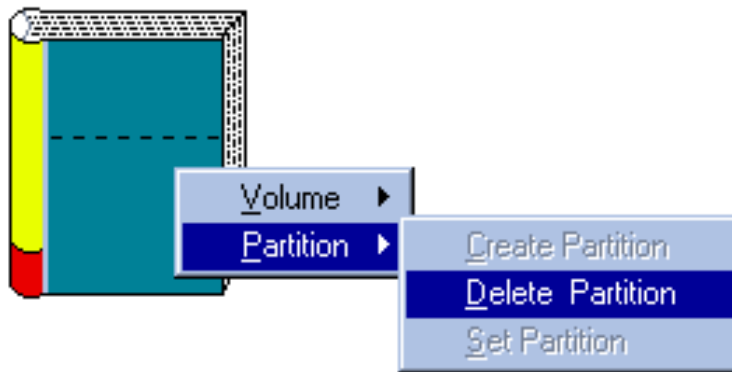
Deleting logical volume partitions

1. Display the Volume window by clicking on the **Logical Volume** command button or selecting the **Logical Volume** command from the **Open** menu.
2. Double-click on the partition you wish to delete. The following menu appears on the screen:

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3. Select **Partition**. The following menu will appear on the screen:



4. Select **Delete Partition**.
5. Repeat the same procedure to delete the other unwanted partitions.
6. After deleting partitions, double-click the right mouse button on the current logical volume.
7. From the displayed menu, select **Partition**. Then, select **Set Partition**.

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Mapping Logical Volumes/Partitions to Host LUNs

After creating a logical volume, you can map it as is to a host LUN if you prefer; or, if partitions are set, you can map each partition to specific host LUNs. Each host supports eight LUNs, each of which appears as a single drive letter to the host if mapped to a logical volume (or its partition).

Alternatively, you can delete existing host LUN mappings. In cases where certain mappings are found useless, or disk array reconfiguration is needed, you can delete unwanted mappings in your system.

Mapping an entire logical volume to a host LUN

1. Display the Volume and Host LUN Assignment windows. To display the former, click on the **Logical Volume** command button or select the **Logical Volume** command from the **Open** menu. To display the Host LUN Assignment window, click on the **Host LUN Assignment** command button or select the **Host LUN Assignment** command from the same menu.
2. From the Volume window, position the mouse pointer on the icon of the logical volume you wish to map and press and hold the left mouse button.
3. Drag the icon over to the target host LUN and then release the mouse button.

Mapping logical volume partitions to host LUNs

1. Display the Volume and Host LUN Assignment windows. To display the former, click on the **Logical Volume** command button or select the **Logical Volume** command from the **Open** menu. To display the Host LUN Assignment window, click on the **Host LUN Assignment** command button or select the **Host LUN Assignment** command from the same menu.
2. From the Volume window, position the mouse pointer on the partition you wish to map and press and hold down the left mouse button.
3. Drag the partition over to the target host LUN and then release the mouse button.
4. Repeat the same procedure for the other remaining partitions on the logical volume to be mapped.

Deleting a host LUN mapping

1. Display the Host LUN Assignment window by clicking on the **Host LUN Assignment** command button or selecting the **Host LUN Assignment** command from the **Open** menu.

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- From the Host LUN Assignment window, double-click on the icon of the mapped logical volume. The following confirmation message appears on the screen:



- Click OK.

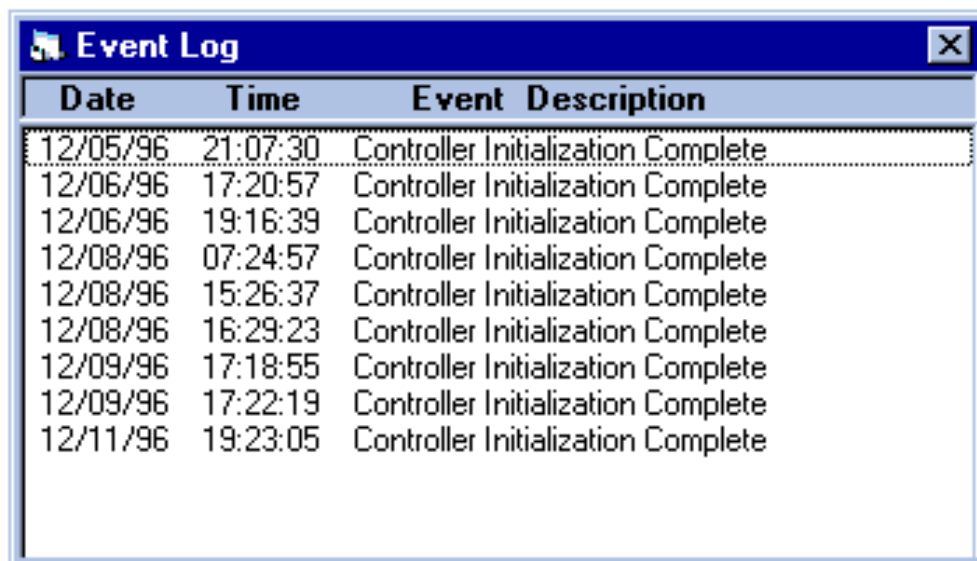
Displaying the Event Log

The GUI RAID Manager keeps a log file for documenting all events that occurred in the disk array system ranging from simple notifications, to warnings, to alerts.

The GUI RAID Manager saves the system log into a file named EVENT.LOG in the GUI RAID Manager directory. You can view the contents of this text file using any text editor program such as Windows Notepad. You can also print out the contents of the log file on a printer for reference purposes. In the event of a system failure, you can use the print-outs for diagnosis.

To display the event log

- Click on the **Event Log** command button or select the **Event Log** command from the **Open** menu. The Event Log window will appear:



Date	Time	Event Description
12/05/96	21:07:30	Controller Initialization Complete
12/06/96	17:20:57	Controller Initialization Complete
12/06/96	19:16:39	Controller Initialization Complete
12/08/96	07:24:57	Controller Initialization Complete
12/08/96	15:26:37	Controller Initialization Complete
12/08/96	16:29:23	Controller Initialization Complete
12/09/96	17:18:55	Controller Initialization Complete
12/09/96	17:22:19	Controller Initialization Complete
12/11/96	19:23:05	Controller Initialization Complete

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The events in the window are sorted according to the date and time they occurred. Description for each event is also provided to facilitate reference.

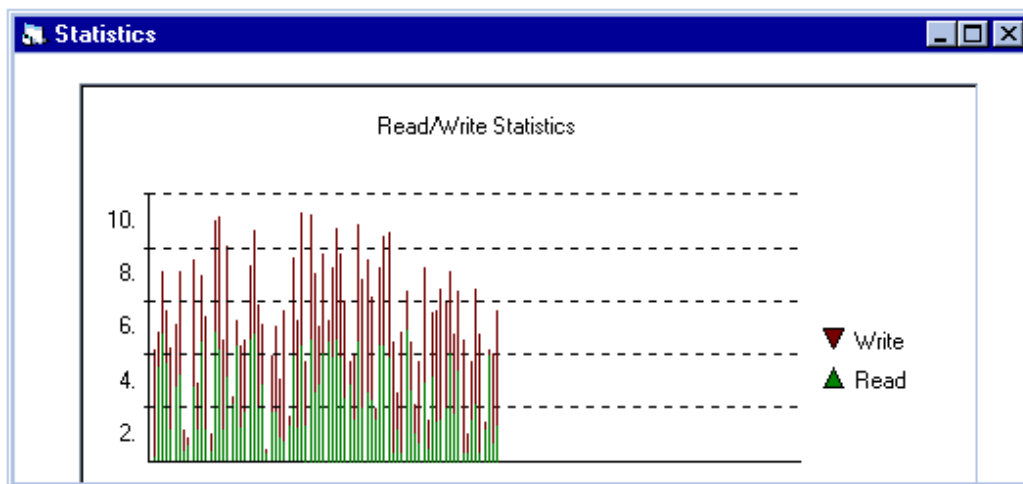
2. To scroll through the list, use the vertical scroll bars.

Monitoring Statistics

The GUI RAID Manager comes with a statistics monitoring feature to report on the overall performance of the disk array system. This feature provides a real-time report on the current throughput of the system, displaying the number of bytes being read and written per second. These values are displayed in a graphical format to facilitate reference.

To monitor the current data traffic on the disk array system

- Click on the **Statistics** command button or select the **Statistics** command from the **Open** menu. The Statistics window appears:



The Statistics window displays the amount of data being read from and written to the disk array system, in MB per second. Read values appear in green, and are displayed under Write values which appear in red.

NOTE: The program automatically adjusts the y-axis to fit the entire graph snugly in the Statistics window.

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Notification Configuration

A management program is almost useless without reporting or notification function ability. For this reason, the GUI RAID Manager enables you to configure notifications to occur in response to various disk array events. For example, if you configure an e-mail notification, the GUI RAID Manager will send an e-mail to selected computers on the network if the event (that just occurred) falls within the selected notification level. If the notification is detailed enough, the recipient can respond accordingly.

The notification function makes it possible to manage (or monitor) the disk array system even when the administrator is away from the manager station. When properly configured, this function can notify the administrator of event occurrences in the managed disk array system instantly even when he or she is at home, or in other places around the globe.

The GUI RAID Manager provides four methods of sending notifications:

- Pager
- Fax
- E-mail
- Broadcast

You can use any of the notification methods mentioned above; be reminded though that before you can use a particular method, you should have the proper hardware (like a modem for the pager notification) and software (like Windows NT for the broadcast message notification) installed in your system.

Notification Levels

The GUI RAID Manager classifies disk array events into three levels depending on their severity. These include Level 1, Level 2, and Level 3. The first event level covers notifiational events such as initialization of the controller and initiation of the rebuilding process; Level 2 includes events which require the issuance of warning messages; Level 3 is the highest level, and covers events the need immediate attention (and action) from the administrator. The following lists sample events for each level:

III. GUI RAID MANAGER

Level 1 Sample Events

- Controller Initialization Complete
- Rebuild Initiated
- Rebuild Complete
- Rebuild Failed
- Logical Drive Initialization Started
- Logical Drive Initialization Complete
- Logical Drive Initialization Failed

Level 2 Sample Events

- SCSI Target Select Timeout
- SCSI Target Phase/Signal Error
- SCSI Target Unexpected Disconnect
- SCSI Target Negotiation Error
- SCSI Target Timed Out
- SCSI Target Parity Error
- SCSI Bus Reset Issued
- SCSI Target Not Ready Error
- SCSI Target Media Error
- SCSI Target Hardware Error
- SCSI Target Unit Attention
- SCSI Target Unexpected Sense Data
- SCSI Target Block Reassignment Failure
- SCSI Target Unexpected Data Over/Underrun
- Drive SCSI Unrecognized Event

III. GUI RAID MANAGER

Level 3 Sample Events

- SCSI Drive Failure

You select the notification level from the RAID Manager Options dialog box. Selecting a relatively low level also selects the level(s) above it; thus, selecting Level 1 events, for example, will also select Levels 2 and 3 events. Since Level 3 is the highest level, selecting this will only select Level 3 events.

Configuring Notification Options

The RAID Manager Options dialog box allows you to enable or disable the notification function of the GUI RAID Manager, select the notification level, specify the event countdown limit, and stop all on-going pager notifications. Event countdown is the latency time between event occurrence and notification sequence initiation; this helps administrators to abort issuance of the notification sequence should they be on-site already.

To configure notification options

1. Select **Options** from the menu bar. The RAID Manager Options dialog box appears:



2. To enable the notification function of the GUI RAID Manager, select the **Enable** option button in the **Event Notification** field. To disable, select the **Disable** option button.

III. GUI RAID MANAGER

3. From the **RAID Event Level** drop-down list box, select the notification level. To select, click on the down-arrow button at the right of this box, then select the option you want. The **All Events** option includes Levels 1, 2, and 3 events; **Warning** covers Levels 2 and 3 events; **Alert** covers Level 3 events. Default notification level is **Alert**.
4. In the **Event Countdown Limit** text box, type in the latency time you need. This determines how long to wait after the occurrence of the event before actually sending the configured notification.
5. To stop all on-going pager notifications, check the **Stop All In-Progress Event Notification** check box. Since the pager notification function repeatedly sends the notification at a user-configurable time interval, you can stop subsequent transmissions with this check box. Be reminded though that this will only affect the current event; for succeeding events, this check box will revert to its default state of disabled (no check mark).

You can also stop the on-going pager notification to a specific recipient through the Personal Information: Pager dialog box. For information, see the *Configuring a Pager Notification* section.

6. Click OK to save the new notification option settings.

Configuring a Pager Notification

You can configure a pager notification that will send a message to a paging device when a specific disk array event occurs in the system.

It is recommended that a unique number be assigned to identify a specific disk array system. Since messages received on a pager may vary widely, you need to assign a number to facilitate reference. For example, if the disk array system in the Accounting Department of your company has 01131965 assigned to it, when this number is sent to the pager, the recipient knows that the message is from the disk array system in the Accounting Department.

For pager notification to work, you should have a modem connected to the RS-232 of your manager station. This modem should then be connected to a working telephone line. The communication parameters of both the modem and the RS-232 port on the computer should be set accordingly.

Modem Settings

The modem plays a vital role in the pager notification function for it acts as the medium between the manager station and the outside world. If not configured or installed properly, this method of notification will not work properly, preventing communication with any paging device.

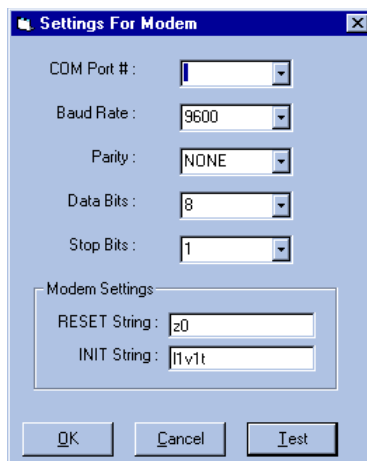
III. GUI RAID MANAGER

To configure the connected modem

1. From the **Notification** menu, select **Pager** → **Settings**.

-or-

Click on the **Notification** command button and then select **Pager** → **Settings**. The Settings for Modem dialog box appears:



2. In the **COM Port #** drop-down list box, select the COM port where you installed the modem. To select, click on the down-arrow button at the right of this box. Then, select the port you need.
3. In the **Baud Rate** drop-down list box, select the baud rate of the connected modem. Be sure to select the correct value here; otherwise, the modem will not work properly. To select, click on the down-arrow button and then select the value you need.
4. In the **Parity**, **Data Bits**, and **Stop Bits** drop-down list boxes, set the other pertinent communication parameters. Be sure that the values you specify correspond to the actual settings on the modem. By default, these parameters are set to no parity, 8 data bits, and 1 stop bit.
5. In the **Modem Settings** field, specify the modem reset and initial strings. These values vary with the type of modem you are using. For information about these parameters, check the documentation that came with your modem.
6. If you want to check to be sure the settings are correct, click on the **Test** button. If you receive a successful message, it means that the settings are correct and link with the modem is okay. If you receive an error message, check if the settings correspond to those assigned to the modem, or check the cable connecting the modem to your computer. Check also if the modem is turned on.
7. If everything is correct, click OK to save the settings.

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Selecting the Destinations

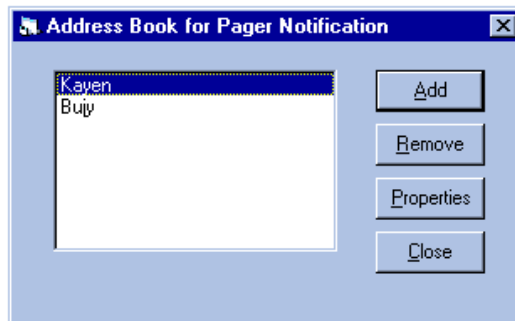
You can configure the pager notification function to send a notification to multiple pagers. This is achieved through the pager address book provided by the GUI RAID Manager. From this book, you can add and remove entries, and select which of these entries will receive notification from the system.

To maintain the pager address book

1. From the **Notification** menu, select **Pager** → **Address Book**.

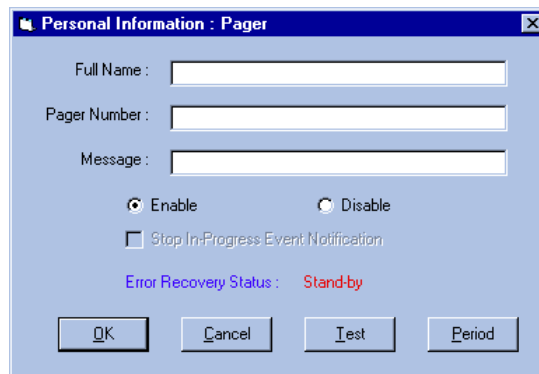
-or-

Click on the **Notification** command button and then select **Pager** → **Address Book**. The Address Book for Pager Notification dialog box appears:



The list box on the left of this dialog box displays the current contents of the pager address book.

2. Click on the **Add** button to add a new entry. The Personal Information: Pager dialog box appears:



3. In the **Full Name** text box, type in the name of the notification recipient. This only serves for reference purposes in the address book.

III. GUI RAID MANAGER

4. Enter the pager number in the **Pager Number** text box, including the area code. If you want to add a delay between the sending of this number and the sending of the actual message, add commas at the end of the pager number. The more commas you add, the longer the delay is. You can also add commas in front of the message.
5. Type in the appropriate message in the **Message** text box. If you want to add a delay between the sending of the pager number and the sending of this message, add commas in front of this value. The more commas you add, the longer the delay is. You can also add commas at the end of the pager number.
6. To enable pager notification for this particular entry, select the **Enable** option button. To disable, select the **Disable** option button.
7. If you want to check the reachability of the specified destination, click on the **Test** button. Then, check whether or not the notification is received successfully on the pager.
8. Click OK to add the specified destination to the address book.
9. Repeat the same procedure to add the other entries you want.
10. If you want to delete an entry from the address book, select it from the list box and then click on the **Remove** button.
11. If you want to modify the settings of a particular entry, select it and then click on the **Properties** button. From the displayed dialog box, modify the parameters you want.

Prescheduling Pager Notification

You can preschedule the pager notification for a particular destination to occur automatically at specific intervals. This notification will be sent regardless of the events occurring in the disk array system.

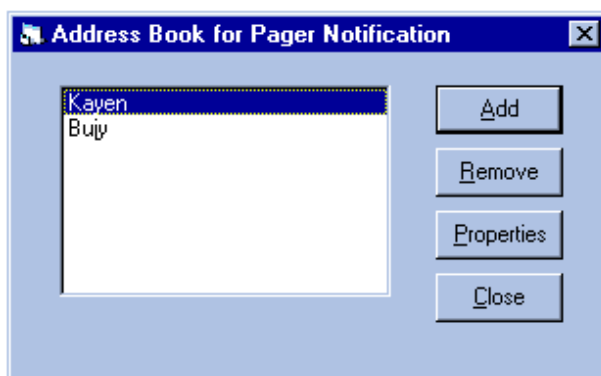
NOTE: The prescheduled pager notification does not affect in any way the configured pager notification — prescheduled pager notification is triggered by time, while configured pager notification is triggered by events based on the selected notification level.

To preschedule a pager notification

1. From the **Notification** menu, select **Pager** → **Address Book**.
-or-

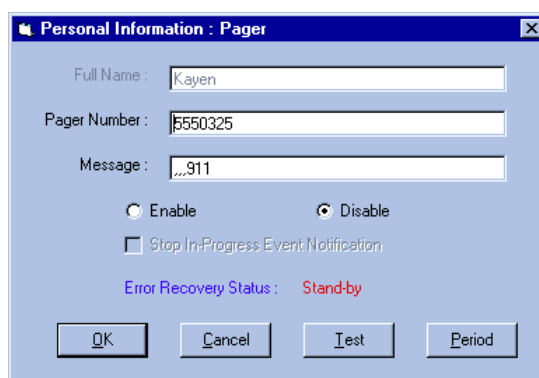
Click on the **Notification** command button and then select **Pager** → **Address Book**. The Address Book for Pager Notification dialog box appears:

III. GUI RAID MANAGER

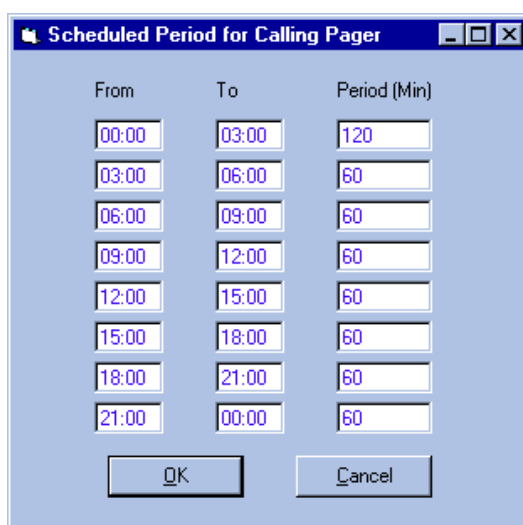


The list box on the left of this dialog box displays the current contents of the pager address book.

- From the list box, select the target entry, then click on the **Properties** button. The Personal Information: Pager dialog box appears:



- Click on the **Period** button. The Scheduled Period for Calling Pager dialog box appears:



III. GUI RAID MANAGER

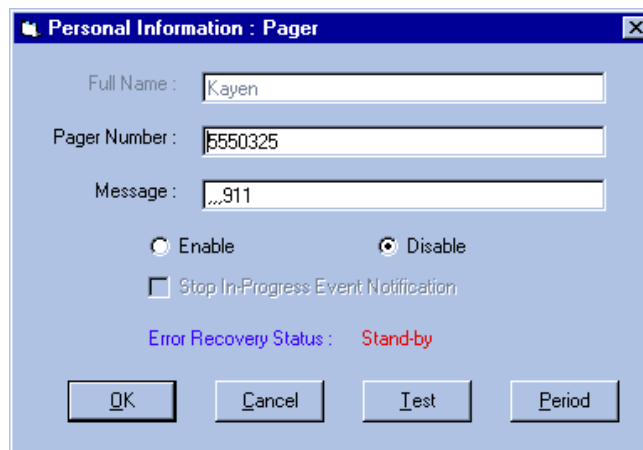
4. In the **From** and **To** text boxes, specify the time ranges you want.
5. For each time range, specify the notification frequency in the respective **Period (Min)** text box. For example, if you want to send a notification to the selected destination every hour from 1:00 AM up to 5:00 AM, set **From** and **To** to 0100 and 0500, respectively, and **Period (Min)** to 60.
6. Click OK.

Stopping On-going Pager Notification

Once initiated, the pager notification function will repeatedly send the notification to the destination pagers at a specific time interval. You have the option though to stop subsequent retransmissions for a particular destination, or for all destinations.

To stop any on-going pager notification to a particular destination

1. From the list box in the Address Book for Pager Notification dialog box, select the target entry, then click on the **Properties** button. The Personal Information: Pager dialog box appears displaying the current settings of the selected entry:



To determine if there is any on-going pager notification on the selected pager, check the **Error Recovery Status** field. If this field displays **Active**, it means that there is; if this displays **Stand-by**, it means that there is none.

2. If there is on-going pager notification and you want to stop subsequent retransmissions, check the **Stop In-Progress Event Notification** check box.
3. Click OK.

You can also stop on-going pager notification for all destination pagers through the RAID Manager Options dialog box. For information about this feature, see “Configuring Notification Options” previously discussed in this section.

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Configuring a Fax Notification

The GUI RAID Manager sends fax messages to specific destinations using the Microsoft Fax Exchange service. If your manager station does not have this service, install it first before using the fax notification function of the system. You will also need to connect a fax/modem to your computer. Installing a fax/modem can be a tricky process, so consult your operating system manuals for instructions on how to install your fax/modem software.

Since the GUI RAID Manager depends largely on Microsoft Fax Exchange for the delivery of fax messages, most fax notification parameters are configured through this software package. The GUI RAID Manager only allows you to select which users will receive the notification messages, and specify the notification message for each recipient.

For information on how to configure users for fax reception and other pertinent information about the Microsoft Fax Exchange, refer to the Microsoft Fax Exchange manual. Ensure that the Fax Exchange service is properly configured in your computer before using the fax notification function of the GUI RAID Manager.

Selecting the Destinations

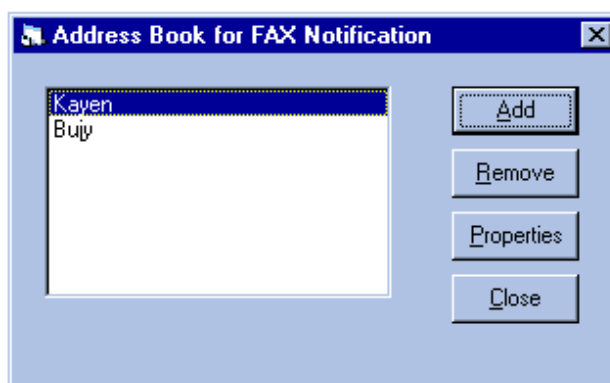
You can configure the fax notification function to send a notification to multiple users. This is achieved through the fax address book provided by the GUI RAID Manager. From this book, you can add and remove entries, and select which of these entries will receive notification from the system.

To maintain the fax address book

1. From the **Notification** menu, select **Fax** → **Address Book**.

-or-

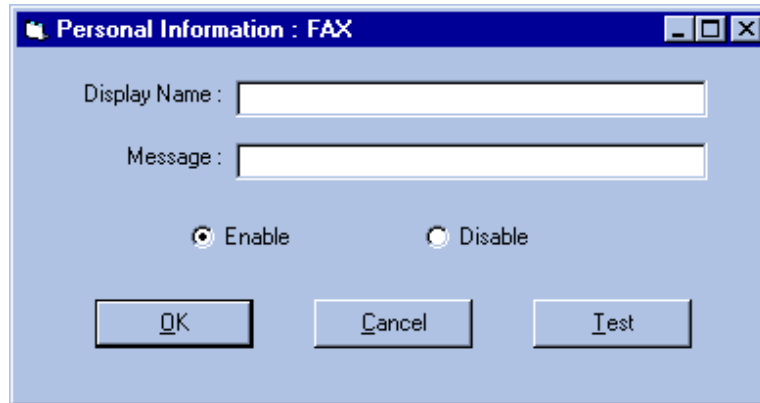
Click on the **Notification** command button and then select **Fax** → **Address Book**. The Address Book for Fax Notification dialog box appears:



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The list box on the left of this dialog box displays the current contents of the fax address book.

2. Click on the **Add** button to add a new entry. The Personal Information: Fax dialog box appears:



3. In the **Display Name** text box, type in the name of the user that will receive a fax notification. If you specify a name that does not have an account on Fax Exchange yet, the program will prompt you to create one for this particular user.
4. In the **Message** text box, specify the fax message you want to relay to the selected user.
5. To enable fax notification for this particular entry, select the **Enable** option button. To disable, select the **Disable** option button.
6. If you want to check the reachability of the selected user, click on the **Test** button.
7. Click **OK** to add the specified entry to the address book. The Choose Profile dialog box appears on the screen.
8. To accept the MS Fax Exchange default setting, click **OK**. To choose another profile, click the **New** button. For assistance on how to proceed from here, refer to your Windows manual.
9. Repeat the same procedure to add the other entries you want.
10. If you want to delete an entry from the address book, select it from the list box and then click on the **Remove** button.
11. If you want to modify the settings of a particular entry, select it and then click on the **Properties** button. From the displayed dialog box, modify the parameters you want.
12. To put the Fax notification function into effect, start the MS Fax Exchange.

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Configuring an E-Mail Notification

The GUI RAID Manager sends e-mail messages to specific people on the network or Internet using the Microsoft Mail and/or Microsoft Internet Mail services in Microsoft Exchange. You will need these services to enable the e-mail notification function of the GUI RAID Manager. In addition to this, you will also need a network interface card or modem to connect your manager station to the network or Internet.

Since the GUI RAID Manager depends largely on services mentioned above for the delivery of e-mail messages, most e-mail notification parameters are configured through these packages. The GUI RAID Manager only allows you to select the users who will receive the notification messages, and specify the notification message for each recipient.

For information on how to configure users for e-mail reception and other pertinent information about the Microsoft Mail and Microsoft Internet Mail services in Microsoft Exchange, refer to the Microsoft Exchange manual. Be sure that these services are configured properly, and functioning before using the e-mail notification function of the GUI RAID Manager.

Selecting the Destinations

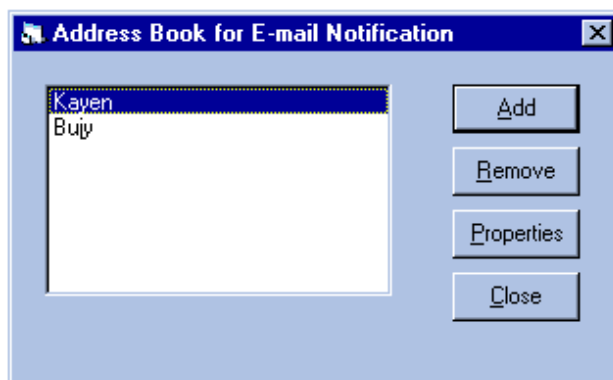
You can configure the e-mail notification function to send a notification to multiple users. This is achieved through the e-mail address book provided by the GUI RAID Manager. From this book, you can add and remove entries, and select which of these entries will receive notification from the system.

To maintain the e-mail address book

1. From the **Notification** menu, select **E-mail** → **Address Book**.

-or-

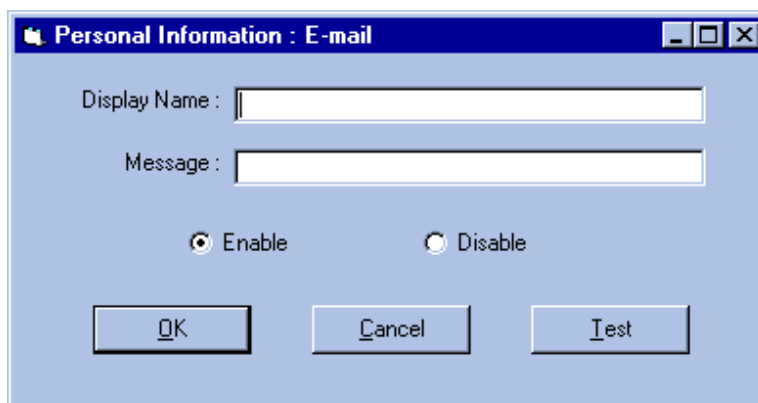
Click on the **Notification** command button and then select **E-mail** → **Address Book**. The Address Book for E-mail Notification dialog box appears:



The list box displays the current contents of the e-mail address book.

III. GUI RAID MANAGER

2. Click on the **Add** button to add a new entry. The Personal Information: E-mail dialog box appears:



3. In the **Display Name** text box, type in the name of the user that will receive an e-mail notification. If you specify a name that does not have a network account yet, Exchange will prompt you to create one for this particular user.
4. In the **Message** text box, specify the message you want to send to the selected user.
5. To enable e-mail notification for this particular entry, select the **Enable** option button. To disable, select the **Disable** option button.
6. If you want to check the reachability of the selected user, click on the **Test** button.
7. Click **OK** to add the specified entry to the address book. The Choose Profile dialog box appears on the screen.
8. To accept the MS Exchange default setting, click **OK**. To choose another profile, click the **New** button. For assistance on how to proceed from here, refer to your Windows manual.
9. Repeat the same procedure to add the other entries you want.
10. If you want to delete an entry from the address book, select it from the list box and then click on the **Remove** button.
11. If you want to modify the settings of a particular entry, select it and then click on the **Properties** button. From the displayed dialog box, modify the parameters you want.
12. To put the E-mail notification function into effect, start the Microsoft Messaging (Exchange).

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Configuring a Broadcast Message Notification

The GUI RAID Manager provides a way to notify selected users on the network by sending broadcast messages to their respective stations. This notification method only works on Windows NT stations with the Windows NT Messenger service installed. If your system does not have these programs, you will not be able to use this method. In addition to these programs, your station also needs a network interface card to connect to an existing network. Be sure that the adapter is properly installed and configured, and the correct driver is used.

For information on how to configure users for broadcast message reception in Windows NT and other pertinent information about this software, refer to the Windows NT manual.

Selecting the Destinations

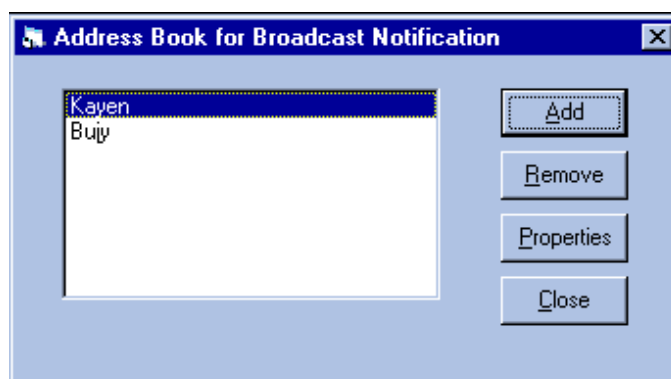
You can configure the broadcast message notification function to send messages to multiple users. This is achieved through the broadcast message address book provided by the GUI RAID Manager. From this book, you can add and remove entries, and select which of these entries will receive notification from the system.

To maintain the broadcast message address book

1. From the **Notification** menu, select **Broadcast** → **Address Book**.

-or-

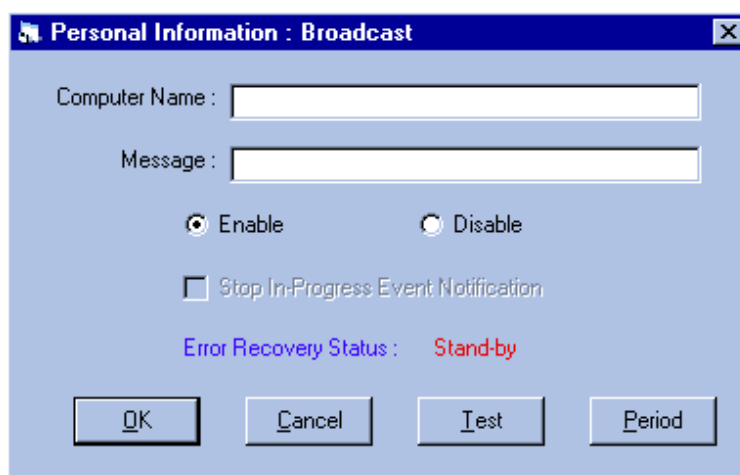
Click on the **Notification** command button and then select **Broadcast** → **Address Book**. The Address Book for Messenger Information dialog box will appear:



The list box on the left of this dialog box displays the current contents of the broadcast message address book.

2. Click on the **Add** button to add a new entry. The Personal Information: Broadcast dialog box will appear:

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3. In the **Computer Name** text box, type in the name of the computer that will receive a broadcast message. Be sure that the name you specify has a network account with Windows NT.
4. In the **Message** text box, specify the message you want to send to the selected computer.
5. To enable broadcast message notification for this particular entry, select the **Enable** option button. To disable, select the **Disable** option button.
6. If you want to check the reachability of the selected computer, click on the **Test** button.
7. Click **OK** to add the specified entry to the address book.
8. Repeat the same procedure to add the other entries you want.
9. If you want to delete an entry from the address book, select it from the list box and then click on the **Remove** button.
10. If you want to modify the settings of a particular entry, select it and then click on the **Properties** button. From the displayed dialog box, modify the parameters you want.

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Prescheduling Broadcast Message Notification

You can preschedule the broadcast message notification for a particular destination to occur automatically at specific intervals. This notification will be sent regardless of the events occurring in the disk array system.

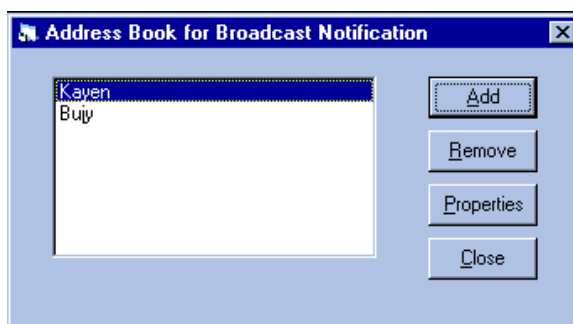
NOTE: The prescheduled broadcast message notification does not affect in any way the configured broadcast message notification — prescheduled broadcast message notification is triggered by time, while configured broadcast message notification is triggered by events based on the selected notification level.

To preschedule a broadcast message notification

1. From the **Notification** menu, select **Broadcast** → **Address Book**.

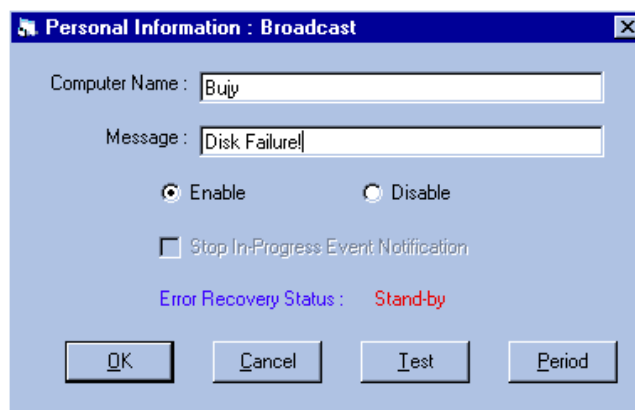
-or-

Click on the **Notification** command button and then select **Broadcast** → **Address Book**. The Address Book for Messenger Information dialog box appears:



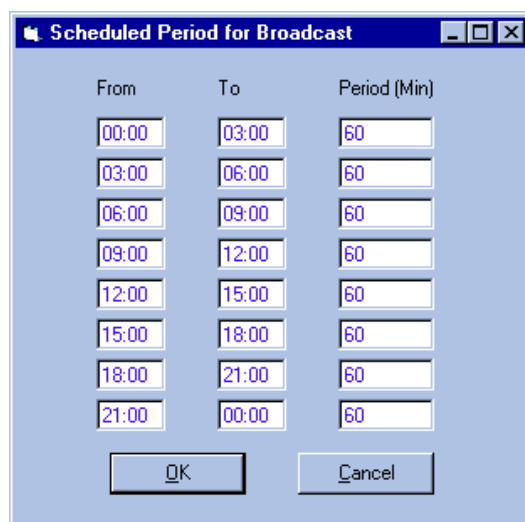
The list box on the left of this dialog box displays the current contents of the broadcast message address book.

2. From the list box, select the target entry, then click on the **Properties** button. The Personal Information: Broadcast dialog box appears:



III. GUI RAID MANAGER

- Click on the **Period** button. The Scheduled Period for Broadcast dialog box appears:



- In the **From** and **To** text boxes, specify the time ranges you want.
- For each time range, specify the notification frequency in the respective **Period (Min)** text box. For example, if you want to send a notification to the selected destination every hour from 1:00 AM up to 5:00 AM, set **From** and **To** to 0100 and 0500, respectively, and **Period (Min)** to 60.
- Click OK.

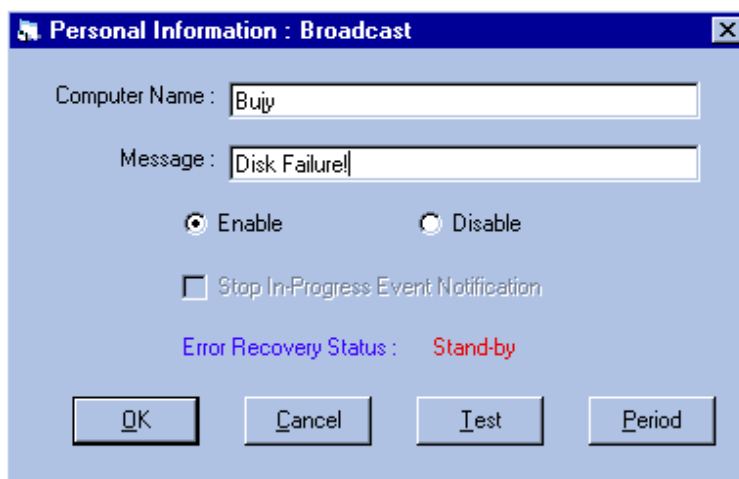
III. GUI RAID MANAGER

Stopping On-going Broadcast Notification

The broadcast message notification function automatically retransmits the message to a destination computer until an ACK (acknowledgment) message is received from it. This ensures message reception by the intended administrator. If, however, the destination computer is off-line, you can terminate subsequent message retransmissions to cut back in the processing time of your computer, and also to lessen traffic on the network.

To stop message retransmission to a particular destination

1. From the list box in the Address Book for Messenger Information dialog box, select the target entry, then click on the **Properties** button. The Personal Information: Broadcast dialog box appears displaying the current settings of the selected entry:



To determine if there is any on-going broadcast message notification to the selected computer, check the **Error Recovery Status** field. If this field displays **Active**, it means that there is; if this displays **Stand-by**, it means that there is none.

2. If there is on-going broadcast message notification and you want to stop subsequent retransmissions, check the **Stop In-Progress Event Notification** check box.
3. Click OK.

III. GUI RAID MANAGER

Running in Demo Mode

The GUI RAID Manager provides a Demo program for use as a learning tool and for demonstration purposes. This program allows you to experiment with various disk array configurations and check how the system responds and operates under various conditions.

The Demo program supports all management functions available in the actual GUI RAID Manager, making management of the virtual disk array system as real as possible. You can select the controller for your virtual system and drive channels, the number of physical drives, configure your logical drives and volumes, partition logical volumes, and map partitions to hosts. You can even fail drives to check how the particular system configuration reacts under such a condition.

Starting the Demo Program

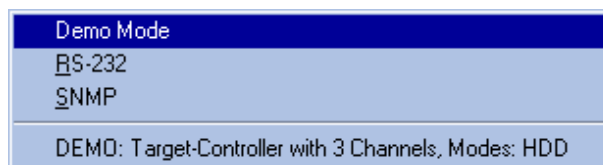
You can use the Demo program any time, even without a real disk array system (that is, a controller and SCSI drives) installed in your computer. Since the Demo program only simulates management of a disk array system, you will not need any of these devices.

To Start the Demo Program

1. Start the GUI RAID Manager by performing the appropriate startup procedure described in the *Starting the GUI RAID Manager* section of “Basic Operations at Startup.”
2. From the **File** menu, select **Connect**.

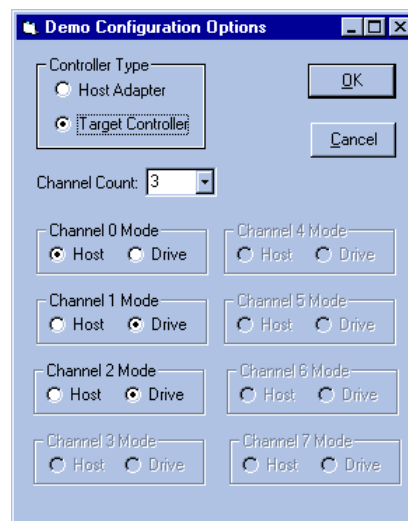
-or-

Click on the **Connect** command button. The following submenu appears on the screen:



III. GUI RAID MANAGER

3. Select **Demo Mode**. The Demo Configuration Options dialog box appears:



4. In the **Controller Type** section, select the **Host Adapter** option button for the ASUS PCI-DA2100 RAID controller.

NOTE: The ASUS PCI-DA2100 does not support the “Target Controller” option because it does not support the SCSI-to-SCSI controller function.

5. From the **Channel Count** drop-down list box, select the total number of channels you want to assign to the selected controller. To select, click on the down-arrow button at the right of the box. Then, select the option you want from the displayed list. Maximum setting for each controller is eight.

As you select a value, the program enables the corresponding number of **Channel x Mode** (where x is the channel number) sections below.

6. If you selected **Host Adapter** in step 4, proceed to the next step; otherwise, select the channel mode for each enabled **Channel x Mode** section. To configure the channel as a host channel, select the **Host** option button; to configure it as a drive channel, select **Drive**.
7. Click OK.

The Demo program creates a virtual disk array system based on the configuration specified in the Demo Configuration Options dialog box. For each drive channel, the program places four SCSI drives, which you can increase if you want by simply scanning in drives from unoccupied connectors.

You may now start managing the selected disk array system using the available commands. Try experimenting on various commands to see how the system reacts, and also to help clarify the use of such commands. All disk array icons on the screen respond accordingly - just like a real system. For information on disk array management, see *Array Management*.

III. GUI RAID MANAGER

NOTE: The management operations you perform and settings you specify in Demo mode do not have any effect on the actual disk array system installed in your computer, assuming you have one installed. Everything you do under the Demo mode is only a simulation.

Failing a Drive

The Demo program comes with a Fail One Drive function that allows you to fail a drive (that is, one physical drive) from any existing logical drives in the system. This function is particularly useful in testing the response of the selected disk array system when there is failure in one of its drives.

During a drive failure, the system responds differently depending on the current array configuration. The following describes the possible scenarios:

- ☒ If there is a spare drive assigned to the selected logical drive, the virtual controller will automatically start data rebuilding in the background onto the spare drive.
- ☒ If there is no spare drive assigned to the selected logical drive, the failed drive must be replaced and rebuilding must be initiated manually. If the replacement drive is installed on a different connector, you will need to scan in first the drive and assign it as a spare drive for the affected logical drive before rebuilding can be initiated.

While the logical drive is being rebuilt, its respective icon on the Logical Drives window reflects the rebuilding status. The Physical Drives window also reflects the rebuilding status through the assigned spare drive.

To fail a drive

1. Display the Logical Drives window by clicking on the **Logical Drives** command button or selecting the **Logical Drives** command from the **Open** menu.
2. From the Logical Drives window, double-click the right mouse button on the target logical drive. The following menu will appear on the screen:



III. GUI RAID MANAGER

3. Select **Fail One Drive**.

The Demo program fails one of the drives belonging to the selected logical drive. The Physical Drives window, and the Enclosure window if implemented, displays which drive has failed. The Logical Drives window displays the selected logical drive in degraded mode.

The system will then react to this situation based on its current configuration; that is, whether or not a spare drive exists. For information, see the discussion earlier in this section.

If you want to fail drives from other existing logical drives, follow the same procedure.

Exiting the Demo Program

If you are done with the Demo program and you want to manage the real disk array system installed in your computer, quit from the Demo program and then connect to your disk array system. Quitting from the Demo program only requires disconnecting from it.

Exiting from the Demo program

✕ From the **File** menu, select **Disconnect**.

All toolbar buttons, except the **Connect** and **Notification** command buttons, turn gray signifying termination of the Demo program.

III. GUI RAID MANAGER

Appendix A

Command Summary

This appendix describes the available commands in the GUI RAID Manager disk array management program. These commands are presented either in menus or command buttons.

Menu Commands

This section lists and explains in tabular form the commands available from the menus in the menu bar. Keyboard strokes for commands that can also be executed from the keyboard are indicated in the tables inside angle brackets. For example:

Connect <C>

means that you can connect to a disk array system by selecting Connect from the File menu or by pressing the C key on your keyboard.



File Open View Window Notification Options Help

File Menu Commands

Command	Description
Connect < <u>C</u> >	Connects the GUI RAID Manager station to a particular disk array system for management. This command has the same function as the Connect/Open command button found on the toolbar.
Disconnect < <u>D</u> >	Disconnects from the current disk array system, terminating the current management session with the device.
Exit < <u>X</u> >	Exits the GUI RAID Manager.

Open Menu Commands

Command	Description
Enclosure < <u>E</u> >	Displays the Enclosure window. This command has the same function as the Enclosure command button found on the toolbar.
Physical Drive < <u>P</u> >	Displays the Physical Drives window. This command has the same function as the Physical Drives command button found on the toolbar.

III. GUI RAID MANAGER

Command	Description
Logical Drive <L>	Displays the Logical Drives window. This command has the same function as the Logical Drives command button found on the toolbar.
Logical Volume <V>	Displays the Volume window. This command has the same function as the Logical Volume command button found on the toolbar.
Host LUN Assignment <H>	Displays the Host LUN Assignment window. This command has the same function as the Host LUN Assignment command button found on the toolbar.
Event Log <L>	Displays the Event Log window. This command has the same function as the Event Log command button found on the toolbar.
Statistics <S>	Displays the Statistics window. This command has the same function as the Statistics command button found on the toolbar.
View Menu Commands	
Command	Description
Toolbar <T>	Toggles between displaying and hiding the toolbar. To display the toolbar, select this option until a check mark "Ö" appears next to it; to hide, remove the displayed check mark.
StatusBar <S>	Toggles between displaying and hiding the status bar. To display the status bar, select this option until a check mark "Ö" appears next to it; to hide, remove the displayed check mark.
Window Menu Commands	
Command	Description
Tile In-Sequence <S>	A command specifically designed for disk array management. This command arranges the displayed windows horizontally based on their uses, with each window reduced to fit all elements within its width. Has the same function as the Tile In-Sequence command button found on the toolbar.

III. GUI RAID MANAGER

Cascade <C>	A standard Windows command that cascades windows in such a way that they overlap with each other, making their title bars visible.
Tile Horizontal <H>	A standard Windows command that arranges windows into smaller sizes, fitting them horizontally next to each other.
Tile Vertical <V>	A standard Windows command that arranges windows into smaller sizes, fitting them vertically next to each other.

Notification Menu Commands

Command	Description
Pager <P>	Configures pager notification.
Fax <F>	Configures fax notification.
E-Mail <E>	Configures e-mail notification.
Broadcast 	Configures broadcast notification.

Options Command

Command	Description
Options	This command allows you to configure the system notification function. From this command, you can enable or disable the notification function, select the event severity, specify the event countdown limit, and stop all on-going pager notifications.

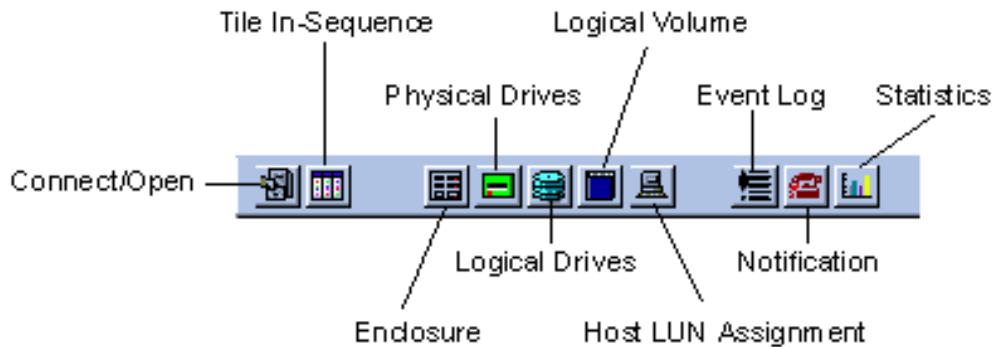
Help Menu Commands

Command	Description
Contents	Displays the GUI RAID Manager on-line help manual.
About RAID Manager	Displays some information about the GUI RAID Manager program.

III. GUI RAID MANAGER

Command Buttons

This section describes the various command buttons provided by the system to facilitate execution of commonly used commands. These buttons can be found on the toolbar.



Command Button	Description
Connect/Open	Connects your GUI RAID Manager station to a particular disk array system for management. Has the same function as the Connect command in the File menu. After connection to a disk array system has been established successfully, this button becomes the Open button, providing the same function as Open in the menu bar.
Tile In-Sequence	A command button specifically designed for disk array management. This button arranges the displayed windows horizontally based on their uses, with each window reduced to fit all elements within its width. Has the same function as the Tile In-Sequence command found in the Window menu.
Enclosure	Displays the Enclosure window. This button has the same function as the Enclosure command in the Open menu.
Physical Drives	Displays the Physical Drives window. Has the same function as the Physical Drive command found in the Open menu.

III. GUI RAID MANAGER

Logical Drives	Displays the Logical Drives window. Has the same function as the Logical Drive command found in the Open menu.
Logical Volume	Displays the Volume window. This button has the same function as the Logical Volume command in the Open menu.
Host LUN Assignment	Displays the Host LUN Assignment window. Has the same function as the Host LUN Assignment command found in the Open menu.
Event Log	Displays the Event Log window. This button has the same function as the Event Log command found in the Open menu.
Notification	Allows you to configure system notifications. This button provides the same function as Notification in the menu bar.
Statistics	Displays the Statistics window. Has the same function as the Statistics command in the Open menu.

III. GUI RAID MANAGER

Appendix B

Troubleshooting

This appendix provides troubleshooting tips for common problems you may encounter while using the GUI RAID Manager. These include the following topics:

- ☒ Startup errors
- ☒ Notification errors
- ☒ SNMP errors

Startup Errors

Error Message1: *Error encountered during OPEN: Unable to Connect to Controller*

Cause1: The GUI RAID Manager was not able to establish a link with the target disk array system. This may be caused by one (or more) of the following: a wrong baud rate or communication port setting, no disk array controller is installed, bad RS-232 cable, bad connection, or no null modem is installed.

Solution1: Specify the correct baud rate and/or COM port in the Settings of RS-232 Interface dialog box. Ensure that the settings you specify correspond to the actual settings on the RS-232 port. Check also for the required hardware and cable connection.

Error Message2: *Error encountered during OPEN: Selected Port Not Available*

Cause2: The COM Port you selected does not exist in your system.

Solution2: Specify the correct COM port in the Settings of RS-232 Interface dialog box. Be sure to select the port to which the disk array system is actually connected.

Error Message3: *Error encountered during OPEN: Selected Port Already in Use*

Cause3: The selected COM port is in use by another program or device.

Solution3: Select an unused COM port from the Settings of RS-232 Interface dialog box and connect the controller to this COM port. Or, locate the program or device that is using the port and disable or remove it.

III. GUI RAID MANAGER

Error Message4: *Error in loading DLL*

Cause4: The GUI RAID Manager cannot find one of its components.

Solution4: Re-install the GUI RAID Manager.

Notification Errors

Error Condition1: Pager notification does not work

Cause1: This error can be caused by one (or more) of the following: no modem is connected, the modem is not properly connected to the RS-232 port of the computer, modem is not connected to a telephone line, bad telephone line, wrong pager number, selected COM port is currently in use by another program or device, or modem initialization string is not properly set.

Solution1: Check the modem, the modem's RS-232 connection, telephone line, etc. Check also if the specified pager number is correct. If the selected COM port is in use by another program or device, select a different COM port from the Settings for Modem dialog box. Or, locate the program or device that is using the port and disable or remove it. Check the documentation that comes with the modem for information on how to set properly the modem initialization string. To check whether or not your modem settings are correct, use the **Test** button on the mentioned dialog box.

Error Condition2: Some numbers are missing from the message displayed on the pager

Cause2: There is not enough delay between the start of dialing and the actual sending out of the message.

Solution2: Add commas between the pager number and the message number in the Personal Information: Pager dialog box. You may place the commas at the end of the pager number, or in front of the message number. If your pager number is 1234567, for example, and the message you want to send is 911, you can specify one of the following:

1234567 , , ,(in the **Pager Number** text box)

-or-

, , , 911(in the **Message** text box)

III. GUI RAID MANAGER

You can specify as many commas as you want; be reminded though that as you increase the number of commas, the more delay you are adding between these processes. Use the **Test** button on the mentioned dialog box to check whether or not the pager notification is functioning properly.

Error Condition3: Fax notification does not work

Cause3: This error can be caused by one (or more) of the following: the Microsoft Fax Exchange is not properly installed in your system, there is no modem connected, modem is not properly connected to the RS-232 port of the computer, modem is not connected to a telephone line, bad telephone line, Fax transmission is not supported by the modem (you should be using a Fax/modem), wrong Fax number, selected COM port is currently in use by another program or device, or modem is configured incorrectly.

Solution3: Install the Microsoft Fax Exchange (if not yet installed), check to verify that the Microsoft Fax Exchange settings are correct, check the system modem settings by selecting the Modem Settings option from the Control Panel, check the connected modem for any connection related errors, and check the Fax number. If the selected COM port is currently in use by another program or device, select another port, or disable or remove the program (or device). Use the **Test** button on the Personal Information: Fax dialog box to check the Fax notification functionality.

Error Condition4: E-mail notification does not work

Cause4: This error can be caused by one (or more) of the following: the Microsoft Exchange, Microsoft Mail and/or Microsoft Internet Mail is not properly installed in your system, there is problem with your Internet connection, E-mail address is not correct, or the recipient's Mail Server is not active.

Solution4: Check the Microsoft Exchange, Mail and Internet Mail settings, check the Internet connectivity of the local host (specifically the network interface card and driver programs), and E-mail address. Use the **Test** button on the Personal Information: E-mail dialog box to check the reachability of the selected destinations.

III. GUI RAID MANAGER

Error Condition5: LAN Broadcast notification does not work

Cause5: This error can be caused by one (or more) of the following: the system you are using is not a Windows NT station, the Windows NT Messenger Service is not properly installed, the local host is not properly connected to the network, destination station is not connected to the LAN, or the computer name is not set.

Solution5: Check that you have the required software installed in your system. Check also the Internet connectivity of the local host (specifically the network interface card and driver programs) and the destination computers, and computer name. Use the **Test** button on the Personal Information: Message dialog box to check the reachability of the selected destinations.

SNMP Errors

Error Message1: *SNMP service not installed*

Cause1: The SNMP service of the local host or the remote manager station is not installed.

Solution1: Install the appropriate SNMP service for the environment you are using for the local host or the remote manager station. You can get this service from the software provider; that is, Microsoft for Windows NT and Windows 95, and Novell for NetWare.

Error Message2: *Failed to open SNMP agent comm*

Cause2: This error can be caused by one (or more) of the following: the SNMP agent is not reachable over the LAN or WAN, the SNMP service is not properly installed on the local host and/or the remote manager station, the GUI RAID Manager's SNMP agent software is not installed on the local host, or the disk array controller is not installed or properly connected.

Solution2: Check the LAN/WAN connections, install the required software to the local host and/or remote manager station, check the SNMP service settings, and check that the controller is properly installed and connected.

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ASUS® PCI-DA2100
PCI-to-SCSI RAID Controller

PART III
DRIVER INSTALLATION

I. DOS ASPI

Installing the DOS ASPI Driver

The ASUS PCI-DA2100 RAID controller can be used as a host adapter for SCSI tape drives and CD-ROM drives. To access such devices under DOS, it is necessary to install the ASUS PCI-DA2000 Series DOS ASPI Manager device driver.

The ASUS PCI-DA2000 Series DOS ASPI Manager allows DOS/Windows applications and OS Installation Programs to access CD-ROM drives or SCSI tape drives that are connected to and properly configured under the ASUS PCI-DA2100 RAID controller. The ASUS PCI-DA2000 Series ASPI Manager and CD-ROM Driver are installed as a device driver under DOS by adding the following command lines to the CONFIG.SYS and AUTOEXEC.BAT files in the root directory of the boot drive as follows:

In CONFIG.SYS file

```
DEVICE= [path1]I2DOSASP.SYS
```

```
DEVICE = [path1]ASPICDRM.SYS /d:[driver signature]
```

```
LASTDRIVE = [logical drive]
```

In AUTOEXEC.BAT file

```
[path2]MSCDEX /d:[driver signature]
```

where:

[path1] – A complete DOS path string including logical drive identifier and subdirectories indicating where the file I2DOSASP.SYS can be found.

[path2] – A complete DOS path string including logical drive identifier and subdirectories indicating where the Microsoft CD-ROM extension program, MSCDEX.EXE, can be found.

[driver signature] – The signature for CD-ROM driver, the driver signature specified in CONFIG.SYS must match the driver signature specified in AUTOEXEC.BAT mscdex command.

[logical drive] – The next alphabet of the last logical drive been assigned to hard disk drives.

I. DOS ASPI

Example:

If there is a subdirectory on the C:\DA2000 containing the ASUS PCI-DA2000 Series ASPI Manager Manager file I2DOSASP.SYS and CD-ROM Driver file ASPICDRM.SYS, a subdirectory on the C:\DOS containing the Microsoft CD-ROM extension program MSCDEX.EXE, and logical drives been assigned to Hard disk are C: and D:, then the following lines should be added to the CONFIG.SYS and AUTOEXEC.BAT files respectively:

In CONFIG.SYS file

```
DEVICE=C:\DA2000\I2DOSASP.SYS  
DEVICE = C:\DA2000\ASPICDRM.SYS /D:mscd001  
LASTDRIVE = E
```

In AUTOEXEC.BAT file

```
C:\DOS\MSCDEX /D:mscd001
```

Note that there are no restrictions with regard to where these lines are added in the CONFIG.SYS. Also note that the ASUS PCI-DA2000 Series ASPI Manager will automatically select an optimal configuration so no load line options are needed.

The ASUS PCI-DA2000 Series ASPI Manager and CD-ROM Driver can be “loaded high” should it be desirable to conserve system memory space below 640K. Consult the manual for the particular memory manager installed on your system for details on how to install a device driver “high”.

II. NETWARE

Installing NetWare Drivers

The ASUS PCI-DA2000 Series drivers diskette contains the following driver files for NetWare v3.1x, v4.0x and v4.1 respectively:

In sub-directory `network\v3_1x`:

- ASUSASP.DSK: ASPI manager for NetWare v3.1x
- DA2000.DDI: Installation Information File.
- DA2000.DSK: Disk Driver for NetWare v3.1x

In sub-directory `network\v4_x`:

- ASUSASP.DSK: ASPI manager for Netware v4.0x and v4.1
- DA2000.DDI: Installation Information File.
- DA2000.DSK: Disk Driver for NetWare v4.0x and v4.1.

NetWare v3.1x Driver

Follow these procedures to install ASUS PCI-DA2000 drivers for Netware v3.11 or v3.12.

- 1 Use ASUS PCI-DA2000 Series BIOS Configuration Utility to disable ISA Mailbox Emulation mode (default is *disabled*). To do this, at system bootup, press **[Ctrl-I]**, select Configure Card option, then change IO Port Address to DISABLED.
- 2 Use ASUS Text RAID Manager to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs. **Note that SCSI ID 7 is reserved for the ASUS PCI-DA2100 and thus no logical drives or devices should be mapped to this SCSI ID.**
- 3 Plug one or up to four ASUS PCI-DA2000's Series into host PCI slots then power on. ASUS PCI-DA2000 Series BIOS will show the following messages on the screen for each installed ASUS PCI-DA2000 Series:

```
ASUS PCI-DA2000 Series (PCI-TO-SCSI RAID) BIOS v1.11
PCI Bus # = 00 Device # = 0A Port = E800 IRQ = 11 EDORAM = 4MB FW=v1.12
!! Press <Ctrl><I> for Configuration Utility, <Q> to Skip !!
```

- 4 Make sure the RAID configuration is properly set. (Refer to the section on *Text RAID Manager*).

II. NETWARE

- 5 Follow the instructions in the Netware User's Manual to install the server.
- 6 Run the NetWare v3.11 or v3.12 SERVER.EXE program to start the server.
- 7 At the system console prompt, use load command to load the ASUS PCI-DA2000 Series driver by typing *load DA2000.DSK[Enter]*
- 8 System console will display the following messages on the screen:

```
Loading module DA2000.DSK
ASUS PCI-DA2000 Disk Driver for NetWare v3.1x
Version 1.11c November 3, 1995
Auto-loading module ASUSASPI.DSK
ASUS ASPI Manager for NetWare v3.1x, v4.0x and v4.1
Version 1.11b October 27, 1995
Supported Slot values are 11
Slot: 11
```

The slot number (value) is auto-detected by ASUS PCI-DA2000 Series driver according to which PCI slot the ASUS PCI-DA2000 Series been plugged into. Write down the slot number for later using in STARTUP.NCF.

- 9 At this point, press *[Enter]*. If ASUS PCI-DA2000 Series driver installs successfully, the system console will display the following messages on the screen:

```
PCI Bus # = 0, Device # = 9, Port = E400, IRQ = 10
ASUS Disk Driver Installed Successfully
```

- 10 Load the driver "DA2000.DSK" once for each installed ASUS PCI-DA2000. This driver supports up to four ASUS PCI-DA2000 Series Controller.
- 11 After each instance of the ASUS PCI-DA2000 Series driver has been loaded successfully, continue with the operations of Novell NetWare server described in NetWare User's Manual.

Notes:

The correct syntax in STARTUP.NCF file to load the ASUS PCI-DA2000 Series drivers is similar to the following:

```
# load DA2000 slot = x
```

x is the slot number of slot into which the ASUS PCI-DA2000 Series been plugged. The slot number is auto-detected by ASUS PCI-DA2000 Series driver and shown on the system console screen during ASUS PCI-DA2000 Series driver loading.

II. NETWARE

NetWare V4.0x/v4.1 Driver

- 1 Use ASUS PCI-DA2000 Series BIOS Configuration Utility to disable ISA Mailbox Emulation mode(default is disabled). To do this, at system bootup, press **[Ctrl-I]**, select Configure Card option, then change IO Port Address to DISABLED.
- 2 Use ASUS RAID Manager or RS-232 Terminal Interface Operation to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs. **Note that SCSI ID 7 is reserved for the ASUS PCI-DA2000 Series adapter and thus no logical drives or devices should be mapped to this SCSI ID.**
- 3 For installation of a new server, follow these procedures:
- 4 If your Netware installation package is a CD-ROM version and the CD-ROM Drive used to perform the installation is connected to an ASUS PCI-DA2000 Series, make sure the ASUS PCI-DA2000 Series ASPI manager “I2DOSASP.SYS”, CD-ROM driver “ASPICDRM.SYS”, and Microsoft CD-ROM extension program “MSCDEX.EXE” are specified in DOS files CONFIG.SYS and AUTOEXEC.BAT.
- 5 Plug up to four ASUS PCI-DA2000 Series into host PCI slots then power on. ASUS PCI-DA2000 Series BIOS will show the following messages on the screen for each installed ASUS PCI-DA2000 Series:

```
ASUS PCI-DA2000 Series (PCI-TO-SCSI RAID) BIOS v1.11
PCI Bus # = 00 Device # = 0A Port = E800 IRQ = 11 EDORAM = 4MB FW=v1.12
!! Press <Ctrl><I> for Configuration Utility, <Q> to Skip !!
```

- 6 Make sure the RAID configuration is properly set. (Refer to section 4 Text RAID Manager and RS-232 Terminal Interface Operation).
- 7 Change to sub-directory where the Netware install program locate, then typing install and press Enter.

Example:

Assume the CD-ROM is mapped to DOS logical drive D, type the following at the DOS prompt:

```
CD D:\NETWARE.40\ENGLISH
install
```

II. NETWARE

8 Follow the instructions in the Netware User's Manual until following screen appears:

NetWare Server Installation v4.x
NetWare loadable Module

Load Disk Driver

Choose a disk driver that corresponding to the disk controller hardware in this server. Repeat this step for additional drivers.

▲	ISADISK.DSK	Novell ISADISK (AT Compatible) Driver
	MNS16S.DSK	Mountain Network Solutions, Inc - SCSI Controller Driver
	MNS8MM.DSK	Mountain Network Solutions, Inc - SCSI 8MM Device Driver
	MNSDAT.DSK	Mountain Network Solutions, Inc - SCSI DDS DAT Device Driver
▼	PM11NW40.DSK	DPT ISA SCSI HBA Driver

Use this driver with ESDI, MFM, and ST-506 drives that have adapter boards using the standard AT disk interface. The ISADISK driver can use controllers at both the primary and the secondary addresses. This allows two adapter cards to be installed in the host

Loaded Drivers

Load a disk driver listed	<Enter>
Load a disk driver not listed	<Ins>
Unload a disk driver	
Scroll help windows	<F5>(up) <F6>(dn)
Help<F1>	Continue <F10> Abort INSTALL

Change lists <F2>
<Alt><F10>

9 Press [*Ins*] then wait for the following screen to appears:

NetWare Server Installation v4.x
NetWare loadable Module

Path A:\ will be scanned for drivers to install. Verify that this directory path corresponds to where the driver file (*.DSK, *.CMD, *.HAM, or *.VDM) is located. Drives for a large number of disk controllers are included with NetWare. You may insert the appropriate NetWare diskette (or specify a NetWare CD-ROM directory), or insert a third-party diskette.

Disk drivers are in the directory \NETWARE.40_____ \DISKDRV and LAN drivers are in \NETWARE.40_____ \LANDRV on the CD-ROM.

Press <F3> to specify a different path;
Press <Enter> to continue.

Continue	<Enter>
Specify a different source drive/directory	<F3>
Help <F1> Previous screen	<Esc> Abort INSTALL <ALT><F10>

II. NETWARE

10 Press [**F3**] then wait for the following screen to appear:

NetWare Server Installation v4.x NetWare loadable Module

Specify a directory path:

>A:\

Continue <Enter>
Specify a different source drive/directory <F3>
Help <F1> Previous screen <Esc> Abort INSTALL <ALT><F10>

11 Insert the ASUS PCI-DA2000 Series Driver Diskette into floppy A: and type *netware\v4.x* and press [**Enter**] then wait for the following screen to appear:

NetWare Server Installation v4.x NetWare loadable Module

Select a new disk driver to install:

▲ DA2000.DSK ASUS PCI-DA2000 Series PCI-TO-SCSI Disk Driver for NetWare v4.0x, v4.1
ASUSASPI.DSK ASUS ASPI Manager for Netware v3.1X, v4.0x and v4.1
▼

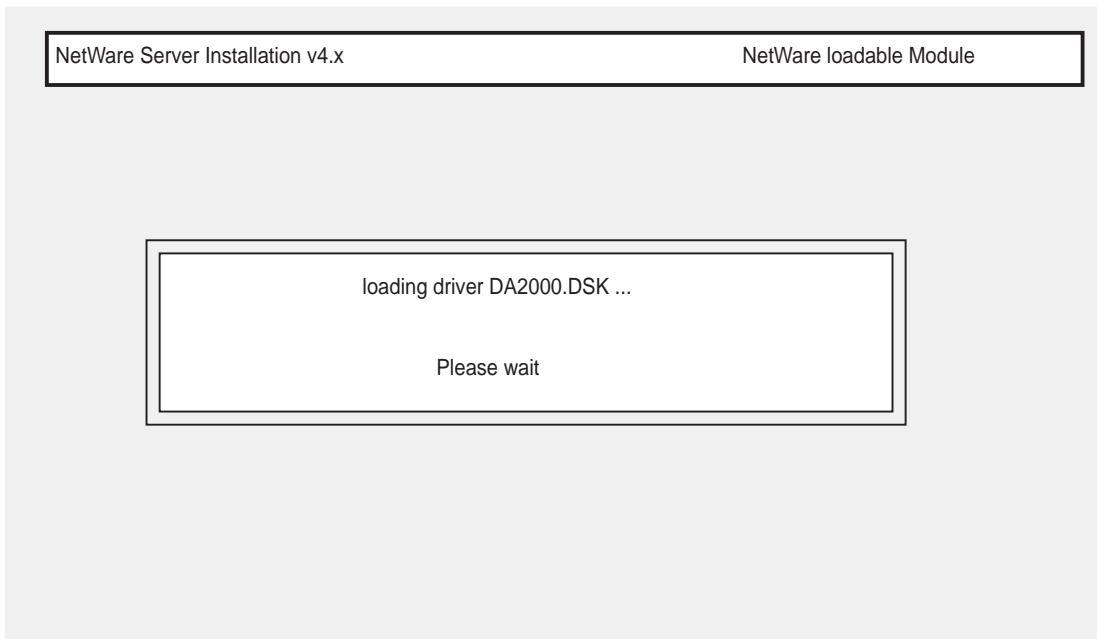
This driver supports up to four ASUS PCI-DA2000 Series and multiple SCSI LUN.
When you load DA2000.DSK you have to specify which ASUS PCI-DA2000 Series you are loading the driver for by using the command line option 'SLOT=N'.

Loaded Drivers

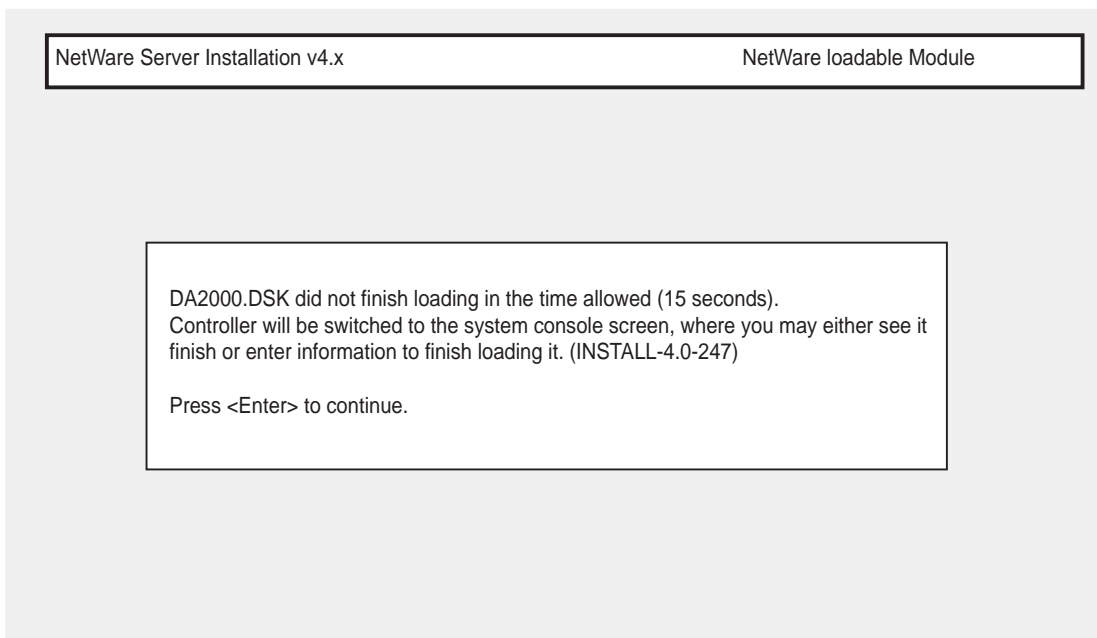
Select multiple disk drivers <F5>
Load a driver listed <Enter>
Unload a driver
Scroll help windows <F7>(up) <F8>(dn) Change lists <F2>
Help <F1> Previous screen <Esc> Abort INSTALL <Alt><F10>

II. NETWARE

- 12 Select DA2100.DSK as a new disk driver to install by pressing \neq key and pressing **[Enter]** then wait for the following screen to appear:



- 13 Press **[ALT][ESC]** keys at the same time to switch to system console screen or wait for the NetWare installation program to time out. When it times out, the following screen will appear:



II. NETWARE

14 Press **[Enter]** to switch to system console screen.

```
LOAD C:\SERVER.40\DA2000.DSK
ASUS PCI-DA2000 Series Disk Driver for NetWare v4.0x, v4.1
Version 1.11b October 27, 1995
Auto-loading module ASUSASPI.DSK
ASUS ASPI Manager for NetWare v3.1x, v4.0x and v4.1
Version 1.11b October 27, 1995
Supported Slot values are 11
Slot: 11
```

The slot number (value) is auto-detected by ASUS PCI-DA2000 Series driver according to which PCI slot the ASUS PCI-DA2000 Series been plugged into. Write down the slot number for later using in STARTUP.NCF.

15 Press **[Enter]** on system console screen

NetWare Server Installation v4.x

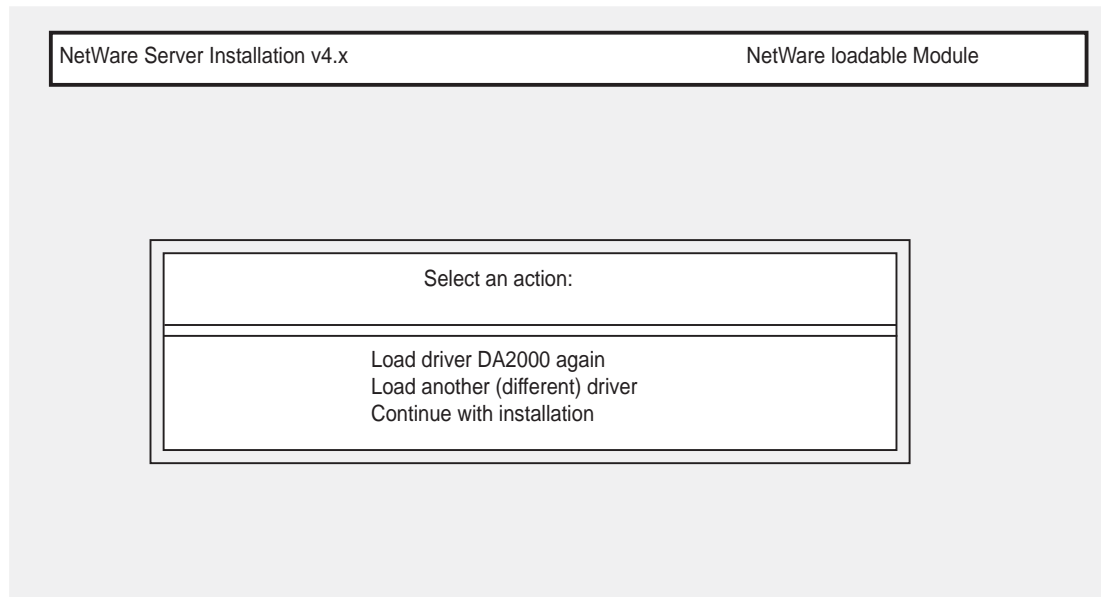
NetWare loadable Module

Driver DA2000 was successfully loaded.

Press <Enter> to continue

II. NETWARE

16 Press **[Enter]** to continue the installation



17 Select “Continue with installation” and press **[Enter]** to continue the installation.

Note:

The correct syntax in STARTUP.NCF file to load the ASUS PCI-DA2000 Series drivers is similar to the following:

```
# load DA2000 slot = x
```

x is the slot number of slot into which where the ASUS PCI-DA2000 Series been plugged. The slot number is auto-detected by ASUS PCI-DA2000 Series driver and shown on the system console screen during ASUS PCI-DA2000 Series driver loading.

III. WINDOWS NT

Installing Windows NT Drivers

Up to 4 ASUS PCI-DA2000 Series adapters can be installed in one computer. The following files are supplied for driver installation, to be found in the subdirectory \WINNT\V3_1 for Windows NT 3.1.

-DA2000.SYS:	PCI-DA2000 Series Miniport Driver for Windows NT 3.1
-PCIDA:	PCI Disk Array Tag File
-OEMSETUP.INF:	Information file for driver installation
-TXTSETUP.OEM:	Information file for driver installation

The following files are supplied for driver installation, they are put in the \WINNT\V3_5X subdirectory for Windows NT 3.5X.

-DA2000.SYS:	PCI-DA2000 Series Miniport Driver for Windows NT 3.5x
-PCIDA:	PCI Disk Array Tag File
-OEMSETUP.INF:	Information file for driver installation
-TXTSETUP.OEM:	Information file for driver installation

Windows NT Not Installed or to be Upgraded

Follow these steps only if Windows NT is not installed on your computer or if you are upgrading to a new version of Windows NT.

- 1 Use ASUS PCI-DA2000 Series BIOS Configuration Utility to disable ISA Mailbox Emulation mode (default is disabled). To do this, at system bootup, press **[Ctrl-I]**, select Configure Card option, then change IO Port Address to DISABLED.
- 2 Use ASUS Text RAID Manager to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs. **Note that SCSI ID 7 is reserved for the ASUS PCI-DA2000 Series adapter and thus no logical drives or devices should be mapped to this SCSI ID.**
- 3 Prepare for the installation by using DISKCOPY (or any other diskcopy utility) to make backup copy of ASUS PCI-DA2000 Series distribution diskette. If you are installing Windows NT 3.1, copy all files from \WINNT\V3_1 to root directory of the backup diskette. If you are installing Windows NT 3.5x, copy all files from \WINNT\V3_5X to root directory of the backup diskette. Use the backup copy as your working diskette.

III. WINDOWS NT

- 4 If you are installing Windows NT from a floppy drive, insert the “Windows NT Disk #1” into floppy drive A. If you are installing Windows NT from a CD-ROM drive, insert the “Windows NT Setup Boot Disk” into floppy drive A.
- 5 Power on your computer.
- 6 When Prompted, select Custom Setup. If you are installing Windows NT 3.1 go to step 8.
- 7 Press *S* to skip mass storage devices detection.
- 8 Windows NT setup cannot find any adapter and displays NONE. Press *S* to specify additional SCSI adapters. From the list of SCSI adapters, select “Other (Requires disk provided by a hardware manufacturer)”.
- 9 Insert ASUS PCI-DA2000 Series Distribution Diskette into floppy drive A and press *[Enter]*. The screen displays “ASUS PCI-DA2000 Series PCI-TO-SCSI RAID Miniport”. Then, press *[Enter]* to select this driver.
- 10 Press *[Enter]* to continue Windows NT setup and follow the steps given in Windows NT Installation documentation.

Existing Windows NT System

If you are adding an ASUS PCI-DA2000 Series adapter to a computer that already has an ASUS PCI-DA2000 Series adapter installed for Windows NT, then follow step 1 through step 2 only.

If you are adding an ASUS PCI-DA2000 Series adapter to a computer that has no ASUS PCI-DA2000 Series adapter installed for Windows NT, then follow all steps.

- 1 Use ASUS PCI-DA2000 Series BIOS Configuration Utility to disable ISA Mailbox Emulation mode (default is disabled). To do this, at system bootup, press *[Ctrl-I]*, select Configure Card option, then change IO Port Address to DISABLED.
- 2 Use ASUS Text RAID Manager or RS-232 Terminal Interface Operation to configure Logical Drives and SCSI Devices and map them to valid host SCSI-IDs/LUNs. **Note that SCSI ID 7 is reserved for the ASUS PCI-DA2000 Series adapter and thus no logical drives or devices should be mapped to this SCSI ID.**

III. WINDOWS NT

- 3 Prepare for the installation by using DISKCOPY (or any other disk-copy utility) to make backup copy of ASUS PCI-DA2000 Series distribution diskette. If you are installing Windows NT 3.1, copy all files from \WINNT\V3_1 to root directory of the backup diskette. If you are installing Windows NT 3.5x, copy all files from \WINNT\V3_5X to root directory of the backup diskette. Use the backup copy as your working diskette.
- 4 Boot Windows NT. Select the “Windows NT Setup” program from the “Main” program group.
- 5 Select the “Options” pull-down menu and then select “Add/Remove SCSI Adapters”. The “SCSI Adapter Setup” displays a list of installed SCSI Adapters. Then select “Add” to add an ASUS PCI-DA2000 Series adapter to the list.
- 6 Select “OK” to make sure you want to add a SCSI adapter, “Windows NT Setup” displays “Select SCSI Adapter Option” and a list of SCSI adapters. Expand the list of SCSI adapters, select “Other (Requires disk provided by a hardware manufacturer)” .
- 7 Insert ASUS PCI-DA2000 Series Distribution Diskette into floppy drive A and press **[Enter]**. The screen displays “ASUS PCI-DA2000 Series PCI-TO-SCSI RAID Miniport”. Then, select “OK” to select this driver, then select “Install” .
- 8 Enter the path, normally it is A:\, to the directory with the device driver, then select “Continue”. “Windows NT Setup” copies device driver to your disk and updates configuration to make new configuration take effect after system reboots.
- 9 Make sure the new added device driver is in the installed SCSI adapter list, then press “Close” to exit the “SCSI Adapter Setup”, and then close the “Windows NT Setup” program. If you are not running Windows NT 3.1, go to step 11, or do step 10.
- 10 Select “Control Panel” program from “Main” program group. Select “Devices” program. A device list appears, select the ASUS PCI-DA2000 Series device, then click on the “Startup” button. Change Startup type to “System”, then select “OK”. Select “Close” to exit “Devices” program, then close the “Control Panel” program.
- 11 Shutdown Windows NT, then restart your computer. It is possible that some drive letter assignments may be different from previous configuration.

III. WINDOWS NT

Updating Windows NT Device Driver

- 1 Copy the new device driver from the distribution diskette to the directory [SystemRoot]\system32\drivers, where [SystemRoot] is the system root directory of Windows NT.

For example, if the system root directory is C:\WINNT, then type the following:

```
copy a:\winnt\v3_1\DA2000.SYS c:\winnt\system32\drivers
```

Skip step 2 if the version of your Windows NT is not v3.1.

- 2 If one of the ASUS PCI-DA2000 Series adapters control the system boot disk, use ATTRIB.EXE to disable the hidden, system and read only attributes of c:\ntbootdd.sys, then copy the same driver to c:\ntbootdd.sys and restore the attributes of c:\ntbootdd.sys.

For example,

```
attrib -h -r -s c:\ntbootdd.sys
```

```
copy a:\winnt\v3_1\DA2000.SYS c:\ntbootdd.sys
```

```
attrib +h +r +s c:\ntbootdd.sys
```

- 3 Shutdown Windows NT, then restart your computer.

IV. WINDOWS 95

Installing Windows 95 Driver

The following files are supplied for driver installation, they are put in the \WIN95 subdirectory for Windows 95.

- DA2000.MPD: ASUS PCI-DA2000 Series family Miniport Driver for Windows 95.
- DAW95.INF : Information file for driver installation.

Installing Windows 95 and the Driver

- 1 Use ASUS PCI-DA2000 Series BIOS Configuration Utility to disable ISA Mailbox Emulation Mode (default is disabled). To do this, at system bootup, press [Ctrl-I], select Configure Card option, then change IO Port Address to DISABLED.
- 2 Use ASUS Text RAID Manager to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs.

Note that SCSI ID 7 is reserved for the ASUS PCI-DA2101 RAID controller and thus no logical drives or devices should be mapped to this SCSI ID.

- 3 Follow the instructions in Windows 95 installation documentation to install Windows 95.
- 4 When Windows 95 installation is complete, restart Windows 95.
- 5 Click on the “Start” button on the task bar of Windows 95.
- 6 Select “Settings”, and then click on “Control Panel”.
- 7 Double-click on the “System” icon, then click on “Device Manager” tab.
- 8 Click on the plus sign next to the “Other devices” icon, then Double-click on the yellow question mark labelled “PCI SCSI Bus Controller” icon, then click on the “Driver” tab.
- 9 In the Driver tab, click on “Change Driver”. When asked to select hardware type, select “SCSI Controllers”.

IV. WINDOWS 95

- 10 Click on the “Have Disk” button and enter a:\win95 as the subdirectory to copy the manufacturer’s file from. Insert ASUS PCI-DA2000 Series distribution diskette into drive A: and click on “OK”.
- 11 Select “ASUS DA-2000 Series PCI-to-SCSI RAID Adapter”, and click on “OK”.
- 12 Click on “OK”. The driver is copied.
- 13 When asked to remove ROM BIOS of ASUS PCI-DA2000 Series Controller, you MUST click on “Cancel” to keep ROM BIOS.
- 14 You must restart your system for the changes to take effect. Click on “Yes” to shutdown the system and restart your computer.
- 15 When the system is booting up, an “Unknown Device” warning window will be displayed, this is a normal behavior because a virtual target is registered by ASUS PCI-DA2000 Series family Miniport Driver to support ASUS GUI RAID Manager. Please select “Do not install a driver” , and click on “OK”.
- 16 Make sure that the ASUS PCI-DA2000 Series family Miniport Driver is working properly by using Device Manager tab of System icon in Control Panel. Click on the plus sign next to the SCSI controllers icon, and double-click on the Infortrend ASUS PCI-DA2000 Series PCI-to-SCSI RAID Adapter icon. Check the Device status. If the device is working properly, the driver is installed successfully. If not, the driver is not installed. Check your CONFIG.SYS to see if I2DOSASP.SYS is installed. If it is installed, remove it, and restart your computer.

IV. WINDOWS 95

Updating the Driver

- 1 Click on the “Start” button in the task bar of Windows 95.
- 2 Select “Settings”, and then click on “Control Panel”.
- 3 Double-click on the “System” icon, then click on “Device Manager” tab.
- 4 Click on the plus sign next to the “SCSI controller” icon, then Double-click on the “ASUS PCI-DA2000 Series PCI-to-SCSI RAID Adapter” icon. Click on the “Driver” tab.
- 5 On the “Driver” tab, click on “Change Driver”.
- 6 Click on the “Have Disk” button and enter a:\win95 as the subdirectory to copy the manufacturer’s file from. Click “OK”.
- 7 Select ASUS PCI-DA2000 Series PCI-to-SCSI RAID Adapter, and click on “OK”.
- 8 Click on “OK”. The driver is copied.
- 9 You must restart your system for the changes to take effect. Click on “Yes” to shutdown the system and restart your computer.

Installing the OS/2 Driver

Up to 4 ASUS PCI-DA2000 Series controllers can be installed in one computer. The following files are supplied for driver installation, they are put in the \OS2 subdirectory.

DA2000.ADD:

ASUS PCI-DA2000 Series OS/2 2.x and 3.0 (Warp) Device Driver.

DA2000.DDP:

Device Driver Profile for driver installation.

README.OS2:

An text file describing the ASUS PCI-DA2000 Series OS/2 driver.

NOTE: The RS-232 Terminal Interface Operation requires an RS-232 port. Thus this interface cannot be used on the ASUS PCI-DA2100, which does not have an RS-232 port on board.

Installing OS/2 2.x or 3.0

Follow these steps only if OS/2 2.x, 3.0 is not installed on your computer or if you are upgrading to OS/2 2.x or 3.0.

- 1 Use ASUS PCI-DA2000 Series BIOS Configuration Utility to disable ISA Mailbox Emulation mode (default is *disabled*). To do this, at system bootup, press **[Ctrl-I]**, select Configure Card option, then change IO Port Address to DISABLED.
- 2 Use ASUS Text RAID Manager or RS-232 Terminal Interface Operation to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs. **Note that SCSI ID 7 is reserved for the ASUS PCI-DA2000 Series adapter and thus no logical drives or devices should be mapped to this SCSI ID.**
- 3 Prepare for the installation by using DISKCOPY (or any other disk-copy utility) to make backup copy of IBM OS/2 installation diskette #1. Use this copy as your working diskette #1.
- 4 Copy DA2000.ADD from ASUS PCI-DA2000 Series Distribution Diskette to OS/2 installation diskette #1. Modify the CONFIG.SYS file on OS/2 installation diskette #1 to add the following line to the end of CONFIG.SYS:

```
BASEDEV=DA2000.ADD /V
```

- 5 Follow the steps from IBM for installing OS/2.

V. OS/2

Installing in an Existing OS/2 2.x/3.0

If you are adding an ASUS PCI-DA2000 Series controller to a computer that already has an ASUS PCI-DA2000 Series controller installed for OS/2 2.x/3.0, then follow step 1 through step 2 only. If you are adding an ASUS PCI-DA2000 Series controller to a computer that has no ASUS PCI-DA2000 Series controller installed for OS/2 2.x/3.0, then follow all steps.

- 1 Use ASUS PCI-DA2000 Series BIOS Configuration Utility to disable ISA Mailbox Emulation mode (default is *disabled*). To do this, at system bootup, press **[Ctrl-I]**, select Configure Card option, then change IO Port Address to DISABLED.
- 2 Use ASUS Text RAID Manager or RS-232 Terminal Interface Operation to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs. **Note that SCSI ID 7 is reserved for the ASUS PCI-DA2000 Series controller and thus no logical drives or devices should be mapped to this SCSI ID.**
- 3 Execute the program DDINSTAL by selecting the Device Driver Install icon within the System Setup folder of OS/2 System folder or by typing **DDINSTAL** at OS/2 prompt.
- 4 Insert the ASUS PCI-DA2000 Series Distribution Diskette in the appropriate floppy drive and follow the instructions from DDINSTALL. Set the source directory to a:\os2 and the destination path to the root directory of system drive while running DDINSTALL.
- 5 Reboot your system.

Updating the Driver

- 1 Copy the new device driver from the distribution diskette to the root directory of system drive where that OS/2 is installed.

For example,

```
copy a:\os2\DA2000.ADDc:\
```

- 2 Shutdown OS/2, then restart your computer.

OS/2 Driver Command-Line Options

1 Driver Command Syntax :

BASEDEV=DA2000.ADD [Driver-Options][Adapter-Options][Unit-Options]

The command and options must be put in the CONFIG.SYS file. The changes of command-line option will not take effect until the system is restarted.

2 Command-Line Options :

- 1) Command-line options are case-insensitive.
- 2) All command-line options begin with the slash character (/).
- 3) The exclamation character (!) is a negation operator; that is, it negates the option that follows it.

3 Driver-Options :

/V

Verbose. Either Display the driver name, version number, date, adapter Information and device information if the driver loads successfully, or display error messages if the driver fails to initialize.

/(!)ET

(Disable) Enable Embedded Target Support. Makes the driver (disable) enable not-zero SCSI LUN support. Default setting is /ET.

/PCI:n

Maximum PCI Bus Number in the computer. Where n is a decimal value between 0 to 255. Default value is 255.

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4 Adapter-Options :

/A:n

Adapter Identification. Where n is a decimal value. This option specifies the ordering of adapters. Normally, adapters are numbered consecutively, starting at 0.

/BUS:n

PCI Bus Number which ASUS PCI-DA2000 Series is plugged in. You can get the PCI bus number from the information that ASUS PCI-DA2000 Series BIOS displays at system bootup.

Note: ASUS PCI-DA2000 Series BIOS displays bus number in hex value, you must translate that into decimal value.

/DEV:n

PCI Device Number which ASUS PCI-DA2000 Series is plugged in. You can get the PCI device number from the information that ASUS PCI-DA2000 Series BIOS displays at system bootup.

Note: ASUS PCI-DA2000 Series BIOS displays device number in hex value, you must translate that into decimal value.

/(!)ET

(Disable) Enable Embedded Target Support. Makes the driver (disable) enable not-zero SCSI LUN support to the specified adapter by /A:n . Default setting is /ET.

/(!)DM

(Disable) Enable Direct Access Storage Device (DASD) Manager Support. (Disable) Enable all the units, connect to the adapter specified by /A:n, to be supported by the IBM-supplied DASD manager (OS2DASD.DMD). The default setting is /DM.

/(!)SM

(Disable) Enable SCSI Manager Support. (Disable) Enable all the units, connect to the adapter specified by /A:n, to be supported by the IBM-supplied SCSI manager (OS2SCSI.DMD). The default setting is /SM.

5 Unit-Options :

/(!)ET:i1,i2,i3....

(Disable) Enable Embedded Target Support. Where i1,i2,i3 is the specified SCSI Target ID. Makes the driver (disable) enable not-zero SCSI LUN support to the specified SCSI ID of the specified adapter by /A:n. Default setting is /ET.

V. OS/2

/(!)DM:i1,i2,i3... OR /(!)DM:(i1,l1),(i2,l2)....

(Disable) Enable Direct Access Storage Device (DASD) Manager Support. Where i1,i2,i3 is the specified SCSI Target ID. (i1,l1),(i2,l2) is the specified SCSI Target ID-LUN. (Disable) Enable the specified SCSI Target ID(LUN) of the adapter specified by /A:n, to be supported by the IBM-supplied DASD manager (OS2DASD.DMD). The default setting is /DM. The boot device **MUST** be supported by DASD Manager, or the computer can not be able to boot OS/2.

/(!)SM:i1,i2,i3... OR /(!)SM:(i1,l1),(i2,l2)....

(Disable) Enable SCSI Manager Support. Where i1,i2,i3 is the specified SCSI Target ID. (i1,l1),(i2,l2) is the specified SCSI Target ID-LUN. (Disable) Enable the specified SCSI Target ID(LUN) of the adapter specified by /A:n, to be supported by the IBM-supplied SCSI manager (OS2SCSI.DMD). The default setting is /SM.

NOTE: The driver will find all the ASUS PCI-DA2000 Series controller in your computer automatically, if no /BUS and /DEV options specified.

VI. SCO UNIX

Installing the SCO Unix Driver

The chapter describes how to install SCO UNIX BTLDD (Boot Time Loadable Driver) for ASUS PCI-DA2000 Series Controller.

NOTE: The RS-232 Terminal Interface Operation requires an RS-232 port. Thus this interface cannot be used on the ASUS PCI-DA2100, which does not have an RS-232 port on board.

Installing SCO UNIX

- 1 Use ASUS PCI-DA2000 Series BIOS Configuration Utility to disable ISA Mailbox Emulation mode (default is disabled). To do this, at system bootup, press **[Ctrl-I]**, select Configure Card option, then change IO Port Address to DISABLED.
- 2 Use ASUS Text RAID Manager or RS-232 Terminal Interface Operation to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs. **Note that SCSI ID 7 is reserved for the ASUS PCI-DA2000 Series controller and thus no logical drives or devices should be mapped to this SCSI ID.**
- 3 Check IO devices, CD-ROM or TAPE drive is properly installed.
- 4 Insert the N1 boot diskette into the floppy drive and turn on the PC. When the “boot” message appears, type **link** as follows:

```
SCO UNIX System V/386
```

```
Boot: link <Enter>
```

- 5 Type **PCIDA** at the following prompt:

```
What packages do you need linked in the system,  
or 'q' to quit?: pcida
```

VI. SCO UNIX

- 6 You will be prompted to insert the DA2000 Series BTLD diskette after a series of messages as follows:

Please insert the fd(x)**pcida** volume and press <RETURN>
or 'q' to quit:

- 7 After Insert the diskette, press [**Enter**].

Follow the appropriate SCSI manual to install the SCO UNIX from the installation media (floppy, tape, or CD-ROM).

- 8 A message similar to the following will be displayed:

Please insert the pcida volume and press <ENTER>:

Insert the ASUS BTLD diskette again and press [**ENTER**]

- 9 At the following prompt, type "y":

The BTLD packages will now be added to the Link Kit.

The Link Kit is not installed.

Do you wish to install it now?(y/n)

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10 At the following prompt, press [ENTER]:

The following packages are on this diskette:

NAME	DESCRIPTION
pcida	ASUS PCI-DA2000 Series SCSI Disk Array Driver for SCO UNIX system

Please enter the names of the packages you
wish to install or q to quit: _
[default:pcida]

11 The ASUS PCI-DA2000 Series driver will now be linked into the SCO UNIX kernel.

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