

USER'S GUIDE

ServeRAID M5000 Series Battery Assembly

May 2013

Second Edition (May 2013)

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Preface

This user's guide explains how to install the IBM® ServeRAID M5000 Series Battery Assembly product and use it with the ServeRAID SAS/SATA controller.

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 the ServeRAID M5000 Series Battery Assembly on a ServeRAID SAS/SATA controller.
- Engineers and managers who are evaluating BBU products for possible use with ServeRAID controllers.

Organization

This document has the following chapters:

- [Chapter 1, Introduction](#), describes the ServeRAID M5000 Series Battery Assembly and explains how its operates.
- [Chapter 2, Installing the ServeRAID M5000 Series Battery Assembly](#), explains how to install the ServeRAID M5000 Series Battery Assembly.
- [Chapter 3, Using the Battery Backup Unit](#), explains how to use and monitor the ServeRAID M5000 Series Battery Assembly model and how to replace it.

- [Chapter 4, Battery Backup Unit Specifications](#), has complete technical information and specifications for the ServeRAID M5000 Series Battery Assembly.

Related Publications

ServeRAID-MR Device Driver Installation User's Guide

IBM Document Number: 46M1382

This document explains how to install the ServeRAID device driver for your operating system. The information in this document is independent of the back-end bus and applies to the ServeRAID SAS/SATA controllers.

ServeRAID-MR Software User's Guide

IBM Document Number: 46M1381

This document explains how to use the MegaRAID Storage Manager, WebBIOS, and Command Line Interface (CLI) utilities to configure, monitor, and maintain the ServeRAID-MR10M controller and the storage-related devices connected to them.

IBM Systems Safety Notices

IBM Document Number: G229-9054-01

This book contains safety notices from IBM Systems documentation. The safety notices include danger and caution notices.

Notices and Statements in This Document

The caution and danger statements in this document are also in the multilingual *IBM Systems Safety Notices* document, which is on the *ServeRAID-MR Support CD*. Each statement is followed by a reference number that you can use to locate the corresponding statement in your language in the *IBM Systems Safety Notices* document. The following notices and statements are used in this document:

Note: These notices provide important tips, guidance, or advice.

Important: These notices provide information or advice that might help you avoid inconvenient or problem situations.

Attention: These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.

CAUTION: These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.

DANGER: These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Revision History

IBM Document Number	Date/Version	Remarks
	Second Edition March 2013	Added information about multiple relearns for replacement BBUs. Corrected Spelling Errors.
???	First Edition August 2009	Initial release of document.

IBM Customer Support

Web site:

<http://www.ibm.com/systems/support/>

Safety Instructions

Use the following safety guidelines to help protect your computer system from potential damage and to ensure your own personal safety.

Note: Use the ServeRAID M5000 Series Battery Assembly with UL-listed Information Technology Equipment (ITE) products only.



DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the provided power cord. Do not use the provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. Remove the power cords from the outlets.
3. Remove the signal cables from the connectors.
4. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
2. Attach all cables to the devices.
3. Attach the signal cables to the connectors.
4. Attach the power cords to the outlets.
5. Turn on the devices.

(D005)



CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

Protecting against Electrostatic Discharge – Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer’s electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface, such as the metal around the card-slot openings at the back of the computer.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated. In addition to the preceding precautions, you can also take the following steps to prevent damage from electrostatic discharge:

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.

Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

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Chapter 1

Introduction

IBM provides the ServeRAID M5000 Series Battery Assembly for use with its high-performance ServeRAID SAS/SATA controllers. The battery backup unit protects the integrity of the cached data on by providing backup power if there is a complete AC power failure or a brief power outage. The ServeRAID M5000 Series Battery Assembly provides an inexpensive alternative to using an uninterruptible power supply (UPS).

The M5000 Battery Assembly is compatible with systems that offer auxiliary power. Battery charging and recharging take place automatically. You can use the M5000 Battery Assembly on the following ServeRAID SAS/SATA controllers:

- ServeRAID-M5014/M5015 SAS/SATA controller
- ServeRAID-M5025 SAS/SATA controller
- ServeRAID-MR10M SAS/SATA controller

Writing a block of data to cache memory is much faster than writing it to a storage device. The ServeRAID SAS/SATA controller 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 ServeRAID SAS/SATA controller has an onboard BBU.

The ServeRAID M5000 Series Battery Assembly monitors the voltage level of the DRAM modules installed on the ServeRAID SAS/SATA controller. If the voltage drops below a predefined level, the battery backup module switches the memory power source from the ServeRAID SAS/SATA controller to the battery pack attached to the iBBU. As long as the voltage level stays below the predefined value, the iBBU provides power for memory. If the voltage level returns to an acceptable level, the iBBU switches the power source back to the ServeRAID SAS/SATA

controller, and all incomplete writes to storage devices are completed with no data loss.

The ServeRAID M5000 Series Battery Assembly 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.

Chapter 2

Installing the ServeRAID M5000 Series Battery Assembly

This chapter explains how to install the ServeRAID M5000 Series Battery Assembly on your ServeRAID SAS/SATA controller.

Attention: Electrostatic discharge can damage the iBBU and the ServeRAID SAS/SATA controller on which it is installed. Always ground yourself and/or use a ground strap before you touch the storage adapter or the iBBU. 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.

The batteries in the battery assembly must recharge for at least six hours during fast charge under normal operating conditions. IBM recommends that you set the Write Policy for the controller 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 0 °C to 44.5 °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 reach full capacity only through trickle charging. This greatly increases the time required to charge the battery pack.

2.1 Installing the ServeRAID M5000 Series Battery Assembly Controller

You can mount the ServeRAID M5000 Series Battery Assembly mounts directly or remotely (using a supplied 12-inch cable) to the following ServeRAID SAS/SATA controllers:

- ServeRAID-M5014/M5015 SAS/SATA controller
- ServeRAID-M5025 SAS/SATA controller
- ServeRAID-MR10M SAS/SATA controller

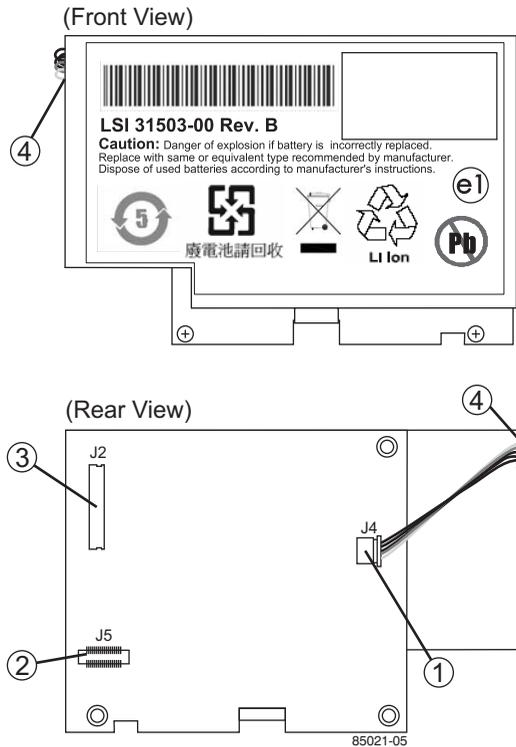
2.1.1 Installing the Battery Assembly Directly on a ServeRAID SAS/SATA Controller

This procedure shows how to install the battery assembly on the ServeRAID-MR10M SAS/SATA controller. You can install the battery assembly on the ServeRAID-M5014/M5015 SAS/SATA controller and the ServeRAID-MR10M SAS/SATA controller in the same way.

Note: For information about the iBBU connectors on these controllers, see the user's guide for each controller.

[Figure 2.1](#) displays the top view and the bottom view of the card. (The “top” side is the side you can see after you install the battery assembly on the controller.) Note that this unit combines a battery pack with a daughtercard.

Figure 2.1 ServerRAID M5000 Series Battery Assembly



- 1 - J4 battery pack harness connector
- 2 - J5 board-to-board connector
- 3 - J2 connector
- 4 - Battery pack harness

Attention: 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. See the *Warranty and Support Information* document for the replacement battery part number and battery-disposal instructions.

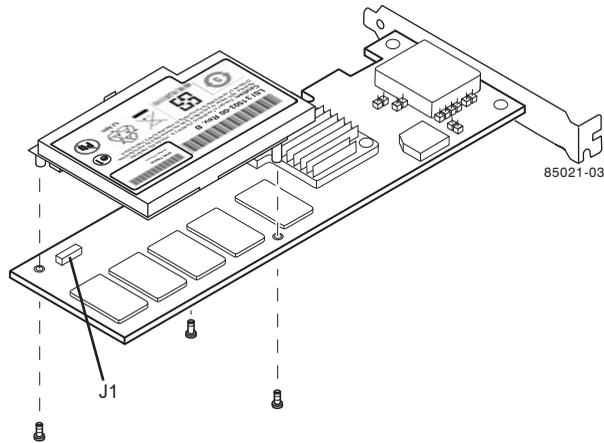
If the controller is already installed in a computer, follow these steps to remove it before you install the battery assembly:

1. Turn off the computer, and unplug the power cords from the rear of the power supply.
2. Remove the cover from the computer according to the instructions in the system user's manual so you can access the controller.
3. Ground yourself before you touch the controller.
4. Unplug all cables from the controller, remove the screw attaching the bracket to the computer case, and carefully remove the RAID controller from the slot.
5. Place the controller on a flat, clean, static-free surface, and continue with the next section.

Perform the following steps to mount the battery assembly directly to the ServeRAID-MR10M SAS/SATA controller using the daughtercard. (All components are installed on the bottom of the card. The battery is installed on the top. The maximum height of components installed on the battery assembly is 0.125".)

1. Ground yourself, and remove the daughtercard for the battery assembly from the package.
2. Insert the battery pack harness into the 5-pin J4 connector on the backside of the battery assembly.
3. Hold the daughtercard for the battery assembly so that the battery side is up and the J5 connector lines up with the J1 BBU connector on the ServeRAID-MR10M SAS/SATA controller, as shown in [Figure 2.2](#).

Figure 2.2 Installing the Battery Assembly on the ServeRAID-MR10M SAS/SATA Controller



4. Carefully press the battery assembly onto the controller so that the two connectors are firmly joined.
5. Secure the battery assembly to the controller with the screws and the standoffs in the three screwholes.

The standoffs are threaded at both ends, and a 2-56 screw goes into each end.

6. Use the Phillips-head screws that are provided to secure the battery assembly to the controller.

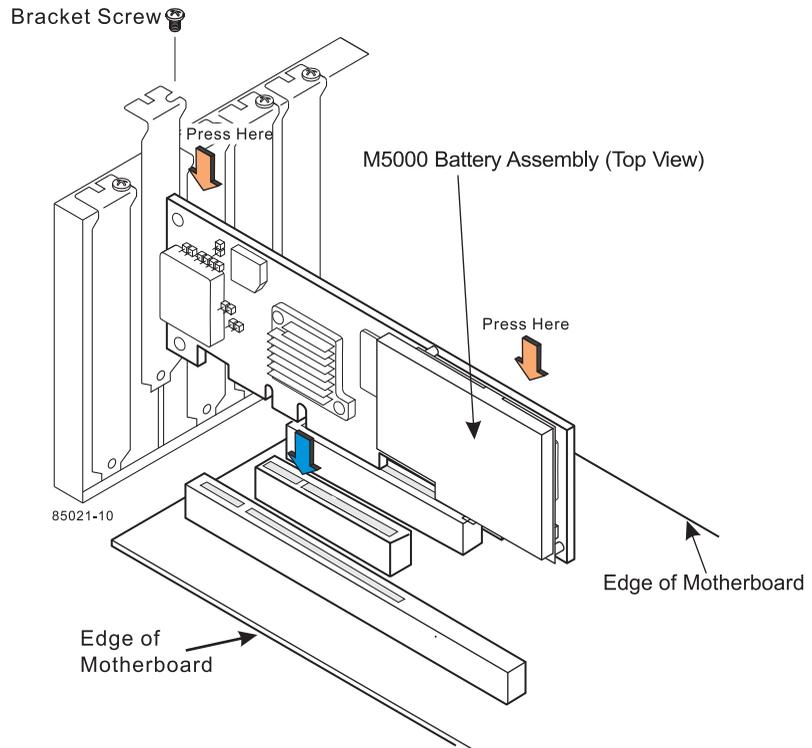
Caution: Center the screwdriver carefully to avoid stripping the screwhead. Do not over-tighten the screws.

7. Install the controller in a PCI Express slot in the computer, as shown in [Figure 2.3](#).

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

Caution: *Never* apply pressure to the battery assembly when you insert the controller. Instead, press down only on the top edge of the controller, as shown in [Figure 2.3](#).

Figure 2.3 Installing the ServeRAID-MR10M SAS/SATA Controller



8. Attach the controller to the computer chassis with the bracket screw.
9. Attach the cables, as needed, to the connectors on the controller.
10. Reinstall the computer cover and reconnect the power cords. Turn on the power to the computer.

Attention: See the *ServeRAID-M Software User's Guide* for information about running the RAID configuration utility and installing software drivers.

2.2 Connecting the Battery Assembly to a ServeRAID Controller Remotely

This section contains the procedures used to connect the battery assembly remotely to the controller. Perform the following tasks to connect the battery assembly remotely to the controller:

- Remove the controller from the computer
- Mount the daughtercard to the controller
- Mount the iBBU to the chassis
- Re-install the controller
- Connect the controller to the remote iBBU using the 12-inch cable and daughtercard (the battery backup unit must be mounted inside the chassis within 10 inches of the controller)

Note: Because server and workstation chassis vary from vendor to vendor, there is no standard mounting option that is compatible with the various system configurations. Therefore, the battery assembly battery kit contains only the battery, daughtercard, and cable, allowing VAR's and chassis manufacturers to customize the location of the remote battery to provide the most flexibility within various environments.

Follow these steps to remove the controller from the computer.

- Step 1. Turn off the power and unplug the power cords.
- Step 2. Remove the cover from the computer according to the instructions in the system user's manual to allow access to the controller.
- Step 3. Unplug all cables from the controller, remove the screw attaching the bracket to the computer case, and carefully remove the controller from the slot.
- Step 4. Place the controller on a flat, clean, static-free surface, and continue with the next procedure.

Follow these steps to install the daughtercard on the controller, as shown in [Figure 2.4](#).

- Step 1. With the controller on a flat, clean, static-free surface, ground yourself, and remove the daughtercard, standoff, and screws from the package.
- Step 2. Place the standoff on the controller so that the bottom side is over the screwhole next to the J1 connector on the controller.
- Step 3. Use one of the screws to secure the standoff to the controller.

Important: Center the screwdriver carefully to avoid stripping the screwhead. Do not over-tighten the screws.

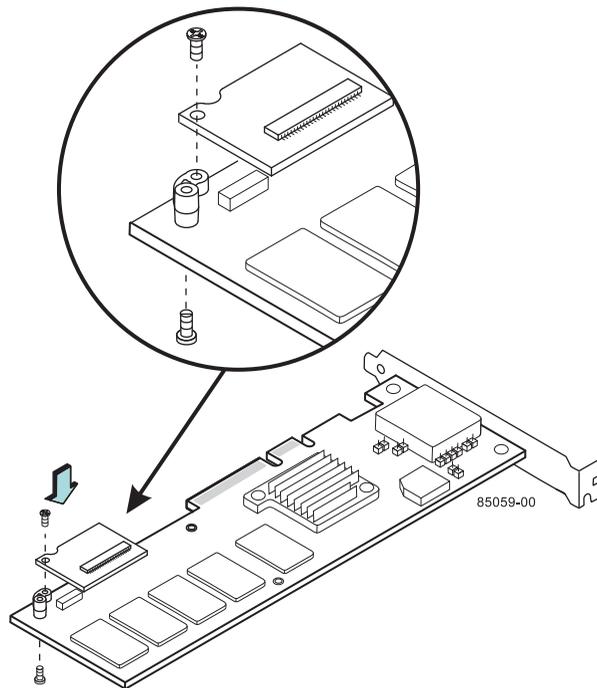
Step 4. Hold the daughtercard so that the J2 board-to-board connector on the daughtercard lines up with the J1 board-to-board connector on the controller.

Step 5. Carefully press the J2 connector on the daughtercard into the J1 connector on the controller so that the two connectors are firmly joined.

The connectors fit only when they are in the correct alignment.

Step 6. Use the other screw to secure the daughtercard to the controller and continue with the next procedure.

Figure 2.4 Connecting the Daughtercard to the ServeRAID-MR10M SAS/SATA Controller



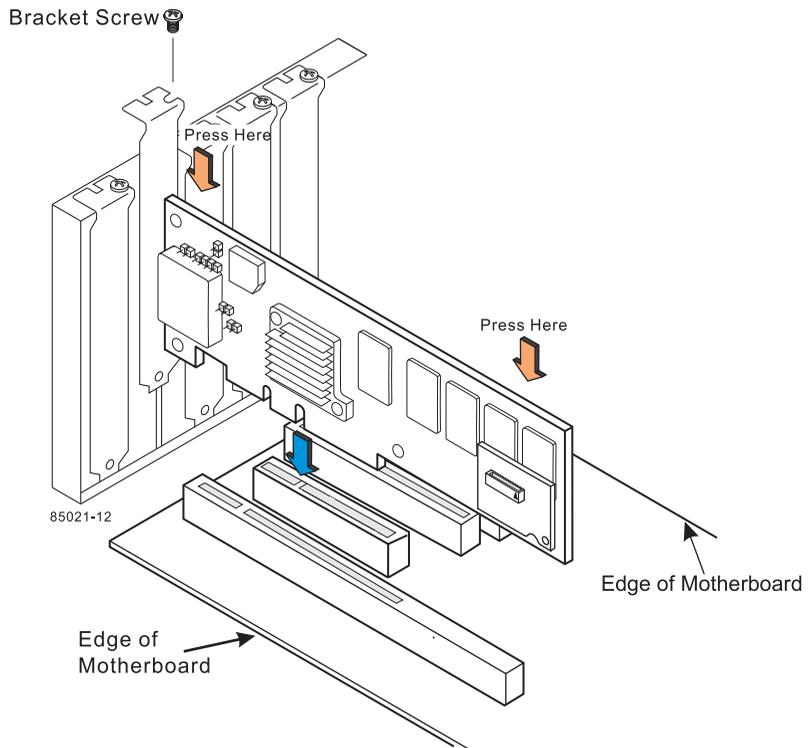
Follow these steps to install the controller in the computer.

Step 1. Insert the controller in a PCI Express slot on the motherboard, as shown in [Figure 2.5](#).

- Step 2. Press down gently but firmly to seat the card correctly in the slot.
- Step 3. Secure the controller to the computer chassis with the bracket screw.

Note: Refer to your computer documentation for information about the PCI Express slot.

Figure 2.5 Installing the ServeRAID-MR10M SAS/SATA Controller



Follow these steps to connect the cable between the daughtercard on the controller and the battery assembly, as shown in [Figure 2.6](#).

- Step 1. Make sure you are grounded and then remove the 12-inch cable from the package.
- Step 2. Attach the controller to the computer chassis with the bracket screw.

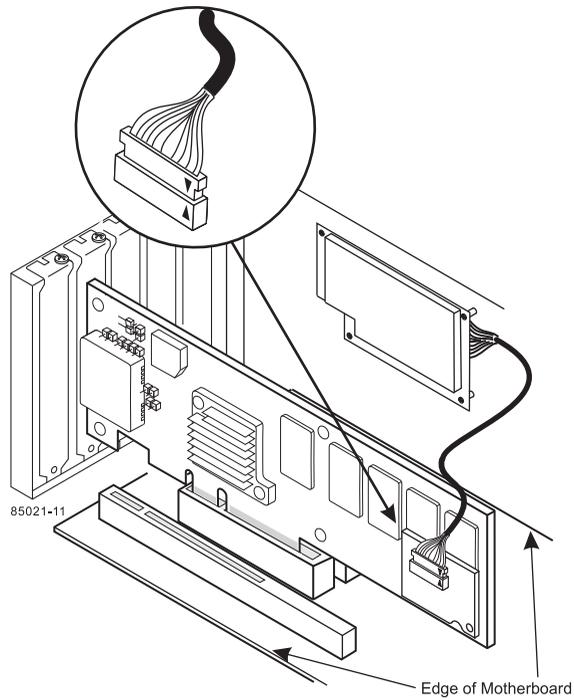
- Step 3. Mount the battery assembly to the chassis of your computer based on the location and type of mounting option.
- Step 4. Insert one end of the cable into the 20-pin J1 connector on the battery assembly and the other end into the 20-pin J1 connector on the daughtercard.

Align the black triangles on the connectors to make sure they are connected properly.

Note: The cable connectors are polarized and can be inserted into the connectors on the daughtercard and the iBBU only if the rails on the cable connectors align with the slots on the other connectors. **Do not** force the cable into the 20-pin connectors. The cable end inserts into the connector with minimal resistance.

- Step 5. Attach the cables, as needed, to the connectors on the controller.
- Step 6. Reinstall the computer cover and reconnect the power cords.
- Step 7. Turn on the power to the computer.

Figure 2.6 Connecting the ServeRAID M5000 Series Battery Assembly Remotely to the Controller



Important: See the *ServeRAID-MR Software User's Guide* for information about running the configuration utility and installing software drivers.

Chapter 3

Using the Battery Backup Unit

This chapter explains how to monitor and maintain the ServeRAID M5000 Series Battery Assembly for your ServeRAID SAS/SATA controller. You can use the battery assembly on the following ServeRAID SAS/SATA controllers:

- ServeRAID-M5014/M5015 SAS/SATA controller
- ServeRAID-M5025 SAS/SATA controller
- ServeRAID-MR10M SAS/SATA controller

Most of the battery assembly functions, such as battery recharging, occur automatically. Click on the following links to view instructions about how to use the battery assembly:

- [Section 3.1, “Monitoring the Battery Assembly with the MegaRAID Configuration Utilities”](#)
- [Section 3.2, “Replacing the ServeRAID M5000 Series Battery Assembly”](#)
- [Section 3.3, “Transferring Cached Data from a Failed Controller”](#)
- [Section 3.4, “Resolving a Configuration Mismatch”](#)
- [Section 3.5, “Disposing of Battery Backup Units”](#)

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

- WebBIOS Configuration Utility
- MegaCLI (Command Line Interface)
- MegaRAID Storage Manager (MSM)

The MegaRAID utilities display a counter showing the number of times the battery pack on the battery assembly has been recharged. When you

install a new battery assembly, the battery recharge cycle counter for the battery assembly is automatically set to zero.

Note: For optimal performance, replace the battery assembly once a year.

This chapter describes only the battery assembly-related features of the MegaRAID configuration utility programs. For complete information on these utilities, see the *ServeRAID-M Software User's Guide*, IBM Document No. 46M1381.

3.1 Monitoring the Battery Assembly with the MegaRAID Configuration Utilities

This section describes the MegaRAID configuration utilities you can use to monitor the condition of the installed battery assembly and to change the automatic learn mode options. They include the WebBIOS Configuration Utility, MegaCLI, and MegaRAID Storage Manager.

3.1.1 Monitoring the Battery Assembly 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 battery assembly 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.

The WebBIOS CU main menu screen appears.

3. Click **Controller Properties** on the WebBIOS CU main menu screen.

The first Controller Properties screen appears, as shown in [Figure 3.1](#). There are three Controller Properties screens.

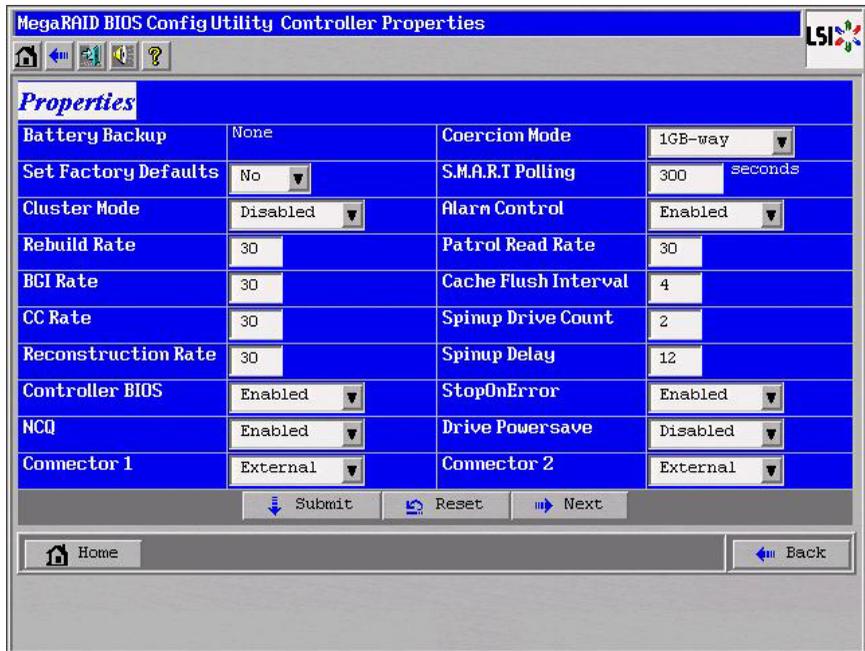
Figure 3.1 First Controller Properties Screen



4. Click **Next** to view the second Controller Properties screen.

The second Controller Properties screen appears, as shown in [Figure 3.2](#). The **Battery Backup** field at the top left of the screen indicates whether the battery backup assembly is present.

Figure 3.2 Second Controller Properties Screen

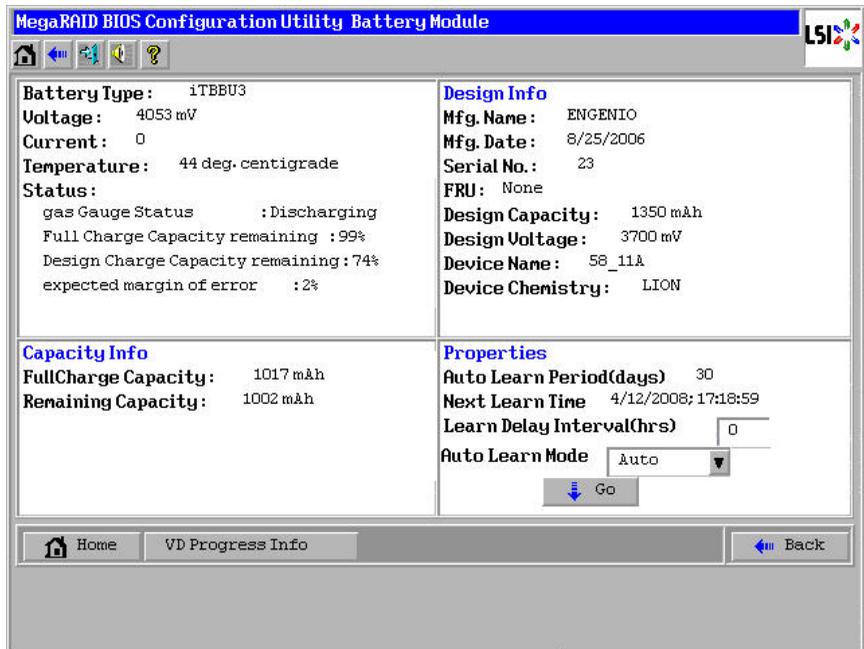


5. Click **Present** in the **Battery Backup** field.

The Battery Module screen appears, as shown in [Figure 3.3](#). This screen contains the following information:

- Battery information
- Design information
- Capacity information
- Auto Learn properties

Figure 3.3 Battery Module Screen



Most of the Battery Module properties are view-only and are self-explanatory.

In the lower right corner of the screen are the Auto Learn options. A *learning cycle* is a battery calibration operation performed by the controller periodically to determine the condition of the battery. You can change the learn delay interval and the auto learn mode.

Note: IBM recommends leaving the learn delay interval and the auto learn mode at their default settings.

3.1.1.1 Setting the Learn Delay Interval

The learn delay interval is the length of the interval between automatic learning cycles. Perform the following steps to change the interval:

1. Open the drop-down menu in the **Auto Learn Mode** field.
2. Set the learn mode as `Auto` (the default).
3. Change the number of hours in the **Learn Delay Interval** field.

You can delay the start of the learn cycles for up to 168 hours (7 days).

4. Click **Go**

3.1.1.2 Setting the Learn Mode

You can start battery learn cycles manually or automatically. Perform the following steps to choose the learn mode:

1. Open the drop-down menu in the **Auto Learn Mode** field.
2. Set the learn mode as *Auto* (the default) or *Manual*.
3. Click **Go**.

Note: IBM recommends 30 days for the interval between cycles.

Note: When you replace the battery assembly, the charge cycle counter is reset automatically. Additionally, the new BBU may take multiple relearn cycles before coming operational.

3.1.2 Monitoring the Battery Assembly with the MegaCLI Utility

You can use the MegaCLI commands in this section to monitor the ServeRAID M5000 Series Battery Assembly and to select the settings for battery backup unit (BBU)-related options.

3.1.2.1 Display BBU Information

Use the command in [Table 3.1](#) to display complete information about the iBBU for the selected controllers.

Table 3.1 Display BBU Information

Convention	<code>MegaCli -AdpBbuCmd -aN -a0,1,2 -aALL</code>
Description	Displays complete information about the BBU, such as status, capacity information, design information, and properties.

3.1.2.2 Display BBU Status Information

Use the command in [Table 3.2](#) to display complete information about the status of the BBU, such as temperature and voltage, for the selected controllers.

Table 3.2 Display BBU Status Information

Convention	MegaCli -AdpBbuCmd -GetBbuStatus -aN -a0,1,2 -aALL
Description	<p>Displays complete information about the BBU status, such as the temperature and voltage. The information displays in the following formats:</p> <p>BBU Status for Adapter: xx Battery Type: XXXXXX(string) Voltage: xx mV Current: xx mA Temperature: xx C° Firmware Status: xx Battery state: xx</p> <p>Gas Gauge Status: Fully Discharged: Yes/No Fully Charged: Yes/No Discharging: Yes/No Initialized: Yes/No Remaining Time Alarm: Yes/No Remaining Capacity Alarm: Yes/No Discharge Terminated: Yes/No Over Temperature: Yes/No Charging Terminated: Yes/No Over Charged: Yes/No</p> <p>Additional status information displays differently for iBBU™ and BBU.</p> <p>For iBBU: Relative State of Charge: xx Charger System State: xx Charger System Ctrl: xx Charging Current: xx mA Absolute State of Charge: xx% Max Error: xx%</p> <p>For BBU: Relative State of Charge: xx Charger Status: xx Remaining Capacity: xx mAh Full Charge Capacity: mAh isSOHGood: Yes/No</p>

3.1.2.3 Display BBU Capacity

Use the command in [Table 3.3](#) to display the BBU capacity for the selected controller(s).

Table 3.3 Display BBU Capacity Information

Convention	MegaCli -AdpBbuCmd -GetBbuCapacityInfo -aN -a0,1,2 -aALL
-------------------	--

Table 3.3 Display BBU Capacity Information (Cont.)

Description	Displays BBU capacity information. The information displays in the following format: BBU Capacity Info for Adapter: x Relative State of Charge: xx% Absolute State of Charge: xx% Remaining Capacity: xx mAh Full Charge Capacity: xx mAh Run Time to Empty: xxx Min Average Time to Empty: xxx Min Average Time to Full: xxx Min Cycle Count: xx Max Error: xx%
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3.1.2.4 Display BBU Design Parameters

Use the command in [Table 3.4](#) to display BBU design parameters for the selected controller(s).

Table 3.4 Display BBU Design Parameters

Convention	<code>MegaCli -AdpBbuCmd -GetBbuDesignInfo -aN -a0,1,2 -aALL</code>
Description	Displays information about the BBU design parameters. The information displays in the following formats: BBU Design Info for Adapter: x Date of Manufacture: mm/dd, yyyy Design Capacity: xxx mAh Design Voltage: mV Serial Number: 0xhhh Pack Stat Configuration: 0xhhh Manufacture Name: XXXXXX(String) Device Name: XXXXXX(String) Device Chemistry: XXXXXX(String)

3.1.2.5 Display Current BBU Properties

Use the command in [Table 3.5](#) to display the current BBU properties for the selected controller(s).

Table 3.5 Display Current BBU Properties

Convention	<code>MegaCli -AdpBbuCmd -GetBbuProperties -aN -a0,1,2 -aALL</code>
-------------------	---

Table 3.5 Display Current BBU Properties (Cont.)

Description	Displays current properties of the BBU. The information displays in the following formats: BBU Properties for Adapter: x Auto Learn Period: xxx Sec Next Learn Time: xxxx Sec Learn Delay Interval: xx Hours Auto-Learn Mode: Warn via Event/Disabled/Enabled
--------------------	--

3.1.2.6 Start BBU Learning Cycle

Use the command in [Table 3.6](#) to start the BBU learning cycle on the selected controller(s). A learning cycle is a battery calibration operation performed by the controller periodically (approximately every three months) to determine the condition of the battery.

Table 3.6 Start BBU Learning Cycle

Convention	<code>MegaCli -AdpBbuCmd -BbuLearn -aN -a0,1,2 -aALL</code>
Description	Starts the learning cycle on the BBU. No parameter is needed for this option.

3.1.2.7 Place Battery in Low-Power Storage Mode

Use the command in [Table 3.7](#) to place the battery into Low-Power Storage mode on the selected controller(s). This saves battery power consumption.

Table 3.7 Place Battery in Low-Power Storage Mode

Convention	<code>MegaCli -AdpBbuCmd -BbuMfgSleep -aN -a0,1,2 -aALL</code>
Description	Places the battery in Low-Power Storage mode. The battery automatically exits this state after 5 seconds.

3.1.2.8 Set BBU Properties

Use the command in [Table 3.8](#) to set the BBU properties on the selected controller(s) after reading from the file.

Table 3.8 Set BBU Properties

Convention	<code>MegaCli -AdpBbuCmd -SetBbuProperties -f<fileName> -aN -a0,1,2 -aALL</code>
-------------------	--

Table 3.8 Set BBU Properties (Cont.)

Description	<p>Sets the BBU properties on the selected controller(s) after reading from the file. The information displays in the following formats: autoLearnPeriod = 1800Sec nextLearnTime = 12345678Sec Seconds past 1/1/2000 learnDelayInterval = 24hours Not greater than 7 days autoLearnMode = 0 0 – Enabled, 1 - Disabled, 2 – WarnViaEvent.</p> <p>1. NOTE: You can change only two of these parameters, learnDelayInterval and autoLearnMode.</p>
--------------------	---

3.1.3 Monitoring the Battery Assembly with MegaRAID Storage Manager

When MegaRAID Storage Manager software is running, you can monitor the status of the battery assembly connected to controllers in the server.

If the battery assembly is operating normally, the icon looks like this: If it has failed, a red dot appears next to the icon.

To show the properties for the battery assembly, perform the following steps:

1. Click the **Physical** tab to open the physical view.
2. Select the BBU icon in the left panel.
3. Click the **Properties** tab.

The BBU properties, such as the battery type, temperature, and voltage, appear. The BBU properties include the following:

- The number of times the BBU has been recharged (**Cycle Count**)
- The full capacity of the BBU, plus the percentage of its current state of charge, and the estimated time until it will be depleted
- The current BBU temperature, voltage, current, and remaining capacity
- If the battery is charging, the estimated time until it is fully charged

3.1.3.1 Battery Learn Cycle

Learn Cycle is a battery calibration operation performed by the controller periodically to determine the condition of the battery. You can start battery learn cycles manually or automatically. To choose automatic

battery learn cycles, enable automatic learn cycles. To choose manual battery learn cycles, disable automatic learn cycles.

If you enable automatic learn cycles, you can delay the start of the learn cycles for up to 168 hours (7 days). If you disable automatic learn cycles, you can start the learn cycles manually, and you can choose to receive a reminder to start a manual learn cycle.

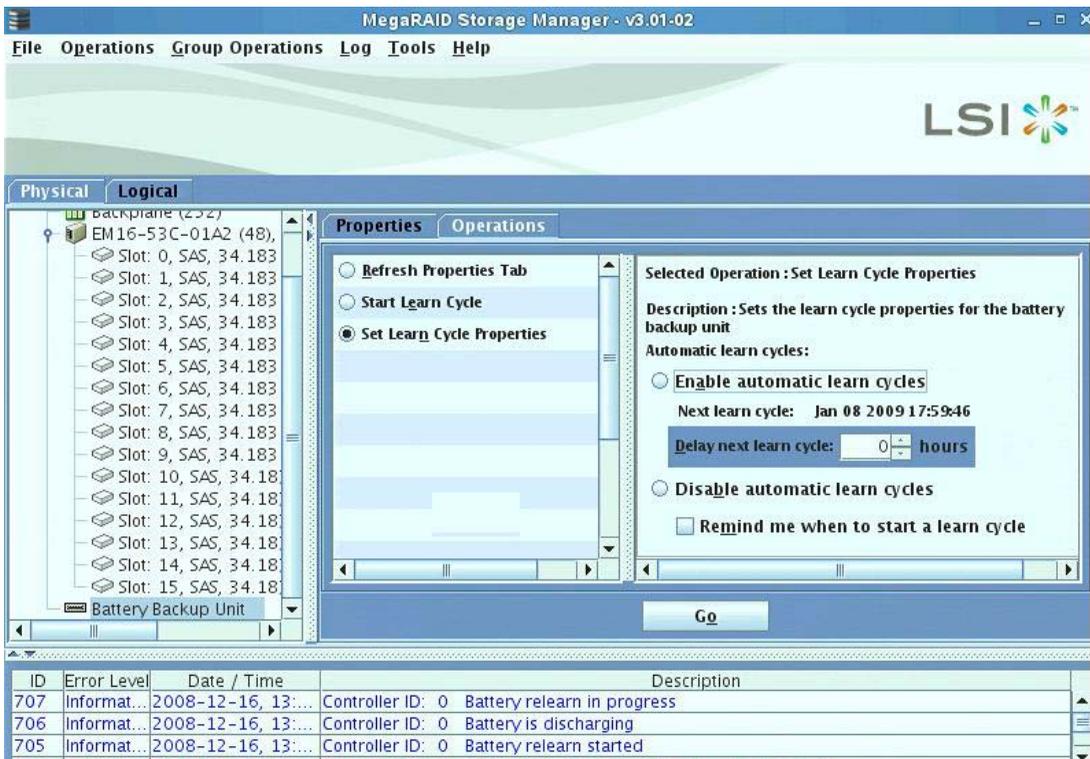
3.1.3.2 Setting the Learn Cycle Properties

To set the learn cycle properties, perform the following steps:

1. Click the **Physical** tab to open the physical view.
2. Select the BBU icon in the left panel.
3. Click the **Operations** tab.

The BBU operations appear, as shown in [Figure 3.4](#).

Figure 3.4 Battery Assembly Operations



4. Select **Set Learn Cycle Properties**.

The options appear in the right frame.

5. To enable automatic learn cycles, click **Enable automatic learn cycles** and click **Go**.

You can delay the start of the next learn cycle by up to 7 days (168 hours) using the **Delay next learn cycle** field.

6. To disable automatic learn cycles, click **Disable automatic learn cycles** and click **Go**.

You can start the learn cycles manually. In addition, you can check the box next to the field **Remind me when to start a learn cycle** to receive a reminder to start a manual learn cycle.

3.1.3.3 Starting a Learn Cycle Manually

To start the learn cycle properties manually, perform the following steps:

1. Click the **Physical** tab to open the physical view.
2. Select the BBU icon in the left panel.
3. Click the **Operations** tab.

The BBU operations appear, as shown in [Figure 3.4](#).

4. Click **Start Learn Cycle** and click **Go**.

Another method to use the BBU operations is to right-click the BBU icon to open the operations menu and select **Start Learn Cycle**.

3.2 Replacing the ServeRAID M5000 Series Battery Assembly

For optimal performance, replace the ServeRAID M5000 Series Battery Assembly once a year. See the *Warranty and Support Information* document for the replacement battery part number.

When you install a new battery assembly, the battery recharge cycle counter for the battery assembly is automatically set to zero. For instructions on installing the battery assembly, see [Chapter 2, “Installing the ServeRAID M5000 Series Battery Assembly”](#).

CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

3.3 Transferring Cached Data from a Failed Controller

If you are using a ServeRAID SAS/SATA controller with the battery assembly, and if the controller fails when there is data in the cache that has not been written to disk, you can save the cached data. To do so, remove the battery assembly from the failed controller and install it on a new controller. To save the data, the following conditions must be met:

- The new controller on which you install the BBU must be the same model as the failed controller
- The replacement controller must have a *cleared configuration*
- The new controller must be connected to the same drives that the failed controller was connected to

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

Attention: Be sure to ground yourself before you touch the controller and the BBU.

1. Shut down the computer, turn off the power, and unplug the power cords.
2. Remove the cover from the computer according to the instructions in the system user's manual so that you can access the controller.
3. Ground yourself before you touch the controller.
4. Unplug all cables from the controller, remove the screw attaching the bracket to the computer case, and carefully remove the failed controller from the slot.
5. Remove the battery assembly from the failed controller.
6. Install the battery assembly on the replacement controller.

Note: See [Chapter 2, “Installing the ServeRAID M5000 Series Battery Assembly”](#) for instructions about how to install the battery assembly on your controller and about how to install the controller in a system.

7. Install the replacement controller in the computer and connect it to the drives.
8. Reinstall the computer cover and reconnect the power cords.
9. Turn on the power to the computer.

Note: A replacement battery may take multiple relearn cycles to become fully operational.

The replacement controller will then read the disk configuration into NVRAM and flush the cached data to the logical drives.

3.4 Resolving a Configuration Mismatch

If the replacement controller 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 drives are different. To resolve this, update the configuration data in the NVRAM with the data from the physical disk. To update the configuration data, 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 on the physical disk.

3. Select the configuration on the drive.
4. Press **ESC**, and select **YES** to update the NVRAM.

Press **ESC** to exit, and then reboot the computer.

3.5 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. IBM 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.

See the *Warranty and Support Information* document for battery-disposal instructions.

Chapter 4

Battery Backup Unit Specifications

This chapter includes technical information and specifications for the ServeRAID M5000 Series Battery Assembly. The second section lists information about battery life and data retention time. Click on the following links to access detailed BBU specifications:

- [Section 4.1, “Battery Assembly Specifications”](#)
- [Section 4.2, “Battery Life and Data Retention Time”](#)

4.1 Battery Assembly Specifications

The following specifications apply to the battery assembly:

- **Battery type:** LiON, Li-Poly cell
- **Battery operating ambient temperature:** 10–44.5 °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

Table 4.1 Specifications

	Battery Assembly
Fast Charge Rate	500 mAH
Trickle Charge Rate	N/A
Battery Pack	1 cell
Mechanical	2.611” x 2.122”
Battery Capacity	1350 mAH

Table 4.1 Specifications

	Battery Assembly
Charge Circuitry Card	Yes
Memory Technology	DDR2 SDRAM (1.8V)
Battery Charge Time	~4 hours
Socket Type	N/A
Module Support	DDR2
Cache Memory Size Supported	128 MB - 512 MB
Memory Bus Speed	667 MHz
Memory Bus Width	Maximum 72 bit
Error Correcting Capability (ECC)	N/A
Auxiliary	Yes ¹

1. This battery product has the ability to detect the presence of an external auxiliary power source. Circuitry on this product automatically chooses auxiliary power to maintain cache contents, deferring battery discharge until auxiliary power is removed or exhausted. Presence of an auxiliary power source thus increases the overall data retention time (DRT) ratings in [Table 4.2](#).

4.2 Battery Life and Data Retention Time

The MegaRAID utilities display a counter showing the number of times the battery assembly 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 recommends that you replace the battery pack on the BBU once a year. The warranty on the battery pack is good for one year.

The data retention time shown in [Table 4.2](#) is 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 installed DIMMs
- DRAM size

Table 4.2 Reference Data Retention Times

BBU Name	Data Retention Times
ServeRAID M5000 Series	- 72 hours for 512 Mbytes, using five 64 Mx16 parts DDR2 (low power)
Battery Assembly	- 72 hours for 256 Mbytes, using five 32 Mx16 parts DDR2 (low power)
	- 72 hours for 128 Mbytes, using five 16 Mx16 parts DDR2 (low power)

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