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Preface

Notices

The information in this document is subject to change without notice.

While every effort has been made to ensure that all information in this document is accurate, the Authors accept no liability for any errors that may arise.

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What is in this guide

This user guide gives you step-by-step instructions on how to install, configure and connect the 12big Rack Storage Server system, and how to use and maintain the system.

Who should use this guide

This user guide assumes that you have a working knowledge of storage application products. If you do not have these skills, or are not confident with the instructions in this guide, do not proceed with the installation.

Qualified Personnel

The personnel referred to within this document are defined as follows:

- ✦ Service Person: A person with appropriate technical training and experience necessary to avoid any hazards when working on the equipment.
- ✦ User/Operator: Any person other than a Service Person.

Related Documentation

- ✦ 12big Rack Storage Server Quick Installation Guide.
- ✦ Intel IPMI v2.0 Specification.

Revision History

Version	Date	Description of Change
1.0	xx-xx-xx	First release.

1. Safety Guidelines

1.1. Safe Handling

CAUTION: If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

All plug-in modules and blanking plates are part of the fire enclosure and must only be removed when they can be immediately replaced. The system must not be run without all units in place. In order to comply with applicable safety, emission and thermal requirements no covers should be removed and all bays must be fitted with plug-in modules.

Permanently unplug the unit if you think that it has become damaged in any way.

Unplug the unit before moving it.

CAUTION: A fully assembled 12big Rack Storage Server can weigh up to 32kg (71lb) or 18kg (40lb) without drives installed. Do not try to lift it by yourself.

Table 01 - Lifting Warning Label

IMPORTANT INFO: The removal of the enclosure top cover or the power supply mounting cage must only be performed by a service person. Potential hazards include rotating fans and hot surfaces.

The enclosure top cover must be secured when the enclosure is in normal use by rotating the lock 90° to the "locked" position (this is to prevent users/operators from accessing service areas).

1.2. Safety

The 12big Rack Storage Server must only be operated from a power supply input voltage range of 100 to 240 VAC, 50 to 60 Hz.

Make sure that the socket outlets are located near the equipment and are easily accessible.

This equipment is intended to operate with two working Power Supply Units (PSUs) housed in a power supply mounting cage. Before removal/replacement of a PSU, disconnect all supply power for complete isolation.

Fig. 01 - Power Supply Mounting Cage Warning Label

A faulty PSU must be replaced with a fully operational PSU within 24 hours. Refer to section *11.3. Environment*.

A safe electrical earth connection must be provided to the power cord. Check the grounding of the enclosure before applying power.

Fig. 02 - Warning Label – Earthed Mains Socket

Provide a suitable power source with electrical overload protection to meet the requirements laid down in the technical specification.

Bifurcated power cords MUST NOT be used with the 12big Rack Storage Server – they are not supported.

Hot surfaces (heatsinks) are exposed when the enclosure top cover is removed. Disconnect power and allow the enclosure to cool before working inside the system.

Fig. 03 - SAS Expander Cover Warning Label

Rotating fan blades are exposed when the enclosure top cover is removed.
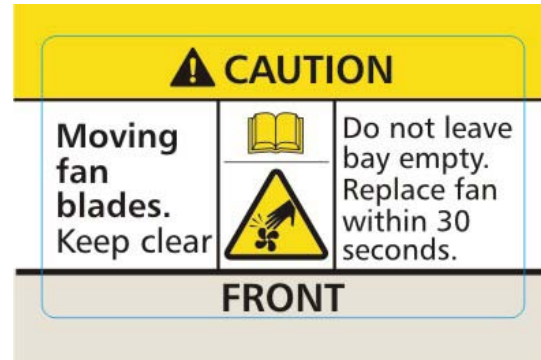
Fig. 04 - Fan Caution Label

When pulled out from the rack, the enclosure must not be used as a shelf to support any other object.

Fig. 05 - Shelf Caution Label

CAUTION: Do not remove covers from the PSU: there is a danger of electric shock inside. Return faulty PSUs to LaCie for repair.

1.2.1. Battery Precautions

CAUTION: There is a danger of explosion if the battery is replaced by an incorrect type.

Dispose of used batteries in accordance with the manufacturer's instructions and national regulations. Equipment Handling Precautions

IMPORTANT INFO: Operation of the enclosure with ANY drive carrier modules missing will disrupt the airflow and the system will not receive sufficient cooling. It is ESSENTIAL that all apertures are filled before operating the unit. Dummy drive carrier modules must be fitted to unused drive bays.

The RJ45 sockets on the motherboard/PCI cards are for Ethernet connection only and must not be connected to a telecommunications network.

Drives are fragile and must be handled with care during removal/replacement.

1.3. Rack System Safety Precautions

The rack construction must be capable of supporting the total weight of the installed enclosure(s) and the design should incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or in normal use.

When loading a rack with the units, fill the rack from the bottom up and empty the rack from the top down.

Before loading the chassis into a rack, remove all PSU modules and drives to minimize weight.

CAUTION: To avoid danger of the rack toppling over, under no circumstances should more than one enclosure be drawn out of the cabinet at any one time.

The back pressure created by rack doors and obstacles must not exceed 5 pascals (0.5mm water gauge).

The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 35°C.

The rack should have a safe electrical distribution system. It must provide overcurrent protection for the unit and must not be overloaded by the total number of units installed in the rack. When addressing these concerns, consider the electrical power consumption rating shown on the product.

The electrical distribution system must provide a reliable earth for each unit and for the rack.

Each Power Supply Unit has an earth leakage current of 1.4mA. The design of the electrical distribution system must take into consideration the total earth leakage current from all the power supplies in all the units. The rack requires labelling with the following: "HIGH LEAKAGE CURRENT. Earth connection essential before connecting supply".

When configured, the rack must meet the safety requirements of UL 60950-1:2005 (2nd edition) and IEC 60950-1 2nd edition.

1.4. Note to Australian Customers

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Contact us:

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Phone: 02 8063 3711

Email: info.au@lacie.com

For fast technical support, create a support ticket after registering your product at http://www.lacie.com/au/register.

2. System Overview

2.1. The 12big Rack Storage Server

The 12big Rack Storage Server is a 2U sized disk drive enclosure, housing up to twelve low profile (1 inch high), 3.5 inch form factor drives of the following types:

✦ 3.0/6.0Gb/s SAS (up to 15000 rpm).

✦ 3.0Gb/s SATA (up to 7200 rpm).

IMPORTANT INFO: A mixed population of both drive types is supported but drive types cannot be mixed within individual columns.

Each individual disk drive is hot pluggable and field replaceable.

Fig. 06 shows a front view of an 12big Rack Storage Server while *Fig. 07* depicts a rear view with the lid removed, showing those areas accessible to service personnel only.

Fig. 06 - The 12big Rack Storage Server – front view
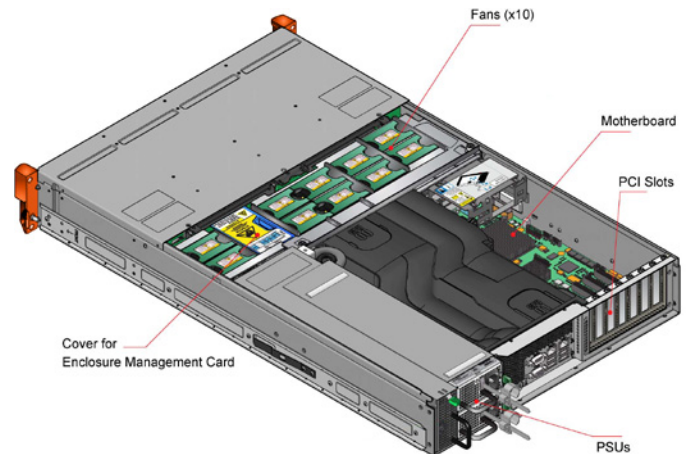
Fig. 07 - The 12big Rack Storage Server – rear view showing service areas

2.2. The Enclosure Core Product

The 12big Rack Storage Server is an enclosure subsystem together with a set of plug-in modules and (as supplied) comprises:

✦ An enclosure chassis comprising:

– A backplane PCB.

– An Enclosure Management Card (EM Card).

– An integral Operator's (Ops) Panel.

– An integral rear panel, incorporating an Enclosure ID LED (see *Fig. 14*).

– A power supply mounting cage containing two 850W, 100-240V AC auto-ranging, plug-in Power Supply Units (see *Fig. 12*).

✦ An ATX server subsystem. Refer to section *2.4. ATX Server Subsystem* for details.

✦ A cooling cage, containing 10 high speed single rotor axial fans which are individually pluggable.

✦ Up to 12 drive carrier modules with 3.5" drives installed (see *Fig. 14*). Dummy drive carrier modules must be fitted in all unused drive bays.

✦ Boot options. One of the following boot options may be chosen for inclusion within the required configuration:

a. Front drives with pre-installed OS
b. An eUSB (Embedded Universal Serial Bus) flash drive.
c. A compact flash card in a PCI card adapter.

✦ A rack mounting rail kit for mounting the enclosure in a 19" rack.

The high speed serial architecture of the 12big Rack Storage Server provides three 4-lane connections from the EM Card to the HBA.

Module and major component locations are shown in *Fig. 07*.
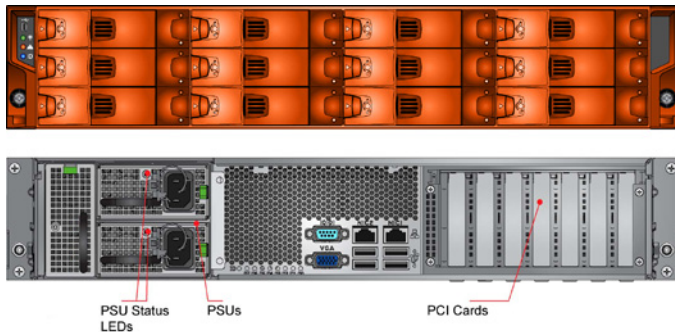
Fig. 08 - Module Locations

2.3. Enclosure Chassis

The chassis consists of a sheet metal enclosure assembly containing an integrated backplane PCB, Enclosure Management Card (with audible alarm) and drive carrier runner system.

The chassis is fitted with 19 inch rack mounting features which enables it to be fitted to standard 19 inch racks and uses 2U (3.5") of rack space.

The backplane PCB provides 12 direct dock SAS / Serial ATA connectors to the drives and acts as the connectivity hub of the enclosure, connecting to the EM Card.

The ten cooling fans are connected to the system via the EM Card.

There are 12 drive bays at the front of the enclosure. Each drive bay accommodates a plug-in drive carrier module which houses low profile (1 inch) high 3.5 inch form factor drives.

NOTE: A bay is defined as the space required to house a single 1.0" high 3.5 inch disk drive in its carrier module.

At the rear, the chassis assembly accommodates two Power Supply Units and the ATX server subsystem.

The top cover on the enclosure provides access to the cooling fans and the ATX server subsystem.

IMPORTANT INFO: The cover should only be removed by service personnel as it provides access to a service area.

Upon replacement, the cover MUST be secured by turning the lock mechanism to the "locked" position with a screwdriver (see *Fig. 09*).
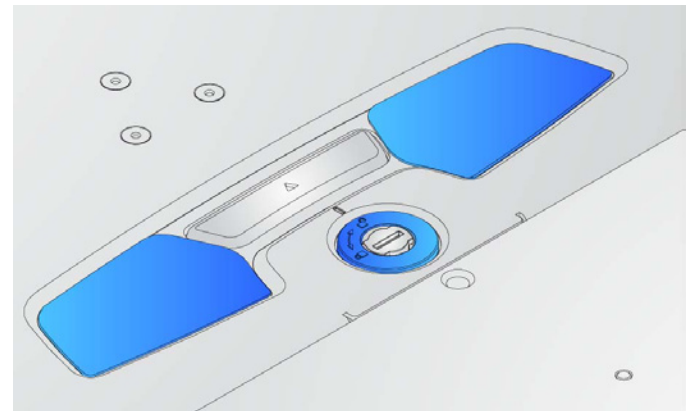
Fig. 09 - Lid Set to the "Locked" position

2.4. ATX Server Subsystem

The ATX server subsystem comprises:

✦ A 12big Rack Storage Server ATX motherboard.

✦ Slots for up to 7 low profile PCI Express cards. Blank PCI plates are fitted in the empty slots.

2.4.1. ATX Server I/O Panel Connectors

The ATX server I/O panel incorporates the following connectors:

✦ 1 x serial port.

✦ 1 x VGA video port.

✦ 2 x RJ45 gigabit Ethernet ports. Boot from LAN capability (PXE) is available on these ports. It can be enabled in the ATX server BIOS via the "Advanced -> Onboard LAN Configuration" option.

✦ 4 x USB 2.0 ports.

✦ 2 x RJ45 additionnal gigabit Ethernet port on PCIe card.

✦ 1 x Mini SAS connector for 6Gb/s JBOD storage expansion.

The connectors are shown in *Fig. 10*.
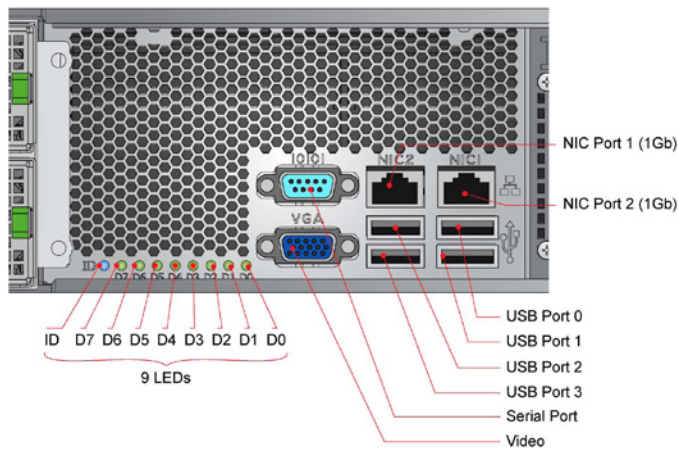
Fig. 10 - ATX Server I/O Components

2.4.2.   PCI Express Slots

The motherboard has seven PCI Express slots, as detailed in *Table 02*.

Table 02 - PCI Express Slots

Slot Number	Color	Type	Connector
1	Blue	Gen2 x8	x8
2	White		
3	Blue		
4	Black	Gen2 x4	x8
5			
6			
7	White	Gen1 x4	x8

NOTE: 2 PCIe slots are used for HW RAID controller and additional dual gigabit Ethernet card.

2.4.3.   Memory Slots

The 12big Rack Storage Server supports up to 96GB of DDR3 memory. There are 12 memory slots, 6 per CPU, divided into 3 channels of up to 2 modules each.

The motherboard takes DDR3, 1.5V typical, ECC, registered or unbuffered, x4 or x8 memory with up to 4 ranks per module. The maximum module size is 8GB.

2.4.4.   TPM (Trusted Platform Module)

The motherboard has one TPM 1.2 header for connection of a Trusted Platform Module. This can be used to store cryptographic keys, digital certificates and passwords.

2.4.5.   ATX Server LEDs

2.4.5.1. Server Status LEDs

The ATX Server I/O panel, shown in Figure 2–5, contains diagnostic LEDs to help you identify failed and failing components and to help you identify the server from among several servers. Section *4.4.6.1. Server Status LEDs* summarizes the LED states.

2.4.5.2. Network Port LEDs

The network port LEDs provide the information shown in *4.4.6.2. Network Port LEDs*.

2.4.5.3. ID LED

This is the enclosure identification LED (there is a duplicate LED on the Ops Panel).

2.5.   eUSB Flash Drive

The motherboard supports a solid state flash drive with a USB 2.0 interface.

The eUSB flash drive can be set up in the ATX server's BIOS, by selecting the "Advanced -> USB Configuration" option.

2.6.   Operator's (Ops) Panel

The enclosure front panel incorporates an Operator's (Ops) Panel, shown in *Fig. 11*.

Important The Ops Panel is an integral part of the enclosure chassis assembly and is not field replaceable.

This assembly incorporates a USB socket, three LEDs and three buttons, with the following functions:

✦ LEDs:
  – Green: The enclosure is powered on.
  – Amber: The enclosure has detected a fault (this LED can be overridden by the customer using SES).
  – Blue: Enclosure identification LED.

✦ Buttons:
  – On/off: Powers the system on or off (if held down for at least four seconds). However, note that the system should

be shut down using the procedure in *4.2. Powering Off the Enclosure*.

- – System reset: Reboots the hardware and firmware. Use the tip of a ballpoint pen to press the recessed button.
- – ID LED: Toggles the blue enclosure identification LED; mutes the audible alarm.
- ✦ USB port. This is a Micro USB Type B port connected to the ATX motherboard. This can be treated as a general purpose USB port.

Refer to section *4.4.1. Ops Panel LEDs and Switches* for a full description of the LED and switch functions.
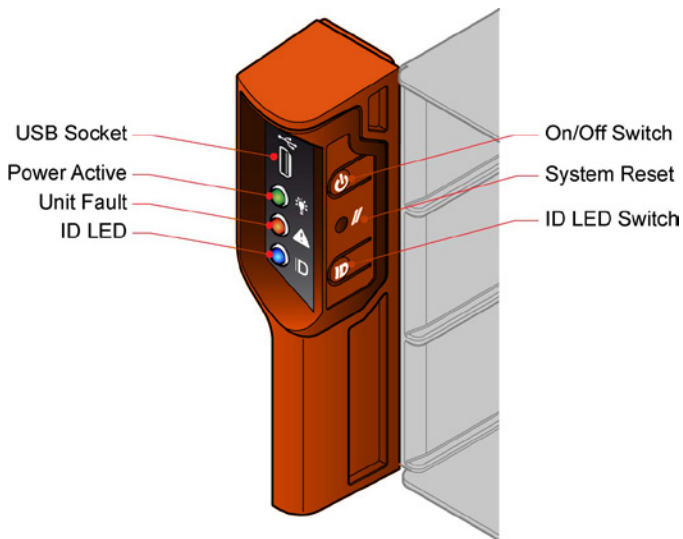
Fig. 11 - Enclosure Front Operator's Panel

2.7. Enclosure Rear Panel

The enclosure assembly includes an integral rear panel, incorporating an enclosure ID LED (blue), shown in *Fig. 10*. This LED is activated by the button on the Ops Panel or by system software, and can be used to identify the server from among other units.

IMPORTANT INFO: The Rear Panel is an integral part of the enclosure chassis assembly and is not field replaceable.

2.8. Power Supply Unit

AC/DC power is provided by two commercial dual-redundant Power Supply Units.

A Power Supply Mounting Cage is fitted in the rear of the enclosure. The cage houses two individually hot-pluggable 850W AC Power Supply Units (PSUs), each with its own IEC inlet connector and failure indicator.
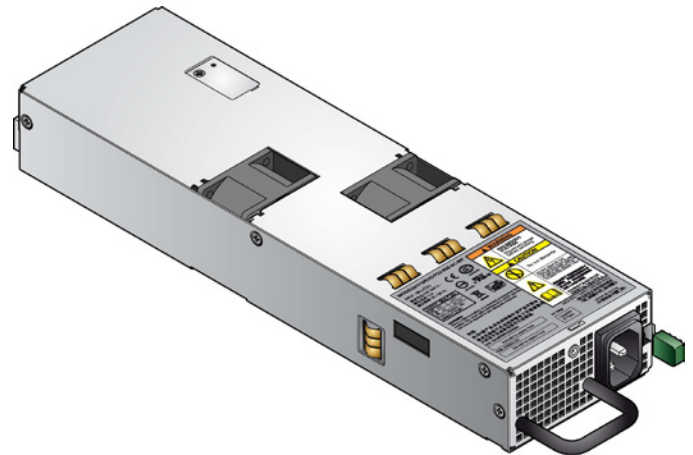
Fig. 12 - Power Supply Unit

PSU voltage operating ranges are nominally 100V to 240V AC, selected automatically. A typical PSU is shown in *Fig. 12*.

2.8.1. Multiple Power Supply Units

The 12big Rack Storage Server includes two PSUs fitted in the Power Supply Mounting Cage, providing dual power sources for the system so that if one PSU fails the other maintains the power supply and enclosure operation is not affected while the faulty unit is replaced.

PSU replacement should only take a few minutes to perform but must be completed within 10 minutes of removing the failed PSU.

IMPORTANT INFO: Operation of the enclosure with ANY modules missing will disrupt the airflow and the system will

not receive sufficient cooling. It is ESSENTIAL that all apertures are filled before operating the unit.

2.9. Cooling Fans

The cooling fans are high speed single rotor axial fans. Ten fans are housed in a cooling cage, located centrally within the enclosure, between the drive bays and the motherboard, as shown in *Fig. 07*. This allows maximum airflow through the system and minimizes noise.
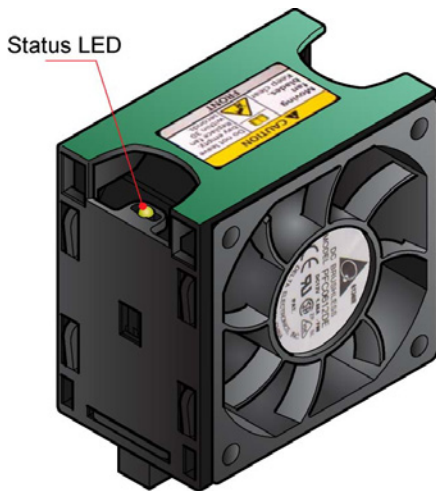
Fig. 13 - Cooling Fan Module

Airflow is from front to rear, with cooling air being drawn across the drives, through the fans and pressurizing the rear of the enclosure. The pressurized rear allows the PSU to draw the air that it requires, and perforations at the rear of the chassis allow cooling airflow over the processor heatsinks, memory, motherboard and PCI cards.

Back pressure created by rack doors and obstacles is not to exceed 5 pascals (0.5mm water gauge).

The cooling system provides sufficient airflow to make sure that drive maximum temperatures are not exceeded when the enclosure is at 35°C ambient (sea level) and one fan has failed.

The cooling cage contains ten individual high speed single rotor axial fans, individually connected to and interfacing with the EM Card. This interface provides power and speed control to the fans and returns tachometer output from each fan.

2.10. Drive Carrier Module

The drive darrier module comprises a hard disk mounted in a carrier. Each drive bay houses a single low profile 1.0 inch high, 3.5 inch form factor disk drive in its carrier. The carrier has mounting locations for SAS/SATA drives.

Each disk drive is enclosed in a sheet steel carrier which provides excellent thermal conduction, radio frequency and electro-magnetic induction protection and affords the drive physical protection.

The front cap features an ergonomic handle which provides the following functions:

✦ Camming of carrier into and out of drive bays.

✦ Positive 'spring loading' of the drive/backplane connector.
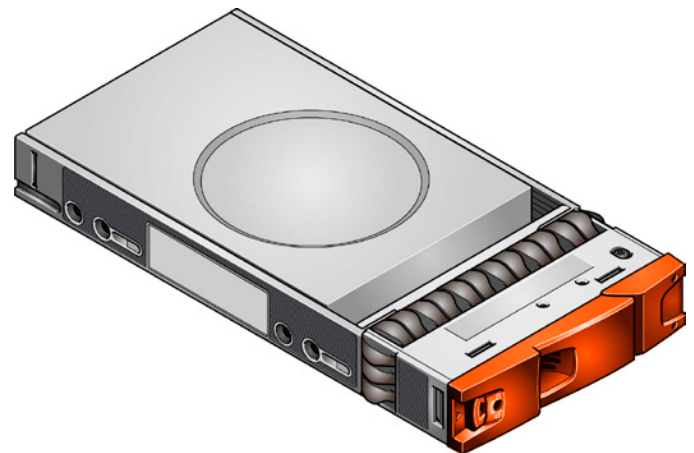
Fig. 14 - Drive Carrier Module

2.10.1. Drive Status Indicator

Disk drive status is monitored by green and amber LEDs mounted on the front of each drive carrier module, under GEM control (see *Fig. 15*). Refer to section *4.4.3. Drive Carrier LEDs* for a description of the LED states.

The behavior of these LEDs can be overridden by the customer via SES.

2.10.2. Anti-Tamper Locks

Anti-tamper locks are fitted in the drive carrier handles (*Fig. 15*) and are accessed through the small cutout in the latch section of the handle. These are provided to disable the normal 'pinch' latch action of the carrier handle.
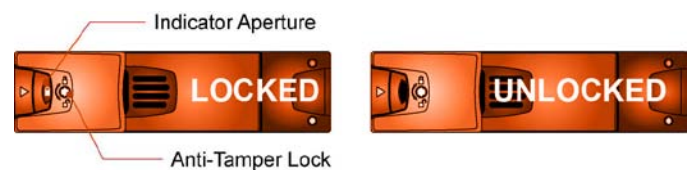
Fig. 15 - Anti-tamper Lock

2.10.3. Mixed Drive Types

SAS and SATA drives may be mixed within an enclosure but drives of a similar type and rotation speed should be mounted within the same column of the enclosure.

2.10.4. Dummy Drive Carrier Modules

Dummy drive carrier modules are provided for fitting in all unused drive bays. They are designed as integral drive module front caps with handles and must be fitted to all unused drive bays to maintain a balanced airflow.

2.10.5. Blanking Plates

Blanking plates must be fitted in any vacant PSU bay or PCI card slots at the rear of the enclosure to maintain airflow and allow correct operation.

CAUTION: Operation of the enclosure with ANY modules missing will disrupt the airflow and the drives will not receive sufficient cooling.

3. Installation

3.1. Introduction

In this chapter, you are shown how to install the 12big Rack Storage Server into an industry standard 19 inch rack cabinet.

NOTE: 12big Rack Storage Server are supplied and delivered fully populated with drive carrier modules preinstalled.

CAUTION: The 12big Rack Storage Server with all its component parts installed is too heavy for a single person to easily install into a rack cabinet.

The following procedures describe the installation of the 12big Rack Storage Server and highlight any critical requirements and good handling practices which you must follow in order not to void the warranty.

CAUTION: Make sure that you have fitted and checked a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling 12big Rack Storage Server modules and components. Avoid contact with the backplane, motherboard, PCI card components, module connectors, etc.

CAUTION: When connecting up the 12big Rack Storage Server, use only the power cords supplied or cords which match the specification quoted in section *12.7. AC Power Cords*.

3.2. Pre-Installation

3.2.1. System Components

Before you begin installation you should become familiar with the configuration requirements of your 12big Rack Storage Server. The correct locations of each of the plug-in modules are shown in *Fig. 16*.

IMPORTANT INFO: Installation procedures should be performed by service personnel only.

Table 03 - 12big Rack Storage Server Configuration

Module	Location
Drive Bays	ALL drive bays must be fitted with a drive carrier module. No bays should be left completely empty.
Power Supply Modules	Two Power Supply Units must be fitted. When two PSUs are installed in the Power Supply Module, full power redundancy is provided while a faulty PSU is replaced.
Cooling Fans	Ten fans, housed in a cooling cage, are located centrally within the enclosure, installed between the drive bays and the ATX motherboard.
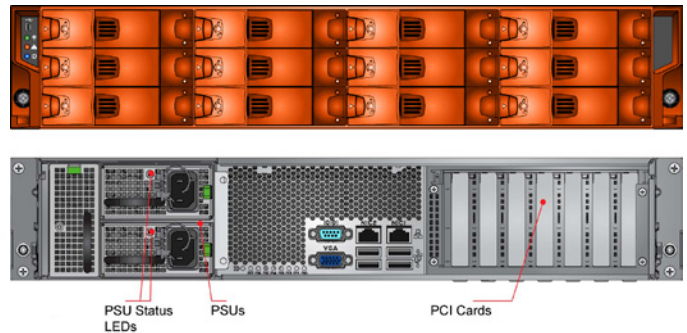
Fig. 16 - Module locations

3.2.2. Preparation of Site

Before you begin, make sure that the site where you intend to set up and use your 12big Rack Storage Server has standard AC power from an independent source or a rack Power Distribution Unit with a UPS (uninterruptible power supply).

3.2.3. Rack Precautions

The following safety requirements must be considered when the unit is mounted in a rack:

✦ The rack design should incorporate stabilizing features suitable to prevent the rack from tipping or being pushed over during installation or in normal use.

✦ When loading a rack with the units, fill the rack from the bottom up and empty from the top down.

✦ The rack should have a safe electrical distribution system. It must provide overcurrent protection for the unit and must not

be overloaded by the total number of units installed in the rack. Consideration of the electrical power consumption rating shown on the unit's nameplate should be used when addressing these concerns.

✦ The electrical distribution system must provide a reliable earth for each unit in the rack.

✦ Each power supply in each unit has an earth leakage current of 0.75mA. The design of the electrical distribution system must take into consideration the total earth leakage current from all the power supplies in all the units. The rack will require labelling with "HIGH LEAKAGE CURRENT. Earth connection essential before connecting supply".

✦ The rack, when configured with the units, must meet the safety requirements of UL 60950-1:2005 (2nd edition) and IEC 60950-1 2nd edition.

3.2.4. Rack Installation Pre-Requisites

The 12big Rack Storage Server is designed for installation into an industry standard 19 inch rack cabinet subject to the following requirements:

✦ There must be a minimum depth of 707mm (27.83 inches) from rack posts to maximum extremity of enclosure (excluding rear cabling).

✦ The rack must be able to support enclosures weighing up to 32kg (71lb).

✦ There must be a minimum gap of 25mm (1 inch) between the rack cover and front of the enclosure

✦ There must be a minimum gap of 50mm (2 inches) between the rear of the enclosure and the rear of the rack in order to maintain the correct air flow around the enclosure.

✦ Use in a fully enclosed rack installation is not recommended.

✦ The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 35°C.

✦ The system must be operated with low pressure rear exhaust installation. The back pressure created by rack doors and obstacles must not exceed 5 pascals (0.5mm water gauge).

CAUTION: Operation of the enclosure system with ANY modules missing will disrupt the airflow and the system will not receive sufficient cooling. It is ESSENTIAL that all apertures are filled before operating the unit. Dummy drive carriers and/or blanking plates are available for this purpose.

3.3. Unpacking the Enclosure System

CAUTION: An enclosure can weigh up to 32kg (71lb). Do not try to lift it by yourself. Do not lift the enclosure by the handles on the battery modules – they are not designed to take the weight.

1. Inspect the packaging for crushes, cuts, water damage or any other evidence of mishandling during transit. If any damage appears present, photograph the packaging for reference before opening.

2. Unpack the system (see *Fig. 17*).

Ancillaries Box
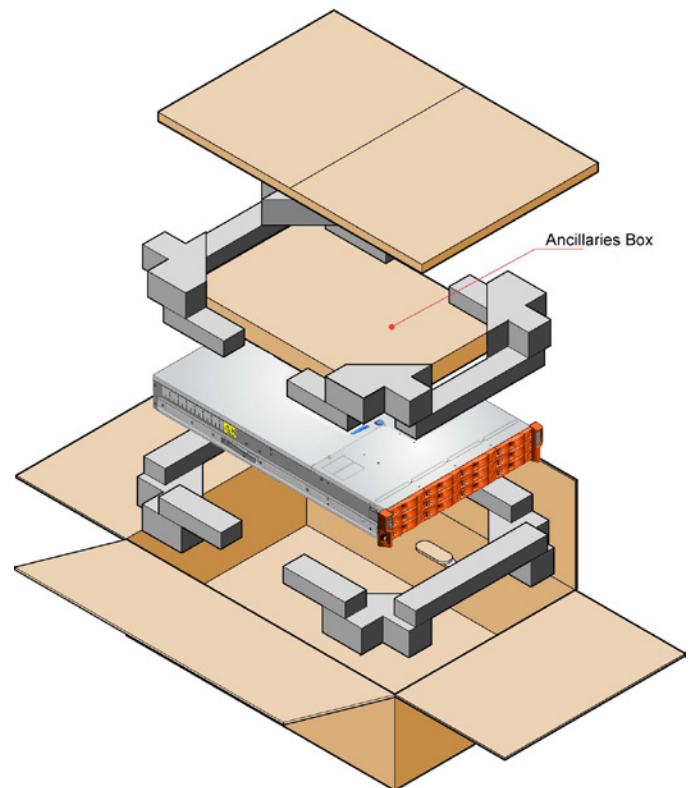
Fig. 17 - Unpacking the System

3.4. Installation

3.4.1. Equipment

The following equipment is required for installation:

- ✦ The enclosure chassis, including the following:
  - – Backplane PCB.
  - – ATX motherboard.
  - – Enclosure Management Card (EM Card).
  - – Ops Panel.
  - – Blanking plates covering empty PCI slots.
- ✦ Power cord.
- ✦ Rack kit (if installing within a rack). Refer to LaCie for a list of qualified accessories for use with the enclosure. The Accessory Box contains the power cords and other ordered accessories.
- ✦ Flat blade screwdriver (not supplied).
- ✦ Torx driver (for drive module locks).

3.4.2. Mounting the System into a Rack

The rail kit is suitable for 19" racks with square and round holes only.

- ✦ The minimum distance between vertical rack posts is 24" (610mm)
- ✦ The maximum distance between vertical rack posts = 36" (914mm)

Tools required:

- ✦ No.2 Phillips screwdriver or flat bladed screwdriver.

Installation procedure:

1. Remove the rack mounting rail kit from the accessory box and check for damage.

2. Ensure the pre-assembled rail is at its shortest length.

3. Locate the rail location pins inside the front of the rack post (see *Fig. 18*). (The rail location pins are pre-assembled to suit square hole or round hole racks. These pins should not be removed.)

4. Extend the rail to enable the rear location pins to locate in the rear rack post.

5. Ensure the pins are securely located at both the front and rear, so that any load on the rail is transferred to the rack posts.
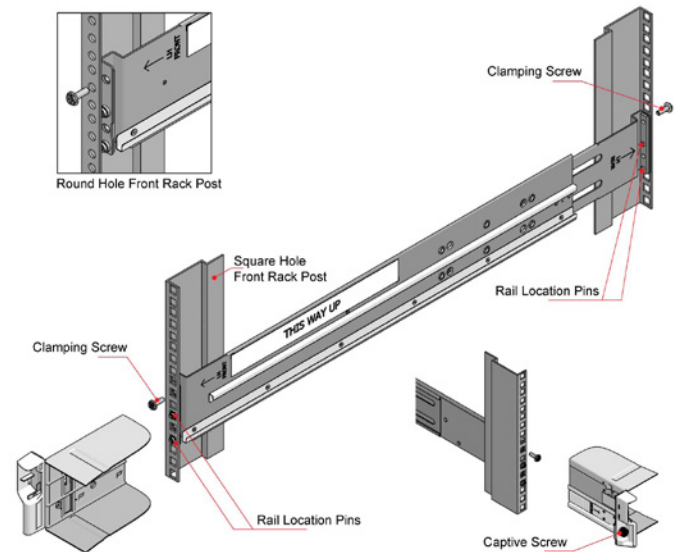
Fig. 18 - Securing Brackets to Rack

6. Install the front and rear clamping screws, marked (3) in *Fig. 18*. There are 4 screws in total – left and right sides, front and rear. The screws should be left loose enough to allow the rail to move sideways in its slots.

7. Slide the chassis fully home on the rails (*Fig. 19*).

8. Withdraw the chassis approximately 200mm and fully tighten the front and rear rail clamping screws.

9. Fasten the front of the chassis using the two captive screws as shown.
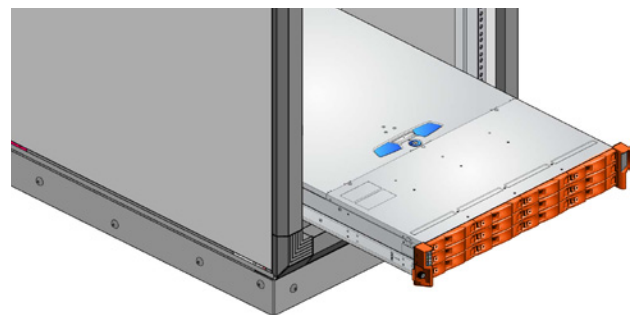
Fig. 19 - Mounting the System into a Rack

IMPORTANT INFO: Chassis rails have features to restrict chassis withdrawal while allowing access to fans. If it becomes necessary to remove the chassis completely, pull the chassis out until it reaches its stops, then press in the latches on the side of the enclosure (see *Fig. 20*) before continuing to fully withdraw the chassis.
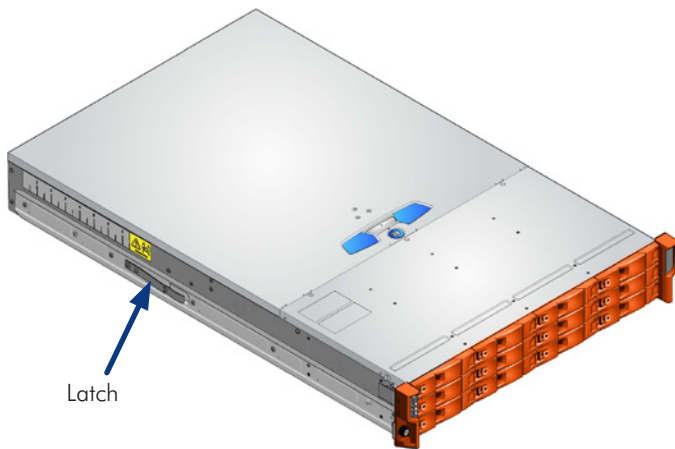
Latch

Fig. 20 - Latch Position

3.4.3.   Installing the Modules

12big Rack Storage Servers are supplied and delivered populated with all components and plug-in modules installed.

For information on removal/replacement of plug-in modules, refer to *8. Module Removal and Replacement*.

IMPORTANT INFO: Dummy drive carrier modules must be fitted in all unused drive bays to maintain a balanced airflow.

IMPORTANT INFO: Blanking plates must be fitted in any vacant PSU bay or PCI card slots at the rear of the enclosure to maintain airflow and allow correct operation. Operation of the enclosure system with ANY modules missing will disrupt the airflow and the drives will not receive sufficient cooling.

3.4.4.   Connecting the Power Cords

1. Attach the power cords to the two Power Supply Units.

IMPORTANT INFO: To provide AC power failure redundancy the two power cords must be connected to separate and independent AC power sources.

2. The Power On LED on each PSU indicates whether AC mains power is present (flashing green).

CAUTION: The power connections must always be disconnected prior to removal of the Power Supply Unit from the enclosure.

IMPORTANT INFO: If bifurcated power cords are used, there will be no independent power source redundancy.

3.4.5.   Grounding Checks

CAUTION: The product must only be connected to a power source that has a safety electrical earth connection.

Before switching on, the earth connection to the rack must be checked by an electrical engineer who is qualified to the appropriate local and national standards to perform the check.

4. Operation

4.1. Powering On the Enclosure

CAUTION: Do not operate the subsystem until the ambient temperature is within the specified operating range. If the drives have been recently installed make sure they have had time to acclimatize before operating them.

1. Before powering up the enclosure make sure that all the modules are firmly seated in their correct bays.

IMPORTANT INFO: All drive and PSU apertures must be filled in order for the enclosure to receive sufficient cooling. If a drive or PSU is not present, the aperture must be filled with a blank.

2. Apply AC mains power to the enclosure.

3. Press the enclosure on/off switch (see section *4.4.1. Ops Panel LEDs and Switches*). The Power Active LED on the Ops Panel should be lit (green) when the enclosure power button is pressed (and the disk drive motors should start).

Unless otherwise configured through the enclosure management firmware, all drives in the enclosure should automatically start up. If this has not occurred one of the following conditions may exist:

- ✦ There may be a power problem (an alarm and power fault indication would normally be indicated – see chapter *7. Troubleshooting and Problem Solving*).

- ✦ If there is only one PSU present, the drive motors will spin up in a delayed sequence.

IMPORTANT INFO: If mains power is lost for any reason, on restoration of power the enclosure will re-start automatically (unless configured otherwise in the BIOS).

4.2. Powering Off the Enclosure

1. Shut down any applications that are running on the server.

2. Shut down the operating system on the server.

3. Remove all AC power cords from the enclosure.

NOTE: Until the AC power cords are removed, the system will still be running in standby mode.

IMPORTANT INFO: The enclosure will not be completely isolated from the power source unless both power cords are disconnected.

4.3. Drive Anti-Tamper Locks

Anti-tamper locks are fitted in the drive carrier handles.

4.3.1. Activating the Locks

1. Carefully insert the Torx driver provided into the anti-tamper lock in the handle (see *Fig. 21*).

2. Rotate the key in a clockwise direction until the indicator is visible in the aperture beside the key.
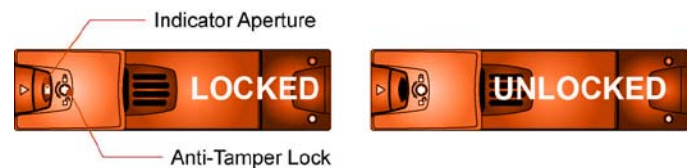
Fig. 21 - Activating the Anti-tamper Lock

3. Remove the key.

4.3.2. De-Activating the Locks

1. Carefully insert the Torx driver provided into the anti-tamper lock in the handle.

2. Rotate the key in a counterclockwise direction until the indicator is no longer visible in the aperture beside the key.

3. Remove the key.

NOTE: A drive carrier cannot be installed if its anti-tamper lock is activated outside the enclosure.

4.4. LEDs and Controls

4.4.1. Ops Panel LEDs and Switches

The Ops Panel LEDs (*Fig. 22*) fault and status conditions are defined in *Table 04* while the functions of the push-button switches are defined in *Table 05*.

Refer to chapter *7. Troubleshooting and Problem Solving* for details of any fault indication.
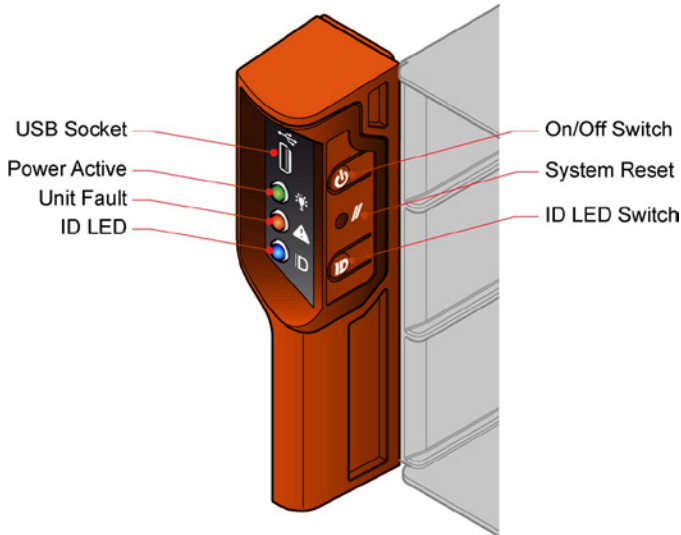
Fig. 22 - Ops Panel LEDs and Switches

Table 04 - Ops Panel LEDs

LED	Status
Power Active	✦ Constant green: system has full power and is running. ✦ Off: system is off, or in standby mode.
Unit Fault	Constant amber: there is a fault with the enclosure.
Enclosure ID	Blue: only when activated via the ID LED switch or the enclosure firmware.

Table 05 - Ops Panel Switches

Push-button Switches	Definition
On/Off	✦ Powers the enclosure on if currently off. ✦ Powers the enclosure off if currently on (hold the switch down for at least four seconds).
System Reset	Resets the enclosure hardware and firmware. The button is recessed and must be activated with a ball-point pen or similar implement.

Push-button Switches	Definition
Enclosure ID	Blue: only when activated via the ID LED switch or the enclosure firmware.
ID LED	Toggles the state of the blue ID LEDs on the Ops Panel and the back of the enclosure. Also mutes the audible alarm if it is sounding.

NOTE: The Ops Panel is supplied as an integral part of the enclosure core product and is not user replaceable.

4.4.2. Power Supply Unit LEDs

The PSU incorporates a green LED, as shown in Figure 4–3.

Table 06 Power Supply Unit LEDs

LED	Status
Power	✦ Flashing green: the PSU is connected to a mains supply. Standy power is present. ✦ Constant green: the PSU is powered on. ✦ Flashing amber: power supply failure – over current or under voltage. ✦ Constant Amber: power supply failure – over voltage, over temperature or fan failure.

Power Supply LEDs are shown in *Fig. 23*.
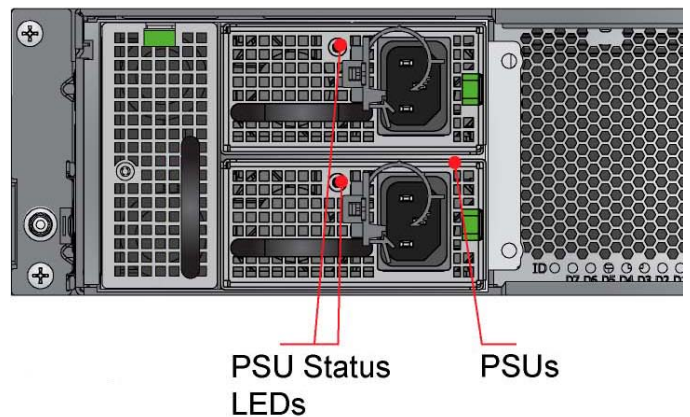
Fig. 23 - Enclosure Rear View showing Switches and Connections

4.4.3. Drive Carrier LEDs

Each drive carrier module incorporates a green and amber LED, shown in *Fig. 24*.
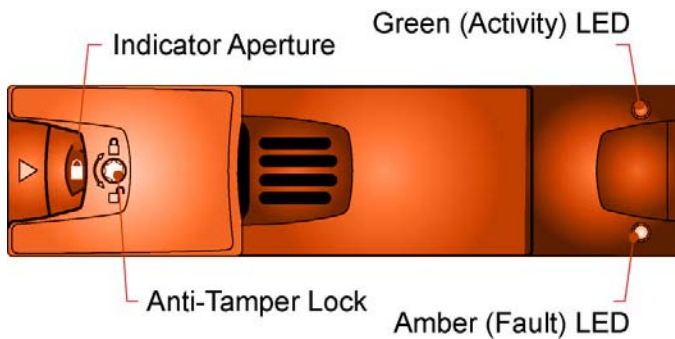
Fig. 24 - Drive Carrier LEDs

Table 07 - Disk Drive LEDs

LED	Definition
Activity	✦ Flickering green: the drive is powered and has active I/O. ✦ Constant green: the drive is powered and idle.
Fault	✦ •Off: the drive is functioning correctly. ✦ •Flashing amber: drive identified via SES. ✦ •Constant amber: the drive is faulty.

4.4.4. Cooling Fan LEDs

The cooling fans feature a single amber status LED, as shown in *Fig. 13*.

Table 08 - Cooling Fan LEDs

LED	Status
Status	✦ Off: the fan is operating correctly. ✦ Flashing amber: this is used to identify the fan and can be achieved through the firmware. ✦ Constant amber: the fan has a fault.

4.4.5. Rear Panel LED

The rear panel LED (shown in *Fig. 23*) is used to identify the enclosure in the same way as the ID LED described in section *4.4.1. Ops Panel LEDs and Switches*.

Table 09 - Rear Panel LEDs

LED	Status
Enclosure ID	Blue: only when activated via the ID LED switch.

4.4.6. ATX Server LEDs

4.4.6.1. Server Status LEDs

The ATX motherboard I/O panel contains eight LEDs labelled D7 to D0 (from left to right). These LEDs indicate the POST status (see *13.3. POST Code Checkpoints*).
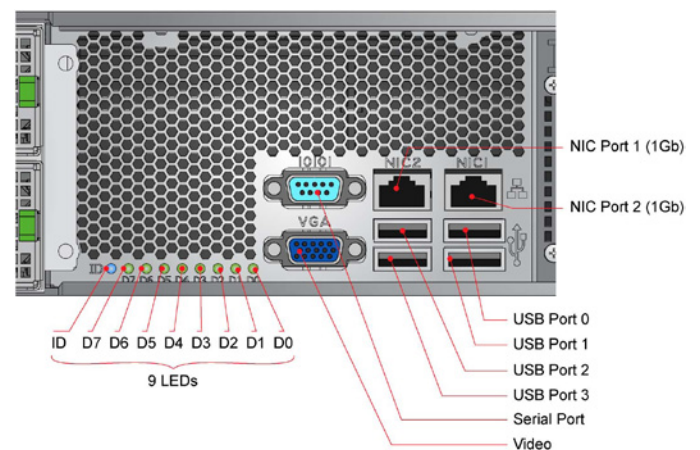
Fig. 25 - ATX Server I/O Components

4.4.6.2. Network Port LEDs

The network port LEDs are defined in *Table 10*. Refer to your ATX Server documentation for full details of the LED states.

Table 10 - Network Port LEDs

LED	LED State	Description
Left	Off	No network connection
	Solid green	Network connection is active
	Blinking green	Transmit / receive activity is occurring
Right	Off	10 Mbps connection (if left LED is on or blinking)
	Solid amber	100 Mbps connection
	Solid green	1000 Mbps connection

5. The Management GUI

5.1. Connecting to the Web Management Interface

Before connecting to the management GUI, the baseboard management IP address needs to be confirmed. To obtain the address or configure it:

1. Enter the BIOS setup.

2. Go to Set LAN configuration menu, which is located under "System Management".

3. Set LAN channel IP Address source, IP Address, MAC address, Subnet Mask and (if required) the Gateway address on the corresponding menu.

4. To enable the settings, select "Enable Channel".

To access the Web Management Interface:

1. Open a web browser.

2. Type the IP address of the management controller in the browser.

3. The default user name and password are "admin" and "admin".

NOTE: A maximum of 5 users can be connected simultaneously. Users will be logged out automatically after 300 seconds of inactivity.

5.2. System

5.2.1. Information

Once connected to the Web Management Interface, the first page seen is the System Information. All board information is displayed on this page.

5.2.2. Event Log

On the left column, the Event Log section can be selected by clicking on the corresponding text. In this section the System Event Log (SEL) information and the event list are shown. A maximum of 1023 events can be displayed; the older ones will be removed when there are more than 1023. Use the arrows at the bottom of the table to browse events. They can be cleared or refreshed manually.

5.3. Sensor

5.3.1. Reading

This section offers a visual display of all board sensor readings. The values can be manually refreshed. Below is the list of all onboard sensors.

Table 11 - On-Board Sensors

Sensor Number	Sensor Name	Sensor Type	Event/Reading Type	OEM Discrete Readings Available
0	Watchdog	Watchdog	Sensor Specific	None
1	IPMI Info-1	OEM	OEM	00h - Internal Error 01h - Event Overflow
2	IPMI Info-2	OEM	OEM	00h - Internal Error 01h - Event Overflow
3	Init Agent Err	OEM	Generic digital Discrete 03h state asserted/deasserted	None
4	Sensor Modif	System Event	OEM	00h - Set Sensor Hysteresis 01h - Set Sensor Threshold 02h - Set Sensor Event Enable
5	Temp CPU0	Temperature	Threshold	None
6	Temp CPU1	Temperature	Threshold	None
7	Temp DIMM#1	Temperature	Threshold	None
8	Temp DIMM#2	Temperature	Threshold	None
9	Temp DIMM#3	Temperature	Threshold	None
10	Temp DIMM#4	Temperature	Threshold	None
11	Temp DIMM#5	Temperature	Threshold	None
12	Temp DIMM#6	Temperature	Threshold	None
13	Temp DIMM#7	Temperature	Threshold	None
14	Temp DIMM#8	Temperature	Threshold	None
15	Temp DIMM#9	Temperature	Threshold	None
16	Temp DIMM#10	Temperature	Threshold	None
17	Temp DIMM#11	Temperature	Threshold	None
18	Temp DIMM#12	Temperature	Threshold	None
19	Temp PCIe Zone	Temperature	Threshold	None
20	PowerOK 1.5v	Power Supply	Sensor Specific	None
21	PowerOK 1.1v	Power Supply	Sensor Specific	None
22	PowerOK ATX	Power Supply	Sensor Specific	None
23	PowerOK_0Vcore	Power Supply	Sensor Specific	None
24	PowerOK_0Vtt	Power Supply	Sensor Specific	None

Sensor Number	Sensor Name	Sensor Type	Event/Reading Type	OEM Discrete Readings Available
25	PowerOK_0VDDQ	Power Supply	Sensor Specific	None
26	PowerOK_01.8v	Power Supply	Sensor Specific	None
27	PowerOK_1Vcore	Power Supply	Sensor Specific	None
28	PowerOK_1Vtt	Power Supply	Sensor Specific	None
29	PowerOK_1VDDQ	Power Supply	Sensor Specific	None
30	PowerOK_11.8v	Power Supply	Sensor Specific	None
31	IPMB Sel State	Event Logging Disabled	Sensor Specific	None
32	IPMB Link State	IPMB Link State	Sensor Specific	None
33	CPU0 Status	Processor	Sensor Specific	None
34	CPU1 Status	Processor	Sensor Specific	None
35	Memory Err	Memory	Sensor Specific	None
36	Post Value	OEM	Sensor Specific	None
37	BMC Reboot	Platform Alert	Sensor Specific	None
38	Ver Change IPMC	Version Change	Sensor Specific	None
39	Ver Change FPGA	Version Change	Sensor Specific	None
40	Ver Change BIOS	Version Change	Sensor Specific	None
41	Board Reset	OEM	Generic digital Discrete 03h state asserted/deasserted	None
42	MB Application	System Event	Usage State	None
43	MB State	FRU State	Sensor Specific	None
44	GEM Quiesced	Module/Board	Digital Discrete	None
45	GEM AC Feed	Power Unit	Sensor Specific	None
46	GEM Battery	Battery	Sensor Specific	None
47	Power Button	Button Type	Sensor Specific	None
48	ACPI State	ACPI Power	Sensor Specific	None

5.4. Control

5.4.1. Remote Power/Reset

This section allows you to power down, shutdown, reset and power cycle the board.

Table 12 - Enclosure Impact

Command	Payload Impact
Reset	Immediately reboots the enclosure in the same way as pressing the Reset button.
Power Cycle	Powers down and restarts the enclosure.

The current POST value is also displayed on this page.

5.5. Console

5.5.1. KVM/VM

This section gives access to the KVM and the VM.

5.5.2. KVM

To start the KVM, click on the button KVM (Keyboard Video Mouse). A small Java file will be downloaded to the computer. A safety warning may pop up and ask if the application can be started. Answer Yes to continue. A new window will appear and display what is shown on the computer (12big Rack Storage Server-ATX).

The motherboard can be managed from any remote computer.

The mouse needs to be configured depending on the installed operating system. To do so, when the KVM is started, click on Tools, located on the menu bar, then on Mouse and select the appropriate OS in the Mouse Acceleration section; then click OK.

5.5.3. Virtual Media

To start the Virtual Media, click on the button Virtual Media. A small Java file will be downloaded to the computer. A safety warning may pop up and ask if the application can be started. Answer Yes to continue. A new window will appear in which all physical drives on the computer are listed.

A drive image can be added by clicking the Add image button. In this menu, select the ISO or IMG file to be mounted. To map a drive, check the corresponding box in the window. The device will be detected as a USB device. An operating system installation can be done remotely by mapping the source file.

5.6. Maintenance

5.6.1. Component Upgrade

This section allows the firmware of the Web Management Interface to be upgraded.

1. Click Browse... and select the .hpm file to upload. Then click on File Upload.

Fig. 26 - Firmware Upgrade Step 1

2. When the file is uploaded, the file information will be displayed. At this point it is possible to select the component to upgrade.

Fig. 27 - Figure 5–2 Firmware Upgrade Step 2

3. Start the firmware upgrade by clicking "Start Upgrade Component(s)". The progress bars will display the upgrade status of the components.

Fig. 28 - Firmware Upgrade Step 3

4. If the upgrade is successful, the "Activate and Reboot Management" button will appear. Click it to restart the management interface. An automatic page reload will be done after 60 seconds. This step only reboots the BMC, not the whole enclosure.

Fig. 29 - Firmware Upgrade Step 4

5.6.2. Users

This section allows the management of authorized users. A maximum of five (5) users can be set, each of which can be enabled or disabled. Privilege levels are defined in the table below.

Privilege Level	Description
Administrator	All BMC commands are allowed, including configuration settings. An Administrator can even execute configuration commands that will disable the channel that the Administrator is working on.
Operator	All BMC commands are allowed, except for configuration settings which can change the behavior of the out-of-band interfaces. For example, Operator privilege does not allow the capability to disable individual channels or change user access privileges.
User	Only "basic" commands are allowed. These are primarily commands that read data and retrieve status. Forbidden commands include those that can be used to alter BMC configuration, write data to the management controllers, or perform system actions such as resets, power on/off, and watchdog activation.
Callback	This is the lowest privilege level. Only commands necessary to support initiating a callback are allowed.
No Access	No access is given to this user.

User ID 1 is a user without a name or password. This user can be enabled or disabled and has a privilege level set to "User" by default.

User ID2 is the admin user with "Administrator" privileges.

User ID3 to User ID5 are configurable. By default they are disabled.

5.7. Logout

This button logs out of the management interface. Users are automatically logged out after 300 seconds of inactivity.

6. BIOS Settings

6.1. AMI BIOS Setup Program

All relevant information for operating the board and connected peripherals are stored in the CMOS memory backed-up by a battery or in the main BIOS flash and EEPROM.

6.1.1. Accessing the BIOS Setup Utility

The system BIOS (Basic Input Output System) provides an interface between the operating system and the hardware of the 12big Storage Server ATX board. It uses the AMI Setup program, a setup utility in flash memory that is accessed by pressing the <DEL> (or <F4> from a console redirection terminal) key at the appropriate time during system boot. This utility is used to set configuration data in CMOS RAM.

To run the AMI Setup program incorporated in the ROM BIOS:

✦ Turn on or reboot the system.

✦ When you get the following messages, hit <DEL> key to enter SETUP.

```
AMIBIOS(C)2009 American Megatrends, Inc.
HS-1235T-ATX BIOS Version 1.02
CPU : Intel(R) Xeon(R) CPU        E5540  @ 2.53GHz
 Speed : 2.53 GHz      Physical CPU : 2

Currently Running On Primary BIOS.

Press DEL to run Setup (F4 on Remote Keyboard)
Press F11 for BBS POPUP  (F3 on Remote Keyboard)
Wait BMC responding ..
Initializing Management Controller .. Done.
Initializing USB Controllers .. Done.
Memory DDR3: 6144MB OK, Speed: 1066MHz

USB Device(s): 1 Keyboard, 1 Mouse, 1 Storage Device
Auto-detecting USB Mass Storage Devices ..
Device #01 : Corsair Flash Voyager *HiSpeed*
01 USB mass storage devices found and configured.
```

The main menu of the AMI BIOS CMOS Setup Utility appears on the screen.

```
Main    Advanced    Security    Boot    System Management    Exit
******************************************************************
* System Overview                             * Use [ENTER], [TAB]   *
* ******************************************** * or [SHIFT-TAB] to    *
* AMIBIOS                                      * select a field.      *
* Version                :08.00.16            *                      *
* Build Date             :15/05/10            * Use [+] or [-] to    *
* ID                     :2029_102            * configure system Time.*
*                                             *                      *
* Processor                                   *                      *
* Intel(R) Xeon(R) CPU        E5540 @ 2.53GHz *                      *
* Speed                  :2533MHz             *                      *
* Physical CPU           :2                   *                      *
*                                             *                      *
* System Memory                               * *     Select Screen  *
* System Memory          :612 KB              * **    Select Item    *
* Extended Memory        :24568MB             * +-    Change Field   *
* Memory Speed           :1066MHz             * Tab   Select Field   *
*                                             * F1    General Help   *
* System Time            [12:55:01]           * F10   Save and Exit  *
* System Date            [Mon 05/24/2010]     * ESC   Exit           *
*                                             *                      *
******************************************************************
       v02.67 (C)Copyright 1985-2009, American Megatrends, Inc.
```

Setup Default values provide optimum performance settings for all devices and system features.

NOTE: The CMOS setup options described in this section are based on BIOS Version 1.02. The options and default settings may change in a new BIOS release.

IMPORTANT INFO: These parameters have been provided to give control over the system. However, the values for these options should be changed only if the user has a full understanding of the timing relationships involved.

NOTE: Options in Bold are the default settings.

6.1.2. Menu Bar

The Menu Bar at the top of the window lists these selections:

Table 13 - Menu Bar

Menu Selection	Description
Main	Use this menu for basic system configuration.
Advanced	Use this menu to set the Advanced Features available on your system.
Security	Use this menu to configure Security features.
Boot	Use this menu to determine the booting device order.
System Management	Use this menu to set and view the System Management on your system.
Exit	Use this menu to choose Exits option

Use the left and right arrows keys to make a selection.

6.1.2.1. Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu. The chart on the following page describes the legend keys and their alternates.

Table 14 - Legend Bar

Key	Function
<F1>	General Help windows (see section 6.1.2.2 on page 45).
<Esc>	Exit this menu.
--> arrow keys	Select a different menu.
<Home> or <End>	Move cursor to top or bottom of window.
<PgUp> or <PgDn>	Move cursor to top or bottom of window.
<->	Select the Previous Value for the field.
<+>	Select the Next Value for the field.
<F2> and <F3>	Change colors used in Setup.

Key	Function
<F7>	Discard the changes for all menus.
<F9>	Load the Optimal Default Configuration values for all menus.
<F10>	Save and exit.
<Enter>	Execute Command, display possible value for this field or Select the sub-menu.

To select an item, use the arrow keys to move the cursor to the field you want. Then use the plus-and-minus value keys to select a value for that field. To save value commands in the Exit Menu, save the values displayed in all menus.

To display a submenu, use the arrow keys to move the cursor to the submenu you want. Then press <Enter>.

6.1.2.2. Field Help Window

The help window on the right side of each menu displays the help text for the selected field.

It updates as you move the cursor to each field.

6.1.2.3. General Help Windows

Pressing <F1>on any menu brings up the General Help window that describes the legend keys and their alternates:


```
General Help
←→     Select Screen             ↑↓     Select Item
 -     Change Option/Field       Enter Go to Sub Screen
PGDN   Next Page                 PGUP   Previous Page
HOME   Go to Top of Screen       END    Go to Bottom of Screen
F2/F3  Change Colors             F7     Discard Changes
F9     Load Defaults             ESC    Exit
F10    Save and Exit

                        [OK]
```

6.2. Main Menu

Table 15 - Main Menu

Feature	Options	Description	Setup Help
Version	X.YY	Displays the BIOS core version.	N/A, display only.
Build Date	YYMMDD	Displays the BIOS build date in the format YYMMDD.	
ID	BIOS ID code	Displays the BIOS identification code. The first 5 characters uniquely identify the board. The last 3 digits correspond to BIOS version in the format X.YZ.	
	CPU Brand string	Reads and display the 48 byte CPU Brand string from the CPU MSR.	
Speed	X Ghz	Displays the current processor core(s) speed.	
Physical CPU	x	Displays the number of physical processors.	
Size	X KB/MB/GB	Displays the system memory size.	
System Time	HH:MM:SS	Set the system time.	Use [ENTER], [TAB] or [SHIFT-TAB] to select a field. Use [+] or [-] to change values.
System Date	MM/DD/YYYY	Set the system date.	

6.3. Advanced Menu

Table 16 - Advanced Menu

Feature	Options	Description	Setup Help
ACPI Configuration	N/A	"Press Enter to go to sub screen ""ACPI Configuration""."	
Chipset Configuration	N/A	"Press Enter to go to sub screen ""Chipset Configuration""."	
CPU Configuration	N/A	"Press Enter to go to sub screen ""CPU Configuration""."	
Drive Configuration	N/A	"Press Enter to go to sub screen ""Drive Configuration""."	
Event Log Configuration	N/A	"Press Enter to go to sub screen ""Event Log Configuration""."	Mark as read, Clear or View Event Log statistics.
Onboard LAN Configuration	N/A	"Press Enter to go to sub screen ""Onboard LAN Configuration""."	
PCI Slots Configuration	N/A	"Press Enter to go to sub screen ""PCI Slots Configuration""."	Enable / Disable Expansion ROM on PCI Slots.
Remote Access Configuration	N/A	"Press Enter to go to sub screen ""Remote Access Configuration""."	
SuperIO Configuration	N/A	"Press Enter to go to sub screen ""SuperIO Configuration""."	Configure SuperIO Chipset Win627DHG.

Feature	Options	Description	Setup Help
Trusted Computing	N/A	"Press Enter to go to sub screen ""Trusted Computing""."	
USB Configuration	N/A	"Press Enter to go to sub screen ""USB Configuration""."	
Virtualization Configuration	N/A	"Press Enter to go to subscreen ""Virtualization Configuration""."	
Watchdog Configuration	N/A	"Press Enter to go to subscreen ""Watchdog Configuration"". "	

6.3.1. ACPI Configuration Sub-Menu

Table 17 - ACPI Configuration Sub-Menu

Feature	Options	Description	Setup Help
General ACPI Configuration	N/A	"Press Enter to go to sub screen ""General ACPI Configuration""."	
Advanced ACPI Configuration	N/A	"Press Enter to go to sub screen ""Advanced ACPI Configuration""."	
Chipset ACPI Configuration	N/A	"Press Enter to go to sub screen ""Chipset ACPI Configuration""."	

6.3.1.1. General ACPI Configuration Sub-Menu

Table 18 - General ACPI Configuration Sub-Menu

Feature	Options	Description	Setup Help
Suspend Mode	S3 (STR)	Select a suspend mode used by system	Select the ACPI state used for System Suspend.
Repost Video on S3 Resume	✦ No ✦ Yes	VGA BIOS in used or not during suspend resume.	Determines whether to invoke VGA BIOS post on S3/STR resume.

6.3.1.2. Advanced ACPI Configuration Sub-Menu

Table 19 - Advanced ACPI Configuration Sub-Menu

Feature	Options	Description	Setup Help
ACPI Version Features	✦ ACPI v1.0 ✦ ACPI v2.0 ✦ ACPI v3.0	Version 1.0 only supports RSDP pointers to 32-bit Fixed System Description Tables. Version 2.0 enables RSDP pointers to 64-bit Fixed System Description Tables. Version 3.0 improves processor, PCI Express and SATA support.	Enable RSDP pointers to 64-bit Fixed System Description Tables. Different ACPI version has some addition.

Feature	Options	Description	Setup Help
NUMA Support	✦ Enabled ✦ Disabled	Enable/Disable NUMA (Non-Uniform Memory Access) support.	Enable: Efficiently execute software for NUMA aware OS. Disable: Better memory access performance for non-NUMA OS.

6.3.1.3. Chipset ACPI Configuration Sub-Menu

Table 20 - Chipset ACPI Configuration Sub-Menu

Feature	Options	Description	Setup Help
Energy Lake Feature	✦ Enabled ✦ Disabled	Energy Lake feature (Intel Quick Resume Technology).	
APIC ACPI SCI IRQ	✦ Enabled ✦ Disabled	IRQ9 if APIC is not used for SCI. IRQ20 is only available for SCI if APIC is enabled.	Enable/Disable APIC ACPI SCI IRQ.
High Performance Event Timer	✦ Enabled ✦ Disabled	Enable/Disable High Performance Event Timer (HPET).	

6.3.2. Chipset Configuration Sub-Menu

Table 21 - Chipset Configuration Sub-Menu

Feature	Options	Description	Setup Help
CPU Bridge Configuration	N/A	Press Enter to go to sub screen "CPU Bridge Configuration".	
North Bridge Configuration	N/A	Press Enter to go to sub screen "North Bridge Configuration".	
South Bridge Configuration	N/A	Press Enter to go to sub screen "South Bridge Configuration".	
Spread Spectrum Mode	✦ Enabled ✦ Disabled	Spread spectrum modulation.	

6.3.2.1. CPU Bridge Configuration Sub-Menu

Table 22 - CPU Bridge Configuration Sub-Menu

Feature	Options	Description	Setup Help
CPU Revision	N/A	Display CPU revision ID.	
Current QPI Frequency	N/A	Display Current QPI frequency speed in GT/s	
Current Memory Frequency	N/A	Display current memory speed (DDR-3) in MHz	

6.3.2.2. North Bridge Configuration Sub-Menu

Table 23 - North Bridge Configuration Sub-Menu

Feature	Options	Description	Setup Help
NB Revision	N/A	Display Current NB revision ID.	
Current QPI Frequency	N/A	Display Current QPI frequency speed in GT/s	
Intel QuickData Technology DMA	✦ Enabled ✦ Disabled	Intel QuickData Technology is a platform solution designed to maximize the throughput of server data traffic across a broader range of configurations and server environments to achieve faster, scalable, and more reliable I/O.	Intel QuickData Technology / Direct Memory Access configuration.
Intel QuickData Technology DCA	✦ Enabled ✦ Disabled		Intel QuickData Technology / Direct Cache Access configuration.

6.3.2.3. South Bridge Configuration Sub-Menu

Table 24 - South Bridge Configuration Sub-Menu

Feature	Options	Description	Setup Help
SMBUS Controller	✦ Enabled ✦ Disabled	Enable/Disable intel HDA Audio controller device.	Enable/Disable SMBUS controller.
Restore on AC Power Loss	✦ Power off ✦ Power on ✦ Last state	Board power state value after AC power is lost.	
SATA Master Break Event	✦ Enabled ✦ Disabled	Serial ATA master activity will cause a break from C3/C6 state if enabled.	

6.3.3. CPU Configuration Sub-Menu

Table 25 - CPU Configuration Sub-Menu

Feature	Options	Description	Setup Help
Manufacturer	Intel	Displays the processor manufacturer name.	
	CPU Brand string	Reads and display the 48 bytes CPU Brand string from the CPU MSR.	
Frequency	X Ghz	Displays the current processor core(s) speed.	
BCLK Speed	x MHz	Displays the surrent BCLK speed	
Cache L1	X KB	Displays amount of Level 1 processor cache per processor.	
Cache L2	X KB/MB	Displays amount of Level 2 processor cache per processor.	
Cache L3	X KB/MB	Displays amount of Level 3 processor cache per processor.	

Feature	Options	Description	Setup Help
Ratio Status	✦ Unlocked ✦ Locked	Lock status of the FSB multiplier.	Sets the ratio between CPU Core Clock and the FSB Frequency.
Ratio Actual Value	x	Displays current processor FSB multiplier value (FSB time ratio = processor core speed).	
Processor Power Management Configuration	N/A	Press Enter to go to sub screen ""Processor Power Management Configuration"".	Configure CPU EIST and C-state function.
Ratio CMOS Setting	x	Selects the processor FSB ratio value (FSB x ratio = processor core speed).	Sets the ratio between CPU Core Clock and the FSB Frequency.
Hardware Prefetcher	✦ Enabled ✦ Disabled	The hardware prefetcher looks at streams of data. The hardware prefetcher assumes that if a line A and A+1 were requested, then line A+2 also will be requested. The data is prefetched into L2 from external memory. Disabling of the hardware prefetcher may impact processor performance. Default should be enabled. Optionally for DP/MP servers, the default may be set based on performance results observed during platform validation and testing with standard workloads.	For UP platforms, leave it enabled. For DP/MP servers, it may use to tune performance to the specific application.
Adjacent Cache Line Prefetch	✦ Enabled ✦ Disabled	When enabled the Adjacent Cache Line Prefetcher fetches both cache lines that comprise a cache line pair (128 bytes) when it determines required data is not currently in its cache. When the Adjacent Cache Line Prefetcher is disabled, the processor will only fetch the cache line (64 bytes) that contains the data currently required by the processor. Note: Single processor platforms should enable it. It is recommended that server platforms disable it. Optionally for DP/MP servers, the default may be set based on performance results observed during platform validation and testing with standard workloads.	For UP platforms, leave it enabled. For DP/MP servers, it may use to tune performance to the specific application.
MPS and ACPI MADT ordering	✦ Modern ordering ✦ Legacy ordering	MPS and ACPI MADT ordering. Modern ordering for Windows XP or later OSes. Legacy ordering for Windows 2000 or earlier OSes.	
Max CPUID Value Limit	✦ Enabled ✦ Disabled		Disabled for WindowsXP
Intel® Tech	✦ Enabled ✦ Disabled	Enables the hardware capability provided by Intel® Note: A full reset is required to change this setting.	
Execute-Disable Bit Capability	✦ Enabled ✦ Disabled	Execute Disable Bit allows the processor to classify areas in memory where application code can execute and where it cannot, preventing certain classes of malicious buffer overflow attacks when combined with a supporting operating system.	When disabled, forces the XD feature flag to always return 0.

Feature	Options	Description	Setup Help
Intel® HT Technology	✦ Enabled ✦ Disabled	Delivers thread-level parallelism on each processor resulting in more efficient use of processor resources, higher processing throughput, and improved performance on the multi-threaded software of today and tomorrow.	When 'Disabled' only one thread per enabled core is enabled.
Active Processor Cores	✦ All ✦ 1 ✦ 2	Number of cores to enable in each physical processor package.	
A20M	✦ Enabled ✦ Disabled	Legacy OSes and APs may need A20M enabled.	
ACPI T State	✦ Enabled ✦ Disabled	This throttling reduces CPU performance to the duty cycle specified and, more importantly, results in processor power reduction.	Report processor throttling in ACPI.

6.3.3.1. Processor Power Management Configuration Sub-Menu

Table 26 - Processor Power Management Configuration Sub-Menu

Feature	Options	Description	Setup Help
Intel® SpeedStep™ tech	✦ Enabled ✦ Disabled	Enables Intel® SpeedStep™ technology for usage by OS.	Disable: Disables GV3. Enable: Enables GV3.
Intel® TurboMode tech	✦ Enabled ✦ Disabled	This is an Intel Core i7-specific BIOS feature. When this feature is enabled, the Intel Core i7 processor can dynamically overclock one or two of its four processing cores to improve performance with applications that are not multi-threaded or optimized for quad-core processors (e.g.single-threaded applications).	Turbo mode allows processor cores to run faster than marked frequency in specific conditions.
Intel® C-STATE tech	✦ Enabled ✦ Disabled	Advanced power management state (C-state) that significantly reduces the power of the processor during idle periods.	CState: CPU idle is set to C2/C3/C4.

Feature	Options	Description	Setup Help
C State package limit setting	✦ Auto ✦ C1 ✦ C3 ✦ C6 ✦ C7	Advanced power management state (C-state) that significantly reduces the power of the processor during idle periods.	Selected option will program into C State package limit register.
C3 State	✦ Disabled ✦ ACPI C2 ✦ ACPI C3		Nehalem C state action select.
C6 State	✦ Enabled ✦ Disabled		Nehalem C state action select.
C1 Auto Demotion	✦ Enabled ✦ Disabled		When enabled, CPU will conditionally demote C3/C6/C7 requests to C1 based on uncore auto-demote information.
C3 Auto Demotion	✦ Enabled ✦ Disabled		When enable, CPU will conditionally demote C6/C7 requests to C3 based on uncore auto-demote information.

6.3.4. Drive Configuration Sub-Menu

Table 27 - Drive Configuration Sub-Menu

Feature	Options	Description	Setup Help
Configure SATA#1 as	✦ IDE ✦ RAID ✦ AHCI	When SATA #1 is in enhanced mode, the AHCI or RAID modes can be set.	AHCI: allows advanced SATA features such as Native Command Queuing and hot plug. IDE is legacy disk usage. Note: Any changes require a restart.
AHCI Configuration	N/A	Press Enter to go to sub screen "AHCI Configuration".	
IDE Configuration	N/A	Press Enter to go to sub screen "IDE Configuration".	

6.3.4.1. AHCI Configuration Sub-Menu

Table 28 - AHCI Configuration Sub-Menu

Feature	Options	Description	Setup Help
AHCI BIOS Support	✦ Enabled ✦ Disabled	Support AHCI mode during BIOS control.	Enables the AHCI controller to operate in AHCI mode during BIOS control, otherwise it will operate in IDE mode.
AHCI Port2	N/A	Press Enter to go to sub screen "AHCI Port2".	While entering setup, the BIOS auto detects the presence of IDE devices. This displays the status of auto detection of IDE devices.
AHCI Port3	N/A	Press Enter to go to sub screen "AHCI Port3".	

6.3.4.2. AHCI Port2 and Port3 Sub-Menus

Table 29 - AHCI Port2 and Port3 Sub-Menus

Feature	Options	Description	Setup Help
Device	Device type	Displays the type of device (Hard Disk, CD-ROM or ARMD).	
Vendor	Disk vendor and description	Displays the device vendor name and/or model.	
Size	X KB/MB/GB	Displays device size.	
SATA Port0	✦ Auto ✦ Not Installed	Select the type of device connected to the system.	
S.M.A.R.T.	✦ Auto (default for AHCI Port 3) ✦ Disabled ✦ Enabled (default for AHCI Port 2)	Self-Monitoring Analysis and Reporting Technology (SMART) feature can help predict impending drive failures.	

6.3.4.3. IDE Configuration Sub-Menu

Table 30 - IDE Configuration Sub-Menu

Feature	Options	Description	Setup Help
Primary IDE Master	N/A	Press Enter to go to sub screen "Primary IDE Master".	While entering setup, BIOS auto detects the presence of IDE devices. This displays the status of auto detection of IDE devices.
Primary IDE Slave	N/A	Press Enter to go to sub screen "Primary IDE Slave".	
Secondary IDE Master	N/A	Press Enter to go to sub screen "Secondary IDE Master".	
Secondary IDE Slave	N/A	Press Enter to go to sub screen "Secondary IDE Slave".	
Hard Disk Write Protect	✦ Enabled ✦ Disabled	Disable/Enable device write protection. This will be effective only if device is accessed through BIOS.	
IDE Detect Time Out (Sec)	✦ 0 ✦ 5 ✦ 10 ✦ 15 ✦ 20 ✦ 25 ✦ 30 ✦ 35	Select the maximum time out value for detecting ATA/ATAPI device(s).	

6.3.4.4. Primary/Secondary IDE Master/Slave Sub-Menus

Table 31 - Primary IDE Master sub-menu

Feature	Options	Description	Setup Help
Device	Device type	Displays the type of device (Hard Disk, CD-ROM or ARMD).	
Vendor	Disk vendor and description	Displays the device vendor name and/or model.	
Size	X KB/MB/GB	Displays system memory size.	
LBA Mode	Supported Not Supported	Displays whether LBA mode is supported by the device.	
Block Mode	x Sectors	Displays the Block mode size used by the device.	
PIO Mode	0-4	Displays the PIO mode used by the devices.	

6.3.5. Event Log Configuration Sub-Menu

Table 32 - Event Log Configuration Sub-Menu

Feature	Options	Description	Setup Help
View Event Log	Enter	View all unread events in the Event Log.	
Mark all events as read	Enter	Mark all unread events as read in the Event Log.	
Clear Event Log	Enter	Discard all events in the Event Log.	
DRAM Data Integrity Mode	✦ ECC ✦ Non-ECC	ECC: ECC Checking enables. Non-ECC: Use only for testing purposes	
ECC Error Reporting	✦ Both ✦ Correctable ✦ Uncorrectable	Correctable: ECC for testing purposes. Uncorrectable: ECC errors reported. Both: ECC errors for testing purposes. Disabled: ECC errors nor reported.	

6.3.6. Onboard LAN Configuration Sub-Menu

Table 33 - Onboard LAN Configuration Sub-Menu

Feature	Options	Description	Setup Help
Onboard LAN 1	✦ Enabled ✦ Disabled		Enable/Disable LAN interface. Note: This will not disable Management LAN Access (KVM)
Option ROM	✦ Enabled ✦ Disabled		Enabled: Initializes LAN Option ROM. Disabled: LAN Option ROM not used.
MAC	Display only		N/A, display only.
Onboard LAN 2	✦ Enabled ✦ Disabled		Enable/Disable LAN interface. Note: This will not disable Management LAN Access (KVM).
Option ROM	✦ Enabled ✦ Disabled		Enabled: Initializes LAN Option ROM. Disabled: LAN Option ROM not used.
MAC	Display only		

6.3.7. PCI Slots Configuration Sub-Menu

Table 34 - PCI Slots Configuration Sub-Menu

Feature	Options	Description	Setup Help
Expansion ROM on PCI Slot 1	✦ Enabled		Enabled: Loads Expansion ROM on PCI Slot. Disabled: Expansion ROM on PCI Slot not loaded.
Expansion ROM on PCI Slot 2	✦ Disabled		
Expansion ROM on PCI Slot 3			
Expansion ROM on PCI Slot 4			
Expansion ROM on PCI Slot 5			
Expansion ROM on PCI Slot 6			
Expansion ROM on PCI Slot 7			

6.3.8. Remote Access Configuration Sub-Menu

Table 35 - Remote Access Configuration Sub-Menu

Feature	Options	Description	Setup Help
Remote Access	✦ Enabled ✦ Disabled	Configures console redirection. Disabling remote access will hide all related features in this sub-menu.	
Serial port number	✦ COM1 ✦ COM2	Configures serial port for console redirection. Also used for Headless operation mode through ACPI.	Make sure the selected port is enabled.
Base Address, IRQ	IO, IRQ	Displays the hardware address of the COM port used for the console.	
Serial Port Mode	✦ 115200 8,n,1 ✦ 57600 8,n,1 ✦ 38400 8,n,1 ✦ 19200 8,n,1 ✦ 09600 8,n,1	Configures the serial Baud rate for the serial ports. 8 data bits, no parity and 1 stop bit parameters are fixed.	
Flow Control	✦ Hardware ✦ Software ✦ None	Configures flow control for console redirection for both serial ports.	
Redirection After BIOS POST	✦ Disabled ✦ Boot loader ✦ Always	Selects how the serial redirection done by the BIOS will operate after the POST.	Disable: Turns off the redirection after POST Boot Loader: Redirection is active during POST and during Boot Loader. Always: Redirection is always active. (Some OSs may not work if set to Always) [Enabled] - keep it [Disabled]-deactivate

Feature	Options	Description	Setup Help
Terminal Type	✦ ANSI ✦ VT100 ✦ VTUTF8	Configures the type of console emulation used for both serial ports.	
VT-UTF8 Combo Key Support	✦ Enabled ✦ Disabled	VT-UTF8 adds escape sequences for F1 to F12 and most other control keys on a keyboard.	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.
Sredir Memory Display Delay	✦ No delay ✦ Delay 1 sec ✦ Delay 2 sec ✦ Delay 3 sec	Allows additional delay during POST to give time to display memory information by the terminal software.	Gives the delay in seconds to display memory information.

6.3.9. SuperIO Configuration Sub-Menu

Table 36 - SuperIO Configuration Sub-Menu

Feature	Options	Description	Setup Help
Serial Port1 Address	✦ Disabled ✦ 3F8/IRQ4 ✦ 3E8/IRQ4 ✦ 2E8/IRQ4	Select the base address used by Serial Port1.	
Serial Port2 Address	✦ Disabled ✦ 2F8/IRQ3 ✦ 3E8/IRQ4 ✦ 2E8/IRQ4	Select the base address used by Serial Port2.	

6.3.10. Trusted Computing Sub-Menu

Table 37 - Trusted Computing Sub-Menu

Feature	Options	Description	Setup Help
TCG/TPM SUPPORT	✦ No ✦ Yes	Enable support for Trusted Platform Module. Requires a TPM module to be inserted in the TPM port.	Enable/Disable TPM TCG (TPM 1.1/1.2) support in BIOS
TPM Enable/Disable Status	Display Only	TPM module Status (Read only)	
TPM Owner Status	Display Only	TPM ownership status (Read only)	

6.3.11. USB Configuration Sub-Menu

Table 38 - USB Configuration Sub-Menu

Feature	Options	Description	Setup Help
	List USB device(s) detected.	This feature appears when the BIOS POST has detected USB device(s).	
USB 2.0 Controller Mode	✦ FullSpeed ✦ HiSpeed	Configures the USB 2.0 Controller in HiSpeed (480 Mbps) or FullSpeed (12 Mbps).	
BIOS EHCI Hand-Off	✦ Disabled ✦ Enabled	A workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by an EHCI driver.	
Legacy USB 1.1 HC Support	✦ Disabled ✦ Enabled	BIOS support for Legacy USB 1.1 controller	
Hotplug USB FDD Support	✦ Disabled ✦ Enabled ✦ Auto	Normally, all boot devices must be detected during POST to be able to participate in the boot sequence. This feature can prevent the need to reboot the system if the USB FDD was plugged after POST.	A dummy FDD device is created that will be associated with the hotplugged FDD later. Auto option creates this dummy device only if there is no USB FDD present.
USB Mass Storage Device Configuration	N/A	Press Enter to go to sub screen "USB Mass Storage Device Configuration".	Configure the USB Mass Storage Class Devices.

6.3.11.1. USB Mass Storage Device Configuration Sub-Menu

Table 39 - USB Mass Storage Device Configuration Sub-Menu

Feature	Options	Description	Setup Help
USB Mass Storage Reset Delay	✦ 10 Sec ✦ 20 Sec ✦ 30 Sec ✦ 40 Sec		Number of seconds POST waits for the USB mass storage device after start unit command.
Device #1 to #6	USB device description	Displays the 1st to 6th USB mass storage device description.	
Emulation Type	✦ Auto ✦ Floppy ✦ Forced FDD ✦ Hard Disk ✦ CDROM	If Auto, USB devices less than 530MB will be emulated as Floppy and others as a hard drive. Forced FDD option can be used to force a HDD formatted drive to boot as FDD (e.g. ZIP drive).	

6.3.12. Virtualization Configuration Sub-Menu

Table 40 - Virtualization Configuration Sub-Menu

Feature	Options	Description	Setup Help
SR-IOV Supported	Disabled		Single Root I/O Virtualization.
Intel VT-d	Disabled		Intel® Virtualization Technology for Directed I/O.

6.3.13. Watchdog Timer Configuration Sub-Menu

Table 41 - Watchdog Timer Configuration Sub-Menu

Feature	Options	Description	Setup Help
BIOS POST Timeout	300		
BIOS POST Action	Hard Reset		
OS Load Watchdog Time Out	✦ 15 ✦ 30 ✦ 45 ✦ 60 ✦ 90 ✦ 120 ✦ 150 ✦ 300 ✦ 600 ✦ Disabled		Amount of time for BMC to wait before assuming the system has crashed and needs to be reset.
OS Load Watchdog Timer Action	✦ No Action ✦ Hard Reset ✦ Power Down ✦ Power Cycle		Allows the BMC to reset or power down the system if the operating system crashes or hangs.

6.4. Security Menu

Table 42 - Security Menu

Feature	Options	Description	Setup Help
Supervisor Password	✦ Installed ✦ Not installed	Indicates the status of the Supervisor Password.	

Feature	Options	Description	Setup Help
User Password	✦ No ✦ Yes	Indicates the status of the User Password.	
Change Supervisor Password	Enter	The supervisor password can be installed or changed.	Install or Change the password.
User Access Level	✦ No Access ✦ View Only ✦ Limited ✦ Full Access	Controls the user access level to the BIOS Setup utility. Supervisor has full access to the BIOS Setup utility. No Access: Prevents user access to the setup utility. View Only: Allows read-only user access to the setup utility.	Limited: allows only limited fields to be changed such as Date and Time. No Access: prevents User access to the Setup Utility. View Only: allows access to the Setup Utility but the fields can not be changed. Full: allows any field to be changed except the Supervisor password.
Change User Password	Enter	The user password can be installed or changed.	Install or Change the password.
Clear User Password	Enter	Immediately clears the User password.	Immediately clears the User password.
Password Check	✦ Setup ✦ Always	Selects when the password is check during POST.	Setup: Check password while invoking setup. Always: Check password while invoking setup as well as on each boot.
Boot Sector Virus Protection	✦ Disabled ✦ Enabled	Enable/Disable Boot Sector Virus Protection.	

6.5. Boot Menu

Table 43 - Boot Menu

Feature	Options	Description	Setup Help
Boot Settings Configuration	N/A	"Press Enter to go to sub screen ""Boot Settings Configuration""."	
Boot Device Priority	N/A	"Press Enter to go to sub screen ""Boot Device Priority""."	
Hard Disk Drives	N/A	"Press Enter to go to sub screen ""Hard Disk Drives""."	Specifies the Boot Device Priority sequence from available Hard Drives.
Removable Drives	N/A	"Press Enter to go to sub screen ""Removable Drives""."	Specifies the Boot Device Priority sequence from available Removable Drives.

Feature	Options	Description	Setup Help
CD/DVD Drives	N/A	"Press Enter to go to sub screen ""CD/DVD Drives""."	Specifies the Boot Device Priority sequence from available CD/DVD Drives.
USB Drives	N/A	"Press Enter to go to sub screen ""USB Drives""."	Specifies the Boot Device Priority sequence from available USB Drives.
Network Drives	N/A	"Press Enter to go to sub screen ""Network Drives""."	Specifies the Boot Device Priority sequence from available Network Drives.
Other Drives	N/A	"Press Enter to go to sub screen ""Other Drives""."	Specifies the Boot Device Priority sequence from available Other Drives.

6.5.1. Boot Settings Configuration Sub-Menu

Table 44 - Boot Settings Configuration Sub-Menu

Feature	Options	Description	Setup Help
Boots Graphic Adapter Priority	✦ Auto ✦ Onboard VGA	Select which graphics controller to use as the primary boot device.	
Quiet Boot	✦ Disabled ✦ Enabled	Disabled: Displays normal POST messages. Enabled: Displays OEM Logo instead of POST messages.	
Warm Reset Initial count	✦ Never ✦ Always ✦ 5 ✦ 10 ✦ 15		Select the value of the warm reset count. Always: always do a warm reset. Never: always do a cold reset.
Save CMOS in FLASH	Enabled		Saving CMOS memory content into Flash Memory will prevent loosing CMOS options when battery fails.
Interrupt 19 Capture	✦ Disabled ✦ Enabled		Enabled: Allows option ROM to trap interrupt 19.

6.5.2.   Boot Device Priority Sub-Menu

Table 45 - Boot Device Priority Sub-Menu

Feature	Options	Description	Setup Help
1st ... Nth Boot Device	Type: Boot device	Specifies the priority of the available boot sources. The list includes USB CD ROM, USB Hard Drive, Hard Drive and PXE. Other supported devices might be dynamically added to the list.	Specifies the boot sequence from the available devices. A device enclosed in parenthesis has been disabled in the corresponding type menu.

6.5.3.   Hard Disk Drives Sub-Menu

Table 46 - Hard Disk Drives Sub-Menu

Feature	Options	Description	Setup Help
1st .. Nth Drive			Specifies the boot sequence from the available devices.

6.5.4.   Removable Drives Sub-Menu

Table 47 - Removable Drives Sub-Menu

Feature	Options	Description	Setup Help
1st ... 4th Drive			Specifies the boot sequence from the available devices.

6.5.5.   CD/DVD Drives Sub-Menu

Table 48 - CD/DVD Drives Sub-Menu

Feature	Options	Description	Setup Help
1st ... Nth Drive			Specifies the boot sequence from the available devices.

6.5.6.   USB Drives Sub-Menu

Table 49 - USB Drives Sub-Menu

Feature	Options	Description	Setup Help
1st ... Nth Drive			Specifies the boot sequence from the available devices.

6.5.7.   Network Drives Sub-Menu

Table 50 - Network Drives Sub-Menu

Feature	Options	Description	Setup Help
1st ... Nth Drive			Specifies the boot sequence from the available devices.

6.5.8. Other Drives Sub-Menu

Table 51 - Other Drives Sub-Menu

Feature	Options	Description	Setup Help
1st … Nth Drive			Specifies the boot sequence from the available devices.

6.6. System Management Menu

Table 52 - System Management Menu

Feature	Options	Description	Setup Help
Status of BMC	✦ Working ✦ Not working	Indicates if the BIOS was able to communicate with the IPMC.	
BMC Synchronization	Enable		Synchronize Baseboard Management Controller initialization with BIOS POST initialization.
Set LAN Configuration	N/A	"Press Enter to go to the screen ""Set LAN Configuration"	Sets the BMC LAN configurations.
IPMI Device and Firmware Information	N/A	Press Enter to go to sub screen ""IPMI Device and Firmware Information"".	
FRU Board Information	N/A	Press Enter to go to sub screen ""FRU Board Information"".	Displays FRU board and product information, Displays IPMC device and FW information.

6.6.1. Set LAN Configuration Sub-Menu

Table 53 - Set LAN Configuration Sub-Menu

Feature	Options	Description	Setup Help
Channel Number		Each interface has a channel number that is used when configuring the channel and for routing messages between channels. The channel number assignments are described in IPMI Specification 1.5, table 6-1.	Enter Channel Number for SET LAN Config Command. Proper value 1 or 2.
Channel Number Status	✦ Valid ✦ Invalid	Displays Valid if IPMC support LAN Channel.	
IP Address	N/A	"Press Enter to go to sub screen ""IP Address""."	
MAC Address	N/A	"Press Enter to go to sub screen ""MAC Address""."	
Subnet Mask	N/A	"Press Enter to go to sub screen ""Subnet Mask""."	

Feature	Options	Description	Setup Help
Gateway Address	N/A	"Press Enter to go to sub screen ""Gateway Address""."	
Active LAN Channel Number	✦ None ✦ 01 ✦ 02 ✦ Both	Each interface has a channel number that is used when configuring the channel and for routing messages between channels. The channel number assignments are described in IPMI Specification 1.5, *Table 13*.	Enter Active LAN Channel Number for Set LAN Configuration Command.

6.6.2. IP Address Sub-Menu

Table 54 - IP Address Sub-Menu

Feature	Options	Description	Setup Help
Channel Number		Each interface has a channel number that is used when configuring the channel and for routing messages between channels. The channel number assignments are described in IPMI Specification 1.5, *Table 13*.	Enter Channel Number for SET LAN Config Command. Proper value 1 or 2.
Channel Number Status	✦ Valid ✦ Invalid	Displays Valid if IPMC support LAN Channel.	N/A, display only.
IP Address Source	✦ Static ✦ DHCP	Select IP address source.	
Current IP Address	xxx.xxx.xxx.xxx	Display the current LAN configuration stored in IPMI NVRAM for IPMI LAN.	
IP Address	Enter	This allows setting an IP Address for LAN configuration.	Enter for IP Address Configuration.

6.6.3. MAC Address Sub-Menu

Table 55 - MAC Address Sub-Menu

Feature	Options	Description	Setup Help
Channel Number		Each interface has a channel number that is used when configuring the channel and for routing messages between channels. The channel number assignments are described in IPMI Specification 1.5, *Table 13*.	Enter Channel Number for SET LAN Config Command. Proper value 1 or 2.
Channel Number Status	✦ Valid ✦ Invalid	Displays Valid if IPMC support LAN Channel.	
Current MAC Address	xx.xx.xx.xx.xx.xx	Displays the current MAC Address stored in IPMI NVRAM for IPMI LAN.	

6.6.4. Subnet Mask Sub-Menu

Table 56 - Subnet Mask Sub-Menu

Feature	Options	Description	Setup Help
Channel Number		Each interface has a channel number that is used when configuring the channel and for routing messages between channels. The channel number assignments are described in IPMI Specification 1.5, *Table 13*.	Enter Channel Number for SET LAN Config Command. Proper value 1 or 2.
Channel Number Status	✦ Valid ✦ Invalid	Displays Valid if IPMC support LAN Channel.	
IP Address Source	✦ Static ✦ DHCP	Configures Subnet Mask from DHCP.	Select IP Address Source: Static or DHCP
Current Subnet Mask	xxx.xxx.xxx.xxx	Displays the current Subnet Mask configuration stored in IPMI NVRAM for IPMI LAN.	
Subnet Mask	Enter	Allows setting of a Subnet Mask for LAN configuration.	Enter for Subnet Mask Configuration.

6.6.5. Gateway Address Sub-Menu

Table 57 - Gateway Address Sub-Menu

Feature	Options	Description	Setup Help
Channel Number		Each interface has a channel number that is used when configuring the channel and for routing messages between channels. The channel number assignments are described in IPMI Specification 1.5, *Table 13*.	Enter Channel Number for SET LAN Config Command. Proper value 1 or 2.
Channel Number Status	✦ Valid ✦ Invalid	Displays Valid if IPMC support LAN Channel.	
IP Address Source	✦ Static ✦ DHCP	Configures Gateway address from DHCP.	Select IP Address Source: Static or DHCP
Current Gateway Address	xxx.xxx.xxx.xxx	Displays the current Gateway configuration stored in IPMI NVRAM for IPMI LAN.	
Gateway Address	Enter	Allows setting an Gateway IP Address for LAN configuration.	

6.6.6. IPMI Device and Firmware Information Sub-Menu

Table 58 - IPMI Device and Firmware Information Sub-Menu

Feature	Options	Description	Setup Help
Product ID		Product ID code (2 bytes)	"Displays CPU blade product ID from IPMI ""Get Device ID Command"", byte 11:12. Least significant byte first."
IPMI Version	✦ 1.5 ✦ 2.0	Displays IPMI Specification version.	
Device ID	Varies	Displays IPMI device ID. OEM defined, IPMI Device ID has been assigned like this: Renesas H8S2148 = 1 Kontron PMM = 2 Renesas H8S2145 = 3 Renesas H8S2166 = 4 Renesas H8S2138 = 5 Renesas H8S2168 = 6	
Device Revision	Varies	Displays IPMI device revision. OEM defined, specify the version of the IPMI Device controller.	
Firmware Revision	Varies	Displays IPMI firmware version.	
Aux Revision Info byte 0	Varies	"Displays implementation specific auxiliary information from IPMI ""Get Device ID Command"", byte 16. The byte is displayed as a 2-digit hexadecimal number."	
Aux Revision Info byte 1	Varies	"Displays implementation specific auxiliary information from IPMI ""Get Device ID Command"", byte 14. The byte is displayed as a 2-digit hexadecimal number."	
Aux Revision Info byte 2	Varies	"Displays implementation specific auxiliary information from IPMI ""Get Device ID Command"", byte 15. The byte is displayed as a 2-digit hexadecimal number."	
Aux Revision Info byte 3	Varies	"Displays implementation specific auxiliary information from IPMI ""Get Device ID Command"", byte 16. The byte is displayed as a 2-digit hexadecimal number. "	

6.6.7. FRU Board Information Sub-Menu

Table 59 - FRU Board Information Sub-Menu

Feature	Options	Description	Setup Help
Board Product Name	Board name	Displays the CPU blade product name.	
Board Serial Number	Varies	Displays the CPU blade serial number.	
Board Part Number	Varies	Displays the CPU blade part number.	
Product Name	Board name	Displays the CPU blade product name.	
Product Part/Model	Varies	Displays the CPU blade part/model number.	

Feature	Options	Description	Setup Help
Product Version Number	Manufacturer PCB version	Displays the CPU blade PCB revision number.	
Product Serial Number	Varies	Displays the CPU blade serial number.	

6.7. Exit Menu

Table 60 - Exit Menu

Feature	Options	Description	Setup Help
Save Changes and Exit	Enter	Saves modified settings into non-volatile memory and reboots the system.	Exit system setup after saving the changes. F10 key can be used for this operation.
Discard Changes and Exit	Enter	Discards modifications to settings and reverts to the state when Setup was entered, then complete remaining POST.	Exit system setup without saving any changes. ESC key can be used for this operation.
Discard Changes	Enter	Discards modifications to settings and reverts to the state when Setup was entered.	Discards changes done so far to any of the setup questions. F7 key can be used for this operation.
Load Optimal Defaults	Enter	Loads the factory default settings.	Loads Optimal Default values for all the setup questions. F9 key can be used for this operation.

6.8. BOOT Menu POP-UP

Boot Menu POP-UP is a boot screen that displays a selection of boot devices from which you can boot your operating system.

Pressing <F11> (or <F3> from a Console Redirection terminal) displays the Boot Menu POP-UP with these options:

1. Load the operating system from a boot device of your choice.

2. Exit the Boot Menu POP-UP (with <ESC>) and load the operating system from the boot devices in the order specified in Setup.

The BOOT Menu POP-UP expands your boot options by letting you choose your boot device, which could be a hard disk, floppy disk, CDROM, Flash Disk, SCSI or LAN. You can select your boot device in Setup, or you can choose a different device each time you boot during POST by selecting your boot device in the Boot menu POP-UP.

6.9. Console Redirection (VT100 Mode)

The VT100 operating mode allows remote setup of the board. This configuration requires a remote terminal that must be connected to the board through a serial communication link.

6.9.1. Requirements

The terminal should emulate a VT100 or an ANSI terminal. Terminal emulation programs such as Telix©, HyperTherminal (Windows), minicom (Linux) or ProComm© (Windows) can also be used.

6.9.2. ANSI and VT100 Keystroke Mapping

Table 61 - ANSI and VT100 Keystroke Mapping

Up	<ESC>[A
Down	<ESC>[B
Right	<ESC>[C
Left	<ESC>[D
Home	<ESC>[H
End	<ESC>[K
F1	<ESC>OP
F2	<ESC>OQ
F3	<ESC>OR
F4	<ESC>OT

6.9.3. VT-UTF8 Keystroke Mapping

The following "escape sequences" are defined in the "Conventions for Keys Not in VT100 Terminal Definition and ASCII Character Set" section of "Standardizing Out-of-Band Management Console Output and Terminal Emulation (VT-UTF8 and VT100+)", available for download at www.microsoft.com.

Table 62 - VT-UTF8 Keystroke Mapping

F1 Key	<ESC>1
F2 Key	<ESC>2
F3 Key	<ESC>3
F4 Key	<ESC>4
F5 Key	<ESC>5

F6 Key	<ESC>6
F7 Key	<ESC>7
F8 Key	<ESC>8
F9 Key	<ESC>9
F10 Key	<ESC>0
F11 Key	<ESC>!
F12 Key	<ESC>@
Alt Modifier	<ESC> ^ A
Control Modifier	<ESC> ^ C
Home Key	<ESC>h
End Key	<ESC>k
Insert Key	<ESC>+
Delete Key	<ESC>-
Page Up Key	<ESC>?
Page Down Key	<ESC>/

These "escape sequences" are supported by VT-UTF8 compliant terminal connections, such as Windows Server 2008 Emergency Management Services (EMS).

AMIBIOS8 Serial Redirection supports these key sequences under two configurations:

✦ "Terminal Type" setup question is set to "VT-UTF8".

✦ "Terminal Type" setup question is set to "VT100" or "ANSI" and "VTUTF8 Combo Key Support" setup question is set to "Enabled".

7. Troubleshooting and Problem Solving

7.1. Overview

The 12big Rack Storage Server includes an Enclosure Services Processor and associated monitoring and control logic to enable it to diagnose problems within the EM Card, Ops Panel, CPU(s) and DIMM(s).

The sensors for power and cooling conditions are housed within the power supples and cooling fans. There is independent monitoring for each unit.

7.1.1. Continuous Operation During Replacement

If a disk unit fails, it can normally be replaced without interrupting the use of the system.

If an enclosure contains two Power Supply Units, either of them can maintain power to the subsystem while the other is replaced.

7.1.2. Replacing Modules

Make sure that you have obtained a replacement module of the same type before removing any faulty module. Refer to Chapter 8 for instructions on how to replace modules.

CAUTION: If the 12big Rack Storage Server is powered up and you remove any module, its replacement must be inserted immediately. If the subsystem is used with modules or module blanks missing for more than a few minutes, the enclosure can overheat, causing power failure and data loss. Such use will invalidate the warranty.

- ✦ Replace a faulty drive with a drive of the same type and equal or greater capacity.
- ✦ All drive bays must be fitted with a drive carrier module in order to maintain a balanced air flow.
- ✦ All the supplied plug-in power supply units, electronics modules and blank modules must be in place for the air to flow correctly around the cabinet.

CAUTION: Observe all conventional ESD precautions when handling 12big Rack Storage Server modules and components. Avoid contact with backplane components and module connectors, etc.

IMPORTANT INFO: The top cover of the enclosure covers a service area which should be accessed by service personnel only. When the cover is replaced it MUST be secured by turning the lock mechanism to the "locked" position.

7.2. Start-Up Problems

7.2.1. Faulty Power Cords

1. Make sure that the power source to the enclosure is switched on.

2. Check that all power cords are inserted into PSUs. The PSU LEDs (see *4.4.2. Power Supply Unit LEDs*) should flash green when an active power cord is inserted (or be constant green if the enclosure has been powered on).

Contact LaCie if any of the following are true:

- ✦ Cords are missing or damaged.
- ✦ Plugs are incorrect.
- ✦ Cords are too short.

7.2.2. Alarm Sounds On Power Up

Refer to Section *7.3. Audible Alarm*.

7.2.3. The Motherboard Doesn't Recognize the Drives

1. Check that the LEDs on all installed drive carrier modules are illuminated (amber). Note that the drive LEDs will not be lit during drive spinup.

2. Check that all drive carrier modules have been correctly installed.

3. Check the SAS interconnect cables between the HBA and the EM Card.

7.3. Audible Alarm

The chassis audible alarm will sound if the enclosure requires attention. It can be muted by pressing the ID LED button on the Ops Panel (see section *4.4.1. Ops Panel LEDs and Switches*) and can be reinstated through the firmware.

7.4. LED/Audible Alarm Interpretation

The following tables summarize the various states of the LEDs and audible alarm and their meaning. Some states are duplicated in this section to make it easier to search for the cause of a problem.

NOTE: No audible alarm will sound if the enclosure has been muted.

The audible alarm states in the following tables are defined as:

✦ Intermittent beep – A 0.5 second beep every 32 seconds.

✦ Short beep – A 0.5 second beep every 8 seconds.

✦ Long beep – A 1.5 second beep every 2 seconds.

✦ Constant – The audible alarm is on constantly.

The LED states in the following tables are defined as:

✦ Slow blink – The LED is on for 0.5 seconds in every 4 seconds.

✦ Fast blink – The LED is on for 0.5 seconds in every 1 second.

✦ Constant – The LED is on constantly (no blinking).

Table 63 - Ops Panel Fault LED

Ops Panel Fault LED	Audible Alarm	Other LED	Meaning and Required Action
Off	Off		No warnings or faults
Slow blink	Short beep	No fan/drive fault LEDs constant	Warning state (usually approaching temperature threshold): check ambient temperature and increase if too cold or decrease if too hot. If this does not work, check for fan failure.
		Fan LED constant	Fan broken or out of tolerance: replace faulty fan.
		Drive LED constant	Drive fault – replace faulty drive.
Fast blink	Long beep	No fan LEDs constant	Critical state (usually temperature near edge of operating realm): check ambient temperature and increase if too cold or decrease if too hot immediately. If this does not work check for fan failure that has a broken light too.
		Two or more fan LEDs constant or one PSU fan LED constant	Fans broken or out of tolerance: replace fans immediately.

Ops Panel Fault LED	Audible Alarm	Other LED	Meaning and Required Action
Constant	Constant	No fan LEDs constant	Failure state (temperature in range where damage could occur): check ambient temperature and increase if too cold or decrease if too hot immediately. If this does not work check for fan failure that has a broken light too.
		Multiple fan LEDs constant	Fans broken or out of tolerance: replace fans immediately and decrease ambient temperature.

Table 64 - Fan Fault LED

Fan Fault LED	Audible Alarm	Other LED	Meaning and Required Action
Flashing			Fan identification has been turned on
Constant	Long or short beep	Chassis fault LED constant.	The fan broken or out of tolerance: replace fan immediately.

Table 65 - Drive Fault LED

Drive Fault LED	Audible Alarm	Other LED	Meaning and Required Action
Flashing			Drive identification has been turned on.
Constant	Long or short beep	Chassis fault LED constant.	Fan broken or out of tolerance: replace fan immediately.

Table 66 - Audible Alarm

Audible Alarm	OPS Panel Fault LED	Meaning and Required Action
Off	Off	No issues
Off	Flashing or constant	The audible alarm is muted: see *Table 63* for interpretation of LEDs and remedy
Intermittent beep	Various flash states	A fault has occurred and system is muted but in 'remind' mode: see *Table 63* for interpretation of LEDs and remedy
Slow beep	Slow blink	Warning mode: see *Table 63* for interpretation of LEDs and remedy
Fast beep	Fast blink	Critical mode: see *Table 63* for interpretation of LEDs and remedy
Constant	Constant	Failure mode: see *Table 63* for interpretation of LEDs and remedy

8. Module Removal and Replacement

8.1. Overview

The 12big Rack Storage Server includes an Enclosure Services Processor and associated monitoring and control logic to enable it to diagnose problems within the enclosure's power, cooling and drive systems.

The sensors for power and cooling conditions are housed within the EM Card, Ops Panel, CPU(s) and DIMM(s). There is independent monitoring for each unit.

8.2. ESD Precautions

CAUTION: It is recommended that you fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling 12big Rack Storage Server plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

8.3. Replacing a Module

CAUTION: Whenever replacing a module never leave an empty bay in the rear of the enclosure – obtain a replacement before removing the problem part.

CAUTION: Upon module replacement, the enclosure top cover MUST be secured by turning the lock mechanism to the "locked" position with a screwdriver.
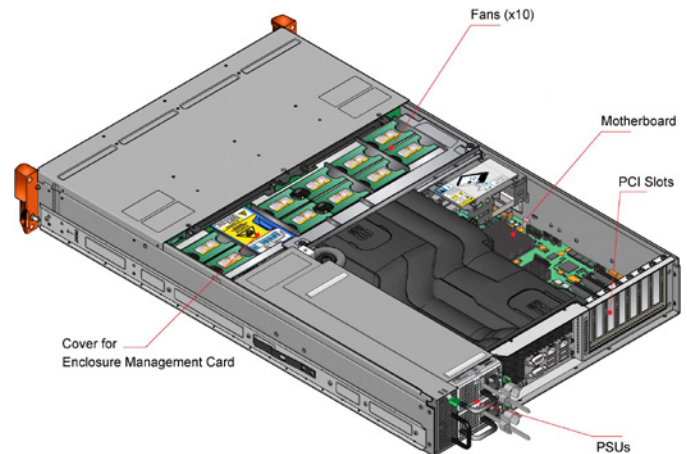
Fig. 30ATX Server Component Locations

8.3.1. Power Supply Units

The 12big Rack Storage Server system incorporates two PSUs housed in a mounting cage. PSU modules are individually installed.

IMPORTANT INFO: A faulty PSU must be replaced by a fully operational PSU within 24 hours.

CAUTION: Do not remove covers from the Power Supply Unit (PSU): there is a danger of electric shock inside. Return the PSU to LaCie for repair.

8.3.1.1. Removing a Power Supply Unit

CAUTION: The removal of the enclosure top cover or a Power Supply Unit must only be performed by a service person. Potential hazards include rotating fans and hot surfaces.

IMPORTANT INFO: Prior to removing the PSU from the mounting cage in the enclosure, disconnect the power from the power supply, by either the mains switch (where present) or by physically removing the power source, to make sure your system has warning of an imminent power shutdown.

1. Make sure that you identify the faulty PSU correctly.

2. Disconnect the power cord (there is no need to turn the PSU off).

3. Squeeze the locking tab to the left (*Fig. 31*).
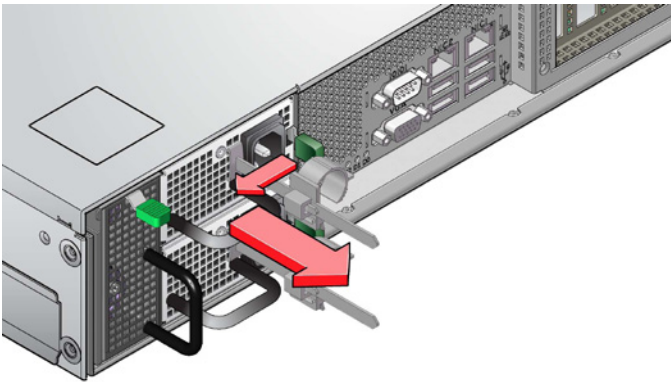
Fig. 31 - Removing a PSU (1)

4. Grip the handle and withdraw the PSU from the mounting cage (*Fig. 32*).
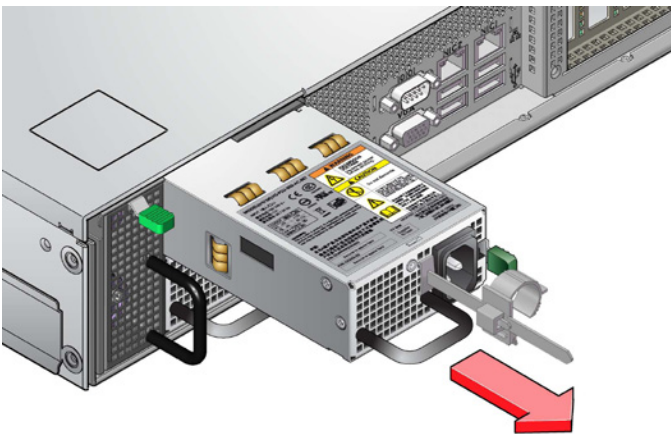
Fig. 32 - Removing a PSU (2)

8.3.1.2. Installing a Power Supply Unit

CAUTION: This procedure should be performed by Service Personnel only.

Two PSUs can be installed in the mounting cage at the rear of the enclosure, see *Fig. 16*.

IMPORTANT INFO: Two PSUs must be fitted. Operation of the enclosure with ANY modules missing will disrupt the airflow and the system will not receive sufficient cooling. It is ESSENTIAL that all apertures are filled before operating the unit.

CAUTION: Do not remove covers from the PSUs: there is a danger of electric shock inside. If a PSU is faulty you must return it to LaCie for repair.

1. Check for damage, especially to the rear connector on the supply.

CAUTION: Handle the PSU carefully and avoid damaging the connector pins. Do not install the PSU if any pins appear to be bent.

2. Slide the PSU into the mounting cage (*Fig. 33*). A click should be heard as the securing spring engages.
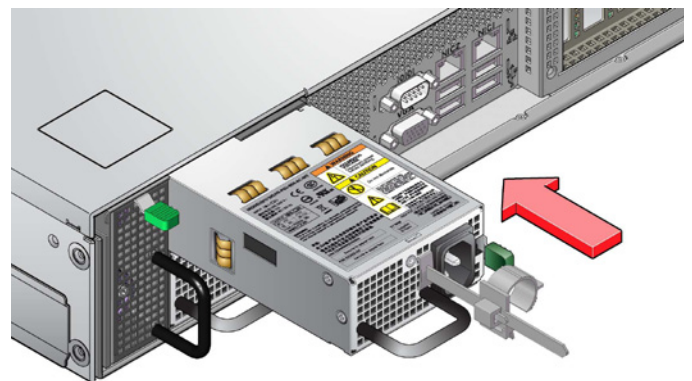
Fig. 33 - Installing a Power Supply Unit (1)
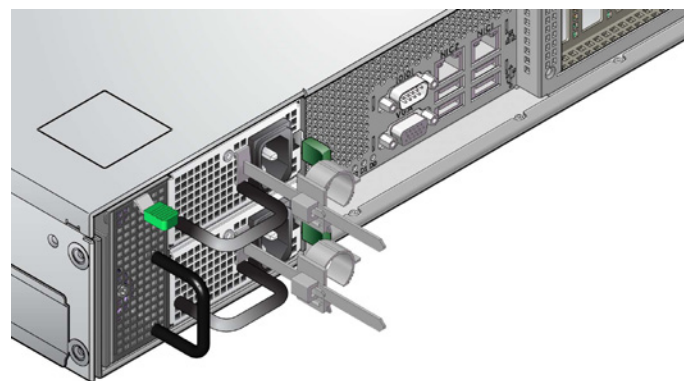
Fig. 34 - Installing a Power Supply Unit (2)

3. You are now ready to connect the power cords to the power sources and switch the power source on. Refer to section *3.4.4. Connecting the Power Cords*.

8.3.2. Cooling Fans

The 12big Rack Storage Server incorporates ten cooling fans, housed in a cooling cage. Fan modules are individually installed.

IMPORTANT INFO: A faulty cooling fan must be replaced by a fully operational fan within 72 hours. Do not remove the faulty module until you have a replacement module of the same type available.

8.3.2.1. Removing a Cooling Fan

CAUTION: The enclosure top cover should only be opened by service personnel as it provides access to a service area. Potential hazards include rotating fans and hot surfaces.

CAUTION: Upon module replacement, the enclosure top cover MUST be secured by turning the lock mechanism to the "locked" position with a screwdriver.

1. To access the ten cooling fans, release the enclosure top cover by turning the lock mechanism to the "unlocked" position and slide the cover back until it stops (see *Fig. 35*).

CAUTION: Make sure the fan has stopped rotating before you attempt to remove it: there is a risk of trapping or cutting fingers.

2. Grip the faulty fan module with finger and thumb and pull it upwards in order to unplug it from the EM Card and remove it from the enclosure (see *Fig. 36*).
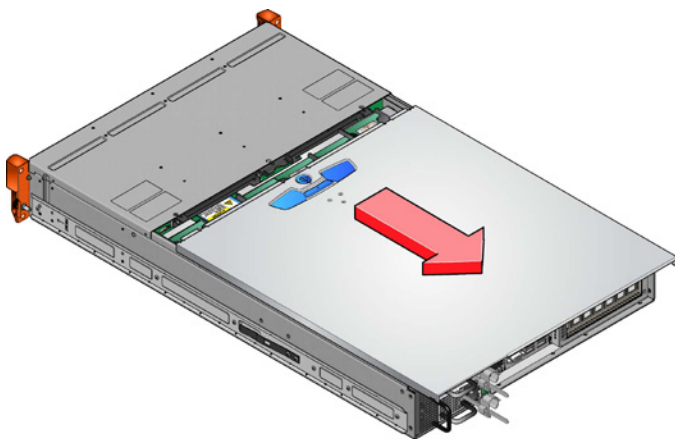
Fig. 35 - Removing the Enclosure Cover
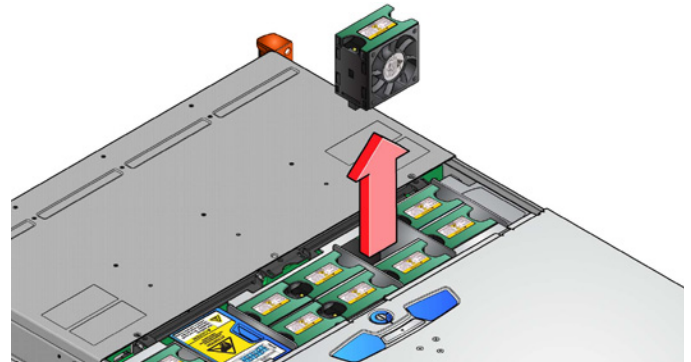
Fig. 36 - Removing a Cooling Fan

8.3.2.2. Installing a Cooling Fan

1. Check the fan for damage. Do not install if there are any visible signs of damage.

2. Grip the fan and push it all the way into the enclosure until it fits firmly and is level with the other fans (see *Fig. 37*). The fan plugs into the EM Card.

3. Make sure that the fan LED extinguishes within 10 seconds of installation.

4. Repeat the above procedure for each fan to be fitted.
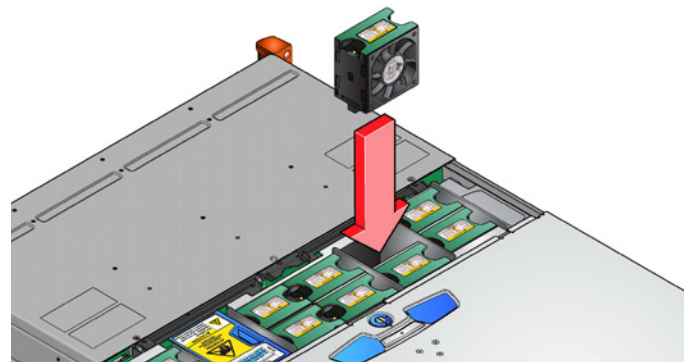
Fig. 37 - Cooling Fan Installation

5. Close the enclosure cover and secure by turning the lock mechanism to the "locked" position.

8.3.3. Drive Carrier Module

CAUTION: Observe all conventional ESD precautions when handling 12big Rack Storage Server modules and components. Avoid contact with backplane components and module connectors, etc.

8.3.3.1. Removing a Drive Carrier

CAUTION: Damage can occur to a drive if it is removed while still spinning. If possible use the operating system to spin down the drives prior to removal. If this is not possible we recommend that you perform all steps of the following procedure to make sure that the drive has stopped prior to removal.

1. If the anti-tamper lock has been activated, de-activate it by locating the key into its socket and rotating it in a counterclockwise direction until the indicator is no longer visible in the aperture beside the key (see *4.3.2. De-Activating the Locks*).

2. Release the carrier handle by pressing the latch in the handle towards the handle hinge (i.e. towards the front of the enclosure). See *Fig. 38*.
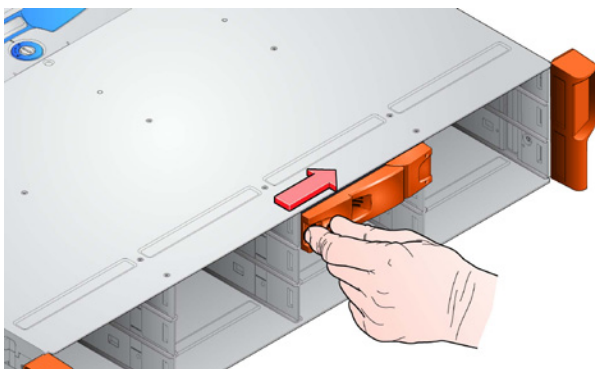
Fig. 38 - Removing a Drive Carrier Module (1)

3. Gently withdraw the drive carrier module approximately 1 inch (25mm), and wait 30 seconds (see *Fig. 39*).
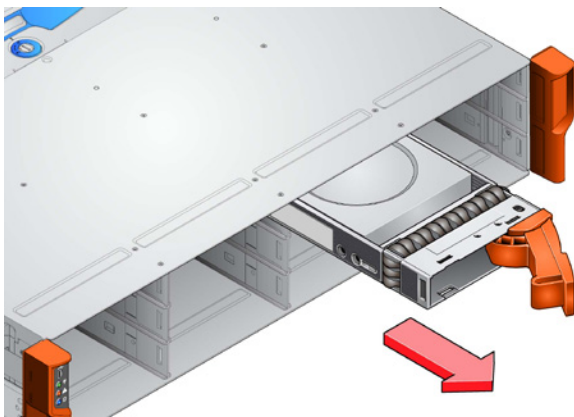
Fig. 39 - Removing a Drive Carrier Module (2)

4. Withdraw the module from the drive bay.

CAUTION: Dummy drive carrier modules MUST be fitted to ALL unused drive bays.There will be inadequate drive cooling if any are left open.

8.3.3.2. Installing a Drive Carrier

IMPORTANT INFO: A drive carrier module cannot be installed if its anti-tamper lock is activated while the unit is outside the enclosure. Refer to section *4.3.2. De-Activating the Locks* for the de-activation procedure.

1. Release the drive carrier handle, by depressing the latch in the handle (see *Fig. 40*).

Fig. 40 - Installing a Drive Carrier Module (1)

2. Insert the drive carrier into the enclosure (*Fig. 41*).
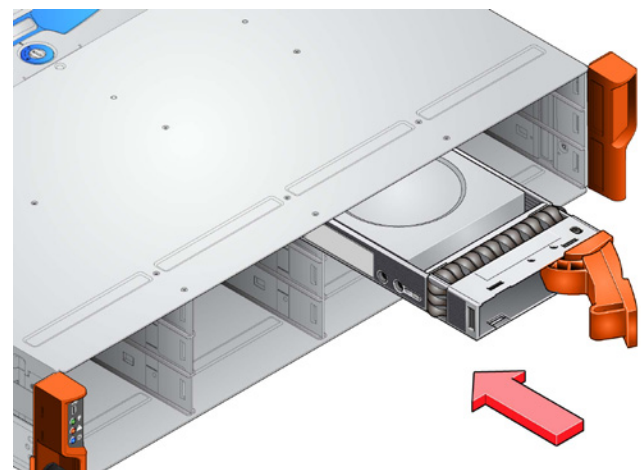
Fig. 41 - Installing a Drive Carrier Module (2)

IMPORTANT INFO: Make sure that the carrier is orientated so that the drive is uppermost and the handle opens from the left, as shown in *Fig. 41*.

3. Gently slide the drive carrier all the way into the enclosure.

4. Cam the drive carrier home. The camming foot on the base of the carrier will engage into a slot in the enclosure. Continue to push firmly until the handle fully engages. A click should be heard as the latch engages and holds the handle closed.

CAUTION: Make sure that all drive carriers are fully engaged in the enclosure by firmly pushing each one home into the slot, as shown in *Fig. 42*.
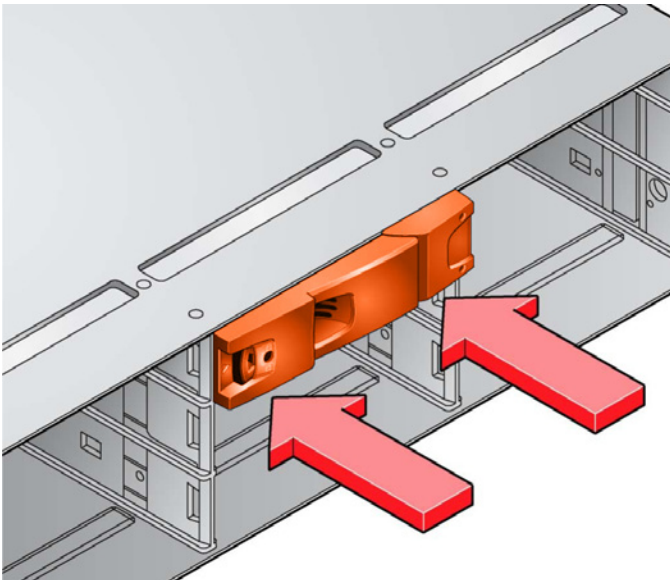
Fig. 42 - Engaging a Drive Carrier Module in an Enclosure

8.4. Replacing Components on the ATX Motherboard

Although some components on the ATX motherboard can be replaced, the motherboard itself cannot. In the event of a motherboard failure, contact LaCie.
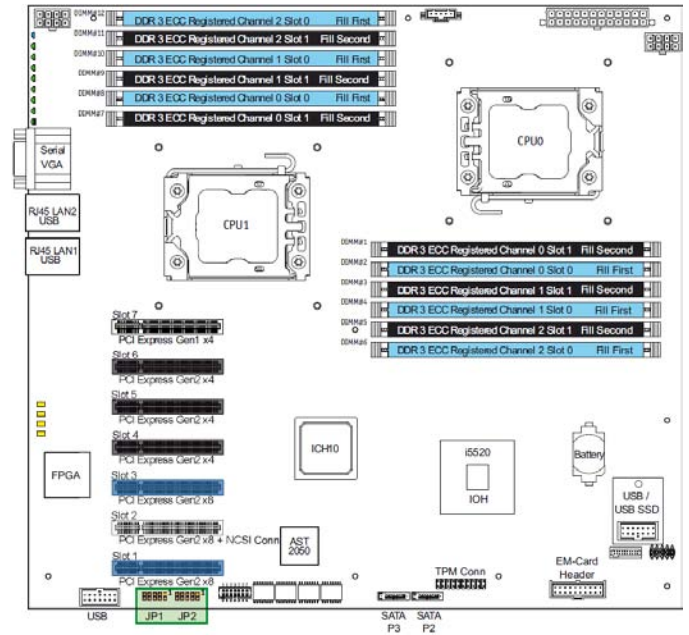
Fig. 43 - Motherboard Layout and Components

8.4.1. Replacing the Motherboard Battery

The 12big Rack Storage Server ATX motherboard is fitted with a coin cell battery, type CR2032.

CAUTION: CMOS settings, such as the BIOS date and time, will be lost if the motherboard battery is removed. If the battery is replaced, these settings must be reset in the BIOS. User data will not be affected.

1. To access the motherboard battery, release the enclosure top cover by turning the lock mechanism to the "unlocked" position and slide the cover back until it stops (see *Fig. 35*).

2. Slide the cover forward, lifting at the same time to completely remove the cover.

3. Remove the CPU/memory ducting.

4. Pull back the spring clip securing the battery to the motherboard and remove the battery.

5. Insert the new battery onto the motherboard, making sure the battery polarization is correct. The clip will spring closed to secure the battery.

6. Replace the CPU/memory ducting.

7. Replace the enclosure cover and secure by turning the lock mechanism to the "locked" position.

CAUTION: There is a danger of explosion if the battery is replaced by an incorrect type.

Dispose of used batteries in accordance with the manufacturer's instructions and national regulations.

8.4.2.   Replacing Memory Modules

NOTE: This procedure is only for authorized customers using authorized parts.

The 12big Rack Storage Server supports up to 96GB of DDR3 memory. There are 12 memory slots, 6 per CPU, divided into 3 channels of 2 modules.

The motherboard takes DDR3, 1.5V typical, ECC, registered or unbuffered, x4 or x8 memory with up to 4 ranks per module. The maximum module size is 8GB.

When replacing memory modules, refer to *Fig. 43* and make sure of the following:

✦ DIMMs #1 to #6 are used by CPU0; DIMMs #7 to #12 are used by CPU1.

✦ Populate as many Slot 0 (blue) slots first, before starting to populate any Slot 1 (black) slots.

✦ Make sure an approved heatsink is attached to each module.

✦ Modules must only be replaced with those of an identical type.

1. Remove the installed module by pushing both retaining clips sideways and pulling the module out of the slot.
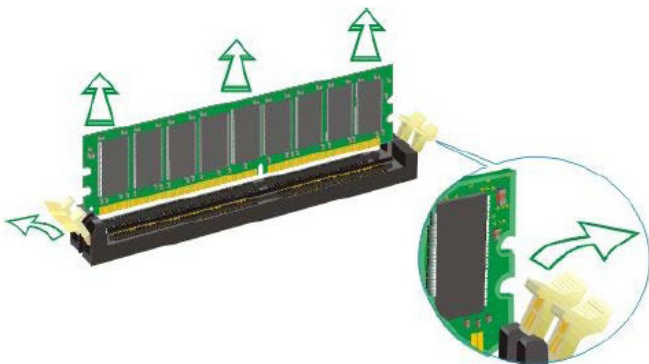
Fig. 44 - Removing a RAM Module

2. Insert the module into the correct slot, aligning the notch on the module with the socket.

3. Push the module down until the retainin clips lock on each side.
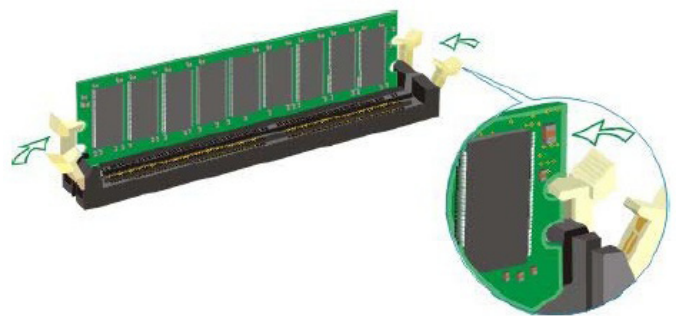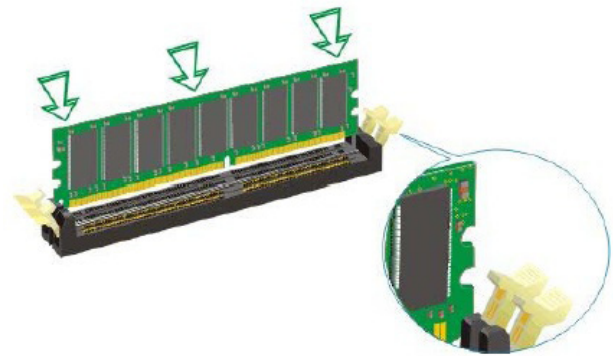
Fig. 45 - Inserting a RAM Module

8.5. Replacing PCI Cards

NOTE: This procedure is only for authorized customers using au-
thorized parts.
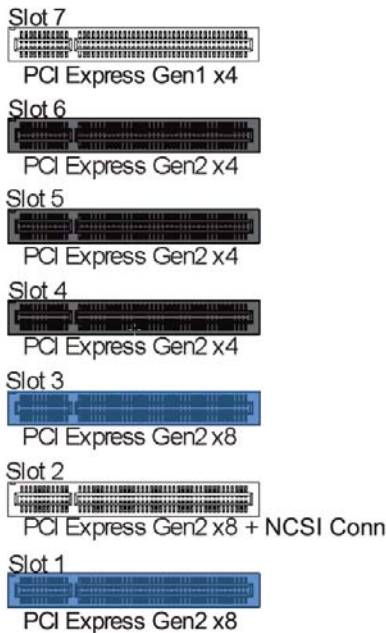
Fig. 46 - Motherboard PCI Slots

1. To access a PCI card, release the enclosure top cover by turn-
ing the lock mechanism to the "unlocked" position and slide the
cover back until it stops (see *Fig. 35*).

2. Slide the cover forward, lifting at the same time to completely
remove the cover.

3. To remove a PCI card, release the screw in the retaining bracket
at the back of the enclosure, disconnect all cables and lift the
card upwards and out of the enclosure.

4. Replace the card.

5. Reconnect the cables.

6. Close the enclosure cover and secure it by turning the lock
mechanism to the "locked" position.

8.6. Spare Parts and Ancillary Items

The following list shows the replaceable parts available for the 12big
Rack Storage Server.

NOTE: Items marked with a * must only be replaced by trained
service personnel.

✦ Chassis (including backplane and motherboard).
✦ *AC Power Supply Unit.
✦ *Cooling Fan Module.
✦ Drive Carrier Module.
✦ Dummy Drive Carrier Module.
✦ *PCI PCBs.
✦ 19 inch Rack Mounting Rail Kit.
✦ Blanking Plate (PCI slot).
✦ Power cords (country specific).
✦ Documentation.

9. Gem Enclosure Firmware

9.1. Alarm States

The GEM firmware supports the following alarms states:

Table 67 - Alarm States

Alarm State	Mode	Action	
		Without Mute Button Pressed	With Mute Button Pressed
S0	Normal Mode	Silent	Beep twice
S1	Fault Mode	One second on, one second off	Transition to S2 or S3 (see notes)
S2	Remind Mode	Intermittent beep	None
S3	Muted Mode	Silent	None
S4	Critical Fault Mode	Continuous alarm	None: Mute not active

NOTES:

1. When in state S1, if the Mute button is not pressed within 2 minutes, the enclosure will automatically move to state S2 or S3.

2. Once a fault is resolved, the system will move back to alarm state S0.

3. The critical fault state S4 can be entered directly from any other alarm state.

4. The beep will only sound if enabled for the configuration.

9.2. Alarm Conditions

The conditions listed in *Table 68* will cause an alarm.

Table 68 - Alarm Conditions

Status	Severity	Alarm State
PSU Alert - Loss of DC power from a single PCM	Fault - no loss of redundancy	S1
PSU Alert - Loss of DC power from a single PCM	Fault - loss of redundancy	S1
Fan Fail	Fault	S1
EM Card detected PSU fault	Fault	S1
PSU removed	Configuration Error	None
Enclosure Configuration Error (VPD)	Fault - Critical	S1

Status	Severity	Alarm State
Low Warning Temperature Alert	Warning	S1
High Warning Temperature Alert	Warning	S1
Over Temperature Alarm	Fault - Critical	S1
I²C Bus failure	Fault - Loss of redundancy	S1
EM Card Interface Module Fault	Fault - Critical	S1
Drive Power Control Fault	Warning - No loss of drive power	S1
Drive Power Control Fault	Fault - Critical - loss of drive power	S1
Drive Removed	Warning	None
Insufficient Power Available	Warning	None
Intrusion < 5 min	Warning	S1
Intrusion > 5 min	Fault - Critical	S4

For all of these alarm conditions, the Ops Panel LED will show a fault.

10. Upgrading the Firmware

10.1. Important Notes

Upgrading the firmware consists of two steps, to be performed in this order:

- ✦ Upgrading the x86 subsystem.
- ✦ Upgrading the GEM subsystem.

NOTE: It is important to note that the x86 subsystem upgrade process outlined in this chapter will not work unless the x86 subsystem firmware has first been upgraded using the update CD in the GEM USM 1.0 (i.e. BR2) package. This is because the system will not have HPM upgrade capability prior to application of the USM 1.0/BR2 x86 motherboard update.

NOTE: Upgrades must be performed from the previous GEM USM release package. If an upgrade is required from an earlier GEM package, please contact your FAE who will provide you an assessment of whether a direct transition can be made, or whether intermediate upgrades will also be required.

10.2. 12big Rack Storage Server x86 Upgrade Procedure

NOTE: It is assumed that the native OS running on the 12big Storage Server is a Linux variant. If an alternative OS is used, such as a variant of MS Windows, a port of the optimized version of IPMITool described in section *10.2.2. Optimized IPMITool* is required. At this stage Xyratex is unable to provide ports for alternative OSs.

NOTE: To improve IPMI performance during the upgrade, it is recommended that all user IPMI daemons are suspended.

This procedure will upgrade the BIOS / FPGA and BMC firmware.

1. Acquire the optimized version of IPMITool indicated by section *10.2.2. Optimized IPMITool*.

NOTE: The use of any other version of IPMITool will result in an exceptionally long update duration (in the order of 2 hours as opposed to approximately 20 minutes with the optimized tool).

2. Run the following command at the Linux prompt from the x86 OS:

```
ipmitool -z 250 hpm upgrade 0956373-XX_But-
ser2_Motherboard_XX.hpm all activate
```

where the 'XX' symbols represent version numbers.

Once the update process has completed, there will be an automatic reboot of the x86 processor to activate the updates.

3. Once the x86 has rebooted, run the following command:

```
ipmitool hpm check
```

4. Verify that the active firmware component versions match those in the release notes.

10.2.1. Upgrade Files

The upgrade files specified in this section can be found in the motherboard sub-folder in this package, which contains a file of the form:

0956373-XX_Butser2_Motherboard_XX.hpm – HPM upgrade file containing BIOS, FPGA and BMC updates.

10.2.2. Optimized IPMITool

An optimized version of IPMITool v1.8.11 is required to update the BIOS, FPGA and BMC firmware.

This optimized variant has only been tested on SUSE Linux Enterprise Server 11 – 64 bit, but it should build and run correctly on all Linux variants normally supported by IPMITool, as long as the Open IPMI drivers and libraries are installed.

This optimized version is available from the IPMITool CVS code repository. It is currently recommended to download the latest code, create a patch against v1.8.11 (as detailed below), and distribute this patch throughout your company.

LaCie will provide notifications for any future enhancements to IPMITool that are required by the 12big Storage Server; a request has been made to the IPMITool project administrators to allow the correct file revisions to be extracted via tags in the future.

1. Download IPMITool v1.8.11 using wget:

```
wget http://downloads.sourceforge.net/
project/ipmitool/ipmitool/1.8.11/ipmi-
tool-1.8.11.tar.gz?use_mirror=cdnetworks-
us-1
```

2. Decompress the IPMITool archive:

```
tar zxvf ipmitool-1.8.11.tar.gz
```

3. Get the latest development version of IPMITool from the CVS sourceforge server:

```
cvs -d:pserver:anonymous@ipmitool.cvs.
sourceforge.net:/cvsroot/ipmitool

login

cvs -z3 -d:pserver:anonymous@ipmitool.cvs.
sourceforge.net:/cvsroot/ipmitool

export -r HEAD ipmitool
```

4. Create patch file:

```
diff -Nur ipmitool-1.8.11 ipmitool > ipmi-
tool.patch
```

5. Apply the patch:

```
patch -Np1 -d ipmitool-1.8.11 < ipmitool.
patch
```

6. If the Bootstrap file is not executable, make it executable:

```
chmod u+x Bootstrap
```

7. Build the patched IPMITool:

```
Bootstrap

Configure

Make

(make install)
```

8. If LAN encryption is required, the OpenSSL development package may need to be installed and the OpenSSL include directory (e.g. `/usr/include/openssl`) added to the include path.

10.3. 12big Rack Storage Server Upgrade Procedure

10.3.1. Upgrade Steps

The GEM subsystem refers to the following enclosure components:

- ✦ GEM Main Firmware.
- ✦ GEM Bootloader.
- ✦ GEM Main CPLD.
- ✦ GEM VPD.
- ✦ GEM Config.

- ✦ PDB VPD.
- ✦ PDB Firmware1.
- ✦ Fan Controller Firmware and Configuration.

SES Page 0x0E is the firmware download mechanism used to upgrade the GEM subsystem. The details for this are covered in the GEM 2.0 ANSI SES Specification and the T-10 ANSI SCSI Enclosure Services – 2 (SES-2) documentation.

If upgrading GEM from GEM USM v1.0 a reduced firmware update procedure can be performed using combined Enclosure Management Card update images. This is detailed in section 10.3.1.1.

If upgrading from an older version of GEM (bypassing the levels stipulated in GEM USM v2.2) the full update procedure should be followed.

NOTE: 1 PDB Firmware download is only supported if the level of firmware on the PDB is 3.05 or later. To 'activate' a PDB firmware download it is necessary to power the system down, remove AC power from the unit, wait 30 seconds and re-apply AC. This can be done by either by removing the power cords from the unit or switching the AC supply outlet off and on.

10.3.2. Updates from GEM USM v1.0

1. Ensure the EM Card and enclosure components are running at GEM USM v2.1 levels:

```
ver
```

In order to ensure a successful combined image download it is advisable to download the GEM single image v2.2.0 first.

2. Download the single GEM image GFF to the EM card. This will be a file of the form:

```
0955684-XX_Butser2_Firmware_XX.gff
```

where the 'XX' symbols represent version numbers.

The package contents can be downloaded individually if desired. If mode 0x07 is used, a reboot will occur automatically. If mode 0x0E is used, the EM Card will need to be rebooted manually.

3. Download the combined package GFF to the EM Card. This will be a file of the form:

```
0958784-XX_Combined_Butser2_XX.gff
```

where the 'XX' symbols represent version numbers.

The package contents can be downloaded individually if desired. If mode 0x07 is used, a reboot will occur automatically. If mode 0x0e is used, the EM Card will need to be rebooted

manually.

4. Download the updated Fan Controller Chip firmware and configuration. This will be a file of the form:

`0955682-XX_EMCard_FanCtrl_XX.gff`

where the 'XX' symbols represent version numbers.

5. The EM Card will be reboot after each download.

10.3.3. Upgrade Filenames

Table 69 - Upgrade Filenames

GEM Firmware Component		File Name Format	Automatic Reboot Action
EM Card	Combined	0958784-XX_Combined_Butser2_XX.gff	Hard Reboot
	Bootloader	0956374-XX_Butser2_Bootloader_XX.gff	Soft Reboot
	Firmware	0955684-XX_Butser2_Firmware_XX.gff	Soft Reboot
	VPD	0955685-XX_butser2_emcard_vpd_CRC_XX.gff	Soft Reboot
	Config	0957282-XX_butser2-config_crc_XX.gff	Soft Reboot
	Main CPLD	0955683-XX_EMCard_CPLD_XX.gff	Hard Reboot
PDB	Firmware	0955686-XX_Butser2_PDB_Download_image_XX.gff	No Reboot
	VPD	0955687_XX_pdbvpd_CRC_XX.gff	No Reboot
Fan Ctrl	Firmware and Config	0955682-XX_EMCard_FanCtrl_XX.gff	Soft Reboot

✦ The combined images contain the bootloader, GEM firmware, VPD, flash config CPLD, PDB VPD and PDB firmware. The Fan Controller firmware and configuration is not currently available in the combined image.

✦ The PDB firmware is downloadable from firmware version 3.05 and later.

✦ To 'activate' a PDB firmware download it is necessary to power the system down, remove A/C from the system wait 30seconds and re-apply A/C – this can be done by either by removing the power cords from the unit or switching the A/C outlet off and on.

10.3.4. Version Checking

After the firmware upgrade the cli ver command should return version numbers for the following:

```
EM Card firmware

EM Card firmware date

EM Card bootloader

EM Card config CRC

EM Card VPD structure

EM Card VPD CRC

EM Card CPLD

EM card chip

EM Card SDK

PDB firmware

PCM 1 firmware

PCM 2 firmware

PDB VPD structure

PCM 1 VPD structure

PCM 2 VPD structure

PDB VPD CRC

PCM 1 VPD CRC

PCM 2 VPD CRC

Fan Controller config

Fan Controller deviceFw

Battery firmware
```

11. Technical Specifications

11.1. Dimensions

Table 70 - Dimensions

Rack Enclosure	Inches	Millimeters
Height	3.46	87.9
Width across mounting flange	19.01	483
Width across body of enclosure	17.68	449
Depth from rack posts to rear of PCI bulkhead	26.82	681.3
Depth from rack posts to maximum extremity of enclosure	27.83	707
Depth from flange to furthest extremity at front of Ops covers	1.18	30

11.2. Weight

Table 71 - Weights

Weight	Kilograms	Pounds
Maximum configuration	32	71
Enclosure without drives installed	17.5	39

11.3. Environment

Table 72 - Ambient Temperature and Humidity

	Temperature Range	Relative Humidity	Max. Wet Bulb
Operational	5°C to 35°C	20% to 80% non-condensing	23°C
Non-Operational	1°C to +50°C	8% to 80% non-condensing	27°C
Storage	1°C to +60°C	5% to 80% non-condensing	29°C
Shipping	-40°C to +60°C	5% to 100% non-precipitating	29°C

Table 73- Environment

Airflow	System must be operated with low pressure rear exhaust installation. Back pressure created by rack doors and obstacles must not exceed 5 pascals (0.5mm Water gauge)
Altitude, Operational	0 to 2133 m (0 to 7,000ft)
Altitude, Non-Operational	-305 to 12,192m (-1000 to 40,000ft)
Shock, Operational	Vertical axis 5g peak 1/2 sine, 10ms
Shock, Non-Operational	20g 10ms 1/2 sine (test with drives) 30g 10ms 1/2 sine (test without drives)
Vibration, Operational	0.2grms 5-500 Hz random
Vibration, Non-Operational	0.8grms 2-200 Hz random (test with drives) 1.04grms 2-200 Hz random (test without drives)
Vibration, Relocation	0.15g 2-200 Hz sine (test with drives) 0.3g 2-200 Hz sine (test without drives)
Acoustics	Operating sound pressure at 20°C with all fans running at 46%: less than 58 dB LpA average measured at the bystander positions (the 4 bystander positions are 1m horizontal and 1.5m off the floor positioned front, back, left and right. The unit under test will be measured on the floor).
Orientation and Mounting	19"" Rack mount (2EIA Units) Rack rails to fit 800mm depth racks compliant with IEC 297 Back pressure not to exceed 5 pascals (0.5mm water gauge)

11.4. AC Power Module (2 x 850W PSU)

Table 74 - AC Power Modules

Voltage Range	100 - 240 VAC Rated
Voltage Range Selection	Full Range PSU
Frequency	50/60 Hz
Input Current	12 A
Power Factor Correction	95% at 110V full load
Harmonics	Meets EN61000-3-2
Output	+5 V aux: 4A, +12 V: 70A max
Output Rails	6
Dimensions	84mm H x 107mm W x 371mm D (3.3in x 4.21in x 1.46in)

11.5. Cooling Fan

Table 75 - Cooling Fans

Number	10
Type	Single Rotor High Speed Axial
Speed Control	PWM Speed Control in 5 banks of 2
Connection	Hot pluggable connector to Enclosure Management Card
Tacho Outputs	Individual tacho outputs for each fan
Power	Operated from resettable fused 12V from supply rail

11.6. Drive Carrier Module Specification

IMPORTANT INFO: Operating the 12big Rack Storage Server with non-approved drives may invalidate the warranty.

Table 76 - Drive Carrier Module Specification

Module Dimensions	26.6mm H x 106.5 mm W x 220.2 mm D
Weight	0.8 kg (1.0" 300GB drive)
Operating Temperature	5° C to 35° C
Power Dissipation	18 Watts maximum

11.7. Drives

IMPORTANT INFO: Drives should be UL Approved.

11.8. Motherboard

Standard ATX form factor with integral I/O panel.

12. Standards & Regulations

12.1. International Standards

The 12big Rack Storage Server complies with the requirements of the following agencies and standards:

- ✦ CE to EN 60950-1
- ✦ CB report to IEC 60950-1:2005 (2nd edition)
- ✦ UL & cUL to UL 60950-1 2nd edition

12.2. Potential for Radio Frequency Interference

USA Federal Communications Commission (FCC)

NOTE: This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. LaCie is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

12.3. European Regulations

This equipment complies with European Regulations EN 55022 Class A: Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment and EN50082-1: Generic Immunity.

12.4. ESD Precautions

CAUTION: It is recommended that you fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling 12big Rack Storage Server plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

12.5. Safety Compliance

Table 77 - Safety Compliance

System Product Type Approval	UL, cUL, CE
Safety Compliance	UL 60950
	IEC 60950
	EN 60950

12.6. EMC Compliance

Table 78 - EMC Compliance

Conducted Emissions Limit Levels	CFR47 Part 15B Class A
	EN55022 Class A
	CISPR Class A
Radiated Emissions Limit Levels	CFR47 Part 15B Class A
	EN55022 Class A
	CISPR Class A
Harmonics and Flicker	EN61000-3-2/3
Immunity Limit Levels	EN55024

NOTE: The cable must not have a connection to a common ground/earth point.

12.7. AC Power Cords

12.7.1. United States

Must be NRTL listed (National Recognized Test Laboratory, e.g. UL)

Table 79 - US Power Cords

Cord type	SV or SVT, 18 AWG minimum, 3 conductor, 4.5 M max length.
Plug	NEMA 5-15P grounding-type attachment plug rated 120V 10A or IEC 320 C14, 250V, 10A.
Socket	IEC 320, C-13, 250V, 10A.

12.7.2. Europe and Other Countries

General requirements:-

Table 80 - Non-US Power Cords

Cord type	Harmonized, H05-VVF-3G1.0
Socket	IEC 320, C-13, 250V, 10A.

IMPORTANT INFO: The plug and the complete power cord assembly must meet the standards appropriate to the country, and must have safety approvals acceptable in that country.

12.8. Recycling of Waste Electrical and Electronic Equipment (WEEE)

At the end of the products life, all scrap/ waste electrical and electronic equipment should be recycled in accordance with National regulations applicable to the handling of hazardous/ toxic electrical and electronic waste materials.

Contact LaCie for a copy of the Recycling Procedures applicable to your product.

IMPORTANT INFO: Observe all applicable safety precautions, e.g. weight restrictions, handling batteries and lasers etc. detailed in the preceding chapters when dismantling and disposing of this equipment.

13. Standards & Regulations

13.1. Introduction

During Power On Self-Test, the eight LEDs on the back of the motherboard (see *Fig. 25*) show the status in a binary pattern as follows:

Table 81 - Motherboard LED Values

LED	D7	D6	D5	D4	D3	D2	D1	D0
Decimal	128	64	32	16	8	4	2	1
Hex	0x80	0x40	0x20	0x10	0x8	0x4	0x2	0x1

The status code is the sum of the values for the illuminated LEDs.

The following sections describe the various status values.

13.2. Bootblock Initialization Code Checkpoints

The Bootblock initialization code sets up the chipset, memory and other components before system memory is available. These codes are shown on the motherboard LEDs as described in section C.1. The following table describes the type of checkpoints that may occur during the bootblock initialization portion of the BIOS:

Table 82 - Bootblock Initialization Code Checkpoints

Checkpoint	Description
Before D1	Early chipset initialization. Early super I/O initialization is done including RTC and keyboard controller. NMI is disabled.
D1	Perform keyboard controller BAT test. Check if waking up from power management suspend state. Save power-on CPUID value in scratch CMOS.
D0	Go to flat mode with 4GB limit and GA20 enabled. Verify the bootblock checksum.
D2	Disable cache before memory detection. Execute full memory sizing module. Verify that flat mode is enabled.

Checkpoint	Description
D3	If memory sizing module is not executed, start memory refresh and do memory sizing in Bootblock code. Do additional chipset initialization. Re-enable cache. Verify that flat mode is enabled.
D4	Test base 512KB memory. Adjust policies and cache first 8MB. Set stack.
D5	Bootblock code is copied from ROM to lower system memory and control is given to it. BIOS now executes out of RAM.
D6	Both key sequence and OEM specific method is checked to determine if BIOS recovery is forced. Main BIOS checksum is tested. If BIOS recovery is necessary, control flows to checkpoint E0.
D7	Restore CPUID value back into register. The Bootblock-Runtime interface module is moved to system memory and control is given to it. Determine whether to execute serial flash.
D8	The Runtime module is uncompressed into memory. CPUID information is stored in memory.
D9	Store the uncompressed pointer for future use in PMM. Copy main BIOS into memory. Leave all RAM below 1MB Read-Write including E000 and F000 shadow areas but closing SMRAM.
DA	Restore CPUID value back into register. Give control to BIOS POST (ExecutePOSTKernel).
E1-E8 EC-EE	OEM memory detection/configuration error. This range is reserved for chipset vendors and system manufacturers. The error associated with this value may be different from one platform to the next.
E9	Checksum of BIOS verified.

13.3. POST Code Checkpoints

Table 83 describes the checkpoints that occur during the Power On Self-Test (POST) portion of the BIOS. These codes are shown on the motherboard LEDs as described in section 13.1. Introduction. All of these codes can be seen through the management GUI.

Table 83 - POST Code Checkpoints

Checkpoint	Description
3	"Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialized CMOS as mentioned in the Kernel Variable ""wC-MOSFlags.""
4	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system
5	Initializes the interrupt controlling hardware (generally PIC) and interrupt vector table.
6	"Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to ""POST-INT1ChHandlerBlock.""
8	Initializes the CPU. The BAT test is being done on KBC. Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
C0	Early CPU Init Start -- Disable Cache - Init Local APIC
C1	Set up boot strap processor Information
C2	Set up boot strap processor for POST
C5	Enumerate and set up application processors
C6	Re-enable cache for boot strap processor
C7	Early CPU Init Exit

Checkpoint	Description
0A	Initializes the 8042 compatible Key Board Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.
13	Early POST initialization of chipset registers.
24	Uncompress and initialize any platform specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes different devices through DIM. See DIM Code Checkpoints section of document for more information.
2C	Initializes different devices. Detects and initializes the video adapter installed in the system that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
38	Initializes different devices through DIM. See DIM Code Checkpoints section of document for more information.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL or ESC keys to limit memory test. Display total memory in the system.

Checkpoint	Description
3C	Mid POST initialization of chipset registers.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, … etc.) successfully installed in the system and update the BDA, EBDA…etc.
50	Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.
60	Initializes NUM-LOCK status and programs the KBD typematic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed / requested.
8C	Late POST initialization of chipset registers.
8D	Build ACPI tables (if ACPI is supported)
8E	Program the peripheral parameters. Enable/ Disable NMI as selected
90	Late POST initialization of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.

Checkpoint	Description
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPU's before boot, which includes the programming of the MTRR's.
A8	Prepare CPU for OS boot including final MTRR values.
A9	Wait for user input at config display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector. Deinitializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	End of POST initialization of chipset registers.
B1	Save system context for ACPI.
0	Passes control to OS Loader (typically INT19h).
61-70	OEM POST Error. This range is reserved for chipset vendors & system manufacturers. The error associated with this value may be different from one platform to the next.
DD-DE	OEM PCI init debug POST code during DIMM init, See DIM Code Checkpoints section of document for more information.

13.4. DIM Code Checkpoints

The Device Initialization Manager (DIM) gets control at various times during BIOS POST to initialize different system busses. *Table 84* describes the main checkpoints where the DIM module is accessed. These codes are shown on the motherboard LEDs as described in section *13.1. Introduction*.

Table 84 - DIM Checkpoints

Checkpoint	Description
2A	Initialize different buses and perform the following functions: Reset, Detect, and Disable (function 0); Static Device Initialization (function 1); Boot Output Device Initialization (function 2). Function 0 disables all device nodes, PCI devices, and PnP ISA cards. It also assigns PCI bus numbers. Function 1 initializes all static devices that include manual configured onboard peripherals, memory and I/O decode windows in PCI-PCI bridges, and non-compliant PCI devices. Static resources are also reserved. Function 2 searches for and initializes any PnP, PCI, or AGP video devices.
38	Initialize different buses and perform the following functions: Boot Input Device Initialization (function 3); IPL Device Initialization (function 4); General Device Initialization (function 5). Function 3 searches for and configures PCI input devices and detects if system has standard keyboard controller. Function 4 searches for and configures all PnP and PCI boot devices. Function 5 configures all onboard peripherals that are set to an automatic configuration and configures all remaining PnP and PCI devices.
DD-DE	OEM PCI init debug POST code during DIMM init. DEh during bus number assignment and DDh during resource allocation. The high byte is the bus number.

While control is in the different functions, additional checkpoints are output to port 80h as a word value to identify the routines under execution. The low byte value indicates the main POST Code Checkpoint. The high byte is divided into two nibbles and contains two fields. The details of the high byte of these checkpoints are as follows:

The upper nibble 'X' indicates the function number that is being executed. The value of 'X' can be from 0 to 7, as shown in *Table 85*.

Table 85 - DIM Code, High Byte, Upper Nibble

Upper Nibble 'X'	Meaning
0	func#0, disable all devices on the bus concerned.
1	func#1, static devices initialization on the bus concerned.
2	func#2, output device initialization on the bus concerned.
3	func#3, input device initialization on the bus concerned.
4	func#4, IPL device initialization on the bus concerned.
5	func#5, general device initialization on the bus concerned.
6	func#6, error reporting for the bus concerned.
7	func#7, add-on ROM initialization for all buses.
8	func#8, BBS ROM initialization for all buses.

The lower nibble 'Y' indicates the bus on which the different routines are being executed. The value of 'Y' can be from 0 to 5, as shown in *Table 86*.

Table 86 - DIM Code, High Byte, Lower Nibble

Upper Nibble 'X'	Meaning
0	Generic DIM (Device Initialization Manager).
1	On-board System devices.
2	ISA devices.
3	EISA devices.
4	ISA PnP devices.
5	PCI devices.

13.5. Memory Initialization Error Codes

These codes are shown on the motherboard LEDs as described in section *13.1. Introduction*.

Table 87 - Memory Initialization Error Codes

Checkpoint	Description
E8	Memory Error - No memory installed.
EA	Memory Error - DDR3 initialisation.
EB	Memory Error - Memory test.
ED	Memory Error - RDIMMs and UDIMMs are mixed.
EE	Memory Error - Invalid memory population.
EF	Memory Error - Memory structure problem.

13.6. FPGA Status Codes

Table 88 - FPGA Status Codes

LED	Color	Meaning
ID	Blue	Enclosure identification
D7	Green	ATX PSU power good
D6		S4 state#
D5		SLP S3#
D4		1.5V and 1.1V valid
D3		CPU0 and CPU1[1] Vcore valid
D2		CPU0 and CPU1[1] VDDQ valid
D1		CPU0 and CPU1[1] VTT valid
D0		CPU0 and CPU1[1] 1.8V valid

[1] – Applies to whichever CPU(s) are present.

14. IPMI Command List

14.1. Chassis Commands

NetFn: 00h, 01h; Lun: 0.

Table 89 - IPMI Chassis Commands

Code	Command
0h	Get Chassis Capabilities
1h	Get Chassis Status
2h	Chassis Control
4h	Chassis Identify

14.2. Sensor Event Commands

NetFn: 04h, 05h; Lun: 0.

Table 90 - IPMI Sensor Event Commands

Code	Command
0h	Set Event Receiver
1h	Get Event Receiver
2h	Platform Event
10h	Get PEF Capabilities
11h	Arm PEF Postpone Timer
12h	Set PEF Configuration Parameters
13h	Get PEF Configuration Parameters
14h	Set Last Processed Event ID
15h	Get Last Processed Event ID
20h	Get Device SDR Info
21h	Get Device SDR
22h	Reserve Device SDR Repository
24h	Set Sensor Hysteresis
25h	Get Sensor Hysteresis

Code	Command
26h	Set Sensor Threshold
27h	Get Sensor Threshold
28h	Set Sensor Event Enable
29h	Get Sensor Event Enable
2Dh	Get Sensor Reading
30h	Set Sensor Reading and Event Status

14.3. APP Commands

NetFn: 06h, 07h; Lun: 0.

Table 91 - IPMI APP Commands

Code	Command
0h	Broadcast Get Device ID
1h	Get Device ID
2h	Cold Reset
4h	Get Self Test Results
5h	Manufacturing Test On
6h	Set ACPI Power State
7h	Get ACPI Power State
8h	Get Device GUID
22h	Reset Watchdog Timer
24h	Set Watchdog Timer
25h	Get Watchdog Timer
2Eh	Set BMC Global Enables
2Fh	Get BMC Global Enables
30h	Clear Message Flags
31h	Get Message Flags

Code	Command
32h	Enable Message Channel Receive
33h	Get Message
34h	Send Message
35h	Read Event Message Buffer
37h	Get System GUID
38h	Get Channel Authentication Capabilities
39h	Get Session Challenge
3Ah	Activate Session
3Bh	Set Session Privilege Level
3Ch	Close Session
3Dh	Get Session Info
40h	Set Channel Access
41h	Get Channel Access
42h	Get Channel Info
43h	Set User Access
44h	Get User Access
45h	Set User Name
46h	Get User Name
47h	Set User Password
48h	Activate Payload
49h	Deactivate Payload
4Ah	Get Payload Activation Status
4Bh	Get Payload Instance Info
4Ch	Set User Payload Access
4Dh	Get User Payload Access
4Eh	Get Channel Payload Support
4Fh	Get Channel Payload Version
52h	Master Write-Read
54h	Get Channel Cipher Suites

Code	Command
55h	Suspend/Resume Payload Encryption
57h	Get System Interface Capabilities

14.4. Storage Commands

NetFn: 0Ah, 0Bh; Lun: 0.

Table 92 - IPMI Storage Commands

Code	Command
10h	Get FRU Inventory Area Info
11h	Read FRU Data
12h	Write FRU Data
20h	Get SDR Repository Info
21h	Get SDR Repository Allocation Info
22h	Reserve SDR Repository
23h	Get SDR
25h	Partial Add SDR
26h	Delete SDR
27h	Clear SDR Repository
2Ch	Run Initialization Agent
40h	Get SEL Info
41h	Get SEL Allocation Info
42h	Reserve SEL
43h	Get SEL Entry
44h	Add SEL Entry
46h	Delete SEL Entry
47h	Clear SEL
48h	Get SEL Time
49h	Set SEL Time

14.5. Transport Commands

NetFn: 0Ch, 0Dh; Lun: 0.

Table 93 - IPMI Transport Commands

Code	Command
1h	Set LAN Configuration Parameters
2h	Get LAN Configuration Parameters
3h	Suspend BMC ARPs
4h	Get IP/UDP/RMCP Statistics
20h	SOL Activating
21h	Set SOL Configuration Parameters
22h	Get SOL Configuration Parameters

14.6. PICMG HPM Commands

NetFn: 2Ch, 01h; Lun: 0.

Table 94 - IPMI PICMG HPM Commands

Code	Command
2Eh	HPM - Get Target Upgrade Capability
2Fh	HPM - Get Component Properties
30h	HPM - Abort Firmware Upgrade
31h	HPM - Initiate Upgrade Action
32h	HPM - Upload Firmware Block
33h	HPM - Finish Firmware Upload
34h	HPM - Get Upgrade Status
35h	HPM - Activate Firmware
36h	HPM - Query Self-Test Result
37h	HPM - Query Rollback Status
38h	HPM - Manual Firmware Rollback

15. Glossary

BMC	Baseboard Management Controller
DP	Dual Processor
EM	Card Enclosure Management Card
eUSB	Embedded USB
GEM	Genesis Enclosure Management
HBA	Host Bus Adapter
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Interface
KVM	Keyboard Video Mouse
LAN	Local Area Network
MP	Multi-Processor
PCI	Peripheral Component Interconnect
PICMG	PCI Industrial Computer Manufacturers Group
PSU	Power Supply Unit
PXE	Preboot eXecution Environment
SAS	Serial Attached SCSI
SATA	Serial ATA
TPM	Trusted Platform Module
UP	Uni-Processor
VM	Virtual Media