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Notices

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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 LaCie 12big Rack Serial RAID and LaCie 12big Rack Serial expansion storage solution to your host computer 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 the Fibre Channel Arbitrated Loop (FC-AL) and SAS or SATA environments into which you are installing the LaCie 12big Rack Serial RAID and LaCie 12big Rack Serial expansion storage solutions. If you do not have these skills, or are not confident with the instructions in this guide, request assistance to proceed with the installation.

Safety Guidelines

Safety

All plug-in modules are part of the fire enclosure and must only be removed when a replacement can be immediately added. The system must not be run without all modules in place.

Permanently unplug the unit if you think that it has become damaged in any way and before you move it

- ◆ A LaCie 12big Rack Serial can weigh up to 32kg (70.4lb). Do not try to lift it by yourself.
- ◆ Do not lift A LaCie 12big Rack Serial by the handles on the plug-in modules or those on the front of the enclosure, they are not designed to support the weight of the enclosure.
- ◆ 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.

Power Supply Safety

LaCie 12big Rack Serials must only be operated from an AC power supply input voltage range of: 100 to 120VAC or 200 to 240VAC.

AC PSU Safety Precautions

- ◆ The power cord/cable on the power supply is used as the main disconnect device. Ensure that the socket outlets are located near the equipment and are easily accessible.
- ◆ The equipment is designed to be operated with two working Power Supply modules.
- ◆ To prevent overheating do not operate the enclosure with one power supply removed for more than 30 minutes.

- ◆ Disconnect all supply power for complete isolation.
- ◆ The power connection must always be disconnected prior to removal of the Power Supply module from the enclosure.
- ◆ A safe electrical earth connection must be provided to the power cords. Check the grounding of the enclosure before applying power.
- ◆ Provide a suitable power source with electrical overload protection to meet the requirements laid down in the technical specification.

CAUTION: Do not remove covers from the Power Supply module. Danger of electric shock inside. Return the Power Supply module to your supplier for repair.

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

Rack System Precautions

The following safety requirements must be considered when the enclosure 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.
- ◆ Do not slide more than one enclosure out of the rack at one time to avoid the danger of the rack toppling over.
- ◆ Always remove all modules and drives to minimize weight before loading chassis into a rack.
- ◆ When loading a rack with the units,

fill the rack from the bottom up and empty from the top down.

- ◆ System must be operated with low pressure rear exhaust installation (back pressure created by rack doors and obstacles not to exceed 5 pascals (0.5 mm water gauge)).
- ◆ The rack design should take into consideration the maximum operating ambient temperature for the unit, which is 40°C (104°F) when two power supply modules are fitted.
- ◆ The rack should have a safe electrical distribution system. It must provide overcurrent protection for the enclosure and must not be overloaded by the total number of enclosures installed in the rack. Consideration of the chassis nameplate rating should be used when addressing these concerns.
- ◆ The electrical distribution system must provide a reliable earth for each unit and the rack.
- ◆ Each power supply in each enclosure has an ground (earth) leakage current of < 1.5 mA maximum at 60 Hz, 264V per power supply. The design of the electrical distribution system must take into consideration the total ground (earth) leakage current from all the power supplies in all the enclosures. The rack will require labelling with "HIGH LEAKAGE CURRENT. Ground (earth) connection essential before connecting supply."
- ◆ The rack when configured with the enclosures must meet the safety requirements of UL 60950-1 and IEC 60950-1/EN 60950-1.

1. System Overview

1.1. LaCie 12big Rack Serial SAS Enclosure

The LaCie 12big Rack Serial Enclosure Platform is a 2U (rack space) disk drive enclosure, housing twelve low profile (1 inch high), 3.5 inch form factor disc drives, which can be either:

- ◆ 3.0Gb/s direct dock SAS disk drives, or
- ◆ 3.0Gb/s direct dock SATA disk drives
- ◆ 3.0Gb/s Active/Active SATA disk drives

The system will provide up to 12Tbytes of data storage per enclosure when 1Tb drives are installed.

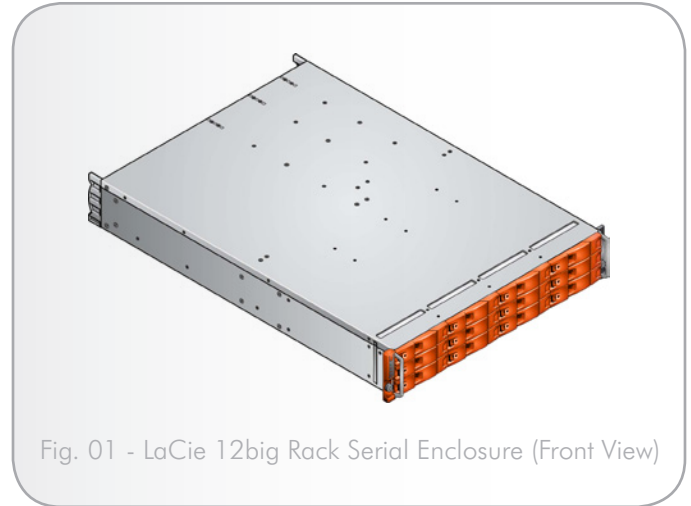


Fig. 01 - LaCie 12big Rack Serial Enclosure (Front View)

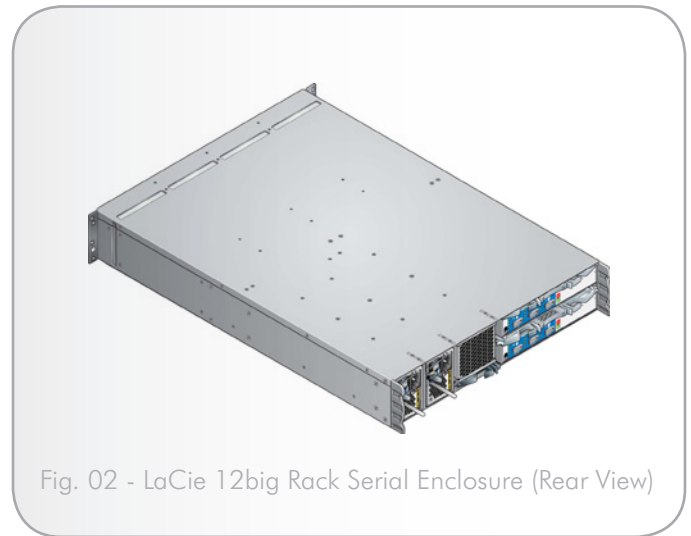


Fig. 02 - LaCie 12big Rack Serial Enclosure (Rear View)

1.2. The Enclosure Core Product

1.2.1. The Enclosure As Supplied

The LaCie 12big Rack Serial design concept is based on an enclosure subsystem together with a set of plug-in modules and, as supplied, comprises:

- ◆ Chassis and Backplane with integral (front panel mounted) Operator's Panel (See [Fig. 06](#)).
- ◆ Two plug-in 100-240V AC, 350W Power Supply Units (PSUs), (see [Fig. 07](#))
- ◆ One plug-in Dual Fan Cooling Module (see [Fig. 08](#))
- ◆ One or two plug-in I/O modules (See [Fig. 09](#)), dependent on customer requirement.

NOTE: If only one I/O module is installed then a Blank module must be fitted in the unused slot. The module must be fitted in the slot designated I/O Module 0 (shown in [Fig. 05](#)) and the Blank in I/O Module 1 (where I/O Module 0 is the lower slot and I/O Module 1 the upper slot).

IMPORTANT INFO: If only one I/O module is fitted it MUST be installed in the Module 0 location (see [Fig. 05](#)), otherwise direct dock SATA will not work.

1.2.1.1. Product Feature Codes

Product feature codes have been assigned to various Enclosure configurations and plug in modules as an aid to ordering information.

1.2.2. Drive Carrier Modules

Drive Carrier Modules and Dummy Carrier Modules must be ordered separately but may be included in the delivered enclosure. A LaCie 12big Rack Serial should be fitted with:

- ◆ Up to 12 Drive Carrier Modules (See [Fig. 12](#)), containing either:
 - 3.0Gb/s direct dock SAS disk drives,
 - 3.0Gb/s direct dock SATA disk drives, or
 - 3.0Gb/s Active/Active SATA disk drives.
- ◆ Dummy Carrier Modules which must be fitted in all unused drive bays to maintain airflow, please refer to section [1.4.6. Dummy Carrier Modules](#).

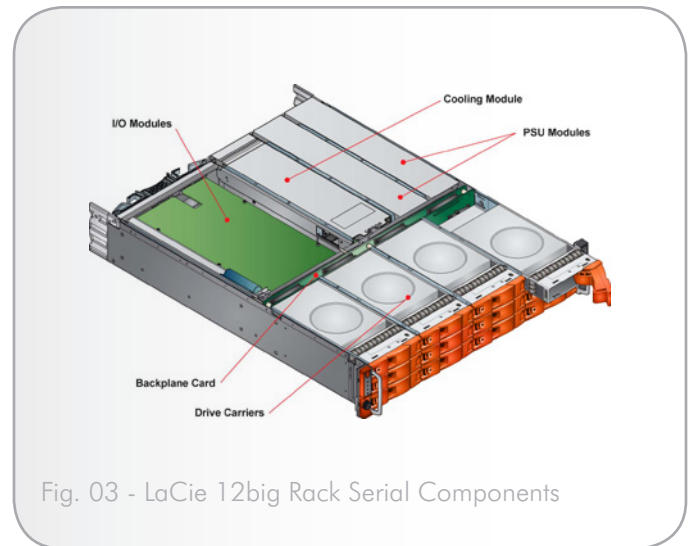


Fig. 03 - LaCie 12big Rack Serial Components

1.2.3. Cables

All cables must be ordered separately.

1.2.4. StorView® Storage Management Software

A GUI application, StorView® Storage Management software, is available on CD to aid the management of the 12big rack serial.

This host pc based software is a full-featured graphical HTML-based software suite designed to configure, manage and monitor the LaCie 12big Rack Serial Module Storage Solution. For further information please refer to the Storview User Manual.

1.3. Enclosure Components

1.3.1. Enclosure Chassis

The chassis consists of a sheet metal enclosure assembly containing a Backplane printed circuit board (PCB) and module runner system.

- ◆ The chassis front panel incorporates an integral Operator's (Ops) Panel.
- ◆ The Backplane PCB provides logic level signal and low voltage power distribution paths.
- ◆ [Fig. 04](#) and [Fig. 05](#) show front and rear views of a populated LaCie 12big Rack Serial chassis respectively.
- ◆ The chassis is fitted with 19 inch Rack mounting features which enable it to be fitted to standard 19 inch racks and uses 2 EIA units of rack space (i.e. 3.5" high).

The chassis assembly contains 12 drive bays at the front, each of which accommodates the appropriate plug-in drive carrier module. The 12 drive bays are arranged in 3 rows of 4 drives. At the rear, the chassis assembly contains five plug-in module bays to house two Power Supply modules, a Dual Fan Cooling Module and two I/O modules (which are fitted horizontally), as shown in [Fig. 05](#).

NOTE: A drive bay is defined as the space required to house a single 1.0" high 3.5 inch disc drive in its carrier module, shown in [Fig. 04](#).



Fig. 04 - LaCie 12big Rack Serial Enclosure (Front View)

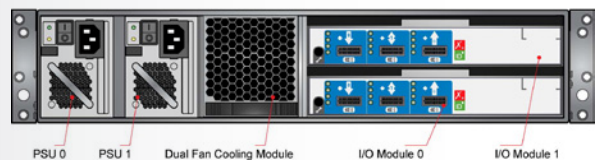


Fig. 05 - LaCie 12big Rack Serial Enclosure (Rear View)

1.3.2. Operator's Panel

The LaCie 12big Rack Serial front panel incorporates an Operator's (Ops) Panel with four LEDs, see [Fig. 06](#). The Ops Panel provides the user with a high level indication of the operation of the Enclosure. Please refer to [Table 06 - Ops Panel LED States](#) for details of the LED status conditions.

CAUTION: The Ops Panel is an integral part of the enclosure assembly and can only be replaced as part of a replacement enclosure.

Enclosure replacement must only be performed by trained personnel.

1.3.3. Alarms

1.3.3.1. Visible Alarms

The functional modules have associated (status indicators (LEDs)). The Ops Panel shows a consolidated status for all modules.

Ops Panel LEDs show constant Green or Blue for good or positive indication. Constant or flashing Amber LEDs indicate there is a fault present within that module.

Table 01 - Status LEDs

LED	State	Description
Power On	Constant green	Good or positive indication
System Fault	Constant amber: fault present	Indicates a problem with a Power Supply, Cooling or I/O module. Refer to individual modules that contain individual fault LEDs. Please refer to section 3.6. Status Indicators (LEDs) for details.
Logical Fault	Constant amber: fault present	Indicates failure of a drive module. The module failing will be indicated by the Fault LED, see Table 08 - Drive Carrier Module LED Functions .
Box Identity	Constant blue: enclosure identity	The user can illuminate this via the Management interfaces to indicate which enclosure requires service actions to be performed on it.

Please refer to [Table 06 - Ops Panel LED States](#) for a description of the Ops Panel LED states.



Fig. 06 - Ops Panel

1.3.3.2. Audible Alarms

The LaCie 12big Rack Serial includes an Audible Alarm which indicates when a fault state is present. The following conditions will activate the Audible Alarm:

- ◆ Fan Fault
- ◆ Over temperature
- ◆ System fault
- ◆ Logical Fault
- ◆ PSU Fault
- ◆ Removal of 1 PSU

When the Audible Alarm sounds, it may be muted by pressing the Alarm Mute push-button which is incorporated in the enclosure front panel. Please refer to section [4.2.1. Audible Alarm Mute](#) for more information on this function.

1.4. The Plug-in Modules

A LaCie 12big Rack Serial requires the following modules for normal operation:

- ◆ 2 x 350W AC Power Supply Units
- ◆ 1 x Dual Fan Cooling Module
- ◆ Either 1 or 2 I/O modules, dependant on customer requirement.
- ◆ Up to 12 Drive Carrier modules.
- ◆ Dummy Carrier modules, as required.

NOTE: Do not leave bays completely empty. Dummy Carrier modules and/or Blank modules must be fitted in all unused bays.

1.4.1. Dual Power Supply Operation

The LaCie 12big Rack Serial must always be operated with two PSUs fitted. The two Power Supply modules operate together so that if one fails the other maintains the power supply and cooling while you replace the faulty unit.

NOTE: Module replacement should only take a few minutes to perform but must be completed within 30 minutes from removal of the failed module, to prevent overheating.

1.4.2. AC Power Supply

Two 100-240VAC 350W Power Supply Units (*Fig. 07*) are supplied mounted in the rear of the enclosure as part of the enclosure core product.

PSU voltage operating ranges are nominally 115V or 230VAC, selected automatically.

Two LEDs mounted on the rear panel of the PSU (see *Fig. 07*) indicate the status of the module. The LED states are defined in *Table 04 - Power Supply LEDs*.

1.4.3. Dual Fan Cooling Module

The Dual Fan Cooling Module (*Fig. 08*) provides system cooling, thermal monitoring and control functions.

System airflow is from front to rear of the enclosure:

- ◆ Cooling air passes over drives and through the midplane to a central plenum.
- ◆ The Dual Fan Cooling Module pulls air from the plenum and from the I/O modules.
- ◆ The PSUs pull cooling air from the plenum at the rear of the enclosure.

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

An Amber FAULT LED is incorporated in the handle of the Dual Fan Cooling Module, LED states are defined in section 3.6.2. *Dual Fan Cooling Module LED*.

IMPORTANT INFO: Fan module replacement time must not exceed 10 seconds.

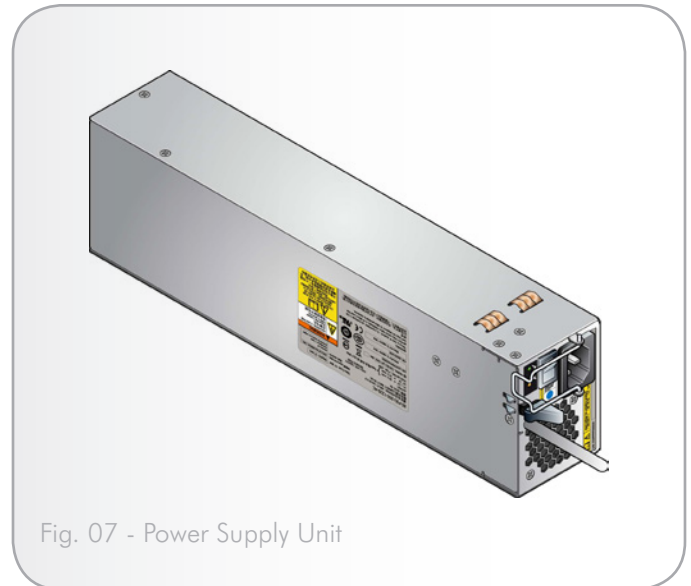


Fig. 07 - Power Supply Unit

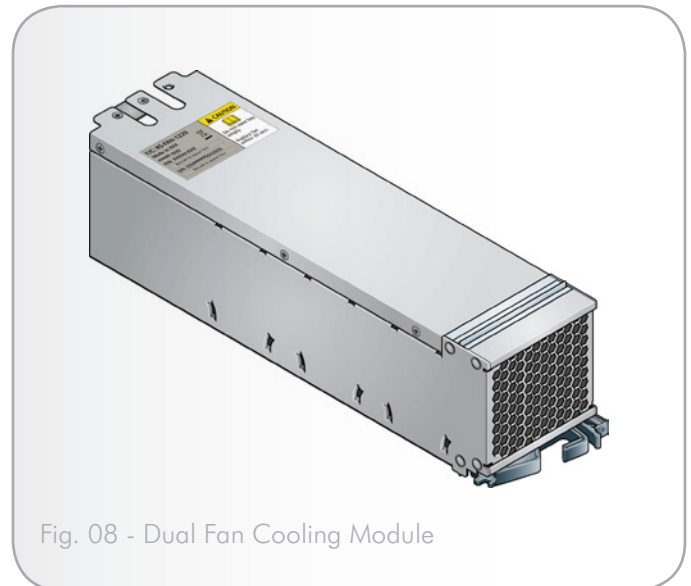


Fig. 08 - Dual Fan Cooling Module

1.4.4. I/O Module

The LaCie 12big Rack Serial storage expansion subsystems include an enclosure with rear facing bays which house two SAS I/O modules, shown in [Fig. 01](#).

The plug-in I/O modules have been designed for integration into LaCie 12big Rack Serial storage subsystems, utilizing SAS interconnections with the host computer system.

Processors housed on the I/O modules provide enclosure management and interface to devices on the Backplane, PSU, I/O module and Ops Panel, to monitor internal functions. These processors operate in a master slave configuration to allow failover.

The enclosure may be configured with either 1 or 2 modules. If only 1 I/O module is fitted a blank module must be fitted in the unused bay. The module incorporates LED indicators, shown in [Fig. 10](#) and defined in [3.6.4. I/O Module LEDs](#).

IMPORTANT INFO: If only one I/O module is to be fitted it MUST be installed in Module 0 location (see [Fig. 05](#)), otherwise direct dock SATA will not function.

NOTE: The Host/Expansion Port "IN" connects the I/O Module to a host or from the expansion out port of another enclosure. The Expansion Port "OUT" is used to connect to the next enclosure in an expansion configuration. The middle port is reserved for future use. Please refer to section [2.7. Enclosure Configurations](#) for further information on enclosure expansion.

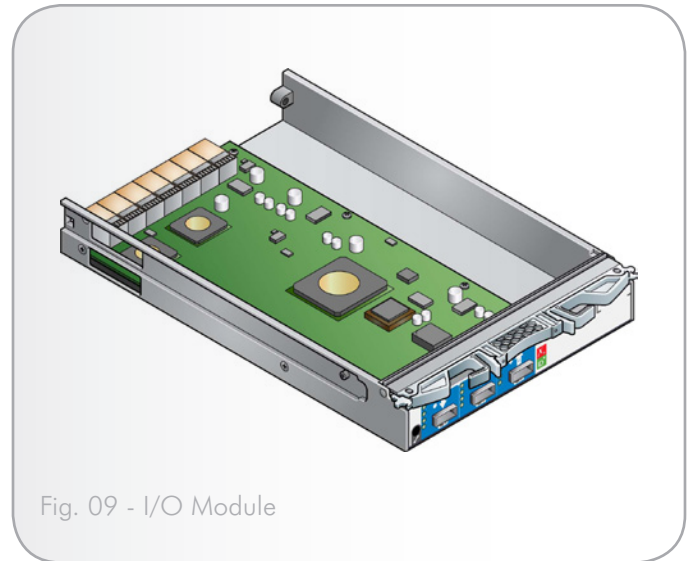


Fig. 09 - I/O Module

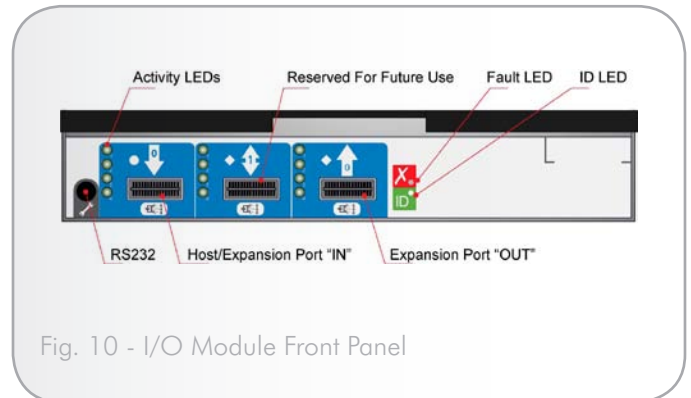


Fig. 10 - I/O Module Front Panel

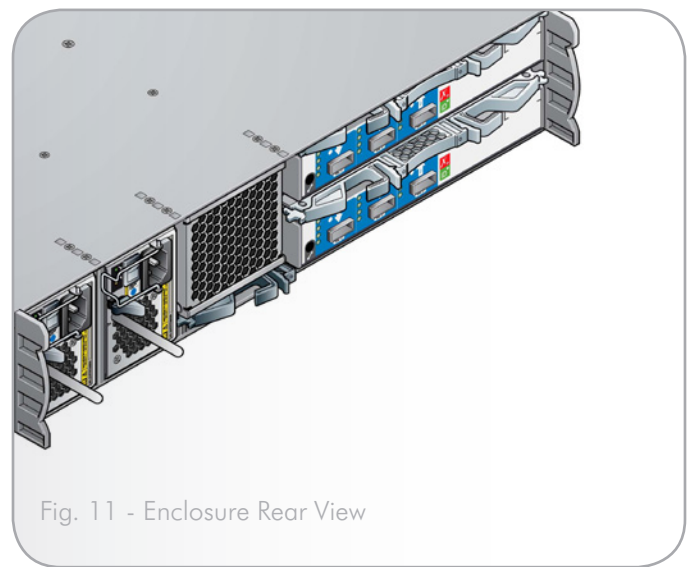


Fig. 11 - Enclosure Rear View

1.4.5. Drive Carrier Module

The Drive Carrier module comprises a hard disk mounted in a carrier. Each drive bay will house a single Low Profile 1.0 inch high, 3.5 inch form factor disk drive in its carrier.

The front cap also supports 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.
- ◆ An anti-tamper lock operated by a torx socket type key.

1.4.5.1. Drive Status Indicators

Each drive carrier incorporates two LEDs, an upper (Green) and lower (Amber). In normal operation the green indicator will be ON and will flicker as the drive operates. See section 3.6.5. *Drive Carrier Module LEDs*

1.4.5.2. Anti-tamper Locks

Anti-tamper locks are fitted in the drive carrier handles (Fig. 13) 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.

1.4.6. Dummy Carrier Modules

Dummy Carrier modules are provided for fitting in all unused drive bays. They are designed as integral drive module front caps and must be fitted to all unused drive bays to maintain a balanced air-flow.

NOTE: Drives cannot be fitted in Dummy Carrier modules

1.4.7. Blank Modules

When only one I/O module is installed, a Blank module must be fitted in the vacant I/O module slot at the rear of the enclosure to maintain airflow and ensure correct operation (Fig. 14).

CAUTION: Operation of the Enclosure with ANY modules missing will disrupt the airflow and the drives will not receive sufficient cooling. It is ESSENTIAL that all apertures are filled before operating the LaCie 12big Rack Serial system.

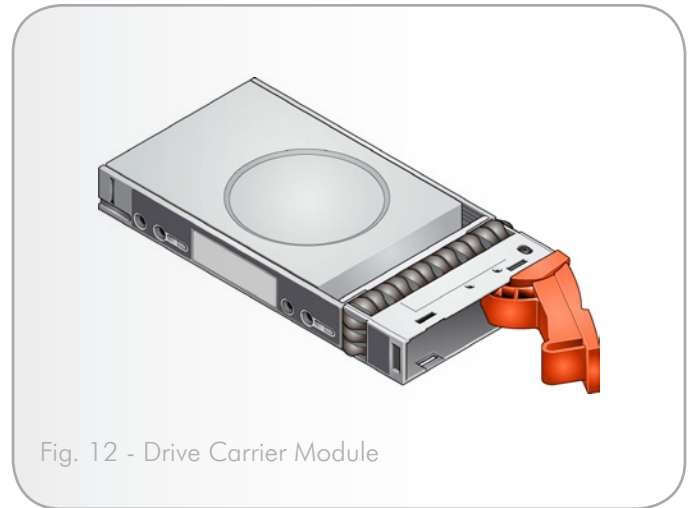


Fig. 12 - Drive Carrier Module

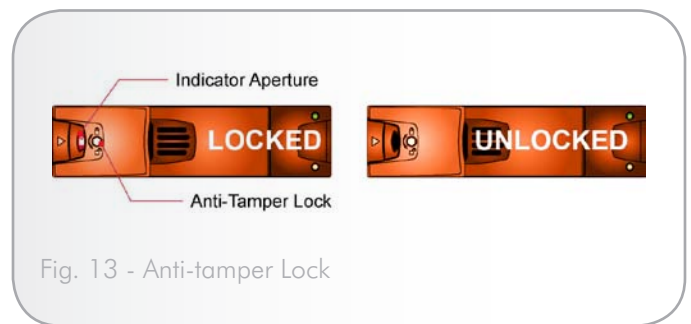


Fig. 13 - Anti-tamper Lock

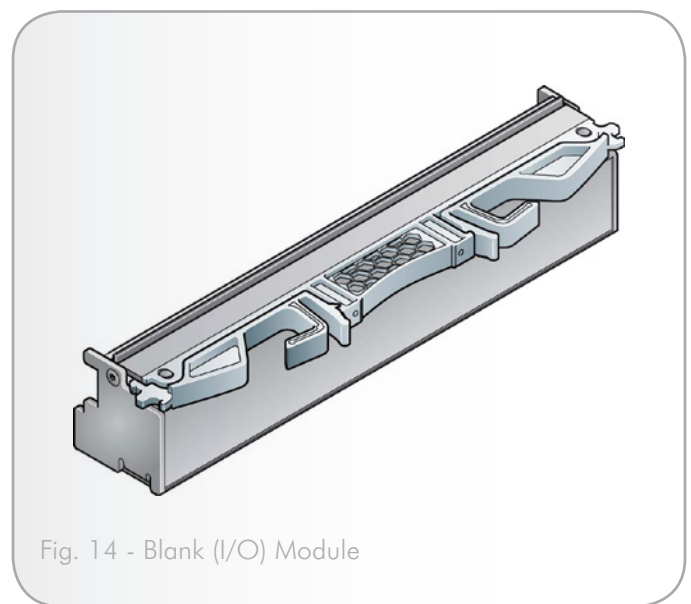


Fig. 14 - Blank (I/O) Module

2. Installation

2.1. Introduction

In this chapter, you are shown how to install your LaCie 12big Rack Serial into an industry standard 19 inch rack cabinet and configure the enclosure sub-system.

CAUTION: When connecting up the LaCie 12big Rack Serial, use only the power cords supplied or cords which match the specification quoted in [7.5. AC Power Cords](#).

2.2. Planning Your Installation

Before you begin installation you should become familiar with the configuration requirements of your LaCie 12big Rack Serial, detailed in [Table 02 - Enclosure System Configuration](#). The correct positions of each of the optional plug-in modules are shown in [Fig. 15](#).

Table 02 - Enclosure System Configuration

Module	Location
Drive Carrier Modules	ALL drive bays must be fitted with a populated Drive Carrier Module or Dummy Carrier Module; no bays should be left completely empty.
Dummy Carrier Modules	Fit in all unused drive bays.
Power Supply Modules	Two PSUs must be fitted. Full power redundancy is provided while a faulty module is replaced. Install the Power Supply modules in LH rear Bays (Fig. 15)
Dual Fan Cooling Module	Install in rear bay, as shown in Fig. 15
I/O Module	Two I/O modules (or 1 module plus 1 blank module) can be fitted, according to required configuration. The modules are Installed horizontally (one above the other) in the RH rear Bay (Fig. 15).
<p>IMPORTANT INFO: If only one I/O module is fitted it MUST be installed in the Module 0 location (see Fig. 15), otherwise direct dock SATA will not work.</p>	

CAUTION: Blank modules or Dummy Carrier modules MUST be fitted to ALL unused bays, there will be inadequate drive cooling if any are left open.

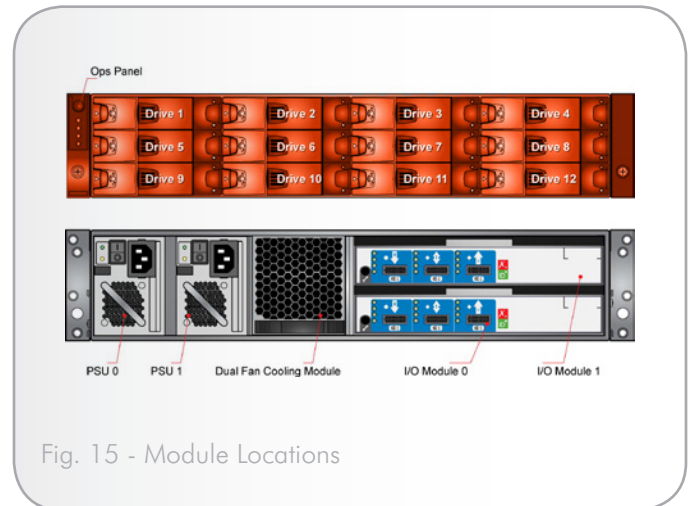


Fig. 15 - Module Locations

2.2.1. Enclosure Drive Bay Numbering Convention

The enclosure drive bay numbering convention is shown in [Fig. 15](#). A drive bay is defined as the space required to house a single 1.0" high 3.5 inch disc drive in its carrier module.

2.2.2. Drive Carrier Configuration

IMPORTANT INFO: Before you begin installation you should become familiar with the configuration requirements of your LaCie 12big Rack Serial, see [Table 02 - Enclosure System Configuration](#).

When planning your system configuration, please remember that all LaCie 12big Rack Serial enclosure drive bays must be filled with either a Drive Carrier or Dummy Carrier module, no bays should be left completely empty.

2.2.3. Enclosure Expansion

The LaCie 12big Rack Serial has been designed as stand alone I/O and may used as expansion with other LaCie 12big Rack Serial or as expansion to the LaCie 12big rack Network. Please refer to section [2.7. Enclosure Configurations](#) for details of enclosure expansion configurations.

2.3. Enclosure Installation Pre-Requisites

CAUTION: A LaCie 12big Rack Serial with all component parts installed is too heavy for a single person to safely install alone into a Rack cabinet. The following procedures describe the installation of a LaCie 12big Rack Serial and highlights any critical co-requisite requirements and good handling practices which we encourage you to follow so as to ensure that a successful installation is achieved in the easiest manner.

CAUTION: Ensure that you have fitted and checked a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling modules and components. Avoid contact with Backplane components and module connectors, etc.

2.3.1. Preparation of Site and Host Server

Before you begin, make sure that the site where you intend to set up and use your LaCie 12big Rack Serial storage system has the following:

- ◆ Standard AC power from an independent source or a rack Power Distribution Unit with a UPS (Universal Power Supply).
- ◆ A host computer with the correct firmware, BIOS and drivers. Please contact your supplier for the correct software levels.

2.3.2. Unpacking the Enclosure System

The package contents and unpacking procedure are outlined in [Fig. 16](#). The Accessory Box contains the power cords and other ordered accessories.

NOTE: The following accessories are optional and must be ordered separately:

- ◆ All Cables
- ◆ Rail Kits
- ◆ Software and documentation CD

Before setting up your enclosure please ensure you have the following;

- ◆ SAS HBA or motherboard with SAS HBA capability (refer to your supplier for the latest supported list).
- ◆ Mini-SAS to Host Cable
- ◆ Power Cord
- ◆ Rack Kit (if installing within a rack)

Please refer to your supplier for a list of qualified accessories for use with the enclosure.

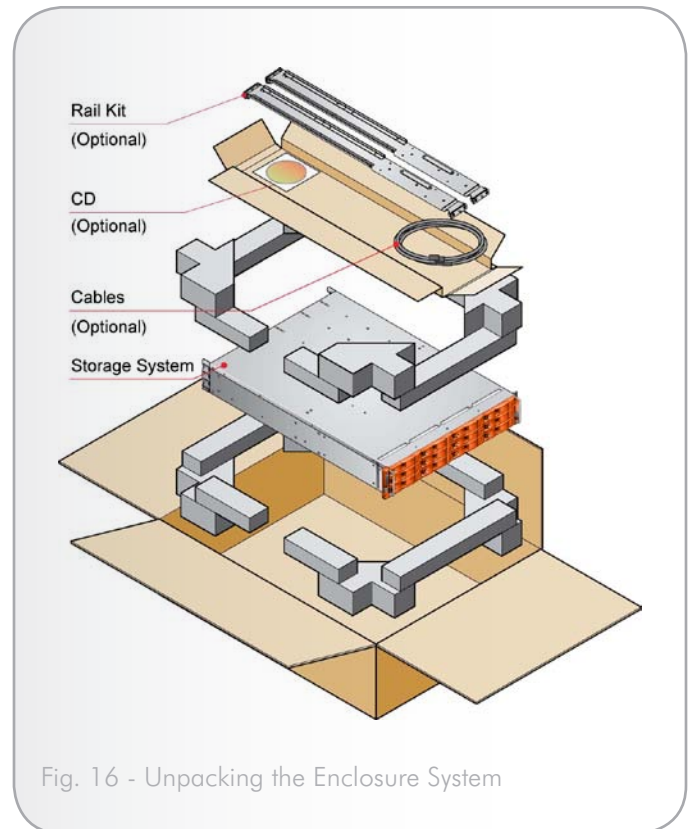


Fig. 16 - Unpacking the Enclosure System

2.4. Installation Procedures

2.4.1. Special Tools and Equipment

There are no special tools required but in order to complete the assembly of some configurations you may need the following:

- ◆ Torx Driver, T10 tamper resistant, black (one of these should be included with your LaCie 12big Rack Serial for use with the drive locks).
- ◆ Standard screwdrivers and wrenches.

2.4.2. Rack Installation Pre-Requisites

The LaCie 12big Rack Serial is designed for installation into an industry standard 19 inch cabinet capable of holding the unit.

- ◆ Minimum depth 700 mm from front flange to rear metalwork (excludes rear cabling).
- ◆ Weight: up to 32kg dependent upon configuration per enclosure.
- ◆ A minimum gap of 25mm (1inch) clearance between the rack cover and front of drawer; and 50mm (2 inches) rear clearance between rear of drawer and rear of rack is recommended in order to maintain the correct air flow around the enclosure.
- ◆ The rack should present a maximum back pressure of 5 pascals (0.5mm water gauge).

2.4.2.1. Rack Mounting Rail Kit

A set of mounting rails is available for use in 19 inch rack cabinets (Fig. 17). These rails have been designed and tested to handle the maximum enclosure weight and to ensure that multiple LaCie 12big Rack Serial may be installed without loss of space within the rack. Use of other mounting hardware may cause some loss of rack space.

The rack mounting rail kit also incorporates a rear hold down mechanism to ensure shock and vibration immunity.

Please contact your supplier to ensure suitable mount rails are available for the rack you are using.

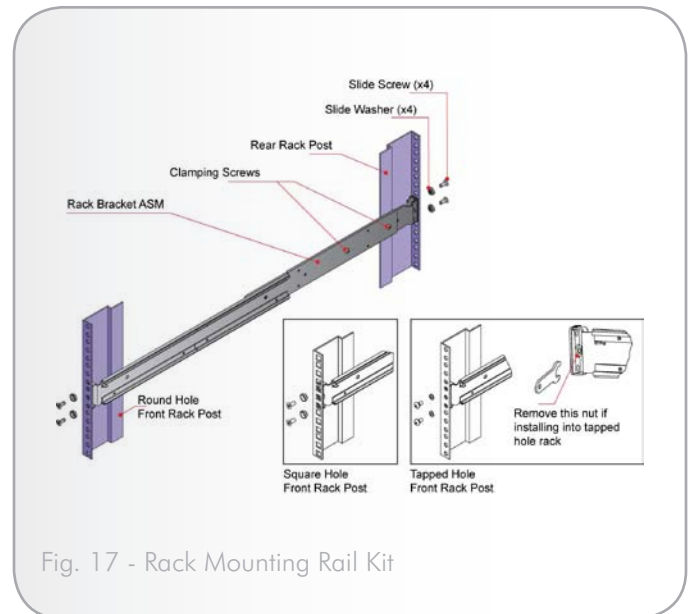


Fig. 17 - Rack Mounting Rail Kit

2.4.3. Rack Installation Procedure

Please refer to the detail drawings supplied with the rack mounting rail kit for further information

2.4.3.1. Parts Checklist

Rack Mounting Rail Kit

2.4.3.2. Installation Procedure

1. Remove the Rack Mounting Kit from the Accessories Box and check for damage.
2. Attach left and right chassis slides to the enclosure sides using 8 M3 x 4 button head screws (see [Fig. 18](#)).
3. Assemble the left and right chassis latches using the special chassis latch screws. Ensure that the latch is orientated as shown in [Fig. 18](#), with the spring arm located against its stop. On the right hand this is at the top, on the left it is at the bottom.
4. Assemble the left and right chassis latches using the special chassis latch screws. Ensure the latch is orientated as shown in [Fig. 18](#), with the spring arm located against its stop. On the right hand side this is at the top, on the left at the bottom.

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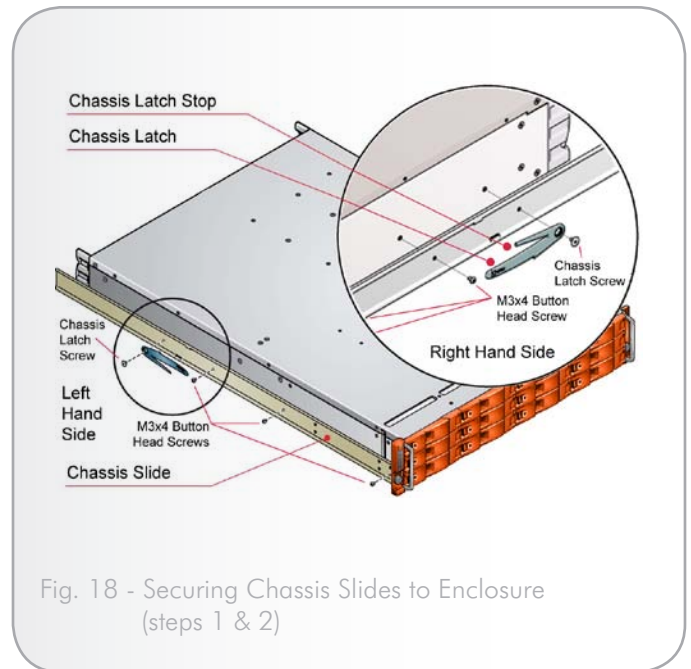


Fig. 18 - Securing Chassis Slides to Enclosure
(steps 1 & 2)

Assemble the rack brackets to the rack posts as follows (see [Fig. 20](#)).

- a. Locate the location pin at the rear of the rail into a rear rail post hole. Attach the bracket to the rear rack post using the washers and screws supplied. The screws should be left loose.
 - b. Extend the rail to fit between the front and rear rack posts.
 - c. Attach the bracket to the front rack post using the washers and screws supplied. The screws should be left loose.
 - d. Tighten the two clamping screws located along the inside of the rear section of the rack bracket (see [Fig. 19](#)).
5. Mount the enclosure in the rack as follows (refer to [Fig. 20](#)):
- a. Lift the enclosure and align it with the rack rails.
 - b. Carefully insert the chassis slides into the rack rails and push fully home.
 - c. Tighten the rear rack bracket mounting screws.
 - d. Withdraw the enclosure until it reaches the hard stops (approximately 400mm, 16.75 inches) and tighten the front rack bracket mounting screws.
 - e. Return the enclosure to the fully home position and attach to the rack using the captive fasteners on the front flanges.

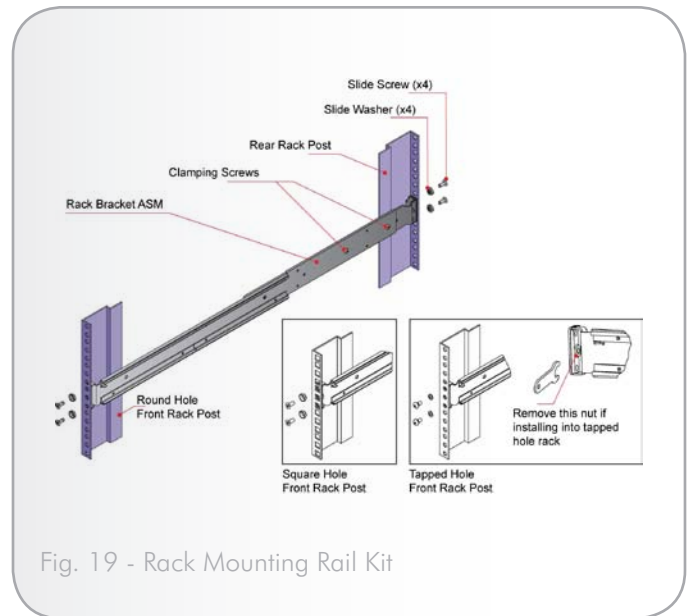


Fig. 19 - Rack Mounting Rail Kit

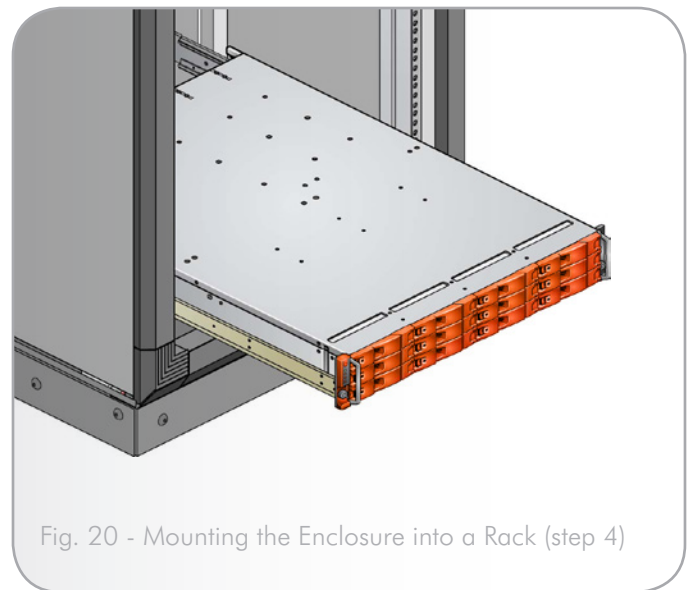


Fig. 20 - Mounting the Enclosure into a Rack (step 4)

2.4.4. Chassis Installation

2.4.4.1. Parts Check List

- ◆ Chassis (complete with Backplane, Ops Panel and all plug-in modules installed).
- ◆ Rack mounting thumbscrews (4 off).

2.4.4.2. Procedure

1. Fit the Rack Mounting Rail Kit in accordance with the mounting kit Installation procedure.
2. Check chassis for damage.
3. Slide the chassis assembly onto the rack rails until the front flanges engage on the rack. Ensure the chassis is centrally located.
4. If in doubt about correct orientation, the Operator's Panel should be on the left hand side of the enclosure.
5. Tighten the two mounting thumbscrews present on each chassis flange.

2.5. Module Installation

The LaCie 12big Rack Serial is supplied fully populated with all plug-in modules installed, see [Table 02 - Enclosure System Configuration](#) for system configuration information.

- ◆ A Single Controller system, LaCie 12big Rack Serial, will be fitted with 1 x I/O Module in Module 0 location, see [Fig. 28](#) and 1 x LRC Blank Assembly. (A LaCie 12big Rack Serial system can be upgraded to a LaCie 12big Rack Serial system at a future date.)
- ◆ A Dual Controller system, LaCie 12big Rack Serial, will be fitted with 2 x I/O Modules.

For information on removal/replacement of plug-in modules, please refer to Chapter [5. Module Removal & Replacement](#).

NOTE: Replaceable parts and product feature codes are listed in section [5.8. Replacement Parts and Ancillary Items](#).

2.5.1. Drive Slot Arrangement

Each enclosure has 12 drives which are referenced by their location as shown in [Table 03 - Drive Slot Arrangement: Enclosure Front View](#). Drives are numbered column/row.

Table 03 - Drive Slot Arrangement: Enclosure Front View

Column/ Row	1/#	2/#	3/#	4/#
#/1	Drive 1	Drive 2	Drive 3	Drive 4
#/2	Drive 5	Drive 6	Drive 7	Drive 8
#/3	Drive 9	Drive 10	Drive 11	Drive 12

The LaCie 12big Rack Serial system supports SAS and SATA drives. However, mixing of drive types within a single enclosure is not supported. The enclosure has no restrictions on drive location.

2.5.1.1. Drive Spindle Start

Drive spindle start is automatically controlled via the I/O modules controlling the power control circuit of the Backplane. With two active PSUs present all drives will start immediately. If only a single PSU is present then the system will start in two groups of 6 drives, separated by a 12 second delay.

2.5.2. Engaging the Drive Carrier Anti-tamper Locks

The anti-tamper locks are fitted in the drive carrier handles and are accessed through the small cutout in the latch section of the handle.

Drives are supplied with the locks set in the locked position.

2.5.2.1. Activating the Locks

1. Rotate the torx driver provided in a clockwise direction until the indicator is visible in the aperture beside the key.
2. Remove the key.

De-activation is the reverse of this procedure, that is: rotate the torx driver in an anti-clockwise direction until the indicator is no longer visible in the aperture beside the key.

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

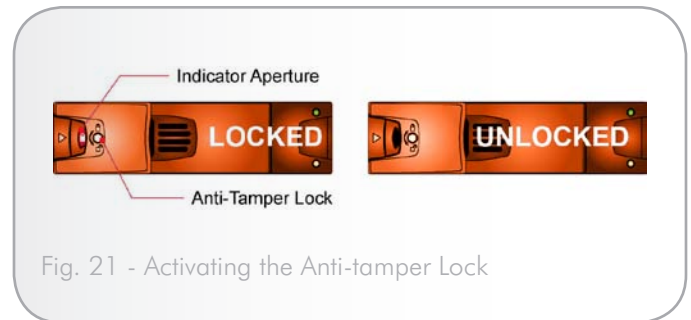


Fig. 21 - Activating the Anti-tamper Lock

2.6. Power Cord Connection

Parts checklist: Power cord to requisite local standards

CAUTION: Rack Installation: The enclosures should be installed SECURELY in the rack before connecting to the power supply. Danger of the enclosure moving and possibly slipping out of the rack unless secured.

1. Attach the power cord to the Power Supply modules,
2. Attach the power cord to the Power Distribution Unit (Fig. 23) in the rack or other power source.

CAUTION: Before applying power, carry out the grounding checks detailed in section 2.8. *Grounding Checks*.

CAUTION: The power connections must always be disconnected prior to removal of the Power Supply module from the enclosure. See section 5.4.1. *Removing a Power Supply Unit*.

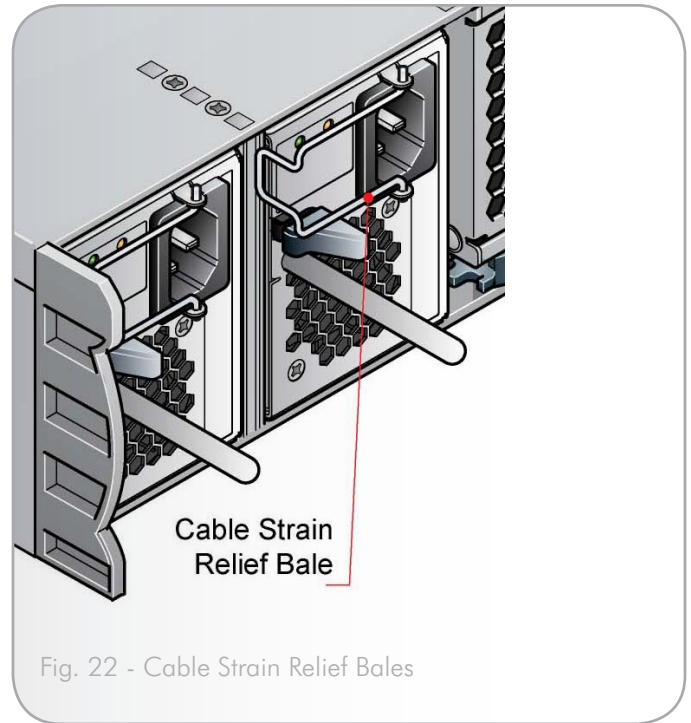


Fig. 22 - Cable Strain Relief Bales

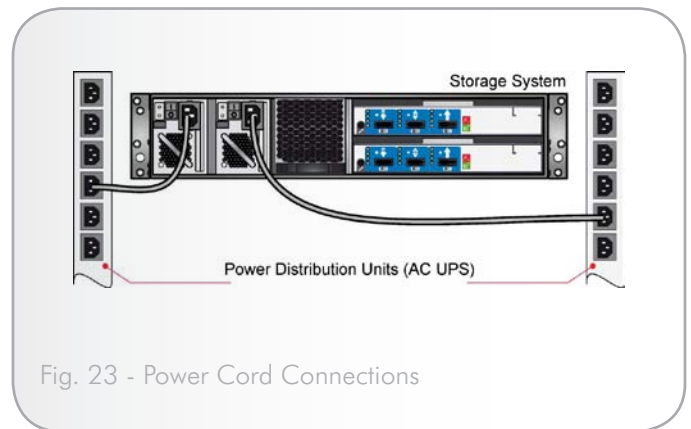


Fig. 23 - Power Cord Connections

2.7. Enclosure Configurations

The basic configuration is a single LaCie 12big Rack Serial connected to a single Host Bus Adaptor (HBA), see [Fig. 24](#).

Before setting up your enclosure please ensure that you have the following:

- ◆ SAS HBA
- ◆ Mini-SAS to Host Cable
- ◆ Power Cable
- ◆ Rack kit (if installing within a rack)

Please refer to your supplier for a list of qualified accessories for use with LaCie 12big rack serial enclosures.

Multiple LaCie 12big Rack Serials may be connected together using SAS patch cables, up to a maximum of 8 enclosures. There are three main expansion configurations

- ◆ Single Host, Single Connection, shown in [Fig. 25](#)
 - Single I/O module
 - Supports SAS or SATA drives
 - Expansion up to 96 drives.
- ◆ Dual Host, Single Connection, shown in [Fig. 26](#)
 - Dual I/O module
 - Supports SAS or SATA drives
 - Expansion up to 96 drives.

[continued on the next page >>](#)

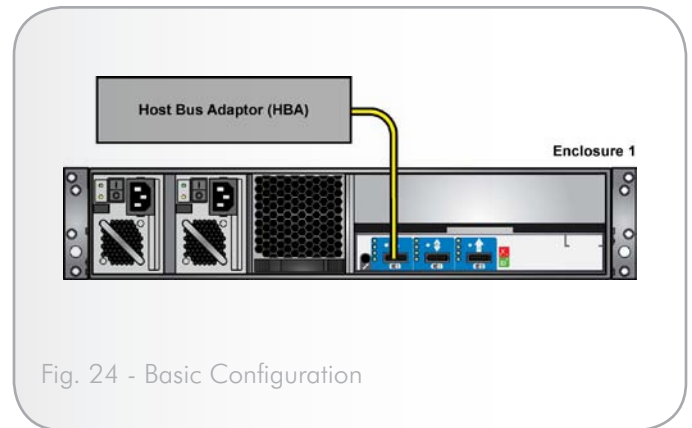


Fig. 24 - Basic Configuration

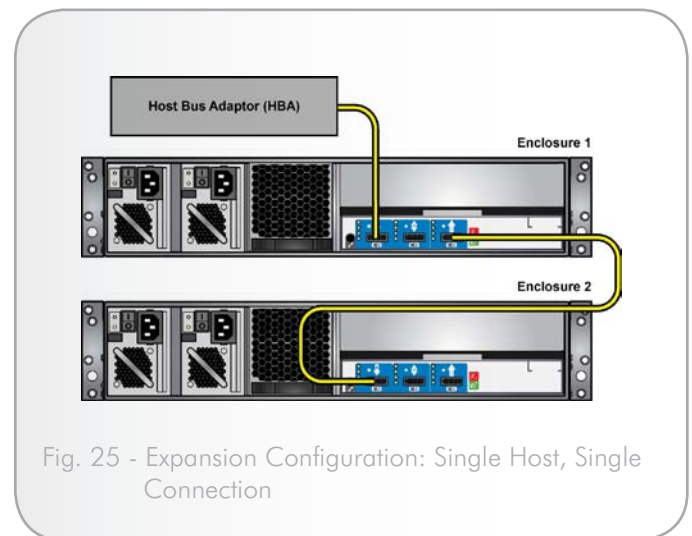


Fig. 25 - Expansion Configuration: Single Host, Single Connection

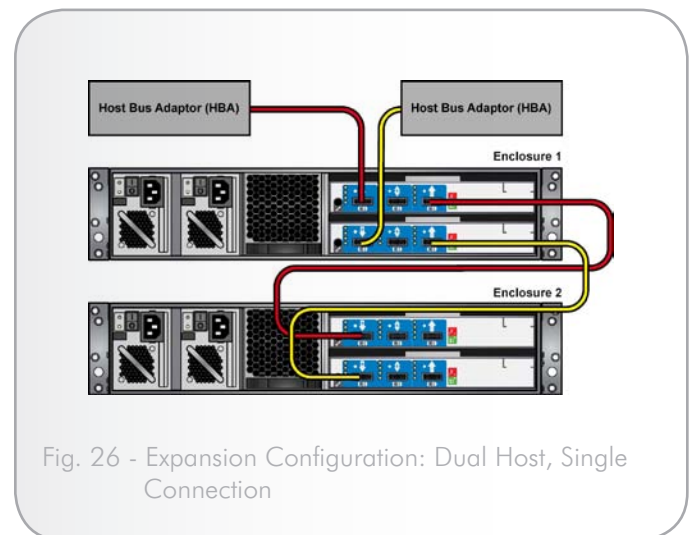


Fig. 26 - Expansion Configuration: Dual Host, Single Connection

- ◆ Dual Host, Dual Connection, shown in [Fig. 27](#)
 - Dual I/O module
 - Supports SAS or SATA drives
 - Expansion up to 96 drives

NOTE: Direct dock SATA drives will not work with multiple host connections.

NOTE: The middle port on the module is for future use.

2.8. Grounding Checks

Perform these checks to ensure that a safe grounding system is provided.

- ◆ If a Rack Distribution System is being used.
 - Ensure power is removed from the rack.
 - Connect the LaCie 12big Rack Serial power cord to the rack distribution and the enclosure.
- ◆ If a direct connection is made with the LaCie 12big Rack Serial power cord, ensure that it is connected to the enclosure.

CAUTION: Some electrical circuits could be damaged if external signal cables or power control cables are present during the grounding checks.

- ◆ Check for continuity between the earth pin of the IEC 320 connector on one of the Power Supply modules and any exposed metal surface of the LaCie 12big Rack Serial.
-

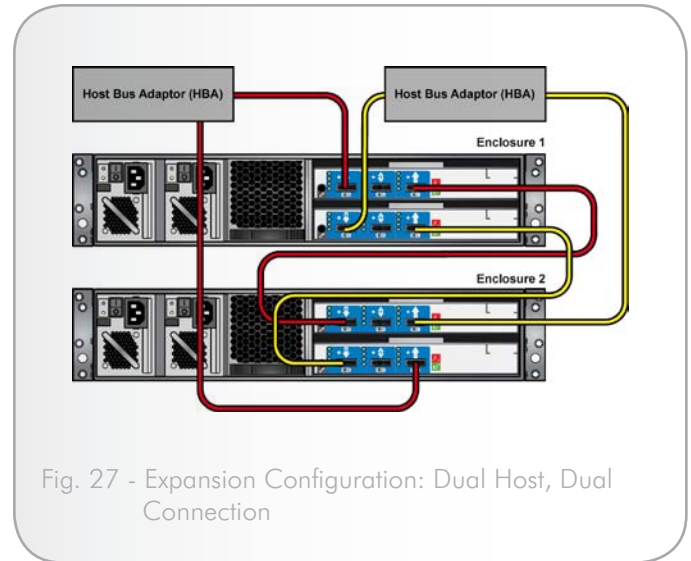


Fig. 27 - Expansion Configuration: Dual Host, Dual Connection

2.9. Data Security

- ◆ Power down your host computer and all attached peripheral devices before beginning installation.
 - ◆ Each enclosure contains up to 12 removable disk drive modules. Disk units are fragile. Handle them with care, and keep them away from strong magnetic fields.
 - ◆ All the supplied plug-in modules, dummy carriers and blank modules must be in place for the air to flow correctly around the enclosure and also to complete the internal circuitry.
 - ◆ If the subsystem is used with plug-in modules, dummy carriers or blank modules missing for more than a few minutes, the enclosure can overheat, causing power failure and data loss. Such use may also invalidate the warranty.
 - ◆ If you remove any drive module, you may lose data.
 - If you remove a drive module, replace it immediately. If the drive module is faulty, replace it with one of the same type and capacity
 - ◆ Ensure that all disk drives are removed from the enclosure before attempting to manhandle or move the rack installation.
 - ◆ Do not abandon your backup routines. No system is completely infallible.
-

3. Operation

3.1. Before You Begin

Before powering up the LaCie 12big Rack Serial please ensure that all the modules are firmly seated in their correct bays, see [Fig. 28](#).

CAUTION: The LaCie 12big Rack Serial must only be operated with two PSUs installed.

3.2. Power On

Power on the enclosure by connecting cables to the Power Distribution Unit (PDU), or powering on the PDU, then power on the Host system.

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

NOTE: Please refer to section [Table 06 - Ops Panel LED States](#) for details of the Ops Panel LEDs and related fault conditions.

Follow the procedure below to Power On the enclosure.

1. Apply power to the enclosure. Press the PSU switches to the ON position. Both PSUs should be powered on together.
2. All LEDs on the OPS Panel should be illuminated when the enclosure power is activated.
3. Power on the Host system(s).

NOTE: The alarm will beep momentarily at power on, this is normal operation.

4. Wait one minute before accessing the system(s).

IMPORTANT INFO: If power is lost for any reason, on restoration of power the enclosure will re-start automatically.

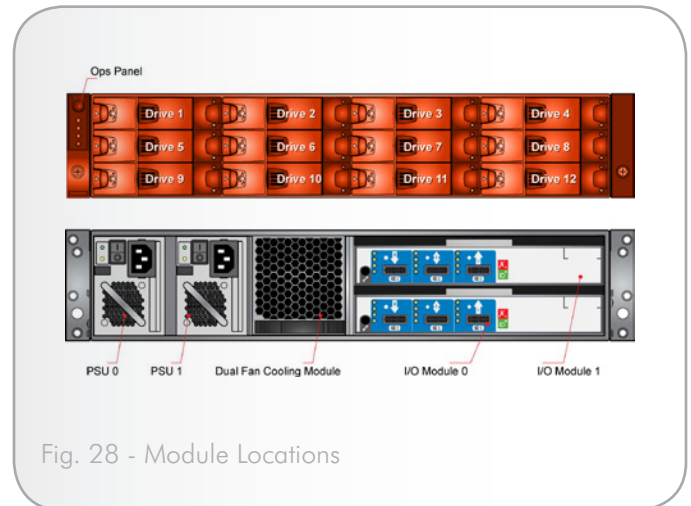


Fig. 28 - Module Locations

3.3. Audible Alarm

The enclosure subsystem includes an Audible Alarm which indicates when a fault state is present. Please refer to section [4.2. Audible Alarm](#) for further information.

3.4. Starting the Drives

Unless otherwise selected during installation, with two active PSUs fitted, all drives in the enclosure should immediately start their motors. 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 active).
- ◆ If there is only one PSU present, the drive motors will spin up in a delayed sequence, i.e. two groups of 6 drives, separated by a 12 second delay.

3.5. Power Down

- ◆ To power the Enclosure down, remove power at the power source.
- ◆ Press the PSU switches to the OFF position.

3.6. Status Indicators (LEDs)

Amber fault LEDs can indicate the following fault conditions:

- ◆ Lit Solid: critical fault
- ◆ Flashing: non-critical fault

3.6.1. Power Supply Unit LEDs

The PSU incorporates 2 LEDs.

- ◆ Under Normal conditions the Power On LED should be illuminated constant GREEN
- ◆ If a problem is detected the Module Fault LED will be illuminated constant AMBER.

The Power Supply module LED states are detailed in [Table 04 - Power Supply LEDs](#).

Table 04 - Power Supply LEDs

Power On & OK(Green)	Module Fault (Amber)	Status
OFF	OFF	No AC power (either PSU)
OFF	ON	<ul style="list-style-type: none"> ◆ No AC power (this PSU only), OR ◆ PSU Fault (over temp, over voltage, over current, PSU fan fail)
ON	OFF	AC present, PSU on and OK
ON	ON	Fan Fault

3.6.2. Dual Fan Cooling Module LED

An Amber FAULT LED is incorporated in the handle of the Dual Fan Cooling Module, defined in [Table 05 - Dual Fan Cooling Module LED](#).

Table 05 - Dual Fan Cooling Module LED

Status	Module Fault (Amber)
Enclosure Off - qualified by PSU and I/O module OK LEDs	OFF
Enclosure On - Fan OK	OFF
Both Fans Fail	ON
Single Fan Fail	Flashing

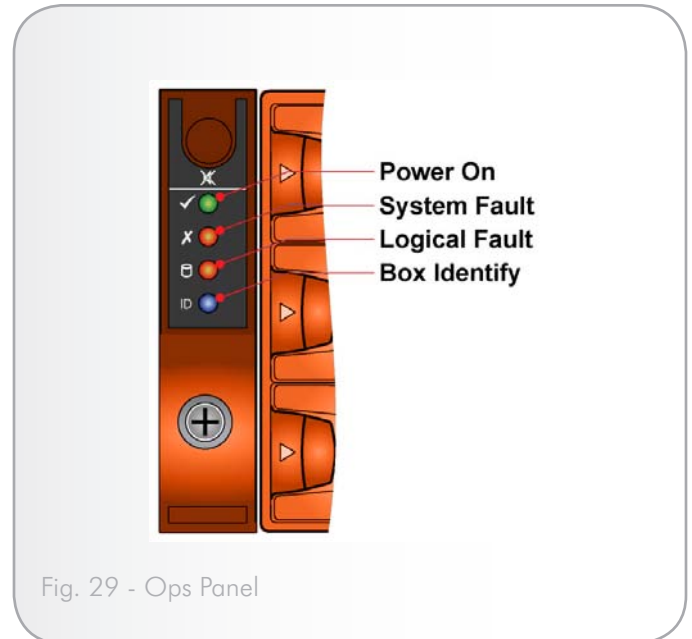


Fig. 29 - Ops Panel

3.6.3. Ops Panel LEDs

The Ops Panel displays the aggregated status of all the modules. The Ops Panel LEDs are shown in [Fig. 29](#) and defined in [Table 06 - Ops Panel LED States](#).

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

Table 06 - Ops Panel LED States

Ops Panel LEDs				Other Associated LEDs or Alarms	State Description	
Power On Green/ Amber	System Fault Amber	Logical Fault* Amber	Box Identify Blue			
ON	ON	ON	ON	LaCie 12big Rack Serial Activity LEDs flash		Ops Panel power on (5s) test state
ON	OFF	any	any		S0	Power On, all functions good
ON	ON	any	any	Dual Fan Cooling Module Fault LED On Continuous beep	S4	Dual Fan Failure
ON	Flashing	any	any	Dual Fan Cooling Module Fault LED On Intermittent beep	S1	Single Fan Failure

continued on the next page >>

Ops Panel LEDs				Other Associated LEDs or Alarms	State Description	
ON	Flashing	any	any	PSU Module Fault LED On Intermittent beep	S1	Single PSU Failure
ON	Flashing	any	any	Intermittent beep	S1	PSU Removed
ON	Flashing	any	any	Intermittent beep	S1	Over or under Temperature Warning
ON	ON	any	any	Continuous beep	S4	Over or under Temperature Critical
ON	ON	any	any	Continuous beep	S4	Voltage Critical
ON	OFF	As per Drive Fault LED	any	None		Drive Critical
ON	OFF	As per Drive Fault LED	any	None		Drive Non-critical
ON	On	any	any	LaCie 12big Rack Serial Fault & ID LEDs On Continuous beep	S4	I/O module watchdog failure
ON	Flashing	any	any**	LaCie 12big Rack Serial Fault & ID LEDs On Intermittent beep	S1	I/O module soft (or POST) failure
ON	Flashing	any	any**	LaCie 12big Rack Serial Fault & ID LEDs On Intermittent beep	S1	Other I/O module fault

LED Operation set via SES Control page 0x02

ON	any	OFF	any			Power On, all functions good
ON	any	As per Drive Fault LED	any	Drive bay Fault LED Flash		POST Fault bit set for any Array Device Element.
ON	any	As per Drive Fault LED	any	Drive bay Fault LED Flash		Other Array bits set for any Array Device Element.
ON	ON	any	any	Continuous beep	S4	UNRECOV bit set in Audible Alarm element
ON	any	any	any	Intermittent beep		INFO, NON-CRIT, CRIT bits set in Audible Alarm element
ON	any	any	any	Continuous beep		UNRECOV bit set in Audible Alarm element

continued on the next page >>

LED Operation set via SES Control page 0x02

ON	Flashing	any	any		REQUEST WARNING bit set in Enclosure element
ON	ON	any	any		REQUEST FAILURE bit set in Enclosure element
ON	any	any	Flashing		RQST IDENT bit set in Enclosure element.

* If a LaCie 12big Rack Serial fault LED is fitted, this will be set for all the above conditions. In addition this LED will flash for an I/O module soft failure.

** Logical Fault LED will take the state of the highest priority drive bay fault LED. Please refer to notes in [Table 08 - Drive Carrier Module LED Functions](#) for Drive Slot LED states.

NOTE: See [Table 09 - Alarm States](#) for descriptions of the audible alarms.

NOTE: The I/O Alarm pattern is a 1 second ON, 1 second OFF sequence applied to all 12 Activity LEDs.

3.6.4. I/O Module LEDs

Each I/O module incorporates two (GREEN) indicators.

Table 07 - I/O Module LEDs

LED Functions	Status
Activity LEDs (Green)	
ON	Ready, No Traffic
Flashing	Active
Flashing (All, 1Hz)	Fault Condition or Re-booting
OFF	Not Ready, No Power
Fault LED (Amber)	
ON	Module Fault (see Table 06 - Ops Panel LED States)
OFF	Module OK
ID LED (Green)	

continued on the next page >>

LED Functions	Status
ON	Identifies specific module when module fault occurs. (see Table 06 - Ops Panel LED States)
OFF	Module OK

All Activity LEDs flash synchronously (1Hz) when there is a Fault condition.

3.6.5. Drive Carrier Module LEDs

Disk drive status is monitored by a Green LED and an Amber LED mounted on the front of each Drive Carrier module, providing the following indications:

Table 08 - Drive Carrier Module LED Functions

State	SES Indications	Green	Amber
No drive fitted		Off	Off
Drive Installed and operational		On/Blink off with activity	Off
Drive Ident	RQST IDENT bit set in Array Device Element	any	Flash Rate 1
Drive Fault	RQST FAULT bit set in Array Device Element	any	On
Array Fault	RQST CONS CHECK. RQSTIN CRIT ARRY, RQSTRE-BUILD/REMAP, RQST R/R ABORT bits set in Array Device Element	any	Flash Rate 2
Drive Critical	Power applied but phy fails to detect presence of an End Device	any	On
Drive Non-Critical	Drive negotiated a 1.5Gbps link	any	any

NOTE: 1 Flash Rate 1 = 1 second ON, 1 second OFF.

NOTE: 2 Flash Rate 2 = 2 seconds ON, 2 seconds OFF.

NOTE: Fault LED Priorities: If multiple conditions in [Table 08 - Drive Carrier Module LED Functions](#) are met, the fault LED will adopt the setting with the lowest priority value (i.e. a priority 1 outranks a priority 2 condition).

3.7. SCSI Enclosure Services (SES)

SCSI Enclosure Services (SES) forms the primary route to accessing the Enclosure's status, diagnostic and control capabilities.

This information is transferred in-band over the SAS topology. The Enclosure presents a SCSI Target on the topology to which a subset of SCSI SPC commands can be directed. SES consists of a series of numbered 'pages' with static and dynamic status coming from the enclosure and control information written to the enclosure. SES pages are transferred through use of the SCSI SPC Send and Receive diagnostics commands.

- ◆ SES Status Pages 0 and 1 are read to determine the page information available and how to interpret it. Page 0 has a list of supported SES pages. Page 1 contains 'inquiry' type data (product strings etc.) and a list of the number and type of standard elements that are supported (e.g. disk drive/ power supply / SAS expander) This information would normally be polled at start of day.
- ◆ SES Status Page 2 is the main source of enclosure status information which would be regularly polled, for example at 10 second intervals.

The type of information available would be disk drive presence and drive fault LED status, PSU status, fan status, temperature, expander status.

- ◆ SES Control Page 2 provides a mechanism for control of some of the enclosures resources, for example turning the audible alarm on or blinking drive fault leds
- ◆ SES Status page 0x0A provides additional information, for example drive SAS Addresses.
- ◆ SES Status page 0x0E provides a mechanism to download new firmware to the enclosure.

StorView uses SES as it's mechanism for obtaining Enclosure information.

4. Troubleshooting & Problem Solving

4.1. Overview

The LaCie 12big Rack Serial includes a processor and associated monitoring and control logic to enable them to diagnose problems within the enclosure's power, cooling and drive systems.

If a fault is indicated on the Ops Panel, please refer to [Table 06 - Ops Panel LED States](#).

4.1.1. Troubleshooting with Storview

The StorView® Storage Management software can be used to select and determine whether a component or sub-component is faulty. This information can be displayed in one of two ways:

- ◆ The Graphical View shows a real-world representation of the enclosures and their components:
- ◆ The Tree View shows a hierarchical view of the system, using icons and text.

The quick way to get information on a component is simply to hover the mouse over it. A large tooltip will appear giving the relevant data.

4.1.2. Initial Start-up Problems

4.1.2.1. Faulty Connections

First check that you have wired up the subsystem correctly. Then, if:

- ◆ cords are missing or damaged
- ◆ plugs are incorrect
- ◆ cords are too short

Call your supplier for a replacement.

4.1.2.2. Alarm Sounds On Power Up

Under normal conditions the alarm sounds on Power Up and clears after one second. If the alarm does not clear, please refer to section [4.2. Audible Alarm](#).

4.1.2.3. Computer Doesn't Recognize the LaCie 12big Rack Serial

1. Check that the SAS interface cables from the LaCie 12big Rack

Serial to the host computer are fitted correctly.

2. Check that there is a valid SAS signal present at the I/O connector by observing the state of the LEDs. A green LED indicates that the signal is present.
3. Check the I/O module setup as follows:
 - If a single I/O module is fitted, check that it has been correctly installed in Slot 0.
 - Check that the maximum cable length has not been exceeded.

IMPORTANT INFO: For details on how to remove and replace a plug-in module please refer to [5. Module Removal & Replacement](#).

If you have any problems in configuring your system please refer to your HBA supplier.

4.1.3. Faulty Modules

It is recommended that a faulty Power Supply Module is replaced as soon as possible.

CAUTION: PSU bays must not be left empty. Please refer to section [5.4. Power Supply Units](#) for PSU removal/replacement procedures.

If one fan fails in a Dual Fan Cooling Module then the complete module must be replaced. Please refer to section [5.5. Dual Fan Cooling Module](#) for cooling module removal/replacement procedures.

4.2. Audible Alarm

The enclosure subsystem includes an Audible Alarm which indicates when a fault state is present. The following conditions will activate the Audible Alarm:

- ◆ Fan Fault
- ◆ Voltage out of range
- ◆ Over temperature
- ◆ System fault
- ◆ Logical fault

- ◆ PSU Fault
- ◆ Removal of 1 PSU

The alarm states are defined in [Table 09 - Alarm States](#).

4.2.1. Audible Alarm Mute

When the Audible Alarm sounds, it may be muted by pressing the Alarm Mute push-button, located on the Ops panel. Automatic muting will take place after two minutes if the mute switch is not manually operated.

When the alarm is muted it will continue to sound with 20 second beeps to indicate that a problem still exists, it will be silenced when all problems are cleared.

Table 09 - Alarm States

Alarm State	Action	Action with Mute button pressed
S0	Normal Mode: Silent	Bleep twice, Flash all LEDs for self test until error or pressed again.
S1	Fault Mode: 1s on/1s off	Transition to S2.If mute not pressed, after 2 minutes, automatically transition state S2
S2	Remind Mode: Intermittent Bleep	None
S3	Muted Mode: Silent	None: only supported from SES
S4	Critical Fault: mode: Continuous alarm	None: Mute not active

4.2.1.1. LED Test Mode

The Alarm Mute push-button can also be used to activate the self-test feature for the LEDs on the Ops Panel. The test is activated when you press the Mute push-button while no faults are present. While the test is running all LEDs will flash.

4.3. Troubleshooting

The following sections describe problems, with possible solutions, which can occur with your LaCie 12big Rack Serial Enclosure.

4.3.1. System Faults

Table 10 - Troubleshooting System Faults

Symptom	Cause	Action
1. I/O Module Fault LEDs illuminated Amber & ID LEDs illuminated GREEN when there is a Fault condition.	The ESI processor has detected an internal fault on one of the following modules: PSU, Cooling, I/O Module	Replace faulty module as appropriate: <ul style="list-style-type: none"> ◆ PSU ◆ Cooling ◆ I/O Module
2. Audible Alarm sound		

NOTE: See also section [4.3.6. Thermal Faults](#).

4.3.2. Power Supply Faults

Table 11 - Troubleshooting Power Supply Faults

Symptom	Cause	Action
1. Ops Panel SYSTEM FAULT LED AMBER 2. An AMBER LED on one or more Power Supply Modules. 3. Audible Alarm sounding.	1. Any power fault. 2. A fan failure. 3. A thermal condition which could cause PSU overheating. 4. Fault: on one of the following modules: <ul style="list-style-type: none"> ◆ PSU ◆ Cooling ◆ I/O Module 5. Removal of 1 PSU	1. Check AC power connections to Power Supply module are live. 2. Disconnect the Power Supply module from AC power and remove the module from the system, Re-install: if problem persists, replace Power Supply Module. 3. Reduce the ambient temperature. 4. Replace faulty module as appropriate: <ul style="list-style-type: none"> ◆ PSU ◆ Cooling ◆ I/O Module

4.3.3. Dual Fan Cooling Module Faults

Table 12 - Troubleshooting Dual Fan Cooling Module Faults

Symptom	Cause	Action
1. Ops Panel SYSTEM FAULT LED AMBER 2. Audible Alarm sounding. 3. AMBER LED on Dual Fan Cooling Module ON. OR 4. AMBER LED on Dual Fan Cooling Module Flashing.	1. Both Fans Failed OR 2. Single Fan failure.	Both fans fail: Replace faulty Cooling module. Single fan fails: the complete Cooling module must be replaced.

4.3.4. Thermal Control

The LaCie 12big Rack Serial uses extensive thermal monitoring and take a number of actions to ensure component temperatures are kept low and also to minimize acoustic noise. Air flow is from front to rear of the enclosure.

Table 13 - Troubleshooting Thermal Control

Symptom	Cause	Action
If the ambient air is cool (below 25 °C) and the fans are observed to increase in speed then some restriction on airflow may be causing additional internal temperature rise. <hr/> NOTE: This is not a fault condition.	The first stage in the thermal control process is for the fans to automatically increase in speed when a thermal threshold is reached. This may be caused by higher ambient temperatures in the local environment and may be perfectly normal. <hr/> NOTE: This threshold changes according to the number of drives and power supplies fitted.	1. Check the installation for any airflow restrictions at either the front or rear of the enclosure. A minimum gap of 25mm at the front and 50mm at the rear is recommended. 2. Check for restrictions due to dust build-up, clean as appropriate. 3. Check for excessive re-circulation of heated air from rear to the front. Use in a fully enclosed rack installation is not recommended. 4. Reduce the ambient temperature.

4.3.5. Thermal Alarm

Table 14 - Troubleshooting Thermal Alarm

Symptom	Cause	Action
<ol style="list-style-type: none"> 1. Ops Panel SYSTEM FAULT LED AMBER. 2. An AMBER LED on one or more Power Supply module. 3. Audible Alarm Sounding. 4. Air temperature exiting PSU above 55°C. 	<ol style="list-style-type: none"> 1. If the internal temperature measured in the airflow through the enclosure exceeds a pre-set threshold a thermal alarm will sound. 2. Dual Fan Cooling Module failure 	<ol style="list-style-type: none"> 1. Check local ambient environment temperature is below the upper 40°C specification. 2. Check the installation for any airflow restrictions at either the front or rear of the enclosure. A minimum gap of 25mm at the front and 50mm at the rear is recommended. 3. Check for restrictions due to dust build-up, clean as appropriate. 4. Check for excessive re-circulation of heated air from rear to the front. Use in a fully enclosed rack installation is not recommended. 5. If possible shutdown the enclosure and investigate the problem before continuing. 6. Replace Dual Fan Cooling Module

4.3.6. Thermal Faults

Table 15 - Troubleshooting Thermal Faults

Symptom	Cause	Action
<ol style="list-style-type: none"> 1. ALL AMBER LEDs on the Ops Panel and drive bays illuminated flash. 2. Audible Alarm sounds almost continuously and cannot be muted. 	<p>At a higher threshold than the Thermal Alarm (this should already have been activated).</p> <p>OR - All fans have failed.</p> <p>OR - Only 1 fan operating and the internal temperature is 40° C or above.</p>	<ol style="list-style-type: none"> 1. Switch Off immediately. 2. Check for airflow restrictions. 3. Check Power Supply module faults. 4. Check for excessive local temperatures.

4.4. Dealing with Hardware Faults

Ensure that you have obtained a replacement module of the same type before removing any faulty module.

CAUTION: If your LaCie 12big Rack Serial is powered up and you remove any module, replace it immediately. If the enclosure is used with plug-in modules, Dummy Carriers or Blank modules 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 SAS/SATA Drive Carrier or Dummy Carrier module in order to maintain a balanced air flow.
- ◆ All of the supplied plug-in power supply units, electronics modules, dummy carriers and blank modules must be in place for the air to flow correctly around the cabinet.

Please refer to [5. Module Removal & Replacement](#) for details of module removal/replacement procedures.

4.5. Continuous Operation During Replacement

Depending on how the LaCie 12big Rack Serial is configured, if a disk unit fails, it can normally be replaced without interrupting the use of the system.

In addition, each enclosure contains two PSUs, either of which can maintain power and cooling to the subsystem while the other is replaced.

NOTE: The PSU replacement time must be as short as possible (<30 minutes) as the enclosure is designed to operate with two PSUs installed.

IMPORTANT INFO: in the event of a cooling fan failure the complete Dual Fan Cooling Module must be replaced within <10 seconds.

4.6. I/O Module Firmware Upgrade

LaCie periodically issues updates to the Storage Enclosure Processor (SEP) firmware as part of a scheduled release package, this code needs to be loaded onto each I/O in the enclosure.

There are two ways to perform this upgrade, one uses the diagnostic serial port on the LaCie 12big Rack Serial (Out of Band) and the other uses SCSI commands over the SAS topology (In Band)

4.6.1. I/O Module Firmware Upgrade Out of Band

This method uses a Host PC running a 'terminal' application to download the firmware using an RS232 serial cable to connect to the I/O module to be upgraded.

Instructions for this method are supplied with the upgrade package in the LaCie 12big Rack Serial Upgrade Procedure document.

4.6.2. I/O Module Firmware Upgrade In Band

This method uses the data path to transfer the firmware update to the LaCie 12big Rack Serial, hence no extra cables should be required. SCSI commands are issued to transfer the data blocks. There are two methodologies, the preferred method uses SES page 0x0E download but a Write Buffer method is also available.

4.7. Drive Firmware Upgrade

CAUTION: Upgrading firmware in SAS and SATA drives should only be performed by the most experienced users. If firmware is incorrectly upgraded it could result in a drive becoming non-functional.

5. Module Removal & Replacement

5.1. Overview

In this chapter, you are shown how to remove and replace a plug-in module in your LaCie 12big Rack Serial enclosure.

IMPORTANT INFO: The Ops Panel is an integral part of the enclosure assembly and can only be replaced with a replacement enclosure. The enclosure should only be replaced by trained personnel.

5.2. ESD Precautions

CAUTION: Fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling LaCie 12big Rack Serial plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

5.3. Replacing a Module

CAUTION: Whenever replacing a module NEVER leave an EMPTY space in the rear of the enclosure, obtain a replacement before removing the faulty part.

Please refer to chapter [2. Installation](#) for information on the initial installation of the plug-in modules in the LaCie 12big Rack Serial enclosure.

CAUTION: Observe all conventional ESD precautions when handling LaCie 12big Rack Serial modules and components. Avoid contact with Backplane components and module connectors, etc.

5.4. Power Supply Units

5.4.1. Removing a Power Supply Unit

CAUTION: Do not remove the faulty PSU unless you have a replacement unit of the correct type ready for insertion. the system must not be operated without both PSUs in place.

CAUTION: To prevent overheating do not operate the enclosure with one PSU removed for more than 30 minutes.

As there should always be two power supply units installed, the system can continue working while replacing the faulty module.

1. Make sure you identify the faulty PSU correctly, from the two PSUs installed. The Module Fault LED on the faulty PSU will be illuminated Amber.
2. Remove the power cables from the AC power source.
3. Push the latch on the PSU handle to the right (*Fig. 30*), then grip the handle and pull the PSU out of the enclosure. take care not to drop and lose the cable retaining spring.

CAUTION: Do not remove covers from the PSU. Danger of electric shock inside. Return the PSU to your supplier for repair.

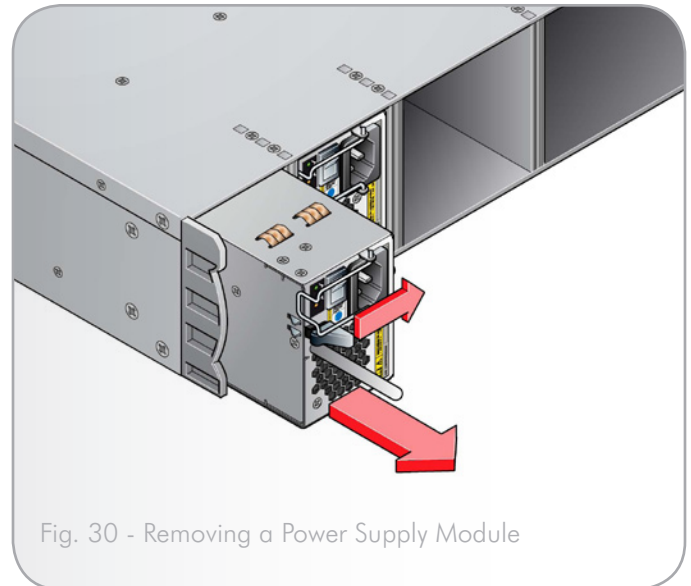


Fig. 30 - Removing a Power Supply Module

5.4.2. Installing a Power Supply Unit

CAUTION: Do not mix PSUs of different types or makes.

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

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

2. Slide the module into the enclosure (Fig. 31).
3. Push the module home. A click should be heard as the handle latch engages.
4. Connect the power supply cords to the power source and engage the retaining spring.

NOTE: The alarm will sound until the new PSU is operating correctly.

5.5. Dual Fan Cooling Module

5.5.1. Removing a Dual Fan Cooling Module

1. Grasp latch (Fig. 32) between thumb and forefinger. Squeeze thumb and forefinger together to release the latch.

NOTE: The module should be orientated so that the handle is always at the bottom of the module.

2. Pull the latch outward to cam the module out of the enclosure (Fig. 33).
3. Withdraw the module.

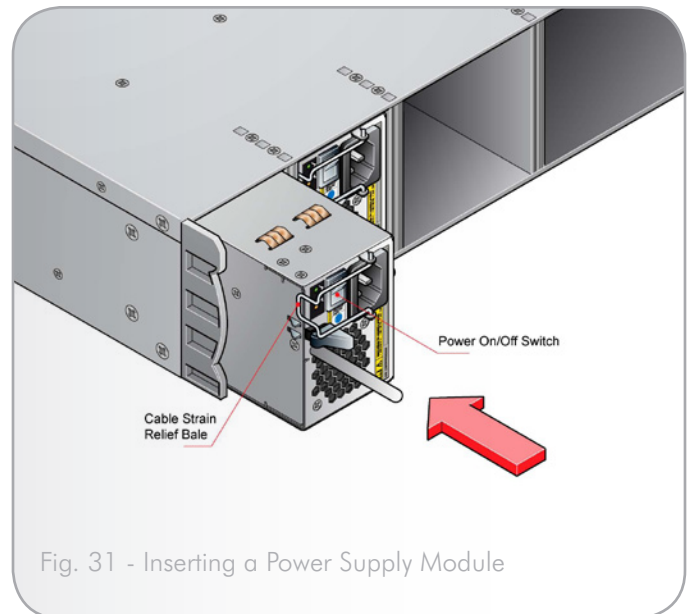


Fig. 31 - Inserting a Power Supply Module

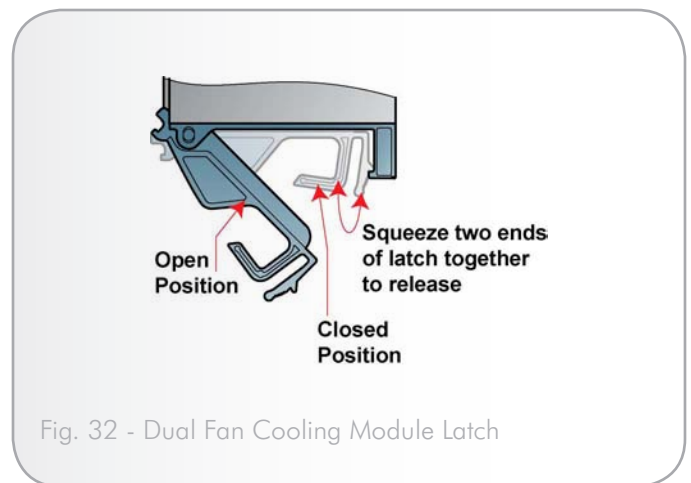


Fig. 32 - Dual Fan Cooling Module Latch

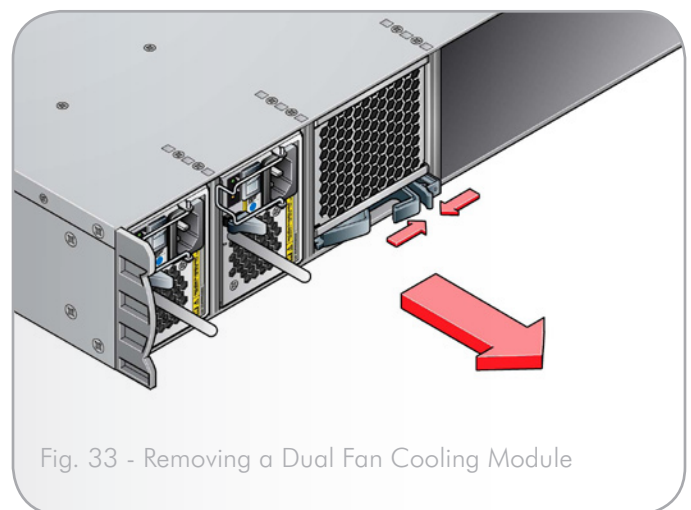


Fig. 33 - Removing a Dual Fan Cooling Module

5.5.2. Installing a Dual Fan Cooling Module

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

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

2. With the latch in the open position (see [Fig. 32](#)), slide the module into the enclosure until the latch engages automatically (see [Fig. 34](#)).
3. Cam the module home by manually closing the latch ([Fig. 35](#)). A click should be heard as the module latches engage.

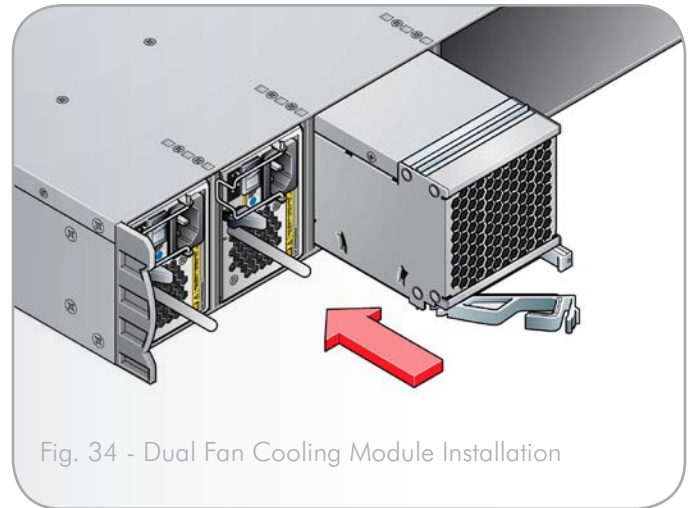


Fig. 34 - Dual Fan Cooling Module Installation

5.6. I/O Module

CAUTION: If only one I/O module is fitted then a Blank module MUST be fitted in the unused slot, there will be inadequate enclosure cooling if the slot is left open.

The following procedures apply to both the I/O module and the Blank module.

5.6.1. Removing an I/O Module

CAUTION: Do not remove this module unless a replacement can be immediately added. The system must not be run without all modules in place.

1. Using two hands, grasp each latch between the thumb and forefinger of each hand. Squeeze thumb and forefinger together to release the latch.
2. Pull the latches outward to cam the module out of the enclosure ([Fig. 37](#)).
3. Grip the latch handles and withdraw the module ([Fig. 35](#)).

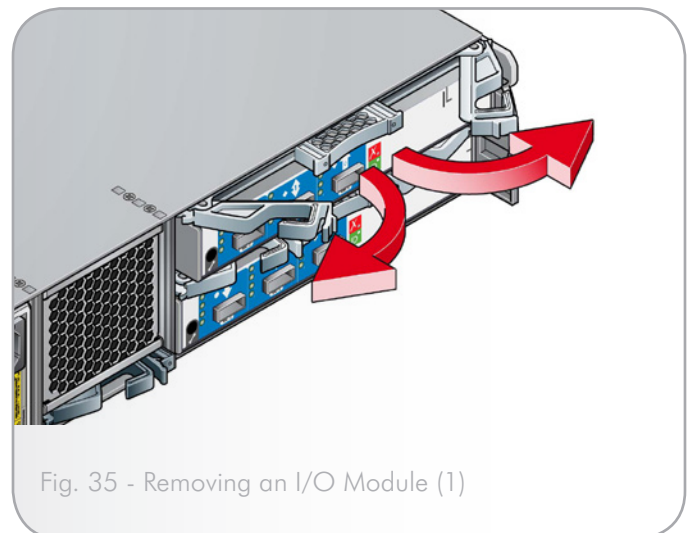


Fig. 35 - Removing an I/O Module (1)

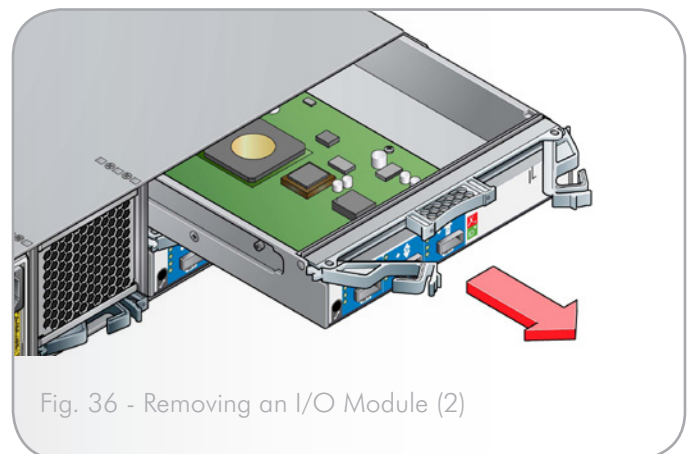


Fig. 36 - Removing an I/O Module (2)

5.6.2. Installing an I/O Module

IMPORTANT INFO: If only one I/O module is fitted it MUST be installed in the lower (Slot 0) location (see [Fig. 28](#)), otherwise direct dock SATA will not work.

CAUTION: EMC Precautions: If passive copper cables are connected, the cable must not have a connection to a common ground/earth point.

1. Check for damage, especially to the interface connector - do not install if the pins are bent.
2. With the latches in the open position (see [Fig. 37](#)), slide the module into the enclosure until the latches engage automatically ([Fig. 38](#)).
3. Cam the module home by manually closing the latches (see [Fig. 39](#)).
4. A click should be heard as the latches engage.

NOTE: The I/O module will take up to 1 minute to re-initialize after re-cabling.

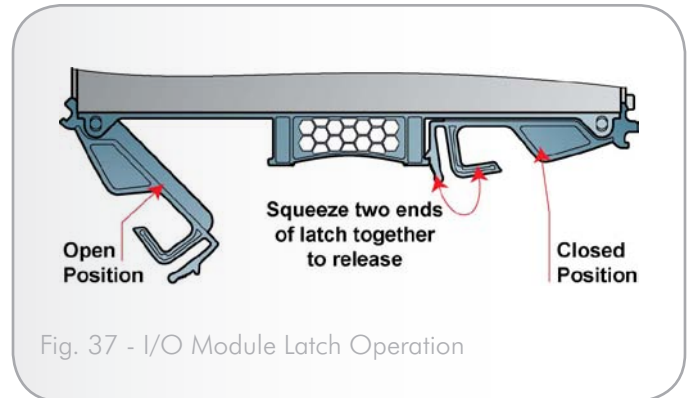


Fig. 37 - I/O Module Latch Operation

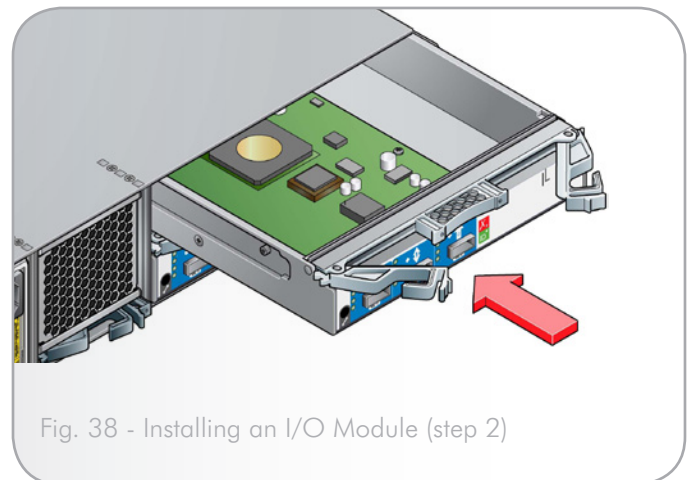


Fig. 38 - Installing an I/O Module (step 2)

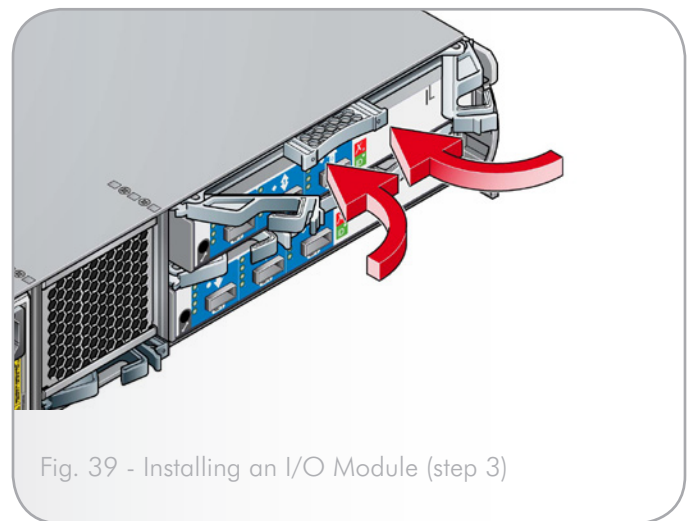


Fig. 39 - Installing an I/O Module (step 3)

5.7. Drive Carrier Module

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

5.7.1. Removing a Drive Carrier Module

CAUTION: Drive spin down: Damage can occur to a drive if it is removed while still spinning, we recommend that you perform All steps of the following procedure to ensure that the drive has stopped prior to removal:

1. Release the drive carrier handle, by pressing the latch in the handle towards the right (Fig. 41).

NOTE: The anti-tamper lock must be disengaged, see Fig. 40.

2. Gently withdraw the carrier approximately 1 inch (25mm) and wait 30 seconds.
3. Withdraw the carrier from the drive bay (Fig. 42).

5.7.2. Installing a Drive Carrier Module

CAUTION: All drive bays must be fitted with Drive Carrier modules or Dummy Carrier modules to maintain a balanced air flow.

5.7.2.1. Drive Carrier Configuration

IMPORTANT INFO: Before you install the Drive Carrier Modules in your LaCie 12big Rack Serial enclosure, please refer to section 2.2. *Planning Your Installation* for system configuration information.

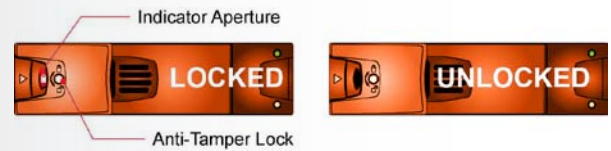


Fig. 40 - Drive Anti-tamper Lock

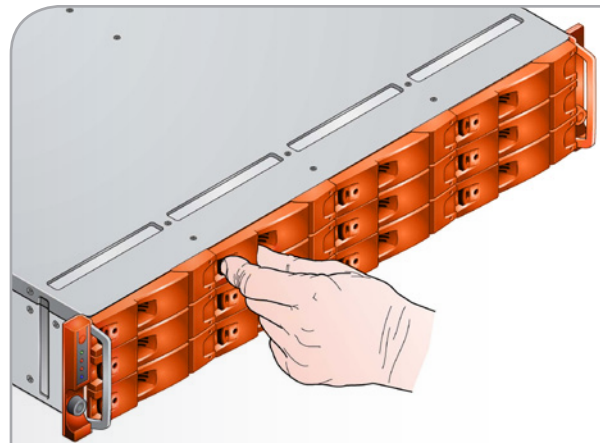


Fig. 41 - Removing a Drive Carrier Module (step 1)

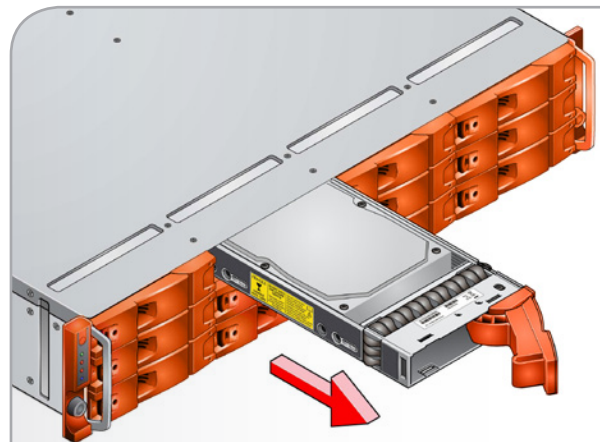


Fig. 42 - Removing a Drive Carrier Module (step 3)

5.7.3. Installation Procedure

IMPORTANT INFO: Ensure that the carrier is orientated so that the drive is uppermost and the handle opens from the left.

1. Ensure that the anti-tamper lock is disengaged (see [Fig. 40](#)).
2. Release the drive carrier handle, by pressing the latch in the handle towards the right ([Fig. 43](#)) and insert the carrier into the enclosure.
3. Slide the carrier, gently, all the way into the enclosure until it is stopped by the camming lever on the right of the carrier ([Fig. 44](#)).
4. Cam the 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 ([Fig. 40](#)).

CAUTION: Ensure that the carriers are fully engaged in the enclosure, as shown in [Fig. 45](#).

5. Carefully insert the anti-tamper lock key provided into the cutout in the handle and rotate the key in a clockwise direction until the red indicator is visible in the aperture beside the key (see [Fig. 40](#)).

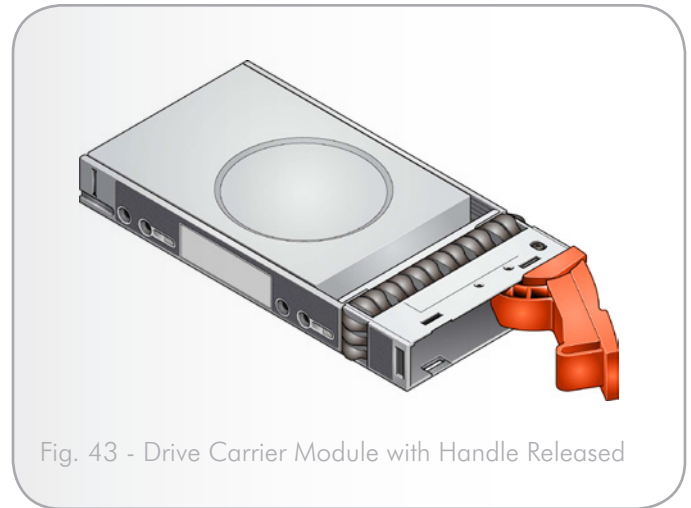


Fig. 43 - Drive Carrier Module with Handle Released

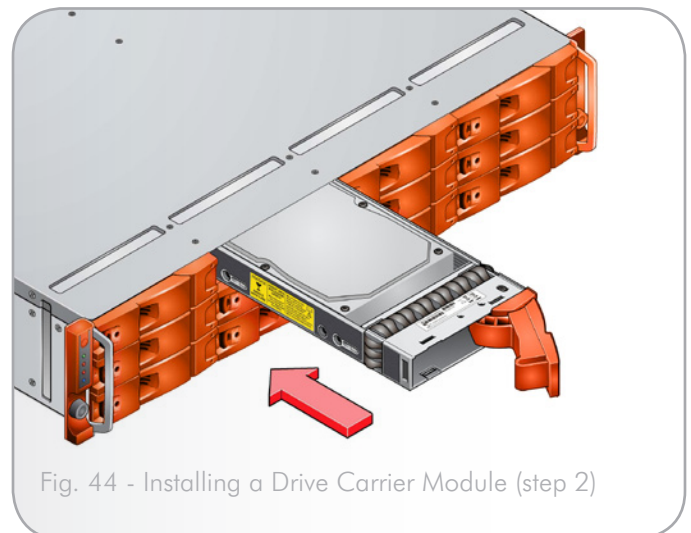


Fig. 44 - Installing a Drive Carrier Module (step 2)

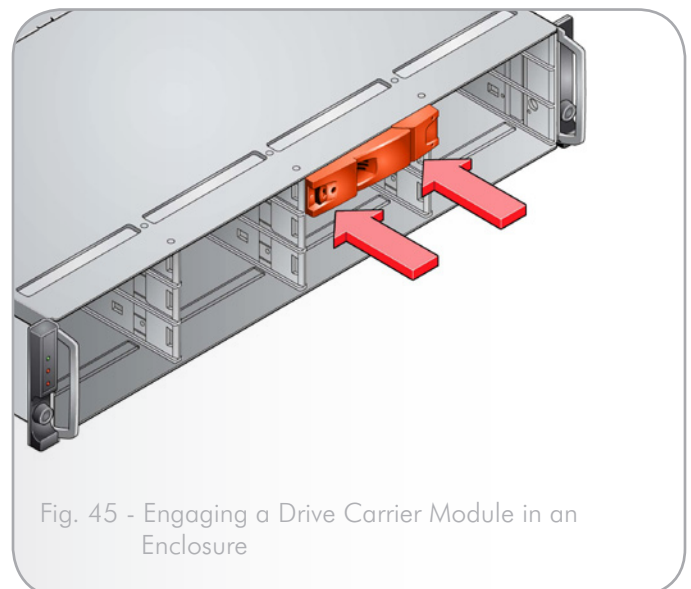


Fig. 45 - Engaging a Drive Carrier Module in an Enclosure

5.7.4. Dummy Carrier Module Removal/ Replacement

Dummy Carrier modules are removed and replaced in the enclosure simply by pulling the module out of the enclosure or pushing it into place.

5.8. Replacement Parts and Ancillary Items

The following Field Replaceable Units (FRUs) are available for LaCie 12big Rack Serial Enclosure Platform:

- ◆ Chassis including Backplane, integrated Ops Panel and Dual Fan Cooling Module
 - ◆ 350W AC Power Supply Module
 - ◆ I/O Blank Assembly
 - ◆ Dual Fan Cooling Module
 - ◆ Power Cords (Country specific)
 - ◆ SAS Drive in Carrier Module
 - ◆ SAS cables (multiple type)
 - ◆ SATA Drive in Carrier Module
 - ◆ Keys, Anti-tamper Lock (for Drive Carrier modules).
 - ◆ Dummy Carrier Module
 - ◆ All documentation
 - ◆ I/O Module
-
-

NOTE: Please contact your supplier for the latest list of available spare parts.

6. Technical Specifications

6.1. Dimensions

Table 16 - Technical Specifications: Dimensions

Enclosure	inches	mm
Height	3.46	87.9
Width across mounting flange	19	83
Width across body of enclosure	17.6	447
Depth from flange to rear of enclosure body	21.65	550
Depth from flange to maximum extremity of enclosure (rear hold down)	22.72	577
Depth from flange to furthest extremity at front of unit	1.44	36.5

It is recommended that a rack with a depth of no less than 700mm (27.55 inches) is used with this product.

6.2. Weight

Table 17 - Technical Specifications: Weight

Maximum Configuration	70.4lb	32k
Empty Enclosure	19.8lb	9kg

6.3. AC Power (350W PSU)

Table 18 - Technical Specifications: AC Power

Voltage Range	100--240 VAC Rated
Frequency	50/60 Hz
Inrush Current	<30A @ 230VAC
Power Factor	>0.98
Harmonics	Meets EN61000-3-2

6.4. Power Consumption

Power consumption of enclosure with twelve SAS drives running IO, powered by a single PSU with extended power lead between PSU and IO Backplane and with two controllers installed at IDLE and ACTIVE operation.

Table 19 - Technical Specifications: Power Consumption

Voltage Rail	Idle		Active	
	Average	Peak	Average	Peak
5V	16.8A	18.7A	15.1A	18.2A
12V	12.8A	14.9A	15.1A	23.0A

6.5. I/O Module Specification

Table 20 - Technical Specifications: I/O Module

Dimensions (internal)	<p>103 mm x 267 mm (4 inches x 10.5 inches)</p> <ul style="list-style-type: none"> ◆ component board area: 103 mm x 240 mm (4 inches x 9.5 inches)
Connectors (refer to Fig. 10)	<ul style="list-style-type: none"> ◆ (1) Host/Expansion Port (IN): <ul style="list-style-type: none"> – SFF8088 connector (4 lane) <hr/> <p>NOTE: Primary Port, must be used first.</p> <hr/> <ul style="list-style-type: none"> ◆ (1) Expansion Port (OUT): <ul style="list-style-type: none"> – SFF8088 connector (4 lane) ◆ (1) Additional Port (IN/OUT) (reserved for future use): <ul style="list-style-type: none"> – SFF8088 connector (4 lane) ◆ RS 232 Port, 3.5in DIN connector, serial cable connector for manufacturing diagnostics
Attachment	<ul style="list-style-type: none"> ◆ (1) SAS 4 lane 3 Gbit/sec wide port Host connector ◆ (1) SAS 4 lane 3 Gbit/sec wide port Expansion connector

6.6. Drive Carrier Module Specification

Table 21 - Technical Specifications: Drive Carrier Module Specification

IMPORTANT INFO: Operating LaCie 12big Rack Serial enclosures with non-approved drives may invalidate the warranty. Please contact your supplier for details of approved drives.

Module Dimensions	<ul style="list-style-type: none"> ◆ Height 1.06" (27.05mm) ◆ Width 4.19" (106.55mm) ◆ Depth 8.25" (209.55mm)
Weight	<ul style="list-style-type: none"> ◆ 0.16 kg (.362 lb.) (carrier) ◆ 0.86 kg (1.91 lb.) w/750 GB drive installed
Operating Temperature	5° C to 40° C (when installed in a LaCie 12big Rack Serial system enclosure with dual Power Supply Modules)
Power Dissipation	18.5 Watts maximum

6.7. Environmental Specification

Table 22 - Technical Specifications: Ambient Temperature and Humidity

	Temperature Range	Relative Humidity	Max. Wet Bulb
Operational	5°C to 40°C	8% 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	8% to 80% non-condensing	29°C
Shipping	-40°C to +60°C	5% to 100% non-precipitating	29°C

Airflow	System must be operated with low pressure rear exhaust installation (Back pressure created by rack doors and obstacles not to exceed 5 pascals [0.5mm Water gauge])
Altitude, Operational	0 to 3045 m (0 to 10,000ft)
Altitude, Non-Operational	-305 to 12,192m (-1000 to 40,000ft)
Shock, Operational	Vertical axis 5g peak 1/2 sine, 10ms
Shock, Non-Operational	30g 10ms 1/2 sine
Vibration, Operational	0.21grms 5-500 Hz Random
Vibration, Non-Operational	1.04grms 2-200 Hz Random
Vibration, Relocation	0.3g 2-200 Hz sine
Acoustics	Sound Power Operating: < 58 dB LwA measured at 23°C. Sound Pressure Operating: < 6.7 Bels LwA measured at 23°C.
Orientation & Mounting	19" Rack mount (2EIA Units)
◆ Rack Rails	To fit 800mm depth Racks compliant with IEC 297
◆ Rack Characteristics	Back pressure not exceeding 5 pascals (0.5mm water gauge)
Safety & Approvals	CE, UL, cUL
◆ EMC	EN55022 (CISPR - A), FCC A

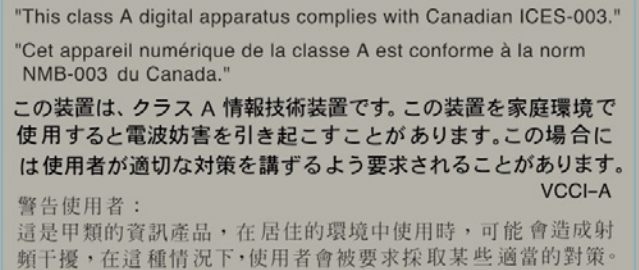
NOTE: For current Approvals please refer to the Product Data Sheet.

7. Standards & Regulations

7.1. International Standards

The LaCie 12big Rack Serial complies with the requirements of the following agencies and standards:

- ◆ CE to EN60950
- ◆ IEC 60950
- ◆ UL 60950-1
- ◆ cUL
- ◆ CE Mark (Europe) EN 55022 Class A
- ◆ FC (USA) Class A
- ◆ VCCI (Japan) Class A



"This class A digital apparatus complies with Canadian ICES-003."
"Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada."
この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。
警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。
VCCI-A

Fig. 46 - RS-1220 Chassis Agency Label

7.2. 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. The supplier 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.

7.3. European Regulations

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

7.4. PSU Safety and EMC Compliance

Table 23 - PSU Safety and EMC Compliance

Safety Compliance	<ul style="list-style-type: none"> ◆ UL 60950 ◆ IEC 60950 ◆ EN 60950
EMC Compliance	<ul style="list-style-type: none"> ◆ CFR47 Part 15B Class A ◆ EN55022 ◆ EN55024

7.5. AC Power Cords

7.5.1. United States

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

Table 24 - U.S. Power Cord Compliance

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.

7.5.2. Europe & Others

General requirements:-

Table 25 - Europe & Others Power Cord Compliance

Cord Type	Harmonized, H05-WF-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.

7.6. EMC Precautions

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

7.7. 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 LaCie 12big Rack Serial plug-in modules and components. Avoid contact with backplane components and module connectors, etc.

7.8. 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.

Please contact your supplier for a copy of the Recycling Procedures applicable to your product.

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

8. Contacting Customer Support

8.1. LaCie Technical Support Contacts

LaCie Asia, Singapore, and Hong Kong Contact us at: http://www.lacie.com/asia/contact/	LaCie Australia Contact us at: http://www.lacie.com/au/contact/
LaCie Belgium Contact us at: http://www.lacie.com/be/contact/ (Français)	LaCie Canada Contact us at: http://www.lacie.com/caen/contact/ (English)
LaCie Denmark Contact us at: http://www.lacie.com/dk/contact	LaCie Finland Contact us at: http://www.lacie.com/fi/contact/
LaCie France Contact us at: http://www.lacie.com/fr/contact/	LaCie Germany Contact us at: http://www.lacie.com/de/contact/
LaCie Italy Contact us at: http://www.lacie.com/it/contact/	LaCie Japan Contact us at: http://www.lacie.com/jp/contact/
LaCie Netherlands Contact us at: http://www.lacie.com/nl/contact/	LaCie Norway Contact us at: http://www.lacie.com/no/contact/
LaCie Spain Contact us at: http://www.lacie.com/es/contact/	LaCie Sweden Contact us at: http://www.lacie.com/se/contact
LaCie Switzerland Contact us at: http://www.lacie.com/chfr/contact/ (Français)	LaCie United Kingdom Contact us at: http://www.lacie.com/uk/contact/
LaCie Ireland Contact us at: http://www.lacie.com/ie/contact/	LaCie USA Contact us at: http://www.lacie.com/contact/
LaCie International Contact us at: http://www.lacie.com/intl/contact/	

9. Warranty Information

LaCie warrants your drive against any defect in material and workmanship, under normal use, for the period designated on your warranty certificate. In the event this product is found to be defective within the warranty period, LaCie will, at its option, repair or replace the defective drive. This warranty is void if:

- ◆ The drive was operated/stored in abnormal use or maintenance conditions;
- ◆ The drive is repaired, modified or altered, unless such repair, modification or alteration is expressly authorized in writing by LaCie;
- ◆ The drive was subjected to abuse, neglect, lightning strike, electrical fault, improper packaging or accident;
- ◆ The drive was installed improperly;
- ◆ The serial number of the drive is defaced or missing;
- ◆ The broken part is a replacement part such as a pickup tray, etc.
- ◆ The tamper seal on the drive casing is broken.

LaCie and its suppliers accept no liability for any loss of data during the use of this device, or for any of the problems caused as a result.

LaCie will not, under any circumstances, be liable for direct, special or consequential damages such as, but not limited to, damage or loss of property or equipment, loss of profits or revenues, cost of replacement goods, or expense or inconvenience caused by service interruptions.

Any loss, corruption or destruction of data while using a LaCie drive is the sole responsibility of the user, and under no circumstances will LaCie be held liable for the recovery or restoration of this data.

Under no circumstances will any person be entitled to any sum greater than the purchase price paid for the drive.

To obtain warranty service, call LaCie Technical Support. You will be asked to provide your LaCie product's serial number, and you may be asked to furnish proof of purchase to confirm that the drive is still under warranty.

All drives returned to LaCie must be securely packaged in their original box and shipped with postage prepaid.

IMPORTANT INFO: Register online for free technical support:
www.lacie.com/register
