IFT-2101U

PCI-to-Ultra SCSI RAID Controller

Instruction Manual

Version 2.6

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$C\epsilon$ This drive is in conformity with the EMC directive.

For equipment FCC ID: LC82101UB
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Federal Communications Commission (FCC) Statement
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. Those limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

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

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

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

Table of Contents

This instruction manual is exclusively written for firmware versions 2.11 and above. It is also applicable for other firmware versions but may differ in some features or in wording shown on the screen.

Chapter 1   Introduction

The IFT-2101U is a PCI-to-SCSI RAID controller specifically designed to provide RAID 0, 1, 3 or 5 capability to any host system equipped with a Little Endian PCI Local Bus interface. All the RAID functions of IFT-2101U 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 controller has comprehensive drive failure management that allows automatic reassignment of reserved blocks when a bad sector is encountered during a write. Hot-swapping is supported through automatic disconnection of a failed drive and detection of a reserved drive followed with background rebuilding of data. The controller also supports spare drive operation. Remarkably, all of these failure recovery procedures are transparent to the host system.

The IFT-2101U has been designed with ease of integration and maintenance in mind. The major features are described in the next chapter.   The controller already includes all the major operational requirements for a RAID subsystem. The overall features of a fully-built RAID subsystem will, however, depend on the actual components used and the creativity of the integrator.

Chapter 2   Features

✓ Five operating modes:

Non-RAID	Disk Spanning
RAID-0	Disk Striping
RAID-1	Disk Mirroring and Striping (RAID 0+1)
RAID-3	Disk Striping with Dedicated Parity
RAID-5	Multiple Block Striping with Interspersed Parity

✓ Comprehensive failure management including:
  - Automatic bad sector reassignment
  - Hot-swapping
  - Spare drive operation (Supports both Global Spare and Local Spare)
  - Background rebuilding (Rebuild priority selectable)
  - Verify-after-Write supported on normal writes, rebuild writes and/or RAID initialization writes

✓ PCI Rev. 2.1 compliant

✓ PCI Standard length form factor: 6.87"(L) x 4.2"(W)

✓ Supports up to 15 SCSI IDs per channel

✓ Up to 8 logical drives, each with independent RAID modes

✓ Up to 8 partitions per logical drive

✓ Number of drives for each logical drive has no limitation

✓ Dynamic mapping of LUNs to logical drives

✓ Concurrent/Background logical drive initialization

✓ Performance optimization for Sequential or Random I/O

✓ Allows multiple drive failure and concurrent multiple drive rebuild of a RAID (0+1) logical drive

✓ Configuration of individual SCSI target parameters

✓ Prior to first disk access, it allows adjustment of delay time 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 a host or drive interface

✓ Two or more SCSI channels can be simultaneously set as host interface for redundant host system operation

- ✓ Compatible and will automatically match any SCSI hard disks with SCSI-1, SCSI-2 or (Ultra)-Wide-SCSI (1 or 2) specification
- ✓ 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
- ✓ EDO DRAM supported for enhanced performance
- ✓ Up to 64 Mbytes of intelligent Read-Ahead/Write-Back cache
- ✓ Firmware resides in easy-to-update Flash Memory
- ✓ GUI RAID Manager & Text RAID Manager interfaces for RAID management

IMPORTANT:

IFT-2101U, mentioned throughout this manual refers to both the IFT-2101UA and IFT-2101UB controllers. There is only one difference: The IFT-2101UA has one Ultra-Wide SCSI channel on board, and the IFT-2101UB has two Ultra-Wide SCSI channels on board.

Chapter 3   Functional Description

The advantages of RAID are: Availability, Capacity and Performance. Choosing the right RAID level and drive failure management can increase Availability, subsequently increasing Performance and Capacity. The IFT-2101U RAID controller provides complete RAID functionality and enhanced drive failure management.

3.1   RAID Management

RAID stands for Redundant Array of Independent Drives.   The advantages of using a RAID storage subsystem are:

- Provides disk spanning by weaving all connected drives into one single volume.

- Increases disk access speed by breaking data into several blocks when reading/writing to several drives in parallel.   With RAID, storage speed increases as more drives are added.

- Provides fault-tolerance by mirroring or parity operation.

What are the RAID levels?

RAID Level	Description	Minimum Drives	Data Availability	Performance Sequential	Performance Random
NRAID	Non-RAID	1		Drive	Drive
RAID 0	Disk Striping	N	==NRAID	R: Highest W: Highest	R: High W: Highest
RAID 1 (0+1)	Mirroring Plus Striping (if N>1)	N+1	>>NRAID ==RAID 5	R: High W: Medium	R: Medium W: Low
RAID 3	Striping with Parity on dedicated disk	N+1	>>NRAID ==RAID 5	R: High W: Medium	R: Medium W: Low
RAID 5	Striping with interspersed parity	N+1	>>NRAID ==RAID 5	R: High W: Medium	R: High W: Low

NRAID

Disk Spanning
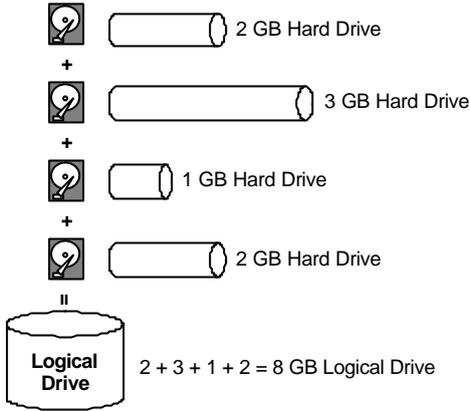
NRAID	
Minimum Disks required	1
Capacity	N
Redundancy	No

2 GB Hard Drive

+

3 GB Hard Drive

+

1 GB Hard Drive

+

2 GB Hard Drive

=

Logical Drive 2 + 3 + 1 + 2 = 8 GB Logical Drive

NRAID stands for Non-RAID. The capacity of all the drives are combined to become one logical drive (no block striping). In other words, the capacity of the logical drive is the total capacity of the physical drives. NRAID does not provide data redundancy.

JBOD

Single-drive Control
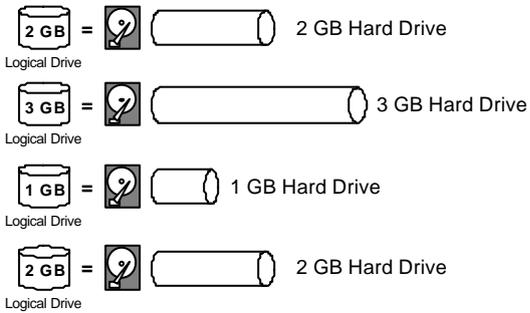
JBOD	
Minimum Disks required	1
Capacity	1
Redundancy	No

2 GB = 2 GB Hard Drive
Logical Drive

3 GB = 3 GB Hard Drive
Logical Drive

1 GB = 1 GB Hard Drive
Logical Drive

2 GB = 2 GB Hard Drive
Logical Drive

JBOD stands for Just a Bunch of Drives. The controller treats each drive as a stand-alone disk, therefore each drive is an independent logical drive. JBOD does not provide data redundancy.

RAID 0
Disk Striping

Logical Drive

Physical Disks

Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8
.
.

Striping

Block 1 | Block 2
Block 3 | Block 4
Block 5 | Block 6
Block 7 | Block 8
. | .
. | .

RAID 0	
Minimum Disks required	2
Capacity	N
Redundancy	No
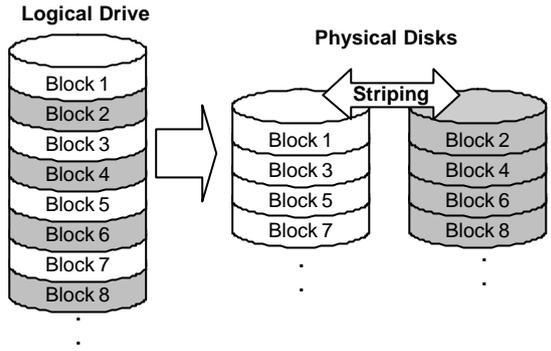
RAID 0 provides the highest performance but no redundancy. Data in the logical drive is striped (distributed) across several physical drives.

RAID 1
Disk Mirroring

Logical Drive

Physical Disks

Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Block 8
.

Mirroring

Block 1 | Mirror 1
Block 2 | Mirror 2
Block 3 | Mirror 3
Block 4 | Mirror 4
. | .
. | .

RAID 1	
Disks required	2
Capacity	N/2
Redundancy	Yes
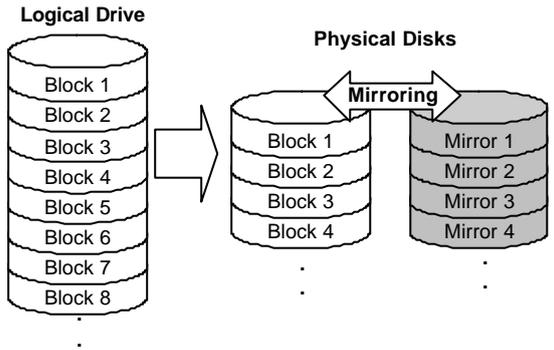
RAID 1 mirrors the data stored in one hard drive to another. RAID 1 can only be performed with two hard drives. If there are more than two hard drives, RAID (0+1) will be performed automatically.

RAID (0+1)
Disk Striping with
Mirroring

Logical Drive

Physical Disks

Striping

Block 1	Block 2
Block 3	Block 4
Block 5	Block 6
Block 7	Block 8

Mirror

Mirror 1	Mirror 2
Mirror 3	Mirror 4
Mirror 5	Mirror 6
Mirror 7	Mirror 8

Striping

Logical Drive blocks:
Block 1, Block 2, Block 3, Block 4, Block 5, Block 6, Block 7, Block 8

RAID (0+1)	
Minimum Disks required	4
Capacity	N/2
Redundancy	Yes
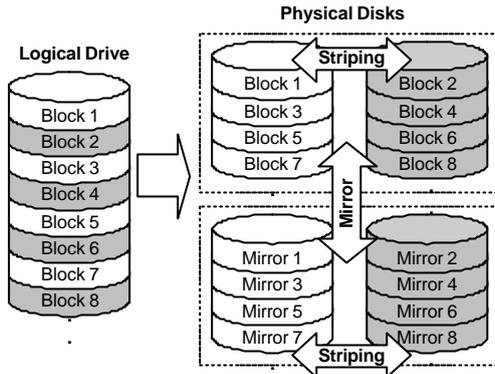
RAID (0+1) combines RAID 0 and RAID 1 - Mirroring and Striping. RAID (0+1) allows multiple drive failure because of the full redundancy of the hard drives. If there are more than two hard drives assigned to perform RAID 1, RAID (0+1) will be performed automatically.

☞ **IMPORTANT:**

"RAID (0+1)" will not appear in the list of RAID levels supported by the controller. If you wish to perform RAID 1, the controller will determine whether to perform RAID 1 or RAID (0+1). This will depend on the drive number that has been selected for the logical

drive.

RAID 3
Disk Striping with
Dedicated Parity Disk

Logical Drive

Physical Disks

Dedicated Parity

Striping

Block 1	Block 2	Parity (1,2)
Block 3	Block 4	Parity (3,4)
Block 5	Block 6	Parity (5,6)
Block 7	Block 8	Parity (7,8)

Logical Drive blocks:
Block 1, Block 2, Block 3, Block 4, Block 5, Block 6, Block 7, Block 8

RAID 3	
Minimum Disks required	3
Capacity	N-1
Redundancy	Yes
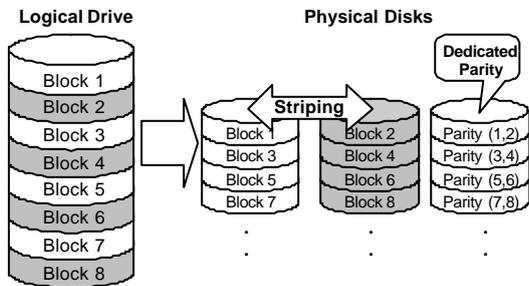
RAID 3 performs Block Striping with Dedicated Parity. One drive member is dedicated to storing the parity data. When a drive member fails, the controller can recover/regenerate the lost data of the failed drive from the dedicated parity drive.

RAID 5
Striping with
Interspersed Parity

Logical Drive | Physical Disks

RAID 5	
Minimum Disks required	3
Capacity	N-1
Redundancy	Yes
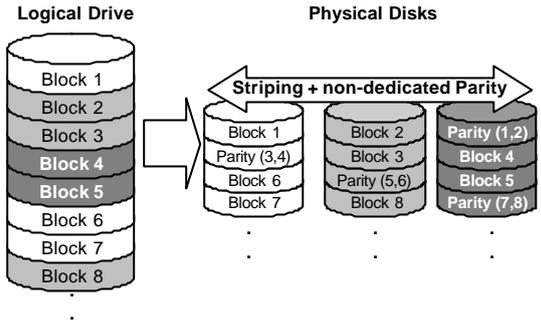
RAID 5 is similar to RAID 3 but the parity data is not stored in one dedicated hard drive. Parity information is interspersed across the drive array. In the event of a failure, the controller can recover/regenerate the lost data of the failed drive from the other surviving drives.

3.2   Drive Failure Management

3.2.1   Global and Local Spare Drive
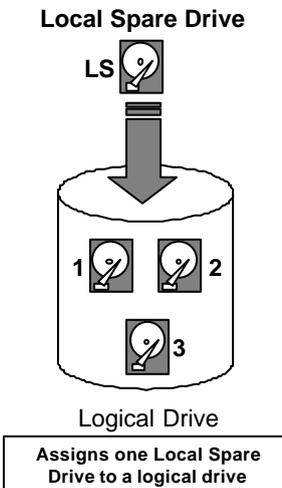
Local Spare Drive

Local Spare Drive is a standby drive assigned to serve one specified logical drive. When a member drive of this specified logical drive fails, the Local Spare Drive becomes a member drive and automatically starts to rebuild.

When one member drive fails, the Local Spare Drive joins the logical drive and automatically starts to rebuild.

Logical Drive

Assigns one Local Spare Drive to a logical drive
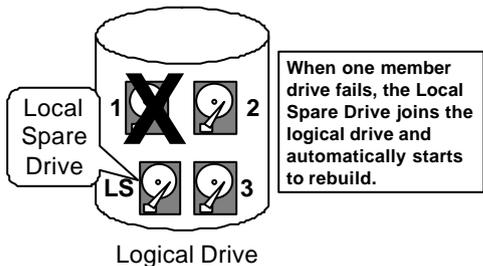
Logical Drive

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

Global Spare Drive **Global Spare Drive**

GS GS

Global Spare Drives
serve   any logical

1 2
3
Logical Drive 0

1 2
Logical Drive 1

1 2
4 3
Logical Drive 2

Global Spare Drive

GS

When a member drive from any
logical drive fails, the Global
Spare Drive joins that logical
drive and automatically starts to
rebuild

1 2
3
Logical Drive 0

1 2
GS Global Spare Drive
Logical Drive 1

1 2
4 3
Logical Drive 2
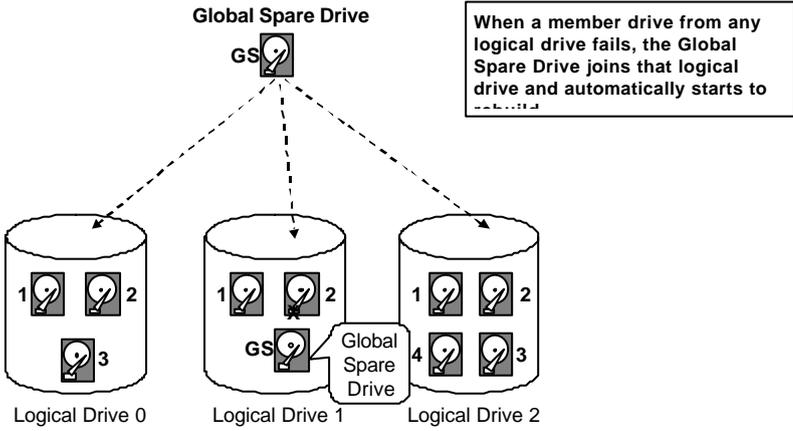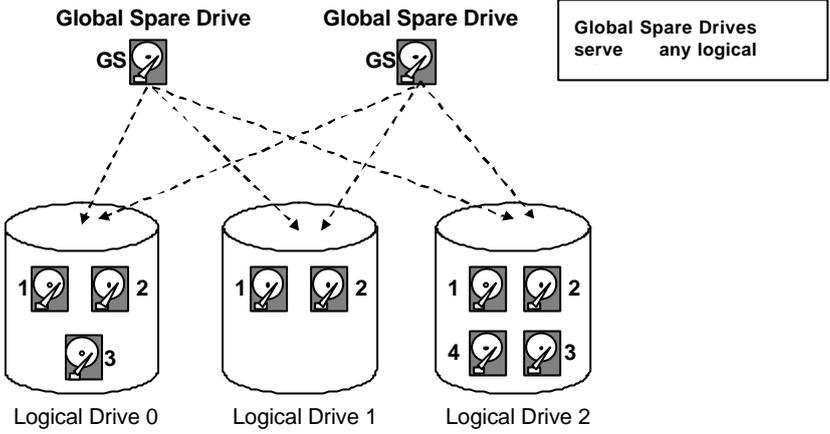
The IFT-2101U RAID controller provides both Local Spare Drive and Global Spare Drive functions. On certain occasions, applying these two functions together will better fit various needs. Take note though that the **Local Spare Drive always has higher priority than the Global Spare Drive.**

In the example shown on the next page, the member drives in Logical Drive 0 are 9 GB drives, and the members in Logical Drives 1 and 2 are all   4 GB drives. It is not possible for the 4 GB Global Spare Drive to join Logical Drive 0 because of its insufficient capacity. However using a 9GB drive as the Global Spare drive for a failed drive that comes from Logical Drive 1 or 2 will bring huge amount of excess capacity since

these logical drives require 4 GB only. In the settings below, the 9 GB Local Spare Drive will aid Logical Drive 0 once a drive in this logical drive failed. If the failed drive is in Logical Drive 1 or 2, the 4 GB Global Spare drive will immediately give aid to the failed drive.

Local Spare Drive

LS (9GB)

Global Spare Drive

GS (4GB)

Local Spare Drive always has higher priority than Global Spare Drive.

1 2
(9GB) (9GB)
3
(9GB)

1 2
(4GB) (4GB)

1 2
(4GB) (4GB)
4 3
(4GB) (4GB)

Logical Drive 0   Logical Drive 1   Logical Drive 2
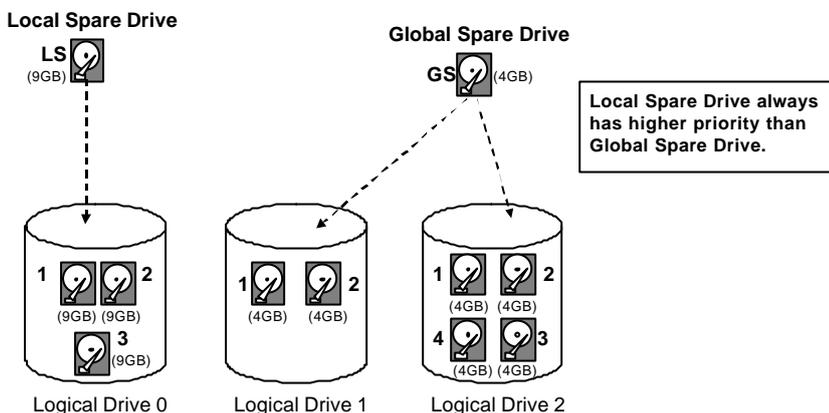
3.2.2   Identifying Drives

Assuming there is a failed drive in the RAID 5 logical drive, make it a point to replace the failed drive with a new drive to keep the logical drive working.

When trying to remove a failed drive and you mistakenly removed the wrong drive, you will no longer be able to read/write the logical drive because the two drives may have already failed.

To prevent this from happening, the controller provides an easy way of identifying for the failed drive. That is, the read/write LED of the failed hard drive will light. This LED will prevent you from removing the wrong drive, and is also helpful when locating for a drive.

Flash Selected SCSI Drive

The Read/Write LED of the drive you selected will light steadily for about one minute.

R/W LED
R/W LED
LED Steadily ON
R/W LED
R/W LED
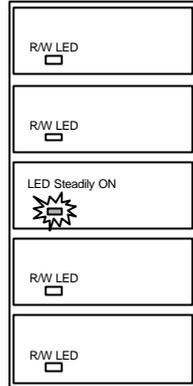
Flash All SCSI Drives

The Read/Write LED of all connected drives will light for about one minute. If the LED of the defective drive did not light on the "Flash Selected SCSI Drive" function, use "Flash All SCSI Drives". The "Flash All SCSI Drives" function will light LEDs of all the drives except the defective one.

LED Steadily ON
LED Steadily ON
LED Steadily ON
LED Steadily ON
LED Steadily ON
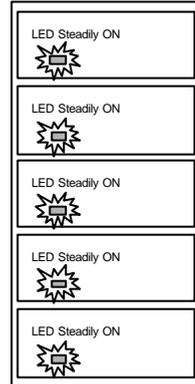
3.2.3 Automatic Rebuild and Manual Rebuild

Automatic Rebuild

```
→  ┌─────────────────┐      ╱ Any ╲                    ┌─────────────────┐
   │ One member drive│     ╱ local spare ╲    Yes      │ Rebuild using the│
   │ fails in logical├───→│ drive assigned ├──────────→│ local spare drive│
   │     drive       │     ╲ to logical   ╱            └─────────────────┘
   └─────────────────┘      ╲  drive?   ╱
                                 │ No
                                 ↓
                             ╱ Any ╲
                            ╱ global spare ╲   Yes      ┌─────────────────┐
                           │ drive assigned ├──────────→│ Rebuild using the│
                            ╲ to logical   ╱            │ global spare drive│
                             ╲  drive?   ╱              └─────────────────┘
                                 │ No
                                 ↓
 ┌─────────────────┐         ╱"Periodic ╲
 │ Waiting for spare│   No   ╱Auto-Detect Failure╲
 │ drive to be added│←──────│Drive Swap Check Time"│
 │ or manual rebuild│        ╲   enabled?  ╱
 └─────────────────┘          ╲          ╱
                                 │ Yes
                                 ↓
                             ╱ Has the ╲
                            ╱ failed drive been╲  Yes   ┌─────────────────┐
                           │    swapped?        ├──────→│ Rebuild using the│
                            ╲                  ╱        │  swapped drive   │
                             ╲              ╱           └─────────────────┘
                                 │ No
                                 ↓
                         ┌─────────────────┐
                         │Keep detecting if drive│
                         │has been swapped or│
                         │spare drive has been│
                         │     added       │
                         └─────────────────┘
```

When a member drive in the logical drive failed, the controller will first check whether there is a Local Spare Drive assigned to this logical drive. If yes, it will automatically start to rebuild.

If there is no Local Spare Drive available, the controller will search for a Global Spare Drive. If there is a Global Spare Drive, it will automatically rebuild the logical drive.

If neither a Local Spare Drive nor a Global Spare Drive is available, and the "Periodic Auto-Detect Failure Drive Swap Check Time" is "Disabled," the controller will not try to rebuild unless the user applies a forced manual rebuild.

When the "Periodic Auto-Detect Failure Drive Swap Check Time" is enabled (i.e., a check time interval has been selected), the controller will detect whether or not the failed drive has been swapped (by checking the failed drive's channel/ID). Once the failed drive has been swapped, the rebuild will begin immediately.

If the failed drive is not swapped but a local spare drive is added to the logical drive, rebuilding will begin with the spare drive.

Manual Rebuild

When a user applies forced-manual rebuild, the controller will first check whether there is any Local Spare Drive assigned to this logical drive. If yes, it will automatically start to rebuild.

If there is no Local Spare Drive available, the controller will search for a Global Spare Drive. If there is a Global Spare Drive, it will automatically rebuild the logical drive.
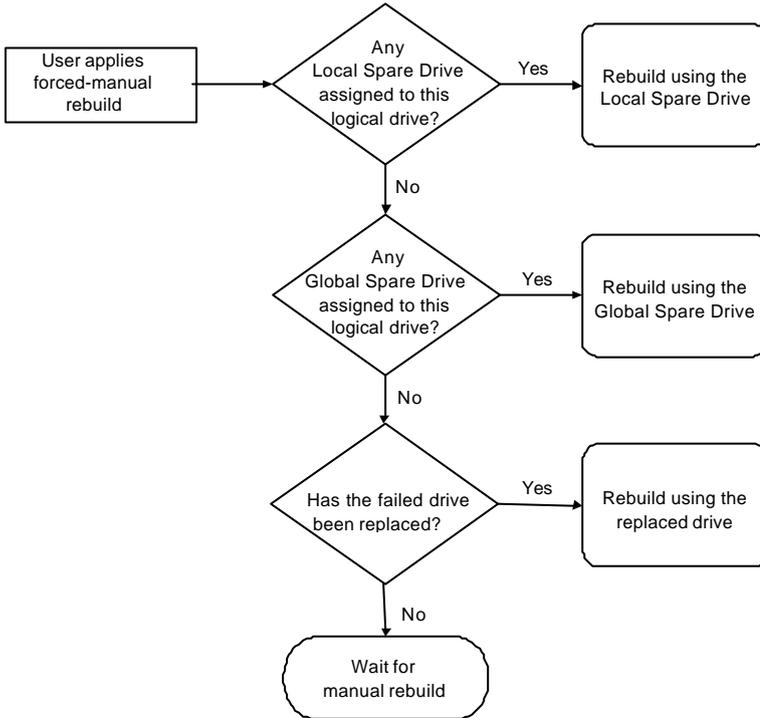
If neither a Local Spare Drive nor a Global Spare Drive is available, the controller will detect the SCSI channel and ID of the failed drive. Once the failed drive has been replaced by a new drive/used drive, it starts to rebuild using the replaced drive. If there is no available drive for rebuilding, the controller will not try to rebuild again until the user applies another forced-manual rebuild.

3.2.4 Concurrent Rebuild in RAID (0+1)

RAID (0+1) allows multiple drive failure and concurrent multiple drive rebuild. Newly replaced drives must be scanned and set as Local Spare

Drives. These drives will be rebuilt at the same time (you do not need to repeat the rebuilding process for each drive).

3.3   Disk Array Parameters

3.3.1   Rebuild Priority

Rebuilding time will depend on the capacity of the logical drive. The IFT-2101U RAID controller provides background rebuilding ability. Meaning, the controller is able to serve other I/O requests while rebuilding the logical drives. The rebuilding process is totally transparent to the host computer or the operating system.

The background rebuild process has four priority options:

- Low
- Normal
- Improved
- High

The default priority is "Low" which uses the controller's minimum resources to rebuild. Choosing "Normal" or "Improved" will speedup the rebuilding process and choosing "High" will use the controller's maximum resources to complete the rebuilding process at the shortest time.

Rebuild priority can be configured through either the Text RAID Manager or the GUI RAID Manager.

3.3.2   Verify-after-Write

The controller has the ability to force the hard drives to verify after data has been written to the media of the HDD. There are three selectable methods:

- Verification on LD Initialization Writes
  Performs Verify-after-Write while initializing the logical drive.
- Verification on LD Rebuild Writes
  Performs Verify-after-Write during the rebuilding process.
- Verification on LD Normal Drive Writes
  Performs Verify-after-Write during normal I/O requests.

Each method can be enabled or disabled individually. Hard drives will perform Verify-after-Write according to the selected method.

☞ **IMPORTANT:**

The "Verification on LD Normal Drive Writes" method will affect "write" *performance during normal use.*

3.4 Cache Parameters

3.4.1 Optimization for Sequential or Random I/O

When using RAID with applications such as video or image oriented applications, the application reads/writes from the drive using large-block, sequential files instead of small-block, random access files. The IFT-2101U RAID controller provides the options to optimize for large-sequential I/O or optimize for small-random I/O access.

"Optimization for Sequential I/O" provides a larger – 128K – stripe size (or "block" size, also known as "chunk" size) than does "Optimization for Random I/O" (with a size of 32K). A lot of the controller's internal parameters will also be changed to optimize for sequential or random I/O. The change will take effect after the controller reboots.

If the existing logical drives were built with "Optimization for Random I/O", these logical drives will not read/write when using "Optimization for Sequential I/O" (shows "INVALID") and vice versa because the stripe size is different. Change it back to the original setting and reset the controller to make available the logical drive data again.

☞ **IMPORTANT:**

Changing the setting to "Optimization for Sequential I/O" or "Optimization for Random I/O" should be performed only when no logical drive exist. Otherwise, you will not be able to access the data in the logical drive later on.

3.5 Drive-Side SCSI Parameters

3.5.1 SCSI Motor Spin-up

When the power supply is unable to provide sufficient current for all the hard drives and controllers that are powered-up at the same time, spinning-up the hard drives serially is one of the best way of consuming lower power-up current.

By default, all hard drives will spin-up when powered-on. These hard drives can be configured so that all of them will not spin-up at power-on. There are 3 methods of spinning-up the hard drive's motor: Spin-up at power-on, Spin-up serially in random sequence or Spin-up by SCSI command. Please refer to the hard drive's user's manual for instructions on configuring the hard drive using the "Spin-up by SCSI command". The procedure for each brand/model of hard drive should vary.

Configure all the hard drives as above and enable "SCSI Motor Spin-Up" in Drive-Side SCSI Parameters. Power off all hard drives and controller, and power them on again. All the hard drives will not spin-up at this time. The controller will then spin-up the hard drives one by one at four seconds interval.

☞ **IMPORTANT:**
If the drives are configured as "Delay Motor Spin-up" or "Motor Spin-up in Random Sequence," some of these drives may not be ready yet for the controller to access when the system powers up. Increase the disk access delay time so that the controller will wait a longer time for the drive to be ready.

3.5.2   SCSI Reset at Power Up

By default, when the controller is powered up, it will send a SCSI bus reset command to the SCSI bus. When disabled, it will not send a SCSI bus reset command on the next power-up.

When connecting dual host computers to the same SCSI bus, the SCSI bus reset will interrupt all the read/write requests that are being performed. This may cause some operating systems or host computers to act abnormally. Disable the "SCSI Reset at Power-up" to avoid this situation.

3.5.3   Disk Access Delay Time

Sets the delay time before the controller tries to access the hard drives after power-on. The default is 15 seconds.

3.5.4   SCSI I/O Timeout

The "SCSI I/O Timeout" is the time interval that the controller waits for a drive to respond. If the controller attempts to read data from or write

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data to a drive, but the drive does not respond within the SCSI I/O timout value, the drive will be judged to be a failed drive.

When the drive itself detects a media error while reading from the drive platter, it will retry the previous reading or recalibrate the head. When the drive has encountered a bad block on the media, it has to reassign the bad block to another spare block. However, all of this takes time. The time to perform these operations can vary between different brands and models of drives.

During SCSI bus arbitration, a device with higher priority can utilize the bus first. A device with lower priority will sometimes get a SCSI I/O timeout when higher priority devices keep utilizing the bus.

The default setting for "SCSI I/O Timeout" is 7 seconds. It is highly recommended not to change this setting. Setting the timeout to a lower value will cause the controller to judge a drive as failed a drive is still retrying or while a drive is unable to arbitrate the SCSI bus. Setting the timeout to a greater value will cause the controller to keep waiting for a drive, and it may sometimes cause a host timeout.

3.5.5 Maximum Tag Count

The maximum number of tags that can be sent to each drive at the same time. A drive has a built-in cache that is used to sort all of the I/O requests ("tags") which are sent to the drive, allowing the drive to finish the requests faster. The cache size and maximum number of tags varies between different brands and models of drive. Using the default setting – "32" – is highly recommended. Changing the maximum tag count to "Disable" will cause the internal cache of the drive to be ignored (i.e., not used).

3.5.6 Periodic Drive Check Time

The "Periodic Drive Check Time" is an interval for the controller to check all of the drives that were on the SCSI bus at controller startup (a list of all the drives that were detected can be seen under "View and Edit SCSI Drives"). The default value is "Disabled". "Disabled" means that if a drive is removed from the bus, the controller will not be able to know – so long as no host accesses that drive. Changing the check time to any other value allows the controller to check – at the selected interval – all of the drives that are listed under "View and Edit SCSI Drives." If any drive is then removed, the controller will be able to know – even if no host accesses that drive.

3.5.7   SAF-TE Enclosure Monitoring

What is SAF-TE?

SAF-TE stands for SCSI Accessed Fault-Tolerant Enclosures. It is an enclosure management technology that uses the SCSI bus to interact with the controller. A SAF-TE-compliant enclosure monitors the fan temperature, power supply, UPS and also provides drive status LED's.

How does it work?

The SAF-TE device, which is often a back-plane within a drive-bay enclosure, must occupy a connector on one of the drive channels' SCSI cables. The presence of a SAF-TE device will be detected and its presence will be displayed in the BIOS configuration utility, Text RAID Manager and the GUI RAID Manager programs. The RAID controller communicates with the SAF-TE enclosure with standard SCSI commands, polling the device in order to get SAF-TE information.

The default value for "Periodic SAF-TE Device Check Time" is "Disabled". If the enclosure does have a SAF-TE device and features, enable the controller to poll the device by selecting a time interval. The RAID controller will then check the SAF-TE device status at that interval.
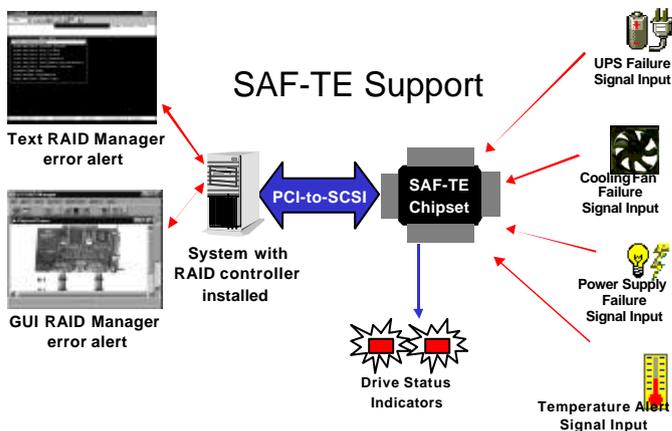
- The SAF-TE chipset connects to the drive channel of the controller together with the other SCSI drives.

3.5.8   Periodic Auto-Detect Failure Drive Swap
Check Time

The "Drive-Swap Check Time" is the interval at which the controller checks to see whether a failed drive has been swapped. When a logical drive's member drive fails, the controller will detect the failed drive (at the selected time interval). Once the failed drive has been swapped with a drive that has adequate capacity to rebuild the logical drive, the rebuild will begin automatically.

The default setting is "Disabled," meaning that that the controller will not Auto-Detect the swap of a failed drive. To enable this feature, select a time interval.

3.6   Dynamic Logical Drive Expansion

3.6.1   What Is It and How Does It Work?

Before Dynamic Logical Drive Expansion, increasing the capacity of a RAID system using traditional methods meant backing up, re-creating and then restoring. Dynamic Logical Drive Expansion (a new feature of firmware version 2.11) allows users to add new SCSI hard disk drives and expand a RAID 0, 3 or 5 Logical Drive without powering down the system.

3.6.2   Two Modes of Dynamic Logical Drive Expansion

There are two modes of Dynamic Logical Drive Expansion: Mode 1 and Mode 2.

Dynamic Logical Drive Expansion

Mode 1   **Mode 2**
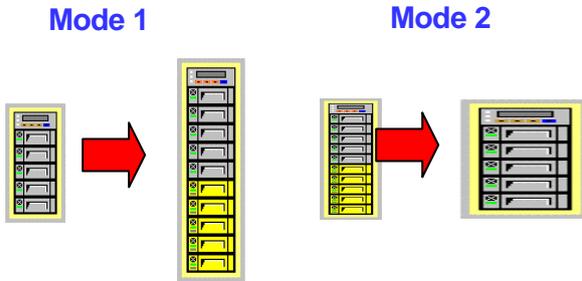
Mode 1 Expansion involves adding more SCSI hard disk drives to a logical drive, which may require that the user obtain an enclosure with more drive bays. The data will be re-striped onto the original and newly added disks.

RAID Expansion - Mode 1
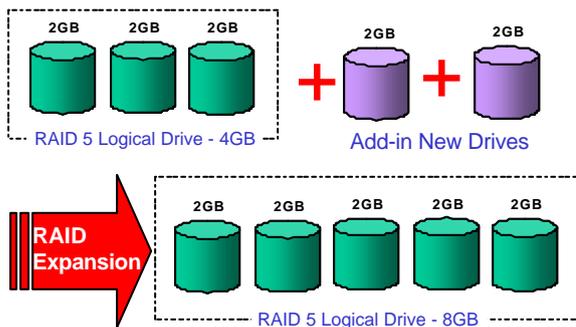
In the figure above, new drives are added to increase the capacity of a 4-Gigabyte RAID 5 logical drive. The two new drives increase the capacity to 8 Gigabytes.

Mode 2 Expansion, on the other hand, requires the same number of higher-capacity SCSI hard disk drives for a given logical drive.
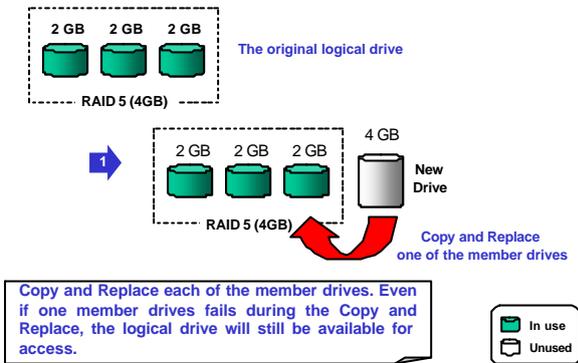
The figure above illustrates expansion of the same 4-Gigabyte RAID 5 logical drive using Mode 2 Expansion. Drives are copied and replaced, one by one, onto three higher-capacity drives.

RAID Expansion - Mode 2 (2/3)
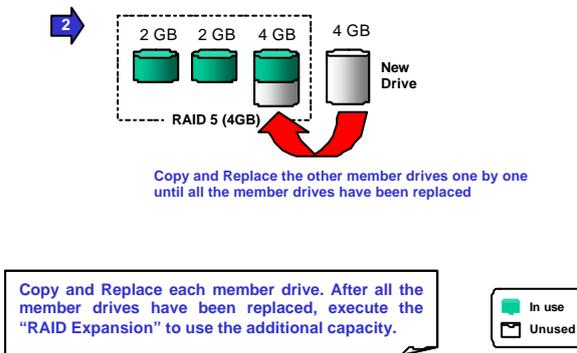
This results in a new 4-Gigabyte, RAID 5 logical drive composed of three physical drives. The 4 Gigabytes of increased capacity is in a new partition.

RAID Expansion - Mode 2 (3/3)

3

4 GB 4 GB 4 GB

RAID 5 (4GB)

RAID Expansion

RAID 5 (8GB)

n partitions
Partition *n+1*

or

RAID 5 (8GB)

After the RAID Expansion, the additional capacity will appear as another partition. Adding the extra capacity into the existing partition requires OS support.

In use
Unused
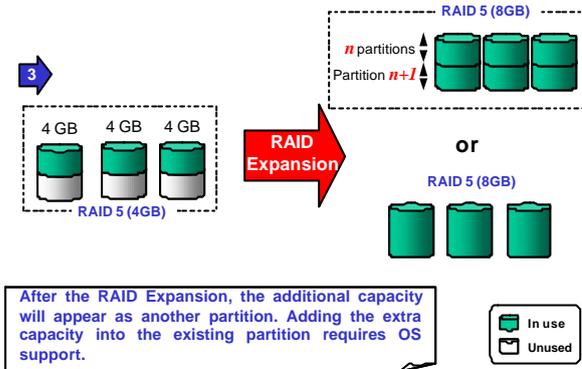
☞ **IMPORTANT:**

- *The increased capacity from Mode 1 and Mode 2 Expansion of a logical drive will be a <u>new</u> partition.*

- *Adding the extra capacity to the existing partition could crash the file system in most current operating systems, so this is not supported. Technically, the controller could easily combine the two partitions together. But, as this may compromise protection of the existing partition's data (due to the questions regarding OS capabilities), this function is not offered as a choice at this time.*

- *At the time of this printing, Firmware version 2.11 does not support the "Copy and Replace" function that is required for Mode 2 Expansion. Third-party hard disk utilities may be used*

for Mode 2 Expansion of logical drives. Future versions of the firmware will support "Copy and Replace."

3.6.3 Example: RAID Expansion in Windows NT Server

Limitations When Using Windows NT 4.0

1. Only the Windows NT Server Disk Administrator includes the Extend Volume Set function; Windows NT Workstation does not have this feature.
2. The system drive (boot drive) of a Windows NT system cannot be extended.

---

3. The drive that will be extended should be using the NTFS file system.

The Example:

The following example demonstrates the expansion of a 900MB   RAID 0 logical drive. The Text RAID Manager software that comes with the IFT-2101U is used to communicate with the RAID controller.
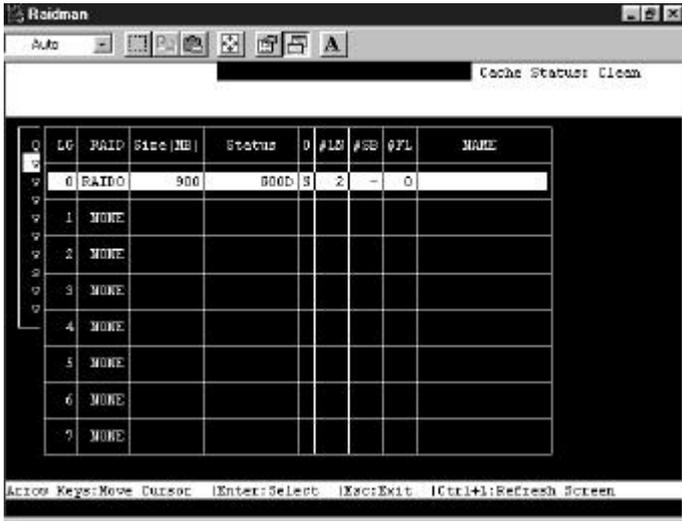
You can view information about this drive in the Windows NT Server's Disk Administrator.
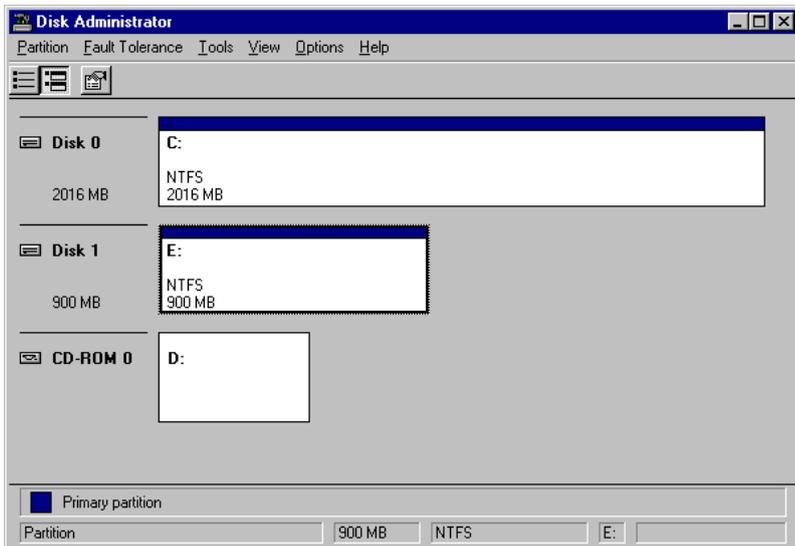
Place the cursor on Disk 1, right-click your mouse, and select "Properties." You will see that the total capacity for the Drive E: is just under 900MB.
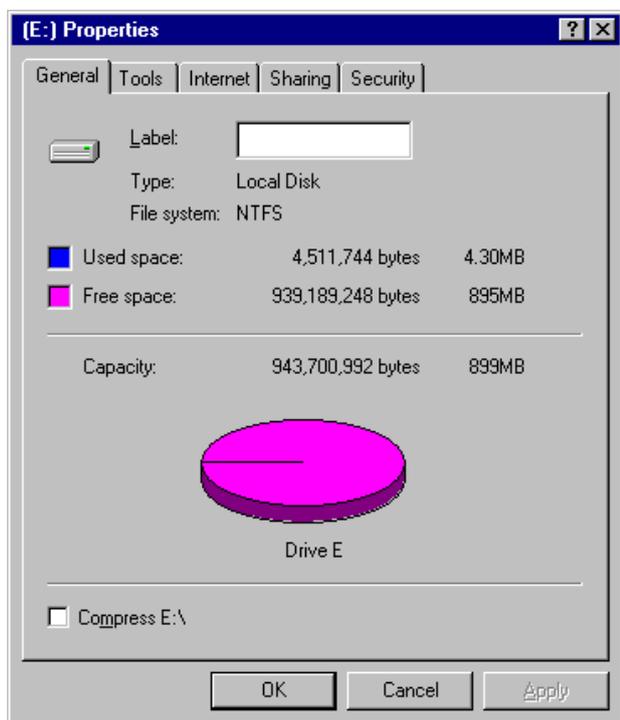
Follow the steps described in section 8.2.8 to add SCSI disk drives and perform Mode 1 Dynamic Logical Drive Expansion.
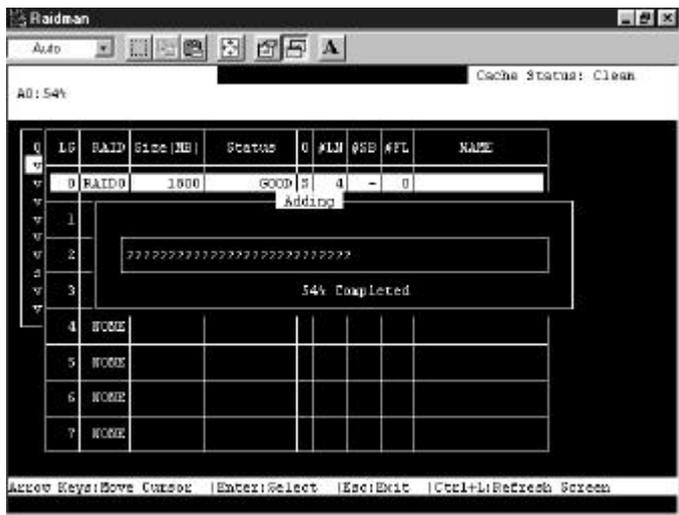
The 900MB logical drive has become a 1800MB logical drive. Place the cursor on that logical drive, and then press <Enter>.
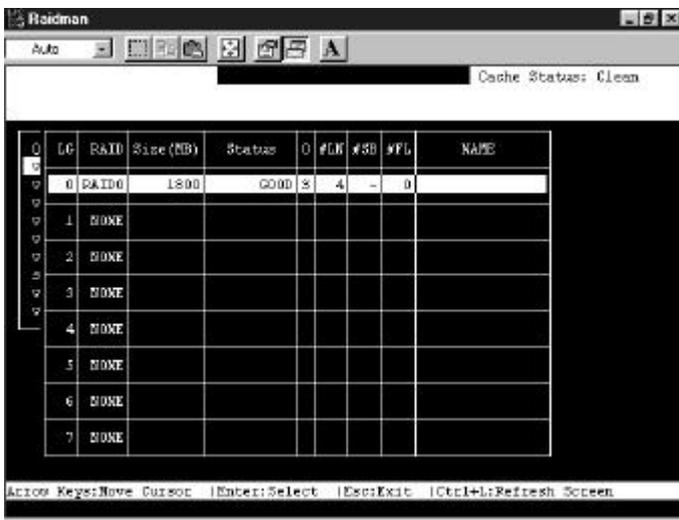
From the menu, select Partition Logical Drive. You will see that the 1800MB logical drive is composed of two 900MB partitions.
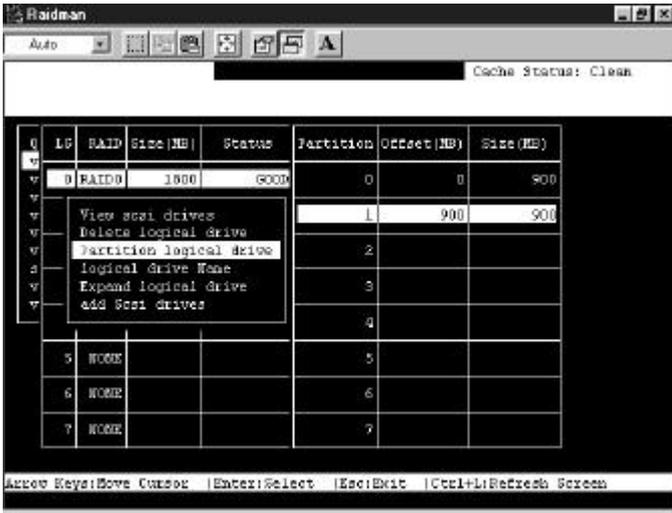
Follow the directions in section 8.3.1 to map the new partition to a Host LUN. The new partition must be mapped to a host LUN in order for the HBA (host-bus adapter) to see it. Once you have mapped the partition, reboot Windows NT. The HBA should be able to detect an additional "disk."

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Return to Windows NT Server's Disk Administrator. There now exists a Disk 2 with 900MB of free space. Click on Disk 2 to select it.
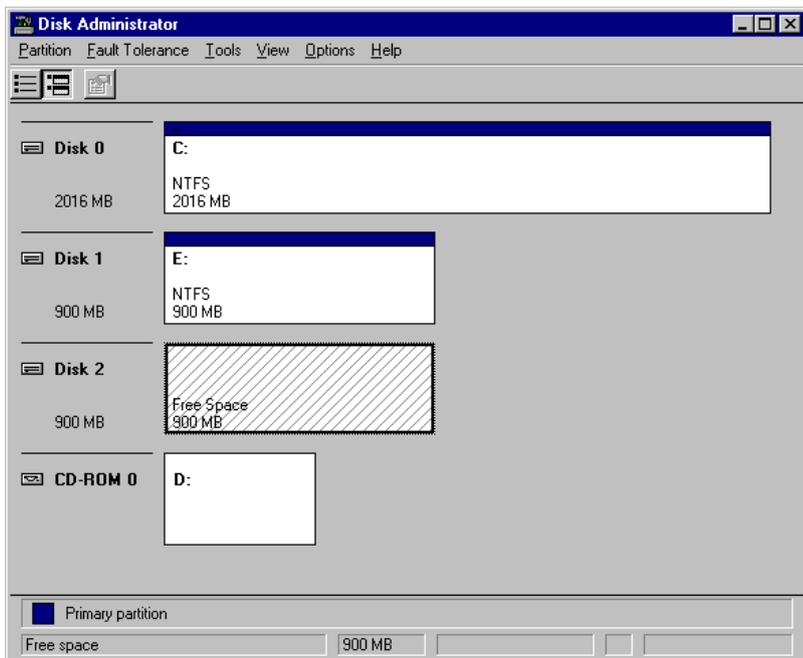
From the "Partition" menu, select "Extend Volume Set."
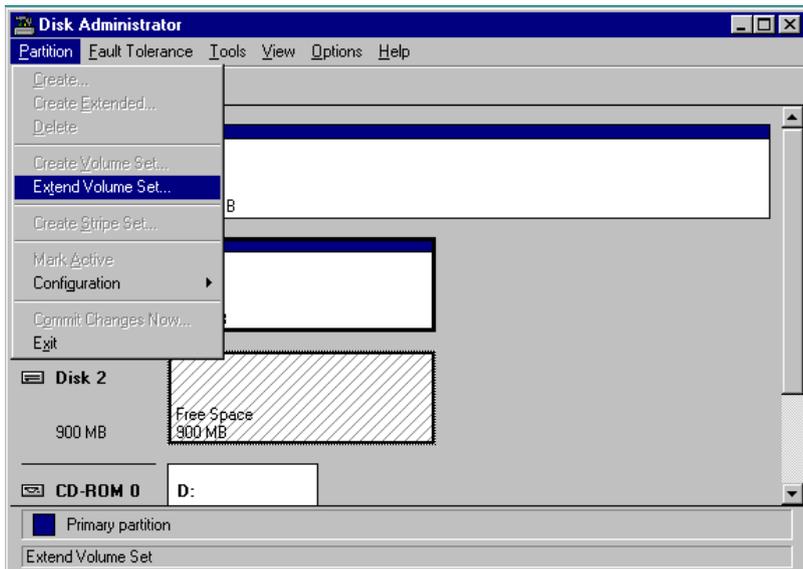
The screen will display that volume set of Drive E: has been extended by the 900MB in Disk2. Move the cursor to "Commit Changes Now" to confirm that you want the free space to become a part of the same logical drive.

Infortrend Technology, Inc.
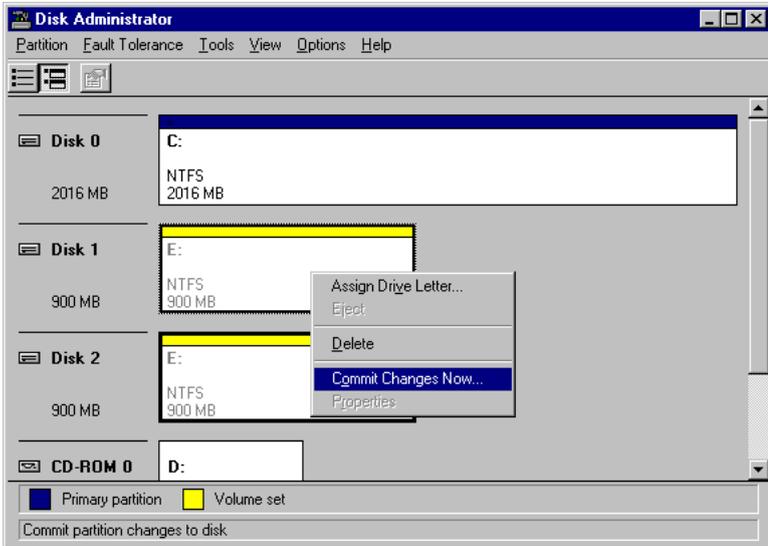
Logical Drive E: is now composed of two 900MB partitions with a total volume of 1800MB. To see this, hold down on the <Ctrl> key and select both Disk 1 and Disk2; then right-click your mouse and select "Properties."
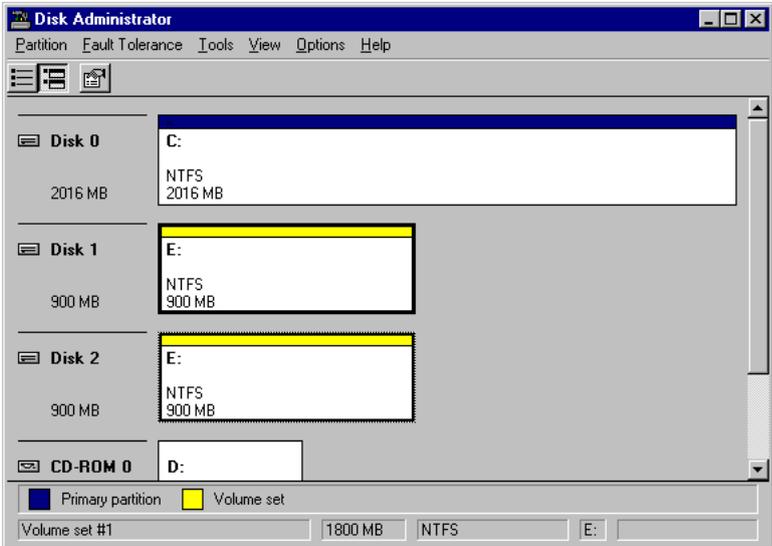
Drive E: now has a capacity just under 1800MB.

Caption: (E:) Properties — General tab

- Label:
- Type: Local Disk
- File system: NTFS
- Used space: 4,642,816 bytes — 4.42MB
- Free space: 1,882,760,192 bytes — 1.75GB
- Capacity: 1,887,403,008 bytes — 1.75GB
- Drive E
- ☐ Compress E:\
- OK   Cancel   Apply
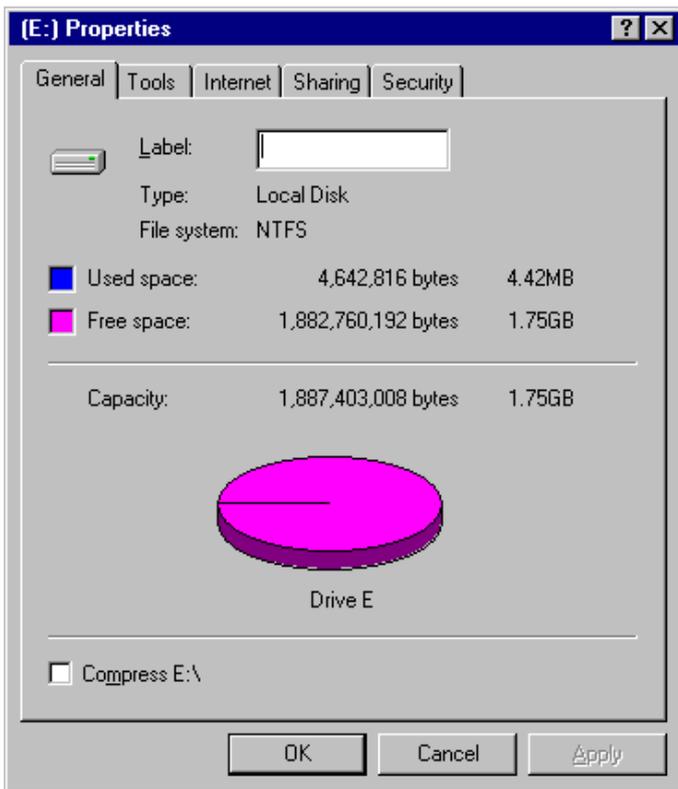
Chapter 4   Hardware Installation

4.1   Main Board Parts Location
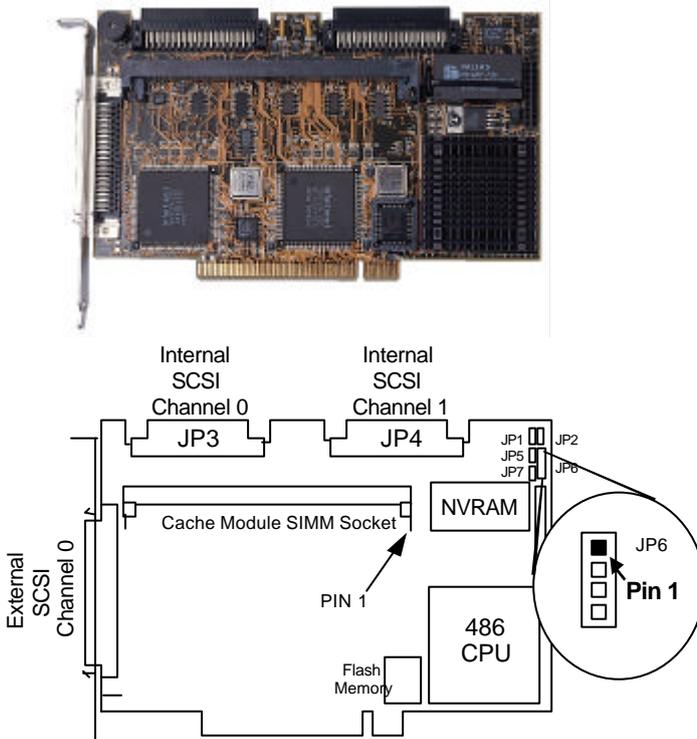
JP6   LED Connector for Hard Disk Drive Activity Indicator

Pin	Descriptions
1	+5V
2	GND
3	GND
4	+5V

IMPORTANT:

- *JP1, JP2, JP5, JP6 and JP 13 are for factory use only. Do not install any jumper cap on them for normal operation.*

4.2   Installing DRAM SIMM

IMPORTANT:
The IFT-2101U requires a minimum of 8 MBytes 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.

Following are guidelines with regards to DRAM:

- **Use 72-pin 60 ns DRAM or 60 ns EDO RAM SIMM module**. EDO RAM is recommended to improve the performance.

- DRAM with or without parity is auto-detected by IFT-2101U, but DRAM with parity is recommended for security.

- Minimum DRAM required is 8 Mbytes installed in SIMM socket, however 16Mbytes is recommended.

- IFT-2101U supports 8, 16, 32, and 64Mbyte DRAM SIMM modules. Maximum DRAM size is 64 Mbytes.

To install DRAM SIMM

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 towards the back until the hooks on both sides of the socket snap into place (2) as shown below.
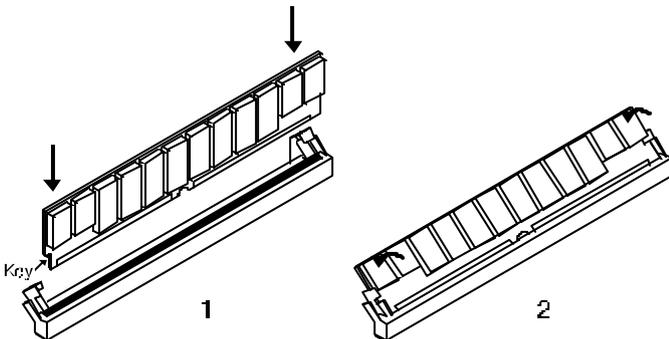
4.3 Basic Operational Set-Up

Following is a description of a sample operational set-up:
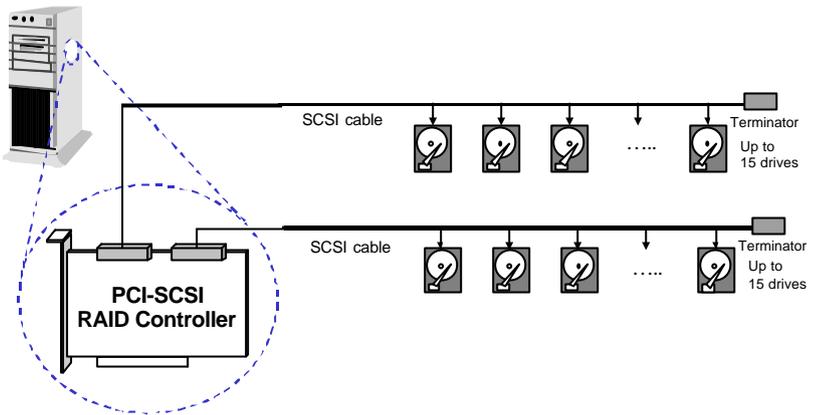
- The SCSI cable must be shorter than 2 meters .

- Drives connected to channel 0 and/or 1.

- SCSI nodes on the same channel have unique ID number. The SCSI ID 7 is reserved for the IFT-2101U adapter and thus no drives should use ID 7.

- Both ends of all SCSI cables are properly terminated. Disable the termination of channel-0 and enable the termination of channel-1

- Power supply attached.

- All operation parameters properly set.

- 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. **The latter, is preferred as removal of the hard disk will not affect cable termination.** All other terminators must be removed making sure that only one terminator is installed.
  The default state of terminators embedded on IFT-2101U controller are enabled and can be changed by running RAIDMAN.EXE.
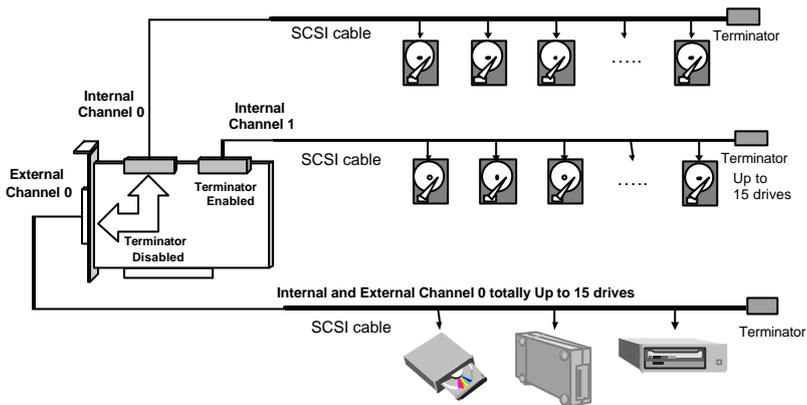
T

he external channel 0 and internal channel are the same channel -- the total devices on external channel 0 should not exceed 15. Disable the termination of channel 0 if external devices are connected.
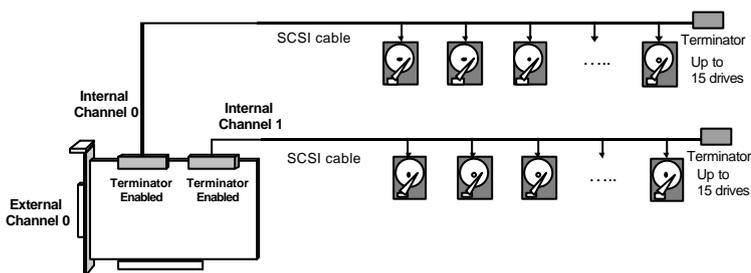
Enable the termination of channel 0 if no external devices are connected.

IMPORTANT:

- *Changing any settings in "View and Edit SCSI Channels" requires a system reset to take effect.*

Chapter 5   Quick Setup

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 IFT-2101U is capable of grouping connected drives into 8 logical drives, each operating on the same or different RAID levels. The logical drive can be further divided into a maximum of 8 "Partitions". During operation, the host sees the logical drive or partition as one single drive.

5.1   Using the BIOS RAID Manager

1. When the system is powered on, the following text will appear:

```
Infortrend IFT-2101U (PCI-TO-SCSI RAID) BIOS v1.16A
(C)Copyright 1995 Infortrend Technology Inc.
PCI Bus # = 00        Device # = 09  Port = E000  IRQ = 10 EDORAM=8 MB FW=2.11
!! Press <Ctrl><I> for Configuration Utility, <Q> to Skip !!
```

2. Press <Ctrll><I> to enter the BIOS Configuration Utility.

3. Choose "Configure RAID" to enter the terminal emulation.

4. Move the cursor to "ANSI" (or another terminal emualtion mode) and press [**Enter**] to see the main menu of the BIOS RAID Manager.

5. The keys used in the RAID Manager operation are as follows:

¬ ® - ¯	Left, right, up and down arrow to select options.
[Enter]	To go into a submenu or to execute an option.
[Esc]	To escape and go back to the preceding menu.

Type **Q,** or use the - ¯ keys, to select "**Q**uick installation" and press **[Enter]**. Choose Yes to create the logical drive.

---

6. All the possible RAID levels will be dispalyed, choose a RAID level by using the ↑ ↓ keys to select a RAID level and press **[Enter]**. The spear drive assigned in this item is Local Spare drive, not Global Spare drive.

```
RAID 5 + Spare
RAID 5
RAID 3 + Spare
RAID 3
RAID 1 + Spare
RAID 1
RAID 0
NRAID
```

The controller will start initialization and automatically map the logical drive to LUN 0 of the first host channel.

```
Initializing
▓
          6% Completed
```
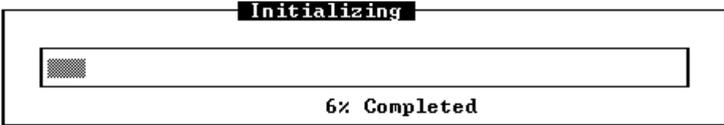
Chapter 6   Configuring RAID

6.1   Starting to Build a RAID System Drive

The following figure is a basic flowchart when configuring a RAID system. Hardware installation must be completed before any configurations take place.

| Create Logical Drive | → | Partition Logical Drive | → | Map Host LUN (System Drive) |
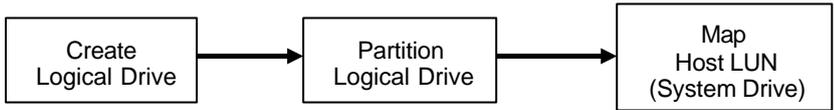
When power is turned on, the IFT-2101U RAID controller scans all the hard drives that are on all the drive channels. If a hard drive was connected after the controller completes initialization, use the "SCAN SCSI DRIVE" function to let the controller recognize the newly added hard drive and configure it as a member of a logical drive or a spare drive.

In accordance to your requirement, configure a logical drive to contain one or more hard drives based on the desired RAID level, and partition the logical drive into one or several partitions. Map each partition as one system drive (LUN). The host SCSI adapter will recognize the system drives after re-scanning the host SCSI bus.

Since the controller is totally operating system independent, the operating system of the host computer will not be able to find out whether the attached devices are physical hard drives or virtual system drives created by the RAID controller.

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 IFT-2101U controller is capable of grouping connected drives to as many as 8 logical drives, each configured on 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 physical drive.

6.2   How Does the RAID Controller Work?

6.2.1   SCSI Channel, SCSI ID and LUN

A SCSI channel (SCSI bus) can connect up to 15 devices (the SCSI controller itself excluded) when the Wide function is enabled (16-bit SCSI). It can connect up to 7 devices (the SCSI controller itself excluded) when the Wide function is disabled (8-bit SCSI). Each device has one unique SCSI ID. Two devices having the same SCSI ID is not allowed.
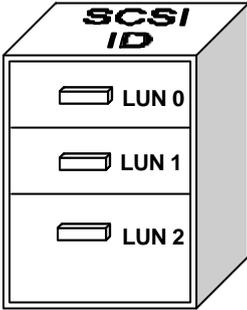
The figure on the left illustrates this. To file a document into a cabinet, you must put the document into one of the drawers. Let's apply this metaphor to SCSI: the SCSI ID is the cabinet, and the drawers are the LUNs (LUN is short for logical unit number.) Each cabinet (SCSI ID) can have up to 32 drawers (LUNs). Data can be stored into one of the LUNs of the SCSI ID. Most SCSI host adapters treat a LUN like another SCSI device.

6.2.2 Understanding Step by Step
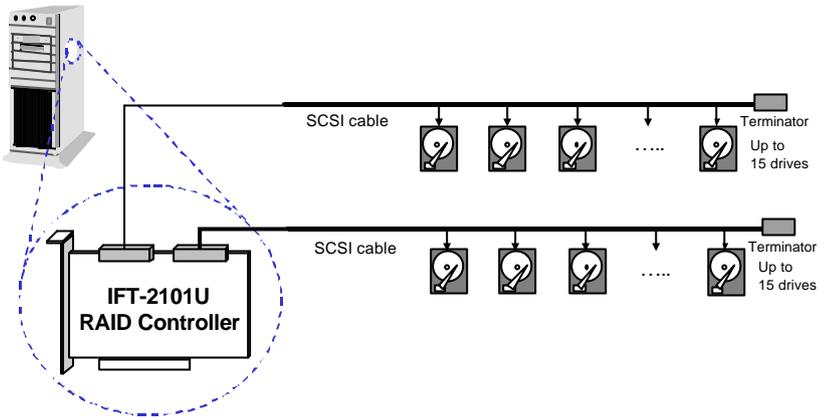
The physical connection should be similar to the one shown above. Install the IFT-2101U RAID controller into a vacant PCI slot in the host system, connect the drives to the SCSI channels on IFT-2101U.

A Logical Drive consists of a group of SCSI drives. Drives in one logical drive do not have to come from the same SCSI channel. Also, each logical drive can be configured a different RAID level.
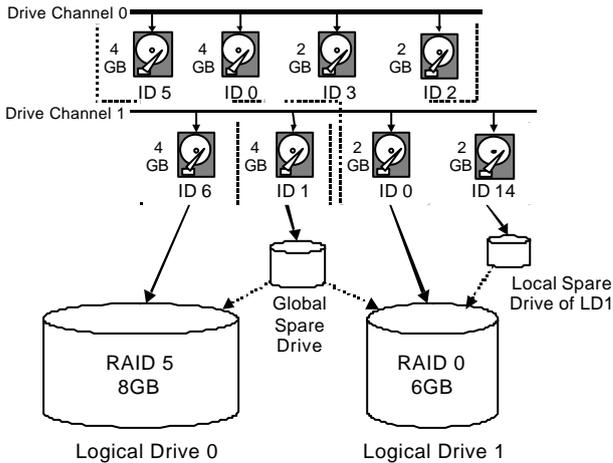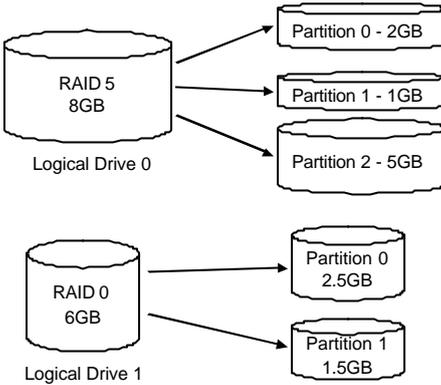
A drive can be assigned as the Local Spare Drive of one specified logical drive, or as Global Spare Drive.

You may divide a logical drive into several partitions, or use the entire logical drive as one single partition.
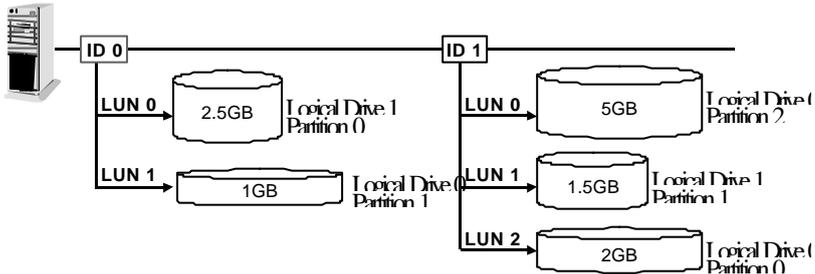
Map each partition to the host SCSI ID. Each SCSI ID will act as one indiviual hard drive to the host computer virtually.
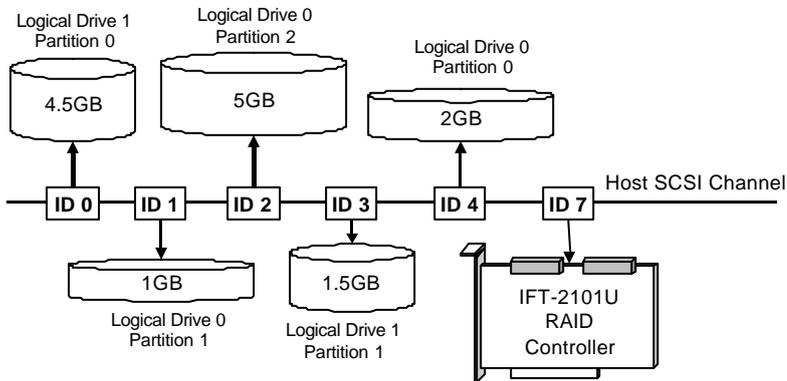
Chapter 7   BIOS Configuration Utility

At system bootup, the IFT-2101U BIOS displays the following message:

```
Infortrend IFT-2101U (PCI-TO-SCSI RAID) BIOS v1.16A
(C)Copyright 1995 Infortrend Technology Inc.
PCI Bus # = 00      Device # = 09  Port = E000  IRQ = 10 EDORAM=8 MB FW=2.11
!! Press <Ctrl><I> for Configuration Utility, <Q> to Skip !!
```

PCI Bus#, Device #:

  displays the PCI bus and PCI device number that has
  been assigned to IFT-2101U. The numbers are in
  hexadecimal.

Port : shows the I/O port base address that has been
  assigned to IFT-2101U.

IRQ : hows the Interrupt level that has been assigned to IFT-
  2101U. The level is in decimal.

EDORAM : displays the cache RAM type and size that is been
  installed on IFT-2101U.

FW : shows the firmware version number of IFT-2101U.

IFT-2101U 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.

7.1   Configuration

There are five functions in the Configuration Option: Configure BIOS,
Configure Card, Configure SCSI, Configure RAID and Reset to Defaults.

```
┌──────────────────────────────────────────────┐
│ Configuration    Color/Monochrome            │
├─────────────────────────────┐────────────────┘
│ Configure BIOS              │
│                             │
│  Configure Card             │
│                             │
│  Configure SCSI             │
│                             │
│  Configure RAID             │
│                             │
│  Reset to Defaults          │
└─────────────────────────────┘
```

7.1.1. Configure BIOS

```
┌──────────────────────────────────────────────────────────────┐
│ Enable BIOS INT 13H Function                          Yes     │
│ BIOS Translation Mode                                 Auto    │
│ Support for Disks > 1 GB                              Yes     │
│ Support for 3 Disks or More (MS-DOS v5.0 or above)   Yes     │
│ Support for NOT-ZERO SCSI LUN                         Yes     │
│ Configure BIOS Devices                             <Enter>   │
└──────────────────────────────────────────────────────────────┘
```

Move the cursor to the the item desired to change.

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 OS's.

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.

Support for Disk > 1 GB
Press <Space> to toggle between Yes or No.

Support for 3 Disks or More (MS-DOS v5.0 or Above)
For MS-DOS version below 5.0, only supports up to 2 disks, don't set this option to "Yes" on such versions DOS system.

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 devices 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.

7.1.2. Configure Card

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

ISA Emulation Mode
If you are going to use IFT-2101U device driver distributed by Infortrend, you MUST set the IO port address to "Disabled". You can select an IO Port address from a list by pressing [Enter].

7.1.3. Configure SCSI

```
Configuration      Color/Monochrome

  Configure BIOS

  Configure Card

  Configure SCSI   SCSI Channel 0

  Configure RAID   SCSI Channel 1

  Reset to Defaults
```

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 Channel 0 Configuration :
SCSI ID                       7
Enable SCSI Termination       Yes
Configuration SCSI Devices    <ENTER>
Enable Wide SCSI              Yes
```

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
```

Please refer to Appendix D, *Sync. Clock Period & Sync. Clock Frequency*, for the Sync. Transfer Period calculation.

Enable Wide SCSI
Use this option to enable/disable wide SCSI.

7.1.4   Configure RAID

```
┌─────────────────────────────────────────┐
│ Configuration    Color/Monochrome        │
├──────────────────────────┐
│ Configure BIOS           │
│                          │
│ Configure Card           │
│                          │
│ Configure SCSI           │
│                          │
│ Configure RAID           │
│ Reset to Defaults        │
└──────────────────────────┘
```
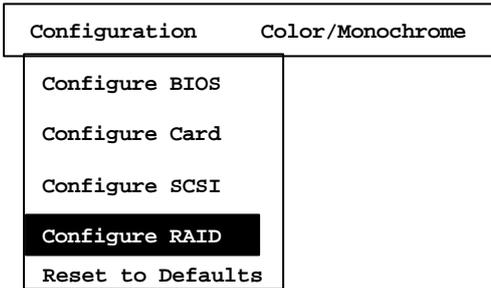
Selecting this option starts the BIOS RAID Manager.   The utility is identical in appearance and features to the Text RAID Manager. See chapter 8, *Text RAID Manager User Interface*, for complete details on the use of the BIOS RAID Manager.

```
                                            Cache Status: Clean

       0                            2MB/S

       0   10  20  30  40  50  60  70  80  90  100

                          ┌──────────────────────────────┐
                          │ PC Graphic(ANSI Mode)         │
                          │ Terminal(VT100 Mode)          │
                          │ PC Graphic(ANSI+Color Mode)   │
                          │ Show Transfer Rate+Show Cache Status │
                          └──────────────────────────────┘
Arrow Keys:Move Cursor|+ & -:Rate Range|Enter:Main Menu|Ctrl+L:Refresh Screen
```
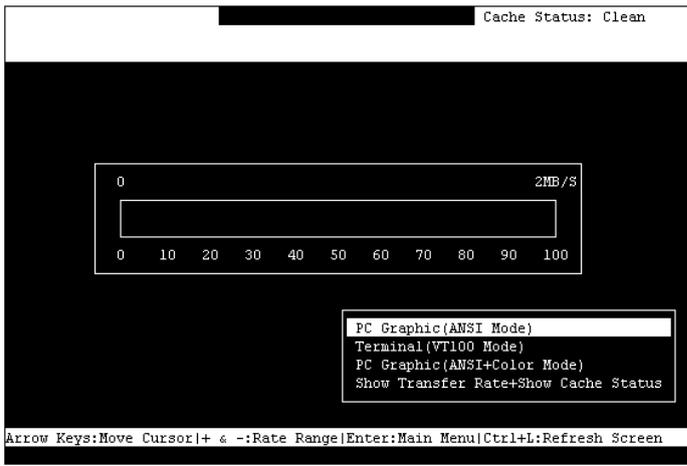
7.1.5   Reset to Defaults

If this option is selected, all the configurations are reset to the manufacturer's defaults.

7.2.   Color/Monochrome

Switches display mode between color and monochrome.

Chapter 8   Text RAID Manager User Interface

To operate Text RAID Manager, simply put the IFT-2101U driver diskette into your floppy disk drive. Change the directory to RAIDMAN. You will see directories for various operating systems. Change to the directory that corresponds to your operating system. For Windows 95/NT and DOS, the program is called RAIDMAN.EXE. For Novell NetWare, the program is called RAIDMAN.NLM. Run the program.

In addition, all of the functions of the Text RAID Manager are available from a BIOS configuration utility. For complete instructions on starting the *BIOS RAID Manager*, please see section 7.1.4.

8.1   The Main Menu

8.1.1   The Initial Screen
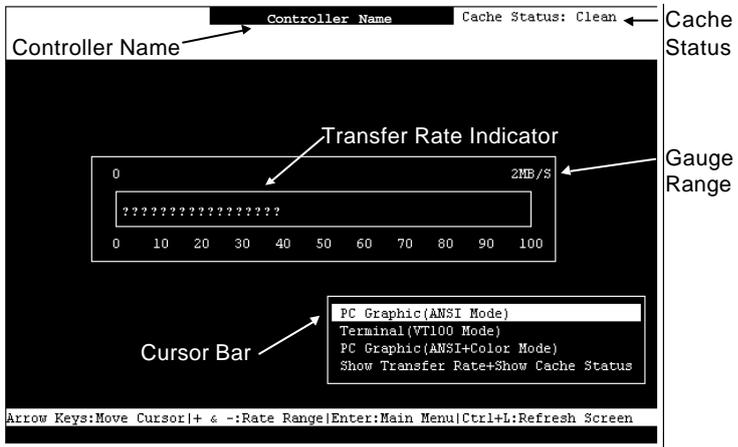
Cursor Bar: Move the cursor bar to a desired item, then press [**Enter]** to select.

Controller Name: Identifies the type of controller.

Transfer Rate Indicator: Indicates the current data transfer rate.

Gauge Range: Use + or - keys to change the gauge range in order to view the transfer rate indicator.

Cache Status: Indicates the current cache status.

PC Graphic (ANSI Mode): Enters the Main Menu and operates in ANSI mode.

Terminal (VT-100 Mode): Enters the Main Menu and operates in VT-100 mode.

PC Graphic (ANSI+Color Mode): Enters the Main Menu and operates in ANSI color mode.

Show Transfer Rate+Show Cache Status: Press ENTER on this item to show the cache status and transfer rate.

8.1.1   Main Menu
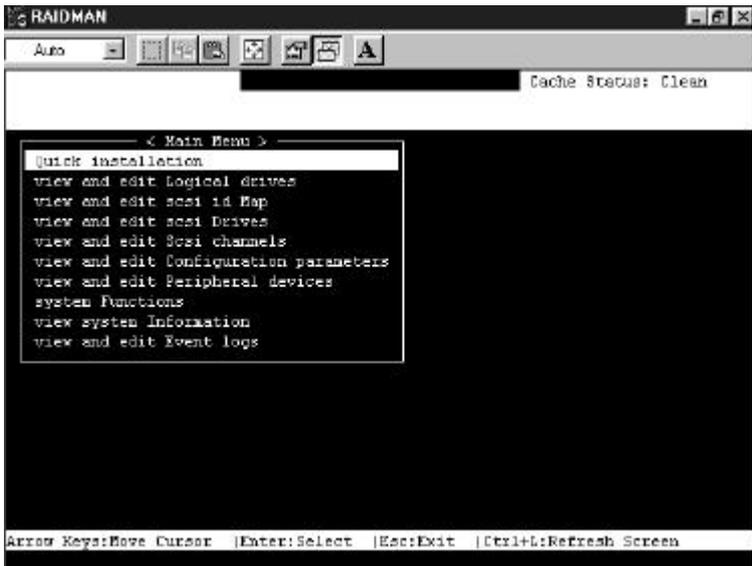
Use the arrow keys to move the cursor bar through the menu item, then press **ENTER** to choose a menu, or **ESC** to return to the previous menu/screen.

8.1.3 Logical Drive's Status

Q	LG	RAID	Size(MB)	Status	O	#LN	#SB	#FL	NAME
v	0	RAID5	2400	GOOD	R	3	0	0	
v	1	NONE							
v	2	NONE							
v	3	NONE							
v	4	NONE							
	5	NONE							
	6	NONE							
	7	NONE							

Arrow Keys:Move Cursor |Enter:Select |Esc:Exit |Ctrl+L:Refresh Screen
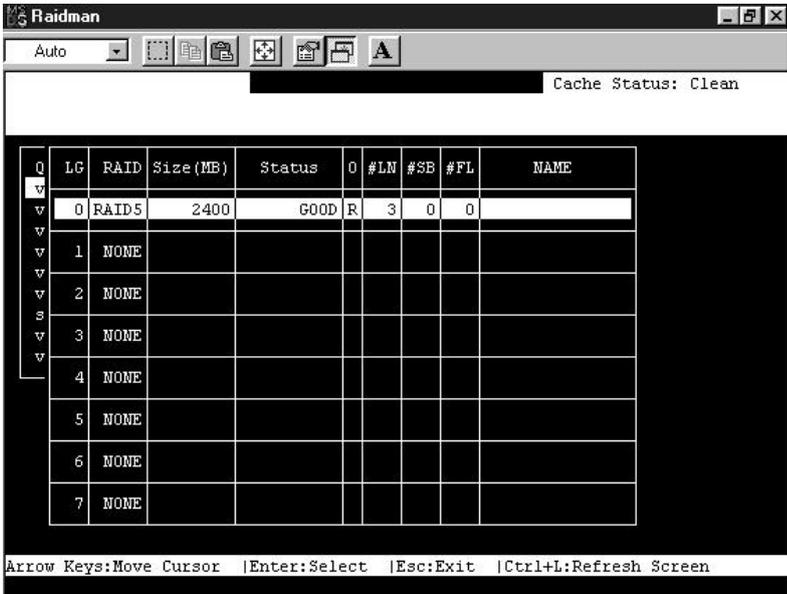
LG　　　　Logical Drive number.

RAID　　　RAID Level.

Size(MB)　Capacity of the Logical Drive.

Status　　Logical Drive Status.

　　　　　　INITING　　The logical drive is now initializing.

　　　　　　INVALID　　The logical drive was created with "Optimization for Sequential I/O", but the current setting is "Optimization for Random I/O".

　　　　　　　　　　　　Or

　　　　　　　　　　　　The logical drive was created with "Optimization for Random I/O", but the current setting is "Optimization for Sequential I/O".

　　　　　　GOOD　　　The logical drive is in good condition.

	DRV FAILED	A drive member failed in the logical drive.
	REBUILDING	Rebuilding the logical drive.
	DRV ABSENT	One of the drives cannot be detected.
	INCOMPLETE	Two or more drives failed in the logical drive.
#OnLine	Total drive members in the logical drive.	
#STB	Standby drives available for the logical drive. This includes all the spare drives available for the logical drive.	
#Fail	Failed drive member in the logical drive.	
Name	Logical drive name.	

8.1.4   SCSI Drive's Status
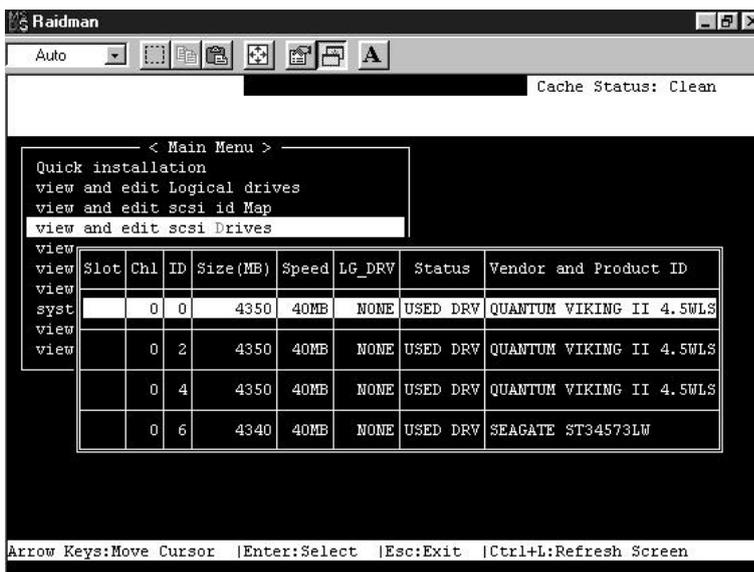
Slot	Slot number of the SCSI drive.
Chl	The SCSI Channel of the connected drive.
ID	The SCSI ID of the drive.

Size (MB)	Drive Capacity.	
Speed	**xxMB**	The maximum sync. transfer rate of this drive.
	Async	The drive is using asynchronous mode.
LG_DRV	*x*	The SCSI drive is a drive member of logical drive *x*.
		If the Status column showed "STAND-BY", the SCSI drive is a Local Spare Drive of logical drive *x*.
	Global	The SCSI drive is a Global Spare Drive.
Status	**INITING**	Processing initialization.
	ON-LINE	The drive is in good condition.
	REBUILD	Processing Rebuild.
	STAND-BY	Local Spare Drive or Global Spare Drive. The Local Spare Drive's LG_DRV column will show the logical drive number. The Global Spare Drive's LG_DRV column will show "Global".
	NEW DRV	The new drive has not been configured to any logical drive or as a spare drive.
	USED DRV	The used drive has not been configured to any logical drive or as a spare drive.
	BAD	Failed drive.
	ABSENT	Drive does not exist.
	MISSING	Drive once exist, but is missing now.
	SB-MISS	Spare drive missing.
Vendor and Product ID	The vendor and product model information of the drive.	

8.1.5 SCSI Channel's Status
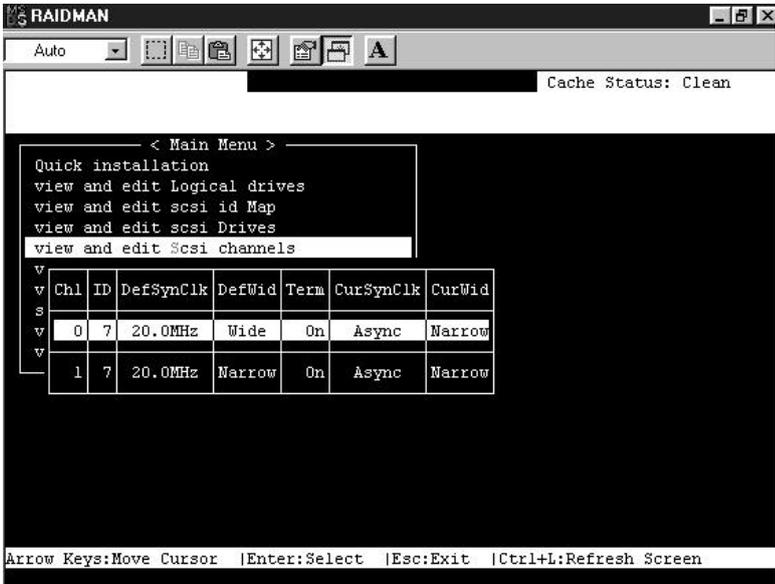
Chl   The SCSI channel's ID.

    (ID number) The Primary Controller is using the SCSI ID for LUN mapping.

    NA   No SCSI ID applied (Drive Channel mode only).

DefSynClk Default SCSI bus sync clock:

    *??.?*M   The default setting of the SCSI channel is ??.? Mhz in Synchronous mode.

    Async   The default setting of the SCSI channel is Asynchronous mode.

DefWid   Default SCSI Bus Width:

    Wide   16-bit SCSI

	Narrow	8-bit SCSI
Term	Terminator Status:	
	On	Terminator is enabled.
	Off	Terminator is disabled.
CurSynClk	Current SCSI bus sync clock:	
	*??.?*M	The default setting of the SCSI channel is ??.? Mhz in Synchronous mode.
	Async	The default setting of the SCSI channel is Asynchronous mode.
	(empty)	The default SCSI bus sync clock has changed. Reset the system for the changes to take effect.
CurWid	Current SCSI Bus Width:	
	Wide	16-bit SCSI
	Narrow	8-bit SCSI
	(empty)	The default SCSI bus width has changed. Reset the controller for the changes to take effect.

8.1.6   Viewing the Current Setting of Each Function
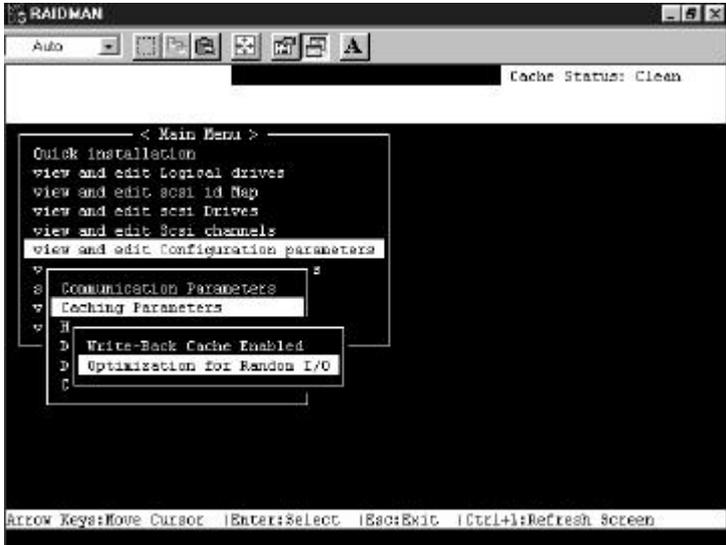
Most of the current settings of each function can be viewed in the menu.

In the example shown above:

- The current setting of "Write-Back Cache" is "Enabled".
- The current setting of Optimization is "Optimization for Random I/O".

```
RAIDMAN                                                          _ |8|X

 Auto        ▼  |□|▣|▣| ⊞ |▣|▣| A |

                                                      Cache Status: Clean


     ┌────────── < Main Menu > ───────────┐
     Quic┌──────────────────────────────────────────────────────────────┐
     view│ SCSI Motor Spin-Up Disabled                                   │
     view│ SCSI Reset at Power-Up Enabled                                │
     view│ Disk Access Delay Time - 15 seconds                           │
     view│ SCSI I/O Timeout -Default( 7 seconds )                        │
     view│ Maximum Tag Count - 32                                        │
     v ┌─┤ Periodic Drive Check Time -  Disable                          │
     s │ C│ Periodic SAF-TE Device Check Time -  Disabled                │
     v │ C│ Periodic Auto-Detect Failure Drive Swap Check Time - Disabled│
     v │ H└──────────────────────────────────────────────────────────────┘
     └──┤ Drive-side SCSI Parameters ├────────┘
        │ Disk Array Parameters                │
        │ Controller Parameters                │
        └──────────────────────────────────────┘




Arrow Keys:Move Cursor  |Enter:Select  |Esc:Exit  |Ctrl+L:Refresh Screen
```

In the example shown above:

- The current setting of "SCSI Motor Spin-Up" is "Disabled".
- The current setting of "SCSI Reset at Power-Up" is "Enabled".
- The current setting of "Disk Access Delay Time" is "15 seconds".
- The current setting of "Maximum Tag Count" is "32".

8.2 Viewing and Editing Logical Drives

8.2.1 Creating a Logical Drive
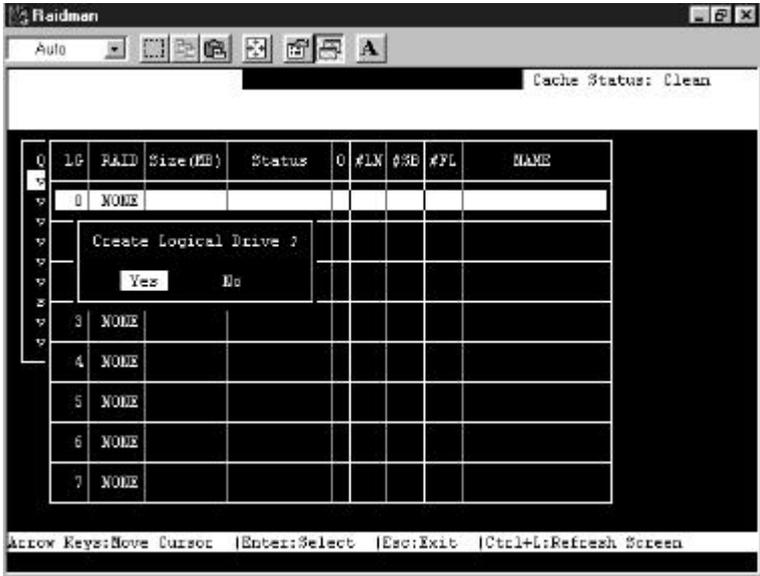
Choose "View and Edit Logical Drives" in the Main Menu. The current logical drive configuration and status will be displayed on the screen. Choose a logical drive number that has not yet been defined, then press [**Enter**]. A prompt "Create Logical Drive?" will appear. Select "**Yes**" and press [**Enter**].
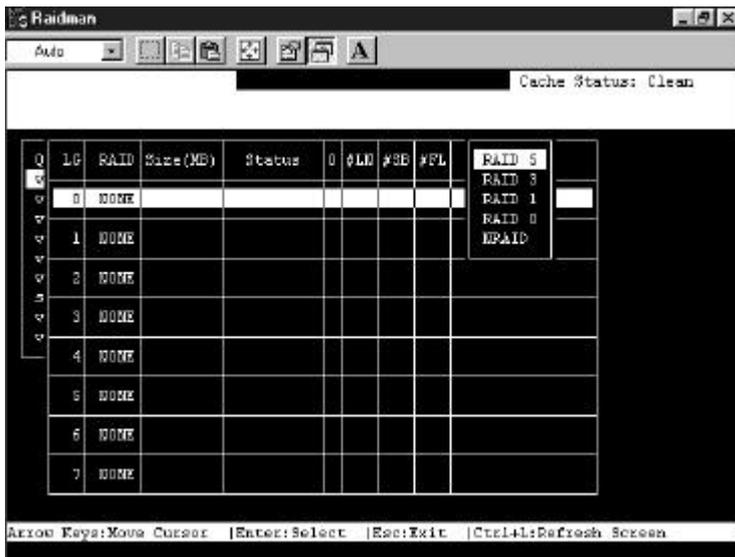
A list of supported RAID levels will appear. Choose a RAID level for this logical drive.
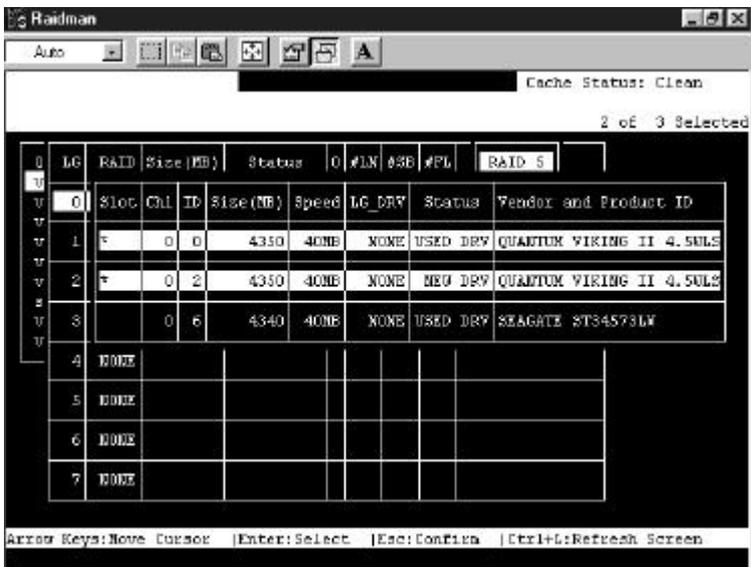
The drives can be tagged for inclusion by positioning the cursor on the drive and then pressing [Enter] to select. An asterisk (*) will appear on the drive that has been selected. Press [**ESC**] when done.
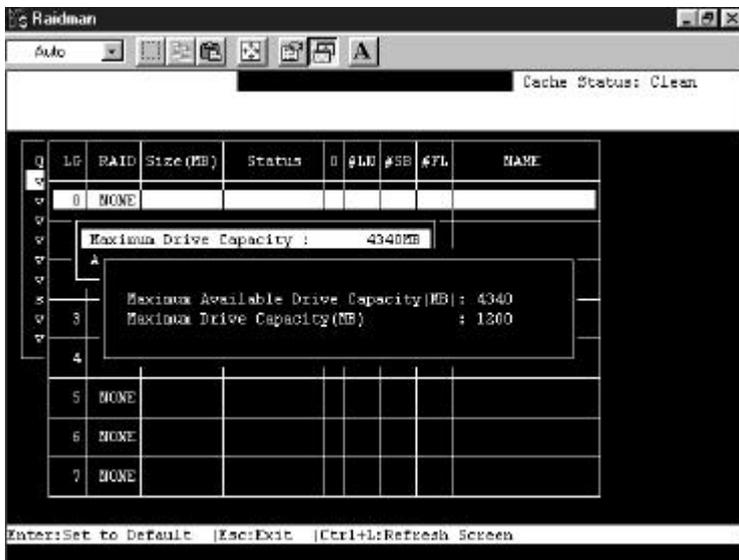
To limit the capacity of each drive included in the logical drive, select "Maximum Drive Capacity", then enter the maximum capacity that will be used by each drive.

You can assign a Local Spare Drive by choosing "Assign Spare Drives" in the above screen. A list of available drives will be displayed on the screen. Mark an asterisk (*) on the drive(s) that will be assigned by moving the cursor bar to that device, then pressing [**Enter**]. Press [**ESC**] when done.

To exit this menu, press [**ESC**].

A prompt to confirm the changes will appear. Select **Yes** to create the logical drive, or **No** to cancel.

When a fault-tolerant RAID level (1, 3 or 5) has been selected, the controller will start initializing parity. A progress indicator will be displayed on the screen. After initialization is done, the created logical drive is also complete.


IFT-2101U Instruction Manual
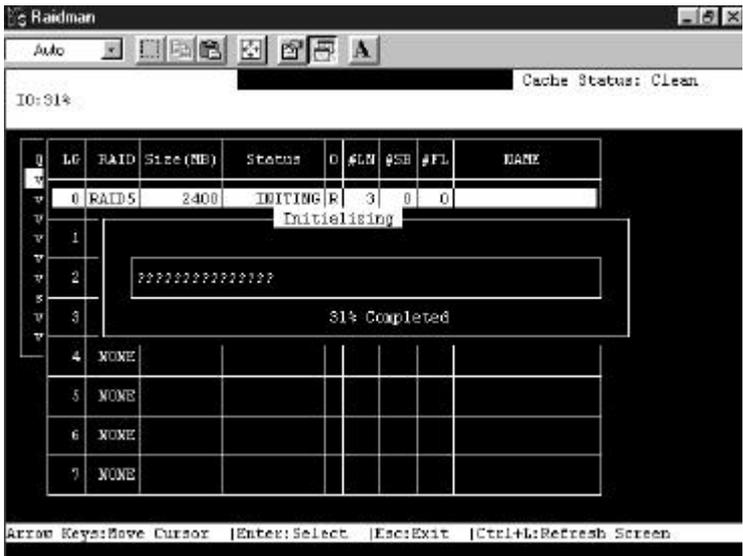
8.2.2   Viewing Logical Drives and Drive Members

Choose "View and Edit Logical Drives" in the Main Menu. The current logical drive configuration and status will be displayed on the screen. Refer to section 8.1.2, *Logical Drive's Status*, for detailed descriptions.

To view the SCSI drive members of the logical drive, choose the logical drive by pressing [**Enter**].
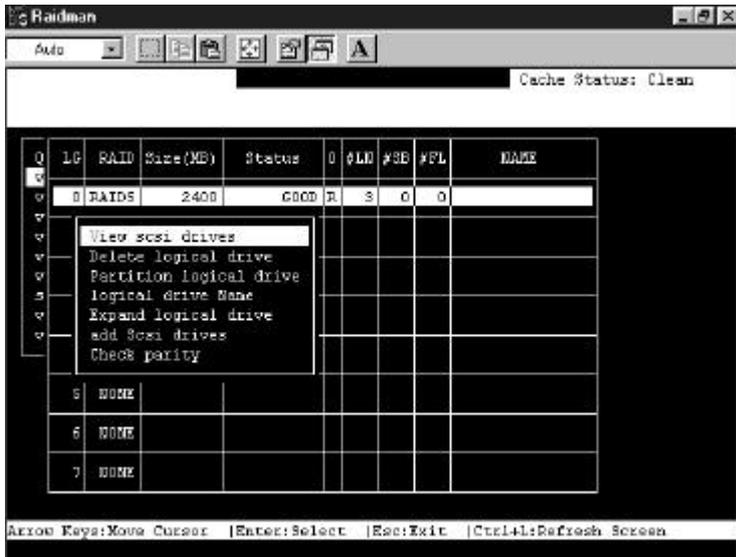
Choose "View SCSI Drives". The member drive information will be displayed on the screen. Refer to section 8.1.3, *SCSI Drive's Status*, for the detailed descriptions of each item.

8.2.3   Deleting a Logical Drive

Choose the logical drive you wish to delete, then press [**Enter**].
Choose "Delete logical drive". Choose **Yes** when prompted to
confirm.
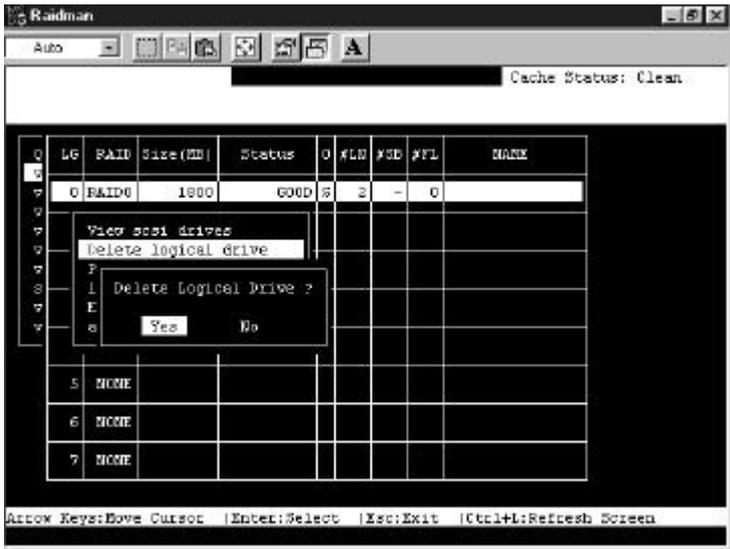
8.2.4   Partitioning a Logical Drive

Choose the logical drive you wish to partition, then press [**Enter**].
Choose "Partition logical drive", then press [**Enter**]. Choose **Yes** to
confirm.
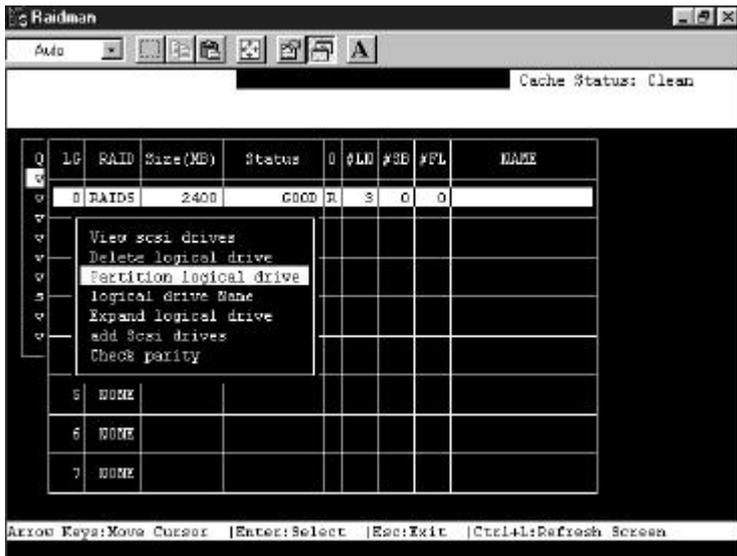
The screen will display a partition table of up to 8 partitions with the last partition selected. Press [**Enter**] and type the desired size for the selected partition, then press **Enter**. The remaining size will be allotted to the next partition.

8.2.5   Deleting a Partition of a Logical Drive


```
Raidman                                                            _ | 8 | X

  Auto       ▼   □ 🗋 🗐  ⊞  🗈🖨  A

                                                      Cache Status: Clean


  Q   LG   RAID  Size(MB)    Status     Partition Offset(MB)   Size(MB)
  v
  v    0 RAID5    2400        GOOD           0          0         1200     |
  v
  v     │   View scsi drives                 1        1200        1200 |
  v     │   Delete logical drive
  v     │   Partition logical drive
  v     │   logical drive Name           Partition Size (MB): 0
  s     │   Expand logical drive
  v     │   add Scsi drives
  v     │   Check parity                     4

        5   NONE                             5

        6   NONE                             6

        7   NONE                             7


Arrow Keys:Move Cursor   |Enter:Select   |Esc:Exit   |Ctrl+L:Refresh Screen
```

Choose the logical drive of the partition you wish to delete, then press
[**Enter**]. Choose "Partition logical drive". The current partition table of
the logical drive will be displayed in tabulated form. Move the cursor
bar to the partition you wish to delete, then press [**Enter**]. Enter "0" on
the partition size to delete this partition.

The capacity of the deleted partition will be added into the last
partition.
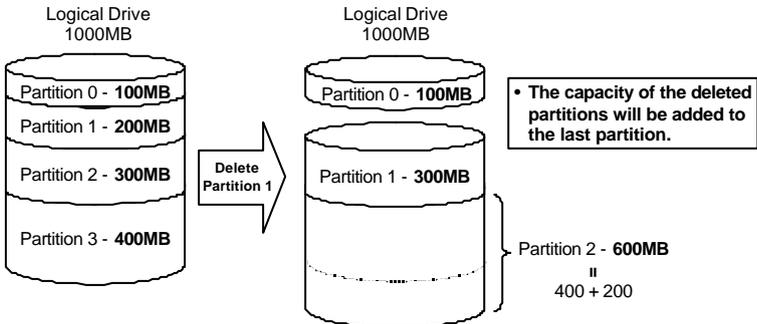
👉 **IMPORTANT:**

- *The capacity of the deleted partition will be added into the last partition.*

- *As long as a partition has been changed, it is necessary to re-configure all LUN mappings. All the LUN mappings will be removed with any partition change.*

8.2.6　Assigning a Logical Drive Name
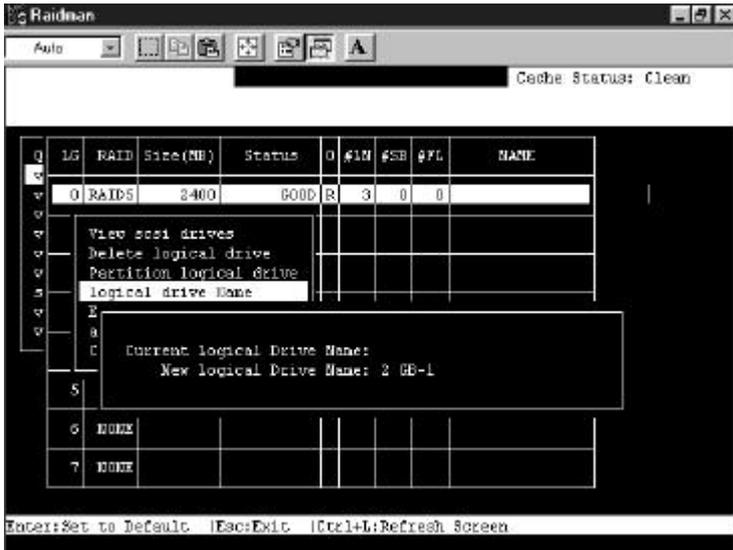
Choose the logical drive you wish to assign a logical drive name, then press [**Enter**]. Choose "logical drive name", then press [**Enter**] again. The current logical drive name will be displayed on the screen. You may now enter the new logical drive name in this field. Enter the logical drive name, then press [**Enter**] to save the new name.

8.2.7 Rebuilding Logical Drive
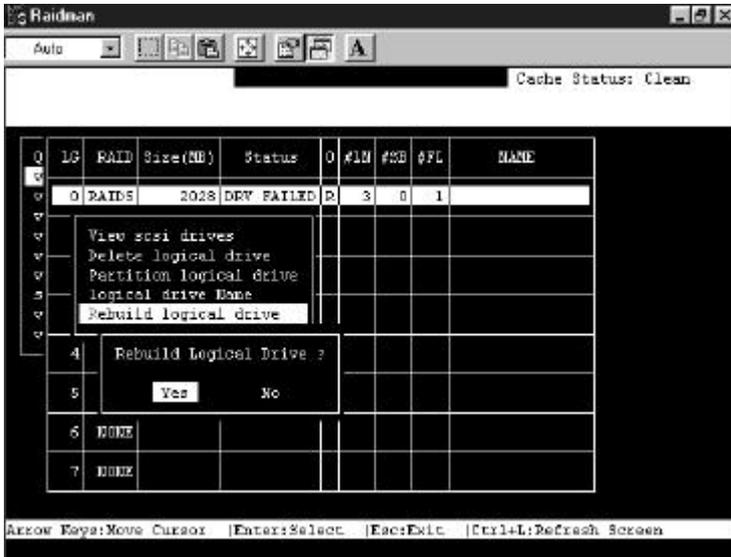
Choose the logical drive that has a failed member drive, then press [**Enter**]. Choose "Rebuild logical drive", then press **Enter**. When prompted with "Rebuild Logical Drive?", select **Yes**. The rebuilding progress will be displayed on the screen.
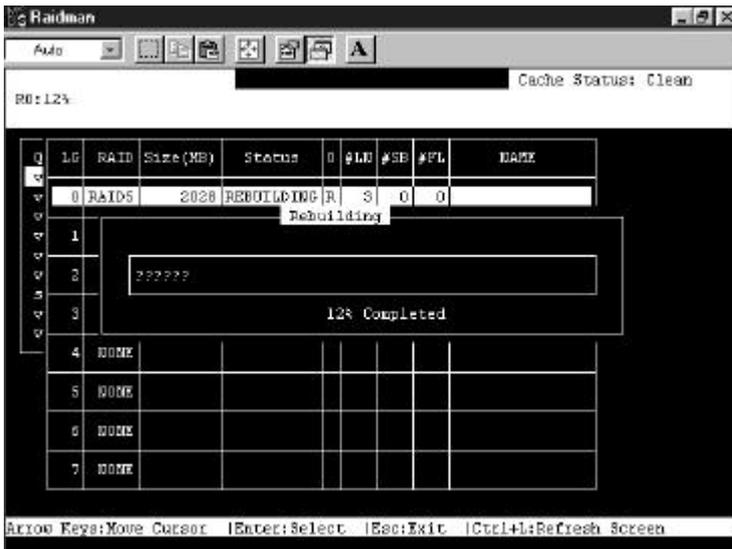
When rebuilding has already started or the logical drive has been automatically rebuilt by a Local Spare Drive or Global Spare Drive, choose "Rebuild progress" to view the rebuilding progress.
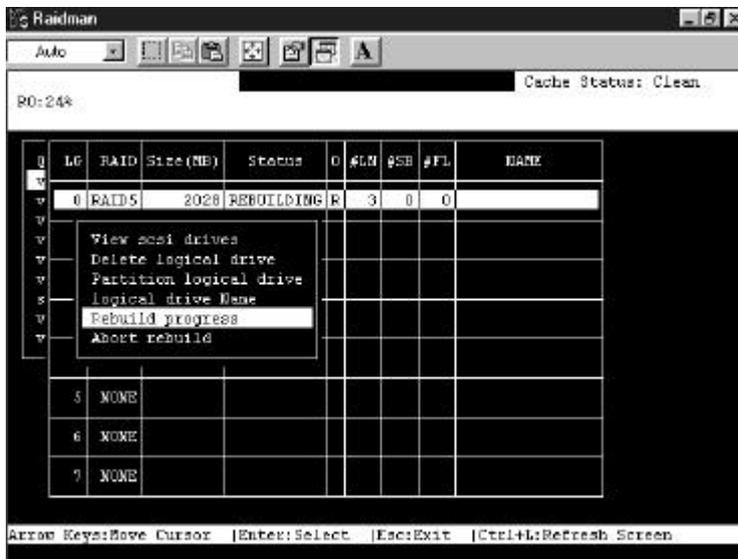
👉 **IMPORTANT:**

- *The Rebuild function will appear only when a logical drive (with RAID level 1, 3 or 5) has a failed drive member.*
- *Refer to "3.2.3 Automatic Rebuild and Manual Rebuild" for more information.*

8.2.8   Dynamic Logical Drive Expansion

From the main menu, select "View and Edit Logical Drives." The logical drive that you wish to expand will be displayed. Move the cursor to that logical drive (if there is more than one) and press [**Enter**] to select it.
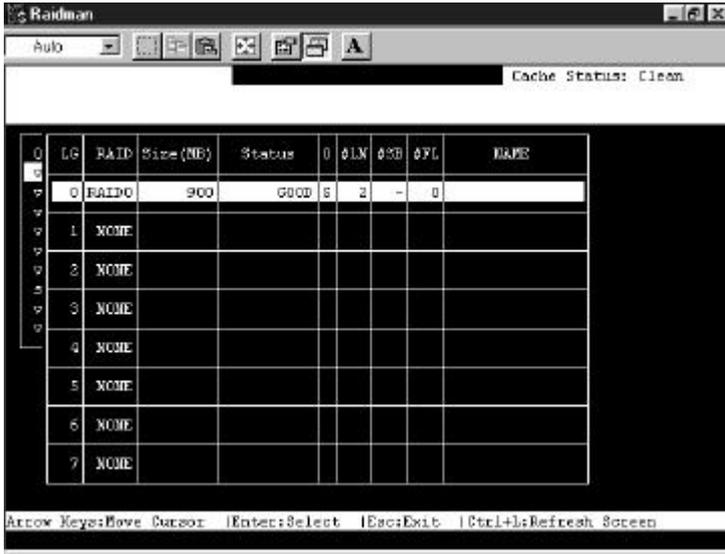
Before the logical drive can be expanded, a SCSI drive (or drives) must be added and scanned in (See section 8.4.1 for details on scanning in a SCSI drive). Use the arrow keys to select "Add SCSI Drives," and then press [**Enter**]. SCSI drives that are available for 'adding' will be displayed. Select drives by highlighting them and then pressing [**Enter**]. An asterisk [*] is displayed by each drive selected. When you are finished selecting, press [**Esc**] to confirm.
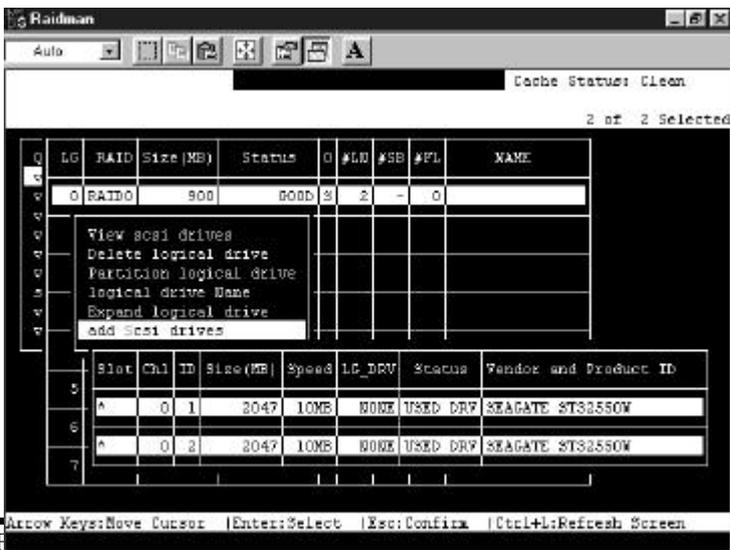
You will be prompted to confirm that you would like to add the SCSI drives to the logical drive.
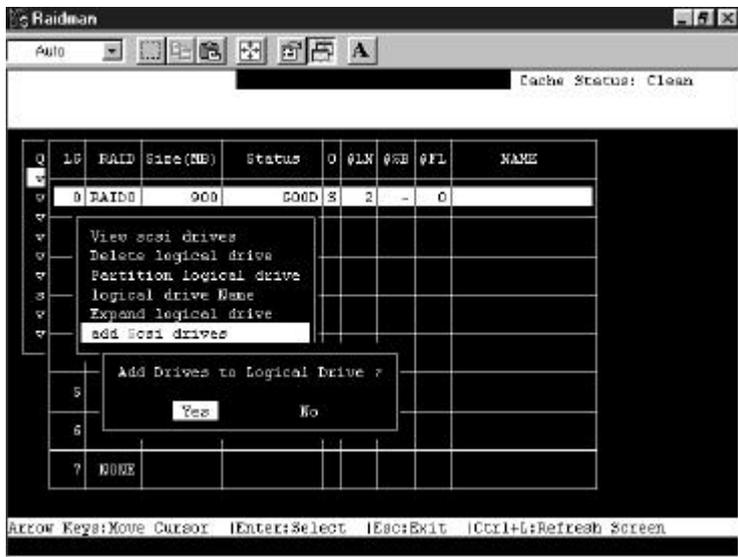
A bar will appear displaying the progress of adding the SCSI drives
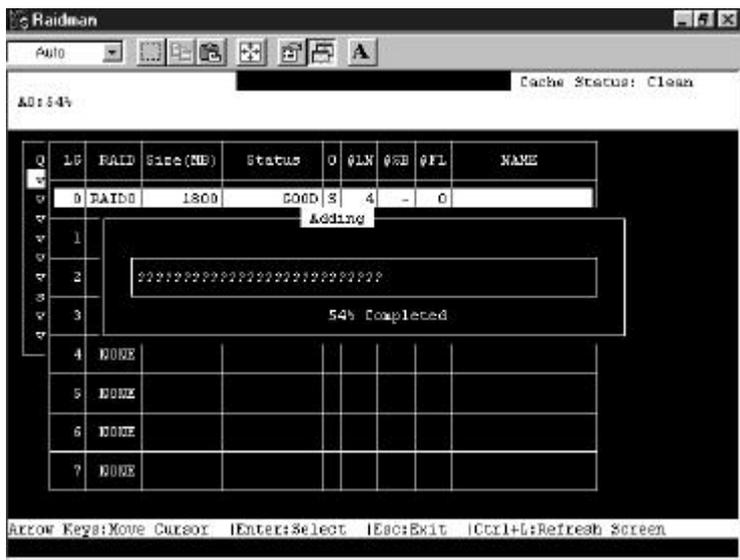
☞ **IMPORTANT:**

- *Mode 1 Expansion can only be performed on RAID 0, 3 and 5 logical drives. Mode 1 Expansion cannot be performed on an NRAID or RAID 1 logical drive.*

- *Mode 1 Expansion (Expanding logical drives by adding more SCSI hard disk drives) cannot be canceled once started. If a power failure occurs, the Mode 1 Expansion will be paused and the controller will NOT automatically continue the expansion when the power comes back on. Resumption of the RAID expansion must be performed manually.*

- *If a member drive of the logical drive fails during RAID expansion, the Mode 1 expansion will be paused. The expansion will resume automatically after logical drive rebuild has been completed.*

8.3   Viewing and Editing SCSI ID Map

8.3.1   Mapping a Logical Drive to an ID/LUN
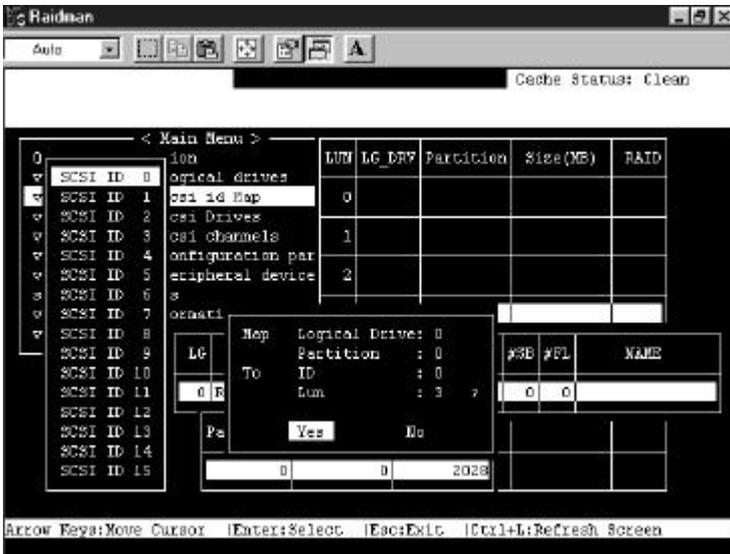
Choose "View and Edit SCSI ID Map" in the Main Menu, then press [**Enter**]. When prompted to "Map Logical Drive?", select **Yes**.
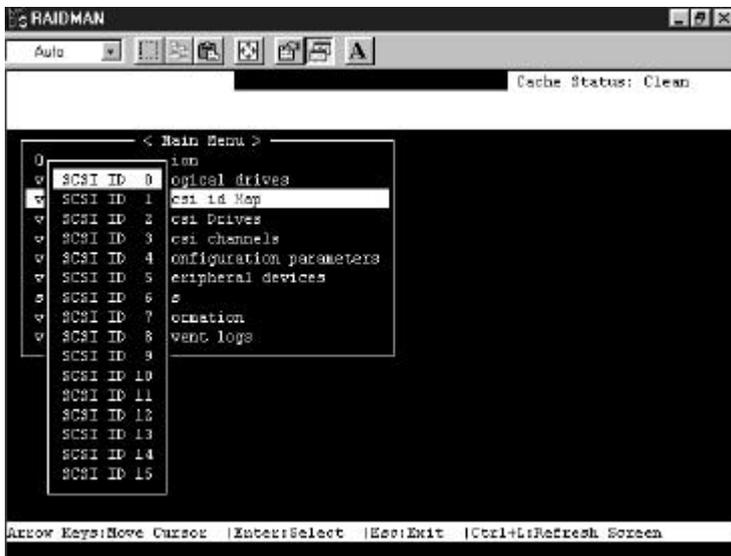
Choose the SCSI ID you wish to map, then press [**Enter**].
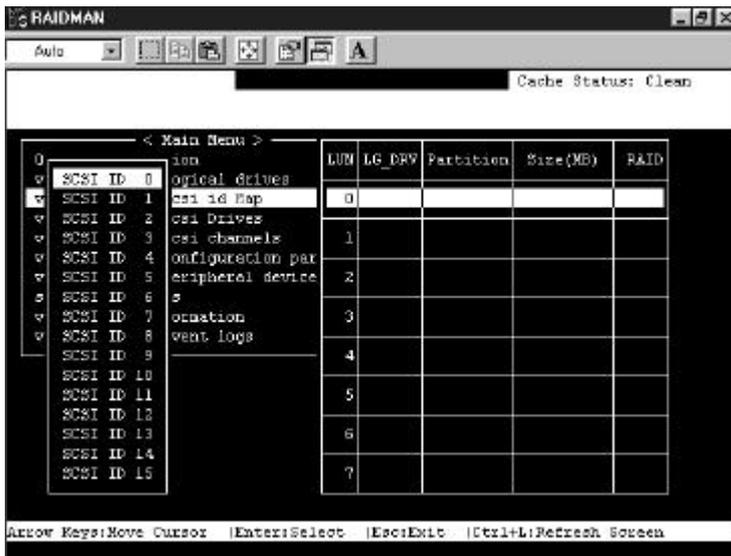
A list of LUNs and their respective mappings will be displayed on the screen. To map a LUN to a logical drive's partition, select an available LUN (one not mapped yet) by moving the cursor bar to the LUN, then pressing [**Enter**].
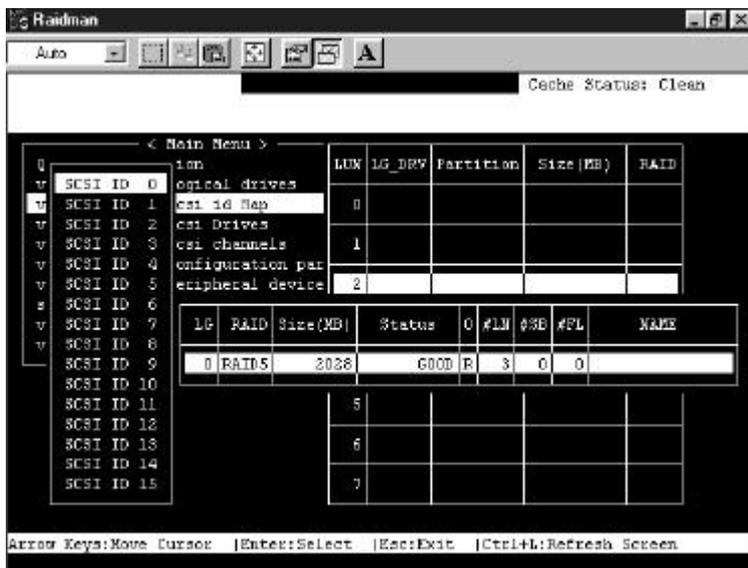
A list of available logical drives will be displayed on the screen. Move the cursor bar to the desired logical drive, then press [**Enter**].
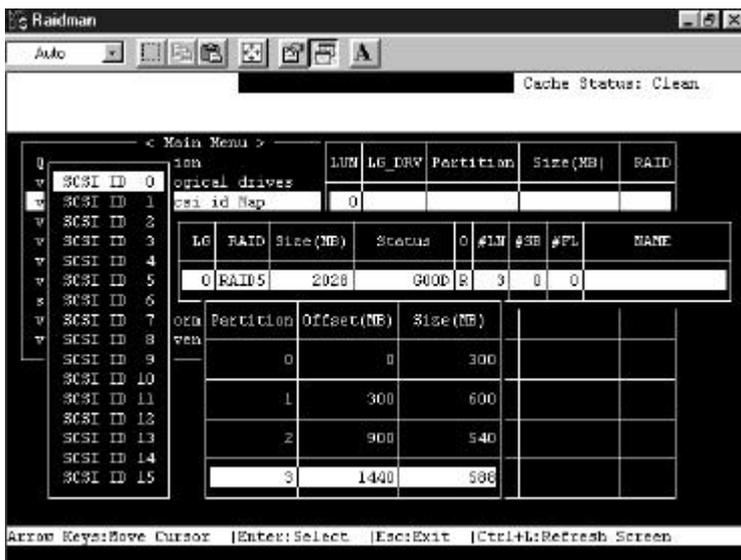
A partition table of the logical drive will be displayed on the screen. Move the cursor to the desired partition, then press [**Enter**].
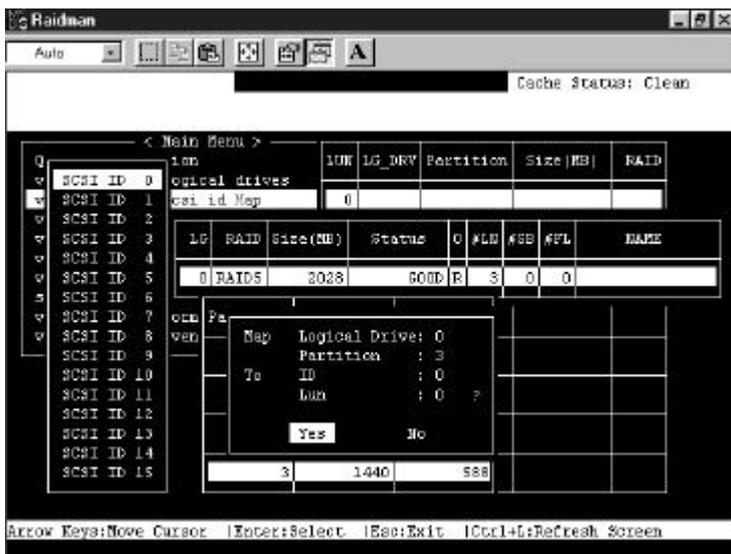
The prompt shown above will display the mapping you wish to create. Choose **Yes** to create the LUN mapping you selected. In the example above, partition 3 of logical drive 0 will map to LUN 0 of SCSI ID 3 on channel 0.

8.3.2   Viewing and Deleting the LUN Mappings

Choose the channel and SCSI ID of the LUN mapping you wish to view or delete.
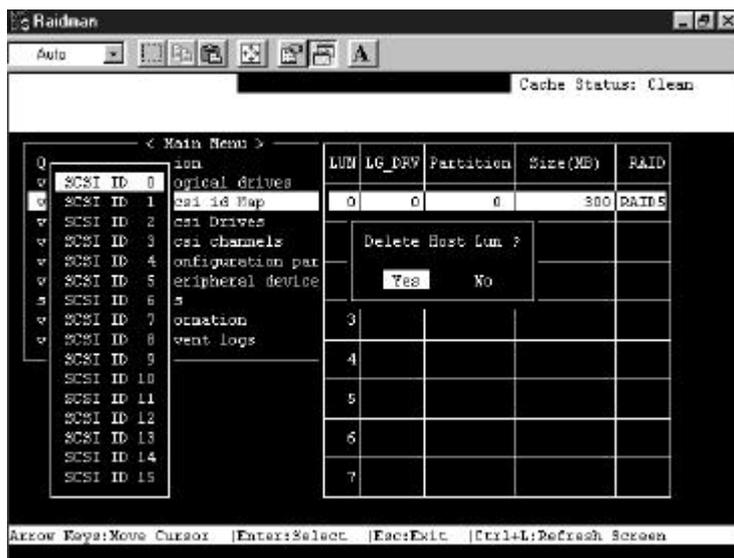
A list of the current LUN mapping will be displayed on the screen. Move the cursor bar to the LUN mapping you wish to delete, then press [**Enter**]. Select **Yes** to delete the LUN mapping, or **No** to cancel.

8.4   Viewing and Editing SCSI Drives
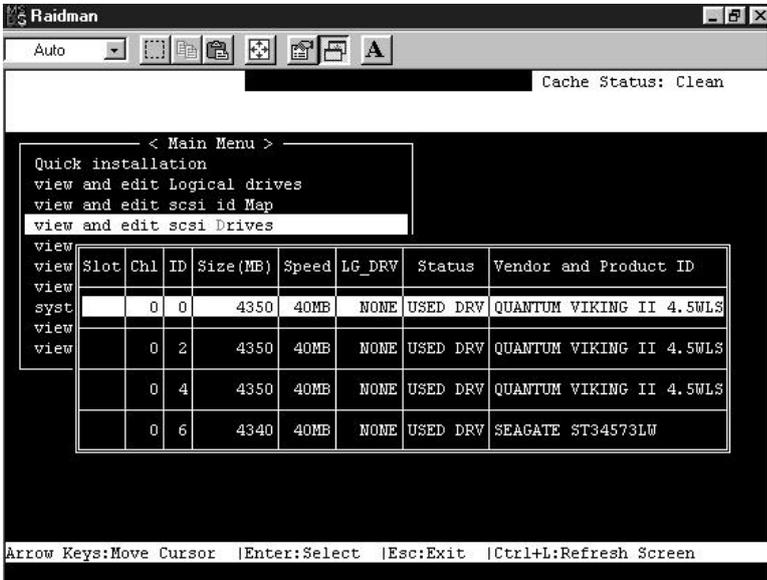
Choose "View and Edit SCSI Drives" in the Main Menu. All drives attached to the drive channels will be displayed on the screen. Refer to "8.1.4 SCSI Drive's Status" for detailed descriptions of each column.

8.4.1   Scanning a New SCSI Drive
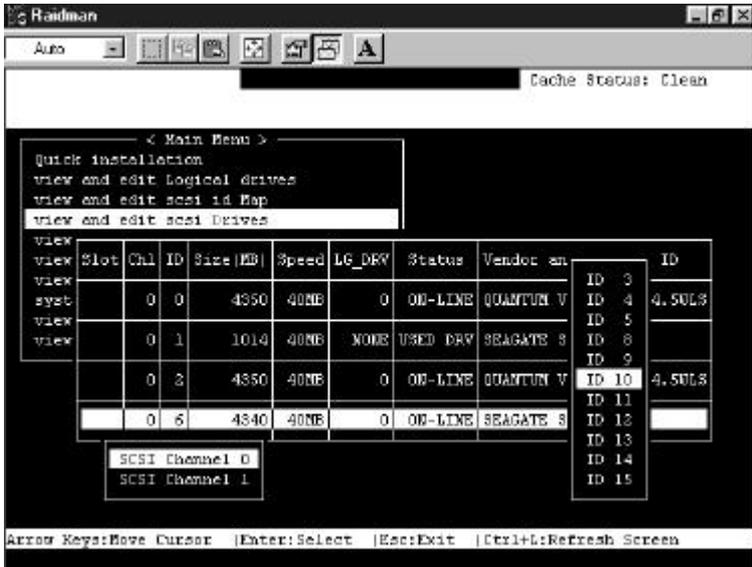
Choose a drive and press [**Enter**]. Choose "Scan SCSI drive", then press [**Enter**]. The menu may vary according to the drive status. Choose the drive channel and SCSI ID of the drive you wish to scan, then press [**Enter**].

8.4.2 Viewing Drive Information
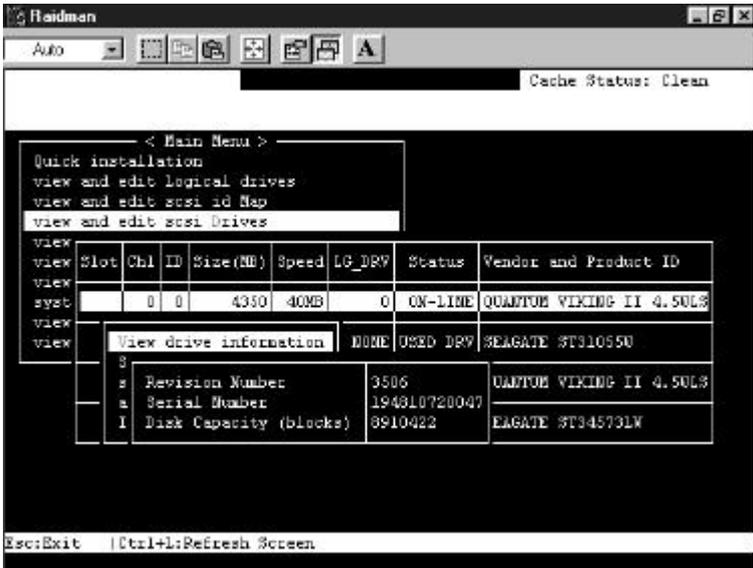
Choose the SCSI drive you wish to view, then press **[Enter**]. Select "View drive information". The revision number, serial number and disk capacity (counts in block; one block refers to 512K) of the drive will be displayed on the screen.

8.4.3   Adding a Local Spare Drive

```
MS Raidman                                                    _ 8 X
 Auto      ▼  ☐ ▤ ▣ ⊞ ☞ ⊟ A
                                          Cache Status: Clean


  Quick i  View drive information
  view an  add Local spare drive
  view an  a
  view an  S  LG  RAID Size(MB)    Status   O #LN #SB #FL        NAME
  view     s
  view S1  a   0 RAID5    2400        GOOD R   3   0   0
  view     I
  syst     scsi drive Utilities        0  ON-LINE QUANTUM VIKING II 4.5WLS
  view
  view         0  1    1014  40MB    NONE USED DRV SEAGATE ST31055W

               0  2    4350  40MB      0  ON-LINE QUANTUM VIKING II 4.5WLS

               0  6    4340  40MB      0  ON-LINE SEAGATE ST34573LW



Arrow Keys:Move Cursor  |Enter:Select  |Esc:Exit  |Ctrl+L:Refresh Screen
```

Move the cursor bar to the SCSI drive that has not yet been assigned
to a logical drive or as a spare drive, then press [**Enter**]. Choose "Add
Local Spare Drive". A list of available logical drives will be displayed
on the screen. Move the cursor bar to a logical drive, then press
[**Enter**]. The unassigned SCSI drive will be assigned to this logical
drive as the Local Spare Drive. When prompted with "Add Local
Spare Drive?", choose **Yes**.

8.4.4   Adding a Global Spare Drive
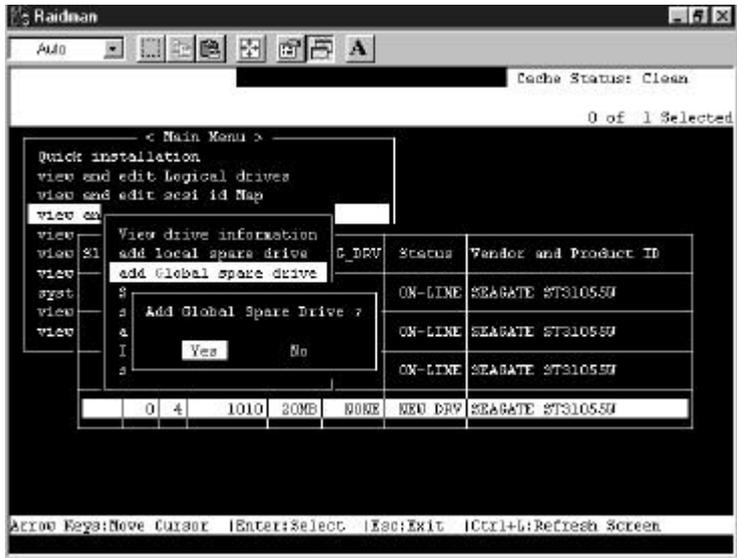
Move the cursor bar to the SCSI drive that has not yet been assigned to a logical drive or as a spare drive, then press [**Enter**]. Choose "Add Global Spare Drive". When prompted with "Add Global Spare Drive?", choose **Yes**.

8.4.5   Deleting a Spare Drive (Global / Local Spare Drive)

Move the cursor to a Local Spare Drive or Global Spare Drive, then press [**Enter**]. Choose "Delete Global/Local Spare Drive", then press [**Enter**] again. Choose **Yes**.
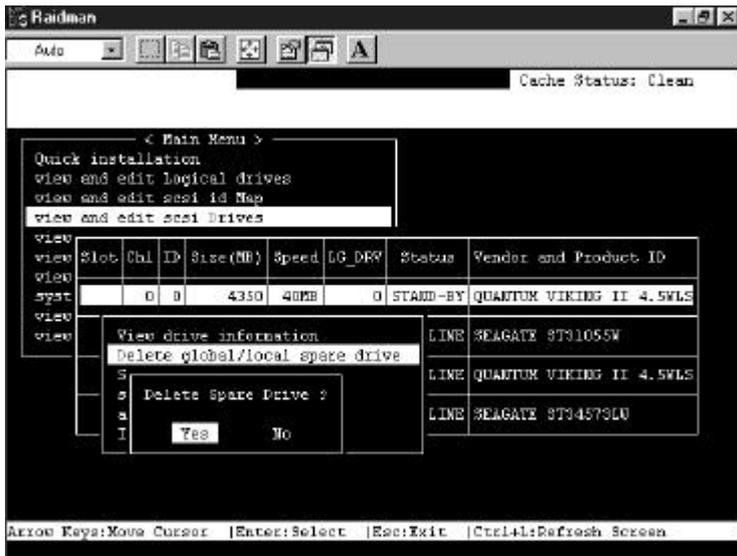
8.5   Viewing and Editing SCSI Channels
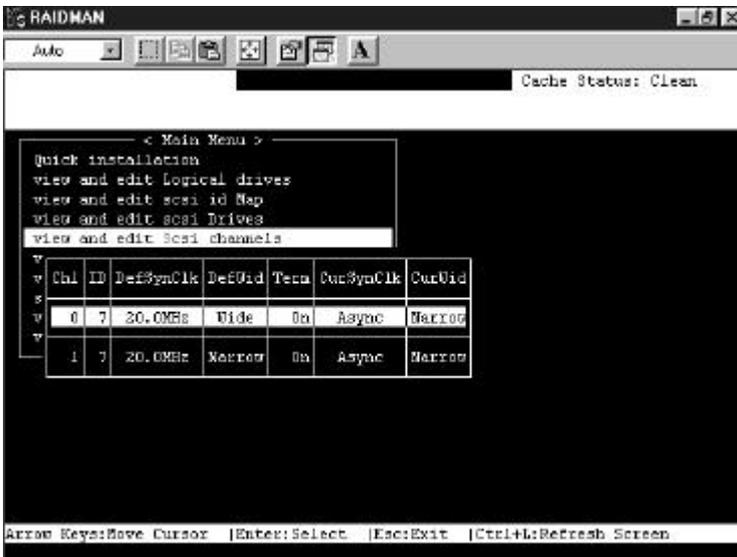
Choose "View and Edit SCSI Channels" in the Main Menu. A list of all the channels will be displayed on the screen. Refer to section 8.1.4, *SCSI Channel Status*, for detailed information.

8.5.1 Viewing and Editing a SCSI ID / Channel
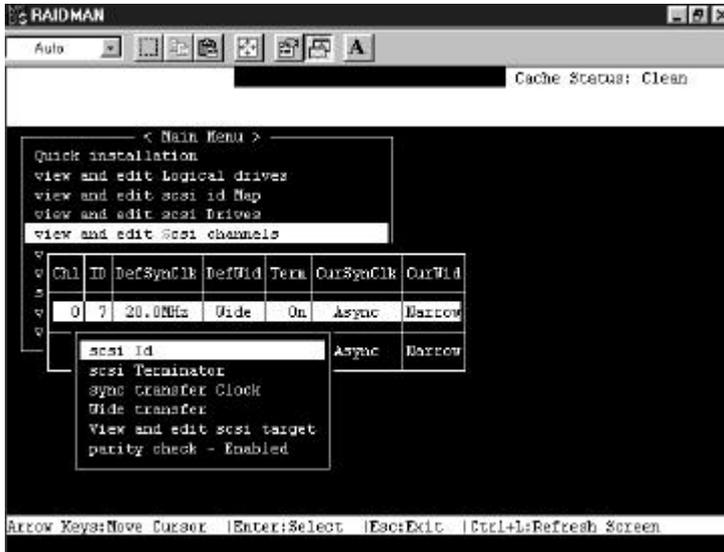
Choose a channel, then press [**Enter**]. Choose "SCSI ID". A list of the existing ID(s) will be displayed on the screen.

☞ **IMPORTANT:**

Any changes to SCSI ID/channel settings require a system reset to take effect.

8.5.2   Setting a SCSI Channel's Terminator
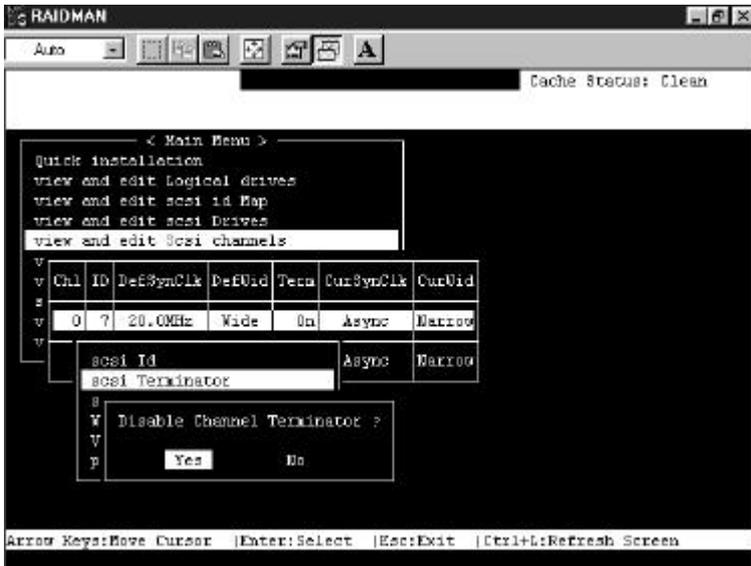
Choose the channel you wish the terminator enabled or disabled, then press [**Enter**]. Choose "SCSI Terminator", then press [**Enter**]. A dialog box will appear. Choose **Yes**, then press [**Enter**].

☞   **IMPORTANT:**
  Every time you change a SCSI channel's termination, you must reset the system for the changes to take effect.

8.5.3   Setting a Transfer Speed
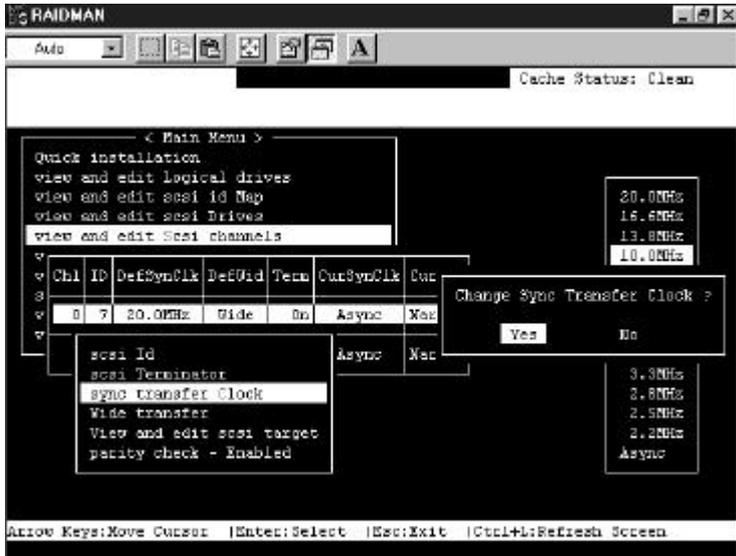
Move the cursor bar to a channel, then press [**Enter**]. Choose "Sync Transfer Clock", then press [**Enter**]. A list of the clock speed will appear. Move the cursor bar to the desired speed and press [**Enter**]. A dialog box "Change Sync Transfer Clock?" will appear. Choose **Yes**.

☞   **IMPORTANT:**
- *Every time you change the SCSI Transfer Speed, you must reset the system for the changes to take effect.*

8.5.4   Setting a Transfer Width
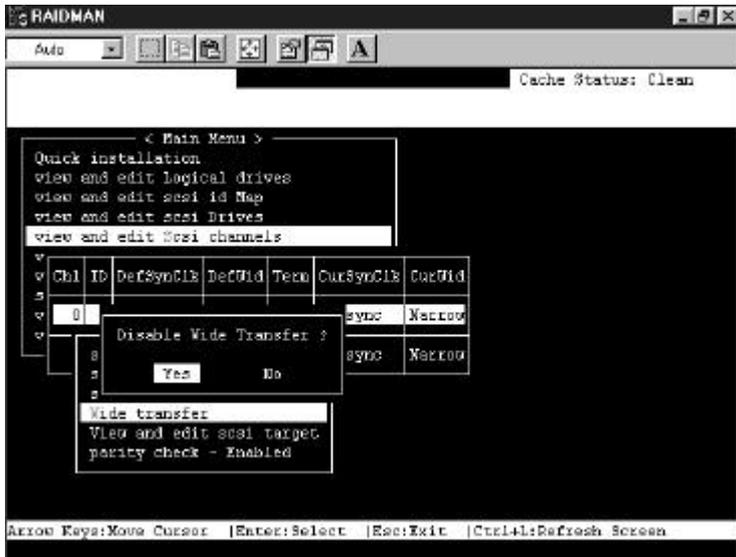
Move the cursor bar to a channel, then press [**Enter**]. Select "Wide Transfer", then press [**Enter**]. A dialog box "Disable Wide Transfer?" or "Enable Wide Transfer?" will appear. Choose **Yes**.

☞   **IMPORTANT:**

- *Every time you change the SCSI Transfer Width, you must reset the system for the changes to take effect.*

8.5.5 Viewing and Editing SCSI Target / Drive Channel
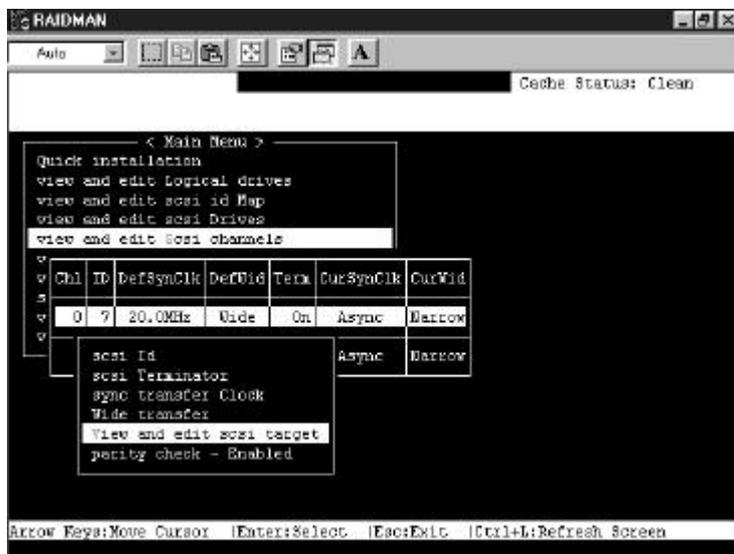
Move the cursor bar to a Drive channel, then press [**Enter**]. Select "View and Edit SCSI Target", then press [**Enter**].
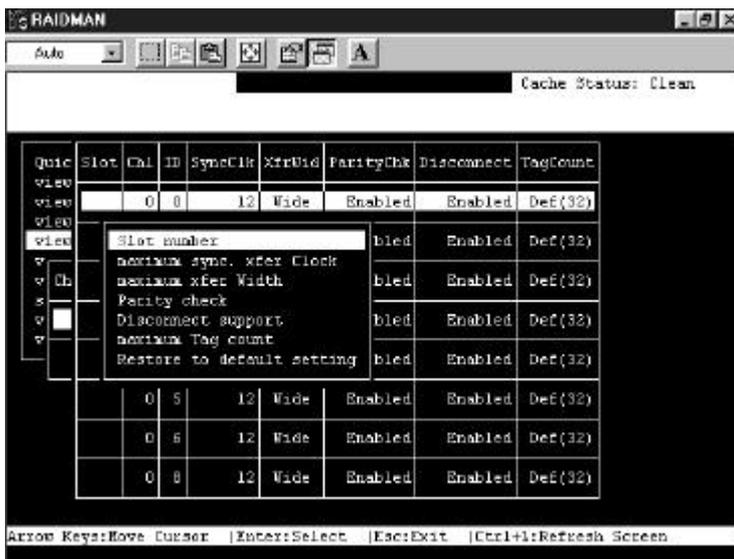
A list of all the SCSI targets and their current settings will appear. Press [**Enter**] on a SCSI target and a menu list will appear on the screen.

Slot Number
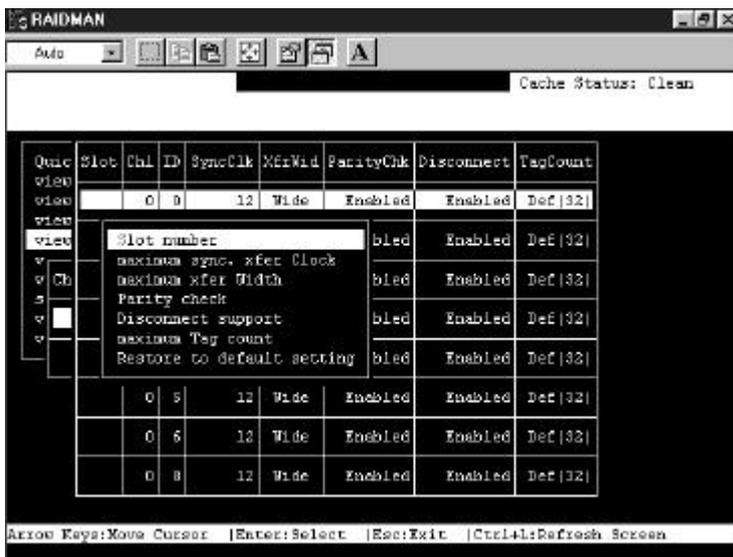
Slot Number is reserved from use.

Maximum Synchronize Transfer Clock
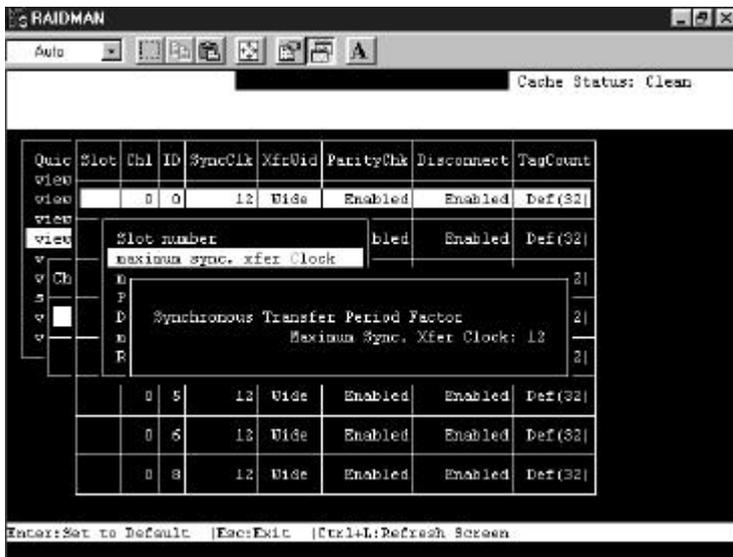
Choose "Maximum Sync. Xfer Clock", then press [**Enter**]. A dialog box will appear on the screen. Enter the clock, then press [**Enter**].

Please refer to Appendix D, Sync. Clock Period and Sync. Clock Frequency, for more information.

Wide Transfer
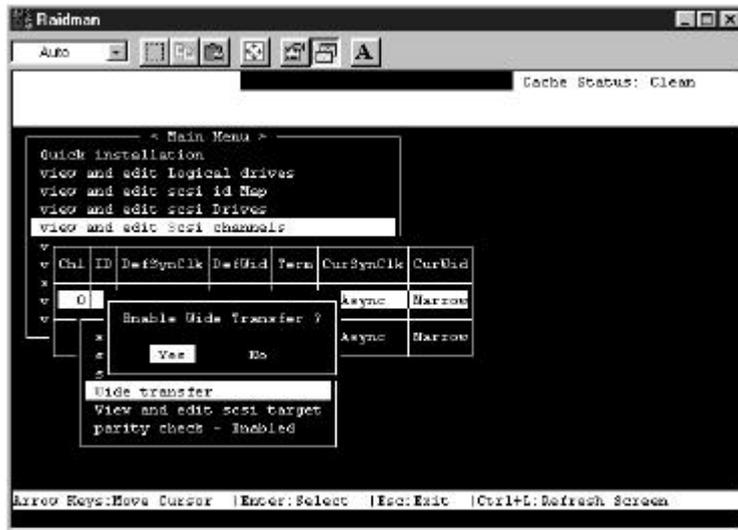
Choose "Wide Transfer", then press [**Enter**]. Choose **Yes** in the dialog box to confirm the setting.

Parity Check
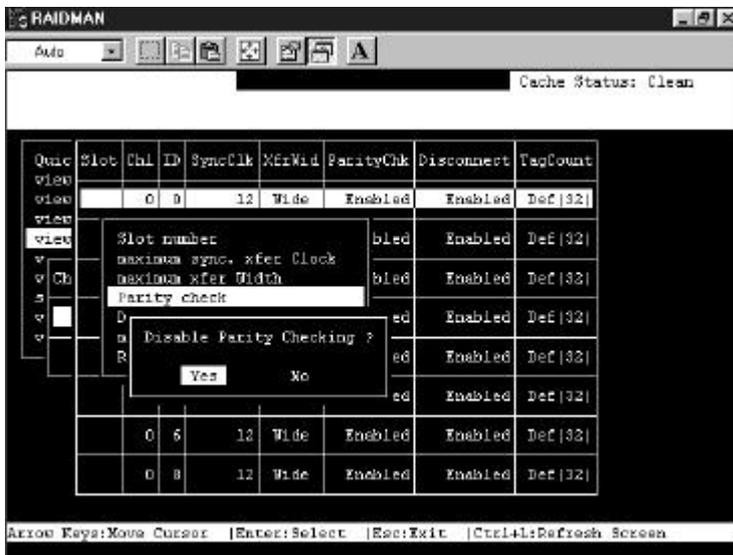
Choose "Parity Check". Choose **Yes** in the dialog box that followed to confirm the setting.

Disconnecting Support
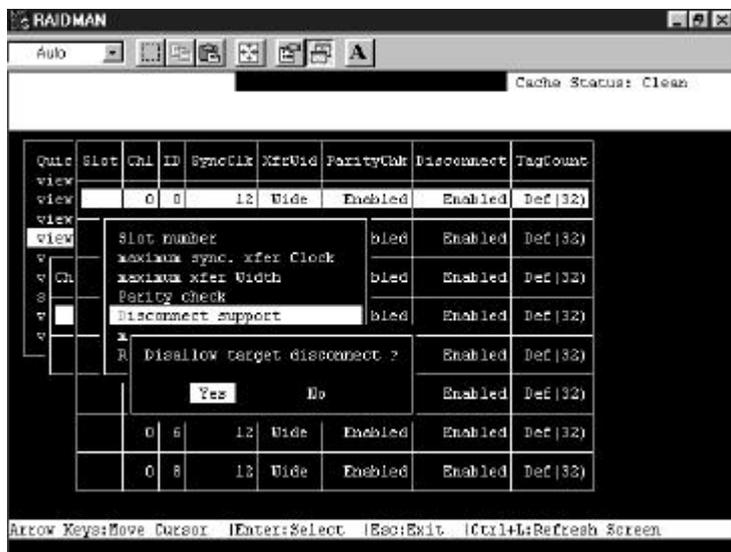
Choose "Disconnect Support". Choose **Yes** in the dialog box that followed to confirm the setting.

SCSI I/O Timeout
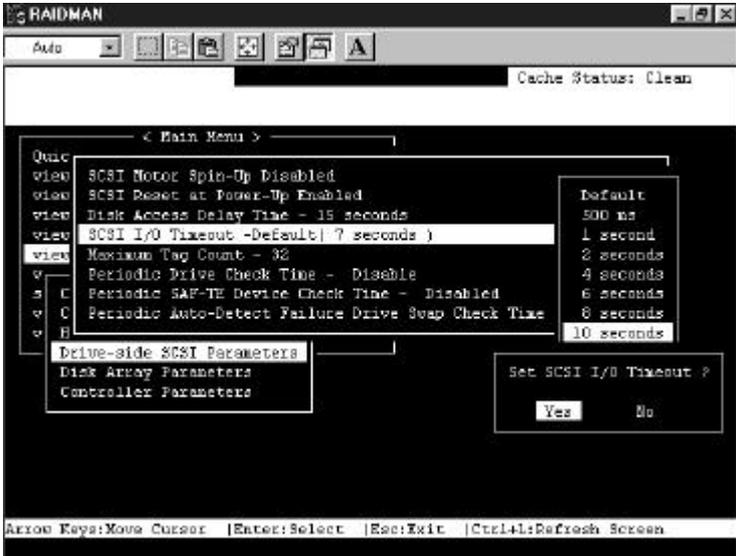
Choose "SCSI I/O Timeout", then press **[Enter]**. A list of available timeout intervals will appear. Move the cursor bar to an interval, then press [**Enter**]. Choose **Yes** in the dialog box that followed to confirm the setting.

Tag Command Queuing
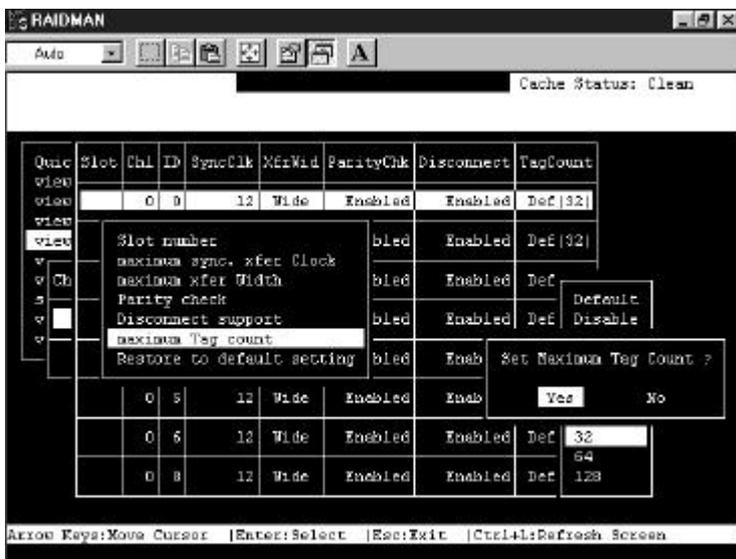
Choose "Maximum Tag Count", then press [**Enter**]. A list of available tag count numbers will appear. Move the cursor bar to a number, then press [**Enter**]. Choose **Yes** in the dialog box that followed to confirm the setting.

☞ **IMPORTANT:**

• *Disabling the Maximum Tag Count will disable the internal cache of the SCSI drive.*

• *Disabling Tag Command Queuing will disable the Write-Back cache built in the hard drive.*

Idle Drive Failure Detection

From the "Drive-side SCSI Parameters" menu, select "Periodic Drive Time – Disable" and then press [**Enter**]. Choose the desired interval for idle drive failure detection.

☞ **IMPORTANT:**

- *By choosing a time value to enable the "Periodic Drive Check Time", the controller will poll all of the connected drives in the controller's drive channels at the assigned interval. Drive removal will be detected even if a host does not attempt to access data on the drive.*

- *If the "Periodic Drive Check Time" is set to "Disabled" (the default setting is "Disabled"), the controller will not be able to detect any drive removal that occurs after the controller has been powered on. The controller will only be able to detect drive removal when a host attempts to access the data on the drive.*

SAF-TE Enclosure Monitoring

From the "Drive-side SCSI Parameters" menu, select "Periodic SAF-TE Device Check Time – Disabled" and then press **[Enter]**. Use the arrow keys to choose the desired SAF-TE status check interval.

Detection of Drive Hot Swap Followed by Auto Rebuild
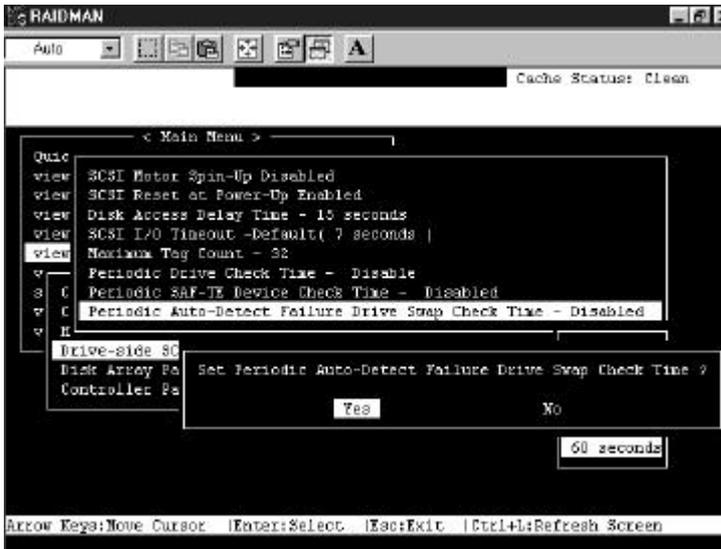
From the "Drive-side SCSI Parameters" menu, select "Periodic Auto-Detect Failure Drive Swap Check Time – Disabled" and then press [**Enter**]. Use the arrow keys to select the desired interval for "Auto Checking Drive Hot Swap," and then press [**Enter**] to confirm. If a member drive of a logical drive fails, the controller will start to check the failed drive to check if it has been replaced (i.e., the controller checks the same drive channel and ID at the assigned interval.) Once the drive has been replaced with another drive, the controller will automatically start to rebuild to that replacement drive.

Restoring the Default Setting for Target

Choose "Restore to default setting", then press [Enter]. Choose Yes in the dialog box that followed to restore all the settings of the SCSI target.

8.6 Viewing and Editing Configuration Parameters

8.6.1   Caching Parameters

Write-Back Cache Enable/Disable
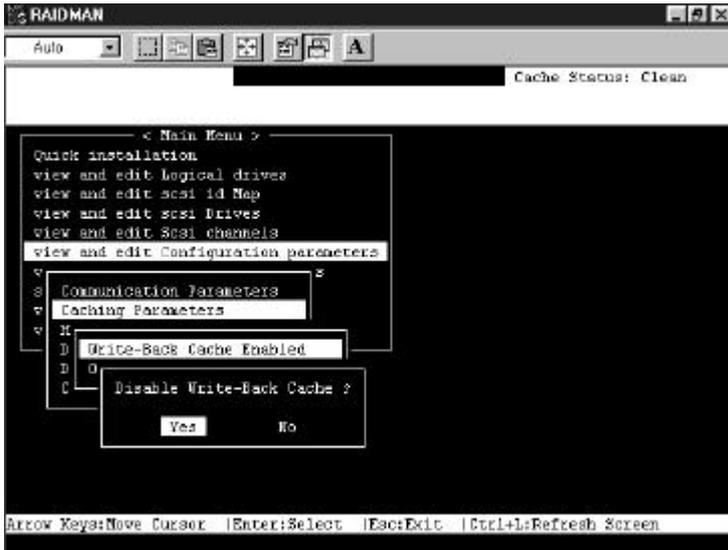
Choose "Caching Parameters", then press [**Enter**]. Select "Write-Back Cache", then press [**Enter**]. "Enabled" or "Disabled" will display the current setting of the Write-Back Cache. Choose **Yes** in the dialog box that followed to confirm the setting.

☞ **IMPORTANT:**
  • *Every time you change the Cache Parameters, you must reset the system for the changes to take effect.*

Optimization for Random or Sequential I/O
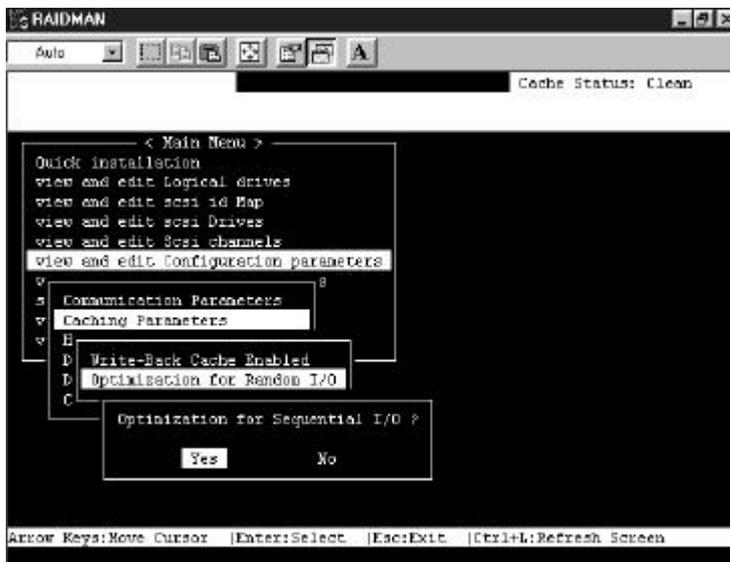
Choose "Optimization for Random I/O" or "Optimization for Sequential I/O", then press [**Enter**]. The "Random" or "Sequential" dialog box will appear, depending on the option you have selected. Choose **Yes** in the dialog box that followed to confirm the setting.

☞ **IMPORTANT:**

- *Every time you change this setting, you must reset the system for the changes to take effect.*
- *Refer to "3.4.1 Optimal for Sequential or Random I/O" for more information.*

8.6.2 SCSI Parameters

Maximum Queued I/O Count
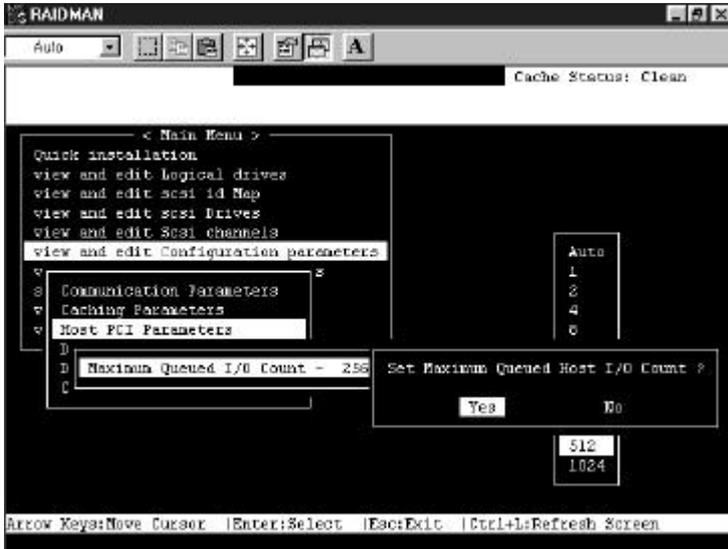
Choose "SCSI Parameters", then press [**Enter**]. Choose "Maximum Queued I/O Count", then press [**Enter**]. A list of available selections will appear. Move the cursor bar to an item, then press [**Enter**]. Choose **Yes** in the dialog box that followed to confirm the setting.

8.6.3   Drive-side SCSI Parameters
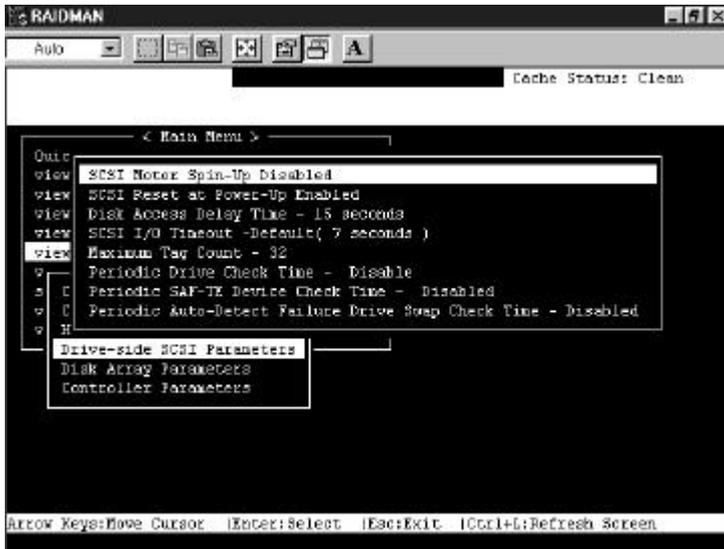
Choose "Drive-side SCSI Parameters", then press [**Enter**]. The Drive-side SCSI parameters menu will appear.

SCSI Motor Spin-Up
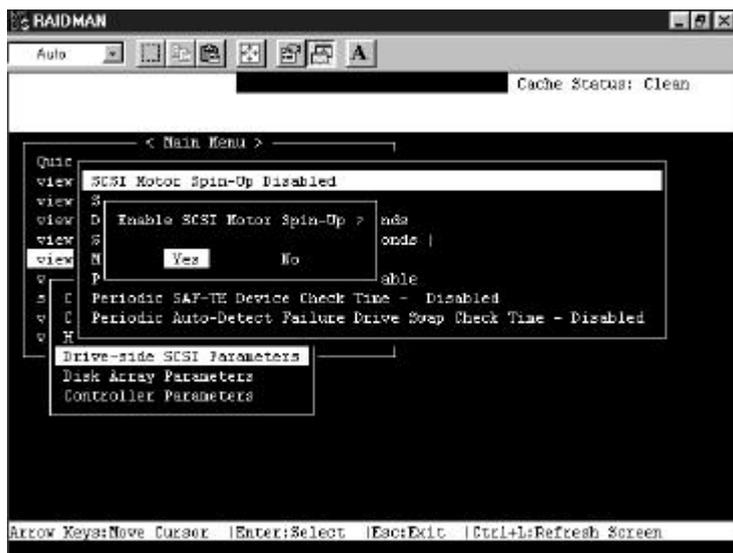
Choose "SCSI Motor Spin-Up", then press [**Enter**]. Choose **Yes** in the dialog box that followed to confirm the setting.

SCSI Reset at Power-Up
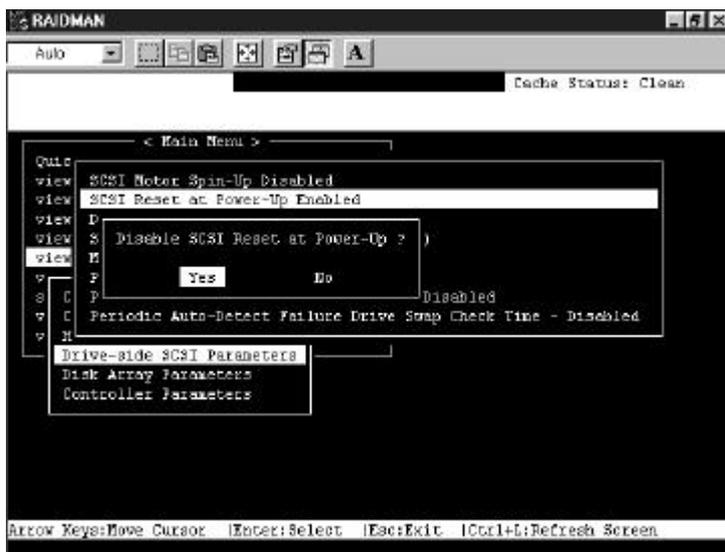
Choose "SCSI Reset at Power-Up", then press [**Enter**]. Choose **Yes** in the dialog box that followed to confirm the setting. Please refer to section 3.5.2 for more information.

Disk Access Delay Time

Choose "Disk Access Delay Time", then press [**Enter**]. A list of selections will appear. Move the cursor bar on a selection, then press [**Enter**]. Choose **Yes** in the dialog box that followed to confirm the setting. Please see section 3.5.3 for more information.

Maximum Tag Count
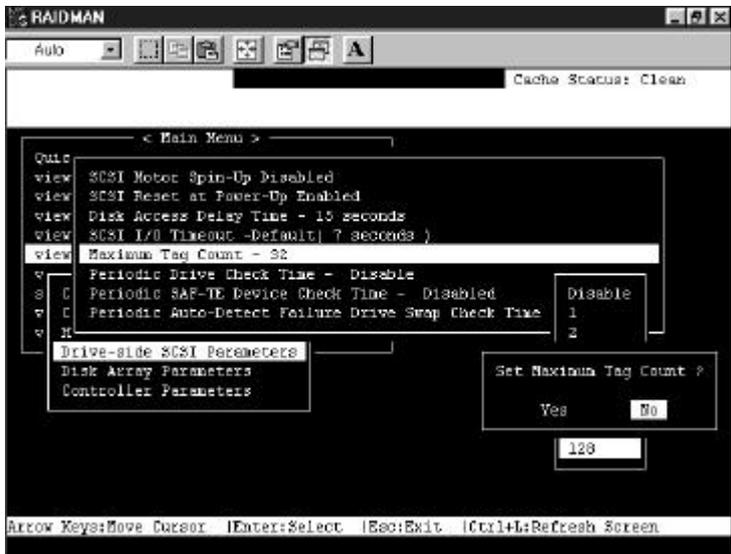
Choose "Maximum Tag Count", then press [**Enter**]. A list of selections will appear. Move the cursor bar to a selection, then press [**Enter**]. Select **Yes** in the dialog box that followed, then press [**Enter**] to confirm the setting. Please see section 3.5.5 for more information.

8.6.4   Disk Array Parameters
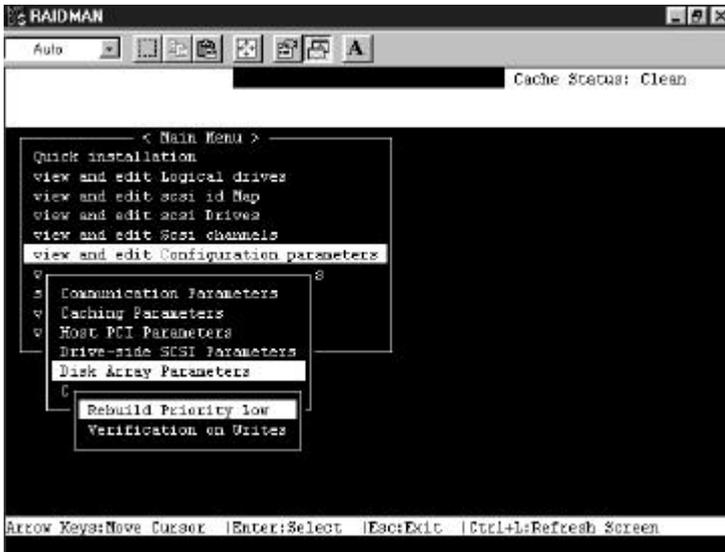
Choose "Disk Array Parameters", then press [**Enter**]. The Disk Array
Parameters menu will appear.

Rebuild Priority

Choose "Rebuild Priority", then press [**Enter**]. A list of the priority selections will appear. Move the cursor bar to a selection, then press [**Enter**]. Please see section 3.3.1 for more information.

Verification On Writes
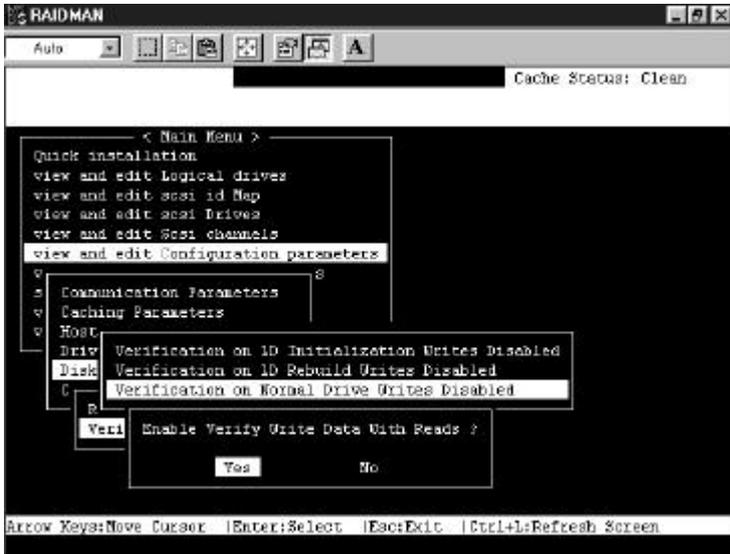
Choose "Verification on Writes", then press [**Enter**]. Move the cursor bar to an item, then press [**Enter**]. Choose **Yes** in the dialog box that followed to confirm the setting. (Refer to section 3.3.2 for more information.)

☞ **IMPORTANT:**
- *Every time you change this setting, you must reset the system for the changes to take effect.*
- *Refer to "3.5.2 SCSI Reset at Power-Up" for more information.*

8.6.5 Controller Parameters

Controller Name

Choose "Controller Parameters", then press [**Enter**]. The current controller name will be displayed. Press [**Enter**]. Enter the new controller name in the dialog box that followed, then press [**Enter**].

Password Validation Timeout
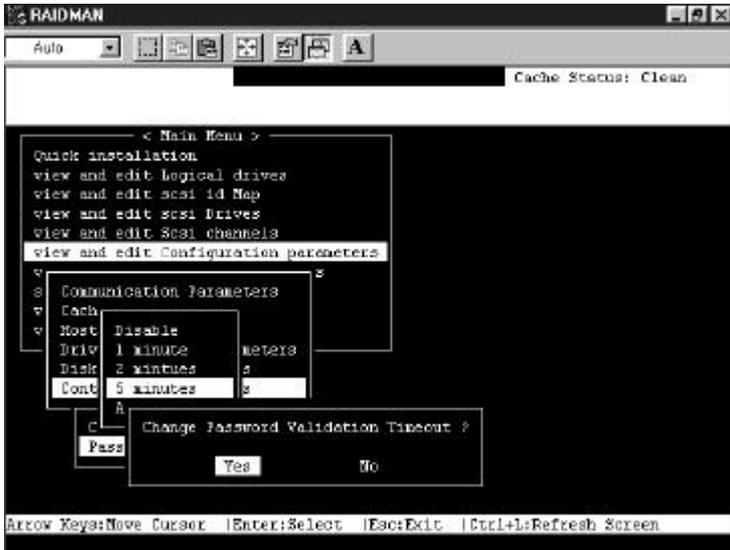
From the "Controller Parameters" menu, select "Password Validation Timeout" and then press **Enter**]. You may select an interval for password validation, "Always check," or "Disabled." Press **Enter**] and then select **Yes** to confirm your selection.

8.7   System Functions
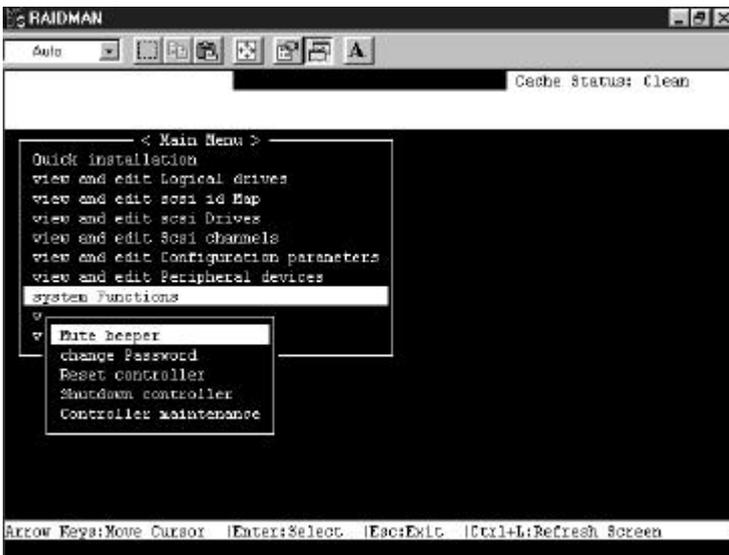
Choose "System Functions" in the Main Menu, then press [**Enter**]. The System Functions menu will appear. Move the cursor bar to an item, then press [**Enter**].

8.7.1   Mute Beeper
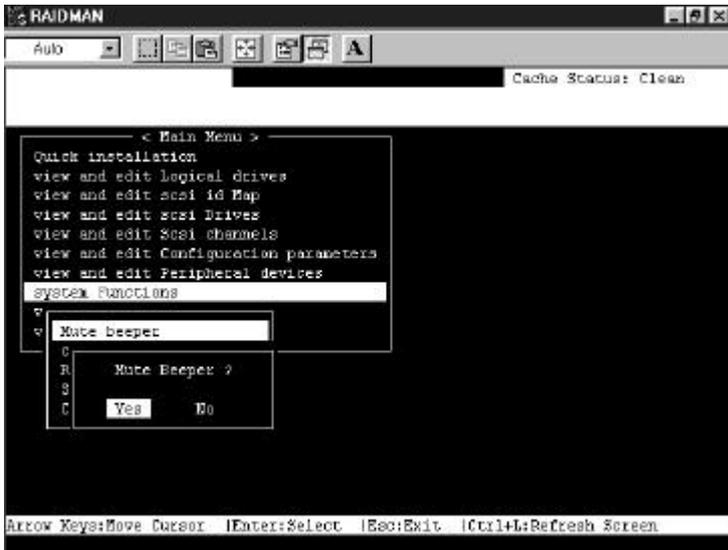
When the controller's beeper has been activated, choose "Mute beeper", then press **Enter**]. Choose "**Yes**" and press **Enter**] in the next dialog box to turn the beeper off temporarily. The beeper will still activate on the next event.

8.7.2   Change Password

Use the controller's password to protect the controller from unauthorized entry. Once the controller's password has been set, regardless of whether the Text RAID Manager or the GUI RAID Manager is used, the user can only configure and monitor the RAID controller by providing the correct password.
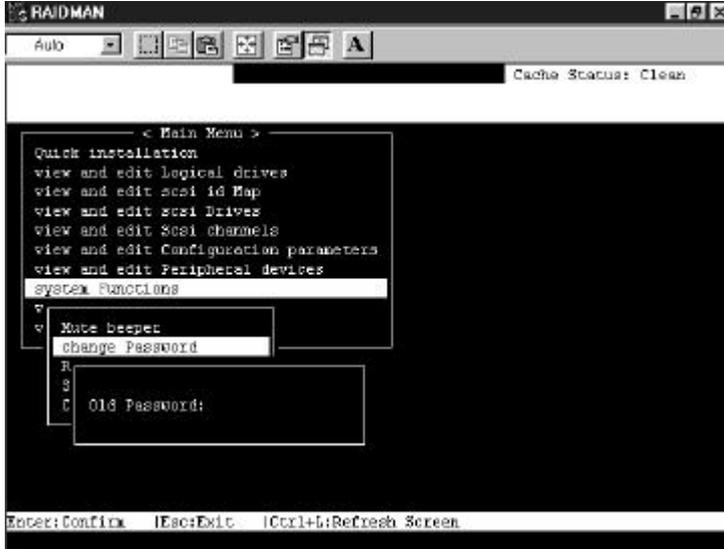
☞ **IMPORTANT:**

- *The controller will verify the password only when entering the Main Menu from the Initial screen. Always go back to the Initial screen when the controller is going to be unattended.*

- *The controller password and controller name are sharing a 16-character space. The maximum characters for the controller password is 15. When the controller name occupied 15 characters, there is only one character left for the controller password and vice versa.*

Changing the Password

To set or change the controller password, move the cursor bar to "Change Password", then press [**Enter**].

If a password has previously been set, the controller will ask for the old password first. If the password has not yet been set, the controller will directly ask for the new password. The password can not be replaced unless a correct old password is provided.

Key-in the old password, then press [**Enter**]. If the password is incorrect, it will not allow you to change the password. Instead, it will display the message "Password incorrect!", then go back to the previous menu.

If the password is correct, or there is no preset password, it will ask for the new password.

Setting a New Password
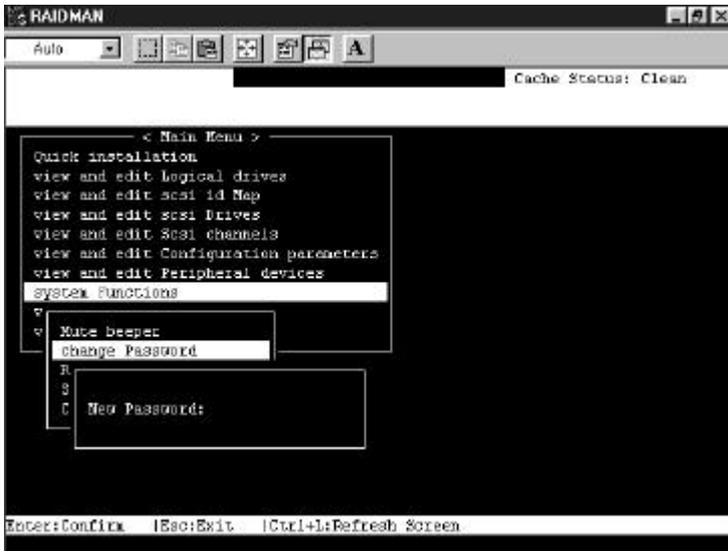
Enter the desired password in the column, then press [**Enter**]. The next dialog box will display "Re-Enter Password". Enter the password again and press [**Enter**].

The new password will now become the controller's password. Providing the correct password is necessary when entering the Main Menu from the Initial screen.

Disabling the Password

To disable or delete the password, press [**Enter**] only in the password column that is used for entering a new password. The existing password will be deleted. No password checking will occur when entering the Main Menu from the Initial screen.

8.7.3 Reset Controller

```
┌────────────────────────────────────────────────────────────────┐
│ Raidman                                               _ □ ✕    │
├────────────────────────────────────────────────────────────────┤
│  Auto      ▼  □ ▣ ▣   ⊞  ☞ ☐  A                                │
├────────────────────────────────────────────────────────────────┤
│                                          Cache Status: Clean    │
│                                                                  │
│         ── < Main Menu > ──                                     │
│      Quick installation                                          │
│      view and edit Logical drives                                │
│      view and edit scsi id Map                                   │
│      view and edit scsi Drives                                   │
│      view and edit Scsi channels                                 │
│      view and edit Configuration parameters                      │
│      view and edit Peripheral devices                            │
│      system Functions                                            │
│    v │                                                           │
│    v │ Mute beeper                                               │
│      │ change Password                                           │
│      │ Reset controller                                          │
│      │ Shutdown controller                                       │
│      │ Controller maintenance                                    │
│      │                                                           │
│                                                                  │
│                                                                  │
│ Arrow Keys:Move Cursor  |Enter:Select  |Esc:Exit  |Ctrl+L:Refresh Screen │
└────────────────────────────────────────────────────────────────┘
```

This function is not supported. The controller is reset when the system is reset.

8.7.4   Shutdown Controller
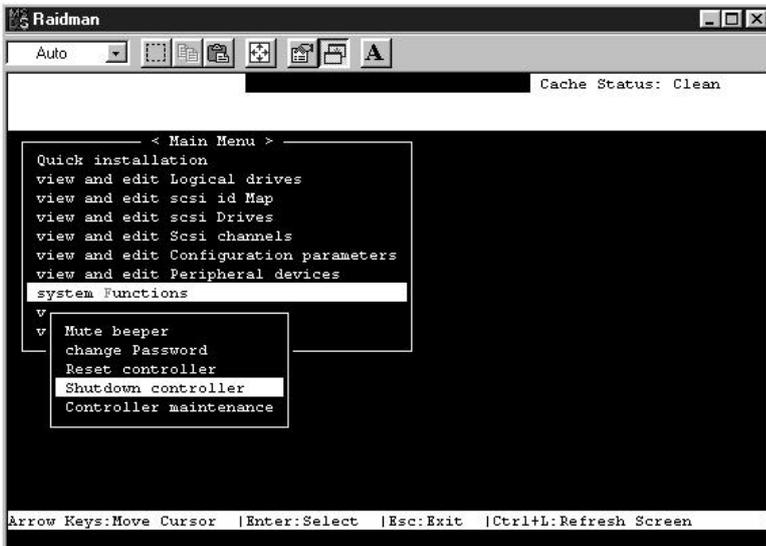
This function is not supported. The controller is shutdown when the system is shutdown.

8.7.5   Controller Maintenance
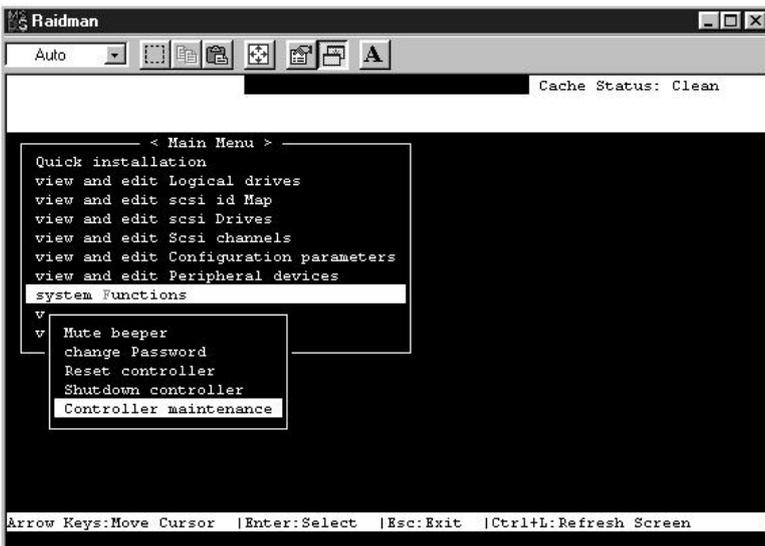
This function is not supported from within the Text RAID Manager. Controller maintenance functions – such as downloading new firmware – can be performed from the start-up menu of the Text RAID Manager.

8.8 Viewing System Information
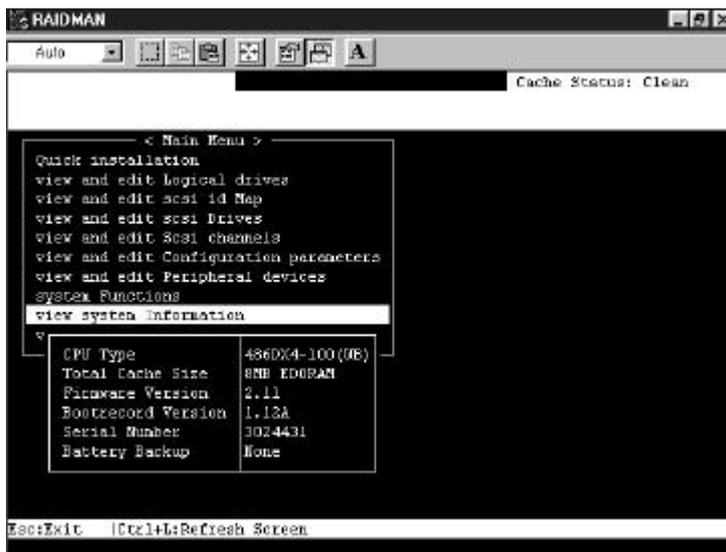
To view the system's information, move the cursor bar to "View System Information", then press [Enter].

A list of information will appear.

CPU Type	The type of CPU installed in the RAID controller.
Total Cache Size	The total DRAM size installed in the controller.
Firmware Version	The version of the firmware.
Bootrecord Version	The version of the boot record.
Serial Number	The serial number of the controller.

Chapter 9   Remote Administration

The IFT-2101U RAID Controller can be administrated remotely. When there is an event, warning or controller notification happened, the IFT-2101U can inform the administrator to take measure in time.

9.1   GUI RAID Manager Using SNMP Service
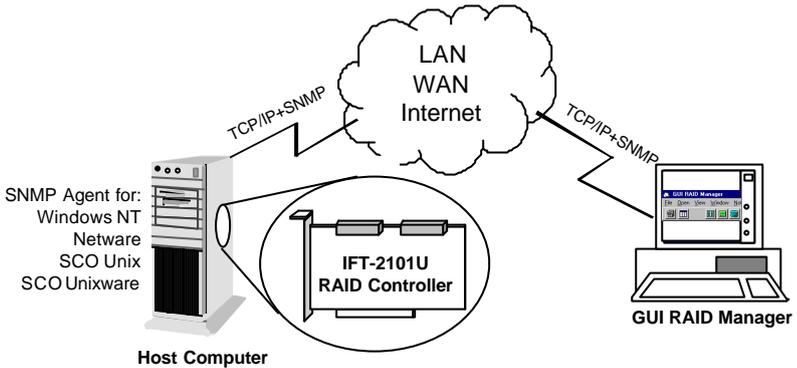
Install the SNMP agent for the corresponded operating system on Host computer and enable the SNMP service. The client computer running with GUI RAID Manager will be able to administrate the IFT-2101 RAID Controller remotely.

How to Establish the connection through SNMP?

Choose the "File" menu, click on "Connect" and choose "SNMP" from the pop up menu.
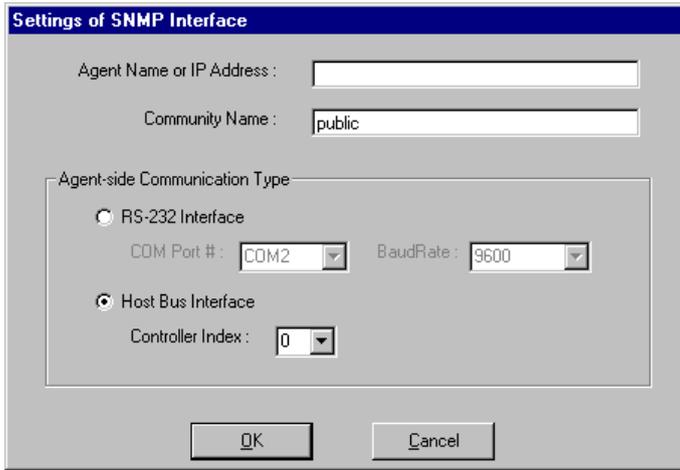
Enter the Agent name or the IP address and the Community name of the host computer in the first column.
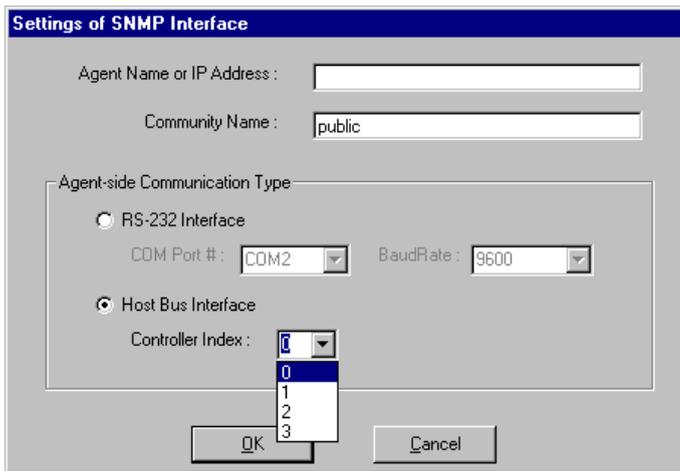
Click on the select button in front of "Host Bus Interface" to select. Choose "0" if there is only one IFT-2101U RAID controller installed in the remote host computer. Press "OK" to establish the connection. After the connection established, all the operation will act exactly the same as executing the GUI RAID Manager from the host computer.

The "Controller Index" refers to the number of the IFT-2101U be found by the host computer. If there is only one controller installed in the host computer, "0" should be chosen. When more than one IFT-2101U RAID controller installed in the same host computer, the second IFT-2101U

controller found by the host computer is numbered as "1", and the third controller found by the host computer is numbered as "2".

Appendix A   Driver Installation

WARNING:
There are a few operating systems that will perform a system reset automatically during installation. The default setting of the IFT-2101U RAID controller is "Write-back Cache – Enabled." If the system resets while there is still data in the cache, the cache data will be cleared. What does all this mean? The system reset during installation will prevent OS installation from completing, since data in the write-back cache gets cleared before it has been written to the SCSI drives. So, it is recommended to "Disable" the write-back cache (i.e., use write-through mode) prior to OS installation. Following OS installation, the setting can be switched back to "Write-back Cache – Enabled." Please see section 8.6.1, Caching Parameters, *for details on how to disable the write-back cache.*

1   MS-DOS® ASPI Drivers Installation

The IFT-2101U can be used as a host adapter for SCSI tape drives and CD-ROM drives. To access such devices under MS-DOS, it is necessary to install the IFT-2101U MS-DOS ASPI Manager device driver.

The IFT-2101U MS-DOS ASPI Manager allows MS-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 IFT-2101U. The IFT-2101U MS-DOS ASPI Manager and CD-ROM Driver are installed as device drivers under MS-DOS by adding the following command lines to the CONFIG.SYS and AUTOEXEC.BAT files in the root directory of the boot drive:

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.

Example:

If there is a subdirectory, C:\IFT, containing the IFT-2101U ASPI Manager file I2DOSASP.SYS and CD-ROM Driver file ASPICDRM.SYS, a subdirectory, C:\DOS, containing the Microsoft CD-ROM extension program MSCDEX.EXE, and MS-DOS logical drives C: and D: have been assigned to hard disks, then the following lines should be added to the CONFIG.SYS and AUTOEXEC.BAT files respectively:

In CONFIG.SYS file

> **DEVICE=C:\IFT\I2DOSASP.SYS**
> **DEVICE = C:\IFT\ASPICDRM.SYS /D:mscd001**
> **LASRDRIVE = 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 IFT-2101U ASPI Manager will automatically select an optimal configuration so no load line options are needed.

The IFT-2101U 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".

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2   NetWare® Driver Installation

The IFT-2101U drivers diskette contains the following driver files for NetWare v3.1x, v4.0x, v4.1 and v4.11 respectively:

In sub-directory netware\v3_1x:
- RAIDASPI.DSK : ASPI manager for NetWare v3.1x
- IFT2000.DDI : Installation Information File.
- IFT2000.DSK : Disk Driver for NetWare v3.1x

In sub-directory netware\v4_x:
- RAIDASPI.DSK : ASPI manager for NetWare 4.0x, 4.1 and 4.11
- IFT2000.DDI : Installation Information File.
- IFT2000.DSK : Disk Driver for NetWare 4.0x, 4.1 and 4.11.

2.1   Installing NetWare 3.1x

Follow these procedures to install IFT-2101U drivers for NetWare 3.11 or 3.12.

1. Plug up to four IFT-2101U controllers into host PCI slots then power on. The IFT-2101U BIOS will show the following messages on the screen for each installed IFT-2101U:

   ```
   IFT-2101U (PCI-TO-SCSI RAID) BIOS vx.xx
   (C) Copyright 1995 Infortrend Technology Inc.
   PCI Bus # = 00 Device # = 0A Port = E800 IRQ = 11 EDORAM = 8MB  FW=vx.xx
   !! Press <Ctrl><I> for Configuration Utility, <Q> to Skip !!
   ```

2. Use the IFT-2101U 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.

3. Use Infortrend 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 IFT-2101U adapter and thus no logical drives or devices should be mapped to this SCSI ID**.

4. Make sure the RAID configuration is properly set. (Refer to chapter 8, *Text RAID Manager User Interface*, for more information on configuring RAID).

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 IFT-2101U driver by typing ***load ift2000.dsk [Enter]***

8. System console will display the following messages on the screen:

```
Loading module IFT2000.DSK
   IFT-2101U Disk Driver for NetWare v3.1x
   Version x.xx    November 3, 1995
   Copyright (C) 1995 Infortrend Technology Inc. All Rights Reserved
   Auto-loading module IFTASPI.DSK
   IFT ASPI Manager for NetWare v3.1x, v4.0x and v4.1
   Version x.xx   October 27, 1995
   Copyright (C) 1995 Infortrend Technology Inc. All Rights Reserved
Supported Slot values are 11
Slot: 11
```

The slot number(value) is auto-detected by the IFT-2101U driver according to which PCI slot the IFT-2101U has been plugged into. Write down the slot number for later using in STARTUP.NCF.

9. At this point, press ***[Enter]***. If the IFT-2101U driver installs successfully, the system console will display the following messages on the screen:

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

10. Load the driver "IFT2000.DSK" once for each installed IFT-2101U. This driver supports up to four IFT-2101U controllers.

11. After each instance of the IFT-2101U 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 IFT-2101U drivers should resemble the following:

        # load ift2000 slot = x

x is the slot number of slot into which the IFT-2101U has been plugged. The slot number is auto-detected by IFT-2101U driver and shown on the system console screen during IFT-2101U driver loading.

2.2 Installing NetWare 4.0x/4.1/4.11

1. Use the IFT-2101U 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 Infortrend 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 IFT-2101U 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 IFT-2101U controller, make sure the IFT-2101U ASPI manager "I2DOSASP.SYS", CD-ROM driver "ASPICDRM.SYS", and Microsoft® CD-ROM extension program "MSCDEX.EXE" are specified in the MS-DOS® files CONFIG.SYS and AUTOEXEC.BAT.

5. Plug up to four IFT-2101U controllers into host PCI slots then power on. IFT-2101U BIOS will show the following messages on the screen for each installed IFT-2101U controller:

    ```
    IFT-2101U (PCI-TO-SCSI RAID) BIOS vx.xx
    (C) Copyright 1995 Infortrend Technology Inc.
    PCI Bus # = 00 Device # = 0A Port = E800 IRQ = 11 EDORAM = 8MB  FW=vx.xx
    !! 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 MS-DOS® logical drive D, type the following at the DOS prompt:
    CD D:\NETWARE.40\ENGLISH
    install

---

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        Loaded Drivers

      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

Load a disk driver listed                    <Enter>
Load a disk driver not listed                <Ins>
Unload a disk driver                         <Del>
Scroll help windows                          <F5>(up)   <F6>(dn)      Change lists <F2>
Help<F1>          Continue                   <F10> Abort INSTALL      <Alt><F10>
```

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

```
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>
```

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

```
┌─────────────────────────────────────────────────────────────────────┐
│ 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> │
│                                                                        │
└─────────────────────────────────────────────────────────────────────┘
```
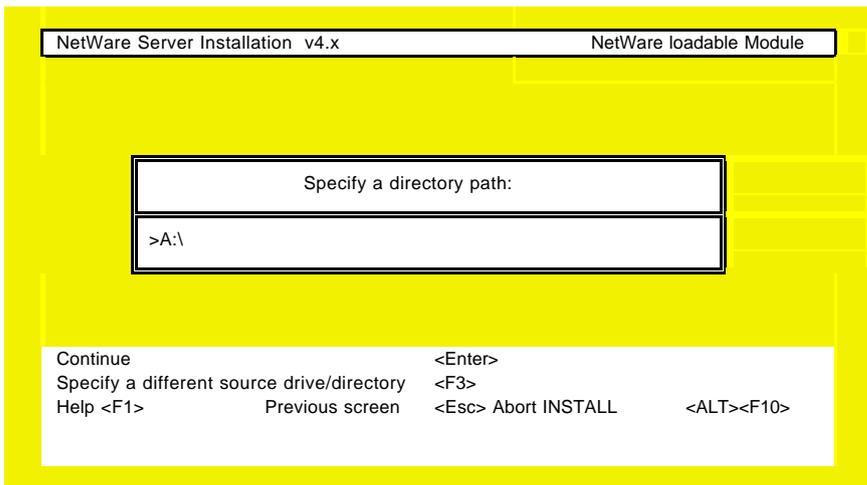
11. Insert the IFT-2101U Driver Diskette into floppy A: and give the IFT-2101U NetWare drivers path by typing **netware\v4.x** and press **[Enter]** then wait for the following screen to appears:

```
NetWare Server Installation  v4.x                          NetWare loadable Module


    ┌─────────────────────────────────────────────────────────────────────┐
    │                   Select a new disk driver to install:               │
    ├─────────────────────────────────────────────────────────────────────┤
    │  IFT2000.DSK      IFT-2101U PCI-TO-SCSI Disk Driver for NetWare v4.0x, v4.1 │
    │  RAIDASPI.DSK     IFT ASPI Manager for NetWare v3.1X, v4.0x and v4.1  │
    │                                                                       │
    │                                                                       │
    │                                                                       │
    └─────────────────────────────────────────────────────────────────────┘

   ┌──────────────────────────────────────────────────────┐  ┌────────────────┐
   │  This driver supports up to four IFT-2101U Controllers and │  │  Loaded Drivers │
   │  multiple                                              │  ├────────────────┤
   │  SCSI LUN.                                             │  │                │
   │  When you load IF2000.DSK you have to specify which    │  │                │
   │  IFT-2101U controller you are loading the driver for by │  │                │
   │  using the                                             │  │                │
   │  command line option 'SLOT=N'.                         │  │                │
   └──────────────────────────────────────────────────────┘  └────────────────┘

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

12. Select IFT2000.DSK as a new disk driver to install by pressing **-** key and pressing ***[Enter]*** then wait for the following screen to appears:

```
NetWare Server Installation  v4.x                          NetWare loadable Module




              ┌──────────────────────────────────────────┐
              │        loading driver IFT2000.DSK ...      │
              │                                            │
              │               Please wait                  │
              └──────────────────────────────────────────┘
```
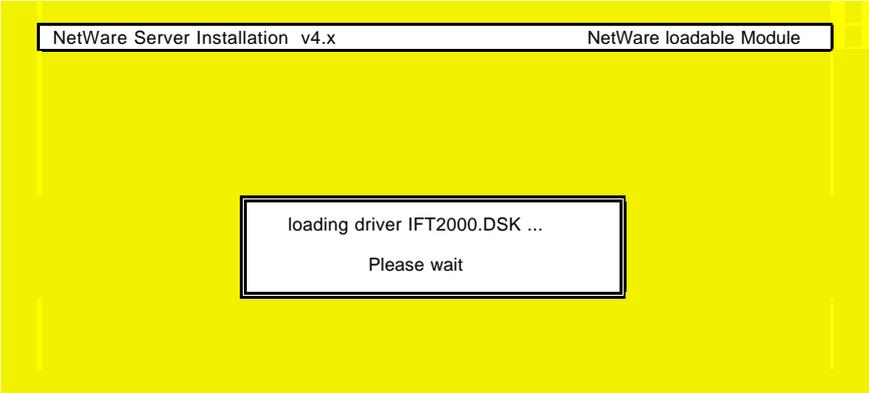
13. Press **[ALT] [ESC]** keys at the same time to switch to system console screen or wait for the NetWare installation program to time out. When it times out, the following screen will appear:

NetWare Server Installation v4.x	NetWare loadable Module

IFT2000.DSK did not finish loading in the time allowed (15 seconds).
Controller will be switched to the system console screen, where you may either
see it finish or enter information to finish loading it. (INSTALL-4.0-247)

Press <Enter> to continue.
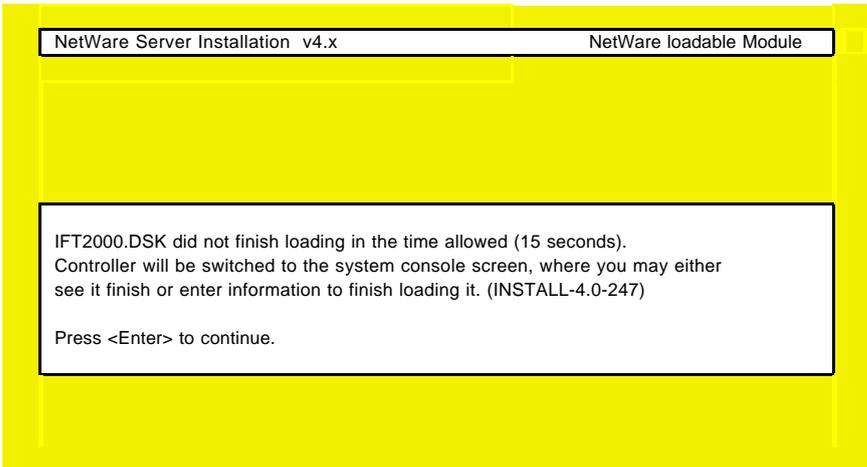
14. Press **[Enter]** to switch to system console screen.
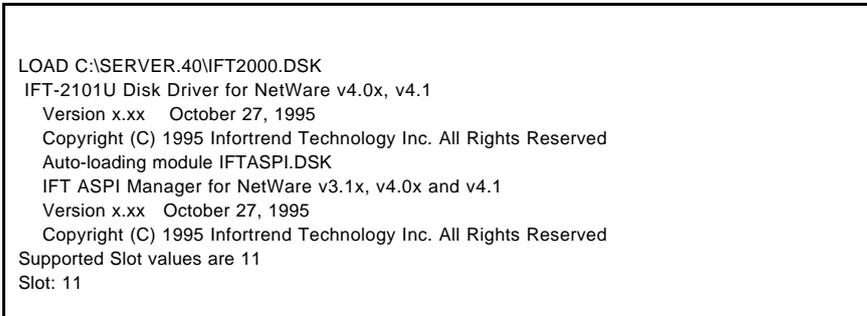
```
LOAD C:\SERVER.40\IFT2000.DSK
 IFT-2101U Disk Driver for NetWare v4.0x, v4.1
   Version x.xx    October 27, 1995
   Copyright (C) 1995 Infortrend Technology Inc. All Rights Reserved
   Auto-loading module IFTASPI.DSK
   IFT ASPI Manager for NetWare v3.1x, v4.0x and v4.1
   Version x.xx   October 27, 1995
   Copyright (C) 1995 Infortrend Technology Inc. All Rights Reserved
Supported Slot values are 11
Slot: 11
```

The slot number(value) is auto-detected by the IFT-2101U driver according to which PCI slot the IFT-2101U controller 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 IFT2000 was successfully loaded. │          │
│              │                                          │          │
│              │  Press <Enter> to continue               │          │
│              │                                          │          │
│              └─────────────────────────────────────────┘          │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```

16. Press *[Enter]* to continue the installation
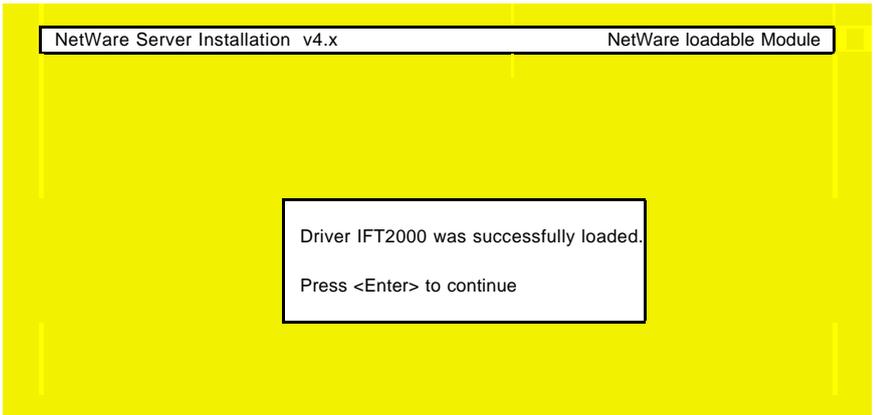
```
┌─────────────────────────────────────────────────────────────────┐
│ NetWare Server Installation  v4.x              NetWare loadable Module │
│                                                                   │
│                                                                   │
│              ┌─────────────────────────────────────────┐          │
│              │          Select an action:               │          │
│              ├─────────────────────────────────────────┤          │
│              │   Load driver IFT2000 again              │          │
│              │   Load another (different) driver        │          │
│              │   Continue with installation             │          │
│              └─────────────────────────────────────────┘          │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```
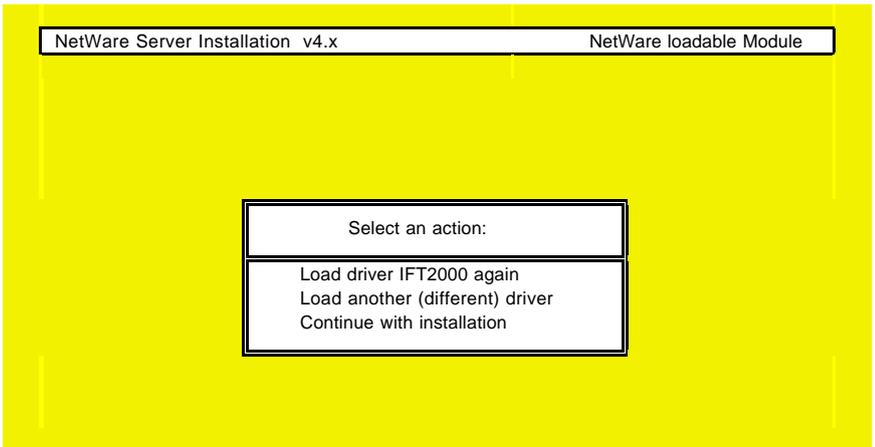
17. Select "Continue with installation" and press *[Enter]* to continue the installation.

Note:
The correct syntax in STARTUP.NCF file to load the IFT-2101U drivers should resemble the following:

    # load ift2000 slot = x

x is the slot number of slot into which where the IFT-2101U has been plugged. The slot number is auto-detected by IFT-2101U driver and shown on the system console screen during IFT-2101U driver loading.

3   Windows NT® 3.1/3.51 Driver Installation

Up to 4 IFT-2101U controllers 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.

-IFT2000.SYS: IFT-2101U Miniport Driver for Windows NT 3.1.
-IFTNT: Tag file for driver installation.
-OEMSETUP.INF: Information file for driver installation.
-TXTSETUP.OEM: Information file for driver installation.
-README.NT: An text file describing the IFT-2101U miniport driver.

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

-IFT2000.SYS: IFT-2101U Miniport Driver for Windows NT 3.5X.
-IFTNT: Tag file for driver installation.
-OEMSETUP.INF: Information file for driver installation.
-TXTSETUP.OEM: Information file for driver installation.
-README.NT: An text file describing the IFT-2101U miniport driver.

3.1   Installing Driver During Windows NT 3.1/3.51 Installation

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

1. Use IFT-2101U 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 Infortrend 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 IFT-2101U controller 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 a backup copy of IFT-2101U controller 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. 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. Reset 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 controllers. From the list of SCSI adapters, select "Other (Requires disk provided by a hardware manufacturer)".

9. Insert the IFT-2101U distribution diskette into floppy drive A and press *[Enter]*. The screen displays "IFT-2000 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.

3.2 Installing Driver in Existing Windows NT 3.1/3.51 System

If you are adding an IFT-2101U controller to a computer that already has an IFT-2101U controller installed for Windows NT, then follow step 1 through step 2 only.

If you are adding an IFT-2101U controller to a computer that has no IFT-2101U controller installed for Windows NT, then follow all steps.

1. Use IFT-2101U 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 Infortrend Text RAID Manager 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 IFT-2101U controller 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 IFT-2101U Controller 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/4.0, 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 IFT-2101U controllers 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 IFT-2101U Distribution Diskette into floppy drive A and press *[Enter]*. The screen displays "IFT-2000 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 IFT-2101U 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.

3.3   Updating Windows NT 3.1/3.51 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\ift2000.sys c:\winnt\system32\drivers
    Skip step 2 if the version of your Windows NT is not v3.1.

2. If one of the IFT-2101U controllers 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\ift2000.sys c:\ntbootdd.sys***
    > ***attrib +h +r +s c:\ntbootdd.sys***

3. Shutdown Windows NT, then restart your computer.

3.4   Installing the Driver During
Windows NT 4.0 Installation

The following installations are covered in this section:
A.   You want to first create a RAID logical drive and then install Windows NT 4.0 on it; and B. You want to install Windows NT on one of your SCSI hard disk drives. If you want to install Windows NT 4.0 on a RAID logical drive, begin at step 1 below; if you want install Windows NT 4.0 on a single SCSI hard disk drive, begin at step 10 below. (For either configuration, we assume that you have already installed the IFT-2101U, attached the cable(s) to a channel(s), attached SCSI hard disk drives to the cable(s), attached the power supply cables to the drives, and then turned on the power supply for both the drives and the system.

The following files are supplied for driver installation, they are put   in the \WINNT\V4_0X subdirectory for Windows NT 4.0

-IFT2000.SYS: IFT-2101U Miniport Driver for Windows NT 4.0 .
-IFTNT: Tag file for driver installation.
-OEMSETUP.INF: Information file for driver installation.
-TXTSETUP.OEM: Information file for driver installation.

-README.NT: An text file describing the IFT-2101U miniport driver.

1. (For steps 1 through 5, it is assumed that you want to first create a RAID logical drive, and then want to install Windows NT 4.0 on that drive.) Insert the boot diskette and boot up your system. Remove the boot diskette and insert the IFT-2101U Text RAID Manager diskette.

2. At the prompt, type **A:\RAIDMAN\DOS\RAIDMAN.EXE** and then press <Enter>.

3. The Text RAID Manager should display the PCI address of the IFT-2101 RAID controller. You are prompted to select the controller. Press <Enter> to select.

4. You will see the Main Menu of the Text RAID Manager. Select View and Edit Logical Drives, and then press <Enter>. Create a logical drive and map it to a SCSI ID and LUN (see Chapter 6 for a detailed explanation.)

5. Press <Esc> and exit the Text RAID Manager. Remove the IFT-2101U driver diskette.

6. Insert the Windows NT 4.0 Installation Diskette #1. Reset the computer to begin installation of Windows NT.

7. You will be prompted to insert diskette #2 and diskette #3 (for detailed information about Windows NT 4.0 installation, see your Windows NT 4.0 User's Manual.) Installation diskette #3 will recognize an IDE CD-ROM (if you have one) and then ask if you want to specify SCSI adapters, other CD-ROM drives, or disk controllers. You want to specify the IFT-2101U. Press "S".

8. Depending on your system, may be more than one device listed. Select **Other (Requires disk provided by a hardware manufacturer)**, and then press <Enter>.

9. You will be prompted to insert the disk from the hardware manufacturer. Insert the IFT-2101U driver diskette, and then press <Enter>.

10. Select **Infortrend IFT-2000 Series RAID Miniport for NT v4.0** from the list, and then press <Enter>. The Windows NT Setup screen will now indicate that it recognizes the RAID Miniport in addition to the IDE CD-ROM. Setup gives you the choice of specifying additional devices for use with Windows NT (press "S") or of not

specifying additional devices (Press <Enter>). Press <Enter> to continue.

11. Remove the IFT-2101U driver diskette and re-insert Windows NT 4.0 Installation Diskette #3, as prompted. Confirm your system configuration and accept the Windows NT license agreement, as prompted. Setup will display the logical drive that you created on the SCSI adapter. Setup asks if you want to install Windows NT on that drive. Press <Enter> to begin installation on that logical drive. (At this point, Windows NT also gives the choice of partitioning the logical drive. To keep the example simple, we do not do this.) The rest of the installation is described in the Windows NT 4.0 User's Manual.

3.5 Installing the Driver During Installation of Windows NT 4.0 (for DEC Alpha)

The Windows NT 4.0 for DEC Alpha installation is almost identical to the installation for Windows NT 4.0 for x86. There are two differences. First, the IFT-2101U cannot be used as the boot device in Windows NT for DEC Alpha; and second, in step 10 (see *Installing the Driver During Windows NT 4.0 Installation*), you should choose the device driver called **Infortrend IFT-2000 Series RAID Miniport for Alpha NT v4.0.** See Section 3.4, steps 6 through 11, for instructions on installing Windows NT 4.0 for DEC Alpha.

The following files are supplied for driver installation, they are put in the \ALPHANT\V4_0X subdirectory for Windows NT 4.0

-IFT2000.SYS: IFT-2101U Miniport Driver for Windows NT 4.0 .
-IFTNT: Tag file for driver installation.
-OEMSETUP.INF: Information file for driver installation.
-TXTSETUP.OEM: Information file for driver installation.
-README.NT: An text file describing the IFT-2101U miniport driver.

3.6 Installing the Driver in Existing Windows NT 4.0 (for DEC Alpha)

This section describes the procedure for installing the driver in a DEC Alpha system that is running Windows NT 4.0.

IMPORTANT:

Under Windows NT 4.0 for DEC Alpha, the IFT-2101U cannot be the boot device.

   1.   Go the **Control Panel** and select **SCSI Adapters**.
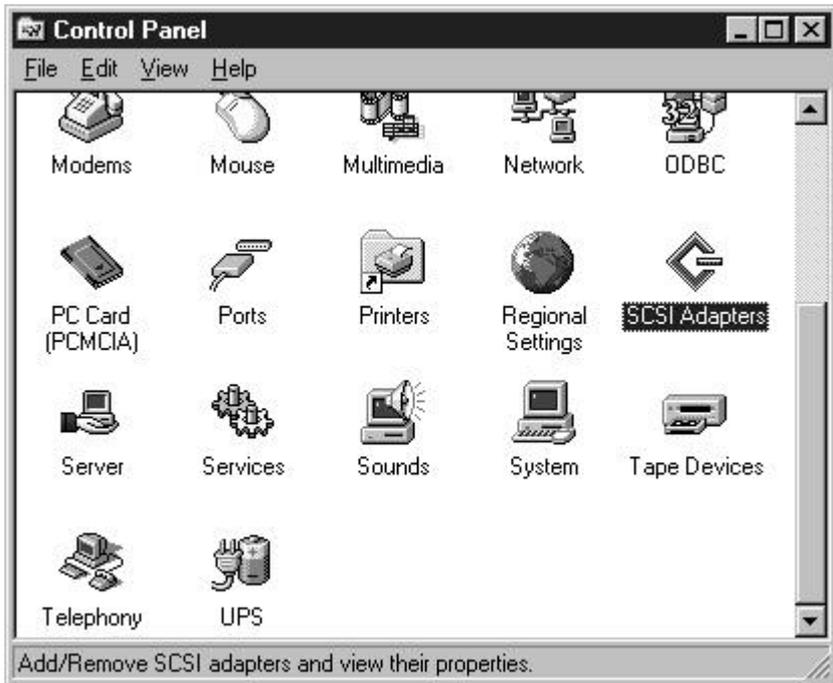
2. Choose the **Drivers** tab and select the "Add..." button.

3. Select the "Have Disk..." button.

4. Insert the IFT-2101U driver diskette, and then press <Enter>. Windows NT will check the floppy drive for a diskette. Files and directories on the diskette are displayed.

5. With your mouse, click on the folder icons for WINNT and then V4_0. Your selection of the **A:\WINNT\V4_0** directory will indicated. (Note: for Windows NT 4.0 for DEC Alpha, you should select the A:\ALPHANT\V4_0 directory.)

Install From Disk ✕

Insert the manufacturer's installation disk into the drive
selected, and then click OK.

[OK]

[Cancel]

Copy manufacturer's files from:

`A:\WINNT\V4_0` ▼   [Browse...]
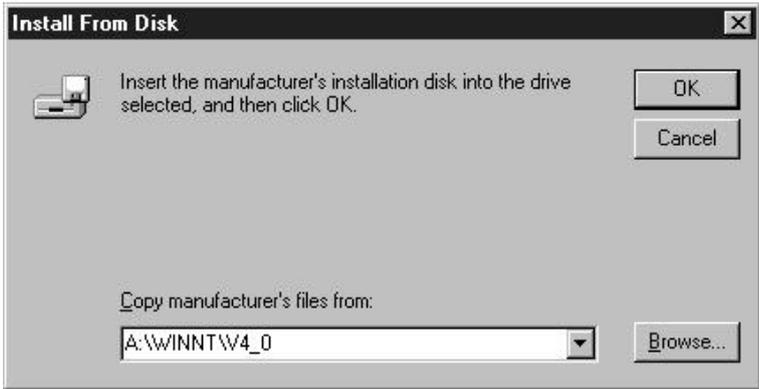
6. You will see **the IFT-2000 Series Miniport Driver for Windows NT 4.0** highlighted in gray. Press <Enter> to select it.

7. You will be asked which directory you want to install the driver from. Type in **A:\WINNT\V4_0** and then press <Enter>. (Note: for Windows NT 4.0 for DEC Alpha users should type in A:\ALPHANT\V4_0.)

4   Windows® 95/98 Driver Installation

The following files are supplied for driver installation, they are put in the \WIN95 subdirectory for Windows 95/98.

-IFT2000.MPD: IFT-2101U Miniport Driver for Windows 95/98.
-IFTW95.INF : Information file for driver installation.

4.1   Installing Windows 95/98 and the Driver

1. Use IFT-2101U 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 Infortrend Text RAID Manager or RS-232 Terminal Interface to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs. Note that SCSI ID 7 is reserved for the IFT-2101U controller and thus no logical drives or devices should be mapped to this SCSI ID.

3. Follow the instructions in Windows 95/98 installation documentation to install Windows 95/98.

4. When Windows 95/98 installation is complete, restart Windows.

5. Click on the "Start" button on the task bar of Windows 95/98.

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 labeled "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".

10. Click on the "Have Disk" button and enter a:\win95 as the subdirectory to copy the manufacturer's file from. Insert IFT-2101U distribution diskette into drive A: and click on "OK".

11. Select "Infortrend IFT-2101U PCI-to-SCSI RAID Adapter", and click on "OK".

12. Click on "OK". The driver is copied.

13. You must restart your system for the changes to take effect. Click on "Yes" to shutdown the system and restart your computer.

14. 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 IFT-2101U Miniport Driver to support Infortrend GUI RAID Manager. Please select "Do not install a driver" , and click on "OK". Don't be alarmed by this message. It is perfectly normal to see this message when using the IFT-2101U under Windows 95/98.

15. Make sure that the IFT-2101U 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 IFT-2101U 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.

4.2   Updating Device Driver for Windows 95/98

1. Click on the "Start" button in the task bar of Windows 95/98.

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 "Infortrend IFT-2101U 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 Infortrend IFT-2101U 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.

5   OS/2® Driver Installation

Up to 4 IFT-2101U controllers can be installed in one computer. The following files are supplied for driver installation, they are put in the \OS2 subdirectory.

-IFT2000.ADD : IFT-2101U OS/2 2.x and 3.0(Warp) Device Driver.
-IFT2000.DDP : Device Driver Profile for driver installation.
-README.OS2 : An text file describing the IFT-2101U OS/2 driver.

5.1   Installing Driver During OS/2 2.x or 3.0 Installation

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 the IFT-2101U 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 Infortrend 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 IFT-2101U 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 IFT2000.ADD from Infortrend IFT-2101U controller 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=IFT2000.ADD /V

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

5.2   Installing Driver in an Existing OS/2 2.x/3.0 System

If you are adding an IFT-2101U controller to a computer that already has an IFT-2101U controller installed for OS/2 2.x/3.0, then follow step 1 through step 2 only. If you are adding an IFT-2101U controller to a computer that has no IFT-2101U controller installed for OS/2 2.x/3.0, then follow all steps.

1. Use the IFT-2101U 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 Infortrend 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 IFT-2101U 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 IFT-2101U 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.

5.3   Updating IFT-2101U OS/2 Device 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, Driver
    copy a:\os2\ift2000.add c:

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

5.4   IFT-2101U OS/2 Driver Command-Line Options

1. Driver Command Syntax :

        BASEDEV=IFT2000.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.

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 IFT-2101U Controller is plugged in. You can get the PCI bus number from the information that the IFT-2101U BIOS displays at system bootup. Note: the IFT-2101U BIOS displays bus number in hex value, you must translate that into decimal value.

/DEV:n
PCI Device Number into which the IFT-2101U is plugged. You can get the PCI device number from the information that the IFT-2101U BIOS displays at system bootup. Note: The IFT-2101U BIOS displays the 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.

/(!)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 IFT-2101U controllers in your computer automatically, if no /BUS and /DEV options are specified.

6 Driver Installation for SCO OpenServer and UnixWare

The chapter describes how to install SCO UNIX BTLD (Boot Time Loadable Driver) for the IFT-2101U.

6.1 Installing the SCO OpenServer Driver

1. Use the IFT-2101U 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 Infortrend Text RAID Manager (refer to chapter 6) to configure Logical Drives and SCSI Devices and map them to valid SCSI-IDs/LUNs. **Note that SCSI ID 7 is reserved for the IFT-2101U 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 **ift2x** at the following prompt:

```
What packages do you need linked in the system,
or 'q' to quit?: ift2x
```

6. You will be prompted to insert the IFT BTLD diskette after a series of messages as follows:

```
Please insert the fd(x)ift2x 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 ift2x volume and press <ENTER>:
```

      Insert the IFT 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)
```

10. At the following prompt, press **[ENTER]**:

```
The following packages are on this diskette:

  NAME            DESCRIPTION
  ift2x           Infortrend IFT-2101U SCSI Disk Array Driver for SCO
                  UNIX system

Please enter the names of the packages you
wish to install or q to quit:_
[default:ift2x]
```

11. The IFT-2101U driver will now be linked into the SCO UNIX kernel.

7   Drivers and Utilities for Linux

The drivers and utilities for Linux can be found in the following directories:

```
\2101\Linux
  \Disk 1 - Linux SLACKWARE 3.5 BOOT DISK
              filename: IABL11F1  (disk 1)
  \Disk 2 - Linux RED HAT 5.1 BOOT DISK
              filename: IABL11F2  (disk 2)
  \Disk 3 - Linux Text RAID Manager, RAID SNMP TOOLS DISK
              filename: IABL11F3  (disk 3)
  \Disk 4 - Linux RED HAT 5.1 SUPPLEMENT DISK
              filename: IABL11F4  (disk 4)
```

NOTE:

The current driver version supports Linux 2.0.34 of Red Hat 5.1 and SlackWare 3.5. The Red Hat 5.2 (Linux 2.0.36) is not yet supported.

7.1   Making Floppy Diskettes for Red Hat 5.1 Installation

1. Prepare three formatted floppy diskettes.

2. Copy the files of Disk 2, Disk 3 and Disk 4 to a UNIX machine with a floppy drive.

3. Place the formatted disk into the floppy drive and use the UNIX "dd" command to make the driver floppy diskettes.

For example:

```
# dd if=iabl11f2 of=/dev/fd0 bs=1440k
# dd if=iabl11f3 of=/dev/fd0 bs=1440k
# dd if=iabl11f4 of=/dev/fd0 bs=1440k
```

4. Label each disk according to the above description.

7.2   Making Floppy Diskettes for SlackWare 3.2 Installation

1. Prepare two formatted floppy diskettes.

2. Copy the files of Disk 1 and Disk 3 to a UNIX machine with floppy drive.

3. Place the formatted disk into the floppy drive and use the UNIX "dd" command to make the driver floppy diskettes.

For example:

```
# dd if=iabl11f1 of=/dev/fd0 bs=1440k
```

```
# dd if=iabl11f3 of=/dev/fd0 bs=1440k
```

4. Label each disk according to the above description.

7.3   Installing Red Hat Linux

☞ **IMPORTANT:**

- *ALWAYS CHANGE THE CACHE TO WRITE-BACK DISABLED BEFORE INSTALLING OPERATING SYSTEMS AND PARTITIONING.*
- *The IFT-2101U is a high-performance PCI RAID controller with Write-Back cache enabled. During the installation of some operating systems, the installation program might reset the computer automatically while the cache still contains data not yet written to the drives. It might cause the installation or partitioning failure. To avoid the failure, always switch the cache mode to Write-Back DISABLED (Write-Through mode) before changing the drive partition (e.g., using MS-DOS FDISK) and before installing any operating systems.*

1. Follow these steps to change the cache mode to Write-back Disabled:

   a) Using BIOS Text RAID Manager (PC platform only) to disable the Write-Back Cache. Power on the computer, press <CTRL><I> when the Infortrend information appears.

   b) Choose "Configure RAID" from the menu and press <Enter> to enter a proper display mode (either ANSI, VT-100 or ANSI Color).

   c) In the Main Menu, choose "View and Edit Configuration Parameters", then "Caching Parameters".

   d) A sub-menu contains "Write Back Cache Enabled/Disabled" which refers to the Write Back mode is Enabled or Disabled. Press <ENTER> on it and choose "Yes" to change it.

   e) After the cache mode has been changed, resetting the computer is required for the new setting to take effect. After

the driver partitioning and operating system are installed, use the same procedure to *enable* the Write-Back cache – the high performance Write-Back Caching will bring your system into a higher performance level.

2. Connect CD-ROM drive to IFT-2101U, remove or disable any other SCSI adapters from the system. (red hat 5.1 installation can only use one SCSI adapter during installation) (The IDE CD-ROM drive can be a substitute for the SCSI CD-ROM drive).

3. If using IFT-2101U BIOS v1.17B, do not leave Red Hat CD disc in the CD-ROM drive during system reboot. The BIOS 1.17B has CD-ROM boot ability, it detects the CD in the CD-ROM drive, once it detects the CD disc is bootable, the system will boot from CD-ROM not from floppy.

4. Insert "Infortrend IFT-2101U Red Hat 5.1 Boot Disk" disk 2 into floppy, and power on the system.

5. Insert the Red Hat 5.1 CD disc into the CD-ROM drive after the system boot up, follow the on-screen instruction to start the installation of Linux.

6. Choose "SCSI CD-ROM", the installation program will found Infortrend IFT-2101U RAID controller, follow the on-screen instructions to continue.

7. Insert "Infortrend IFT-2101U Red Hat 5.1 Supplement Disk" disk 4 into floppy drive when prompted.

8. When on-screen appears "Please insert the Disk 3 (Driver disk)", insert "Infortrend IFT-2101U Text RAID Manager, RAIDSNMP for Linux" into the floppy drive.

9. Follow the on-screen instructions to complete the installation of Red Hat 5.1.

7.4 Installing SlackWare Linux

☞ **IMPORTANT:**

- *ALWAYS CHANGE THE CACHE TO WRITE-BACK DISABLED BEFORE INSTALLING OPERATING SYSTEMS AND PARTITIONING.*

- *The IFT-2101U is a high-performance PCI RAID controller with Write-Back cache enabled. During the installation of some operating systems, the installation program might reset the computer automatically while the cache still contains data not yet written to the drives. It might cause the installation or partitioning failure. To avoid the failure, always switch the cache mode to Write-Back DISABLED (Write-Through mode) before changing the drive partition (e.g., using MS-DOS FDISK) and before installing any operating systems.*

1. Follow these steps to change the cache mode to Write-back Disabled:

    a) Using BIOS Text RAID Manager (PC platform only) to disable the Write-Back Cache. Power on the computer, press <CTRL><I> when the Infortrend information appears.

    b) Choose "Configure RAID" from the menu and press <Enter> to enter a proper display mode (either ANSI, VT-100 or ANSI Color).

    c) In the Main Menu, choose "View and Edit Configuration Parameters", then "Caching Parameters".

    d) A sub-menu contains "Write Back Cache Enabled/Disabled" which refers to the Write Back mode is Enabled or Disabled. Press <ENTER> on it and choose "Yes" to change it.

    e) After the cache mode has been changed, resetting the computer is required for the new setting to take effect. After the driver partitioning and operating system are installed, use the same procedure to *enable* the Write-Back cache – the

high performance Write-Back Caching will bring your system into a higher performance level.

2. Follow the original procedure to create the SlackWare Boot Disk and Root Disk from the SlackWare CD-ROM.

3. If using IFT-2101U BIOS v1.17B, do not leave SlackWare CD disc in the CD-ROM drive during system reboot. The BIOS 1.17B has CD-ROM boot ability, it detects the CD in the CD-ROM drive, once it detects the CD disc is bootable, the system will boot from CD-ROM not from floppy.

4. Use "Infortrend IFT-2101U Linux SlackWare 3.5 Boot Disk" disk 1 instead of the original boot disk, power on the system, let the system boot from the boot disk floppy.

5. Insert the SlackWare 3.5 CD disc into the CD-ROM drive after the system boot up, follow the on-screen instruction to start the installation of Linux.

6. Insert the Root Disk made from Linux SlackWare CD-ROM into floppy drive when prompted.

7. Follow the on-screen instructions to complete the installation of SlackWare 3.5.

7.5 Running the Text RAID Manager for Linux

1. Insert "Infortrend IFT-2101U Text RAID Manager, RAIDSNMP for Linux" (disk 3) into the floppy drive and mount it.

```
# mount -r /dev/fd0 /mnt
```

2. Execute the Raidman in the /tools directory.

```
# cd /mnt/tools
# ./raidman
```

NOTE:
The current driver version supports Linux 2.0.34 of Red Hat 5.1 and SlackWare 3.5. The Red Hat 5.2 (Linux 2.0.36) is not yet supported.

8   Drivers and Utilities for Sun Solaris™

8.1   Solaris 2.5.x and 2.6 (x86 platform)

The drivers and utilities can be found in the following directory:

```
\2101\SOLARIS.X86
      \IAAS111D     - Driver diskette image in UNIX "dd" format.
      \IAAS111D_.Z- Driver files packed by "tar" and "compress".
```

The files extracted from either one of above are exactly the same.

☞ **IMPORTANT:**

> *The logical drive created on IFT-2101U RAID controller cannot be used as the Solaris boot drive.*

8.1.1   Creating the Driver Diskette from the Image File

1. Find a UNIX system with floppy disk drive.

2. Under the command prompt, type:

   ```
   # dd if=IAAS111D of=/dev/fd0 bs=1440k
   ```

   where "/dev/fd0" is the floppy drive device where the driver diskette will extract to.

8.1.2   Extracting Driver Files Using "tar" and "uncompress"

1. Find a system with SUN Solaris 2.5/2.6 (for x86 platform) installed.

2. Make a temporary directory, and copy the file "IAAS111D_.Z" into it.

   ```
   # cd
   # mkdir 2101
   # cp IAAS111D_.Z /2101
   ```

3. Make sure the last character of the filename "Z" is capitalized (not in lower case). If it is in lower case "z", change it to "Z".

   ```
   # mv iaas111d_.z IAAS111D_.Z
   ```

4. Uncompress the file:

   ```
   # uncompress IAAS111D_.Z
   ```

5. Use "tar" command to extract the files:

```
# tar xvf IAAS111D_
```

The driver files will be extracted into the current directory.

8.2   Installing the x86 Platform Driver and Text RAID Manager

A.   Installing from the driver diskette created from image file

A1. To install the driver from the driver diskette, type:

```
# pkgadd -d /floppy/floppy0
```

where "/floppy/floppy0" is the mounted driver diskette. Use Solaris Volume Manager and "volcheck" to mount the driver diskette, or mount it manually.

A2. A list of selections will show as below, choose "3" to install the driver for IFT-2101U.

```
     The following packages are available:
1  dascx86      RAID In-band SCSI Driver for Solaris 2.5,2.6
                    (i386) 1.11a
2  mgrx86       Text RAID Management for Solaris 2.5,2.6
                    (i386) 1.51b
3  rhbax86      PCI-SCSI RAID Host Adapter Driver
                    (i386) 1.11d
4  snmpx86      RAID SNMP SUBAGENT for Solaris 2.5,2.6
                    (i386) 1.15b

Select package(s) you will to process (or 'all' to process
all packages). (default: all) [?,??,q]: 3
```

A3. After the driver installed, the same selections appear again. Choose "2" this time to install the Text RAID Manager for Solaris.

A4. After the driver installed, the same selections appear again. Choose "4" this time to install the RAID SNMP sub-agent for Solaris. This step can be ignored if SNMP remote administration is not going to be used. If TCP/IP protocol and SNMP service have not yet installed on this system, it can be installed later after the system TCP/IP and SNMP installed. The RAID SNMP sub-agent is not a must to be installed. Install it only when needed.

A5. Choose "q" to quit when the same list of selections appear again.

A6. Reboot the system.

```
# init 6
```

A7. After the system reboot, type "boot -r" in the boot screen to let the Solaris knows to look for new device drivers and incorporate them as part of the boot process.

B. Installing from the driver files extracted in the drive

B1. To install the driver from the directory where the files were extracted, type:

```
# pkgadd -d /2101
```

where "/2101" is the directory where the driver files were extracted.

B2. Follow the instructions from A2 to A7 of above to install the driver and the Text RAID Manager, and RAID SNMP sub-agent for Solaris.

8.3   Drivers and Utilities for Solaris 2.5.x and 2.6 (SPARC platform)

The drivers and utilities can be found in the following directory:

```
\2101\SOLARIS.SPK
     \IAAR111D     - Driver diskette image in UNIX "dd" format.
     \sun_tar.Z    - Driver files packed by "tar" and "compress".
```

The files extracted from either one of above are exactly the same.

> **IMPORTANT:**
> *The logical drive created on IFT-2101U RAID controller cannot be used as the Solaris boot drive.*

8.3.1   Creating the Driver Diskette from the Image File

1. Find a UNIX system with floppy disk drive.

2. Under the command prompt, type:

```
# dd if=IAAR111D of=/dev/fd0 bs=1440k
```

Where "/dev/fd0" is the floppy drive device where the driver diskette will extract to.

8.3.2   Extracting the Driver Files Using "tar" and "uncompress"

1. Find a system with SUN Solaris 2.5/2.6 (for x86 platform) installed.

2. Make a temporary directory, and copy the file "IAAS111D_.Z" into
    it.

    ```
    # cd
    # mkdir 2101
    # cp sun_tar.Z /2101
    ```

3. Make sure the last character of the filename "Z" is capitalized (not
    in lower case). If it is in lower case "z", change it to "Z".

    ```
    # mv sun_tar.z sun_tar.Z
    ```

4. Uncompress the file:

    ```
    # uncompress sun_tar.Z
    ```
5. Use "tar" command to extract the files:

    ```
    # tar xvf sun_tar
    ```

    The driver files will be extracted into the current directory.

8.4   Installing the SPARC platform Driver and
           Text RAID Manager

A.   Installing from the driver diskette created from image file

A1. To install the driver from the driver diskette, type:

    ```
    # pkgadd -d /floppy/floppy0
    ```

    where "/floppy/floppy0" is the mounted driver diskette. Use
    Solaris Volume Manager and "volcheck" to mount the driver
    diskette, or mount it manually.

A2. A list of selections will show as below, choose "3" to install the
    driver for IFT-2101U.

```
The following packages are available:
1  RAID In-band SCSI Driver for Solaris 2.5,2.6
2  Text RAID Management for Solaris 2.5,2.6
3  PCI-SCSI RAID Host Adapter Driver
4  RAID SNMP SUBAGENT for Solaris 2.5,2.6

      Select package(s) you will to process (or 'all' to
process
      all packages). (default: all) [?,??,q]: 3
```

A3. After the driver has been installed, the same selections appear again. Choose "2" this time to install the Text RAID Manager for Solaris.

A4. After the driver installed, the same selections appear again. Choose "4" this time to install the RAID SNMP sub-agent for Solaris. This step can be ignored if SNMP remote administration is not going to be. If TCP/IP protocol and SNMP service have not yet installed on this system, it can be installed later after the system TCP/IP and SNMP installed. The RAID SNMP sub-agent is not a must to be installed. Install it only when needed.

A5. Choose "q" to quit when the same list of selections appear again.

A6. Reboot the system.

```
# init 6
```

A7. After the system reboot, type "boot -r" in the boot screen to let the Solaris knows to look for new device drivers and incorporate them as part of the boot process.

B. Installing from the driver files extracted in the drive

B1. To install the driver from the directory where the files were extracted, type:

```
# pkgadd -d /2101
```

where "/2101" is the directory where the driver files were extracted.

B2. Follow the instruction from A2 to A7 of above to install the driver and the Text RAID Manager, and RAID SNMP sub-agent for Solaris.

8.5   Configuring RAID in Solaris with Text RAID Manager

1.   Change the current directory to where the Text RAID Manager is located.

```
# cd /usr/lib/raidsnmp
```

2.   Execute the Text RAID Manager under command prompt:

```
# ./raidman
```

Please refer to chapter 6 for details on the operation of the Text RAID Manager.

Appendix B   SCSI Cable Specifications

The SCSI cable recommended for Ultra Wide SCSI-2 operating at a transfer rate of 40 Mbytes/sec. is as follows:

- Maximum length   1.5 meters
- Impedance   Between $90\,\Omega$ to $132\,\Omega$
- Signal Attenuation   0.095 dB/meter @ 5 MHz (max.)
- Pair-Pair Propagation

Delay Delta   0.2 ns/meter (max.)
- DC Resistance $0.23\,\Omega$/meter @ 20 °C (max.)

SCSI Standards, Cable Length and Corresponding Maximum Possible Drive Connections

	Single-Ended	Differential	*Maximum Devices
SCSI-1	6 m	25 m	8
SCSI-2	3 m	25 m	8
Wide SCSI-2	3 m	25 m	16
Ultra SCSI-2	1.5 m	25 m	8
Ultra SCSI-2	3m	-	4
Ultra Wide SCSI-2	-	25 m	16
Ultra Wide SCSI-2	1.5 m	-	8
Ultra Wide SCSI-2	3 m	-	4

* The maximum device count includes the controller. The controller must occupy one SCSI ID on each drive channel. The contoller usually occupies ID 7.

SCSI Bus Width and Maximum Throughput

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

Appendix C   Upgrading 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 IFT-2101U stored in flash memory can be updated via the Text RAID Manager under DOS. New releases of the BIOS/firmware/boot-record are available on the Infortrend FTP server or in the form of a DOS file on a 5.25" or 3.5" diskette (on request).

To perform the download, the following must be available:

- IFT-2101U plugged into a host PCI slot and properly functioning.
- RAIDMAN.EXE running under DOS.

To perform the download, follow the following procedure:

1.   Select "Controller Maintenance" menu option under "System Functions" via the Text RAID Manager.

2.   Select the desired download option. If upgrading of both firmware and boot record is desired, first select "Advanced Maintenance Functions" menu item then select "Download Boot Record with Firmware".

3.   When prompted to confirm, select "Yes".

4. When prompted for a file name, 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 file name, enter the name of firmware file.

6   When file transfer is complete, please wait a moment while the IFT-2101U burns the code into the flash memory.

☞   **IMPORTANT:**

Allow the downloading process to finish. Do not reset or turn off the computer or the controller while it is downloading the file. Doing so may result in an unrecoverable error that requires the service of the manufacturer.

Appendix D   Sync. Clock Period & Sync. Clock Frequency

Changes to the SCSI Synchronous Clock Period of each SCSI target is a low-level control of the SCSI controller chip. There is no other selectable option. Only the Synchronous Clock Period is available in this field.

To calculate the Synchronous Clock Period, refer to the "Sample equation" to get the correct Synchronous Clock Period.

Sample equation:

$$\frac{1}{20.8Mhz \times 4ns} = \frac{1}{20.8 \times 10^6 \times 4 \times 10^{-9}} = 12$$

$$\frac{1}{12 \times 4ns} = \frac{1}{12 \times 4 \times 10^{-9}} = 20.8Mhz$$

In this example, where "20.8Mhz" is called the Synchronous Clock Frequency, and "12" is called the Synchronous Clock Period.

Synchronous Clock Period	Synchronous Clock Frequency	Synchronous Clock 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

Appendix E   Troubleshooting Guide

NOTE:
The following is a checklist of the common problems encountered during installation. For failures that occur during operation, refer to the failure recovery procedure in the "Disk Failure Management" section.

<u>PROBLEM</u>   <u>CHECK</u>

Text RAID Manager indicates a SCSI channel failure detected upon start-up (SCSI cables connected).

1. Check ID numbers (must be unique for each device on the same SCSI channel).
2. Make sure terminators are properly installed.
3. Check the voltage output of the power supply.

Initialization failure

1. Check ID numbers (must be unique for each device on the same SCSI channel).
2. Make sure terminators are properly installed.

Cannot detect SCSI drive

1. Check drive power connections.
2. Check drive SCSI cable connections.
3. Check ID numbers (must be unique for each device on the same SCSI channel).

Parity error detected

1. DRAM SIMM should be replaced.

Logical drive failure detected during boot-up

1. Check proper installation or connection of the drives (use the "View SCSI drives" function to help locate the problem).

System is not stable after running for a period of time.	1. SCSI cable must be shorter than 2 meters. 2. Make sure terminators are proper installed. 3. Power supply voltage must be within specification. 4. Check the enclosure's inner temperature.
When using "Scan New SCSI Drive" and the desired ID is empty, an empty drive entry appears.	1. Refer to section 8.4.1, *Scan New SCSI Drive*, on how to remove the empty drive entry.
The logical drive states "INVALID".	1. "Optimization for I/O", when creating the logical drive in Cache Parameter, is different from the current setting. 2. Change "Optimization for I/O" to the opposite setting and reset the controller.
In "View and Edit SCSI Drives" or "View and Edit SCSI Channels", the speed is only "20.8Mhz", not "40Mhz"	1. "20.8Mhz" is SCSI sync frequency, not transfer rate. 2. Refer to Appendix B, *SCSI Cable Specifications*, for details.
All settings are too complex to remember.	1. After the system installation is completed, write down all of the settings and related information in Appendix G, *Record the Settings*, for future reference.

Appendix F   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, spare drive operation (Global and Local Spare), background rebuilding
Failure indicator	Via Text RAID Manager or GUI RAID Manager
Host Interface	PCI Rev. 2.1
Cache size	Up to 64 Mbytes
Host interface	Ultra-Wide-SCSI
Hard disk interface	Ultra-Wide-SCSI
Hard disk channels	1 (IFT-2101UA) or 2 (IFT-2101UB)
Channel Terminator	Active, software programmable
SCSI protocol	SCSI-1, SCSI-2, (Ultra)-Wide-SCSI-1 or -2 (auto-match)
Max. Ultra-Wide-SCSI transfer rate	40 MBytes/sec synchronous
Max. SCSI drives	30
No. of logical drives	8, each capable of different RAID levels
Partitions	8 per logical drive, total of 64
No. of LUNs	Up to 32 LUNs per SCSI ID
Control	Via Text RAID Manager or GUI RAID Manager
Ultra-Wide-SCSI connectors	68-pin header (drive side)
Ultra-Wide-SCSI cabling	Single-ended
Voltage	+5 Volts
Current	2 Amp
Operating Temperature	5 to 44 °C
Relative Humidity	10-96%, non-condensing
Operating Altitude	Sea level to 10,000 ft.
Dimensions	PCI Standard length form factor: 6.87"(L) x 4.2"(W)

Appendix G   Record the Settings

View and Edit Logical Drives

Logical Drive Information

LG	RAID Level	#On-Line (DRV=)	#STB (SB=)	Logical Drive Name

Partition Information

LG	Partition	Size (MB)	LG	Partition	Size (MB)

View and Edit Host LUNs

LUN Mappings

Host Channel	Pri. / Sec. Controller	SCSI ID	LUN	Logical Drive	Partition	Size

View and Edit SCSI Drives

Slot	Chl	ID	Size (MB)	Ultra? (Y/N)	Wide? (Y/N)	LG DRV? Global Spare? Local Spare?		Vendor & Product ID
						LG		
						LG		
						LG		
						LG		
						LG		
						LG		
						LG		
						LG		
						LG		
						LG		
						LG		
						LG		
						LG		

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						LG		

View and Edit SCSI Channels

Chl	Mode (Host / Drive)	Default Sync Clock	Default Wide	Terminator Diff/Enable/ Disable/	Current Sync Clock	Current Wide
0						
1						

View and Edit Configuration Parameters

Caching Parameters

Write-back Cache	Enabled Disabled
Optimization for	Random I/O Sequential I/O

Host Side SCSI Parameters

Maximum Queued I/O Count	Auto _____
LUNs per Host SCSI ID	1 LUN 2 LUNs 4 LUNs 8 LUNs

Drive Side SCSI Parameters

SCSI Motor Spin-up	Enabled Disabled
SCSI Reset at Power Up	Enabled Disabled
Disk Access Delay Time	No Delay _____ Seconds
Maximum Tag Count	Disabled _____

Disk Array Parameters

Rebuild Priority	Low Normal Improved High
Verifications on Writes	
Verifications on LD Initialization Writes	Enabled Disabled
Verifications on LD Rebuild Writes	Enabled Disabled
Verifications on Normal Drive Writes	Enabled Disabled

Define Peripheral Device Active Signal

Power Supply Fail Signal	Active High	Active Low
Fan Fail Signal	Active High	Active Low
Temperature Alert Signal	Active High	Active Low
UPS Power Fail Signal	Active High	Active Low

View System Information

Total Cache Size	EDO DRAM	Normal DRAM	_____ MB
Firmware Version			
Bootrecord Version			
Serial Number			

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