

USER'S GUIDE

MegaRAID[®] Battery Backup Unit

October 2005

Version 1.1

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Warranty Notice: Adding a battery on a MegaRAID storage adapter will limit the warranty of this product. Returns determined to be caused by battery installation damage, stripped screws, or other damage resulting from the battery installation will not be covered. ESD damage to the board will also not be covered by the warranty.

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

Preface

This user's guide explains how to install and use these LSI Logic battery backup unit (BBU) products that are used with MegaRAID® storage adapters:

- LSIBBU01 BBU
 - LSIBBU02 BBU
 - LSIBBU03 BBU
 - LSiiBBU01 Intelligent BBU
 - LSiiTBBU01 Intelligent Transportable BBU
 - LSiiTBBU02 Intelligent Transportable BBU
 - LSITBBU03 Transportable BBU
 - LSITBBU04 Transportable BBU
-

Audience

This document assumes that you are familiar with installing add-in boards to computers.

The people who benefit from this book are:

- End users who need to install BBU products on MegaRAID storage adapters.
- Engineers and managers who are evaluating BBU products for possible use with MegaRAID storage adapters.

Organization

This document has the following chapters:

- **Chapter 1, Introduction**, describes all the BBU models and explains how they operate.
- **Chapter 2, Installing the Battery Backup Units**, explains how to install the BBU models.
- **Chapter 3, Using the Battery Backup Units**, explains how to use and monitor the BBU models and how to replace them.
- **Chapter 4, Battery Backup Unit Specifications**, has complete technical information and specifications for all BBU models.

Related Publications

MegaRAID Configuration Software User's Guide

Document number: DB15-000269-01

This document explains how to use the RAID system configuration, monitoring, and management tools that MegaRAID provides. These tools include the BIOS-based MegaRAID Configuration Utility and WebBIOS Configuration Utility, as well as the MegaRAID Manager and the Power Console Plus™ OS-based tools. The information in this document is independent of the back-end bus and applies to both MegaRAID SCSI storage adapters and MegaRAID Serial ATA storage adapters.

Conventions

Throughout the manual, the following conventions are used to describe user interaction with the product.

Notation	Example	Meaning and Use
Courier typeface	.nwk file	Names of commands, files, and directories as well as code and screen messages are shown in Courier.
Initial capital letters	Undo Edit Apply	Names of menu commands, options, check buttons, text buttons, options buttons, text boxes, list boxes, and so on, are shown in text with initial capital lettering to avoid misreading. These elements may appear on your screen in all lowercase.

Note: Notes contain supplementary information that can have an effect on system performance.

Caution: Cautions are notifications that an action has the potential to adversely affect equipment operation, system performance, or data integrity.

WARNING: Warnings are notifications that an action will definitely result in equipment damage, data loss, or personal injury.

Revision History

Version	Date	Comments
1.1	October 2005	Added LSIiTBBU02 battery information.
1.0	November 2004	Original release of this document.

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Chapter 1

Introduction

LSI Logic provides a family of MegaRAID[®] battery backup units (BBUs) for use with its high-performance MegaRAID storage adapters. The battery backup units protect the integrity of the cached data on MegaRAID storage adapters by providing backup power if there is a complete AC power failure or a brief power outage. The LSI Logic MegaRAID BBUs provide an inexpensive alternative to using an uninterruptible power supply (UPS).

Writing a block of data to cache memory is much faster than writing it to a storage device. The MegaRAID storage adapter then writes the cached data to the storage device when system activity is low or when the cache is getting full. The risk of using write-back cache is that the cached data can be lost if the AC power fails before it has been written to the storage device. This risk factor is eliminated when the MegaRAID storage adapter has an onboard BBU.

The MegaRAID BBUs monitor the voltage level of the DRAM modules installed on the MegaRAID storage adapter. (Some types of BBUs are installed directly on the daughter card with the DRAM modules.) If the voltage drops below a predefined level, the battery backup module switches the memory power source from the MegaRAID storage adapter to the battery pack attached to the MegaRAID BBU. As long as the voltage level stays below the predefined value, the MegaRAID BBU provides power for memory. If the voltage level returns to an acceptable level, the BBU switches the power source back to the MegaRAID storage adapter, and all incomplete writes to storage devices are completed with no data loss.

Table 1.1 lists the MegaRAID BBU models and shows which models can be used with each MegaRAID storage adapter.

Table 1.1 MegaRAID Battery Backup Unit Matrix

BBU Product Name	Description	For Storage Adapters
LSIBBU01 (Order #: LSIBBU01)	BBU	MegaRAID SCSI 320-1 MegaRAID SATA 150-6
LSIBBU02 (Order #: LSIBBU02)	BBU	MegaRAID SCSI 320-2 MegaRAID Elite 1650
LSIBBU03 (Order #: LSIBBU03)	BBU	MegaRAID SCSI 320-2X MegaRAID SATA 300-4X MegaRAID SATA 300-8X
LSIiBBU01 (Order #: LSI00012)	Intelligent BBU	MegaRAID SATA 300-4X MegaRAID SATA 300-8X
LSIiTBBU01 (Order #: LSI00009)	Intelligent transportable BBU	MegaRAID SCSI 320-2E
LSIiTBBU02 (Order #: LSI00046)	Intelligent transportable BBU	MegaRAID SAS 8408E MegaRAID SAS 8480E
LSITBBU03 (Order #: LSI00014)	Transportable BBU	MegaRAID SCSI 320-2X
LSITBBU04 (Order #: LSI00015)	Transportable BBU	MegaRAID SCSI 320-4X

An *intelligent* BBU has built-in functionality to charge the battery pack automatically and to communicate battery status information such as voltage, temperature, and current, to the host computer system.

A *transportable* BBU can be used to move to a replacement controller a storage adapter's cached data that has not been written to the disk. This could be necessary if, for example, the controller fails after an unexpected power failure. After you install the transportable BBU on the new storage adapter, it flushes the unwritten data preserved in the cache to the disk through the new adapter. For more information, see [Section 3.4, "Transferring Cached Data from a Failed Controller."](#)

Chapter 2

Installing the Battery Backup Units

This chapter explains how to install the various models of BBUs for MegaRAID storage adapters. Click on a link below to view instructions for a specific BBU:

- [Section 2.1, “Installing the LSIBBU01”](#)
- [Section 2.2, “Installing the LSIBBU02”](#)
- [Section 2.3, “Installing the LSIBBU03”](#)
- [Section 2.4, “Installing the LSIBBU01”](#)
- [Section 2.5, “Installing the LSITBBU01”](#)
- [Section 2.6, “Installing the LSITBBU02”](#)
- [Section 2.7, “Installing the LSITBBU03”](#)
- [Section 2.8, “Installing the LSITBBU04”](#)

Caution: Electrostatic discharge can damage the BBUs and the MegaRAID storage adapters on which they are installed. Always ground yourself and/or use a ground strap before touching the storage adapter or the BBU. Perform all installation work at an ESD safe workstation that meets the requirements of EIA-625—“Requirements for Handling Electrostatic Discharge Sensitive Devices.” Follow the ESD recommended practices in the latest revision of IPC-A-610.

If screws are required to attach the BBU to the MegaRAID storage adapter, use an ESD-safe Phillips screwdriver to install them. Set the screwdriver to a maximum torque of 2.25 inch pounds, and be sure the screwdriver is centered in the screw to avoid damaging the screw head. If you exceed the maximum torque specification, you may damage the board, connectors, or screws, and you will void the warranty of the board.

The batteries in the BBUs must recharge for at least six hours during fast charge under normal operating conditions. LSI Logic recommends that you set the storage adapter Write Policy to *write-through* until the battery unit is fully charged, to protect your data. When the battery unit is charged, you can change the Write Policy to *write-back* to take advantage of the performance improvements of data caching.

The maximum ambient temperature for battery packs is 10 °C to 40 °C.

Note: The temperature of the battery pack is typically 5 degrees higher than the ambient temperature during trickle charge and 15–20 degrees higher than the ambient temperature during fast charge. Therefore, for the fast charge circuit to complete a fast charge cycle, ambient temperature should be less than 40 °C. If the ambient temperature is greater than 40 °C, the fast charge cycle could terminate prematurely, and the battery pack will only reach full capacity through trickle charging. This greatly increases the time required to charge the battery pack.

2.1 Installing the LSIBBU01

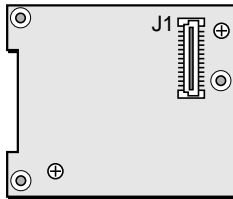
The LSIBBU01 BBU is used with these storage adapters:

- MegaRAID SCSI 320-1
- MegaRAID SATA 150-6

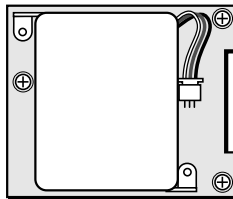
[Figure 2.1](#) shows top and bottom views of the LSIBBU01. (The “top” side is the side you can see after you install the LSIBBU01 on the storage adapter.) Note the J1 connector, which plugs into a matching connector on the storage adapter.

Figure 2.1 LSIBBU01 Battery Backup Unit

LSIBBU01 (Bottom View)



LSIBBU01 (Top View)



If the storage adapter is already installed in a computer, follow these steps to remove it before you install the LSIBBU01:

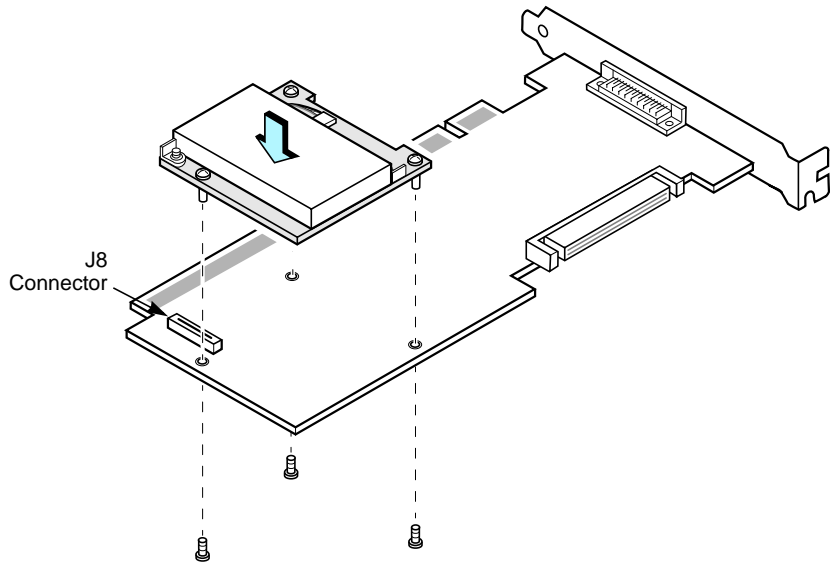
1. Shut down the computer, turn off the power, and unplug the power cord(s).
2. Remove the cover from the computer according to the instructions in the system user's manual, to access the storage adapter.
3. Ground yourself before touching the storage adapter.
4. Unplug all cables from the MegaRAID SCSI 320-1 or MegaRAID SATA 150-6 storage adapter, remove the screw attaching the bracket to the computer case, and carefully remove the storage adapter from the slot.
5. Place the storage adapter on a flat, clean, static-free surface, and continue with the next section.

Follow these steps to install the LSIBBU01 on the MegaRAID SCSI 320-1 or MegaRAID SATA 150-6 storage adapter:

1. Ground yourself, and remove the LSIBBU01 from its package.
2. Insert the battery pack harness connector (at the end of the colored wires) into the white three-pin connector on the top side of the LSIBBU01, as shown in [Figure 2.1](#).

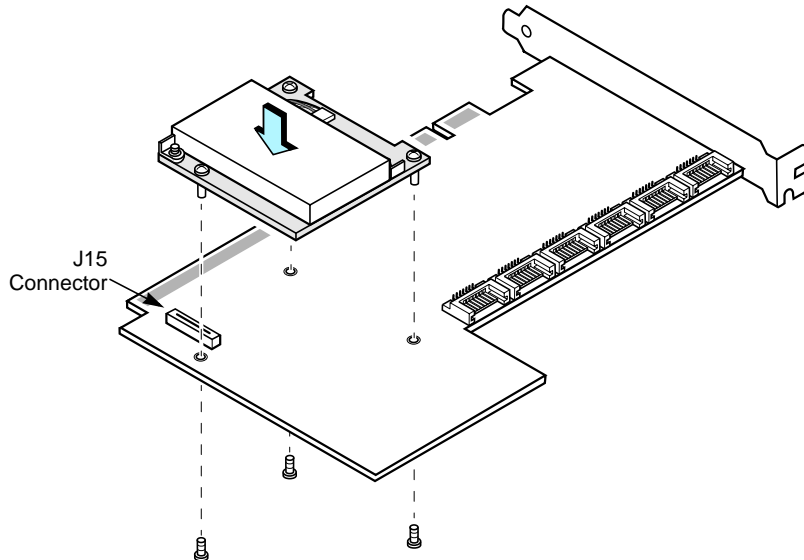
3. With the front side up, place the MegaRAID SCSI 320-1 or MegaRAID SATA 150-6 storage adapter on a flat, clean, static-free surface.
4. Hold the LSIBBU01 so that the battery side is up and the J1 connector lines up with the BBU connector on the storage adapter. For the MegaRAID SCSI 320-1 storage adapter, this is the J8 connector, as shown in [Figure 2.2](#).

Figure 2.2 Installing LSIBBU01 on MegaRAID SCSI 320-1 Storage Adapter



For the MegaRAID SATA 150-6 storage adapter this is the J15 connector, as shown in [Figure 2.3](#).

Figure 2.3 Installing LSIBBU01 on MegaRAID SATA 150-6 Storage Adapter



5. Carefully press the LSIBBU01 onto the storage adapter, so the two connectors are firmly joined.
6. Using the three Phillips-head screws that are provided, secure the LSIBBU01 to the storage adapter, as shown in [Figure 2.2](#) and [Figure 2.3](#).

Caution: Center the screwdriver carefully to avoid stripping the screw head. Do not over-tighten the screws. The maximum recommended torque is 2.25 inch pounds.

7. Install the storage adapter in a PCI slot in the computer, following the directions in the storage adapter documentation.

Press down gently, but firmly, to ensure that the storage adapter is properly seated in the slot. The bottom edge of the storage adapter must be flush with the slot.

Caution: *Never* apply pressure to the LSIBBU01 when inserting the adapter. Instead, press down only on the top edge of the storage adapter.

8. Attach the storage adapter to the computer chassis with the bracket screw.
9. Attach the cables, as needed, to the connectors on the storage adapter.
10. Replace the computer cover and reattach the power cord(s).

2.2 Installing the LSIBBU02

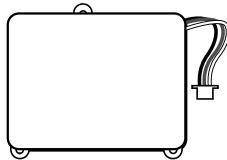
The LSIBBU02 BBU is used with these storage adapters:

- MegaRAID SCSI 320-2
- MegaRAID Elite 1650

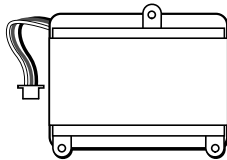
Figure 2.4 shows top and bottom views of the LSIBBU02. (The “top” side is the side you can see after you install the LSIBBU02 on the storage adapter.) Note the small three-pin female connector at the end of the colored wires. This connector plugs into a matching connector on the storage adapter.

Figure 2.4 LSIBBU02 Battery Backup Unit

LSIBBU02 (Top View)



LSIBBU02 (Bottom View)



If the MegaRAID SCSI 320-2 or MegaRAID Elite 1650 storage adapter is already installed in a computer, follow these steps to remove it before you install the LSIBBU02:

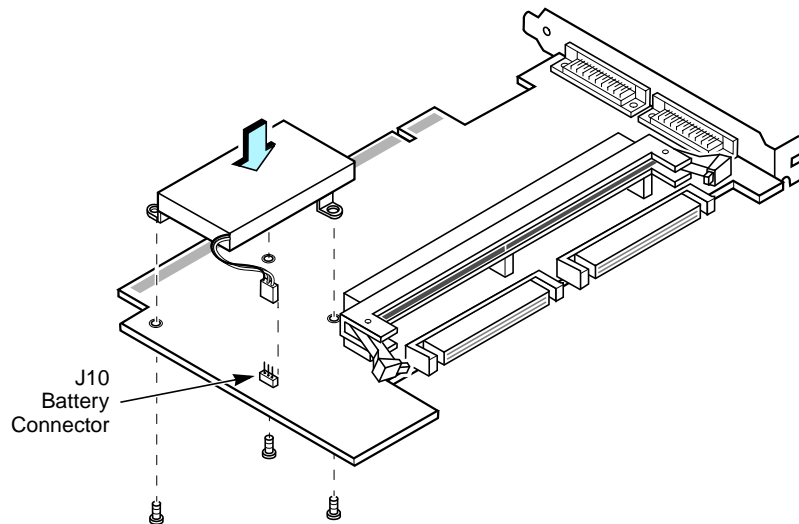
1. Shut down the computer, turn off the power, and unplug the power cord(s).

2. Remove the cover from the computer according to the instructions in the system user's manual, to access the storage adapter.
3. Ground yourself before touching the storage adapter.
4. Unplug all cables from the MegaRAID SCSI 320-2 or MegaRAID Elite 1650 storage adapter, remove the screw attaching the bracket to the computer case, and carefully remove the storage adapter from the slot.
5. Place the storage adapter on a flat, clean, static-free surface, and continue with the next section.

Follow these steps to install the LSIBBU02 on the MegaRAID SCSI 320-2 or MegaRAID Elite 1650 storage adapter:

1. Ground yourself, and remove the LSIBBU02 from its package.
2. With the front side up, place the MegaRAID SCSI 320-2 or MegaRAID Elite 1650 storage adapter on a flat, clean, static-free surface.
3. Hold the LSIBBU02 so that the battery side is up and the three threaded brackets are down.

Figure 2.5 Installing LSIBBU02 on MegaRAID SCSI 320-2 or MegaRAID Elite 1650 Storage Adapter



4. Place the LSIBBU02 onto the surface of the storage adapter, so the three threaded brackets line up with the holes in the storage adapter, as shown in [Figure 2.5](#).

Note: The MegaRAID SCSI 320-2 and MegaRAID Elite 1650 storage adapters are similar. [Figure 2.5](#) represents both storage adapter models.

5. Plug the small three-pin connector on the end of the colored wires into the J10 connector on the storage adapter, as shown in [Figure 2.5](#).
6. Using the three Phillips-head screws that are provided, secure the LSIBBU02 to the storage adapter, as shown in [Figure 2.5](#).

Caution: Center the screwdriver carefully to avoid stripping the screw head. Do not over-tighten the screws. The maximum recommended torque is 2.25 inch pounds.

7. Install the storage adapter in a PCI slot in the computer, following the directions in the storage adapter documentation.

Press down gently, but firmly, to ensure that the storage adapter is properly seated in the slot. The bottom edge of the storage adapter must be flush with the slot.

Caution: *Never* apply pressure to the LSIBBU02 when inserting the adapter. Instead, press down only on the top edge of the storage adapter.

8. Attach the storage adapter to the computer chassis with the bracket screw.
9. Attach the cables, as needed, to the connectors on the storage adapter.
10. Replace the computer cover and reattach the power cord(s).

2.3 Installing the LSIBBU03

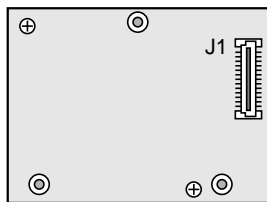
The LSIBBU03 BBU is used with these storage adapters:

- MegaRAID SCSI 320-2X
- MegaRAID SATA 300-4X
- MegaRAID SATA 300-8X

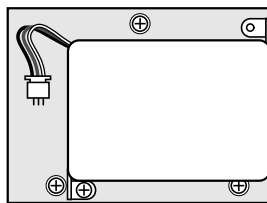
Figure 2.6 shows top and bottom views of the LSIBBU03. (The “top” side is the side you can see after you install the LSIBBU03 on the storage adapter.) Note the J1 connector, which plugs into a matching connector on the storage adapter.

Figure 2.6 LSIBBU03 Battery Backup Unit

LSIBBU03 (Bottom View)



LSIBBU03 (Top View)



If the storage adapter is already installed in a computer, follow these steps to remove it before you install the LSIBBU03:

1. Shut down the computer, turn off the power, and unplug the power cord(s).
2. Remove the cover from the computer according to the instructions in the system user's manual, to access the storage adapter.
3. Ground yourself before touching the storage adapter.

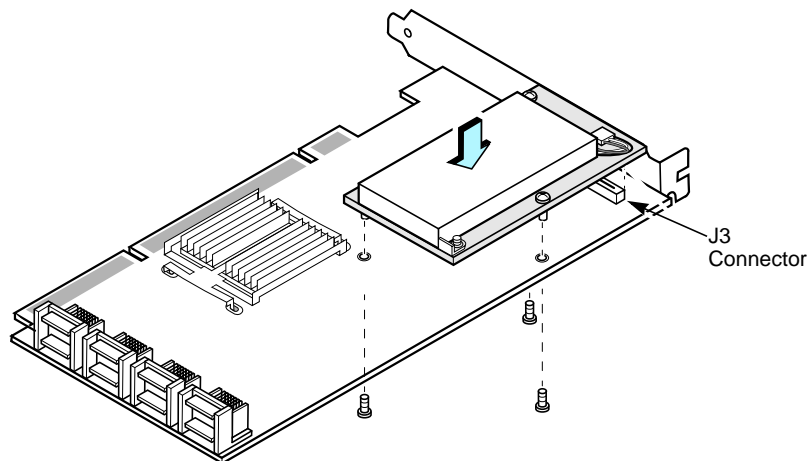
4. Unplug all cables from the MegaRAID SATA 300-4X/8X or MegaRAID SCSI 320-2X storage adapter, remove the screw attaching the bracket to the computer case, and carefully remove the storage adapter from the slot.
5. Place the storage adapter on a flat, clean, static-free surface, and continue with the next section.

Follow these steps to install the LSIBBU03 on the MegaRAID SATA 300-4X/8X or MegaRAID SCSI 320-2X storage adapter:

1. Ground yourself, and remove the LSIBBU03 from its package.
2. Insert the battery pack harness connector (at the end of the colored wires) into the white three-pin connector on the top side of the LSIBBU03, as shown in [Figure 2.6](#).
3. With the front side up, place the MegaRAID SATA 300-4X/8X or MegaRAID SCSI 320-2X storage adapter on a flat, clean, static-free surface.
4. Hold the LSIBBU03 so that the battery side is up and the J1 connector lines up with the BBU connector on the storage adapter.

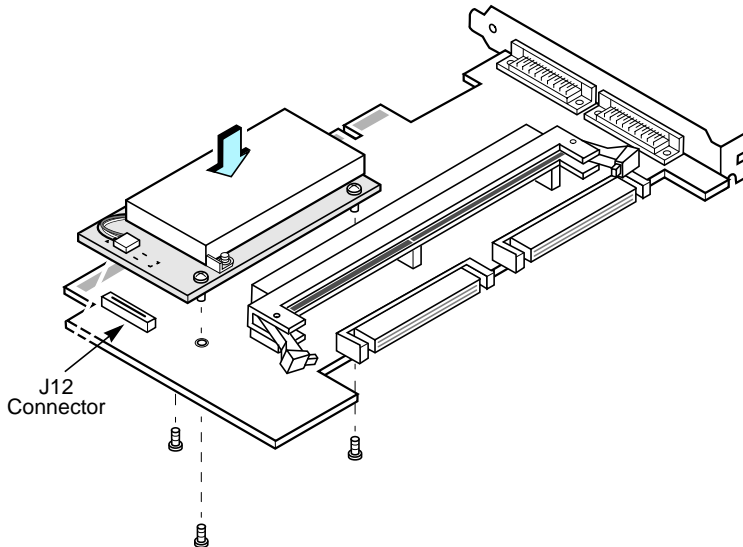
For the MegaRAID SATA 300-4X/8X storage adapter, this is the J3 connector, as shown in [Figure 2.7](#).

Figure 2.7 Installing LSIBBU03 on MegaRAID SATA 300-4X/8X Storage Adapter



For the MegaRAID SCSI 320-2X storage adapter, this is the J12 connector, as shown in [Figure 2.8](#).

Figure 2.8 Installing LSIBBU03 on MegaRAID SCSI 320-2X Storage Adapter



5. Carefully press the LSIBBU03 onto the storage adapter, so the two connectors are firmly joined.
6. Using the three Phillips-head screws that are provided, secure the LSIBBU03 to the storage adapter, as shown in [Figure 2.7](#) and [Figure 2.8](#).

Caution: Center the screwdriver carefully to avoid stripping the screw head. Do not over-tighten the screws. The maximum recommended torque is 2.25 inch pounds.

7. Install the storage adapter in a PCI slot in the computer, following the directions in the storage adapter documentation.

Press down gently, but firmly, to ensure that the storage adapter is properly seated in the slot. The bottom edge of the storage adapter must be flush with the slot.

Caution: *Never* apply pressure to the LSIBBU03 when inserting the adapter. Instead, press down only on the top edge of the storage adapter.

8. Attach the storage adapter to the computer chassis with the bracket screw.
9. Attach the cables, as needed, to the connectors on the storage adapter.
10. Replace the computer cover and reattach the power cord(s).

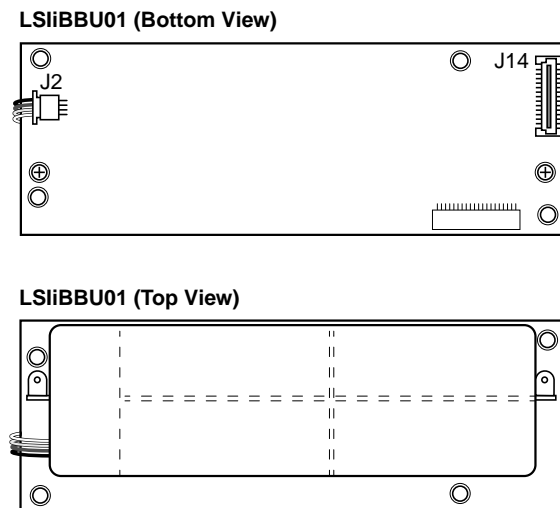
2.4 Installing the LSiIBBU01

The LSiIBBU01 Intelligent BBU is used with these storage adapters:

- MegaRAID SATA 300-4X
- MegaRAID SATA 300-8X

Figure 2.9 shows top and bottom views of the LSiIBBU01. (The “top” side is the side you can see after you install the LSiIBBU01 on the storage adapter.) Note the J2 and J14 connectors and the holes for the screws that attach the LSiIBBU01 to the MegaRAID SATA 300-4X/8X storage adapter.

Figure 2.9 LSiIBBU01 Intelligent Battery Backup Unit



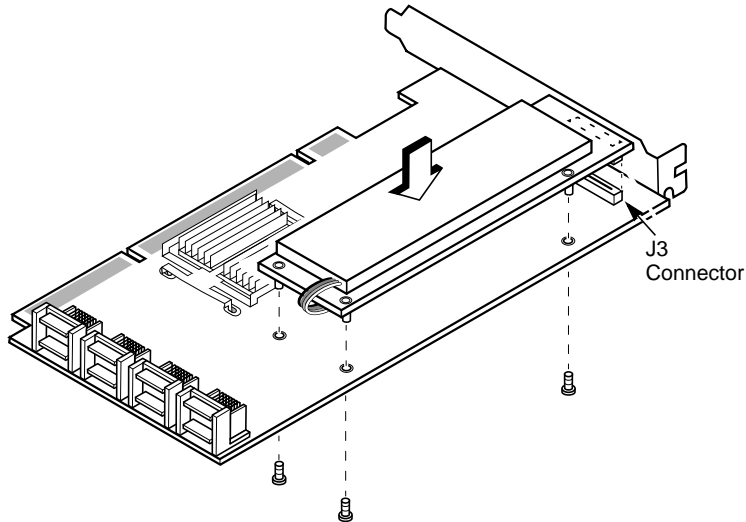
If the MegaRAID SATA 300-4X/8X storage adapter is already installed in a computer, follow these steps to remove it before you install the LSiIBBU01:

1. Shut down the computer, turn off the power, and unplug the power cord(s).
2. Remove the cover from the computer according to the instructions in the system user's manual so you can access the MegaRAID SATA 300-4X/8X storage adapter.
3. Ground yourself before touching the storage adapter.
4. Unplug all cables from the MegaRAID SATA 300-4X/8X storage adapter, remove the screw attaching the bracket to the computer case, and carefully remove the storage adapter from the slot.
5. Place the storage adapter on a flat, clean, static-free surface, and continue with the next section.

Follow these steps to install the LSiIBBU01 on the MegaRAID SATA 300-4X/8X storage adapter:

1. Ground yourself, and remove the LSiIBBU01 from its package.
2. Insert the battery pack harness connector (at the end of the colored wires) into the J2 connector on the bottom side of the LSiIBBU01.
3. With the front side up, place the MegaRAID SATA 300-4X/8X storage adapter on a flat, clean, static-free surface.
4. Hold the LSiIBBU01 so that the battery side is up and the J14 connector lines up with the J3 connector on the MegaRAID SATA 300-4X/8X storage adapter, as shown in [Figure 2.10](#).

Figure 2.10 Installing LSiBBU01 on MegaRAID SATA 300-4X/8X Storage Adapter



5. Carefully press the LSiBBU01 onto the storage adapter, so the J3 and J14 connectors are firmly joined.
6. Using the three Phillips-head screws that are provided, secure the LSiBBU01 to the storage adapter, as shown in [Figure 2.10](#).

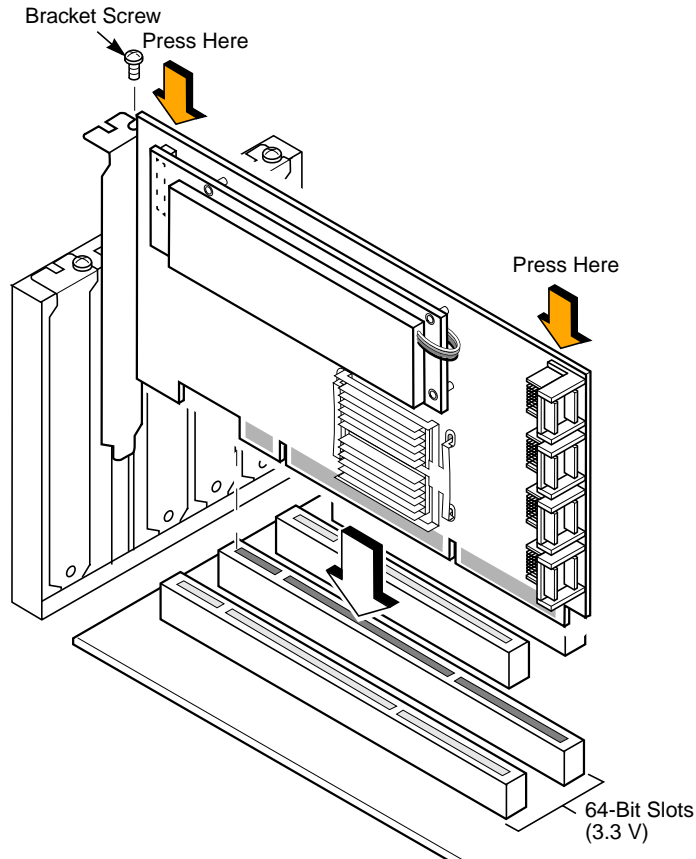
Caution: Center the screwdriver carefully to avoid stripping the screw heads. Do not over-tighten the screws. The maximum recommended torque is 2.25 inch pounds.

7. Install the MegaRAID SATA 300-4X/8X storage adapter in a slot in the computer, as shown in [Figure 2.11](#).

Press down gently, but firmly, to ensure that the card is properly seated in the slot. The bottom edge of the controller card must be flush with the slot.

Caution: *Never* apply pressure to the LSiBBU01 when inserting the adapter. Instead, press down only on the top edge of the storage adapter board, as shown in [Figure 2.11](#).

Figure 2.11 Installing the MegaRAID SATA 300-4X/8X Storage Adapter



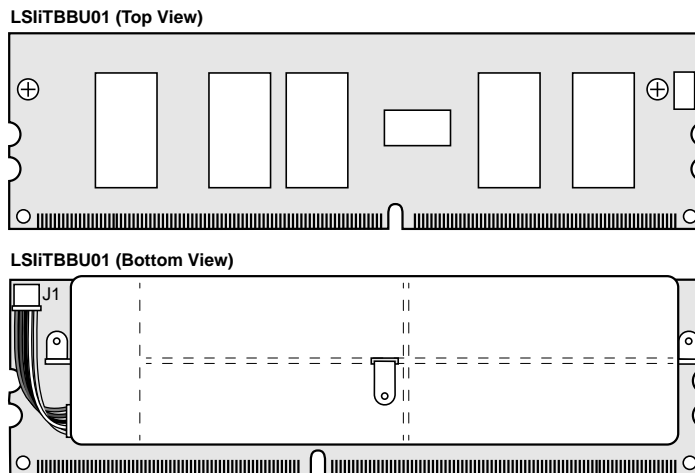
8. Attach the storage adapter to the computer chassis with the bracket screw.
9. Attach the cables, as needed, to the connectors on the MegaRAID SATA 300-4X/8X storage adapter.
10. Replace the computer cover and reattach the power cord(s).

2.5 Installing the LSIiTBBU01

The LSIiTBBU01 Intelligent Transportable BBU is used with the MegaRAID SCSI 320-2E storage adapter.

Figure 2.12 shows top and bottom views of the LSIiTBBU01. (The “top” side is the side you can see after you install the LSIiTBBU01 on the storage adapter.) Note that this unit combines a battery pack with a memory module.

Figure 2.12 LSIiTBBU01 Intelligent Transportable Battery Backup Unit



If the MegaRAID SCSI 320-2E storage adapter is already installed in a computer, follow these steps to remove it before you install the LSIiTBBU01:

1. Shut down the computer, turn off the power, and unplug the power cord(s).
2. Remove the cover from the computer according to the instructions in the system user's manual so you can access the MegaRAID SCSI 320-2E storage adapter.
3. Ground yourself before touching the storage adapter.

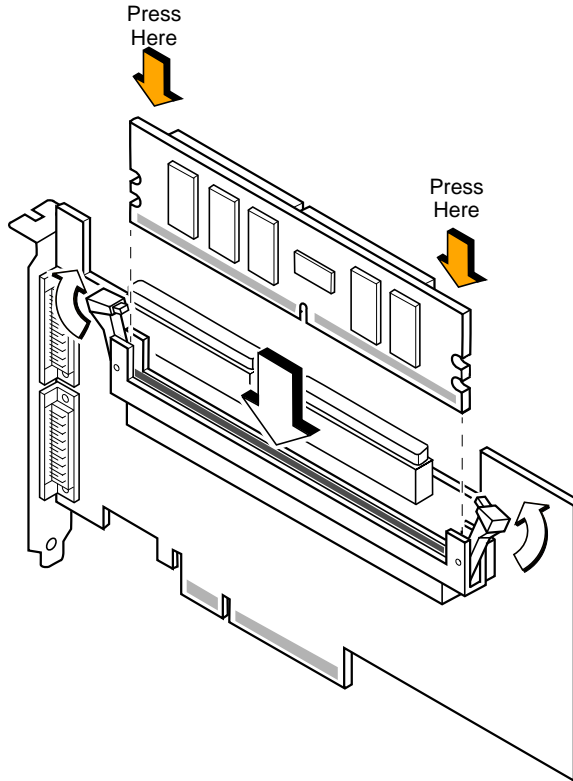
4. Unplug all cables from the MegaRAID SCSI 320-2E storage adapter, remove the screw attaching the bracket to the computer case, and carefully remove the storage adapter from the slot.
5. Place the storage adapter on a flat, clean, static-free surface, and continue with the next section.

Follow these steps to install the LSIiTBBU01 on the MegaRAID SCSI 320-2E storage adapter:

1. Ground yourself, and remove the LSIiTBBU01 from its package.
2. Insert the battery pack harness connector (at the end of the colored wires) into the five-pin J1 connector on the bottom of the LSIiTBBU01.
3. With the front side up, place the MegaRAID SCSI 320-2E storage adapter on a flat, clean, static-free surface.
4. Mount the LSIiTBBU01 in the storage adapter memory socket as you would a standard DIMM, as shown in [Figure 2.13](#).

The memory socket is mounted flush with the storage adapter, so the LSIiTBBU01 is parallel to the storage adapter when properly installed.

Figure 2.13 Installing LSiTBBU01 on MegaRAID SCSI 320-2E Storage Adapter



5. Press the LSiTBBU01 firmly into the memory socket.

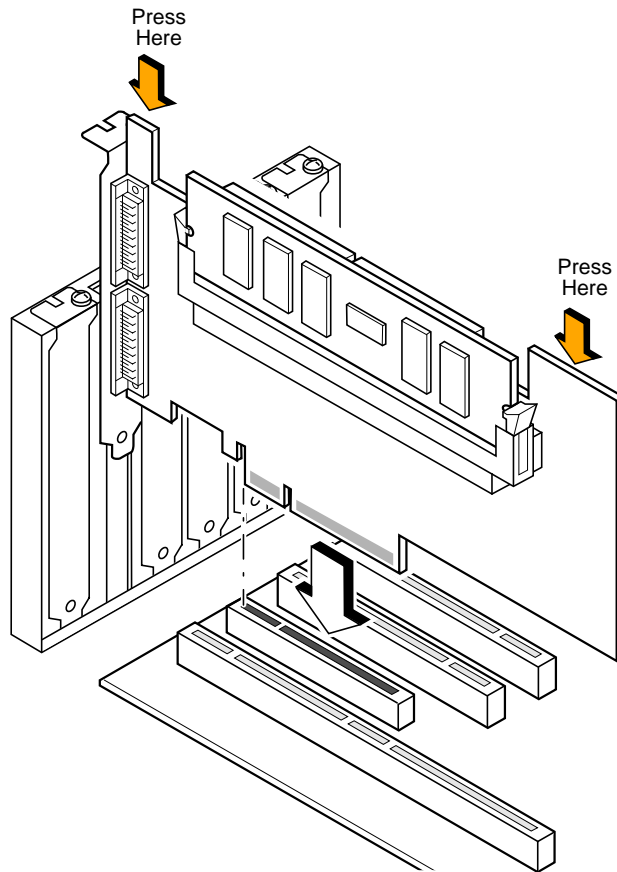
As you press the LSiTBBU01 into the socket, it clicks into place when it is properly seated in the socket, and the arms on the sides of the socket rotate into the notches on the sides of the LSiTBBU01 to hold it securely in place.

6. Install the MegaRAID SCSI 320-2E storage adapter in the computer, as shown in [Figure 2.14](#).

Press down gently, but firmly, to ensure that the storage adapter is properly seated in the slot. The bottom edge of the storage adapter must be flush with the slot.

Caution: *Never* apply pressure to the LSiTBBU01 when inserting the storage adapter. Instead, press down only on the top edge of the storage adapter, as shown in [Figure 2.14](#).

Figure 2.14 Installing the MegaRAID SCSI 320-2E Storage Adapter



7. Attach the storage adapter to the computer chassis with the bracket screw.
8. Attach the cables, as needed, to the connectors on the MegaRAID SCSI 320-2E storage adapter.
9. Replace the computer cover and reattach the power cord(s).

2.6 Installing the LSIiTBBU02

The LSIiTBBU02 Intelligent Transportable BBU is compliant with the Smart Battery Data Specification, which relieves the host system from the responsibility of communicating battery information and charging the battery. Battery charging and recharging take place automatically.

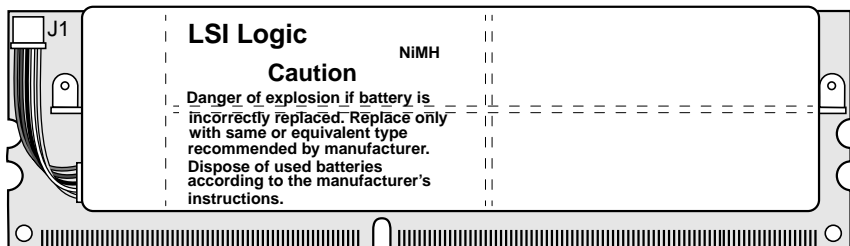
The LSIiTBBU02 Intelligent Transportable BBU is used with the following storage adapters:

- MegaRAID SAS 8408E
- MegaRAID SAS 8480E

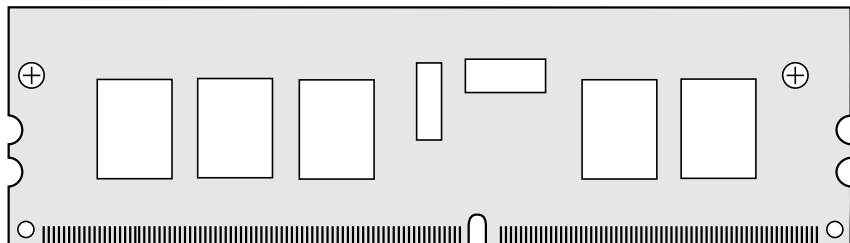
Figure 2.12 shows front and back views of the LSIiTBBU02. (The “front” side is the side you can see after you install the LSIiTBBU02 on the storage adapter.) Note that this unit combines a battery pack with a memory module.

Figure 2.15 LSIiTBBU02 Intelligent Transportable Battery Backup Unit

Memory Module (Front View)



Memory Module (Back View)



Caution: There is danger of an explosion if the battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

If the MegaRAID SAS storage adapter is already installed in a computer, follow these steps to remove it before you install the LSIiTBBU02:

1. Shut down the computer, turn off the power, and unplug the power cord(s).
2. Remove the cover from the computer according to the instructions in the system user's manual, so you can access the PCI Express slots.
3. Ground yourself before touching the MegaRAID SAS storage adapter.
4. Unplug all cables from the MegaRAID SAS storage adapter, remove the screw attaching the bracket to the computer case, and carefully remove the storage adapter from the slot.
5. Place the storage adapter on a flat, clean, static-free surface, and continue with the next section.

Perform the following steps to install the LSIiTBBU02 on the DIMM and the MegaRAID SAS storage adapter, then install the adapter:

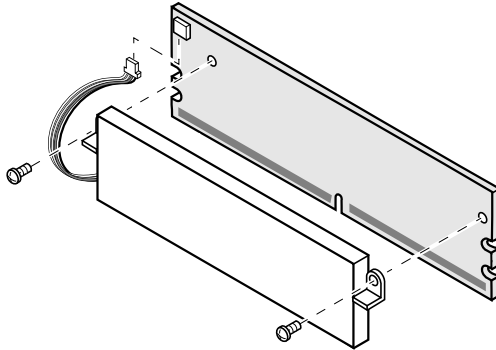
1. Ground yourself, and remove the LSIiTBBU02 from its package.
2. With the front side up, place the LSIiTBBU02 and DIMM on a flat, clean, static-free surface.
3. Keeping the front side up, place the LSIiTBBU02 on the DIMM so the holes for the screws line up, as shown in [Figure 2.16](#).
4. Using the Phillips-head screws, secure the LSIiTBBU02 to the DIMM.

Caution: Center the screwdriver carefully to avoid stripping the screw heads. Do not over-tighten the screws. The maximum recommended torque is 2.25 inch pounds.

5. Insert the battery pack harness connector (at the end of the colored wires) into the five-pin J1 connector on the front side of the LSIiTBBU02.

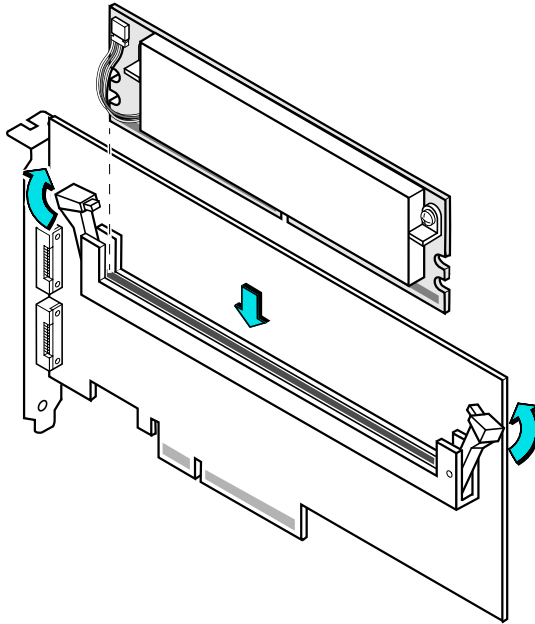
Note: The battery pack harness connector is polarized and can be inserted into the J1 board battery connector only if the rails on the harness connector align with the slots on the J1 connector.

Figure 2.16 Connecting the LSiTBBU02 to the DIMM



6. Insert the LSiTBBU02 into the DIMM socket on the SAS storage adapter, as shown in [Figure 2.17](#).
7. Close the arms to secure the DIMM and LSiTBBU02.

Figure 2.17 Installing LSIiTBBU02 on MegaRAID SAS 8408E Storage Adapter



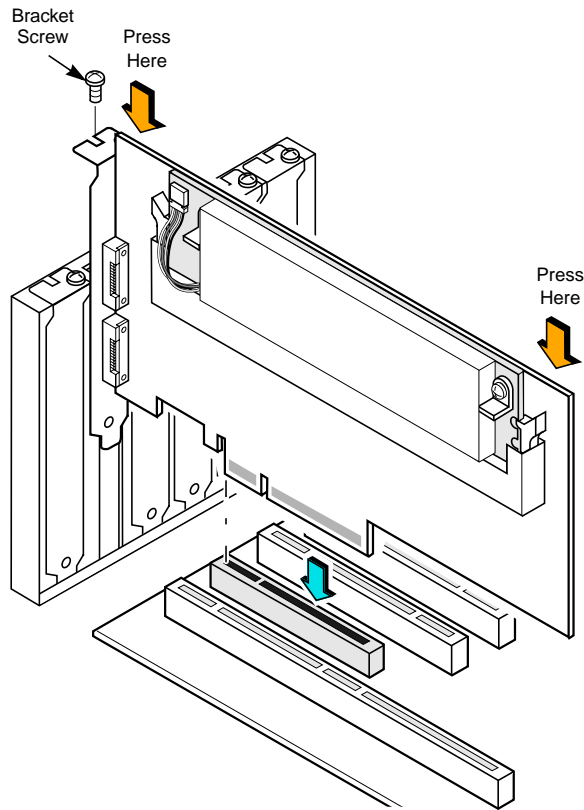
8. Install the LSIiTBBU02 in a PCI Express slot in the computer.

Press down gently, but firmly, to ensure that the storage adapter is properly seated in the slot. The bottom edge of the storage adapter must be flush with the slot.

Caution: *Never* apply pressure to the LSIiTBBU02 when inserting the adapter. Instead, press down only on the top edge of the storage adapter board, as shown in [Figure 2.18](#).

9. Secure the storage adapter to the computer chassis with the bracket screw.

Figure 2.18 Installing the MegaRAID SAS 8480E Storage Adapter



10. Attach the cables, as needed, to the connectors on the MegaRAID SAS storage adapter.
11. Replace the computer cover and reattach the power cord(s).

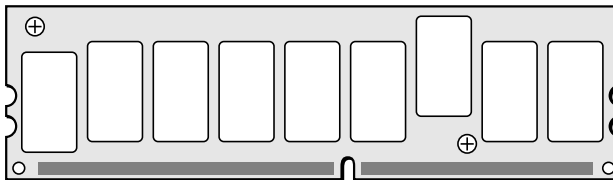
2.7 Installing the LSITBBU03

The LSITBBU03 Transportable BBU is used with the MegaRAID SCSI 320-2X storage adapter.

Figure 2.19 shows top and bottom views of the LSITBBU03. (The “top” side is the side you can see after you install the LSITBBU03 on the storage adapter.) Note that this unit combines a battery pack with a memory module. The LSITBBU03 also includes a daughter card that has the circuitry that controls the automatic charging of the battery pack. This daughter card plugs into a connector on the MegaRAID SCSI 320-2X.

Figure 2.19 LSITBBU03 Transportable Battery Backup Unit

LSITBBU03 (Top View)



LSITBBU03 (Bottom View)



If the MegaRAID SCSI 320-2X storage adapter is already installed in a computer, follow these steps to remove it before you install the LSITBBU03:

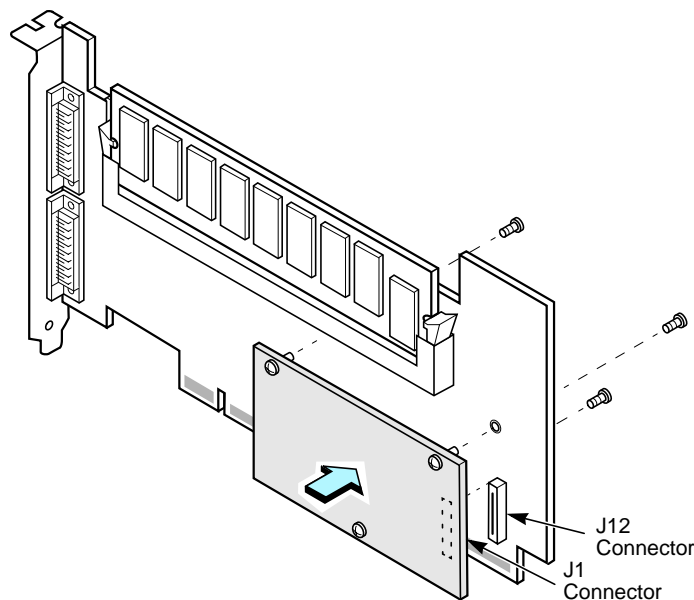
1. Shut down the computer, turn off the power, and unplug the power cord(s).
2. Remove the cover from the computer according to the instructions in the system user's manual so you can access the MegaRAID SCSI 320-2X storage adapter.
3. Ground yourself before touching the storage adapter.

4. Unplug all cables from the MegaRAID SCSI 320-2X storage adapter, remove the screw attaching the bracket to the computer case, and carefully remove the storage adapter from the slot.
5. Place the storage adapter on a flat, clean, static-free surface, and continue with the next section.

Follow these steps to install the LSITBBU03 (including the daughter card) on the MegaRAID SCSI 320-2X storage adapter:

1. Ground yourself, and remove the LSITBBU03 and the daughter card from the package.
2. Insert the battery pack harness connector (at the end of the colored wires) into the five-pin J1 connector on the bottom of the LSITBBU03.
3. With the front side up, place the MegaRAID SCSI 320-2X storage adapter on a flat, clean, static-free surface.
4. Hold the daughter card so the J1 connector lines up with the 40-pin J12 connector on the MegaRAID 320-2X storage adapter, as shown in [Figure 2.20](#).

Figure 2.20 Installing the Daughter Card



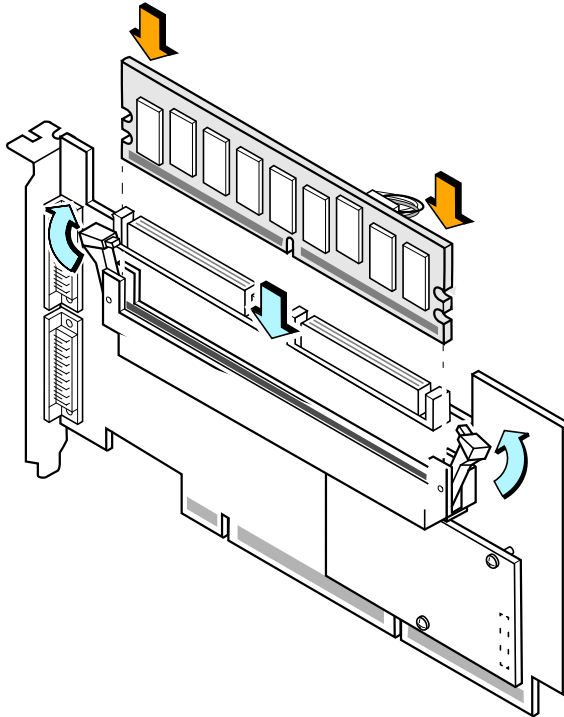
5. Carefully press the daughter card onto the controller so the J1 and J12 connectors are joined. Then secure the daughter card with the three Phillips-head screws.

Caution: Center the screwdriver carefully to avoid stripping the screw heads. Do not over-tighten the screws. The maximum recommended torque is 2.25 inch pounds.

6. Mount the LSITBBU03 in the storage adapter memory socket as you would a standard DIMM, as shown in [Figure 2.21](#).

The LSITBBU03 is mounted flush with the storage adapter, so it is parallel to the storage adapter when properly installed.

Figure 2.21 Installing LSITBBU03 on MegaRAID 320-2X Storage Adapter



7. Press the LSITBBU03 firmly into the memory socket.
As you press the LSITBBU03 into the socket, it clicks into place when it is properly seated in the socket, and the arms on the sides of the socket rotate into the notches on the sides of the LSITBBU03 to hold it securely in place.
 8. Install the MegaRAID SCSI 320-2X storage adapter in the computer.
Press down gently, but firmly, to ensure that the storage adapter is properly seated in the slot. The bottom edge of the storage adapter must be flush with the slot.

Caution: *Never apply pressure to the LSITBBU03 when inserting the storage adapter. Instead, press down only on the top edge of the storage adapter.*
 9. Attach the storage adapter to the computer chassis with the bracket screw.
 10. Attach the cables, as needed, to the connectors on the MegaRAID SCSI 320-2X storage adapter.
 11. Replace the computer cover and reattach the power cord(s).
-

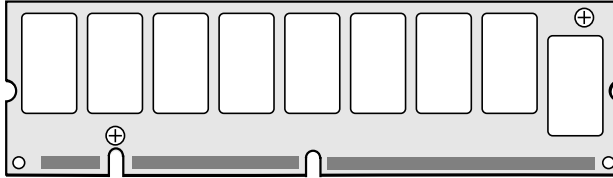
2.8 Installing the LSITBBU04

The LSITBBU04 Transportable BBU is used with the MegaRAID SCSI 320-4X storage adapter.

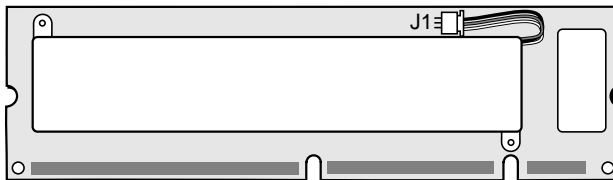
[Figure 2.22](#) shows top and bottom views of the LSITBBU04. (The “top” side is the side you can see after you install the LSITBBU04 on the storage adapter.) Note that this unit combines a battery pack with a memory module.

Figure 2.22 LSITBBU04 Transportable Battery Backup Unit

LSITBBU04 (Top View)



LSITBBU04 (Bottom View)



If the MegaRAID SCSI 320-4X storage adapter is already installed in a computer, follow these steps to remove it before you install the LSITBBU04:

1. Shut down the computer, turn off the power, and unplug the power cord(s).
2. Remove the cover from the computer according to the instructions in the system user's manual so you can access the MegaRAID SCSI 320-4X storage adapter.
3. Ground yourself before touching the storage adapter.
4. Unplug all cables from the MegaRAID SCSI 320-4X storage adapter, remove the screw attaching the bracket to the computer case, and carefully remove the storage adapter from the slot.
5. Place the storage adapter on a flat, clean, static-free surface, and continue with the next section.

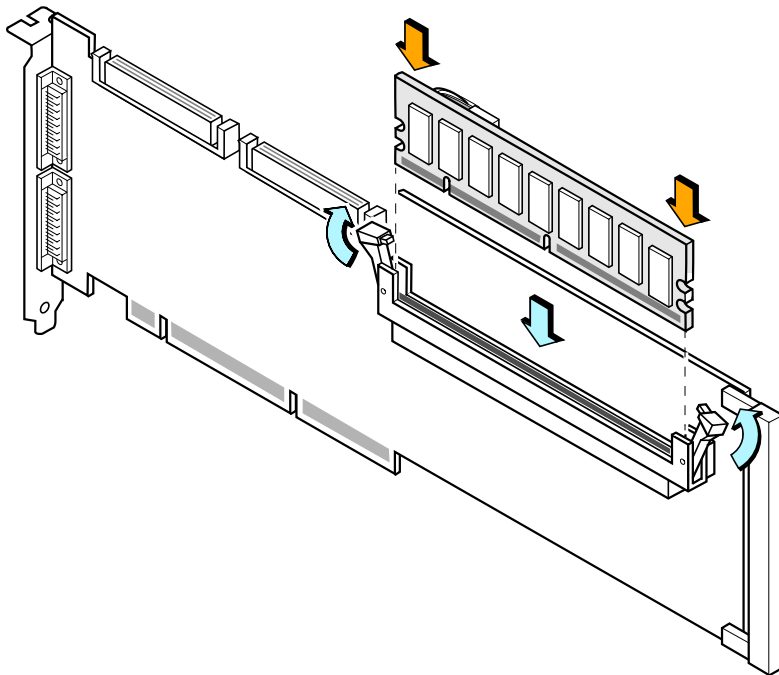
Follow these steps to install the LSITBBU04 on the MegaRAID SCSI 320-4X storage adapter:

1. Ground yourself, and remove the LSITBBU04 from its package.
2. Insert the battery pack harness connector (at the end of the colored wires) into the five-pin J1 connector on the bottom of the LSITBBU04.

3. With the front side up, place the MegaRAID SCSI 320-4X storage adapter on a flat, clean, static-free surface.
4. Mount the LSITBBU04 in the storage adapter memory socket as you would a standard DIMM, as shown in [Figure 2.23](#).

The LSITBBU04 is mounted flush with the storage adapter, so it is parallel to the storage adapter when properly installed.

Figure 2.23 Installing LSITBBU04 on MegaRAID 320-4X Storage Adapter



5. Press the LSITBBU04 firmly into the memory socket.
As you press the LSITBBU04 into the socket, it clicks into place when it is properly seated in the socket, and the arms on the sides of the socket rotate into the notches on the sides of the LSITBBU04 to hold it securely in place.
6. Install the MegaRAID SCSI 320-4X storage adapter in the computer.
Press down gently, but firmly, to ensure that the storage adapter is properly seated in the slot. The bottom edge of the storage adapter must be flush with the slot.

Caution: *Never* apply pressure to the LSITBBU04 when inserting the storage adapter. Instead, press down only on the top edge of the storage adapter.

7. Attach the storage adapter to the computer chassis with the bracket screw.
8. Attach the cables, as needed, to the connectors on the MegaRAID SCSI 320-4X storage adapter.
9. Replace the computer cover and reattach the power cord(s).

Chapter 3

Using the Battery Backup Units

This chapter explains how to monitor and maintain the MegaRAID BBUs for MegaRAID storage adapters. Most of the MegaRAID BBU functions, such as battery recharging, occur automatically. Click on a link below to view instructions for using the BBUs:

- [Section 3.1, “Monitoring BBUs with the MegaRAID Configuration Utilities”](#)
- [Section 3.2, “Replacing Battery Backup Units”](#)
- [Section 3.3, “Disposing of Battery Backup Units”](#)
- [Section 3.4, “Transferring Cached Data from a Failed Controller”](#)

You can monitor the battery status (temperature, voltage, and so on) in these MegaRAID utility programs:

- MegaRAID BIOS Configuration Utility
- MegaRAID Manager
- MegaRAID WebBIOS Configuration Utility
- MegaRAID Power Console Plus™

The MegaRAID utilities display a counter showing the number of times the battery pack on the BBU has been recharged. When you replace a BBU, you should run the utility program and reset this counter to zero for the new BBU.

Note: LSI Logic recommends that you replace the BBU once per year or after 1,000 recharge cycles, whichever comes first.

This chapter describes only the BBU-related features of the MegaRAID utility programs. For complete information on these utilities, see the *MegaRAID Configuration Software User's Guide*, DB15-000269-01.

3.1 Monitoring BBUs with the MegaRAID Configuration Utilities

This section describes the MegaRAID utilities that you can use to monitor the condition of installed BBUs. You can also use these utilities to reset the recharge cycle counter to zero when you replace a battery pack.

3.1.1 Monitoring BBUs with the BIOS Configuration Utility or MegaRAID Manager

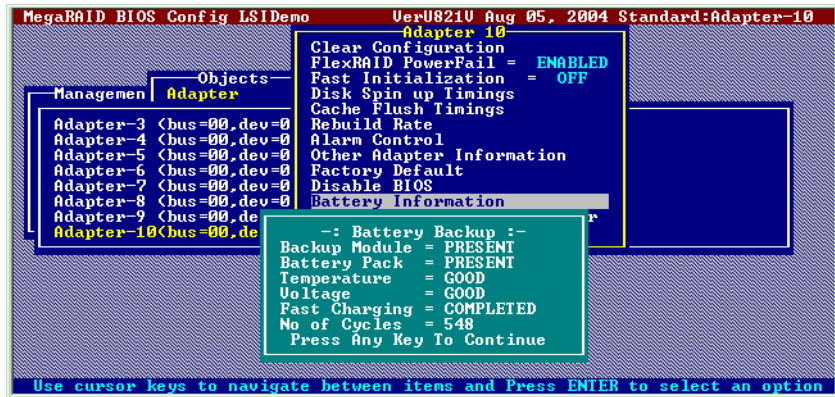
The MegaRAID BIOS Configuration Utility (CU) configures disk arrays and logical drives. Because the CU resides in the BIOS, it is independent of the operating system.

MegaRAID Manager is a character-based, non-GUI utility that changes policies and parameters and monitors RAID systems. MegaRAID Manager runs under DOS, Red Hat Linux, and Novell NetWare.

The BIOS CU and MegaRAID Manager use the same command structure to configure controllers and disks. Follow these steps to monitor the status of an installed MegaRAID BBU with either of these two MegaRAID utilities:

1. Boot the system.
2. Start the MegaRAID CU by pressing CTRL+M, or boot the system to DOS, Red Hat Linux, or Novell NetWare and start the MegaRAID Manager after boot is complete.
3. Select Objects from the Management menu.
4. Select the Adapter submenu.
5. From the Adapter submenu, select Battery Information to view a submenu showing the BBU status, as shown in [Figure 3.1](#).

Figure 3.1 Monitoring with the BIOS Configuration Utility



6. Select Reset Battery Charge Counter from the Battery Information submenu if you want to reset the battery charge counter after replacing a BBU.

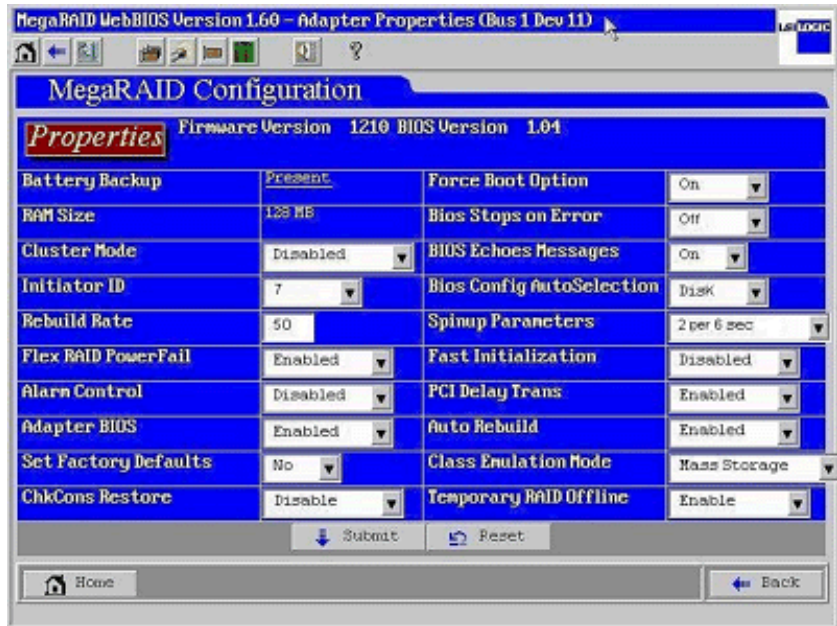
3.1.2 Monitoring BBUs with the WebBIOS Configuration Utility

The WebBIOS CU is a web-based utility for configuring and managing RAID volumes. Its operation is independent of the operating system because the utility resides in the MegaRAID BIOS. Follow these steps to monitor the status of an installed MegaRAID BBU with the WebBIOS utility:

1. Boot the system.
2. Start the WebBIOS CU by pressing CTRL+H when the prompt appears on the screen during boot-up.
3. On the Management menu, select Adapter Properties.

Figure 3.2 shows the Adapter Properties screen.

Figure 3.2 Monitoring with the WebBIOS Configuration Utility



If this screen indicates that the BBU is “Present,” you can click on the word Present to display a subscreen with the following information:

- Temperature
- Voltage
- Progress of the charging cycle
- Number of times this battery has been recharged

When you replace the BBU, you can reset the charging cycle counter on the subscreen.

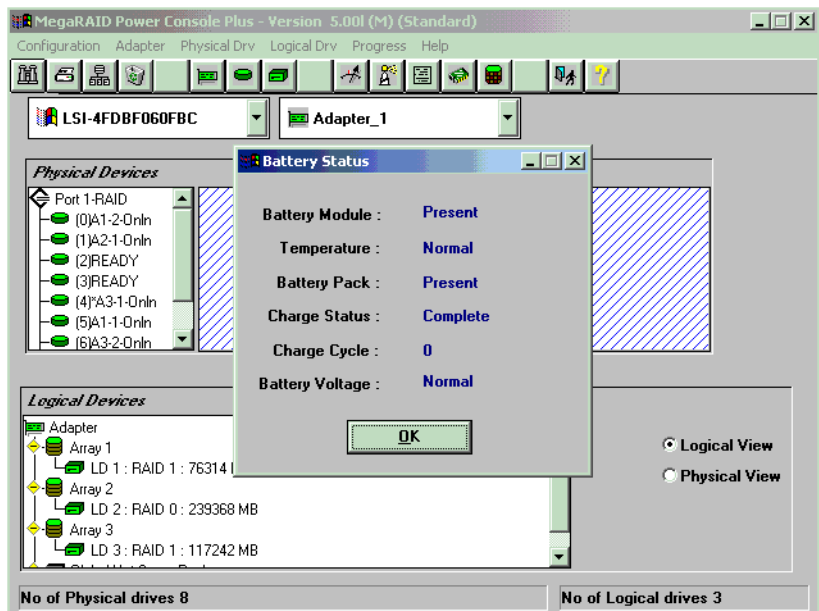
3.1.3 Monitoring BBUs with Power Console Plus

Power Console Plus is an object-oriented GUI utility for configuring and monitoring RAID arrays locally or through a network. Power Console Plus runs under the Windows NT, Windows XP, Windows 2000, and Windows Server 2003/2004 operating systems. Follow these steps to monitor the status of an installed MegaRAID BBU with Power Console Plus:

1. Double-click the Power Console Plus icon in the MegaRAID program group.
2. Select the server in which the storage adapter with the BBU is installed.
3. Click the Adapter toolbar button, or select Adapter from the Management menu.
4. If the adapter with the BBU is not already selected, select it from the drop-down Adapter menu, as shown beneath the toolbar in [Figure 3.3](#).
5. Select Adapter Properties -> Battery Status.

The Battery Status dialog box appears, as shown in [Figure 3.3](#).

Figure 3.3 Monitoring with Power Console Plus



The Battery Status dialog box displays the battery temperature, charge status, and other information about the BBU.

6. Click OK to close the dialog box.

3.2 Replacing Battery Backup Units

LSI Logic recommends that you replace BBUs once a year or after 1,000 recharging cycles, whichever comes first. The warranty on the battery packs is good for one year. [Table 1.1](#) on [page 1-2](#) lists the replacement part order numbers for all BBU models.

After you install a new BBU, use one of the MegaRAID configuration utilities to reset the battery recharge cycle counter to zero. For instructions, see [Section 3.1, "Monitoring BBUs with the MegaRAID Configuration Utilities."](#)

3.3 Disposing of Battery Backup Units

WARNING: Do not damage the battery pack in any way. Toxic chemicals may be released if it is damaged.

The material in the battery pack contains heavy metals that can contaminate the environment. Federal, state, and local regulations prohibit the disposal of rechargeable batteries in public landfills. Be sure to recycle the old battery packs properly. LSI Logic reminds you that you must comply with all applicable battery disposal and hazardous material handling laws and regulations in the country or other jurisdiction where you are using the BBU.

3.4 Transferring Cached Data from a Failed Controller

If you are using a MegaRAID storage adapter with an LSIiTBBU01, LSITBBU03, or LSITBBU04 BBU, and if the storage adapter fails when there is data in the cache that has not been written to disk, you can save the data by removing the BBU from the failed storage adapter and installing it on a new MegaRAID storage adapter. For the data to be saved, the following conditions must be met:

- The new storage adapter on which you install the BBU must be the same model as the failed storage adapter.
- The replacement storage adapter must have a *cleared configuration*.
- The new storage adapter must be connected to the same disk drives of the original configuration.

Follow these steps to use the transportable BBU to transfer cached data from a failed controller to a new controller:

Caution: Be sure to ground yourself before touching the storage adapter and the transportable BBU.

1. Power-down the computer system and disk drives.
2. Remove the failed storage adapter from the system.
3. Remove the transportable BBU from the failed storage adapter.
4. Install the transportable BBU on the replacement storage adapter.
5. Install the replacement storage adapter in the computer and connect it to the disk drives.
6. Power on the computer.

The replacement storage adapter will then read the disk configuration into NVRAM and will flush the cache data to the logical drives.

3.5 Resolving a Configuration Mismatch

If the replacement storage adapter has a previous configuration, this message displays during the power-on self-test (POST):

```
Unresolved configuration mismatch between disk(s) and NVRAM
on the adapter
```

A configuration mismatch occurs when the configuration data in the NVRAM and the configuration data on the hard disk drives are different. To resolve this, you need to update the configuration data in the NVRAM with the data from the hard disk drive. To do this, follow these steps:

1. Press CTRL+M when prompted during boot-up to access the BIOS CU.

2. Select Configure -> View/Add Configuration.

This gives you the option to view both the configuration on the NVRAM and the hard disk drive.

3. Select the configuration on the hard disk drive.

4. Press ESC, and select YES to update the NVRAM.

5. Press ESC to exit, then reboot the computer.

Chapter 4

Battery Backup Unit Specifications

This chapter includes technical information and specifications for the MegaRAID BBUs. For convenience, the information is divided into separate sections for the BBU models with and without memory modules. A third section lists information about battery life and data retention time. Click on a link below to access detailed BBU specifications:

- [Section 4.1, “BBU Models without Memory Modules”](#)
- [Section 4.2, “BBU Models with Memory Modules”](#)
- [Section 4.3, “Battery Life and Data Retention Time”](#)

The following specifications apply to all BBU models:

- **Battery type:** NiMH
- **Battery operating ambient temperature:** 10–40 °C
- **Humidity (storage and operating):** 20% to 80% non-condensing
- **Battery storage temperature:** Depends on storage time, as follows:
 - < 30 days: 0–50 °C
 - 30–90 days: 0–40 °C
 - > 90 days: 0–30 °C

4.1 BBU Models without Memory Modules

Table 4.1 Specifications for BBU Models without Memory Modules

	LSIBBU01	LSIBBU02 ¹	LSIBBU03	LSiBBU01
Battery Voltage Conditioning	<3.6 V	<3.6 V	<3.6 V	<3.6 V
Fast Charge Rate	200 mAH	200 mAH	200 mAH	350 mAH
Trickle Charge Rate	25 mAH	25 mAH	25 mAH	50 mAH
Battery Pack	3 cells	3 cells	3 cells	4 cells
Mechanical	2.355" x 2.19"	1.95" x 1.27"	2.5" x 1.9375"	5.05" x 1.75"
Battery Capacity	600 mAH	600 mAH	640 mAH	880 mAH
Charge Circuitry Card	Yes	No	Yes	Yes
Memory Technology	SDRAM	SDRAM	DDR1 SDRAM	DDR1 SDRAM
Battery Charge Time	~6 hours	~6 hours	~6 hours	~6 hours

1. The LSIBBU02 is just a battery pack mounted on a frame. It has no supporting board or circuitry.

4.2 BBU Models with Memory Modules

Table 4.2 Specifications for BBU Models with Memory Modules

	LSiITBBU01	LSiITBBU02	LSITBBU03	LSITBBU04
Battery Voltage Conditioning	<2.5 V		<3.6 V	<3.6 V
Fast Charge Rate	300 mA	350 mA	200 mA	200 mA
Trickle Charge Rate	25 mA	N/A	25 mA	25 mA
Battery Pack	4 cells	4 cells	4 cells	4 cells
Mechanical	2.355" x 2.19"	4.395" x 1.44"	2.5" x 1.9375"	2.5" x 1.9375"
Battery Capacity	880 mA	880 mA	880 mA	880 mA
Charge Circuitry Card	Yes	Yes	Yes	Yes
Memory Technology	DDR1 SDRAM	DDR2 SDRAM	DDR1 SDRAM	DDR1 SDRAM
Battery Charge Time	~6 hours	~6 hours	~6 hours	~6 hours
Socket Type	DIMM for ECC SDRAM	DIMM for ECC SDRAM	DIMM for ECC SDRAM	DIMM for ECC SDRAM
Module Support	DDR1	DDR2	DDR1	DDR1
Cache Memory Size Supported	128 or 256 Mbytes	256 MB	128 or 256 Mbytes	128 or 256 Mbytes
Memory Bus Speed	333 MHz	400 MHz	333 MHz	333 MHz
Memory Bus Width	64-bit or larger	72-bit	64-bit or larger	64-bit or larger
Error Correcting Capability (ECC)	Supported	Supported	Supported	Supported

4.3 Battery Life and Data Retention Time

The MegaRAID utilities display a counter showing the number of times a BBU has been recharged. When you replace a BBU, you should run the utility program and reset this counter to zero for the new BBU.

LSI Logic recommends that you replace the battery pack on the BBU once a year or after 1,000 recharging cycles, whichever comes first. The warranty on the battery packs is good for one year.

The data retention times shown in [Table 4.3](#) are approximate. They can vary based on a number of factors, including the following:

- Capacity of the battery pack and the battery load
- Ambient temperature
- Age of the battery and number of discharge cycles it has been through
- Number of DIMMs installed and number of chips on the installed DIMMs
- DRAM size

Table 4.3 Reference Data Retention Times

BBU Name	Data Retention Times
LSIBBU01	53 hours for 64 Mbytes standard cache, using 8 Mbit x 16 Mbit SDRAM
LSIBBU02	48 hours for 64 Mbytes standard cache, using 8 Mbit x 16 Mbit SDRAM
LSIBBU03	37 hours for 128 Mbytes standard cache, using 256 Mbit x 16 DDR1
LSiIBBU01	72 hours for 128 Mbytes standard cache, using 256 Mbit x 16 DDR1
LSiITBBU01	72 hours for 128 Mbytes standard cache, using 256 Mbit x 16 DDR1
LSiITBBU02	72 hours for 256 Mbytes standard cache, using 256 Mbit x 16 DDR2
LSITBBU03	72 hours for 128 Mbytes standard cache, using 128 Mbit x 16 low power DDR1 ¹ 25 hours for 128 Mbytes standard cache, using 256 Mbit x 16 DDR1
LSITBBU04	72 hours for 128 Mbytes standard cache, using 128 Mbit x 16 low power DDR1 ¹ 25 hours for 128 Mbytes standard cache, using 256 Mbit x 16 DDR1

1. The 128 Mbyte modules are being phased out. All new modules support 256 Mbyte configurations only.

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