USER'S GUIDE

MegaRAID® ATA 133-2 RAID Controller

May 2003

LSI LOGIC®

DB15-000271-01

This document contains proprietary information of LSI Logic Corporation. The information contained herein is not to be used by or disclosed to third parties without the express written permission of an officer of LSI Logic Corporation.

LSI Logic products are not intended for use in life-support appliances, devices, or systems. Use of any LSI Logic product in such applications without written consent of the appropriate LSI Logic officer is prohibited.

Document DB15-000271-01, May 2003
This document describes the initial release of LSI Logic Corporation's MegaRAID ATA 133-2 RAID Controller and will remain the official reference source for all revisions/releases of this product until rescinded by an update.

LSI Logic Corporation reserves the right to make changes to any products herein at any time without notice. LSI Logic does not assume any responsibility or liability arising out of the application or use of any product described herein, except as expressly agreed to in writing by LSI Logic; nor does the purchase or use of a product from LSI Logic convey a license under any patent rights, copyrights, trademark rights, or any other of the intellectual property rights of LSI Logic or third parties.

TRADEMARK ACKNOWLEDGMENT
LSI Logic, the LSI Logic logo design, and MegaRAID are trademarks or registered trademarks of LSI Logic Corporation. Intel is a registered trademark of Intel Corporation. MS-DOS, Microsoft Windows and Windows NT are registered trademarks of Microsoft Corporation. All other brand and product names may be trademarks of their respective companies.

CD

To receive product literature, visit us at http://www.lsilogic.com.

For a current list of our distributors, sales offices, and design resource centers, view our web page located at

http://www.lsilogic.com/contacts/index.html

FCC Regulatory Statement

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.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and the receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

Shielded interface cables must be used with this product to ensure compliance with the Class B FCC limits.

Model Name: MegaRAID ATA 133-2 RAID Controller

Model Number: Series 524

Disclaimer – LSI Logic certifies only that this product will work correctly when this product is used with the same jumper settings, the same system configuration, the same memory module parts, and the same peripherals that were tested by LSI Logic with this product. The complete list of tested jumper settings, system configurations, peripheral devices, and memory modules are documented in the LSI Logic Compatibility Report for this product. Call your LSI Logic sales representative for a copy of the Compatibility Report for this product.

Preface

This book is the primary reference and Hardware Guide for the LSI Logic MegaRAID® ATA 133-2 RAID Controller. It contains instructions for installing the MegaRAID controller and for configuring RAID arrays. It also contains background information on RAID.

The MegaRAID ATA 133-2 RAID controller provides a cost-effective way to achieve higher transfer rates and reliability. The MegaRAID ATA 133-2 RAID controller supports two IDE channels and up to four drives. It supports the following drive modes: PIO 0-4, DMA 0-2, and Ultra DMA 0-5. The RAID levels supported are RAID 0, 1, and 10. The highest data transfer rate in UDMA mode 4 is 66 Mbytes/s, in UDMA mode 5 is 100 Mbytes/s, and in UDMA mode 6 is 133 Mbytes/s.

You should have received the following items with your MegaRAID ATA 133-2 RAID controller:

- *MegaRAID ATA 133-2 RAID Controller Quick Hardware Setup Guide*
- *MegaRAID ATA 133-2 RAID Controller User's Guide*
- *MegaRAID Configuration Console User's Guide*
- Software license agreement
- MegaRAID software on CD (MegaRAID IDE Console) and diskette (Windows Device Drivers)
- Warranty registration card

Audience

This document is intended for people who need to install the MegaRAID ATA 133-2 RAID controller in a server and then create and configure RAID arrays.

Organization

This document has the following chapters and appendixes:

- Chapter 1, **Overview**, provides an overview of the MegaRAID ATA 133-2 RAID controller and basic SCSI features.
- Chapter 2, **Introduction to RAID**, introduces important RAID concepts.
- Chapter 3, **RAID Levels**, describes each supported RAID level and the factors to consider when choosing a RAID level.
- Chapter 4, **Hardware Installation**, explains how to install the MegaRAID ATA 133-2 RAID controller controller.
- Chapter 5, **Operating System Installation**, explains how to install the MegaRAID driver for Windows NT® and Windows® 2000.
- Chapter 6, **Troubleshooting**, provides troubleshooting information for the MegaRAID ATA 133-2 RAID controller.

Technical Support

If you need help installing, configuring, or running the MegaRAID ATA 133-2 RAID controller, you may be able to find the information you need at the MegaRAID support page at http://megaraid.lsilogic.com

If this does not resolve your problem, you can call your LSI Logic OEM Technical Support representative at 678-728-1250. Before you call, please complete the **MegaRAID Problem Report** form.

MegaRAID Problem Report Form

Customer Information	**MegaRAID Information**
Name:	Today's Date:
Company:	Date of Purchase:
Address:	Invoice Number:
City/State:	Serial Number:
Country:	Number of Channels:

MegaRAID Problem Report Form (Cont.)

Email Address:	Cache Memory:
Phone:	Firmware Version:
Fax:	BIOS Version:
System Information	
Motherboard:	BIOS Manufacturer:
Operating System:	BIOS Date:
Op. Sys. Ver.:	Video Adapter:
MegaRAID IDE Driver Ver.:	CPU Type/Speed:
Network Card:	System Memory:
Other disk controllers Installed:	Other adapter cards Installed:
Description of problem:	
Steps necessary to re-create problem: 1. 2. 3. 4.	

MegaRAID IDE Configuration

MegaRAID IDE Primary Master	
MegaRAID IDE Primary Slave	
MegaRAID IDE Secondary Master	
MegaRAID IDE Secondary Slave	

MegaRAID IDE Configuration

RAID Mode, Stripe Size	
Array #0 Configuration	
Array #1 Configuration	

Contents

Chapter 1
Overview

The MegaRAID ATA 133-2 RAID controller is a short PCI adapter card that provides two IDE channels with Ultra ATA/66 (MegaRAID IDE), Ultra ATA/100 (MegaRAID IDE 100) or Ultra ATA/133 (MegaRAID IDE 133) capability. The MegaRAID ATA 133-2 RAID controller provides a simple and cost-effective way to improve the performance and reliability of your storage subsystems. MegaRAID ATA 133-2 RAID controller offers high transfer rates, and fault-tolerant data redundancy during high performance applications by using low cost Ultra ATA drives in desktops, workstations, or low-end servers.

You can connect from one to four drives to the MegaRAID controller using ATA 100/133 cables (Ultra ATA drives require special 80-pin IDE cables) and configure these drives using a simple setup menu embedded in the MegaRAID controller BIOS. The controller supports the following drive modes: programmable input/output (PIO) 0-4, direct memory address (DMA) 0-2, and Ultra DMA 0-5.

The MegaRAID ATA 133-2 RAID controller supports RAID levels 0, 1, and 10. You can use striping (RAID 0) to improve performance or mirroring (RAID 1) to improve data security. RAID 10 provides both RAID 1 (disk mirroring) and RAID 0 (data striping).

1.1 Features

1.1.1 IDE Channels

The MegaRAID ATA 133-2 RAID controller supports two IDE channels.

1.1.2 IDE Connectors

The MegaRAID ATA 133-2 RAID controller has two 40-pin internal connectors.

1.1.3 Controller

The MegaRAID ATA 133-2 RAID controller provides a single chip solution for a PCI-to-IDE/ATA controller. It receives PCI commands and data, which it processes and sends to the IDE/ATA bus.

1.1.4 BIOS Features

The MegaRAID ATA 133-2 RAID controller BIOS features include:

- RAID support before operating system loads
- Automatic detection and configuration
- Drive roaming capability
- Ability to handle configuration changes
- Support for Interrupt 13, and Enhanced Disk Drive Specification
- Support for PIO modes 0-4, DMA modes 0-2, and Ultra DMA modes 0-5 (0-5 for ATA/100 and ATA/133).
- Support for RAID levels 0, 1, and 10
- Multiple drive rebuilding
- Special handling of error log, spare drive, and rebuilding
- Support for BIOS boot specification (BBS)
- Co-existence with SCSI, CD, and ARMD devices

1.1.5 Driver Features

The MegaRAID ATA 133-2 RAID controller driver features include:

- Automatic negotiation of the highest mode of data transfer
- Handling of both RAID and non-RAID drives
- Special interface for configuration information, configuration changes, and manageability
- Optimized disk access

- Support for RAID levels 0, 1, and 10
- Error logging in NT event log and on disks
- Support for online mirror rebuilding
- Support for consistency check for mirrored disks
- Support for Stand-by and Hibernation in Windows 2000
- Support for PIO modes 0-4, DMA modes 0-2, and Ultra DMA modes 0-5

1.1.6 Manageability/Disk Console

The manageability/disk console features include:

- Configuration information display
- Online mirror rebuilding
- Online consistency checks
- Error logging and notification
- Control panel, property sheet, and Microsoft Management Console (MCC) plug-in
- Desktop Management Interface (DMI) agent
- Simple Network Management Protocol (SNMP) agent
- Support for power management features

1.2 Documentation

The MegaRAID ATA 133-2 RAID controller technical documentation set includes the following:

- MegaRAID ATA 133-2 RAID Controller Quick Hardware Setup Guide
- MegaRAID ATA 133-2 RAID Controller User's Guide
- MegaRAID Configuration Console User's Guide

Chapter 2
Introduction to RAID

RAID (Redundant Array of Independent Disks) is an array of multiple independent hard drives that provide high performance and fault tolerance. A RAID disk subsystem improves I/O (input/output) performance and reliability. The RAID array appears to the host computer as a single storage unit or as multiple logical units. I/O is expedited because several disks can be accessed simultaneously.

RAID systems improve data storage reliability and fault tolerance compared to single-drive computers. Data loss resulting from a hard drive failure can be prevented by reconstructing missing data from the remaining hard drives.

2.1 RAID Benefits

RAID has gained popularity because it improves I/O performance, and increases storage subsystem reliability. RAID provides data security through fault tolerance and redundant data storage.

2.1.1 Improved I/O

Although hard drive capabilities have improved drastically, actual performance has improved only three to four times in the last decade. Computing performance has improved over 50 times during the same time period. RAID allows you to access several disks simultaneously.

2.1.2 Increased Reliability

The electromechanical components of a disk subsystem operate more slowly, require more power, and generate more noise and vibration than electronic devices. These factors reduce the reliability of data stored on disks. RAID systems improve data storage reliability and fault tolerance

compared to single-drive computers. The additional drives make it possible to prevent data loss from a hard drive failure. You can reconstruct missing data from the remaining data and parity drives.

2.2 In This Chapter

Table 2.1 lists the topics discussed in the rest of this chapter.

Table 2.1 List of RAID Topics

Major Topic	Subtopic
RAID Overview	
	Disk Striping
	Disk Mirroring
	Disk Spanning
RAID Terminology	
	Physical Drive
	Physical Drive States
	Array
	Array States
	Logical Drive
	Disk Rebuild
	Hot Spare
	Consistency Check
	Fault Tolerance
Configuration Strategies	
	Selecting a RAID Level
	Assigning RAID Levels

2.3 RAID Overview

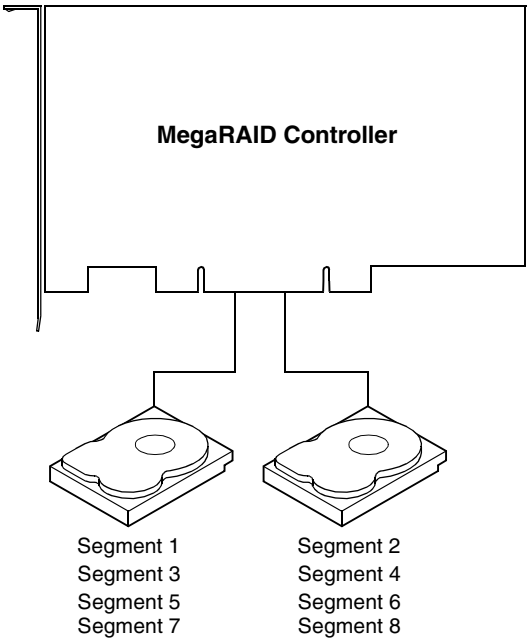
RAID is a collection of specifications that describe a system for ensuring the reliability and stability of data stored on large disk subsystems. A RAID system can be implemented in a number of different versions (or RAID levels). The standard RAID levels are 0, 1, 3, and 5. This controller supports RAID levels 0, 1, and 10 (spanned RAID 1 arrays).

2.3.1 Disk Striping

Disk striping writes data across multiple hard drives instead of just one hard drive. Disk striping involves partitioning each drive storage space into stripes that can vary in size. These stripes are interleaved in a repeated sequential manner. The combined storage space is composed of stripes from each drive. The MegaRAID ATA 133-2 RAID controller supports stripe sizes of 32 Kbytes to 4 Mbytes.

For example, in a four-disk system using only disk striping (as in RAID level 0), segment 1 is written to disk 1, segment 2 is written to disk 2, and so on. Disk striping enhances performance because multiple drives are accessed simultaneously; but disk striping does not provide data redundancy.

Figure 2.1 Disk Striping



2.3.1.1 Stripe Width

Stripe width is the number of disks involved in an array where striping is implemented. For example, a four-disk array with disk striping has a stripe width of four.

2.3.1.2 Stripe Size

The stripe size is the length of the interleaved data segments that are written across multiple drives.

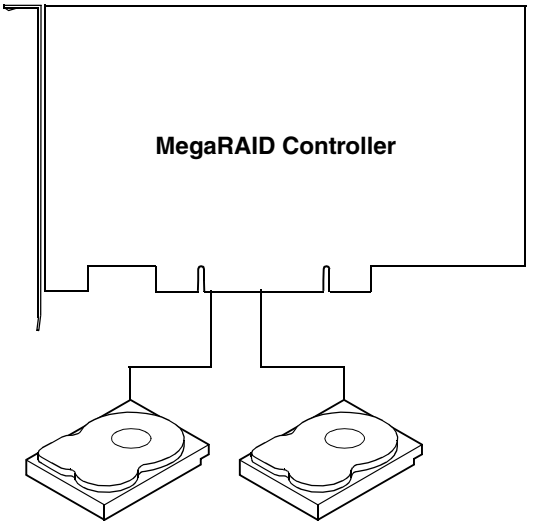
2.3.2 Disk Mirroring

With mirroring (used in RAID 1), data written to one hard drive is simultaneously written to another hard drive. If one hard drive fails, the contents of the other hard drive can be used to run the system and reconstruct the failed drive. The primary advantage of disk mirroring is that it provides 100% data redundancy. Since the contents of the hard drive are completely written to a second drive, it does not matter if one

of the drives fails. Both drives contain the same data at all times. Either drive can act as the operational drive.

Disk mirroring provides 100% redundancy, but is expensive because each drive in the system must be duplicated.

Figure 2.2 Disk Mirroring

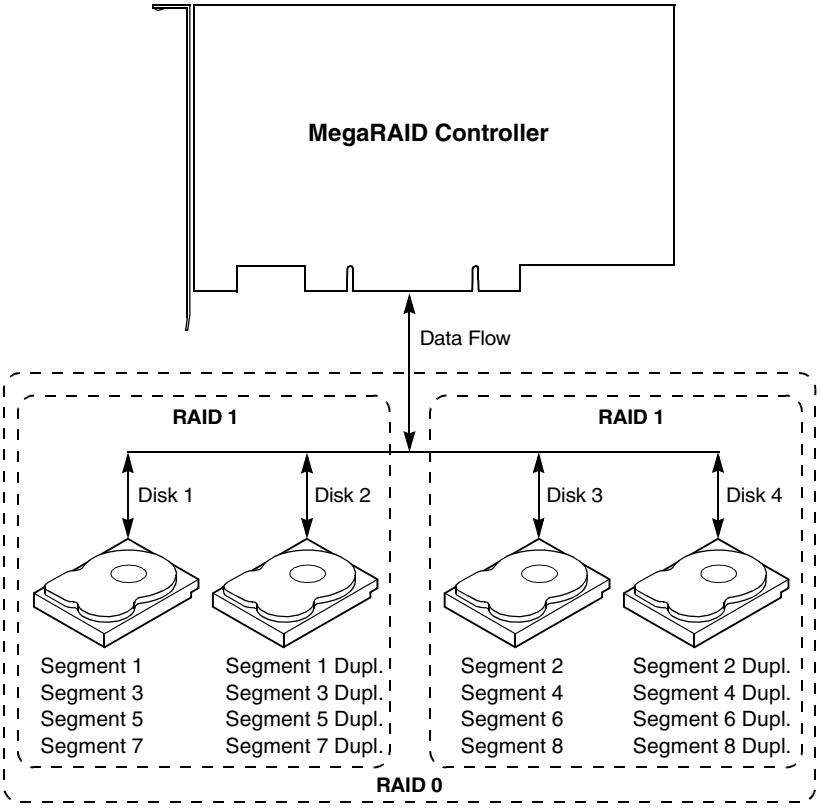


2.3.3 Disk Spanning

Disk spanning allows multiple hard drives to function like one big drive. Spanning overcomes lack of disk space and simplifies storage management by combining existing resources or adding relatively inexpensive resources.

Spanning alone does not provide reliability or performance enhancements. Spanned logical drives must have the same stripe size and must be contiguous. In the following graphic, RAID 1 array is turned into a RAID 10 array.

Figure 2.3 Disk Spanning



2.4 RAID Terminology

The following sections explains terms associated with RAID, including:

- Physical drive
- Physical drive state
- Array
- Array state
- Logical drive
- Rebuild
- Hot spare

- Consistency check
- Fault tolerance

2.4.1 Physical Drive

The physical drive is the IDE hard drive that is connected by cable to the MegaRAID ATA 133-2 RAID controller. The hard drive contains platters that are coated with material that allows them to record data magnetically. Another important feature is the read/write head, which hovers over the surface of the platter. You can store and access data much more quickly on a hard drive than on a floppy disk.

2.4.2 Physical Drive States

Table 2.2 describes the possible states of the physical drives.

Table 2.2 Physical Drive States

State	Description
Online	The drive is functioning normally and is a part of a configured array.
Spare	The drive is powered up and ready for use as a spare in case an online drive fails.
Failed	A fault has occurred in the drive, placing it out of service.
Rebuilding	The drive is being rebuilt with data from a failed drive.
Ready	The drive is available for configuration and is not yet part of an array.

2.4.3 Array

A RAID array is a collection of physical drives governed by the RAID management software. A RAID array appears to the host computer as one or more logical drives.

Note: The hard drives in an array use only the capacity of the smallest drive in the array. The additional capacity of any larger hard drives is not used.

2.4.4 Array States

Table 2.3 shows the valid array states.

Table 2.3 Array States

State	Description
Online	The drive operating condition is good. All configured drives are online.
Degraded	The drive operating condition is not optimal. One or more of the configured drives has failed.
Failed	The drive has failed.
Offline	The drive is not available to the MegaRAID ATA 133-2 RAID controller.

2.4.5 Logical Drive

A logical drive is a partition in a physical array of disks that is made up of contiguous data segments on the physical disks. A logical drive can consist of an entire physical array or part of an array.

2.4.6 Disk Rebuild

You rebuild a hard drive by recreating the data that had been stored on the drive before the drive failed. Rebuilding can be done only in arrays with data redundancy, such as RAID level 1.

The MegaRAID ATA 133-2 RAID controller automatically and transparently rebuilds failed drives with user-definable rebuild rates. If a hot spare is available, the rebuild starts automatically when a drive fails. Rebuilding can start automatically at boot up also if the mirror drive is degraded and a spare is available.

Note: If a hot spare is not available, the failed hard drive must be replaced with a new hard drive so that the data on the failed drive can be rebuilt. The replacement hard drive capacity must be greater than or equal to the failed drive it replaces.

2.4.7 Hot Spare

A hot spare is an extra, unused hard drive that is part of the RAID subsystem. It is usually in standby mode, ready for service if a drive fails. Hot spares permit you to replace failed array drives without system shutdown or user intervention.

The MegaRAID ATA 133-2 RAID controller implements automatic and transparent rebuilds using hot spare drives, providing a high degree of fault tolerance and zero downtime. The MegaRAID controller BIOS configurator allows you to specify physical drives as hot spares. When a hot spare is needed, the MegaRAID controller automatically selects the spare and includes it in the configuration.

Note that spare drives are applicable only in arrays with redundancy, such as RAID 1 arrays.

2.4.8 Consistency Check

In RAID, check consistency verifies the correctness of redundant data in an array and helps to find disk errors. For example, in a system with a mirrored drive, checking consistency means making sure that both the member-drives of the mirror contains the same data.

2.4.9 Fault Tolerance

Fault tolerance is achieved through the use of mirroring (RAID 1). Mirroring provides 100% redundancy. See Section 2.3.2, “Disk Mirroring,” page 2-4, for more information.

2.5 Configuration Strategies

The most important factors in RAID array configuration are drive availability (fault tolerance), and drive performance.

Maximizing Drive Availability:
You can maximize the drive availability by increasing fault tolerance. Use RAID 1 or mirror configuration to attain this objective.

Maximizing Drive Performance:
You can optimize drive performance by using striping. Select RAID 0 or striping to configure an array for optimal performance.

Performance and Availability:
You can achieve both drive performance and availability. Select RAID 10 for this configuration. You will need four drives to configure RAID 10.

2.6 Selecting a RAID Level

To ensure the best performance, you should select the optimal RAID level when you create a system drive. The optimal RAID level for your disk array depends on the following factors:

- Number of drives in the disk array
- Capacity of the drives in the array
- Need for data redundancy
- Disk performance requirements

Table 2.4 describes the factors you need to consider when selecting a RAID level.

Table 2.4 Factors to Consider When Selecting a RAID Level

Level	Description and Use	Pros	Cons	# of Drives	Fault Tolerant
0	Data divided in blocks and distributed sequentially (pure striping). Use for non-critical data that requires high performance.	High data throughput for large files.	No fault tolerance. All data lost if any drive fails.	1 - 4	No
1	Data duplicated on another disk (mirroring). Use for read-intensive fault-tolerant systems.	100 percent data redundancy.	Doubles disk space required. Reduced performance during rebuilds.	2	Yes
10	Data divided in blocks and distributed sequentially and each block is duplicated to another disk.	100 percent data redundancy and High data throughput.	Four drives required.	4	Yes

2.7 Assigning RAID Levels

Only one RAID level can be assigned to each array. Table 2.5 lists the drives required per RAID level.

Table 2.5 Drives Required Per RAID Level

RAID Level	Minimum # of Physical Drives	Maximum # of Physical Drives
0	1	4
1	2	2
10	4	4

Chapter 3
RAID Levels

The MegaRAID ATA 133-2 RAID controller supports three RAID levels, RAID 0, RAID 1, and RAID 10. This chapter describes each supported RAID level and the factors to consider when choosing a RAID level. It contains the following sections:

- Section 3.1, “Selecting a RAID Level”
- Section 3.2, “RAID 0”
- Section 3.3, “RAID 1”
- Section 3.4, “RAID 10”

3.1 Selecting a RAID Level

To ensure the best performance, you should select the optimal RAID level when you create a system drive. The optimal RAID level for your disk array depends on a number of factors:

- The number of drives in the disk array
- The capacity of the drives in the array
- The need for data redundancy
- The disk performance requirements

Note: The hard drives in an array use only the capacity of the smallest drive in the array. The additional capacity of any larger hard drives is not used.

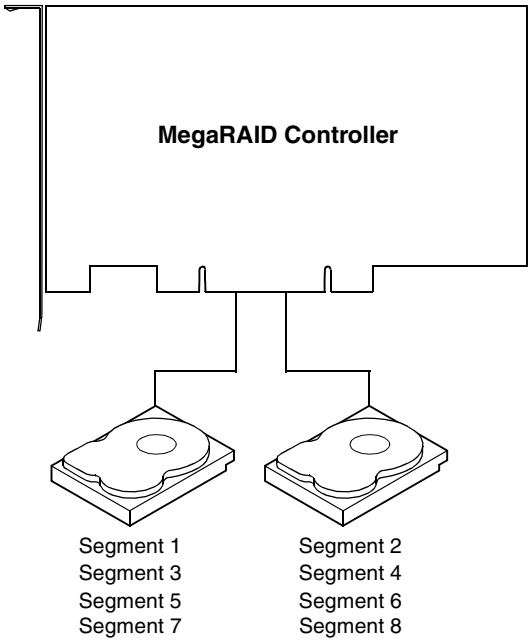
3.2 RAID 0

RAID 0 provides disk striping across all drives in the RAID subsystem. RAID 0 does not provide any data redundancy, but does offer the best performance of any RAID level. RAID 0 breaks up data into smaller blocks and then writes a block to each drive in the array. The size of each block is determined by the stripe size parameter, set during the creation of the RAID set. RAID 0 offers high bandwidth. By breaking up a large file into smaller blocks, the MegaRAID ATA 133-2 RAID controller can use several drives to read or write the file faster. RAID 0 involves no parity calculations to complicate the write operation. This makes RAID 0 ideal for applications that require high bandwidth but do not require fault tolerance.

Uses	RAID 0 provides high data throughput, especially for large files. Suitable for any environment that does not require fault tolerance.
Strong Points	Provides increased data throughput for large files. No capacity loss penalty for parity.
Weak Points	Does not provide fault tolerance. All data lost if any drive fails.
Drives	1 to 4

Figure 3.1 shows a RAID 0 array with two disk drives.

Figure 3.1 RAID 0 Array



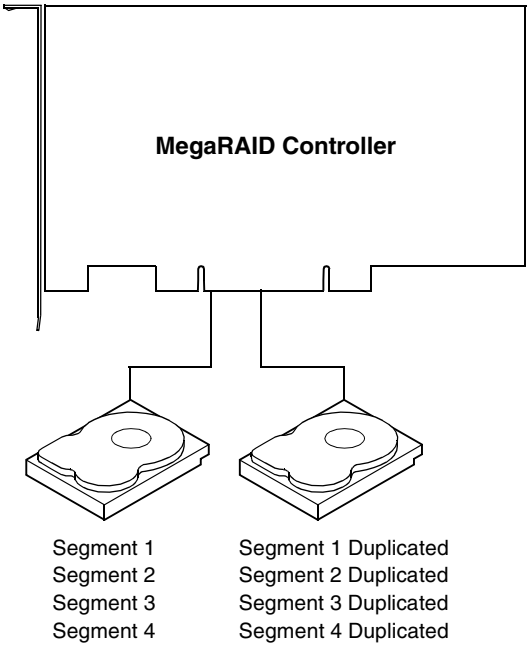
3.3 RAID 1

RAID 1 duplicates all data from one drive to a second drive. RAID 1 provides complete data redundancy, but at the cost of doubling the required data storage capacity.

Uses	Use RAID 1 for small databases or any other environment that requires fault tolerance but small capacity.
Strong Points	Provides complete data redundancy. RAID 1 is ideal for any application that requires fault tolerance and minimal capacity.
Weak Points	Requires twice as many disk drives. Performance is impaired during drive rebuilds.
Drives	2

Figure 3.2 shows a RAID 1 array.

Figure 3.2 RAID 1 Array



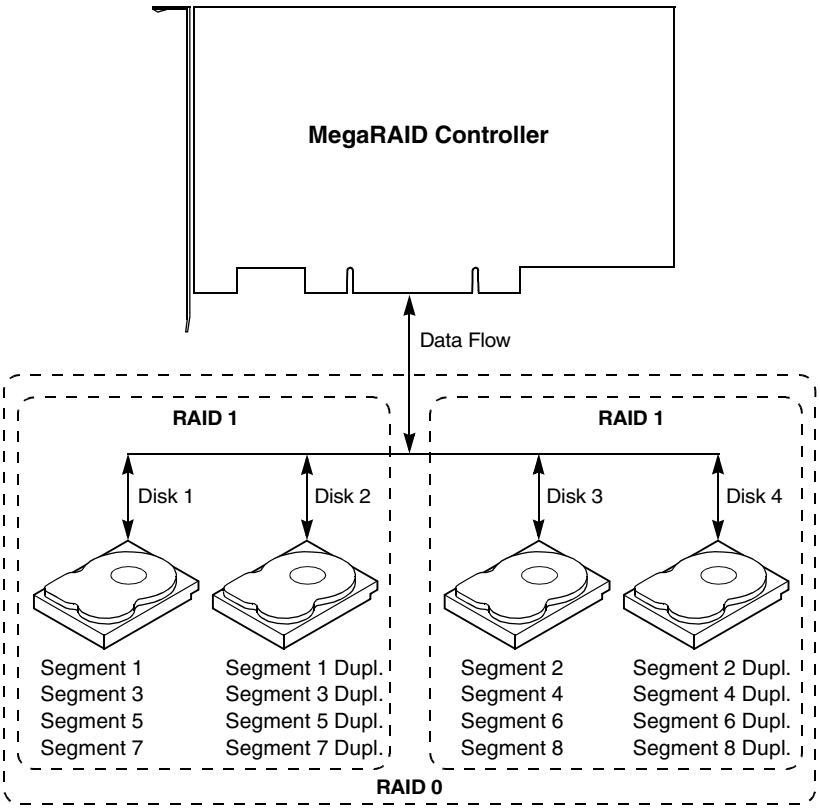
3.4 RAID 10

RAID 10 provides both RAID 0 (data striping) and RAID 1 (disk mirroring). It requires two sets of RAID 1 drives (a total of four drives). In RAID 10, data is striped across the two arrays and is duplicated from one drive to the second drive in each RAID 1 array.

Uses	RAID 10 works well for small or medium-sized databases or for any environment that requires fault tolerance and high data throughput.
Strong Points	Provides both high data transfer rates and complete data redundancy.
Weak Points	Requires a minimum of four hard drives. Performance is impaired during drive rebuilds.
Drives	4

Figure 3.3 shows a RAID 10 array with four disk drives.

Figure 3.3 RAID 10 Array



Chapter 4
Hardware Installation

You must have the following items before installing the MegaRAID ATA 133-2 RAID controller:

- MegaRAID ATA 133-2 RAID controller
- Host computer with an available PCI expansion slot
- MegaRAID controller installation diskettes
- Two 80-conductor Ultra ATA-100 or ATA-133 cables
- At least two IDE drives for RAID configuration

4.1 Installation Steps

Perform the following steps to install the MegaRAID ATA 133-2 RAID controller. Each step is described in detail in the following pages.

1. Unpack the MegaRAID ATA 133-2 RAID controller and inspect for damage.

   Make sure all items are in the package. If damaged, call LSI Logic technical support at 678-728-1250.

2. Turn the computer off, unplug the cord, and remove the cover.
3. Check the jumper settings on the MegaRAID ATA 133-2 RAID controller.

   See Section 4.4, “Step 3: Set Jumpers,” page 4-3, for the jumper settings.

4. Install the MegaRAID ATA 133-2 RAID controller.
5. Connect the IDE cables to IDE devices.
6. Replace the computer cover, plug the computer in, and turn the power on.

Be sure the IDE devices are powered up before or at the same time as the host computer.

7. Configure system BIOS.
8. Install software drivers for the desired operating systems.
9. Run MegaRAID Configuration Console.

   This step is optional. See the *MegaRAID Configuration Console User's Guide* for more information.

4.2 Step 1: Unpack

Unpack and install the hardware in a static-free environment. The MegaRAID ATA 133-2 RAID controller is packed inside an anti-static bag between two sponge sheets. Remove the MegaRAID controller and inspect it for damage. If the controller appears damaged, or if any of items listed below are missing, contact LSI Logic Technical Support at 678-728-1250. The following items are also included with the MegaRAID controller:

- *MegaRAID ATA 133-2 RAID Controller Quick Hardware Setup Guide*
- *MegaRAID ATA 133-2 RAID Controller User's Guide*
- *MegaRAID Configuration Console User's Guide*
- Software license agreement
- MegaRAID software on CD (MegaRAID IDE Console) and diskette (Windows Device Drivers)
- Warranty registration card

4.3 Step 2: Power Down

Turn off the computer, remove the plug, and remove the cover. Make sure the computer is turned off and disconnected from any networks before installing the controller.

4.4 Step 3: Set Jumpers

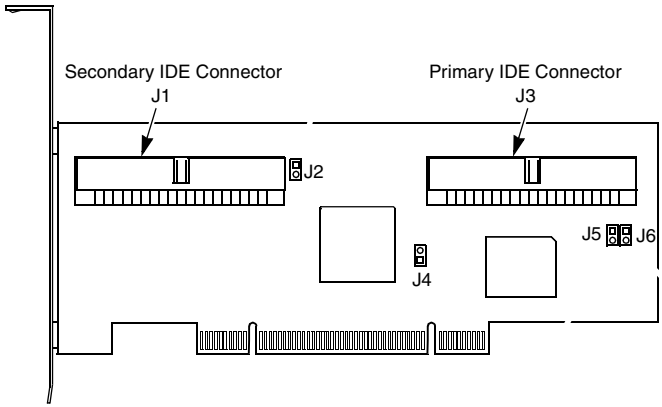
Make sure the jumper settings on the MegaRAID ATA 133-2 RAID controller are correct. Table 4-1 describes the jumpers and connectors.

Table 4.1 Jumpers and Connectors

Connector	Description	Type
J1	Secondary IDE channel	40-pin connector
J3	Primary IDE channel	40-pin connector
J2	Secondary channel activity LED	2-pin connector
J5	Primary channel activity LED	2-pin connector
J4	BA5_ENABLE	2-pin connector
J6	Drive activity LED	2-pin connector

Note: The connectors for the primary and secondary IDE channels (J1 and J3) are positioned in such a way that the pins are parallel to the board.

Figure 4.1 MegaRAID ATA 133-2 Controller Layout



J1 Secondary IDE: J1 is a 40-pin connector. It connects the secondary IDE drive to the controller. See step 5 for cable connections.

J3 Primary IDE: J3 is a 40-pin connector. It connects the primary IDE drive to the controller. See step 5 for cable connections.

J2 Secondary IDE LED: J2 is a two-pin connector for the secondary hard disk LED mounted on the computer enclosure. The LED indicates data transfers on the secondary IDE channel.

J5 Primary IDE LED: J5 is a two-pin connector for the primary hard disk LED mounted on the computer enclosure. The LED indicates data transfers on the primary IDE Channel.

J4 BA5_ENABLE: J4 is a two-pin connector used to enable or disable the Base Address 5. The settings are:

- Pins 1 and 2 open: Option BA5_ENABLE is disabled (this is the default setting)
- Pins 1 and 2 shorted: Option BA5_ENABLE is enabled.

Note: J4 is not for customer use and shall remain open (no Jumper).

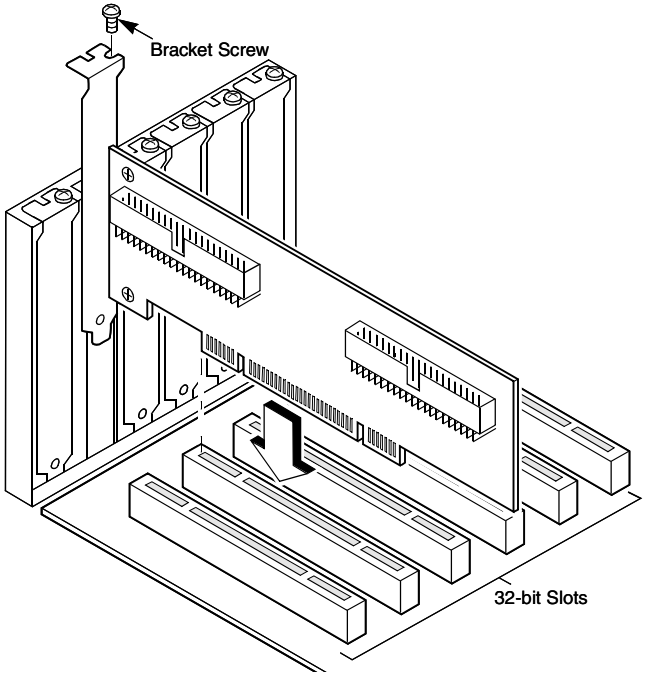
J6 Drive Activity LED: J5 is a two-pin connector for the LED that shows whether there is drive activity.

4.5 Step 4: Install the MegaRAID Controller

Choose a 3.3 V or 5 V PCI slot and align the MegaRAID ATA 133-2 RAID controller bus connector to the slot. Press down gently but firmly to make sure that the MegaRAID controller is properly seated in the slot. The bottom edge of the MegaRAID controller should be flush with the slot.

Insert the MegaRAID ATA 133-2 RAID controller in a PCI slot, as shown in Figure 4.2. Screw the bracket to the computer frame.

Figure 4.2 Installing the MegaRAID Controller



4.6 Step 5: Connect IDE Cables

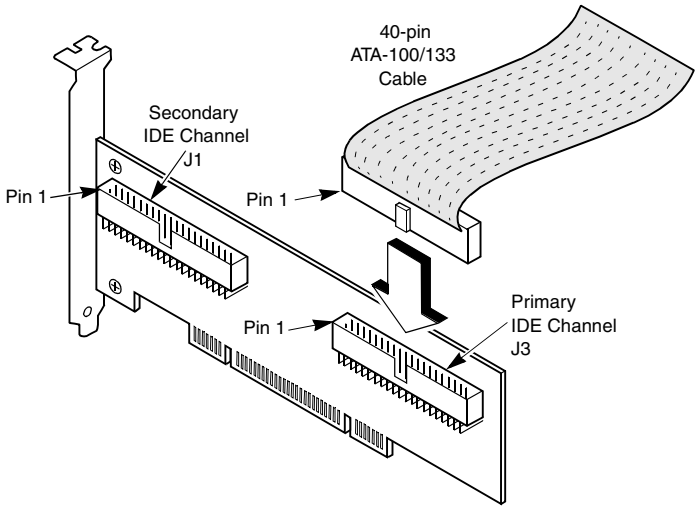
Connect the IDE cables to the IDE hard drives, and the IDE connectors on the MegaRAID ATA 133-2 RAID controller, as shown in Figure 4.3. The MegaRAID controller provides two IDE connectors.

J1 is the secondary IDE channel 40-pin connector.

J3 is the primary IDE channel 40-pin connector.

Connect Pin 1on the IDE cable to Pin 1 on the IDE connectors on the controller (J1 and J3).

Figure 4.3 Connecting IDE Cables



Correct Order for Attaching the Drives Table 4-2 shows the order in which you should connect the hard drives to the MegaRAID ATA 133-2 RAID controller.

Table 4.2 Order for Attaching Drives

Total Number of Drives	Primary IDE Channel (J3)	Primary IDE Channel (J1)
1	Master	---
2	Master	Master
3	Master and Slave	Master
4	Master and Slave	Master and Slave

Note: You have the option of jumpering to Cable Select (CS) and letting the ATA-100 or ATA-133 cable set the address.

4.6.1 Cable Suggestions

System throughput problems and malfunctioning can occur if proper IDE cables are not used. We recommend that you use 80-conductor, 40-pin Ultra ATA-100 or ATA-133 cables for all drives. Two cables come with the retail package. The cable manufacturer is Y.A. Cable USA, Inc.

For ATA/66, ATA/100, or ATA/133 drives, 80-conductor, 40-pin Ultra ATA cables must be used, and the length of the cable must not exceed 18 inches. These cables minimize noise level.

Note: Do not attach ATAPI drives to the MegaRAID ATA 133-2 RAID controller. The MegaRAID controller does not support ATAPI devices, such as CD-ROM, SL120, and Zip drives. Connect only hard drives to the MegaRAID ATA 133-2 RAID controller, and connect ATAPI devices to the IDE channels on the motherboard or to any other off-board IDE/ATAPI adapters.

4.7 Step 6: Power Up

Replace the computer cover and reconnect the AC power cords. Turn power on to the host computer. Set up the power supplies so that the IDE devices are powered up at the same time as or before the host computer. If the computer is powered up before an IDE device, the device might not be recognized.

4.8 Step 7: Configure the System BIOS

Make sure the system BIOS is configured correctly for the MegaRAID ATA 133-2 RAID controller. This is done using the CMOS Setup facility available within the motherboard/server board BIOS. Normally no special setting is required for the MegaRAID controller.

4.9 Step 8: Install the Operating System Driver

See Chapter 5, “Operating System Installation,” for information about installing Microsoft Windows NT 4 and Windows 2000 drivers for the MegaRAID controller.

4.10 Step 9: Run MegaRAID Configuration Console

Use the MegaRAID Configuration Console utility to display and configure the physical drives, arrays, and logical drives for the system. You can also perform consistency checks and rebuilds of the drives in the arrays.

See the *MegaRAID Configuration Console User's Guide* for more information about installing and using the utility.

Chapter 5
Operating System Installation

This chapter explains how to install the Windows NT® and Windows® 2000 drivers for the MegaRAID ATA 133-2 RAID controller.

5.1 Installing Windows NT 4.0 and Windows 2000 Drivers

Perform the following steps to install the MegaRAID ATA 133-2 RAID controller Windows NT 4.0 or Windows 2000 driver onto the RAID-configured drives connected to the MegaRAID controller.

1. Boot the system with the Windows NT or Windows 2000 Boot Installation CD or diskette.
2. Press <F6> when the following message displays:

`Setup is inspecting your computers hardware configuration.`

3. When installation prompts for a key after copying some files, press <S> to add a SCSI adapter.
4. In Windows 2000, you are prompted for the driver diskette. In Windows NT, select `Other` from the list that displays.
5. Insert the MegaRAID controller driver diskette and press <Enter>.
6. Select LSI Logic MegaRAID IDE driver for the appropriate operating system from the list and click <OK>.
7. Continue with the installation procedure.

5.2 Updating the Windows NT 4.0 or Windows 2000 Driver

Perform the following steps to update the MegaRAID controller Windows NT 4.0 or Windows 2000 driver or to install the Windows NT 4.0 or

Windows 2000 driver on an existing system booted from a standard IDE or SCSI drive controller.

1. Click on the Windows Start button. The Windows menu displays.
2. Select Settings. The Settings menu displays to the right.
3. Click on Control Panel. The Control Panel window displays.
4. Select SCSI Adapters.
5. Select Drivers tab.
6. If the MegaRAID controller is already installed, it will appear in the list as “LSI Logic MegaRAID IDE Controller”. Select it and remove by clicking the “Remove” button.
7. Click the Add button.
8. Select the Have Disk button. Insert the disk into the floppy drive.
9. Select drive letter A: and click on <OK>.
10. Select LSI Logic MegaRAID IDE Controller and click on <OK>.
11. After Windows NT or Windows 2000 copies the driver, reset the system.

5.3 Confirming the Windows NT 4.0 or Windows 2000 Driver Installation

Perform the following steps to confirm that the MegaRAID ATA 133-2 RAID controller Windows NT 4.0 or Windows 2000 driver is installed properly.

1. Click on the Windows Start button. The Windows menu displays.
2. Select Settings. The Settings menu displays to the right.
3. Click on Control Panel. The Control Panel window displays.
4. Select SCSI Adapters.
5. Select the Drivers tab.

   If the MegaRAID ATA 133-2 RAID controller is installed, it will appear in the list as LSI Logic MegaRAID IDE Controller.
6. Select the Devices tab.

If drives are connected to the MegaRAID ATA 133-2 RAID controller and configured properly, you will see one or more entries as LSI Logic MegaRAID IDE #xx under LSI Logic MegaRAID IDE Controller.

5.4 Installing DOS

For DOS, no driver installation is required. The MegaRAID controller BIOS contains the low-level MS-DOS driver for the MegaRAID controller.

Chapter 6
Troubleshooting

6.1 Drive Connection Tips

- If you have two drives, connect one per channel.
- The performance of the MegaRAID ATA 133-2 RAID controller is best with one drive per channel.
- Use the same type of drives or drives with similar capability (in terms of speed and capacity).
- Do not use dissimilar drives on the same channel.
- Always use 80-conductor Ultra ATA-100 or ATA-133 cables.
- Ensure that proper jumper settings are used for Master and Slave in each channel. You have the option of using the Cable Select (CS) jumper setting and letting the ATA-100 or ATA-133 cable set the address.
- Do not connect any ATAPI devices (CD, ZIP, LS120 etc.) to the MegaRAID ATA 133-2 RAID controller.

6.2 Problems and Suggested Solutions

Table 6.1 describes the problems you might encounter, along with suggested solutions.

Table 6.1 Problems and Suggested Solutions

Problem	Suggested Solution
The MegaRAID ATA 133-2 RAID controller sign-on message does not appear during boot up (If the MegaRAID controller is properly installed, you should see this message.)	• Be sure the MegaRAID controller is inserted all the way into the PCI slot. • Move the controller to a different PCI slot. • If System BIOS is set for silent boot, no message will appear on screen. This is not a problem. To make sure, set the silent boot option to disabled in the system BIOS.
Drive(s) connected to MegaRAID controller are not detected OR The system hangs when MegaRAID controller ROM scans the IDE channels.	• Be sure to use Ultra ATA-100 or ATA-133 cables. • Be sure that the cable ends are connected properly. • Be sure that the power cables to the drives are connected properly. • Be sure that the Master/Slave jumpers are used properly. • Change cables. • If everything fails, change the drive(s).
BIOS reports that a mirrored array is in degraded mode.	Be sure all physical drives are properly connected and are powered on. Reconnect, replace, or rebuild any failed drive.
One of the hard drives in a mirrored array has failed.	Replace the drive with another drive that has the same capacity.
If this message displays while booting: “NO ROM BASIC SYSTEM HALTED”	There are no active partitions. Run FDISK to set the active partition.
If the system hangs when more than one MegaRAID controller is inserted.	Disable the EEPROM on one of the MegaRAID controllers by changing the jumper setting.
Operating system does not boot.	Check the system BIOS configuration for PCI interrupt assignments. Make sure some Interrupts are assigned for PCI. Make sure that you have properly selected the Boot Device in the system BIOS setup (CMOS Setup).

Index

S

T

U

W

Customer Feedback

We would appreciate your feedback on this document. Please copy the following page, add your comments, and fax it to us at the number shown.

If appropriate, please also fax copies of any marked-up pages from this document.

Important: Please include your name, phone number, fax number, and company address so that we may contact you directly for clarification or additional information.

Thank you for your help in improving the quality of our documents.

Reader's Comments

Fax your comments to: LSI Logic Corporation
Technical Publications
M/S E-198
Fax: 408.433.4333

Please tell us how you rate this document: *MegaRAID ATA 133-2 RAID Controller User's Guide.* Place a check mark in the appropriate blank for each category.

	Excellent	Good	Average	Fair	Poor
Completeness of information	____	____	____	____	____
Clarity of information	____	____	____	____	____
Ease of finding information	____	____	____	____	____
Technical content	____	____	____	____	____
Usefulness of examples and illustrations	____	____	____	____	____
Overall manual	____	____	____	____	____

What could we do to improve this document?

_____

_____

_____

_____

If you found errors in this document, please specify the error and page number. If appropriate, please fax a marked-up copy of the page(s).

_____

_____

_____

Please complete the information below so that we may contact you directly for clarification or additional information.

Name _____ Date _____

Telephone _____ Fax _____

Title _____

Department _____ Mail Stop _____

Company Name _____

Street _____

City, State, Zip _____