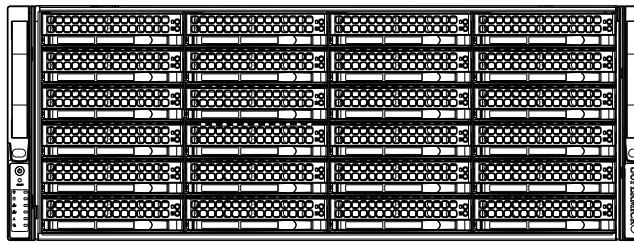
SUPERMICRO®

SC848 CHASSIS SERIES



SC848A-R1800B

USER'S MANUAL

1.0a

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WARNING: Handling of lead solder materials used in this product may expose you to lead, a chemical known to the State of California to cause birth defects and other reproductive harm.

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Preface

About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the SC848 chassis. Installation and maintenance should be performed by experienced technicians only.

This manual lists compatible parts available when this document was published. Always refer to the our Web site for updates on supported parts and configurations.

Manual Organization

Chapter 1: Introduction

The first chapter provides a checklist of the main components included with this chassis and describes the main features of the SC848 chassis. This chapter also includes contact information.

Chapter 2: System Safety

This chapter lists warnings, precautions, and system safety. It recommended that you thoroughly familiarize yourself installing and servicing this chassis safety precautions.

Chapter 3: Chassis Components

Refer here for details on this chassis model including the fans, bays, airflow shields, and other components.

Chapter 4: System Interface

Refer to this chapter for details on the system interface, which includes the functions and information provided by the control panel on the chassis as well as other LEDs located throughout the system.

Chapter 5: Chassis Setup and Maintenance

Follow the procedures given in this chapter when installing, removing, or reconfiguring your chassis.

Chapter 6: Rack Installation

Refer to this chapter for detailed information on chassis rack installation. You should follow the procedures given in this chapter when installing, removing or reconfiguring your chassis into a rack environment.

This section lists compatible cables, power supply specifications, and compatible backplanes. Not all compatible backplanes are listed. Refer to our Web site for the latest compatible backplane information.

Appendix A: Cables and Hardware

This section provides information on cabling, and other hardware which is compatible with your chassis. For complete information on supported cables and hardware, refer to the Supermico Web site at www.supermicro.com.

Appendix B: Power Supply Specifications

This chapter lists the specifications of the power supplies provided with your chassis. For additional information, refer to the Supermicro website at www.supermicro.com.

Appendix C: SAS-846A Backplane Specifications

This section contains detailed specifications on the SAS-846A backplane. Additional information can be found on the Supermicro Web site at www.supermicro.com.

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Chapter 1

Introduction

1-1 Overview

Supermicro's SC848 4U chassis features a unique and highly-optimized design. The chassis is equipped with three 900 Watt (2+1 redundant for a total of 1800 Watts), high-efficiency power supplies. High-performance fans provide ample optimized cooling for FB-DIMM memory modules and twenty-four hot-swappable drive bays offer maximum storage capacity.

1-2 Shipping List

Part Numbers

Please visit the following link for the latest shiping lists and part numbers for your particular chassis model http://www.supermicro.com/

SC848 Chassis				
Model	**CPU**	**HDD**	**I/O Slots**	**Power Supply**
SC848SA-R1800B	QP Xeon	24x SAS/ SATA	7x FF	1800W Redundant

1-3 Where to get Replacement Components

Though not frequently, you may need replacement parts for your system. To ensure the highest level of professional service and technical support, we strongly recommend purchasing exclusively from our Supermicro Authorized Distributors/ System Integrators/Resellers. A list of Supermicro Authorized Distributors/System Integrators/Resellers can be found at: http://www.supermicro.com. Click the Where to Buy link.

1-4 Contacting Supermicro

Headquarters

Address:	Super Micro Computer, Inc.
	980 Rock Ave.
	San Jose, CA 95131 U.S.A.
Tel:	+1 (408) 503-8000
Fax:	+1 (408) 503-8008
Email:	marketing@supermicro.com (General Information)
	support@supermicro.com (Technical Support)
Web Site:	www.supermicro.com

Europe

Address:	Super Micro Computer B.V.
	Het Sterrenbeeld 28, 5215 ML
	's-Hertogenbosch, The Netherlands
Tel:	+31 (0) 73-6400390
Fax:	+31 (0) 73-6416525
Email:	sales@supermicro.nl (General Information)
	support@supermicro.nl (Technical Support)
	rma@supermicro.nl (Customer Support)

Asia-Pacific

Address:	Super Micro Computer, Inc.
	4F, No. 232-1, Liancheng Rd.
	Chung-Ho 235, Taipei County
	Taiwan, R.O.C.
Tel:	+886-(2) 8226-3990
Fax:	+886-(2) 8226-3991
Web Site:	www.supermicro.com.tw
Technical Support:	
Email:	support@supermicro.com.tw
Tel:	886-2-8226-1900

1-5 Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

For faster service, RMA authorizations may be requested online (http://www.supermicro.com/support/rma/).

Whenever possible, repack the chassis in the original Supermicro carton, using the original packaging material. If these are no longer available, be sure to pack the chassis securely, using packaging material to surround the chassis so that it does not shift within the carton and become damaged during shipping.

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alteration, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

Chapter 2

System Safety

2-1 Overview

This chapter provides a quick setup checklist to get your chassis up and running. Following the steps in order given should enable you to have your chassis setup and operational within a minimal amount of time. This quick set up assumes that you are an experienced technician, famailiar with common concepts and terminology.

2-2 Warnings and Precautions

You should inspect the box the chassis was shipped in and note if it was damaged in any way. If the chassis itself shows damage, file a damage claim with carrier who delivered your system.

Decide on a suitable location for the rack unit that will hold that chassis. It should be situated in a clean, dust-free area that is well venilated. Avoid areas where heat, electrical noise and eletromagnetic fields are generated.

You will also need it placed near at least one grounded power outlet. When configured, the SC848 chassis includes two power supplies which require two grounded outlets.

2-3 Preparing for Setup

The SC848 chassis includes a set of rail assemblies, including mounting brackets and mounting screws you will need to install the systems into the rack. Please read this manual in its entirety before you begin the installation procedure.

2-4 Electrical Safety Precautions

Basic electrical safety precautions should be followed to protect yourself from harm and the SC848 from damage:

- Be aware of the locations of the power on/off switch on the chassis as well as the room's emergency power-off switch, disconnection switch or electrical

outlet. If an electrical accident occurs, you can then quickly remove power from the system.

- Do not work alone when working with high voltage components.
- Power should always be disconnected from the system when removing or installing main system components, such as the serverboard, memory modules and the DVD-ROM and floppy drives (not necessary for hot swappable drives). When disconnecting power, you should first power down the system with the operating system and then unplug the power cords from all the power supply modules in the system.
- When working around exposed electrical circuits, another person who is familiar with the power-off controls should be nearby to switch off the power, if necessary.
- Use only one hand when working with powered-on electrical equipment. This is to avoid making a complete circuit, which will cause electrical shock. Use extreme caution when using metal tools, which can easily damage any electrical components or circuit boards they come into contact with.
- Do not use mats designed to decrease electrostatic discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.
- The power supply power cord must include a grounding plug and must be plugged into grounded electrical outlets.
- Serverboard battery: CAUTION - There is a danger of explosion if the onboard battery is installed upside down, which will reverse its polarities This battery must be replaced only with the same or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
- DVD-ROM laser: CAUTION - this server may have come equipped with a DVD-ROM drive. To prevent direct exposure to the laser beam and hazardous radiation exposure, do not open the enclosure or use the unit in any unconventional way.

2-5 General Safety Precautions

- Keep the area around the chassis clean and free of clutter.
- Place the chassis top cover and any system components that have been removed away from the system or on a table so that they won't accidentally be stepped on.
- While working on the system, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.
- Remove any jewelry or metal objects from your body, which are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.
- After accessing the inside of the system, close the system back up and secure it to the rack unit with the retention screws after ensuring that all connections have been made.

2-6 System Safety

Electrostatic discharge (ESD) is generated by two objects with different electrical charges coming into contact with each other. An electrical discharge is created to neutralize this difference, which can damage electronic components and printed circuit boards. The following measures are generally sufficient to neutralize this difference before contact is made to protect your equipment from ESD:

- Do not use mats designed to decrease electrostatic discharge as protection from electrical shock. Instead, use rubber mats that have been specifically designed as electrical insulators.
- Use a grounded wrist strap designed to prevent static discharge.
- Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.
- Touch a grounded metal object before removing any board from its antistatic bag.
- Do not let components or PCBs come into contact with your clothing, which may retain a charge even if you are wearing a wrist strap.

- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

Chapter 3

System Interface

3-1 Overview

There are several LEDs on the control panel as well as others on the drive carriers to keep you constantly informed of the overall status of the system as well as the activity and health of specific components. Most SC848 models have two buttons on the chassis control panel: a reset button and a power on/off switch. This chapter explains the meanings of all LED indicators and the appropriate responses you may need to take.

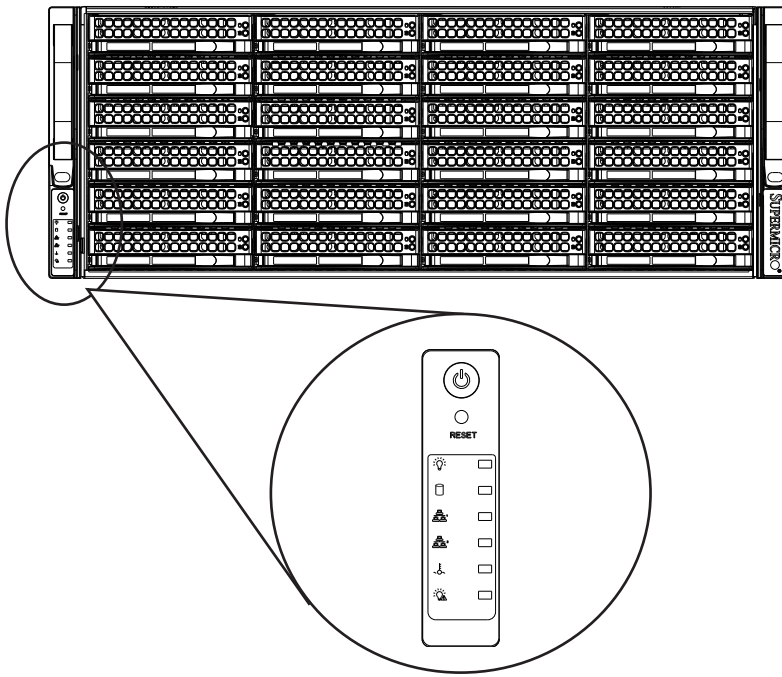
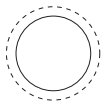


Figure 3-1: Front LED Panel

3-2 Control Panel Buttons

There are two push-buttons located on the left handle of the chassis. These are (in order from top to bottom) a power on/off button and a reset button.

Power: The main power button is used to apply or remove power from the power supply to the server system. Turning off system power with this button removes the main power but keeps standby power supplied to the system. Therefore, you must unplug system before servicing.



Reset: The reset button is used to reboot the system.

3-3 Control Panel LEDs

The control panel located on the left handle of the SC848 chassis has five LEDs. These LEDs provide you with critical information related to different parts of the system. This section explains what each LED indicates when illuminated and any corrective action you may need to take.

Power: Indicates power is being supplied to the system's power supply units. This LED should normally be illuminated when the system is operating.

HDD: Indicates IDE channel activity. SAS/SATA drive, and/or DVD-ROM drive activity when flashing.

NIC1: Indicates network activity on GLAN1 when flashing.

NIC2: Indicates network activity on GLAN2 when flashing.

Overheat/Fan Fail: When this LED flashes, it indicates a fan failure. When continuously on (not flashing) it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers are installed. Finally, verify that the heatsinks are installed properly. This LED will remain flashing or on as long as the overheat condition exists.

Power Failure: When this LED flashes, it indicates a failure in the redundant power supply.

3-4 Drive Carrier LEDs

Your chassis uses SAS/SATA.

SAS/SATA Drives

Each SAS/SATA drive carrier has two LEDs.

- **Blue:**
  Solid on = Drive is present and available.
  Blinking = Drive is actively being accessed.
  Each Serial ATA drive carrier has a blue LED. When illuminated in a solid on state, this blue LED (on the front of the SAS/SATA drive carrier) indicates drive activity. A connection to the SAS/SATA backplane enables this LED to blink on and off when that particular drive is being accessed.

- **Red:**
  Solid on = Drive failure
  Blinking = Rebuilding RAID
  The red LED to indicate an SAS/SATA drive failure. If one of the SAS/SATA drives fail, you should be notified by your system management software.

SCSI Drives

This chassis does not support SCSI drives at this time.

Chapter 4

Chassis Setup and Maintenance

4-1 Overview

This chapter covers the steps required to install components and perform maintenance on the chassis. The only tool you will need to install components and perform maintenance is a Phillips screwdriver. Print this chapter to use as a reference while setting up your chassis.

Review the warnings and precautions listed in the manual before setting up or servicing this chassis. These include information in Chapter 2: System Safety and the warnings/precautions listed in the setup instructions.

Safety Warning: Before performing any chassis setup or maintenance, it is recommended that the chassis be removed from the rack and placed on a stable bench or table. For instructions on how to uninstall the chassis from the rack, refer to Chapter 5 Rack Installation in this manual.

4-2 Removing the Chassis Cover

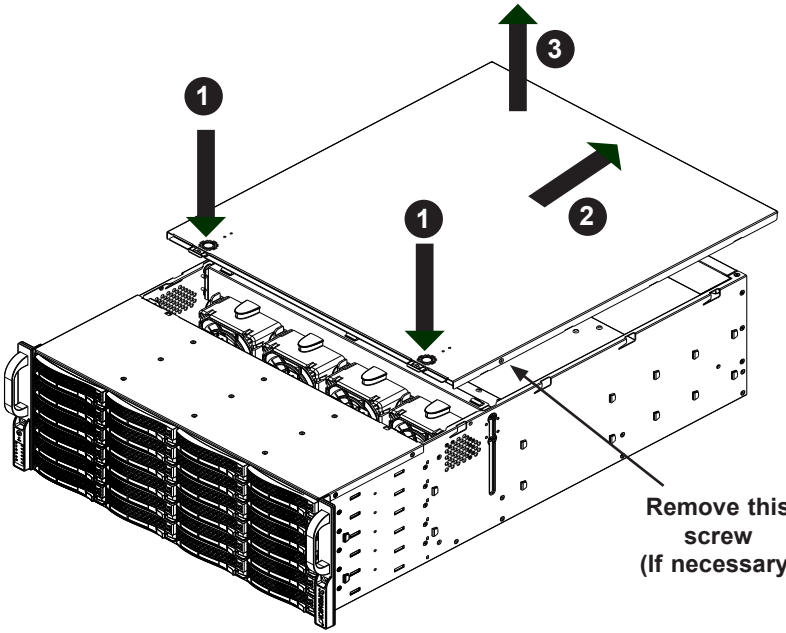


Figure 4-1: Removing the Chassis Cover

Removing the Chassis Cover

1. Press the release tabs to remove the cover from the locked position. Press both tabs at the same time.

2. Once the top cover is released from the locked position, slide the cover toward the rear of the chassis.

3. Lift the cover off the chassis.

Warning: Except for short periods of time, do NOT operate the server without the cover in place. The chassis cover must be in place to allow proper airflow and prevent overheating.

4-3 Installing and Removing Hard Drives

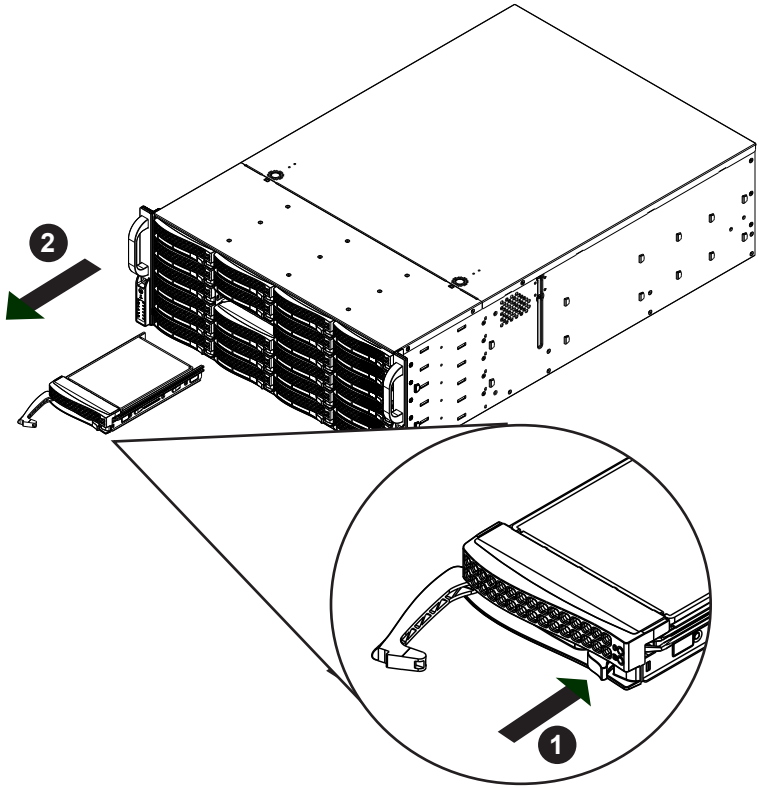


Figure 4-2: Removing Hard Drive

Removing Hard Drive Trays from the Chassis

1. Press the release button on the drive tray. This extends the drive bay handle.
2. Use the handle to pull the drive out of the chassis.

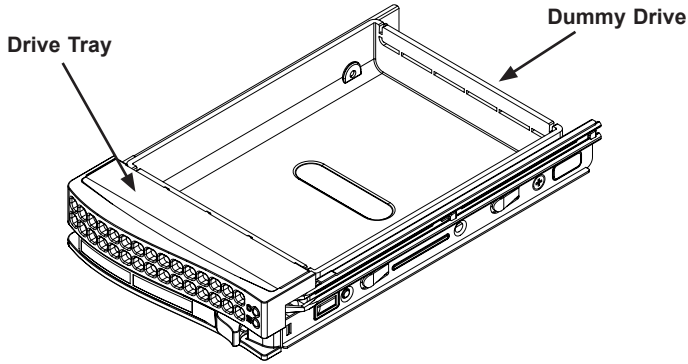


Figure 4-3: Chassis Drive Tray

The drives are mounted in drive trays to simplify their installation and removal from the chassis. These trays also help promote proper airflow for the drive bays.

Warning: Except for short periods of time (swapping hard drives), do not operate the server with the hard drives empty.

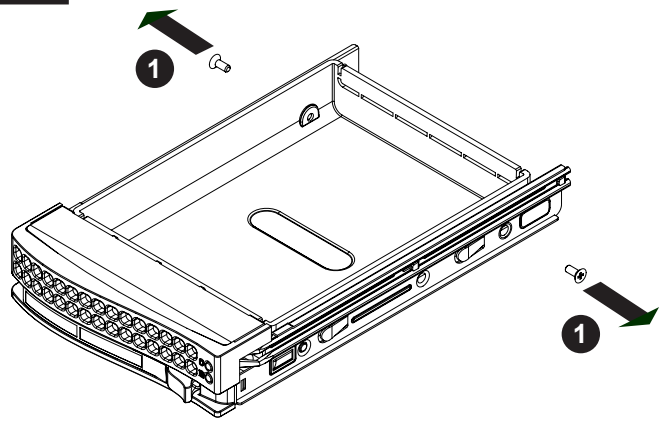


Figure 4-4: Removing Dummy Drive from Tray

Installing a Hard Drive to the Hard Drive Tray

1. Remove the two screws securing the dummy drive to the drive tray and remove the dummy drive.Place the hard drive tray on a flat surface such as a desk, table or work bench.

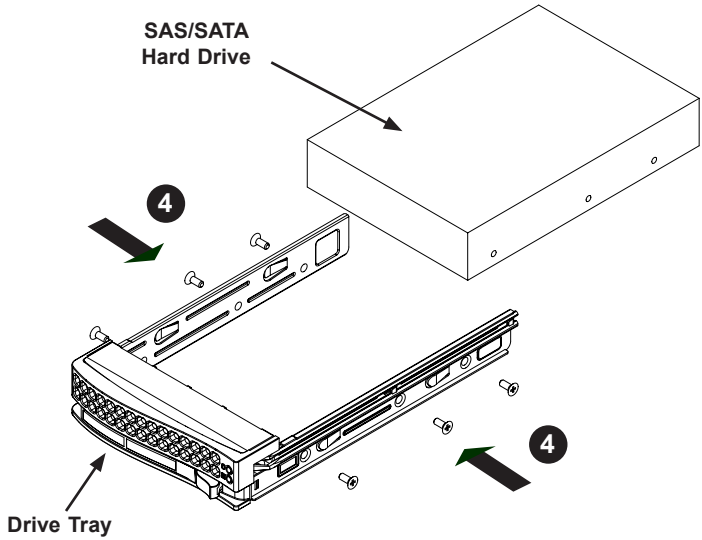


Figure 4-5: Installing the Hard Drive into the Tray

2. Slide the hard drive into the tray with the printed circuit board side facing down.

3. Carefully align the mounting holes in both the drive tray and the hard drive.

4. Secure the hard drive to the tray using six screws.

5. Replace the drive tray into the chassis. Make sure to close the drive tray handle to lock the drive tray into place.

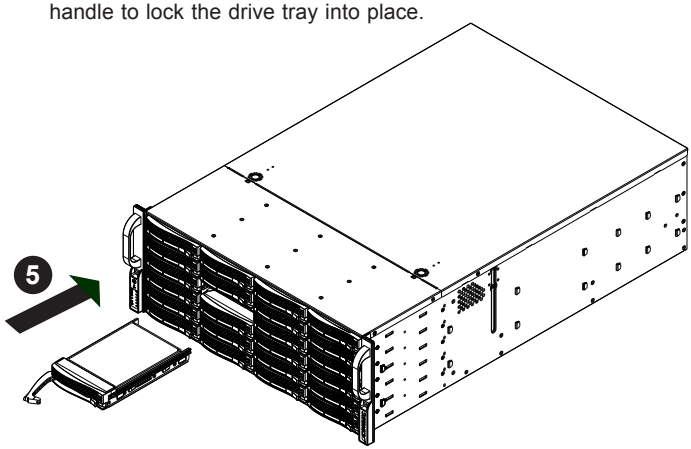


Figure 4-6: Installing the Hard Drive

4-4 Installing the Motherboard

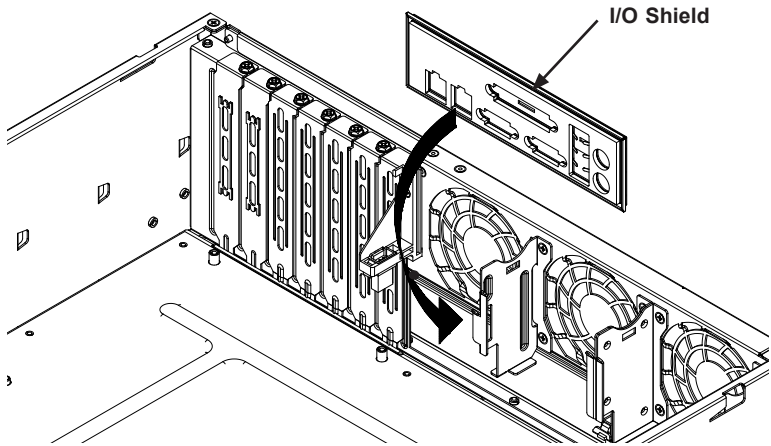


Figure 4-7: I/O Shield Placement

I/O Shield

The I/O shield holds the motherboard ports in place. Install the I/O shield before you install the motherboard.

Installing the I/O Shield

1. Review the documentation that came with your motherboard. Become familiar with component placement, requirements, and precautions.
2. Open the chassis cover.
3. With the illustrations facing the outside of the chassis, place the shield into the space provided.
4. Once installed, the motherboard will hold the I/O shield in place.

Permanent and Optional Standoffs

Standoffs prevent short circuits by securing space between the motherboard and the chassis surface. The SC848 chassis includes permanent standoffs in locations used by most motherboards. These standoffs are included in the SC848 accessories packaging.

Some motherboards require additional screws for heatsinks, general components and/or non-standard security. Optional standoffs are included to these motherboards. To use an optional standoff, you must place the standoff through the bottom the chassis and secure it with a wrench, with the rounded end upward.

M/B standoff
M5 to 6-32

Figure 4-8: Chassis Standoffs

Installing the Motherboard

1. Review the documentation that came with your motherboard. Become familiar with component placement, requirements, precautions, and cable connections.

2. Remove the four screws which mount the middle bracket onto the chassis as illustrated below. (Unplug the fan connectors from the original motherboard if necessary) and lift the middle bracket up and out of the chassis.

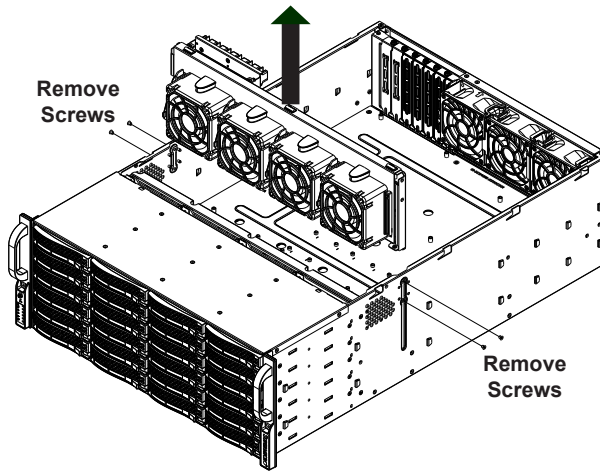


Figure 4-9: Removing the Middle Bracket

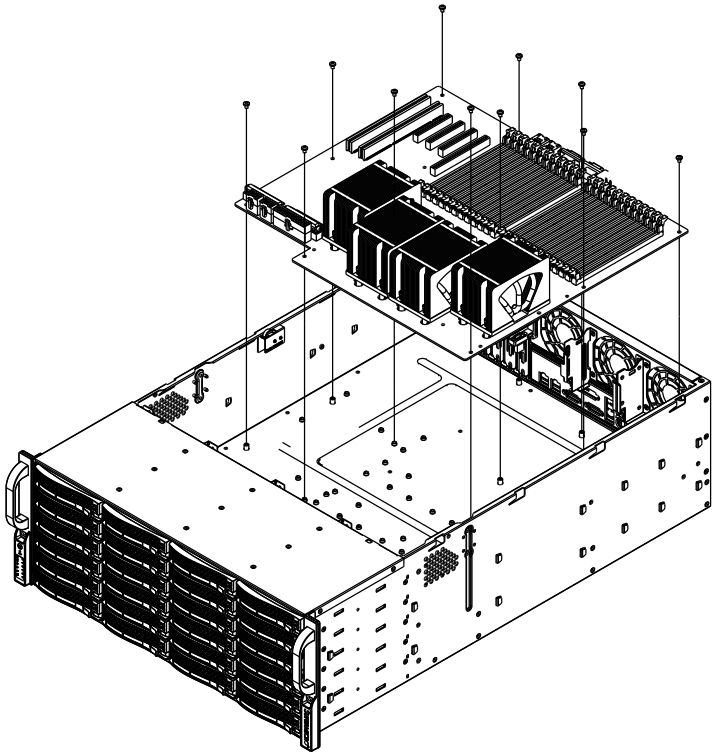


Figure 4-10: Motherboard Installation

3. As required by your motherboard, install standoffs in any areas that do not have a permanent standoff. To do this, place a hexagonal standoff through the bottom the chassis and tighten the standoff with a wrench.

4. Lay the motherboard on the chassis aligning the permanent and optional standoffs

5. Secure the motherboard to the chassis using the rounded, Phillips head screws. CAUTION: Do not exceed 8 lbs of torque when tightening the screws.

6. Secure the CPU(s), heatsinks, and other components to the motherboard as described in the motherboard documentation.

7. Connect the cables between the motherboard, backplane, chassis, front panel, and power supply, as needed. See the Routing Cables in the Peripheral Drawer section of this manual for details on routing cabling to the peripheral drawer.

8. Carefully slide the middle bracket back into the chassis, routing the motherboard cables through the rubber gateway at the bottom of the middle bracket

9. Connect the fan cables to the motherboard through the rubber gateway.

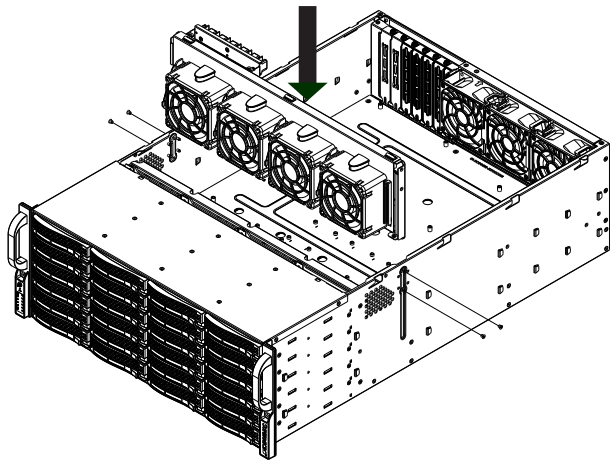


Figure 4-11: Installing the Middle Bracket

Installing Heatsinks on the Motherboard

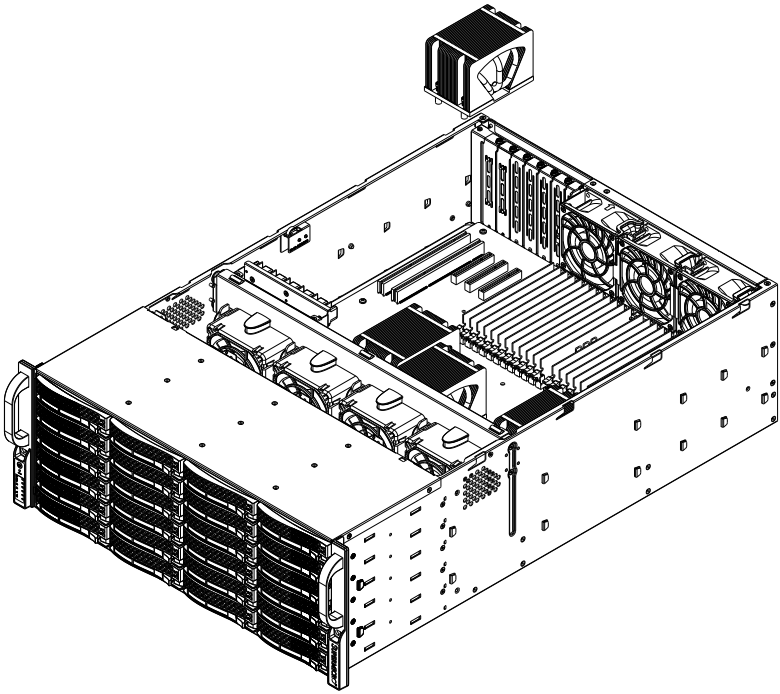


Figure 4-12: Installing Heatsinks on the Motherboard Installation

Heatsinks may be required on the SC848 motherboard. The installation process of these heatsinks may vary with different motherboards. Typically, heatsinks will clip onto the motherboard, and may be installed without removing the motherboard. Check the documentation that came with your motherboard for specific instructions on how to install heatsinks.

Add-on Card/Expansion Slot Setup

Your SC848 chassis includes I/O slots for add-on cards and expansion cards.

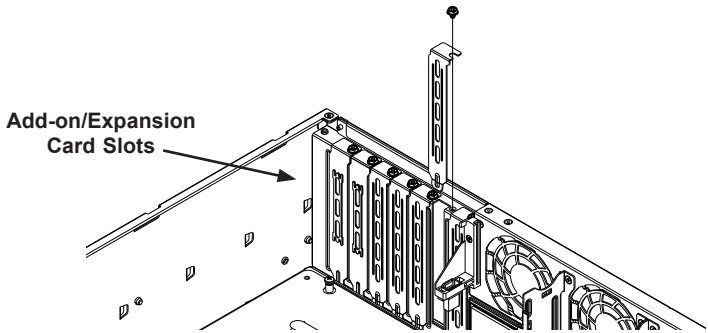


Figure 4-13: Installing Add-on and Expansion Cards

The SC848 chassis includes slots for add-on cards and expansion cards.

Installing Add-on and Expansion Cards in the SC848 Chassis

1. Disconnect the power supply, lay the chassis on a flat surface, and open the chassis cover.

2. Remove the screw holding the cover in place for each add-on/expansion card slot you want to use. Keep this screw for later use.

3. Connect the add-on cards and/or expansion cards to the mother board.

4. Secure each card to the chassis using the card's L bracket and the previously removed screw.

4-5 Installing the Air Shroud

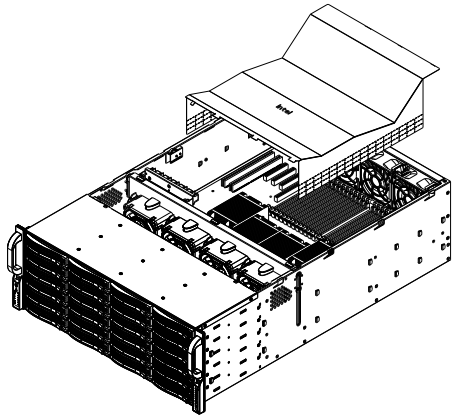


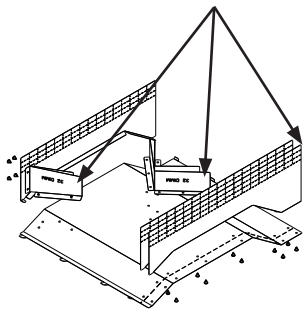
Figure 4-14: Air Shroud for SC848 Chassis

Air shrouds concentrate airflow to maximize fan efficiency. The SC848 chassis air shroud does not require screws for installation.

Air Shroud Part No.	Description
MCP-310-84801-0B	Mylar air shroud for Intel X7.X6 Quad motherboard
MCP-310-84802-0B*	Mylar air shroud for AMD H8 Quad motherboard

*Before installing the AMD airshroud:
16 DIMM: Remove all pieces marked "32 DIMM"and the outer left side piece
32 DIMM: Remove all pieces marked "16 DIMM" and the inner left side piece.

16 DIMM AMD MB: Remove Outer Side and Pieces Marked 32 DIMM



32 DIMM AMD MB: Remove Inner Side and Pieces Marked 16 DIMM

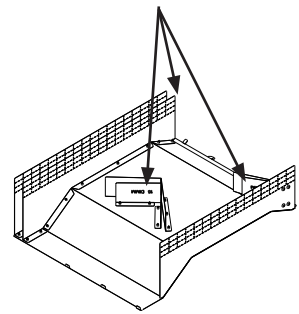


Figure 4-15: Adapting the Air Shroud for AMD Motherboards

Installing the Air Shroud

1. Place air shroud in the chassis, fitting the air shroud between the middle bracket and the rear window. Insert the four front hooks of the air shroud into the holes on the back of the middle bracket, and the three rear hooks in the gap between the rear fans and the rear window.

4-6 Checking the Server's Air Flow

Checking the Air Flow

1. Make sure there are no objects to obstruct airflow in and out of the server. In addition, if you are using a front bezel, make sure the bezel's filter is replaced periodically.

2. Do not operate the server without drives or drive trays in the drive bays. Use only recommended server parts.

3. Make sure no wires or foreign objects obstruct air flow through the chassis. Pull all excess cabling out of the airflow path or use shorter cables.

The control panel LEDs inform you of system status. See “Chapter 3: System Interface” for details on the LEDs and the control panel buttons.

In most cases, the chassis power supply and fans are pre-installed. If you need to install fans continue to the System Fans section of this chapter. If the chassis will be installed into a rack, continue to the next chapter for rack installation instructions

4-7 System Fans

Seven heavy duty fans provide cooling for the chassis. These fans circulate air through the chassis as a means of lowering the chassis internal temperature.

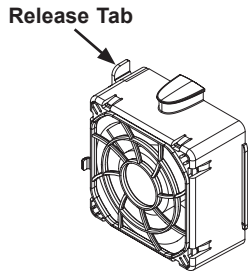


Figure 4-16: Front System Fan

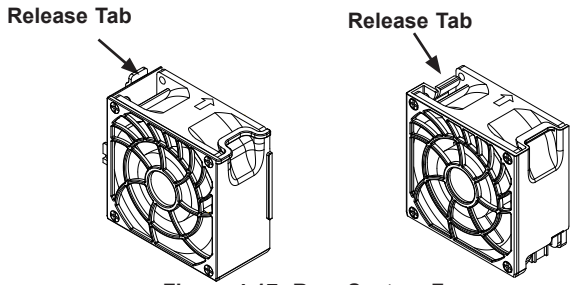


Figure 4-17: Rear System Fans

Replacing a System Fan

1. If necessary, open the chassis while the power is running to determine which fan has failed. (Never run the server for an extended period of time with the chassis open.)

2. Turn off the power to the system and unplug the system from the outlet.

3. Press the fan release tab to lift the failed fan from the chassis and pull it completely from the chassis.

4. Place the new fan into the vacant space in the housing while making sure the arrows on the top of the fan (indicating air direction) point in the same direction as the arrows on the other fans.

5. Power up the system and check that the fan is working properly before replacing the chassis cover.

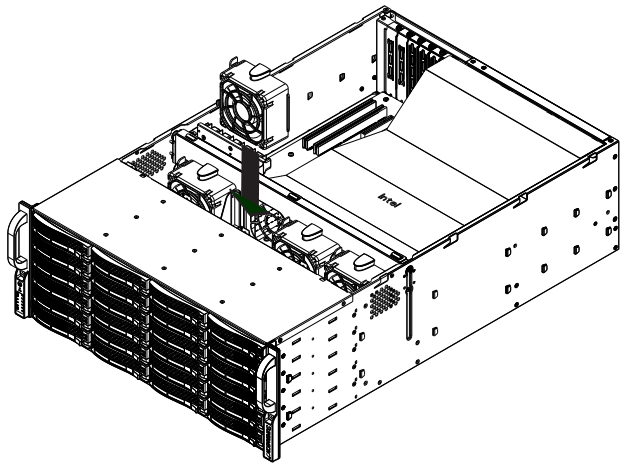


Figure 4-18: Installing a Front System Fan

4-8 Power Supply

The SC848 chassis includes three 900 Watt (2+1 redundant for a total of 1800 Watts) high-efficiency, power supplies. These power supplies are auto-switching capable. This enables it to automatically sense and operate at a 100v to 240v input voltage. An amber light will be illuminated on the power supply when the power is off. An illuminated green light indicates that the power supply is operating.

Redundant power supplies are hot-swappable, and can be changed without powering down the system. New units can be ordered directly from Supermicro (see the contact information in the Preface of this manual).

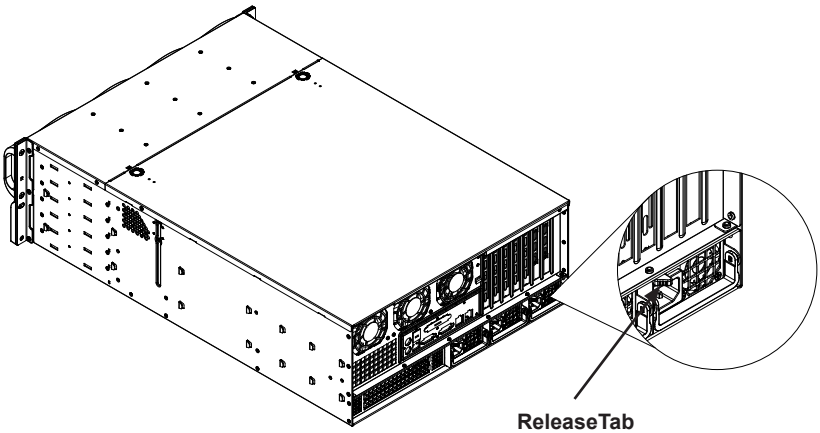


Figure 4-19: Power Supply Release Tab

Changing the Power Supply

1. The SC848 chassis includes redundant 2+1 power supply modules. Any one of the three power supply modules may be removed and replaced without having to power-down the server.

2. Push the release tab (on the back of the power supply) as shown in the illustration above.

3. Pull the power supply out using the handle provided.

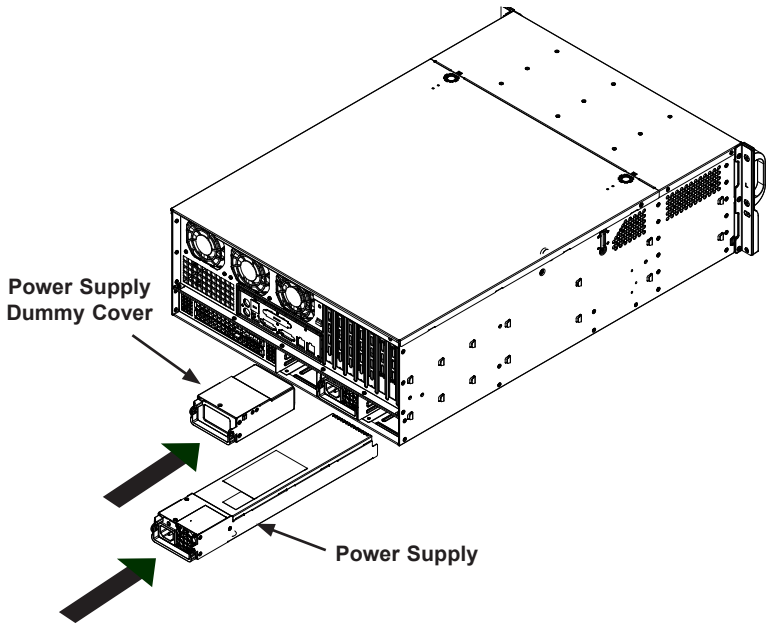


Figure 4-20: Installing the Power Supply and Dummy Cover

4. Replace the failed power module with the same model, or use a dummy cover if power redundancy is not required.

5. Push the new power supply module or dummy cover into the power bay until it clicks into the locked position.

4-9 Changing the Power Distributor Board

The SC848 chassis requires a power distributor. The power distributor provides failover and power supply redundancy. In the unlikely event you must change the power distributor, do following:

Changing the Power Distributor Board

1. Power down the server and remove the plug from the wall socket or power strip.

2. Unplug the fan cables from the motherboard, and then remove the middle bracket (See page 4-7)

3. Remove all cable connections to the power distributor board from the motherboard, backplane, and other components. Also, remove both power supplies.

4. Locate the power distributor board between the power supply and the backplane.

5. Remove the three screws securing the power distributor board cover to the chassis floor

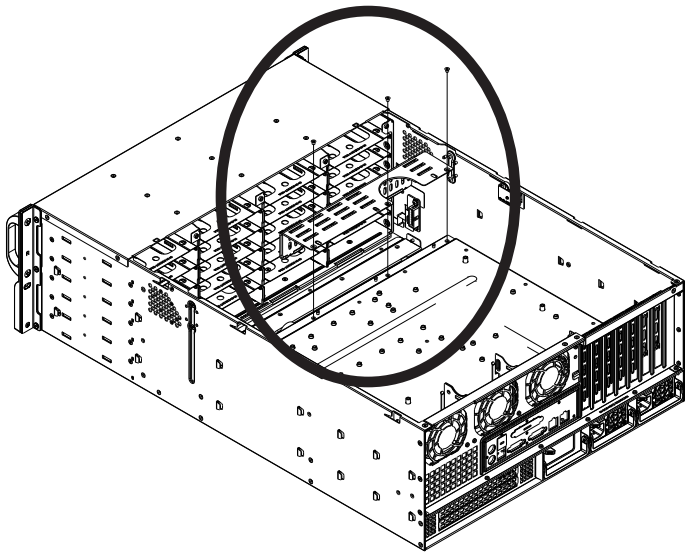


Figure 4-21: Removing the Power Distributor Cover

6. Remove the four screws securing the power distributor board to the housing.

7. Gently push the power distributor board backward from the locked position (7A), lift it upwards (7B), then pull it forwards to remove it from the chassis (7C).

Figure 4-22: Lifting the Power Distributor Board off the Pins

8. Slide the new power distributor board into the chassis, match the thru holes to the pins in the floor of the chassis, lower the board over the pins then slide it forward into the locked position.

9. Align the holes of the power distributor board wth standoffs in the chassis. Note that two of these holes are slotted thru holes designed to allow for the board to be adjusted.

10. Secure the board to the chassis following the lettered A,B,C,D sequence shown below.

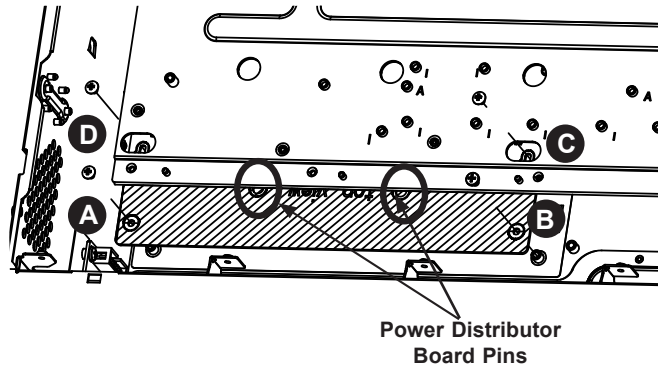


Figure 4-23: Power Distributor Board Fastener Sequence

11. Replace the power distributor board cover by routing three pairs of 4-pin backplane connector cables out the front of the power distributor board cover. Route the 24-pin connector cable and the two 8-pin motherboard connector cables out the top of the power distributor board cover and leave the 4-pin connector aside for peripheral use.

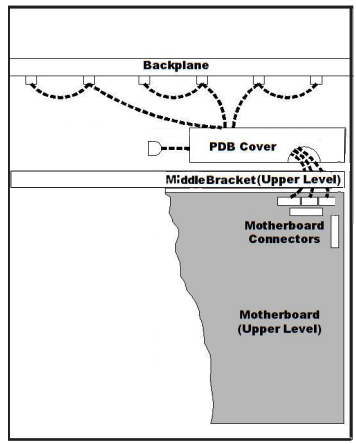


Figure 4-24: Routing Cables from the Power Distributor Board

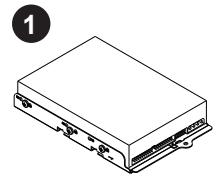
12. Reconnect all the power cables. Spread the power cables to the motherboard carefully before replacing the middle bracket. Make sure the wires passing through the rubber gates of the bracket are not being squeezed.

13. Replace the power supplies, and insert the plug into the wall.

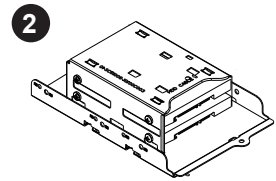
4-10 Configuring the Peripheral Drawer

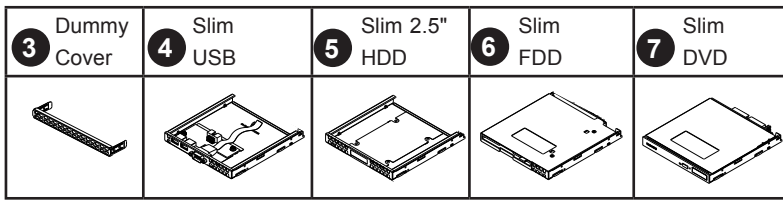
The SC848 chassis supports the following peripheral drawer configuration options, allowing for the tray to be configured for a wide variety of uses:

	Peripheral Device	Part Number
1.	Single 3.5" HDD	MCP-220-00048-0N
2.	Dual 2.5" HDD	MCP-220-00044-0N (MCP-220-00048-0N Needed)
3.	Dummy Cover	MCP-290-11101-0B
4.	Slim USB	MCP-220-00065-0B
5.	Slim 2.5" HDD	MCP-220-00066-0B
6.	Slim FDD	MCP-220-00067-0B
7.	Slim DVD	MCP-220-00068-0N



Location	Peripheral Device
Position A	N/A (Default) or 1. or 2.
Position B	N/A (Default) or 1. or 2.
Position C	3. (Default) or 4. or 5. or 6. or 7.
Position D	3. (Default) or 4. or 5. or 6. or 7.





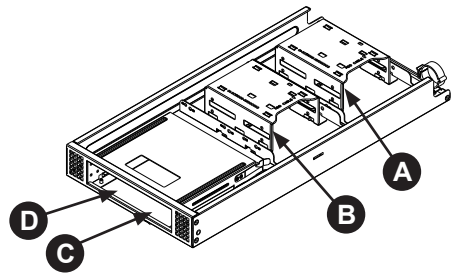


Figure 4-25: Peripheral Drawer Device Options

Opening the Peripheral Drawer

After selecting the optimal configuration options for your system, follow the instructions below to assemble the peripheral drawer with the options desired.

Opening the Peripheral Drawer

1. Power down and unplug the system from the outlet.

2. Unplug the fan cables from the motherboard if necessary, and then remove the middle bracket (See page 4-7)

3. Disconnect the existing power and data cables which extend from the peripheral drawer to other chassis components (Including the motherboard and the power distributor board).

CAUTION! Cable lengths in the peripheral drawer only permit the tray to extend half-way open to allow replacement of the peripheral devices. When configuring HDDs, all cables connecting to the drawer must be removed from the motherboard and the power distributor board, before fully extending the drawer and removing it from the chassis.

4. Using the left hand, press the peripheral drawer release button (A) with the thumb, while simultaneously using the other fingers to push the back of the peripheral drawer forward in the peripheral drawer slot, and out of the chassis.

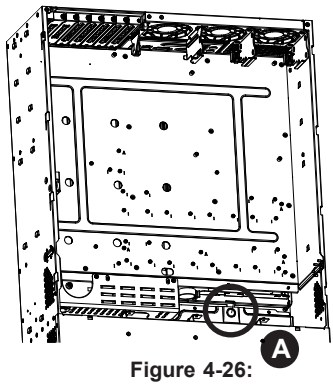


Figure 4-26: Peripheral Drawer Release Button

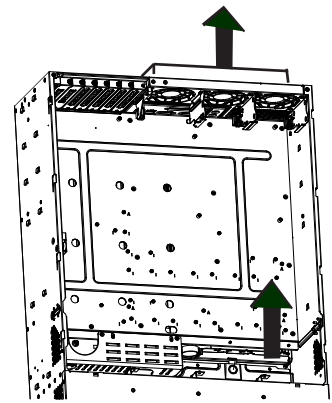


Figure 4-27: Removing the Peripheral Drawer

Installing 2.5" and 3.5" Drives in the Peripheral Drawer

Each drive tray (A) holds either one 3.5" HDD (B), or two 2.5" HDDs in a mounting bracket (C).

Installing HDDs into the Drive Tray

1. Secure the drive into the drive tray using one of the two methods below:

   If installing one 3.5" drive, place the drive directly into the tray and secure it to the tray with the six round head screws provided.

   If installing two 2.5" drives, slide the drives into the bracket and secure them into the bracket with eight round head screws as illustrated, then secure the bracket into the tray, using four flat head screws as shown.

2. Secure the drive tray into the floor of the peripheral drawer using two screws, as shown on the following page of this manual.

3. Connect the cables to the drives.

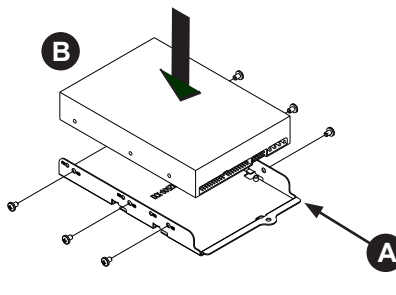


Figure 4-28: Installing One 3.5" HDD into the HDD Tray

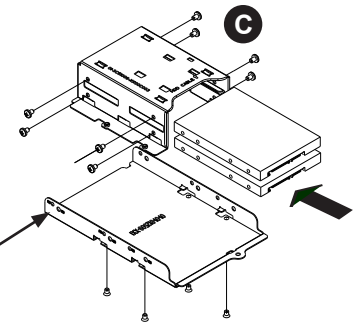


Figure 4-29: Installing Two 2.5" HDDs into the HDD Tray

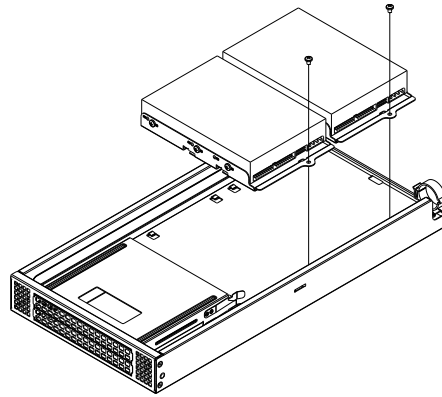


Figure 4-30: Installing 3.5" HDDs into the Peripheral Drawer

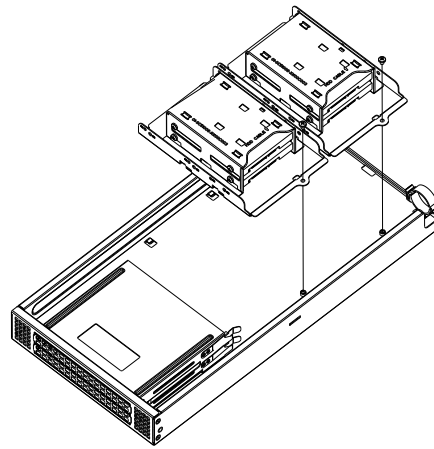


Figure 4-31: Installing 2.5" HDDs into the Peripheral Drawer

Installing Peripheral Devices in the Peripheral Drawer

Installing Peripheral Devices

1. Remove the dummy covers from the front of the peripheral device bays on the front of the peripheral drawer.

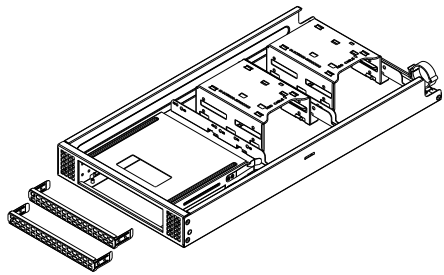


Figure 4-32: Removing the Dummy Covers

2. Install the peripheral devices into the peripheral device bays.

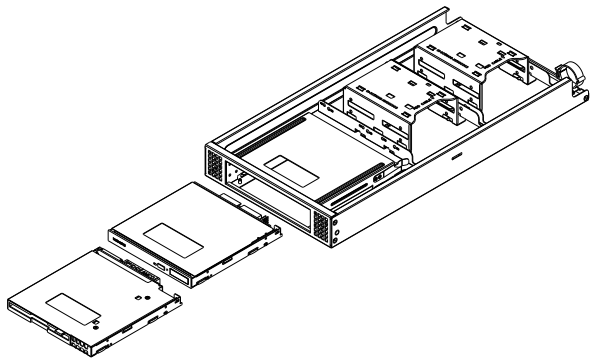


Figure 4-33: Installing Peripheral Devices into the Peripheral Drawer

Removing Peripheral Devices from the Peripheral Drawer

Removing Peripheral Devices

1. Press the release latch on the back of the peripheral device bay towards the wall of the chassis.

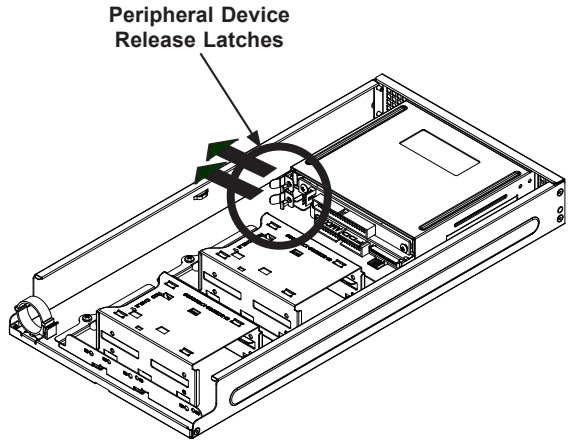


Figure 4-34: Peripheral Device Release Latches

2. Press the back of the peripheral device, gently pushing it forward out the front of the peripheral device bay.

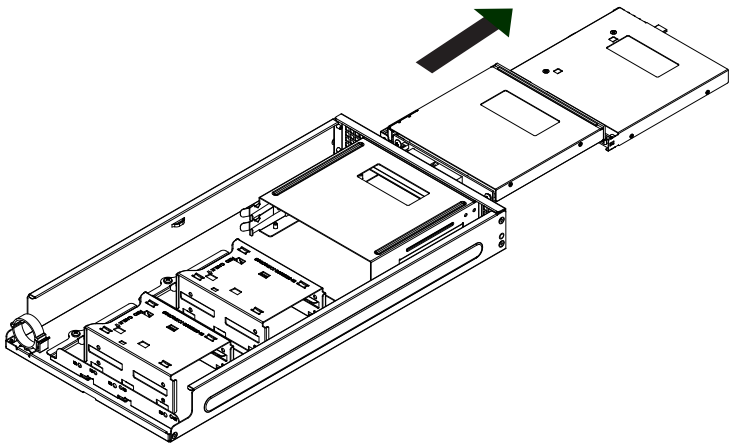


Figure 4-35: Removing Peripheral Devices

Routing Cables in the Peripheral Drawer

Routing Cabling in the Peripheral Drawer

1. Connect the power and signal cables to the devices in the peripheral drawer.
2. Route the cables through the O-clip at the back of the drawer.
3. Push the drawer back into the chassis, while simultaneously pulling the cables which lead to the drawer without breaking or disconnecting the cables, until the drawer clicks into the locked position.
4. Use zip ties to bundle the cables where indicated in the diagram below.
5. Connect the power cable to the 4-pin peripheral connector from the power distributor board.
6. Route the signal cable over the top of the power distributor cover and connect them to the motherboard through the middle bracket.

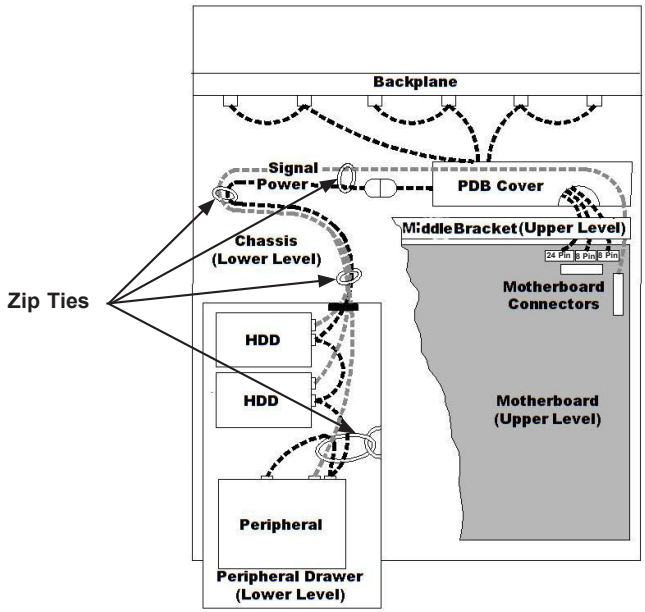


Figure 4-36: Routing Power and Signal Cables

4-11 Accessing the Backplane

The SC848 chassis backplane is located behind the hard drives and in front of the front system fans. In order to change jumper settings on the backplane, it may be necessary to remove the backplane from the chassis.

Removing the Backplane

1. Power down and unplug the system from any power source.
2. Pull all of the existing hot-swappable hard drives half-way out of their drive bays in the front of the chassis.
3. Disconnect the cabling to the backplane.
4. Remove the four upper screws securing backplane housing to the chassis and set these aside for later use.

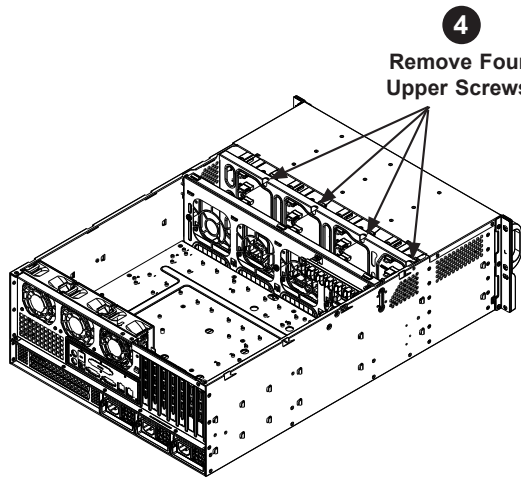


Figure 4-37: Removing the Four Upper Screws

5. Remove the five lower screws securing the backplane housing to the chassis floor and set these aside for later use.

6. Remove the two side screws on the right side of the chassis.

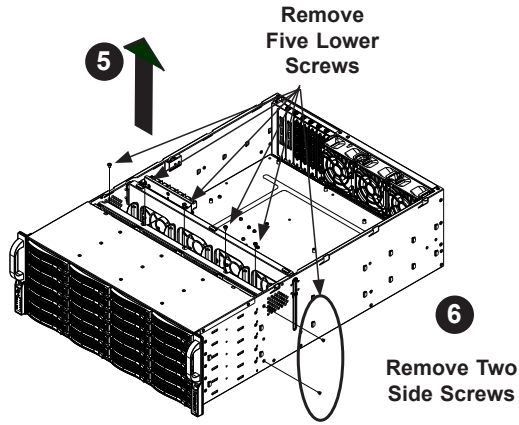


Figure 4-38: Removing the Lower and Side Screws

7. Gently ease the backplane up and out of the chassis.

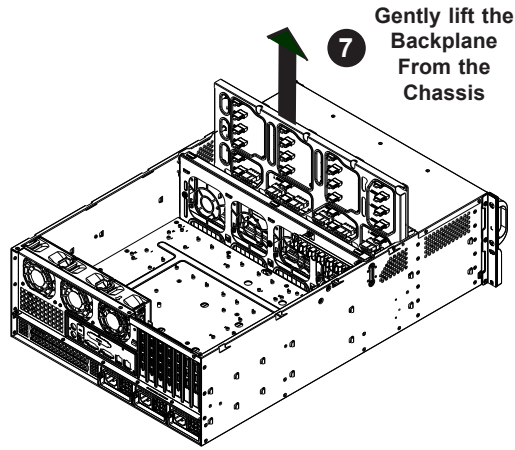


Figure 4-39: Removing the Backplane from the Chassis

Installing the Backplane

1. Connect the power cables to the backplane.

2. Gently slide the backplane and its housing back into position in the chassis.

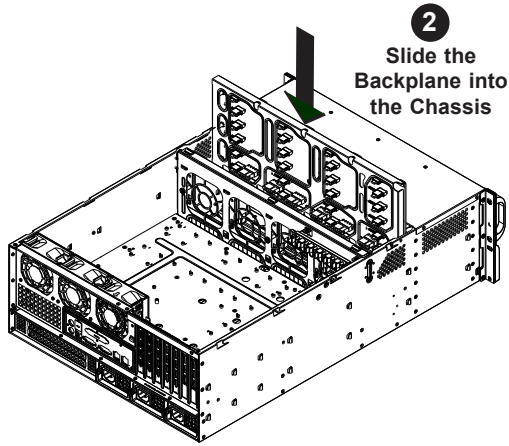


Figure 4-40: Replacing the Backplane in the Chassis

3. Replace the five lower screws which secure the backplane housing to the chassis floor.

4. Replace the two side screws.

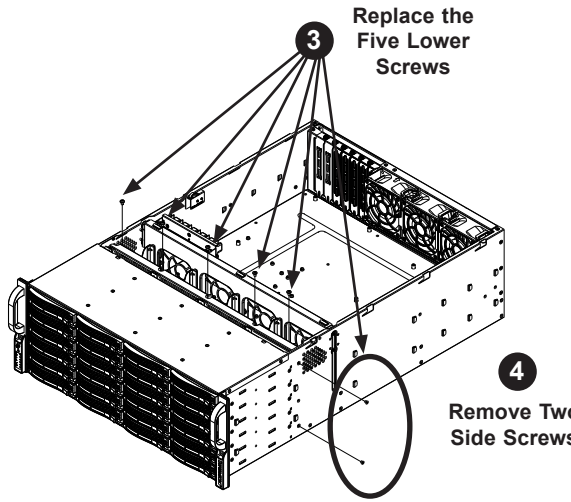


Figure 4-41: Replacing the Lower and Side Screws

5. Replace the four upper screws which secure the backplane housing to the chassis.

6. Reconnect all cabling to the backplane.

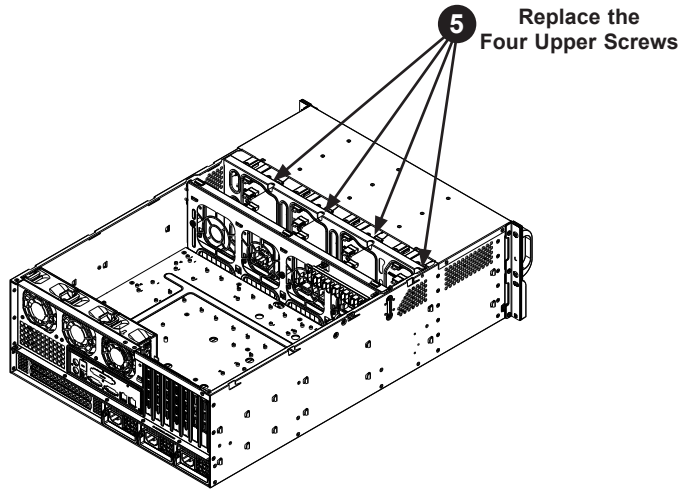


Figure 4-42: Replacing the Four Upper Screws

Notes

Chapter 5

Rack Installation

5-1 Overview

This chapter provides a quick setup checklist to get your chassis up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time.

5-2 Unpacking the System

You should inspect the box the chassis was shipped in and note if it was damaged in any way. If the chassis itself shows damage you should file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack unit that will hold your chassis. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. You will also need it placed near a grounded power outlet. Be sure to read the Rack and Server Precautions in the next section.

5-3 Preparing for Setup

The box your chassis was shipped in should include one pair of rail assemblies, two rail mounting brackets and the mounting screws you will need to install the system into the rack. Read this section in its entirety before you begin the installation procedure outlined in the sections that follow.

Choosing a Setup Location

- Leave enough clearance in front of the rack to enable you to open the front door completely (~25 inches).
- Leave approximately 30 inches of clearance in the back of the rack to allow for sufficient airflow and ease in servicing.

Warnings and Precautions!

- This product is for installation only in a Restricted Access Location (dedicated equipment rooms, service closets and similar locations).

Rack Precautions

- **Safety Warning:** Before performing any chassis setup or maintenance, it is recommended that the chassis be removed from the rack and placed on a stable bench or table. For instructions on how to uninstall the chassis from the rack, refer to Chapter 5 Rack Installation in this manual.
- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single rack installation, stabilizers should be attached to the rack.
- In multiple rack installations, the racks should be coupled together.
- Always make sure the rack is stable before extending a component from the rack.
- You should extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.

General Server Precautions

- Review the electrical and general safety precautions that came with the components you are adding to your chassis.
- Determine the placement of each component in the rack *before* you install the rails.
- Install the heaviest server components on the bottom of the rack first, and then work up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges, voltage spikes and to keep your system operating in case of a power failure.

- Allow the hot plug hard drives and power supply modules to cool before touching them.
- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (Tmra).

Reduced Airflow

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e. the use of power strips, etc.).

5-4 Rack Mounting Instructions

Rack Rails Assembly

This section provides information on installing the SC848 chassis into a rack unit with the rails provided. There are a variety of rack units on the market, which may mean that the assembly procedure will differ slightly. You should also refer to the installation instructions that came with the rack unit you are using.

NOTE: This rail will fit a rack between 27" to 34.45" deep.

Identifying the Inner Rack Rails

The chassis package includes one pair of rack rail assemblies in the rack mounting kit. Each assembly consists of an inner rail that secures to the chassis and an outer rail that is attached directly to the rack.

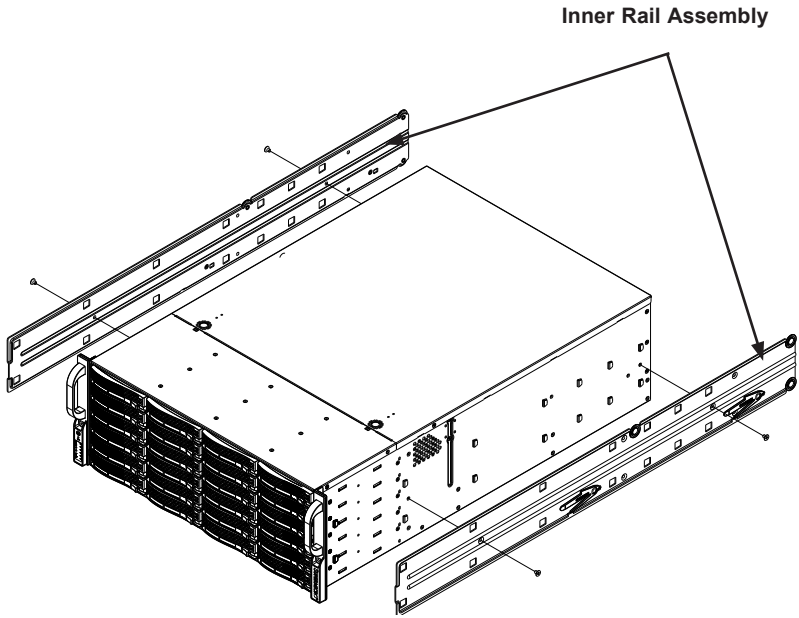


Figure 5-1: Identifying the Rack Rails

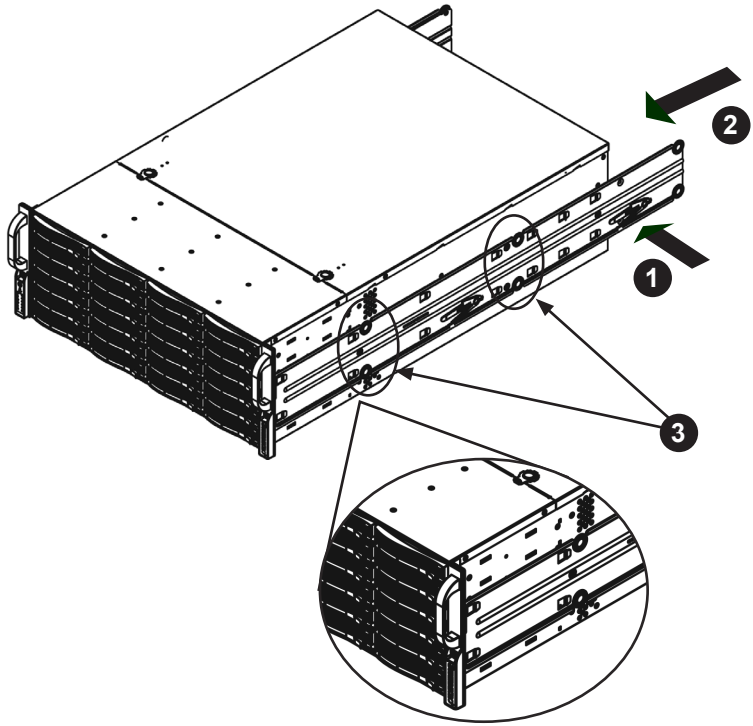


Figure 5-2: Installing the Rails

Installing the Inner Rails on the Chassis

Installing the Inner Rails

1. The inner rails are etched with "L" (Left side) and "R" (Right side). Place one inner rail on the side of the chassis, aligning the hooks of the chassis with the inner rail holes. Make sure the rail faces "outward" so that it will fit with the rack's mounting bracket.

2. Slide the rail toward the front of the chassis to hook the inner rail onto the side of the chassis.

3. Secure the chassis with two flat head M4 x 4mm screws as illustrated.

4. Repeat steps 1-3 for the other inner rack rail.

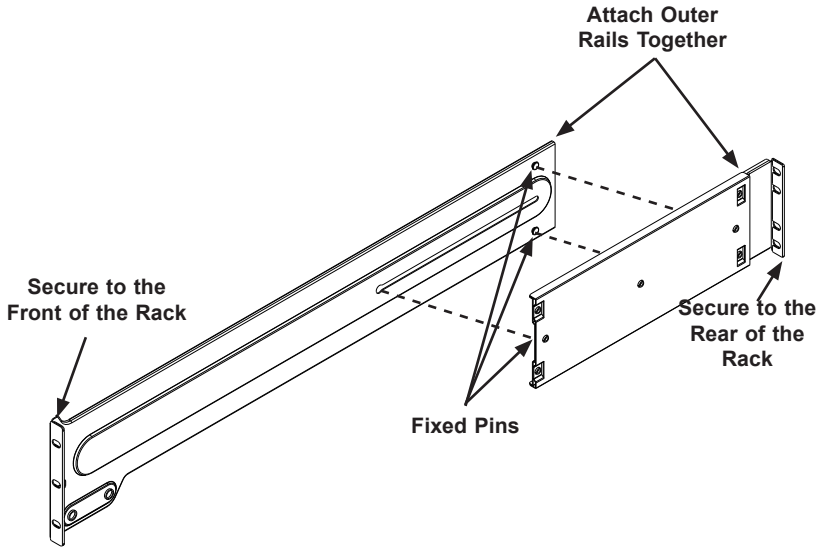


Figure 5-3: Assembling the Outer Rails

Installing the Outer Rails onto a Rack

Installing the Outer Rails

1. Attach the short bracket to the outside of the long bracket. You must align the pins with the slides. Also, both bracket ends must face the same direction.

2. Adjust both the short and long brackets to the proper distance so that the rail fits snugly into the rack.

3. Secure the long bracket to the front side of the outer rail with two M5 screws and washers and the short bracket to the rear side of the outer rail with three M5 screws and washers. Keep the screws slack so that they may be adjusted later.

4. Repeat steps 1-4 for the left outer rail.

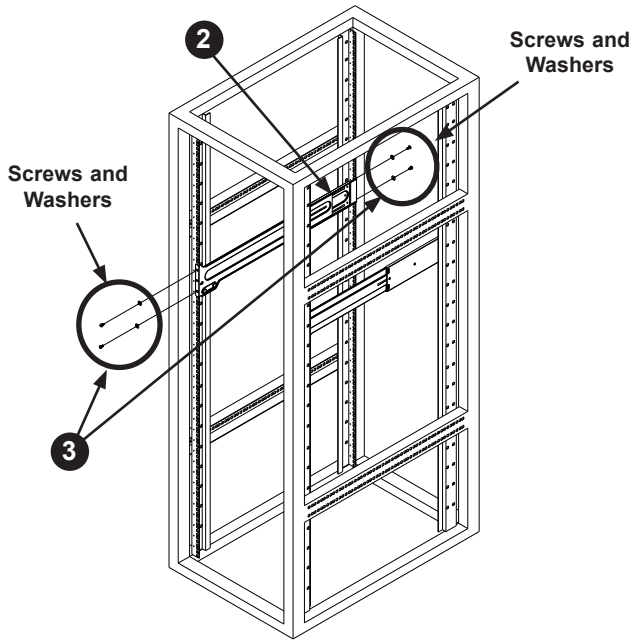
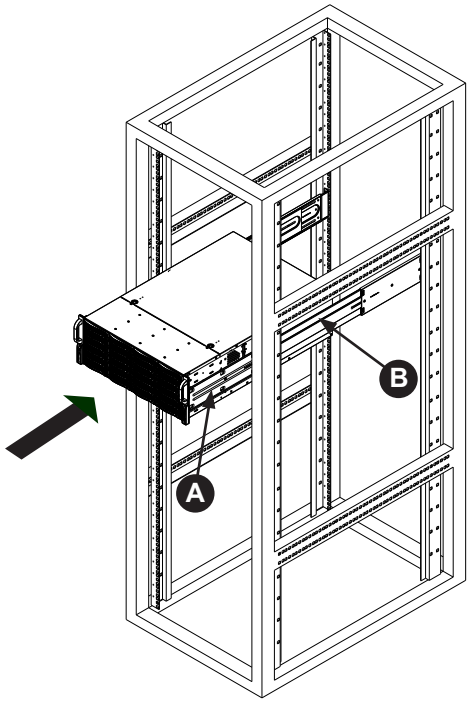


Figure 5-4: Installing the Outer Rails to the Rack



Installing the Chassis into a Rack

Installing the Chassis into a Rack:

1. Confirm that chassis includes the inner rails (A) Also, confirm that the outer rails (B) are installed on the rack.

2. Line chassis rails (A) with the front of the rack rails (B).

3. Slide the chassis rails into the rack rails, keeping the pressure even on both sides (you may have to depress the locking tabs when inserting). When the server has been pushed completely into the rack, you should hear the locking tabs "click" into the locked position.

4. Tighten up all the screws on the front side and rear side of both outer rails.

5. (Optional) Insert and tightening the thumbscrews that hold the front of the server to the rack.

Removing the Chassis from the Rack

Caution! It may be dangerous for a single person to off-load the heavy chassis from the rack without assistance. Be sure to have sufficient assistance supporting the chassis when removing it from the rack.

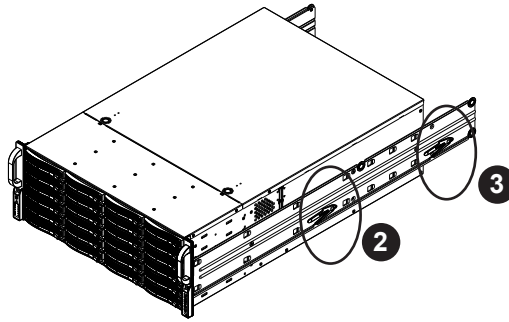


Figure 5-6: Removing the Chassis From the Rack

Removing the Chassis from the Rack

1. Pull the chassis forward out the front of the rack until it stops.

2. Press both of the black plastic release latches on each of the inner rails downward simultaneously and move the chassis forward in the rack.

3. When the chassis stops a second time, press both of the black plastic release latches on the rear of the inner rails downward simultaneously to fully remove the chassis from the rack.

Notes

Appendix A

SC848 Cables and Hardware

A-1 Overview

This appendix lists supported cables for your chassis system. It only includes the most commonly used components and configurations. For more compatible cables, refer to the manufacturer of the motherboard you are using and our Web site at: www.supermicro.com.

A-2 Cables Included with SC848A Chassis (SAS/SATA)

SC848A-R1800			
Part #	**Type**	**Length**	**Description**
CBL-0084L	Cable	6"	Front control cable 16-pin split convertor
CBL-0087	Ribbon, Round	20"	16 pin to 16 pin ribbon cable for control panel
CBL-0088L	Cable	10.5"	4-pin middle fan power extension (PWM)
CBL-0216L	Cable	7.87"-	4 to 4-pin middle fan power extension (PWM)
CBL-0160L	Cable	---	US power cord 16AWG
CBL-0099	Cable	---	Power extension cable, one HDD to two HDD and two FDD
CBL-0217L	Cable	---	16-pin control panel converter cable

A-3 Compatible Cables

These cables are compatible with the SC848 chassis.

Alternate SAS/SATA Cables

Some compatible motherboards have different connectors. If your motherboard has only one SAS connector that the SAS/SATA cables must share, use one of the following cables. These cables must be purchased separately.

Cable Name: SAS Cable **Quantity:** 1

Part #: CBL-0175L
Alt. Name: "Big Four"

Description: This cable has one SFF-8484 (32 pin) connector on one end and 4 SAS connectors (7 pins each) at the other. This cable connects from the Host (motherboard or other controller) to the backplane SAS hard drive port.

Cable Name: SAS Cable **Quantity:** 1

Part #: CBL-0116
Alt. Name: iPass or "Small Four"

Description: This cable has one ipass (SFF-8087/mini-sas) connector (36 pins) at one end and 4 SAS connectors on one end. This cable connects from the Host (motherboard or other controller) to the backplane SAS hard drive port.

Extending Power Cables

Although Supermicro chassis are designed with to be efficient and cost-effective, some compatible motherboards have power connectors located in different areas.

To use these motherboards you may have to extend the power cables to the mother boards. To do this, use the following chart as a guide.

Power Cable Extenders		
Number of Pins	**Cable Part #**	**Length**
24 pin	CBL - 0042	7.9"(20 CM)
20 pin	CBL - 0059	7.9"(20 CM)
8 pin	CBL - 0062	7.9"(20 CM)
4 pin	CBL - 0060	7.9"(20 CM)

Front Panel to the Motherboard

The SC848 chassis includes a cable to connect the chassis front panel to the motherboard. If your motherboard uses a different connector, use the following list to find a compatible cable.

Front Panel to Motherboard Cable (Ribbon Cable)		
Number of Pins (Front Panel)	**Number of Pins (Motherboard**	**Cable Part #**
16 pin	16 pin	CBL - 0049
16 pin	20 pin	CBL - 0048
20 pin	20 pin	CBL - 0047
16 pin	various*	CBL - 0068
20 pin	various*	CBL - 0067

* Split cables: Use these cable if your motherboard requires several different connections from the front panel.

A-4 Chassis Screws

The accessory box includes all the screws needed to setup your chassis. This section lists and describes the most common screws used. Your chassis may not require all the parts listed.

M/B

Pan head
6-32 x 5 mm
[0.197]

HARD DRIVE

Flat head
6-32 x 5 mm
[0.197]

DVD-ROM, CD-ROM, and FLOPPY DRIVE

Pan head
6-32 x 5 mm
[0.197]

Flat head
6-32 x 5 mm
[0.197]

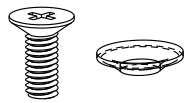
Round head
M3 x 5 mm
[0.197]

Round head
M2.6 x 5 mm
[0.197]

RAIL

Flat head
M4 x 4 mm
[0.157]

Round head
M4 x 4 mm
[0.157]



Flat head
M5 x 12 mm[0.472]

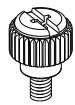
Washer for M5

M/B STANDOFFS

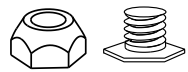
M/B standoff
6-32 to 6-32

M/B (CPU)
standoff
M5 to 6-32

M/B standoff
M5 to 6-32



Thumb screw
6-32 x 5 mm
[0.197]



1U M/B standoff
6-32 x 5 mm
[0.197]

Appendix B

SC848 Power Supply Specifications

This appendix lists power supply specifications for your chassis system.

SC848TQ-R1800B	
	900W (2+1) for a total of 1800W
MFR Part #	PWS-902-1R
Rated AC Voltage	100 - 240V 60 - 50Hz 11 - 4.5 Amp
+5V standby	4 Amp
+12V	75 Amp
+5V	50 Amp
+3.3V	30 Amp
-12V	0.6 Amp

For ordering purposes, the part number of the power supply dummy cover is CSE-PT0130L.

Notes

Appendix C

SAS-846A Backplane Specifications

To avoid personal injury and property damage, carefully follow all the safety steps listed below when accessing your system or handling the components.

C-1 ESD Safety Guidelines

Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to your system, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD.

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing a component from the antistatic bag.
- Handle the RAID card by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the card and peripherals back into their antistatic bags when not in use.

C-2 General Safety Guidelines

- Always disconnect power cables before installing or removing any components from the computer, including the backplane.
- Disconnect the power cable before installing or removing any cables from the backplane.
- Make sure that the backplane is securely and properly installed on the motherboard to prevent damage to the system due to power shortage.

C-3 A Note to Users

- All images and layouts shown in this user's guide are based upon the latest PCB Revision available at the time of publishing. The card you have received may or may not look exactly the same as the graphics shown in this manual.

C-4 Introduction to the SAS-846A Backplane

The SAS-846A backplane has been designed to utilize the most up-to-date technology available, providing your system with reliable, high-quality performance.

This manual reflects SAS-846A Revision 1.00, the most current release available at the time of publication. Always refer to the Supermicro Web site at www.supermicro.com for the latest updates, compatible parts and supported configurations.

Jumper Settings, Connectors and Pin Definitions

C-5 Front Connectors and Jumpers

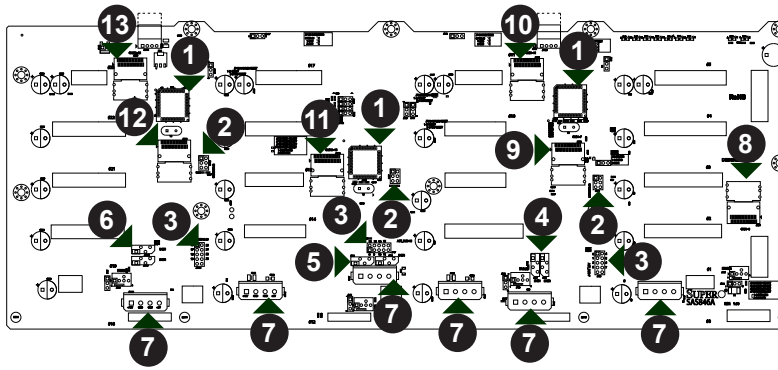


Figure C-1: Front Components

Front Connectors and Components

1. Chip: MG9072
2. Upgrade Connectors: JP69, JP78 and JP115
3. ACT_IN: JP26, JP47, and JP108
4. I²C Connector #1 (JP37) and #2 (JP95)
5. I²C Connector #3 (JP52) and #4 (JP96)
6. I²C Connector #5 (JP116) and #6 (JP117)
7. Power Connectors (4-pin): JP10, JP13, JP46, JP48, JP109, and JP110
8. IPASS Connector CH# 0-3, JSM1
9. IPASS Connector CH# 4-7, JSM2
10. IPASS Connector CH# 8-11, JSM3
11. IPASS Connector CH# 12-15, JSM4
12. IPASS Connector CH# 16-19, JSM5
13. IPASS Connector CH# 20-23, JSM6

C-6 Front Connector and Pin Definitions

1. MG9072 Chip

The MG9072 is an enclosure management chip that supports the SES-2 controller and SES-2 protocols.

2. Upgrade Connectors

The upgrade connectors are designated JP69, JP78, and JP115 and are used for manufacturer's diagnostic purposes only.

3. Activity LED Header

The activity LED header, designated JP26, JP47 and JP108, is used to indicate the activity status of each SAS drive. The Activity LED Header is located on the front panel. For the Activity LED Header to work properly, connect using a 10-pin LED cable.

4., 5., 6. I²C Connectors

The I²C Connectors, designated JP37, JP95, JP52, JP96, JP116, and JP117, are used to monitor HDD activity and status. See the table on the right for pin definitions.

I²C Connector Pin Definitions (JP37, JP95, JP52, JP96, JP116, and JP117)

Pin#	Definition
1	Data
2	Ground
3	Clock
4	No Connection

7. Backplane Main Power Connectors

The 4-pin connectors, designated JP10, JP13, JP46, JP48, JP109, and JP110, provide power to the backplane. See the table on the right for pin definitions.

Backplane Main Power 4-Pin Connector (JP10, JP13, JP46, JP48, 109 and 110)

Pin#	Definition
1	+12V
2 and 3	Ground
4	+5V

C-7 Front Jumper Locations and Pin Definitions

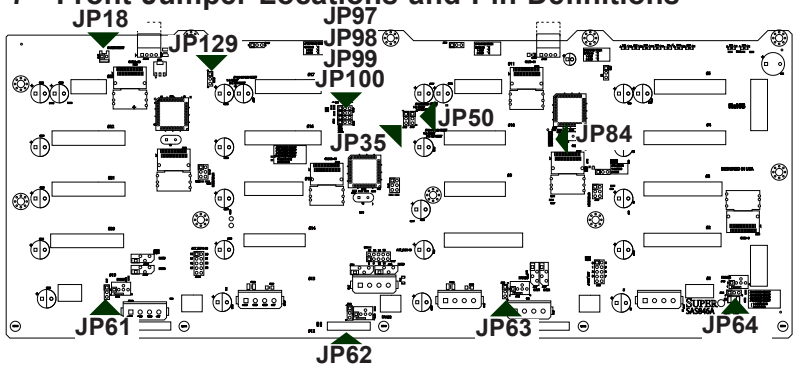
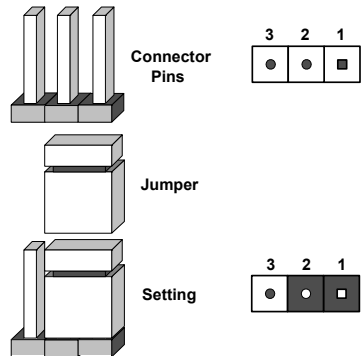


Figure C-2: Front Jumpers

Explanation of Jumpers

To modify the operation of the backplane, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. Note: On two pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.



Jumper Settings		
Jumper	**Jumper Setting**	**Notes**
JP35	1-2: Reset 2-3: Default	MG9072 Chip Reset #1
JP50	1-2: Reset 2-3: Default	MG9072 Chip Reset #2
JP129	1-2: Reset 2-3: Default	MG9072 Chip Reset #3
JP18	1-2: Reset 2-3: Not reset (Default)	Buzzer disabled* Buzzer enabled*

*The buzzer sound indicates that a condition requiring immediate attention has occured.

The buzzer alarm is triggered by the following conditions:

1. Hard drive failure
2. Fan failure
3. System temperature over 45º Celcius.

Fan Jumper Settings

This backplane can use up to four fans. To utilize each fan, you must configure **both jumpers** as indicated below.

Fan Jumper Settings		
Jumper	**Jumper Settings**	**Note**
JP61	1-2:With Fan (Default) 2-3:No Fan	FAN#1
JP97	1-2:With Fan (Default) 2-3:No Fan	FAN#1
JP62	1-2:With Fan (Default) 2-3:No Fan	FAN#2
JP98	1-2:With Fan (Default) 2-3:No Fan	FAN#2
JP63	1-2:With Fan (Default) 2-3:No Fan	FAN#3
JP99	1-2:With Fan (Default) 2-3:No Fan	FAN#3
JP64	1-2:With Fan (Default) 2-3:No Fan	FAN#4
JP100	1-2:With Fan (Default) 2-3:No Fan	FAN#4

I²C and SGPIO Modes and Jumper Settings

This backplane can utilize I²C or SGPIO. SGPIO is the default mode and can be used without making changes to your jumper. The following information details which jumper must be configured to use SGPIO mode or restore your backplane to I²C mode.

SGPIO/I²C Setting		
Jumper	**SGPIO Enabled (Default)**	**I²C Enabled**
JP84	1-2	2-3

Front LED Indicators

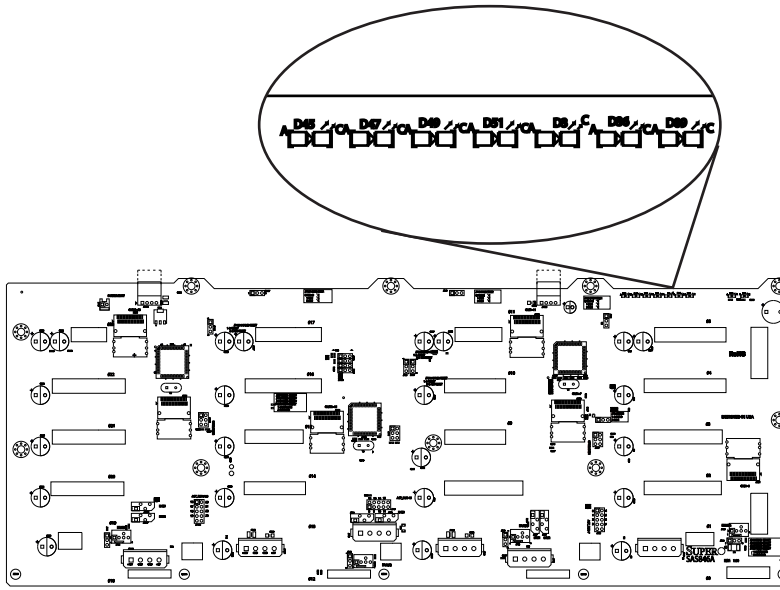


Figure C-3: Front LEDs

Front Panel LEDs		
LED	**State**	**Spefication**
D45	On	Failure in Fan #1
D47	On	Failure in Fan #2
D49	On	Failure in Fan #3
D51	On	Failure in Fan #4
D3	On	Alarm #1: Overheat/Drive Failure in Channel 1
D36	On	Alarm #2: Overheat/Drive Failure in Channel 2
D89	On	Alarm #3: Overheat/Drive Failure in Channel 3
D53	Off	+5V : Backplane power failure. Light is on during normal operation.
D54	Off	+12V : Backplane power failure. Light is on during normal operation.

C-8 Rear Connectors and LED Indicators

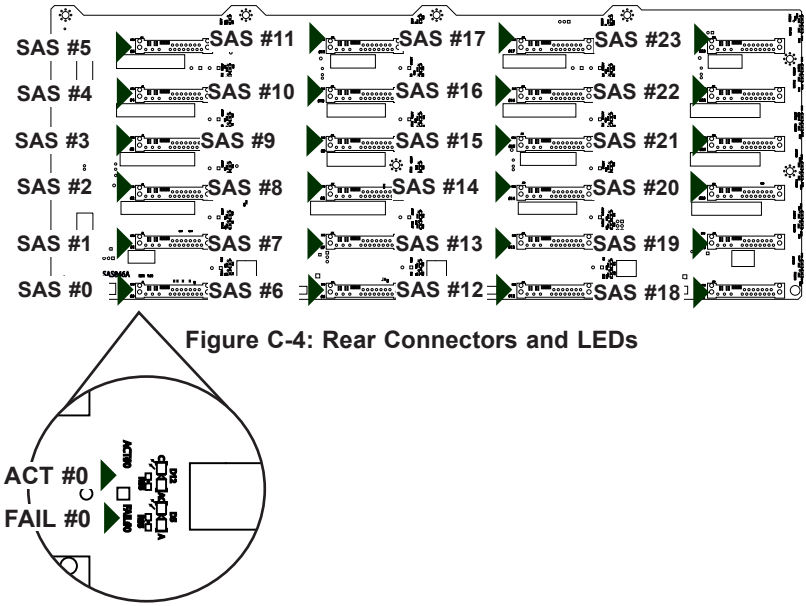


Figure C-4: Rear Connectors and LEDs

Rear SAS/SATA Connectors			
Rear Connector	**SAS Drive Number**	**Rear Connector**	**SAS Drive Number**
SAS #0	SAS/SATA HDD #1	SAS #12	SAS/SATA HDD #13
SAS #1	SAS/SATA HDD #2	SAS #13	SAS/SATA HDD #14
SAS #2	SAS/SATA HDD #3	SAS #14	SAS/SATA HDD #15
SAS #3	SAS/SATA HDD #4	SAS #15	SAS/SATA HDD #16
SAS #4	SAS/SATA HDD #5	SAS #16	SAS/SATA HDD #17
SAS #5	SAS/SATA HDD #6	SAS #17	SAS/SATA HDD #18
SAS #6	SAS/SATA HDD #7	SAS #18	SAS/SATA HDD #19
SAS #7	SAS/SATA HDD #8	SAS #19	SAS/SATA HDD #20
SAS #8	SAS/SATA HDD #9	SAS #20	SAS/SATA HDD #21
SAS #9	SAS/SATA HDD #10	SAS #21	SAS/SATA HDD #22
SAS #10	SAS/SATA HDD #11	SAS #22	SAS/SATA HDD #23
SAS #11	SAS/SATA HDD #12	SAS #23	SAS/SATA HDD #24

Rear LED Indicators		
Rear LED	**Hard Drive Activity**	**Failure LED**
SAS #0	D12	D5
SAS #1	D13	D6
SAS #2	D14	D7
SAS #3	D15	D8
SAS #4	D18	D19
SAS #5	D21	D20
SAS #6	D22	D23
SAS #7	D24	D29
SAS #8	D25	D30
SAS #9	D26	D31
SAS #10	D27	D32
SAS #11	D28	D33
SAS #12	D40	D37
SAS #13	D41	D38
SAS #14	D42	D39
SAS #15	D87	D88
SAS #16	D100	D103
SAS #17	D101	D105
SAS #18	D102	D107
SAS #19	D104	D108
SAS #20	D106	D109
SAS #21	D111	D110
SAS #22	D118	D119
SAS #23	D120	D121

Disclaimer (cont.)

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