



# **Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX Product Family**

## **System Integration and Service Guide**

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**A Guide for Technically Qualified Assemblers of Intel identified Subassemblies/Products**

**Revision 1.3**

**May 2017**

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# Safety Information

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## Important Safety Instructions

Read all caution and safety statements in this document before performing any of the instructions. See also Intel Server Boards and Server Chassis Safety Information at

<http://www.intel.com/support/motherboards/server/sb/cs-010770.htm>.

## Wichtige Sicherheitshinweise

Lesen Sie zunächst sämtliche Warnung und Sicherheitshinweise in diesem Dokument, bevor Sie eine der Anweisungen ausführen. Beachten Sie hierzu auch die Sicherheitshinweise zu Intel-Serverplatinen und Servergehäusen auf der

<http://www.intel.com/support/motherboards/server/sb/cs-010770.htm>.

## Consignes de sécurité

Lisez attention toutes les consignes de sécurité et les mises en garde indiquées dans ce document avant de suivre toute instruction. Consultez Intel Server Boards and Server Chassis Safety Information sur le site

<http://www.intel.com/support/motherboards/server/sb/cs-010770.htm>.

## Instrucciones de seguridad importantes

Lea todas las declaraciones de seguridad y precaución de este documento antes de realizar cualquiera de las instrucciones. Vea Intel Server Boards and Server Chassis Safety Information en

<http://www.intel.com/support/motherboards/server/sb/cs-010770.htm>.

## Error! Hyperlink reference not valid.重要安全指导

在执行任何指令之前，请阅读本文档中的所有注意事项及安全声明。和/或

<http://www.intel.com/support/motherboards/server/sb/cs-010770.htm> 上的 *Intel® Server Boards and Server Chassis Safety Information*（《Intel 服务器主板与服务器机箱安全信息》）。

# Warnings

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**Heed safety instructions:** Before working with your server product, whether you are using this guide or any other resource as a reference, pay close attention to the safety instructions. You must adhere to the assembly instructions in this guide to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products/components will void the UL listing and other regulatory approvals of the product and will most likely result in noncompliance with product regulations in the region(s) in which the product is sold.

**System power on/off:** The power button DOES NOT turn off the system AC power. To remove power from the system, you must unplug the AC power cord from the wall outlet. Make sure the AC power cord is unplugged before you open the chassis, add, or remove any components.

**Hazardous conditions, devices and cables:** Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the server and disconnect the power cord, telecommunications systems, networks, and modems attached to the server before opening it. Otherwise, personal injury or equipment damage can result.

**Electrostatic discharge (ESD) and ESD protection:** ESD can damage disk drives, boards, and other parts. We recommend that you perform all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground - any unpainted metal surface - on your server when handling parts.

**ESD and handling boards:** Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the server, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

**Installing or removing jumpers:** A jumper is a small plastic encased conductor that slips over two jumper pins. Some jumpers have a small tab on top that you can grip with your fingertips or with a pair of fine needle nosed pliers. If your jumpers do not have such a tab, take care when using needle nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to grip with, but not squeeze, the pliers or other tool you use to remove a jumper, or you may bend or break the pins on the board.

# Preface

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## About this document

This document is written for system integrators and service technicians who are responsible for system assembly, server upgrades, server repair, and component replacement.

This document is divided into two major sections. The first half of the document provides detailed instructions on how to assemble a system from the bare chassis to a functional server. It will guide you through the installation of system components and available accessories. The second half of the document is focused on system service. It provides many reference diagrams use to identify all key physical features of the system. It also provides detailed instructions for the replacement of field replaceable components.

For the latest revision of this document, go to <http://www.intel.com/support>.

## Document Organization

### System Integration

**Chapter 1 – Server Building Block System Integration** – provides grounds up assembly instructions for the integration of individual server building blocks, starting with a bare chassis and installing all the system boards and major server components, including power supply and system fans. This chapter can be skipped if the server board and other major components are pre-installed in the system.

**Chapter 2 – Essential System Component Integration and Service** – provides instructions for adding essential system components required to complete the integration of the server chassis. This includes installation of Processors, Memory, Add-in Cards, and hot-swap storage devices.

**Chapter 3 – Options and Accessory Kit Integration and Service** – provides instructions for adding and removing various system options and available accessory option kits that may be installed in the system.

**Chapter 4 – System Software Update and Configuration** – provides instructions for completing the integration of the server chassis by updating the system software and navigating through the BIOS Setup screens.

### System Service

**Chapter 5 – System Features Overview** – provides a high level overview of the Intel® Server Board S2600CW and Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX product family. In this chapter, you will find a list of the server chassis features and illustrations identifying the major system components.

The back of this manual provides "getting help" information, LED Decoder, and POST Code Errors.

## Additional Information and Software

For additional information about this family of products or any of their supported accessories, refer to the following resources available at <http://www.intel.com/support>.

**Table 1. Server Chassis References**

<b>For this information or software</b>	<b>Use this Document or Software</b>
For in-depth technical information about this product.	<i>Intel® Server Board S2600CW Technical Product Specification</i>
For a list of available systems within the product family and supported Intel spares and accessories	<i>Intel® Server Board S2600CW Product Family Spares and Accessories List and Configuration Guide</i>
For server configuration guidance and compatibility	Intel® Server Configurator tool <a href="http://serverconfigurator.intel.com">http://serverconfigurator.intel.com</a>
For system power budget guidance	<i>Intel® Server Board S2600CW Product Family Power Budget Tool</i>
For system firmware updates and onboard device drivers and software to manage your Intel® Server Chassis.	<a href="http://downloadcenter.intel.com">http://downloadcenter.intel.com</a>
Product Safety and Regulatory Information	<i>Intel Server Products - Product Safety and Regulatory Compliance Document</i>

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# 1. Server Building Block System Integration

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## **Purpose**

This chapter provides instructions for the integration of the following Intel server building blocks:

**Intel® Server Chassis P4304XXMFEN2 + Intel® Server Board S2600CW family**

**Intel® Server Chassis P4304XXMUXX + Intel® Server Board S2600CW family + Power Supply Module**

## **Before You Begin**

Before working with your server product, observe the safety and ESD precautions found in the Warnings section at the beginning of this manual.

## **Tools and Supplies Needed**

- Anti-static wrist strap and conductive foam pad (recommended)
- Phillips\* (cross head) screwdriver (#2 bit)

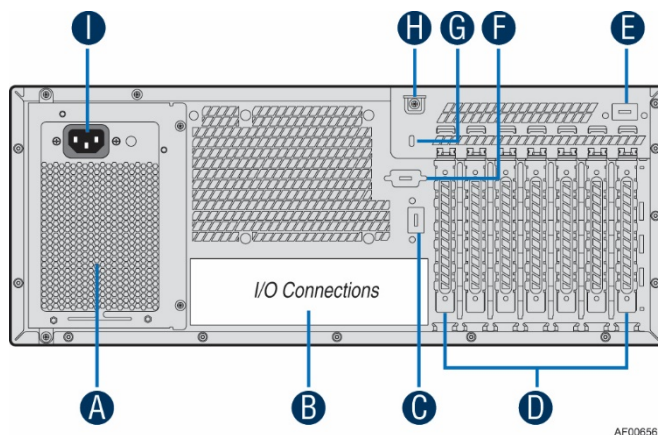
## **System Reference**

All references to left, right, front, top, and bottom assume the reader is facing the front of the chassis.

## **Instruction Format**

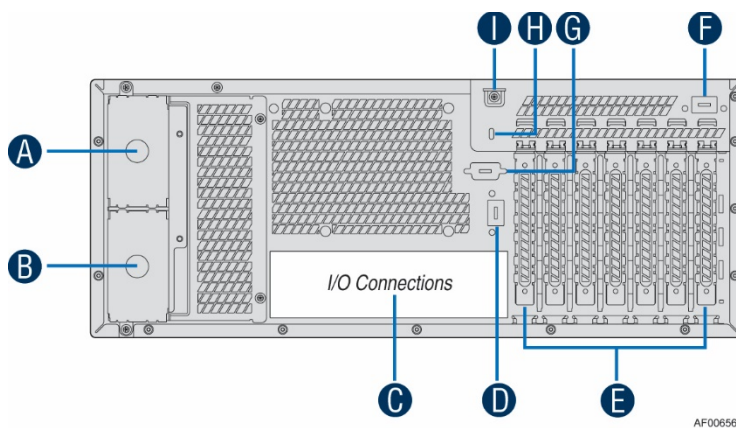
Each procedure described in this chapter will follow an illustration first format. This format will give the reader the option to follow a quicker path to system integration by first seeing an illustration of the intended procedure. If necessary, the reader can then follow the step-by-step instructions that will accompany each procedure.

## 1.1 Intel® Server Chassis Identification



A	Power Supply	F	Serial-B Port (Optional)
B	IO Connectors	G	Kensington* Cable Lock Mounting Hole
C	RMM4 NIC Port (Optional)	H	Padlock Loop
D	Add in PCI-e cards	I	Power Connector
E	RMM4 NIC Port (Optional)		

**Figure 1. Intel® Server Chassis P4304XXMFEN2 – Fixed Power Supply**



A	Power Connector (filler only)	F	RMM4 NIC Port (Optional)
B	Power Connector (filler only)	G	Serial-B Port (Optional)
C	IO Connectors	H	Kensington* Cable Lock Mounting Hole
D	RMM4 NIC Port (Optional)	I	Padlock Loop
E	Add in PCI-e cards		

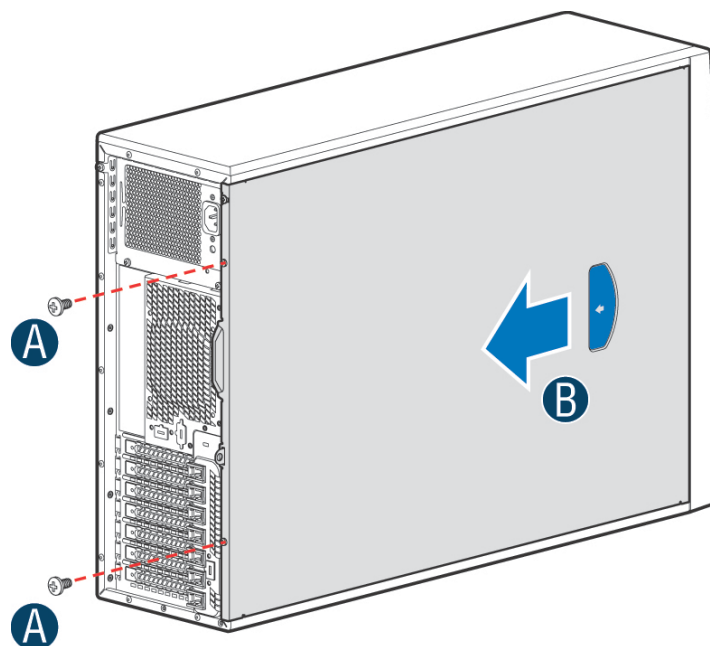
**Figure 2. Intel® Server Chassis P4304XXMUXX – Optional Redundant Power Supplies**

**Note:** There may be only **one** filler present on the power supply positions (Letter A/B).

## 1.2 Server Building Block Installation

### 1.2.1 Removing the Chassis Side Cover

Loosen the two screws located on the back edge of the chassis side cover (see letter “A”).  
 Slide the cover and lift it away (see letter “B”).  
 Take out the material from the chassis inside.

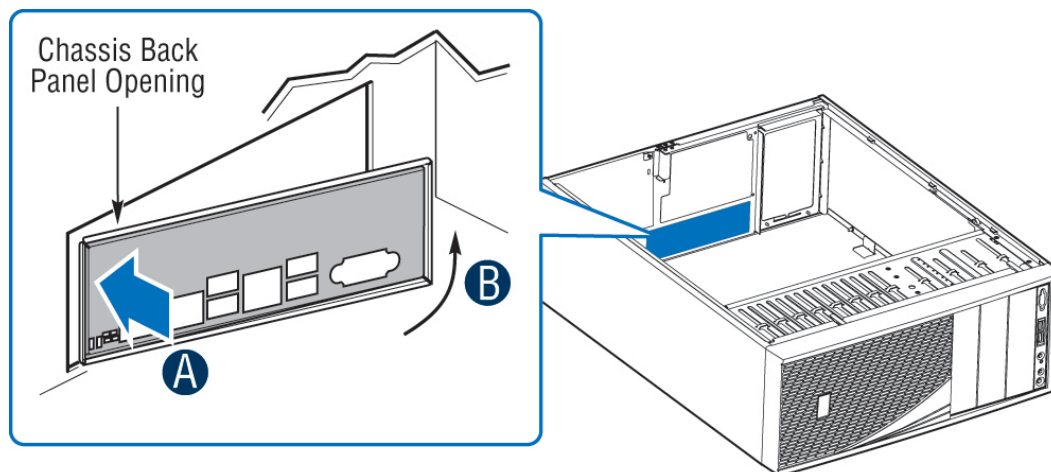


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### 1.2.2 Installing the IO Shield

**Note:** The IO shield can be found in the retail board package, or can be ordered separately.

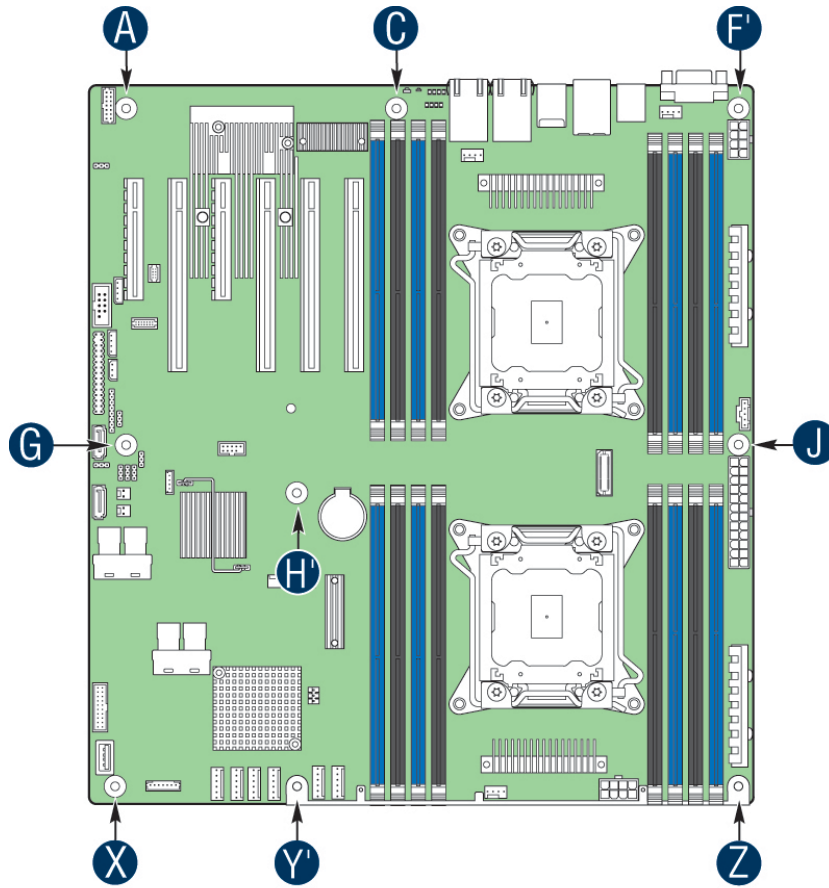
From the chassis inner side, align the IO shield to the chassis rear IO opening. Press the IO shield firmly to the chassis rear IO opening until it clicks into place. To make the process easier, install one end of the IO shield first and finish by pressing the other end.



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### 1.2.3 Installing the Chassis Stand-off

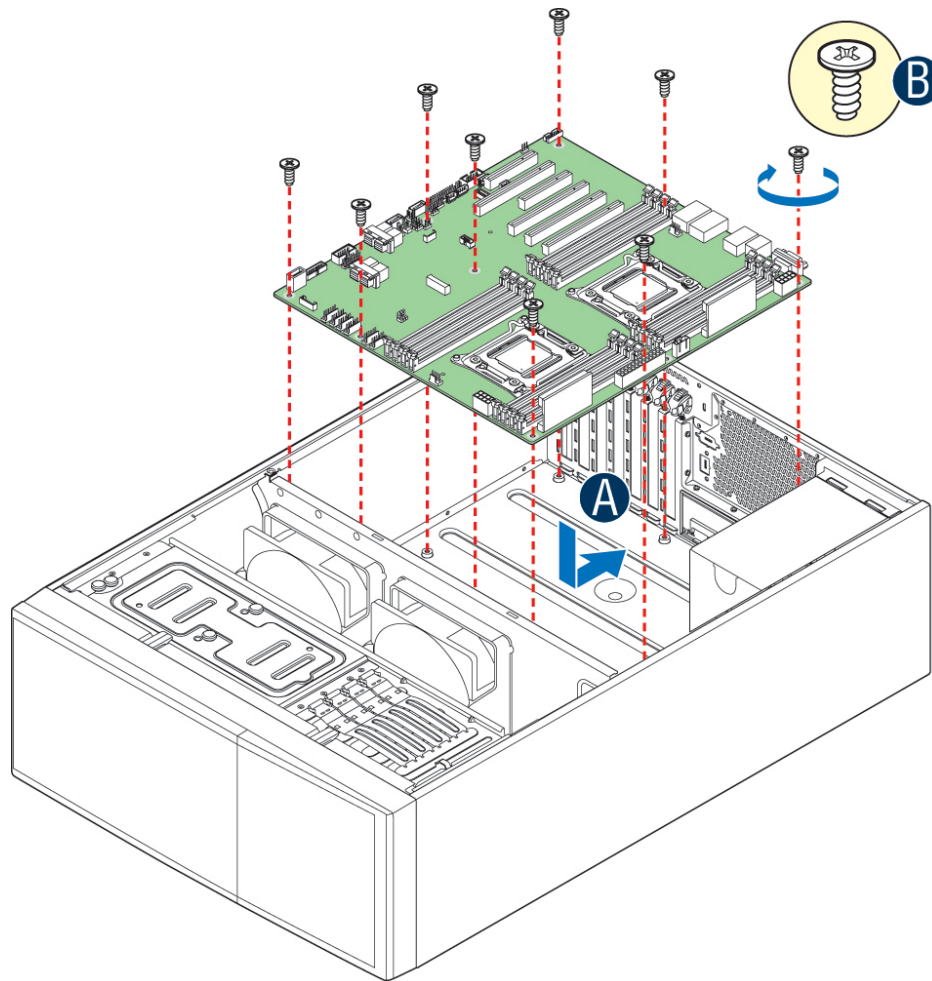
Install the stand-off to the chassis mounting holes aligning to the positions on the server board.



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## 1.2.4 Server Board Installation



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**Figure 3. Server Board Installation**

**Note:** Follow ESD precautions outlined at the beginning of this manual.

Carefully move aside any cables that may be taped to the chassis base to clear the area for server board placement.

Remove the server board from its anti-static bag.

Attach the bumpers to the back of the server board.

Carefully lower the server board into the chassis so that the rear I/O connectors of the server board align with and are fully seated into the matching holes on the chassis back panel.

The server board is accurately placed when rear IO connectors (NIC connectors, USB connectors, and VGA connector) align with the IO shield openings and properly fit into it.

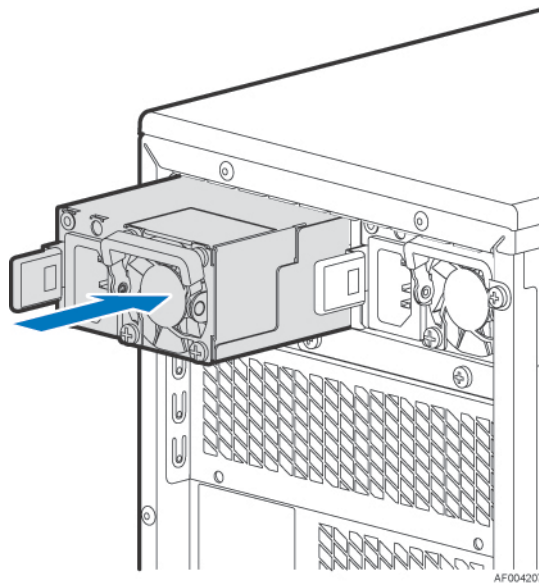
Fasten down the server board with nine screws using 8 in/lbs torque.

## 1.2.5 750W Power Supply Installation (Optional)

**Note:** If the chassis model is P4304XXMFEN2, one 550W fixed power supply is already installed. If the chassis model is P4304XXMUXX, one or two separate power supplies need to be ordered separately and installed in the server chassis. The server chassis P4304XXMUXX supports 750W or 1600W redundant power supplies.

Remove the power supply bay filler if necessary.

Insert the 750W power supply module into the power supply bay until it clicks and locks into place.



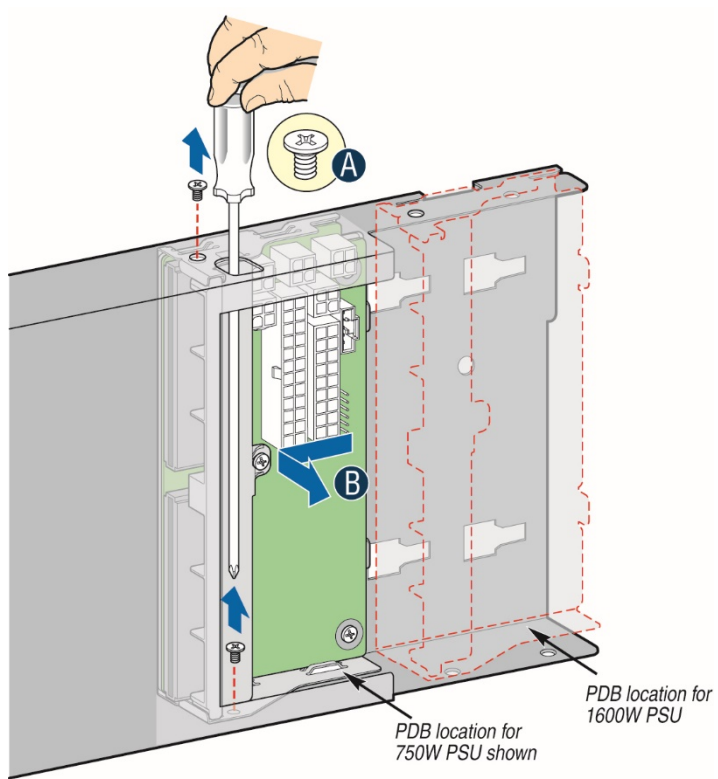
**Figure 4. Installing 750W Power Supply**

## 1.2.6 1600W Power Supply Installation (Optional)

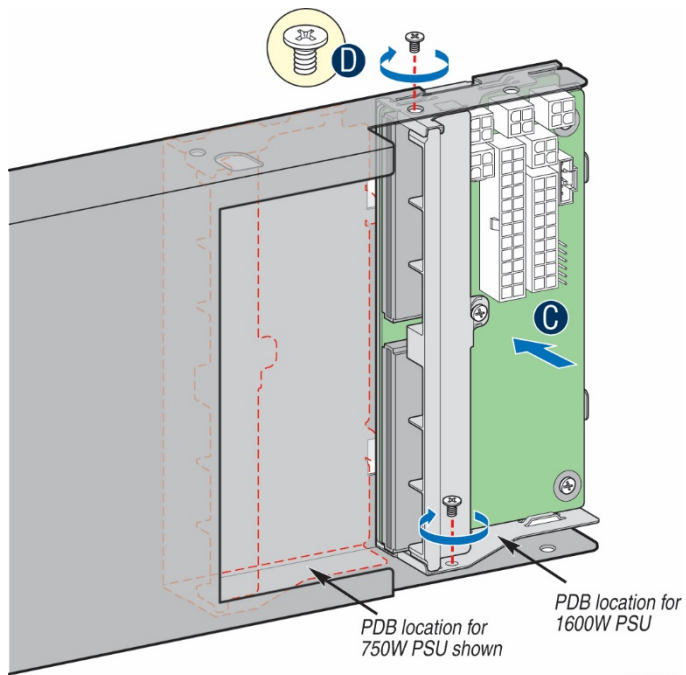
**Note:** If the chassis model is P4304XXMFEN2, one 550W fixed power supply is already installed. If the chassis model is P4304XXMUXX, one or two separate power supplies need to be ordered separately and installed in the server chassis. The server chassis P4304XXMUXX supports 750W or 1600W redundant power supplies.

**Note:** Before inserting the 1600W power supply into the chassis, the power distribution board kit must be re-installed; otherwise the insertion of 1600W power supply may damage the power supply or the power distribution board.

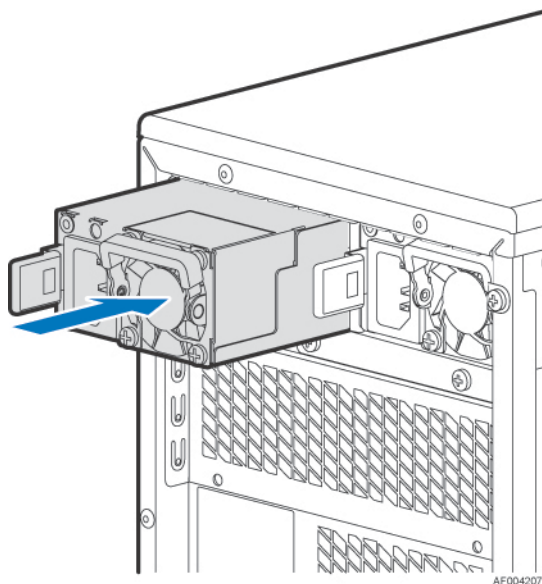
1. Release the two screws that secure the power distribution board kit to the chassis (see letter "A").
2. Move the power distribution board kit from the original location (750W location) to the new location (1600W location) (see letter "B" and "C").
3. Secure the power distribution board kit to the chassis with the two screws (see letter "D").
4. Remove one of the two power supply bay filler.
5. Insert the 1600W power supply module into the power supply bay until it clicks and locks into place.



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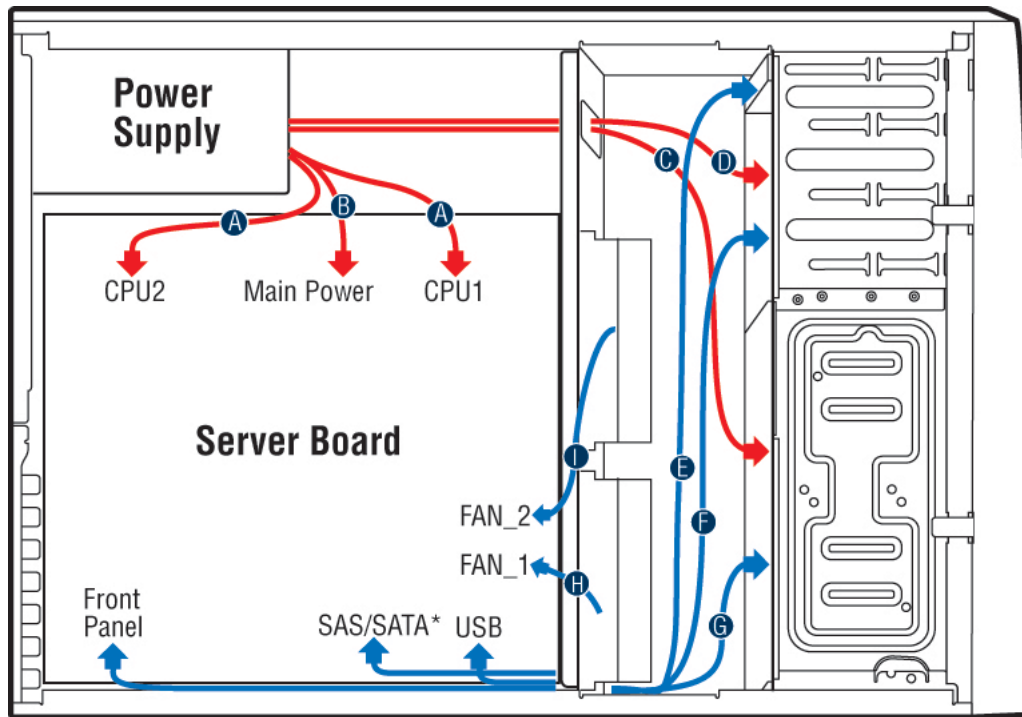
**Figure 5. Installing 1600W Power Supply**

## 1.3 Cable Routing and Connection

All cables in the system that need to be routed from front to back, should be routed using the cable channels along each chassis sidewall as shown in the following illustration. When routing cables from front to back, none should be routed through the center of the system or in the area between the system fans and the DIMM slots. Cable connection instructions provided in this section are presented in the recommended order in which they should be installed.

### 1.3.1 Routing the Cables

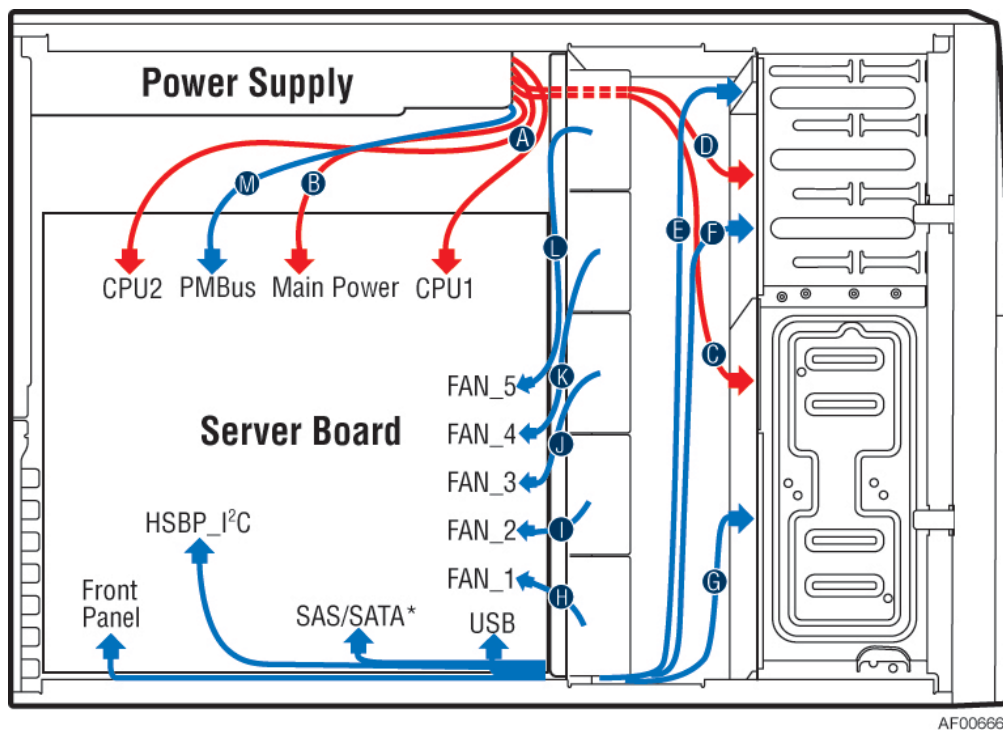
1. For P4304XXMFEN2, the power cables for HDD/ODD bays should be routed through the opening on the system fan bracket, close to the chassis side wall; for P4304XXMUXX, the power cables for HDD/ODD bays should be routed under the 5<sup>th</sup> system fan.
2. The front panel cable, SATA/SAS data cable(s), USB cable (to the front panel), HSBP\_I2C (optional) should be routed between the first system fan and the chassis sidewall.
3. The system main power cable and CPU power cables need to be managed under the notch of the air duct, before the air duct can be installed properly.



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A	CPU1/2 power cable	B	Main power cable	C	SSD/HDD drive bay power cable (SAS/SATA)
D	ODD drive bay power cable	E	Front panel and USB cable	F	ODD data cable
G	SSD/HDD drive bay data cable (SATA)	H	FAN_1 cable (PCIe fan)	I	FAN_2 cable (CPU fan)

Figure 6. P4304XXMFEN2 Cable Routing



A	CPU1/2 power cable	B	Main power cable	C	SSD/HDD drive bay power cable (SAS/SATA)
D	ODD drive bay power cable	E	Front panel and USB cable	F	ODD data cable
G	SSD/HDD drive bay data cable (SATA)	H, I, J, K, L	FAN_n cables	M	PMBus cable

**Figure 7. P4304XXMUXX Cable Routing**

## 1.3.2 Connecting the Power Cables to the Server Board

Connect the 2x12 pin cable connector to the server board close to the server edge (silkscreen labeled **"MAIN\_PWR"**).

Connect the 2x4 pin cable connector to the server board close to CPU1 (silkscreen labeled **"CPU\_1\_PWR"**).

Connect the 2x4 pin cable connector to the server board close to CPU2 (silkscreen labeled **"CPU\_2\_PWR"**).

**Note:** Both CPU1 and CPU2 power need to be supplied even if CPU2 is not installed.

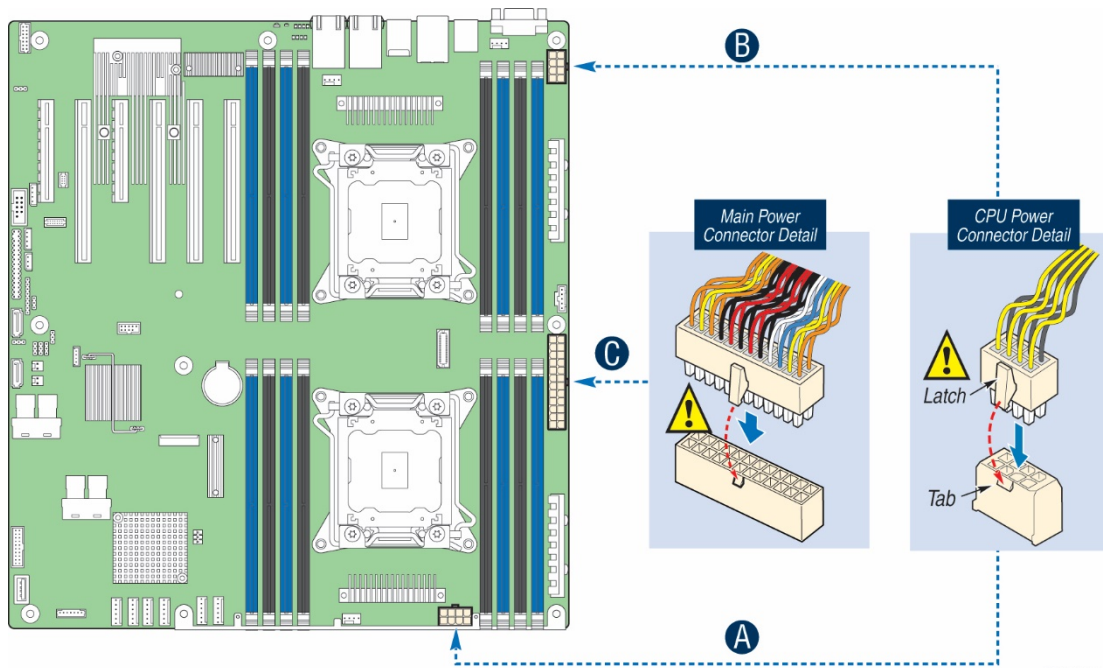
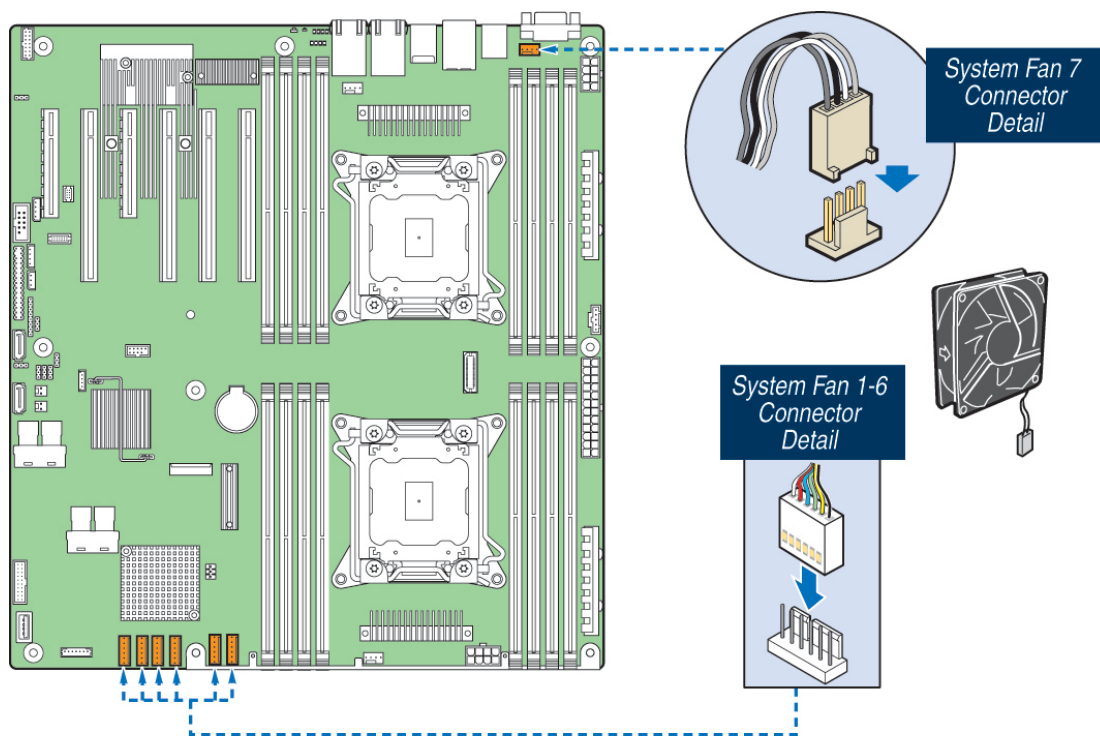


Figure 8. Connecting Power Cables

### 1.3.3 Connecting the System Fan Cables to the Server Board

1. For server chassis P4304XXMFEN2, connect the cables of the two system fans to the fan headers on the board (silkscreen labeled “SYS\_FAN\_1” and “SYS\_FAN\_2”).
2. For server chassis P4304XXMUXX, connect the cables of the five system fans to the fan headers on the board (silkscreen labeled “SYS\_FAN\_1”, “SYS\_FAN\_2”, “SYS\_FAN\_3”, “SYS\_FAN\_4” and “SYS\_FAN\_5”).

**Note:** The system fan connectors labeled as “SYS\_FAN\_6” and “SYS\_FAN\_7” will not be used with server chassis P4304XXMFEN2 and P4304XXMUXX.



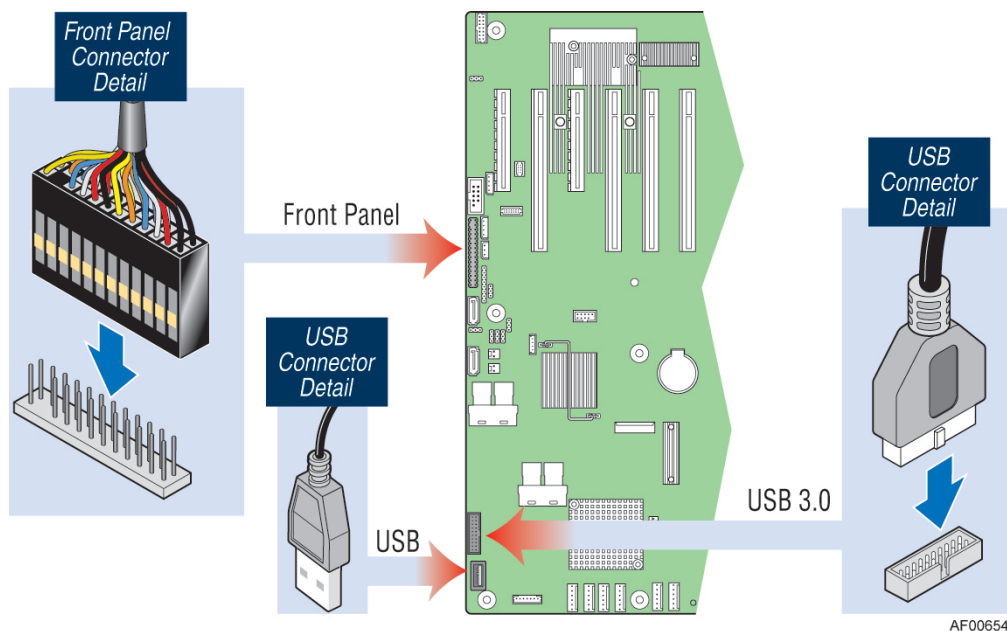
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**Figure 9. Connecting System Fan Cables**



### 1.3.4 Connecting the Cables to the Front Panel

1. Connect the front panel cable to the 2x12 SSI compliant front panel connector on the server board edge (silkscreen labeled “**SSI\_FRONT\_PANEL**”).
2. Connect the USB 3.0 cable to the 2x10 USB 3.0 connector in blue close to the corner of the server board (silkscreen labeled “**USB\_5-6**”).



## 2. Essential System Component Installation and Service

---

### **Purpose**

This chapter provides instructions for the installation and removal of essential system components including processors, memory, storage devices, and add-in cards.

If you are continuing the system integration from the previous chapter, you may skip ahead to the section describing processor installation.

### **Before You Begin**

Before working with your server product, observe the safety and ESD precautions found in the Warnings section at the beginning of this manual.

### **Tools and Supplies Needed**

- Anti-static wrist strap and conductive foam pad (recommended)
- Phillips\* (cross head) screwdriver (#2 bit)

### **System Reference**

All references to left, right, front, top, and bottom assume the reader is facing the front of the chassis.

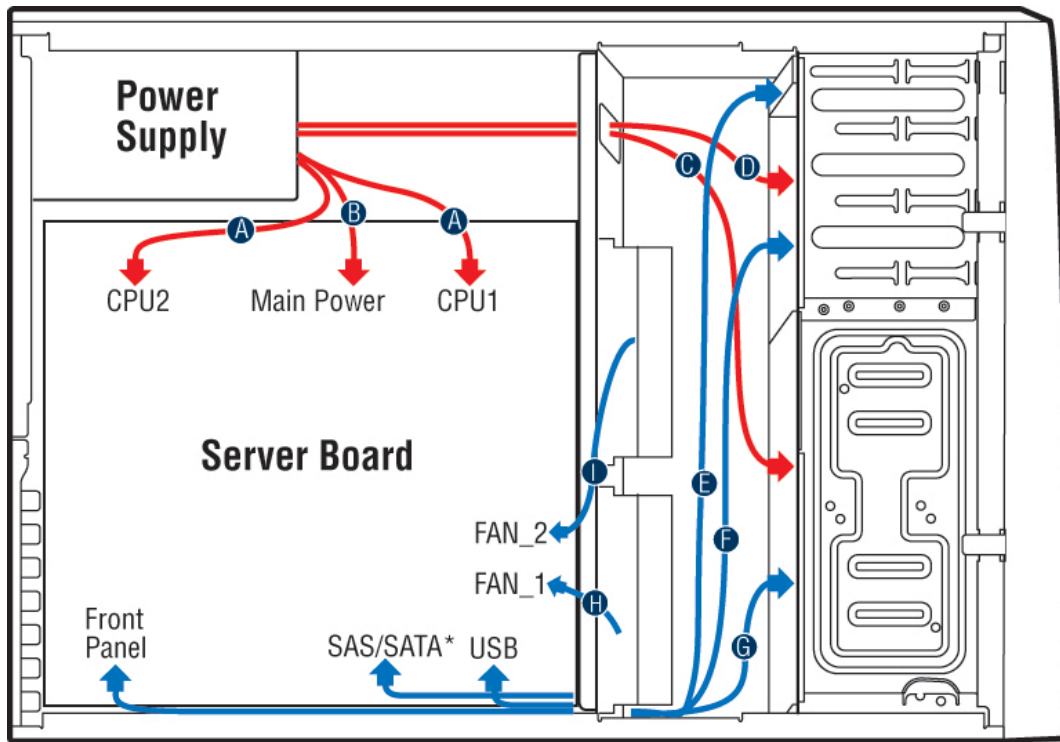
### **Instruction Format**

Each procedure described in this section will follow an illustration first format. This format will give the reader the option to follow a quicker path to system integration by first seeing an illustration of the intended procedure. If necessary, the reader can then follow the step-by-step instructions that will accompany each procedure.

## 2.1 Internal Cable Routing

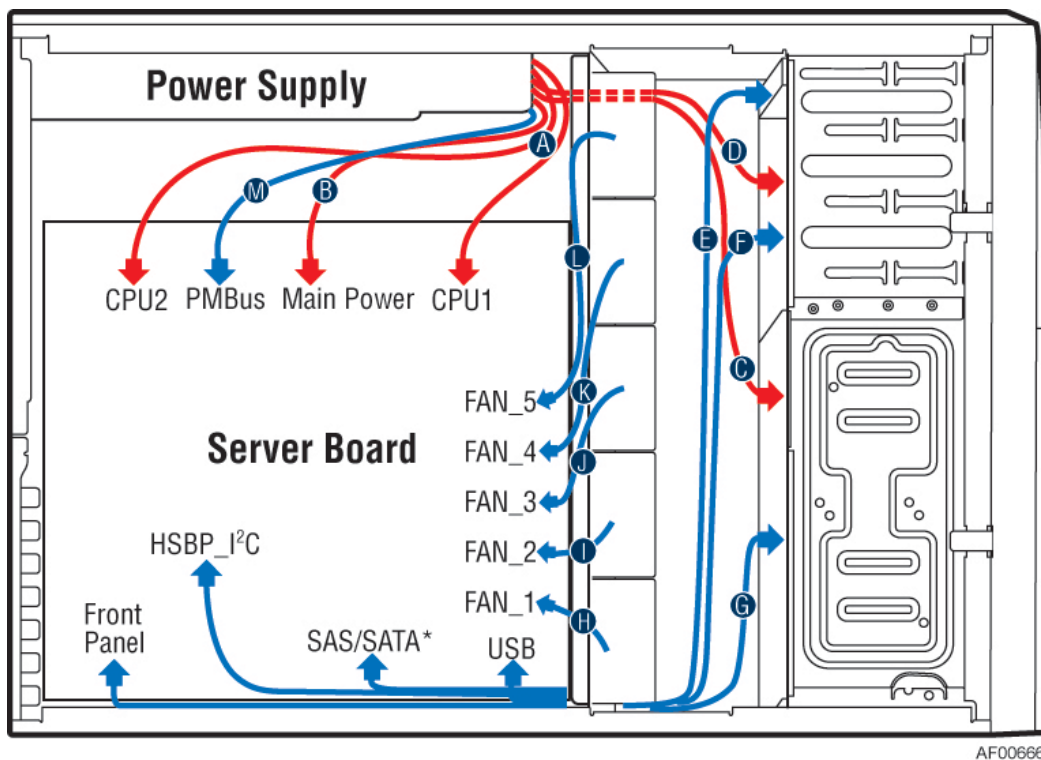
The system fan assembly must be removed when routing cables from front to back. All cables should be routed using the cable channels along each chassis sidewall as shown in the following illustration. When routing cables from front to back, none should be routed through the center of the system or in the area between the system fans and the DIMMs slots.

1. For P4304XXMFEN2, the power cables for HDD/ODD bays should be routed through the opening on the system fan bracket, close to the chassis side wall; for P4304XXMUXX, the power cables for HDD/ODD bays should be routed under the 5<sup>th</sup> system fan.
2. The front panel cable, SATA/SAS data cable(s), USB cable (to the front panel), HSBP\_I2C (optional) should be routed between the first system fan and the chassis sidewall.
3. The system main power cable and CPU power cables need to be managed under the notch of the air duct, before the air duct can be installed properly.



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A	CPU1/2 power cable	B	Main power cable	C	SSD/HDD drive bay power cable (SAS/SATA)
D	ODD drive bay power cable	E	Front panel and USB cable	F	ODD data cable
G	SSD/HDD drive bay data cable (SATA)	H	FAN_1 cable (PCIe fan)	I	FAN_2 cable (CPU fan)



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A	CPU1/2 power cable	B	Main power cable	C	SSD/HDD drive bay power cable (SAS/SATA)
D	ODD drive bay power cable	E	Front panel and USB cable	F	ODD data cable
G	SSD/HDD drive bay data cable (SATA)	H, I, J, K, L	FAN_n cables	M	PMBus cable

**Figure 10. Internal Cable Routing**

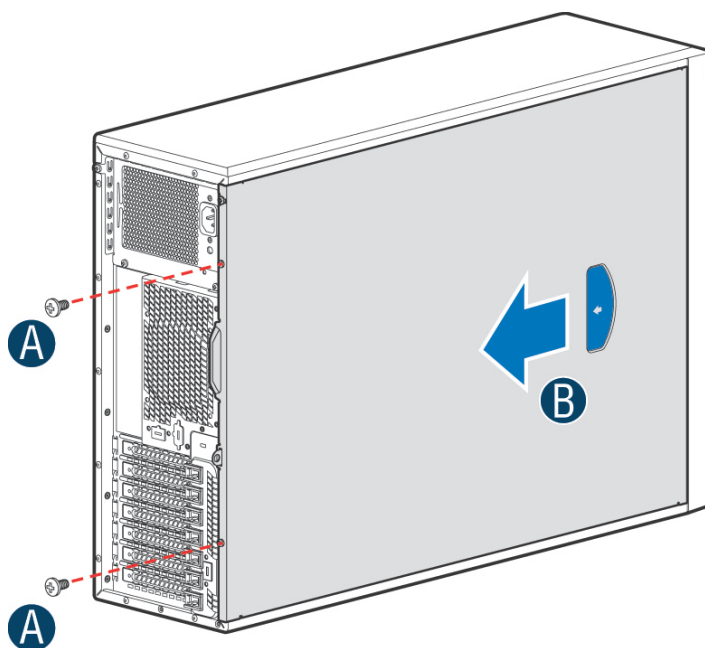
## 2.2 Chassis Side Cover Removal / Installation

### 2.2.1 Chassis Side Cover Removal

The server chassis must be operated with the chassis side cover in place to ensure proper cooling. The side cover must be removed to add or replace components inside of the chassis. Before removing the side cover, power down the chassis and unplug all peripheral devices and the power cable(s).

**Note:** A non-skid surface or a stop behind the server chassis may be needed to prevent the server chassis from sliding on your work surface.

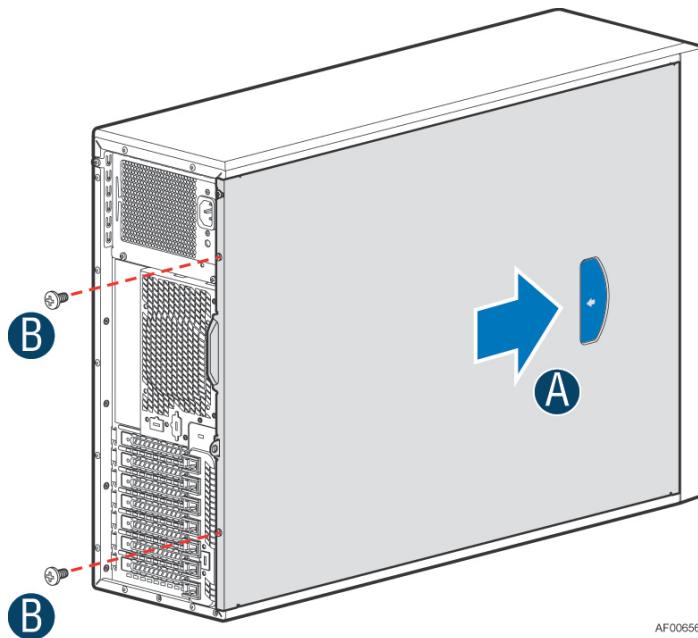
Loosen the two screws located on the back edge of the chassis side cover (see letter "A").  
Slide the cover back and lift it away (see letter "B").



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## 2.2.2 Chassis Side Cover Installation

1. Place the chassis side cover onto the chassis and slide forward until the front edge of the cover is pressed up against the back edge of the front drive bay (see letter "A").
2. Tighten the two screws at the back of the chassis (see letter "B").



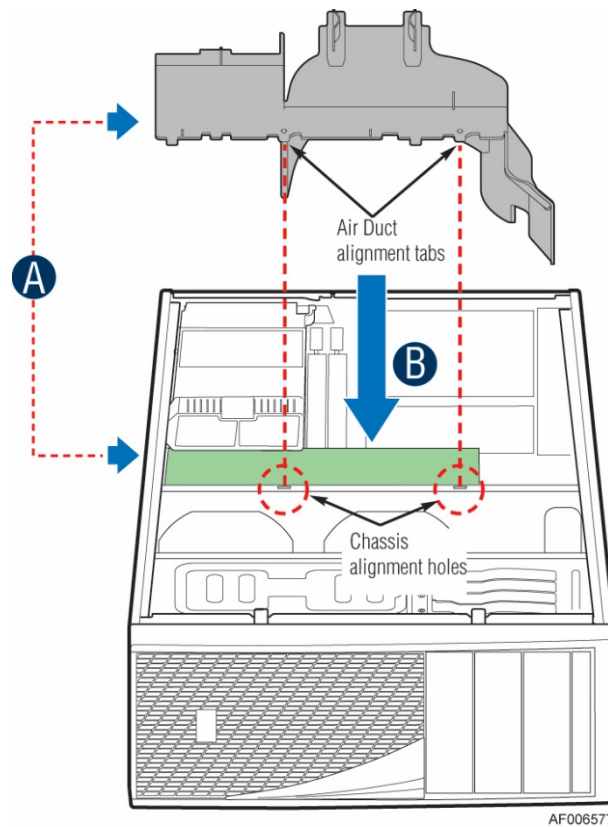
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## 2.3 Air Duct Removal / Installation

Always operate your server chassis with the air duct in place. The air duct is required for proper airflow within the server chassis.

### 2.3.1 Air Duct Installation

1. Manage the system main power cable and CPU power cables under the notch of the air duct.
2. Align the two tabs on the front edge of the air duct with the matching slots on the fan assembly.
3. Lower the air duct into the chassis ensuring the two tabs are securely installed in the fan assembly.



### 2.3.2 Air Duct Removal

Lift the air duct straight up until the tabs on the front edge of the air duct are free from the fan assembly.

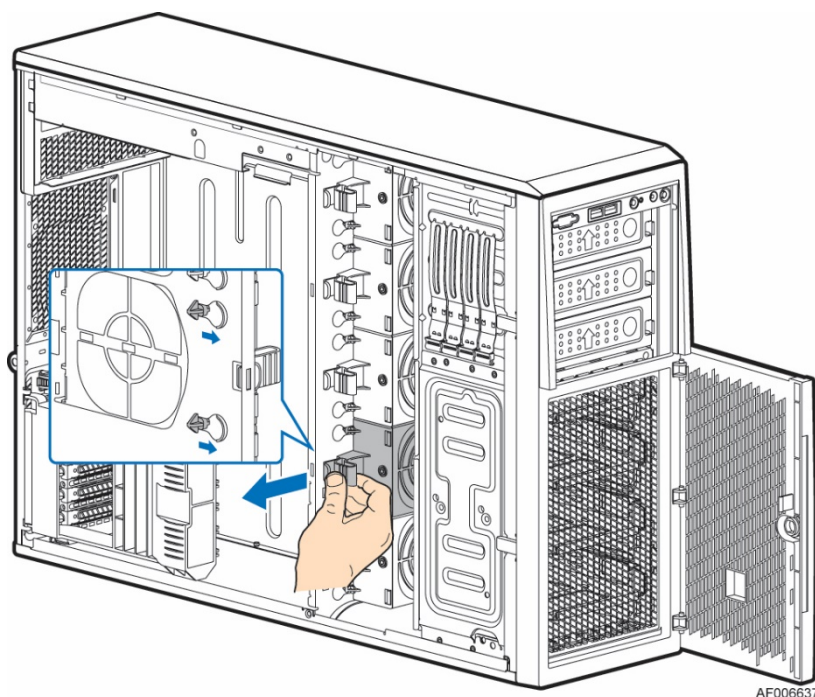
## 2.4 System Fan Assembly Removal / Installation

System fan assembly removal is required whenever routing cables inside the chassis from back to front or from front to back, or when server board replacement is necessary.

### 2.4.1 System Fan Assembly Removal

**To remove the hot-swap system fan from P4304XXMUXX**

1. Press the latch handle located on the top of the fan until the latch is fully disengaged from the fan bracket.
2. Lift the fan away from the fan bracket.

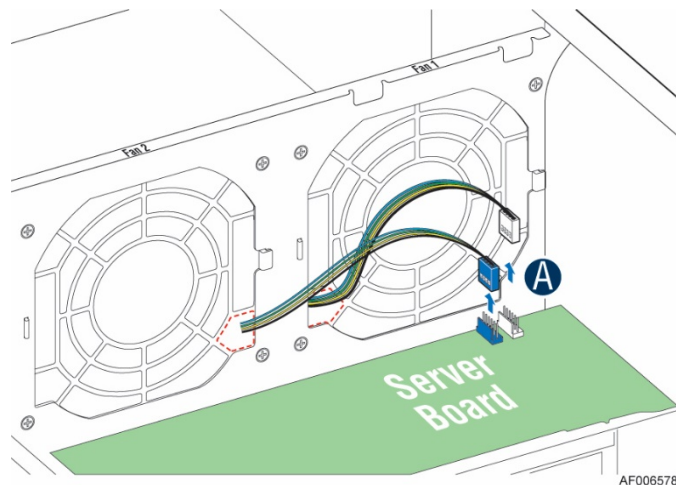


**Figure 11. System Fan Assembly Removal**

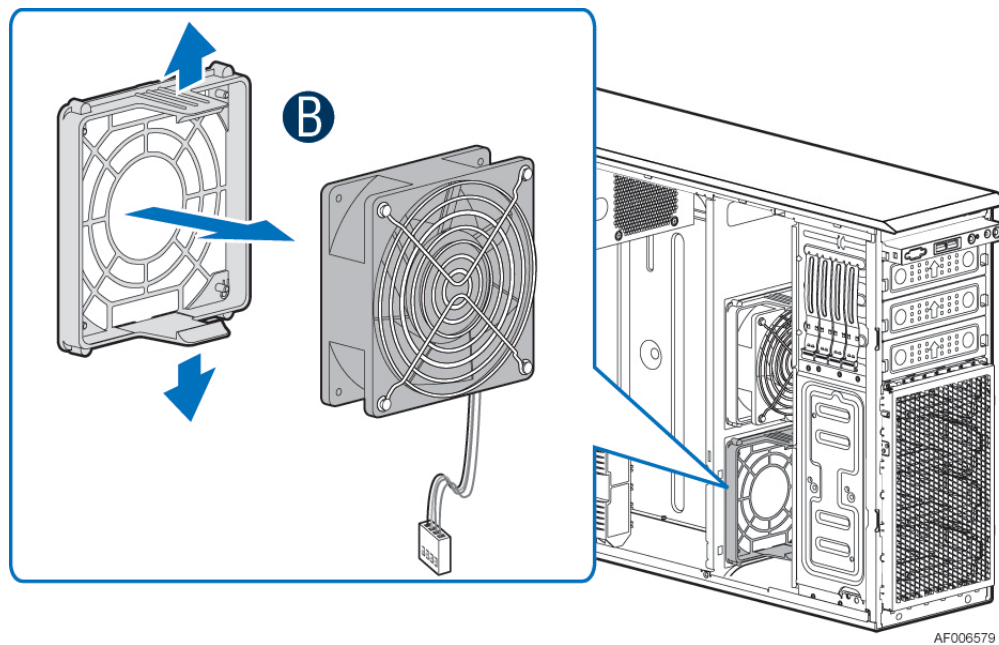


**To remove the fixed system fan (CPU fan or PCIe fan) from P4304XXMFEN2**

1. Unplug the fan cable from the server board (see letter "A").
2. Open the two latches on both sides of the system fan until the fan is full disengaged from the fan holder (see letter "B").



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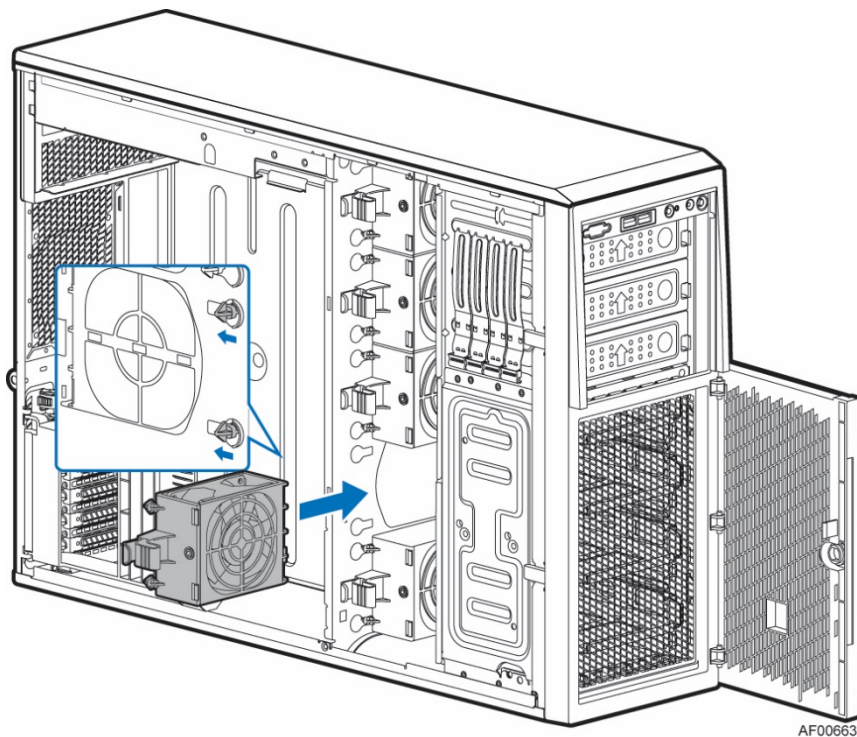
## 2.4.2 System Fan Assembly Installation

### To install the hot-swap system fan on P4304XXMUXX

Align the two guide pins on the fan with the openings located on the fan bracket.

Carefully lower the fan so the guide pins slide lower into the openings.

Continue to push down the fan until the latch on the top of the fan clicks and locks the fan in place.



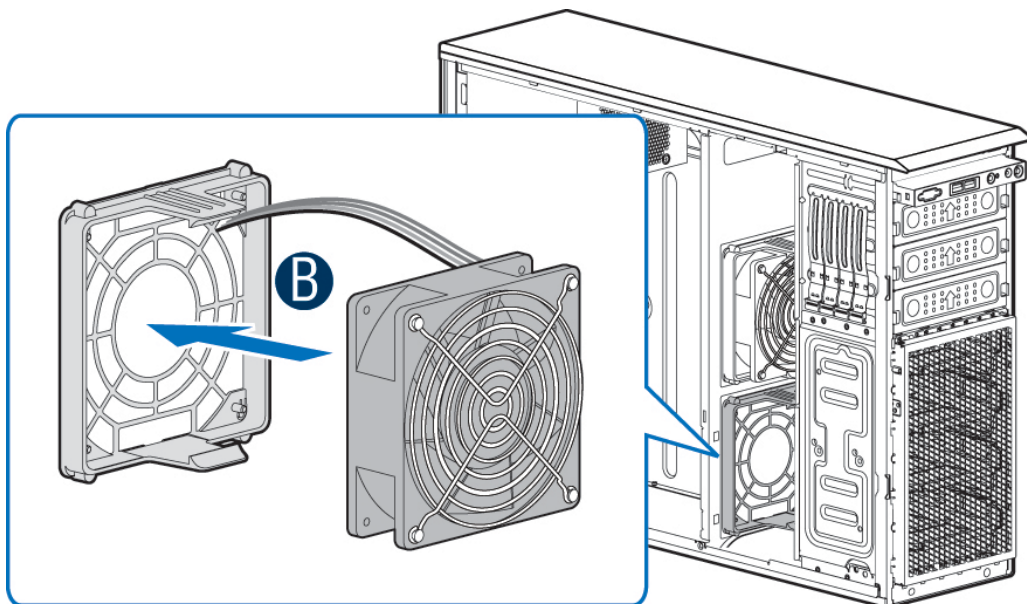
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Figure 12. System Fan Assembly Installation

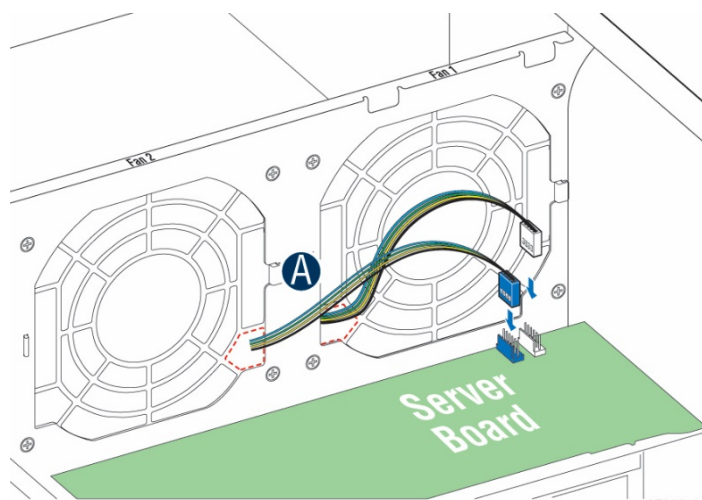
### To install the fixed system fan on P4304XXMFEN2

Route the fixed fan cable through the fan holder.

Align the fixed fan with the fan holder, and press the fixed fan until it clicks and fits into place. Connect the fixed fan cable to the system fan connector on the server board. The PCIe fan connects to the fan connector labeled as “SYS\_FAN\_1”; the CPU fan connects to the fan connector labeled as “SYS\_FAN\_2”.



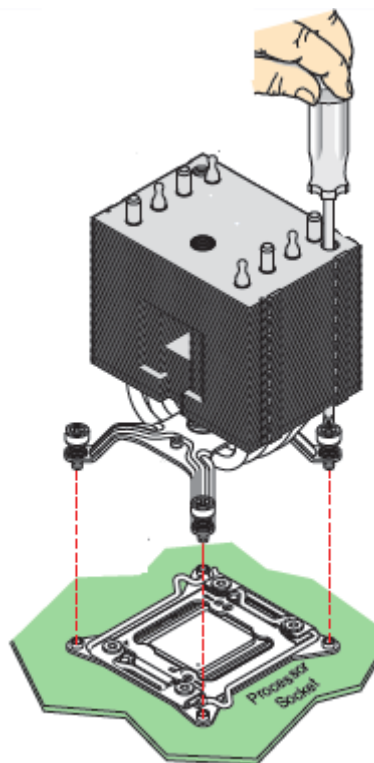
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## 2.5 Processor Installation / Removal

### 2.5.1 Processor Heatsink(s) Removal



**Figure 13. Processor Heatsink Removal**

The heatsink is attached to the server board or processor socket with captive fasteners. Using a #2 Phillips\* screwdriver, loosen the four screws located on the heatsink corners in a diagonal manner using the following procedure:

Using a #2 Phillips\* screwdriver, start with screw 1 and loosen it by giving it two rotations and stop.  
(IMPORTANT: Do not fully loosen.)

Proceed to screw 2 and loosen it by giving it two rotations and stop. Similarly, loosen screws 3 and 4.

Repeat steps A and B by giving each screw two rotations each time until all screws are loosened.

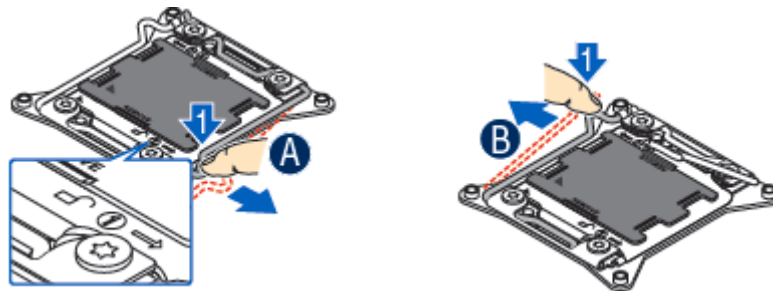
Lift the heatsink straight up.

## 2.5.2 Processor Installation

**Caution:** Processor must be appropriate: You may damage the server board if you install a processor that is inappropriate for your server. For a web link to the list of compatible processor(s), see [“Additional Information and Software”](#).

**Caution:** ESD and handling processors: Reduce the risk of electrostatic discharge (ESD) damage to the processor by doing the following: (1) Touch the metal chassis before touching the processor or server board. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor. (2) Avoid moving around unnecessarily.

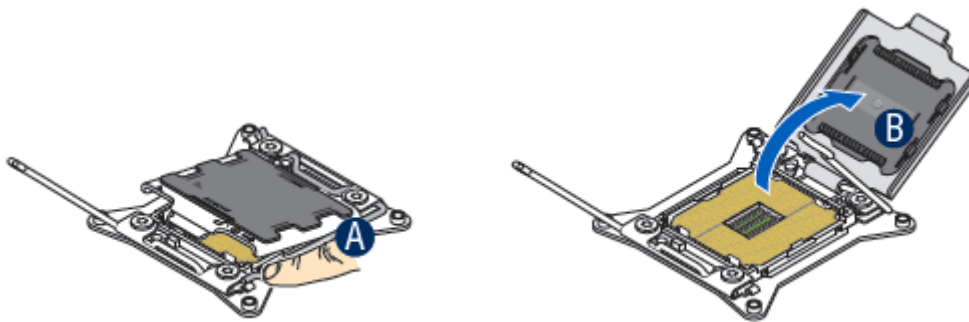
1. Unlatch the CPU Load Plate.



**Figure 14. Processor Installation – Open the Socket Lever**

Push the lever handle labeled “OPEN 1<sup>st</sup>” (see letter “A”) down and away from the CPU socket. Rotate the lever handle up. Repeat the steps for the second lever handle (see letter “B”).

2. Lift open the Load Plate.



**Figure 15. Processor Installation– Open the Load Plate**

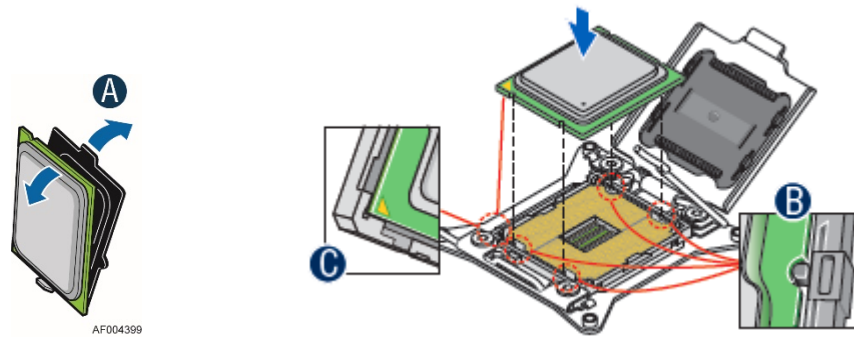
Rotate the right lever handle down until it releases the Load Plate (see letter “A”). While holding down the lever handle, with your other hand, lift open the Load Plate (see letter “B”).

3. Install the Processor.

**Note:** The underside of the processor has components that may damage the socket pins if installed improperly. The processor must align correctly with the socket opening before installation. **DO NOT DROP** the processor into the socket.

**Note:** The pins inside the CPU socket are extremely sensitive. Other than the CPU, no object should make contact with the pins inside the CPU socket.

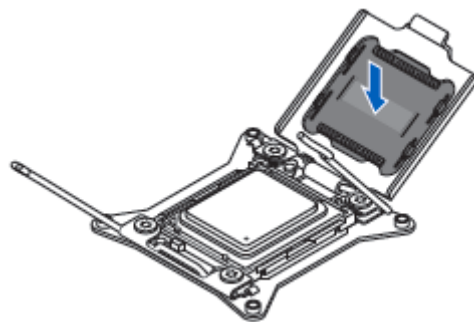
**Note:** When possible, a CPU insertion tool should be used when installing the CPU.



**Figure 16. Processor Installation – Install the Processor**

Remove the processor from its packaging. Carefully remove the protective cover from the bottom side of the CPU, taking care not to touch any CPU contacts (see letter “A”). Orient the processor with the socket so that the processor cutouts match the four orientation posts on the socket (see letter “B”). Note the location of the gold key on the corner of processor (see letter “C”). Carefully place (Do NOT drop) the CPU into the socket.

4. Remove the socket cover.

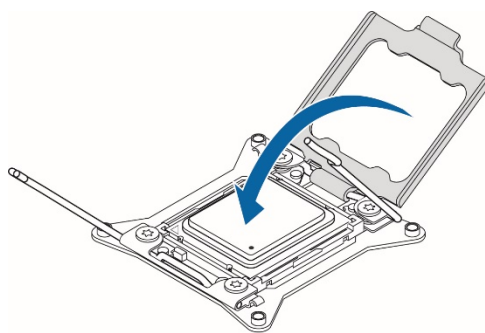


**Figure 17. Processor Installation – Remove the Socket Cover**

Remove the socket cover by pressing it out of the load plate.

**Note:** The socket cover should be saved and re-used should the processor need to be removed at anytime in the future.

5. Close the Load Plate.

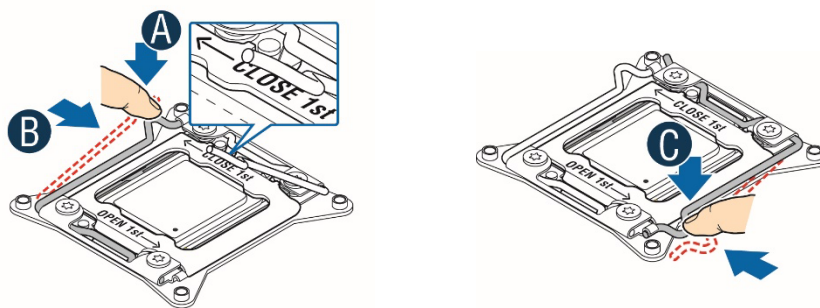


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**Figure 18. Processor Installation – Close the Load Plate**

Carefully lower the load plate down over the processor.

6. Lock down the Load Plate.



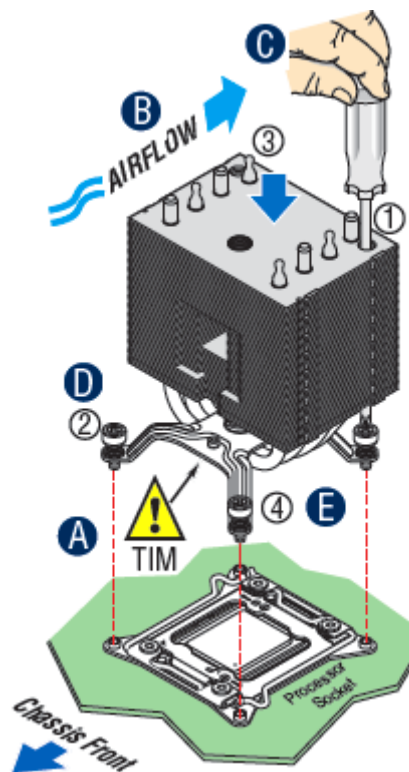
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**Figure 19. Processor Installation – Latch the Locking Lever**

Push down on the locking lever on the CLOSE 1st side (see letter “A”). Slide the tip of the lever under the notch in the load plate (see letter “B”). Make sure the load plate tab engages under the socket lever when fully closed. Repeat the steps to latch the locking lever on the other side (see letter “C”). Latch the levers in the order as shown.

## 2.5.3 Processor Heatsink Installation



**Figure 20. Processor Heatsink Installation**

1. If present, remove the protective film covering the Thermal Interface Material on the bottom side of the heatsink (see letter "A").
2. Align heatsink fins to the front and back of the chassis for correct airflow. Airflow goes from front to back of the chassis (see letter "B").

Each heatsink has four captive fasteners and should be tightened in a diagonal manner using the following procedure:

3. Using a #2 Phillips\* screwdriver, start with screw 1 and engage screw threads by giving it two rotations and stop (see letter "C"). (Do not fully tighten.)
4. Proceed to screw 2 and engage screw threads by giving it two rotations and stop (see letter "D"). Similarly, engage screws 3 and 4.
5. Repeat steps C and D by giving each screw two rotations each time until each screw is lightly tightened up to a maximum of 8 inch-lbs torque (see letter "E").

## 2.5.4 Removing the Processor

1. Remove the processor heatsink (see section 2.5.1).
2. Unlatch the CPU Load Plate (see section 2.5.2).
3. Lift the Load Plate (see section 2.5.2).
4. Remove the processor by carefully lifting it out of the socket, taking care NOT to drop the processor and not touching any pins inside the socket.
5. Install the socket cover if a replacement processor is not going to be installed.



## 2.6 Memory Installation and Removal

### 2.6.1 Memory Slot Population Requirements

**Note:** Some system configurations may come with pre-installed DIMM blanks. DIMM blanks should only be removed when installing a DIMM in the same DIMM slot. Memory population rules apply when installing DIMMs.

- **DIMM Population Rules on CPU-1** – Install DIMMs in order; Channels A, B, C, and D. Start with the 1<sup>st</sup> DIMM (Blue Slot) on each channel, then slot 2.
- **DIMM Population Rules on CPU-2** – Install DIMMs in order; Channels E, F, G, and H. Start with the 1<sup>st</sup> DIMM (Blue Slot) on each channel, then slot 2.
- The following system configurations require that specific memory slots be populated at all times using either a DIMM or supplied DIMM blank.

### 2.6.2 Memory Installation

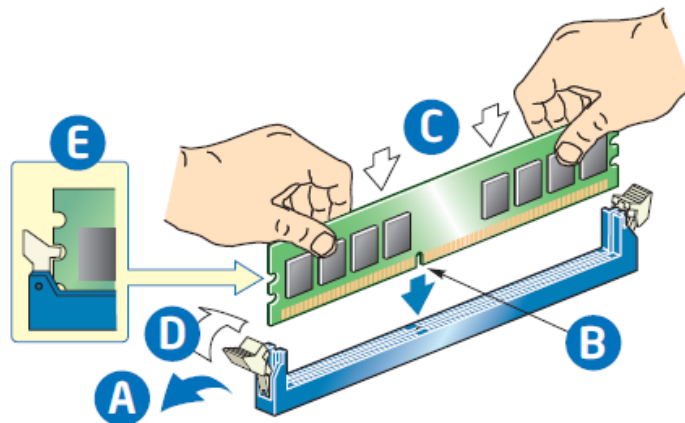
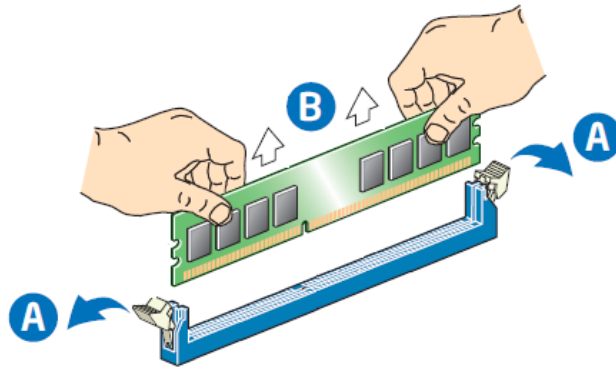


Figure 21. Installing Memory

1. Locate the DIMM sockets. Make sure the clips at either end of the DIMM socket(s) are pushed outward to the open position (see letter "A").
2. Holding the DIMM by the edges, remove it from its anti-static package. Position the DIMM above the socket. Align the notch on the bottom edge of the DIMM with the key in the DIMM socket (see letter "B").
3. Insert the bottom edge of the DIMM into the socket (see letter "C"). When the DIMM is inserted, push down on the top edge of the DIMM until the retaining clips snap into place (see letter "D"). Make sure the clips are firmly in place (see letter "E").

## 2.6.3 Removing Memory



**Figure 22. Removing Memory**

1. Locate the DIMM sockets. Unlatch the retaining clips located on each end of the socket. The DIMM lifts from the socket (see letter "A").
2. Holding the DIMM by the edges, lift it from the socket, and store it in an anti-static package.

## 2.7 Storage Device Installation/Upgrade

The server chassis support several different storage device options. This section provides instruction for the installation and upgrade of front drive bay storage devices. Installation of other storage options available through accessory kits is provided in Chapter 3.

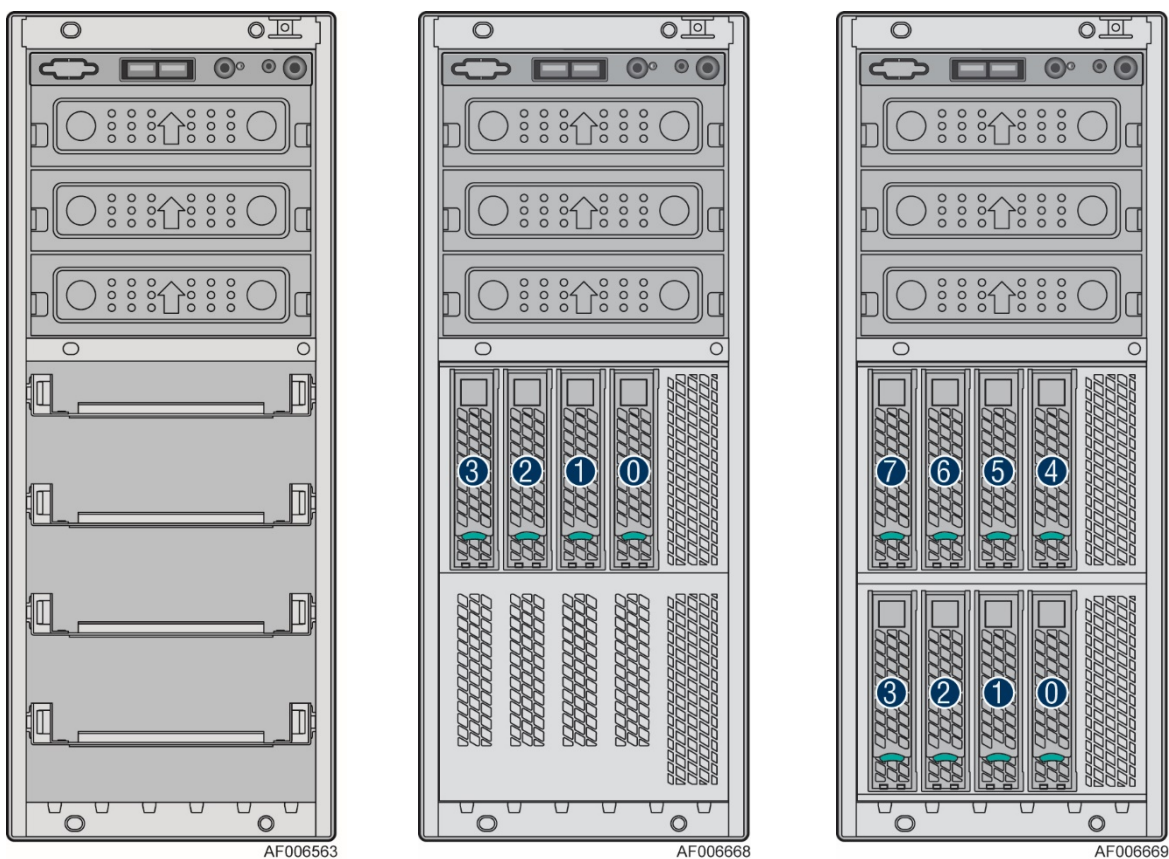
**Note:** To maintain proper system cooling, all externally accessible drive bays must be populated with a drive carrier. Each drive carrier must have a hard disk drive (HDD), Solid State Device (SSD), or a supplied drive blank installed.

The server chassis P4304XXMFEN2 and P4304XXMUXX support various storage options:

Basic configuration: Four 3.5" fixed drive trays are the default chassis configuration.

Upgrade Option: One optional 3.5" drive bay with hot-swap backplane. Support up to 4x3.5" drives.

Upgrade Option: Two optional 3.5" drive bay with hot-swap backplanes. Support up to 8x3.5 drives.



Basic Configuration

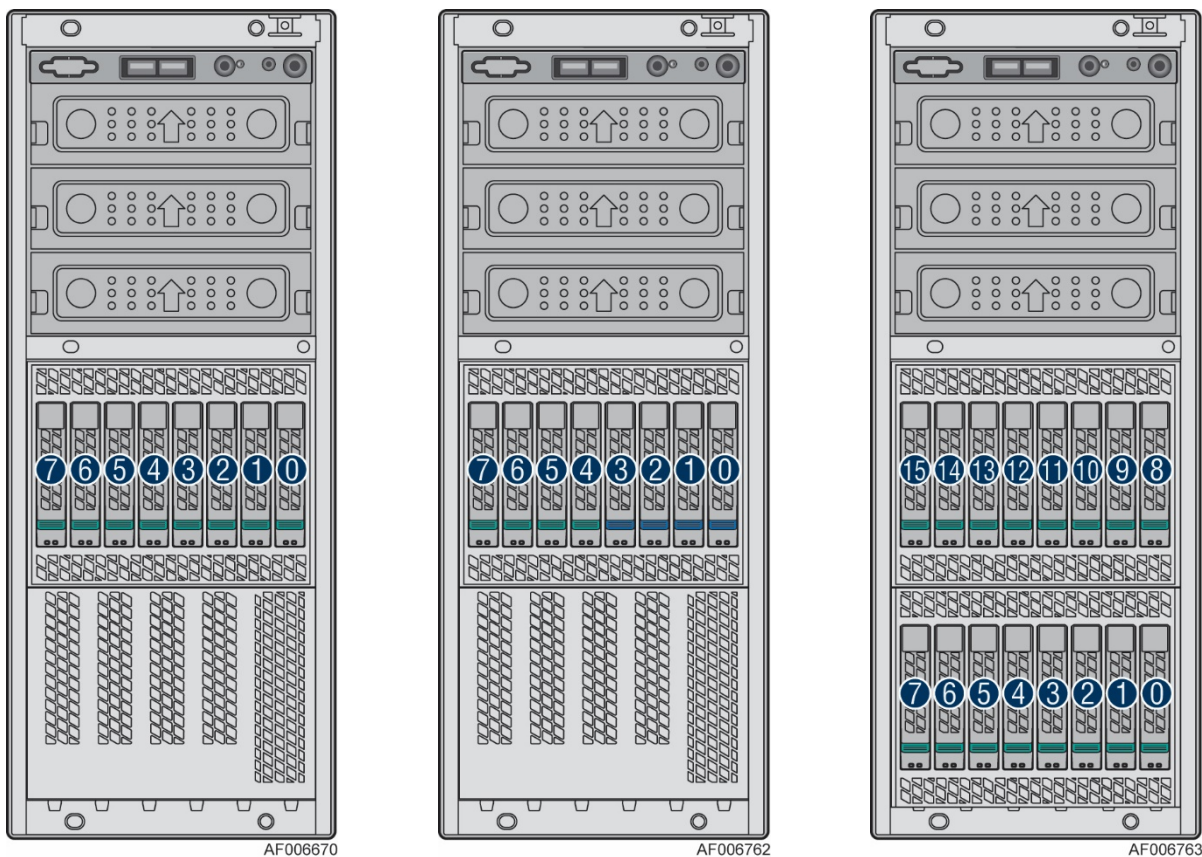
4x3.5 Upgrade Option

8x3.5 Upgrade Option

Upgrade Option: One optional 2.5" drive bay hot-swap backplane. Support up to 8x2.5" drives (HDD/SSD).

Upgrade Option: One optional 2.5" drive bay hot-swap backplane. Support up to 4x2.5" drives (HDD/SSD) with green latch for hot-swap support, and 4x2.5 PCIe SSDs (NVMe) with blue latch (hot-swap not supported).

Upgrade Option: Two optional 2.5" drive bay hot-swap backplanes. Support up to 16x2.5" drives (HDD/SSD).



*8x2.5 Upgrade Option    8x2.5 NVMe Combo Upgrade Option    16x2.5 Upgrade Option*

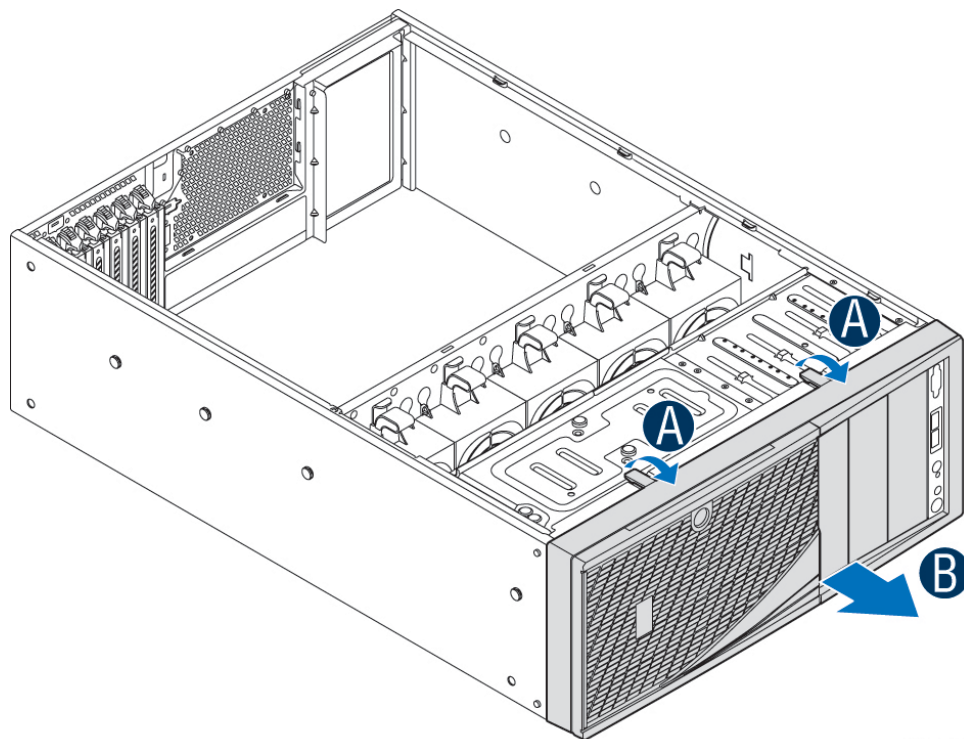
The table below shows the the cables required for these storage drive options.

Drive Count	Configuration	Cable Type
4 drives	Fixed drives (Default configuration)	MiniSAS HD to 7-pin SATA (AXXCBL450HD7S), connect MiniSAS HD side to server board side and 7-pin SATA side to drives. Cable shipped with chassis.
	4x3.5 hot-swap backplane/cage	MiniSAS HD to MiniSAS HD (AXXCBL380HDHD). Both server board and backplane side are MiniSAS HD type.
8 drives	Two 4x3.5 hot-swap backplanes/cages	MiniSAS HD to MiniSAS HD (AXXCBL380HDHD). Both server board and backplane side are MiniSAS HD type.
	8x2.5 hot-swap backplane/cage	MiniSAS HD to MiniSAS HD (AXXCBL380HDHD). Both server board and backplane side are MiniSAS HD type.
	8x2.5 NVMe Combo backplane/cage	One PCIe SSD cable for drive port 0-3 (shipped with FUP8X25S3NVDK) One MiniSAS HD to MiniSAS HD cable (AXXCBL380HDHD) for drive port 4-7
16 drives	Two 8x2.5 hot-swap backplanes/cages	MiniSAS HD to MiniSAS HD cables (AXXCBL380HDHD)

## 2.7.1 Removing the Front Bezel

Before accessing the storage device, the front bezel needs to be removed.

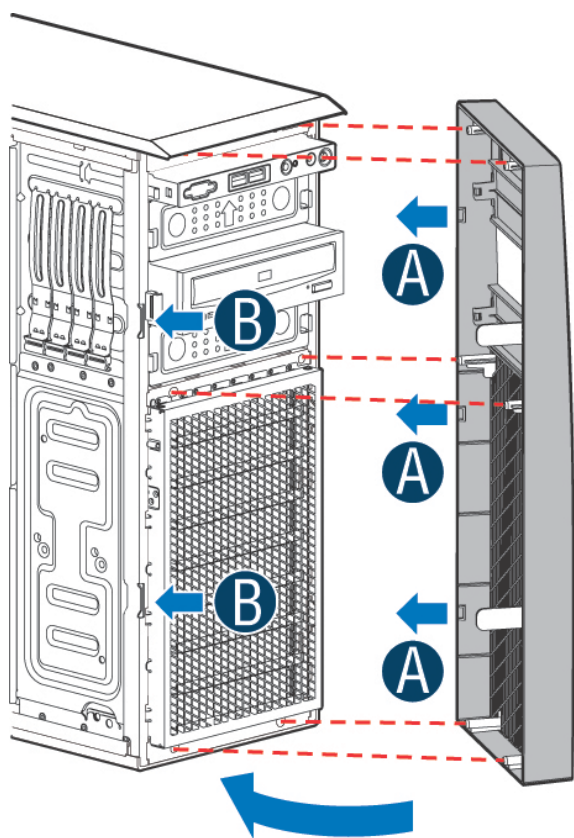
1. Remove the chassis side cover following the instruction in session “Chassis Side Cover Removal”.
2. Push the two tabs on the front bezel outward until the tabs disengage from the chassis (see letter “A”).
3. Lift the front bezel away from the chassis (see letter “B”).



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## 2.7.2 Installing the Front Bezel

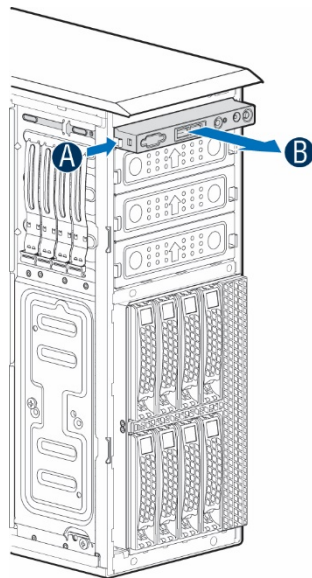
Fit the right edge of the bezel assembly against the right side of the chassis.  
Engage the plastic bezel hooks (see letter "A") into the raised metal slots at the chassis edge.  
Rotate the bezel assembly toward the chassis.  
Latch the two plastic tabs (see letter "B") on the left side of the bezel assembly to the chassis.



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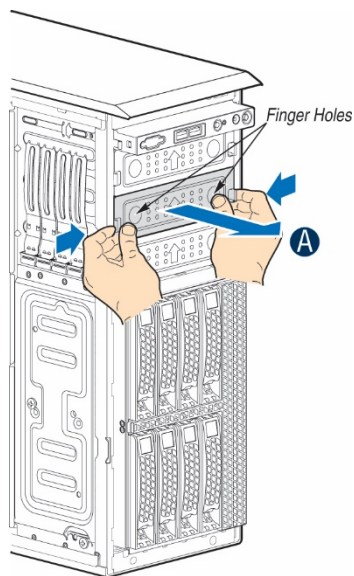
## 2.7.3 Converting the Pedestal Chassis to Rack Mount Chassis

Remove the front panel module.



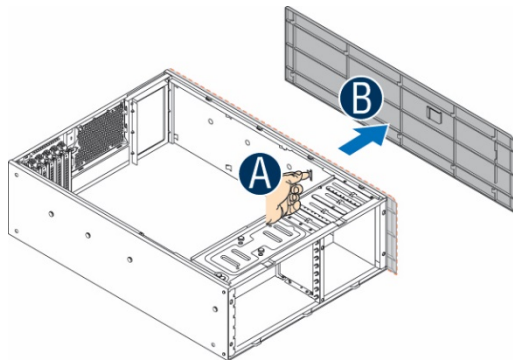
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Remove the fillers for 5.25" drive slots if required.



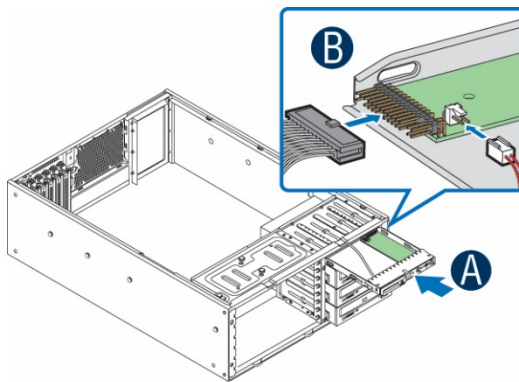
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Remove the cosmetic top board.



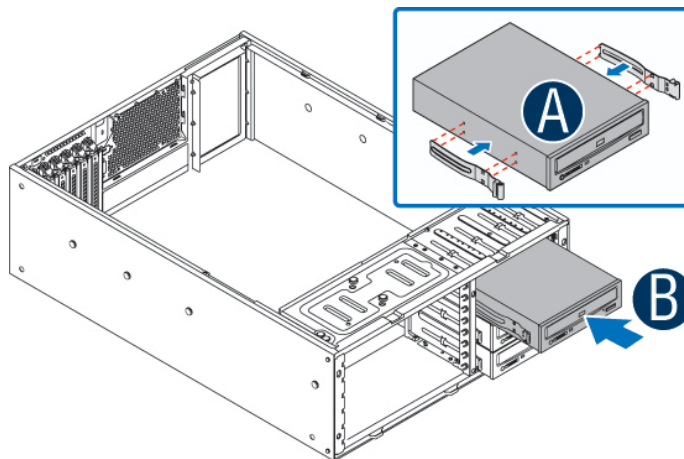
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Install the front panel module.



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Install the 5.25" drive if required.



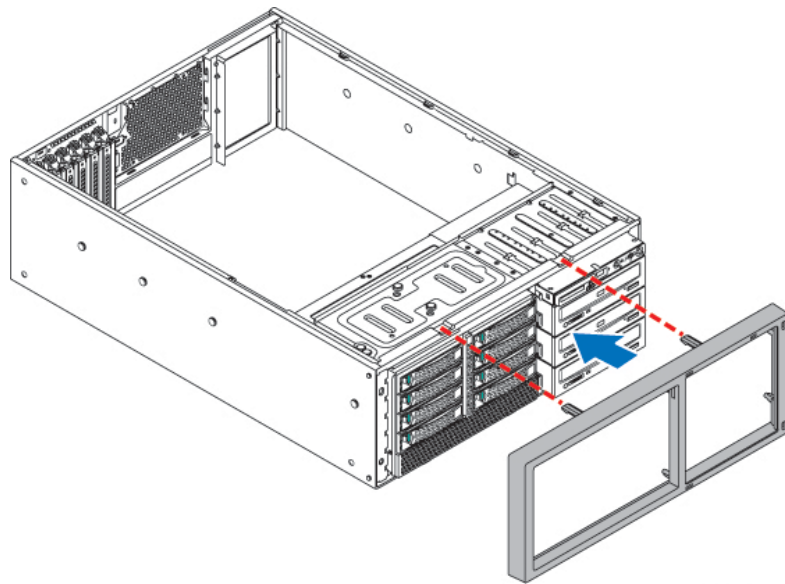
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Install the rack bezel frame.

/ **NOTE**

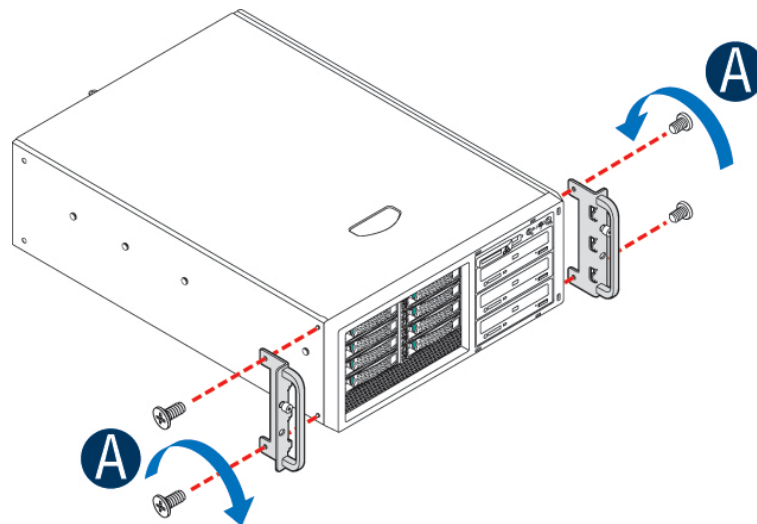
*The rack bezel frame is different from the pedestal bezel frame.*





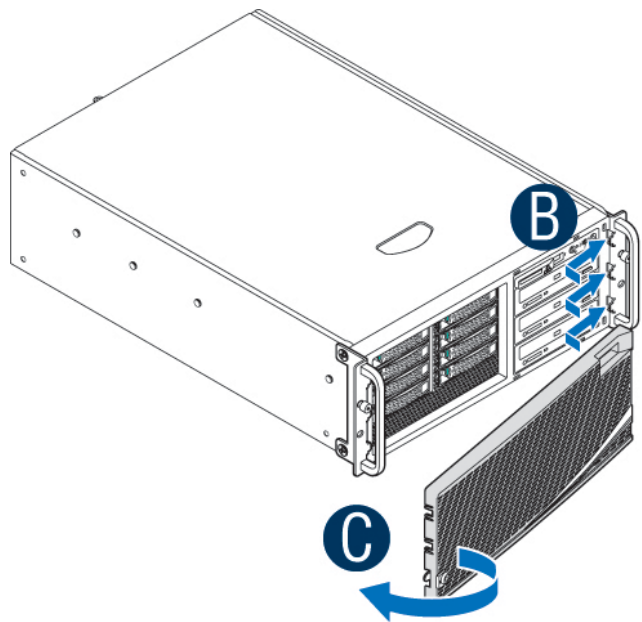
AF006135

Install the rack mount handles.



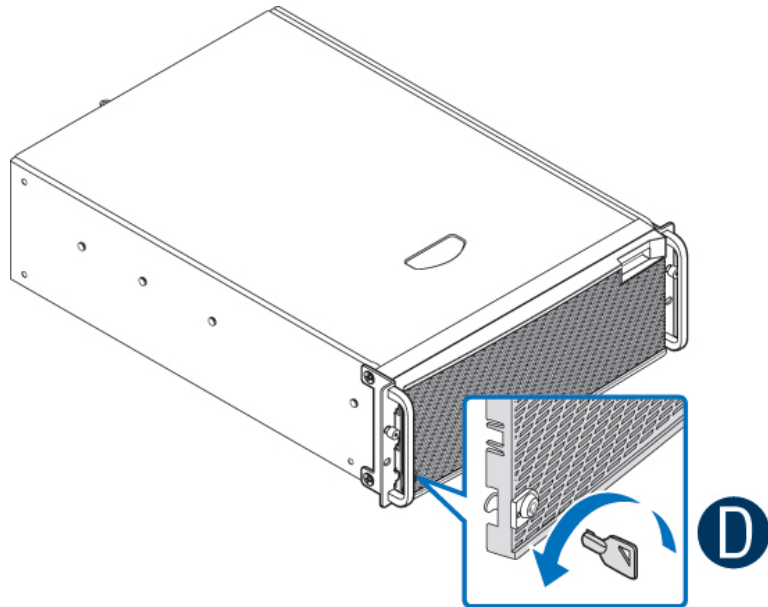
AF006043

Install the rack bezel (optional).



AF006044

Lock the front bezel key.



AF006045

## 2.7.4 Installing the Fixed Drive Storage

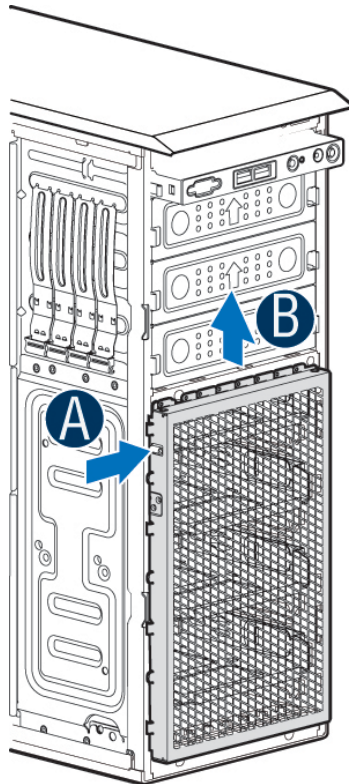
The server chassis P4304XXMFEN2 and P4304XXMUXX support four 3.5" fixed drive trays with their default configuration.

To install a fixed drive:

Remove the chassis side cover following instructions in section "Chassis Side Cover Removal".

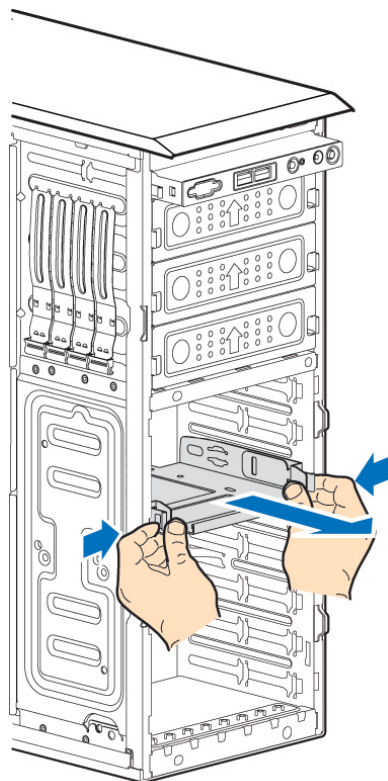
Remove the front bezel following instructions in section "Removing the Front Bezel".

Press the clip to release the EMI cover and lift up until it is removed.



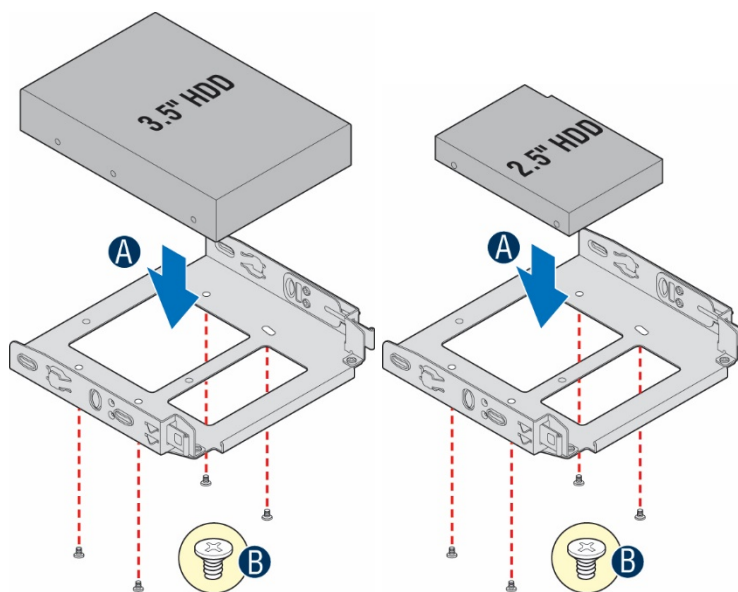
AF006582

Release the fixed drive tray by pressing the latches on both sides of the tray, and pull the drive tray until it is fully removed from the chassis.



AF006588

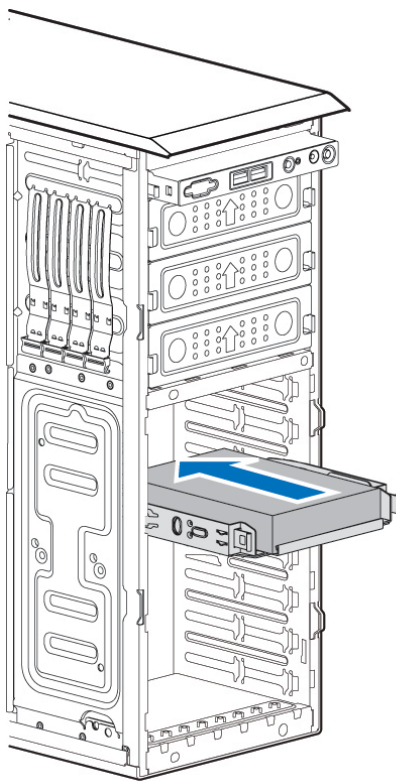
Secure the 3.5" or 2.5" drives onto the fixed drive tray.



AF006590

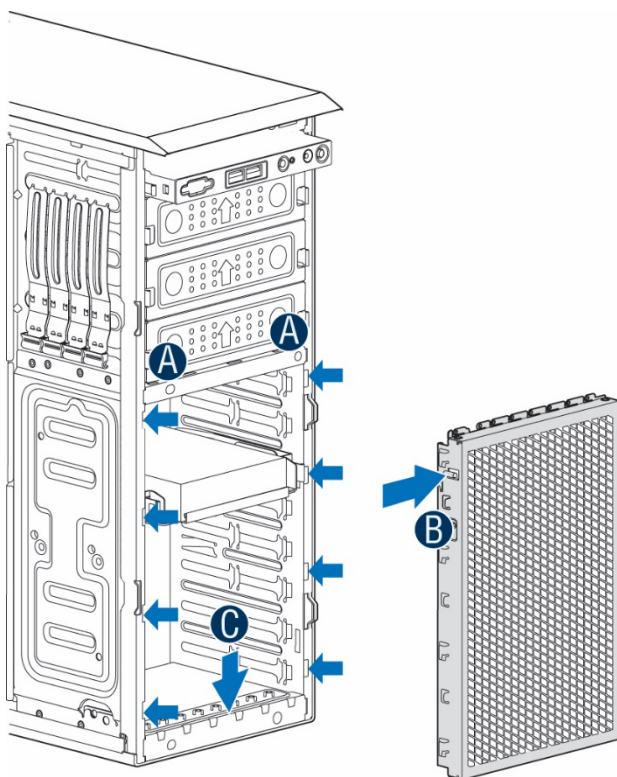
AF006591

Slide the fixed drive tray back into the chassis until it clicks into place.



AF006592

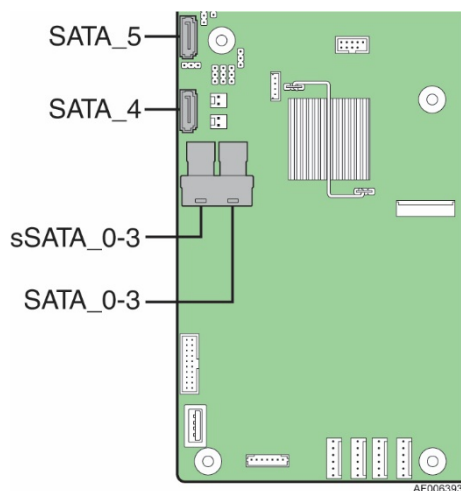
Install the EMI cover to the chassis front.



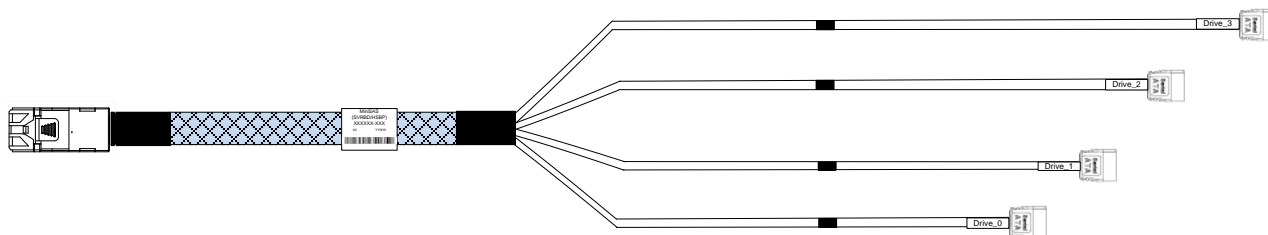
AF006583

Cable connection:

On server board side, connect the miniSAS HD cable header to the onboard connector labeled as “sSATA\_0-3” or “SATA\_0-3”.



On fixed drive side, connect the SATA power header and the 7-pin SATA cable header. A cable example is shown as below. The header on the left side is connected to the server board; the headers on the right side are connected to the fixed drive.



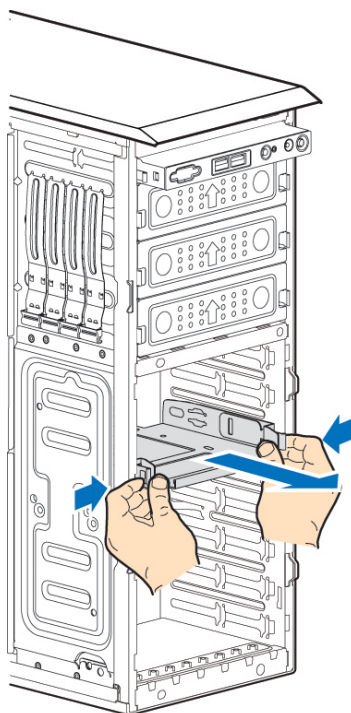
## 2.7.5 Upgrading the Fixed Drive Storage to 4x3.5" or 8x2.5" Hot-swap Drive Bay Storage

The server chassis support fixed drive storage by default; the optional 4x3.5" or 8x2.5" hot-swap drive bays and cables can be ordered separately and installed in the server chassis as upgrade options.

Remove the chassis side cover following instructions in section "Chassis Side Cover Removal".

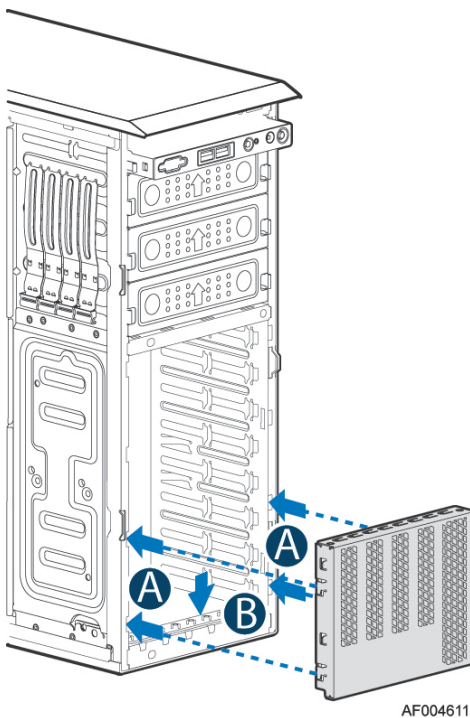
Remove the front bezel following instructions in section "Removing the Front Bezel".

Remove the fixed drive trays.

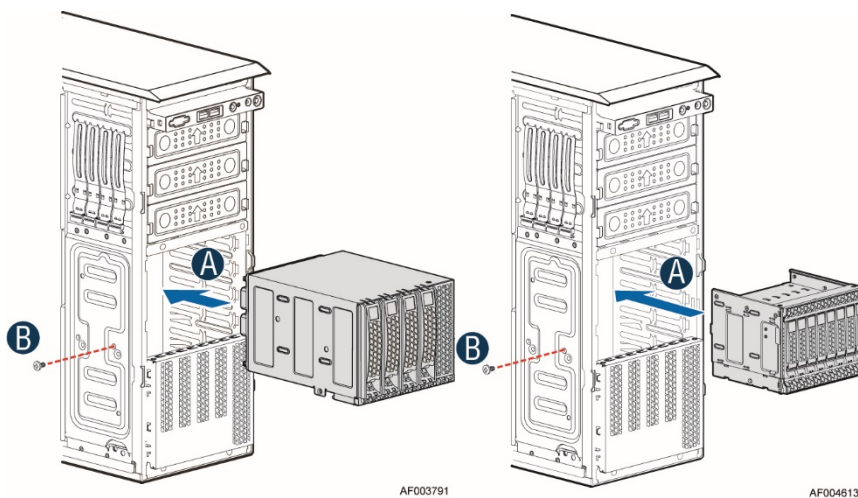


AF006588

Install the EMI cover by aligning the latch on the EMI cover to the chassis front and slide down (see letter "A" and "B").



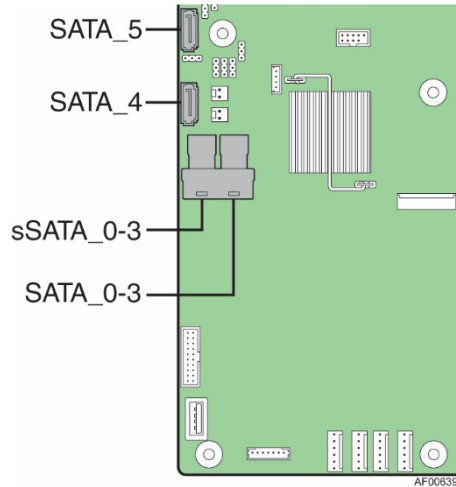
Slide the 4x3.5" or 8x2.5" hot-swap drive bay to the upper/right drive bay position. Secure the drive bay with the thumb screw.





Cable connection:

If using a 4x3.5 hot-swap drive tray, connect the miniSAS HD cable header to the server board connector labeled as “sSATA\_0-3” or “SATA\_0-3”. If using an 8x2.5 hot-swap drive tray, connect the miniSAS HD cable header to both “sSATA\_0-3” and “SATA\_0-3”.



Connect the other end of the miniSAS HD cable header to the backplane. An I2C cable is needed to connect the “HSBP\_I2C” header on the server board to the “I2C\_IN” header on the backplane.

A “mini SAS HD to mini SAS HD” cable example is shown as below.

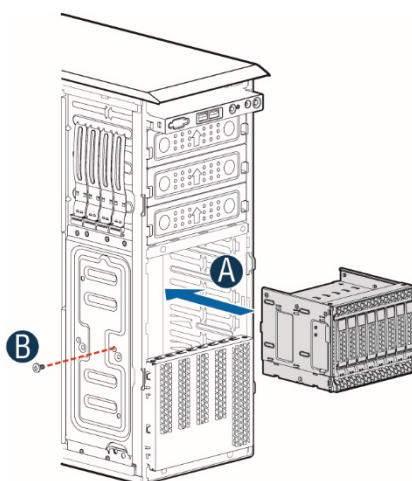


## 2.7.6 Upgrading the Fixed Drive Storage to 8x2.5" PCIe SSD (NVMe) Combo Drive Bay Storage

The installation of the 8x2.5" SAS/PCIe SSD (NVMe) combo drive bay involves several components:

- NVMe add-in card
- 8x2.5" SAS/PCIe SSD (NVMe) combo drive bay
- NVMe cables
- MiniSAS to miniSAS cables (optional)
- I2C cable

1. Follow the same steps 1-4 in the previous section "Upgrading the Fixed Drive Storage to 4x3.5" or 8x2.5" Hot-swap Drive Bay Storage".
2. Slide the 8x2.5" SAS PCIe SSD (NVMe) Combo drive bay to the upper/right drive bay position.

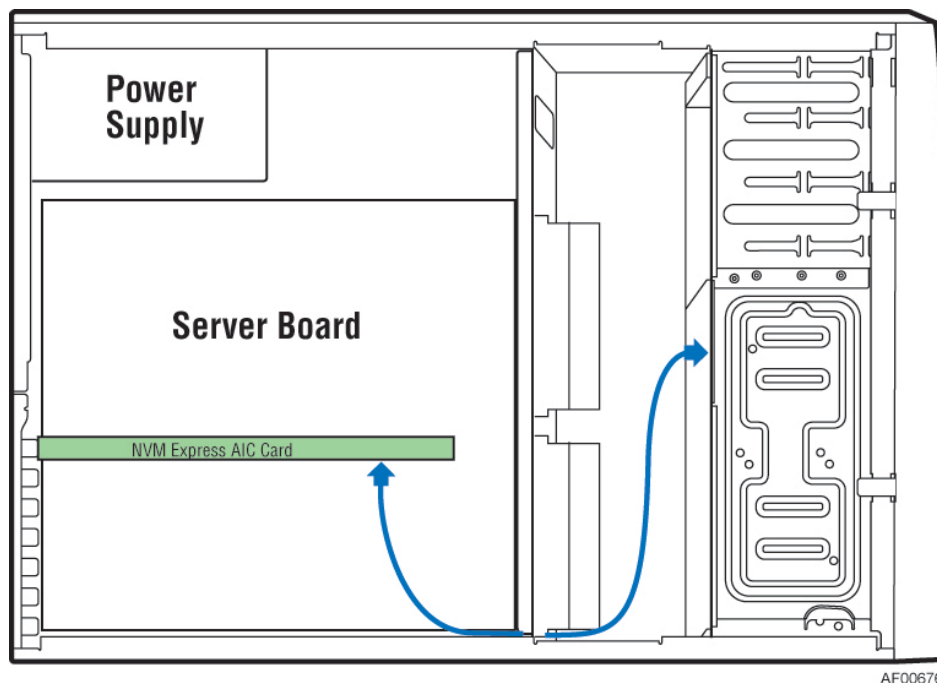


AF004613

3. Install the NVMe add-in card to any PCIe x16 slot on the server board.

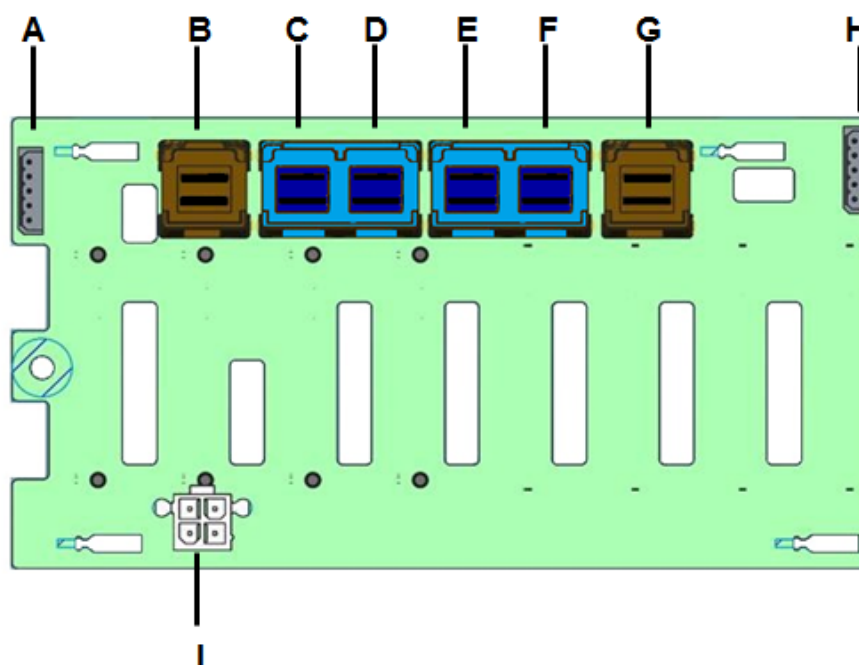
**Note:** The PCIe slot 5 will be PCIe x8 bandwidth on S2600CW2SR and S2600CWTSR.

4. Connect the NVMe cables to the NVMe add-in card and the 8x2.5" SAS/PCIe SSD (NVMe) Combo backplane. The cables can be found in FUP8X25S3NVDK.



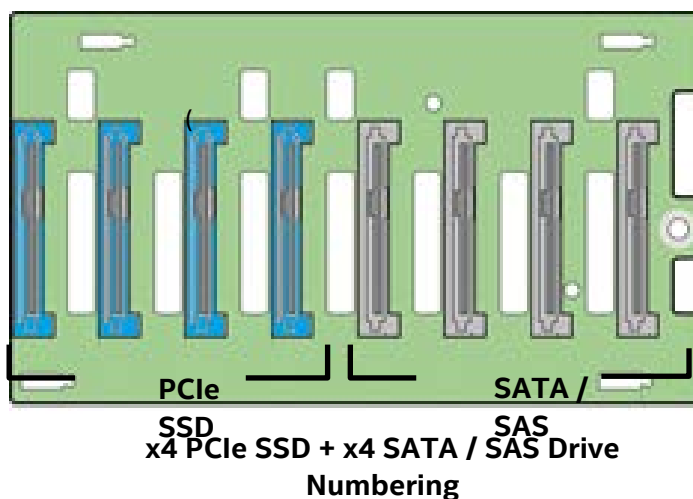
5. Connect the I2C cable from the mother board HSBP\_I2C header to the backplane I2C\_IN (SMBus-in) header.
6. If regular SATA/SAS drives will be used in drive slot 0-3, connect the "miniSAS HD to miniSAS HD" cable to the backplane connector G. If SATA/SAS drives will be used in drive slot 4-7, connect the "miniSAS HD to miniSAS HD" cable to the backplane connector B. The other end of the miniSAS HD connector can be connected to the mother board connector "sSATA\_0-3", "SATA\_0-3", "SAS\_0-3", or "SAS\_4-7".

Below figure shows the backplane connectors.

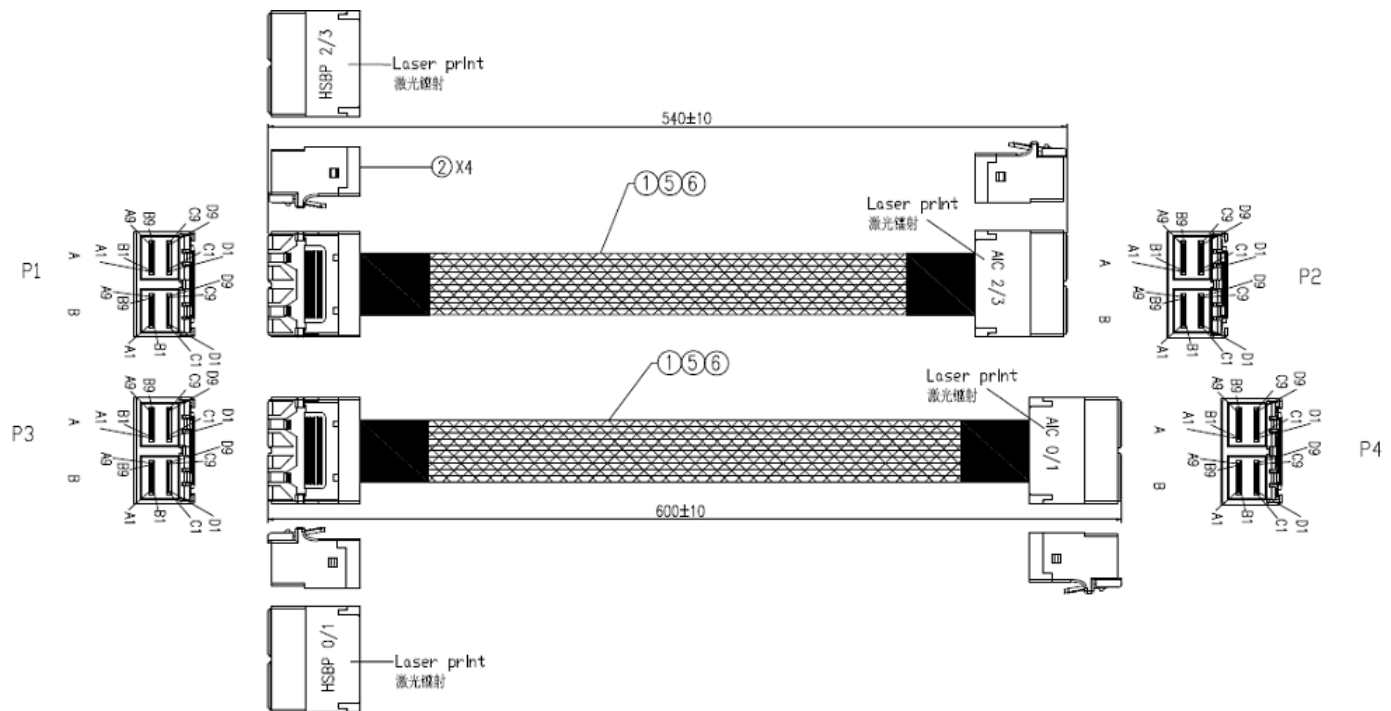


Label	Description
A	SMBus-Out (I2C OUT) cable connector for multi-backplane support
B	SATA/SAS Ports 4-7 Mini-SAS HD cable connector
C	PCIe SSD Drive #3 Mini-SAS HD cable connector
D	PCIe SSD Drive #2 Mini-SAS HD cable connector
E	PCIe SSD Drive #1 Mini-SAS HD cable connector
F	PCIe SSD Drive #0 Mini-SAS HD cable connector
G	SATA/SAS Ports 0-3 Mini-SAS HD cable connector
H	SMBus-In (I2C IN) cable connector – From Server board or other backplane
I	Power connector

Below figure shows the PCIe SSD and SATA/SAS drive slots on the backplane.



The cables used to connect the NVMe add-in card to the 8x2.5" Combo backplane (PCIe SSD Drive #0~3 Mini-SAS HD cable connector) is shown as below. The backplane connects to the left side of the cable; the PCIe SSD add-in card connects to the right side of the cable.



#### Notes:

- On 8x2.5" Combo backplane, the port C, D, E, and F are for PCIe SSD (NVMe). The port B and G are for regular drives. To use the regular drive bays (port B and G on the 8x2.5 Combo backplane), follow the instructions in section "Upgrading the Fixed Drive Storage to 4x3.5" or 8x2.5" Hot-swap Drive Bay Storage" to connect the "minSAS HD to miniSAS HD" cable between the server board SATA/SAS connectors and the port B and G on the backplane.
- The 8x2.5 SAS/NVMe combo backplane is capable of supporting 12 Gb SAS or 6 Gb SAS/SATA drives. The SAS/SATA drives are hot-swappable and each drive is mounted to a drive tray with a green latch. The front side of the backplane includes eight drive interface connectors. All eight connectors can support regular SATA or SAS drives, but only the first four are capable of supporting NVMe drives.
- Any combination of NVMe drives and SATA/SAS drives can be supported, as long as the number of NVMe drives does not exceed four and they are installed into any of the first four drive connectors on the backplane.
- The NVMe drives are NOT hot-swappable. The system must be powered off to add or replace an NVMe drives. To identify an NVMe drive in a system where multiple other SAS/SATA devices may be installed, the NVMe drive tray has a blue latch release.

## 2.7.7 Upgrading the Fixed Drive Storage to 8x3.5" Hot-swap Drive Bay Storage

The server chassis can support two 4x3.5" hot-swap drive bays as an upgrade option from fixed drive storage.

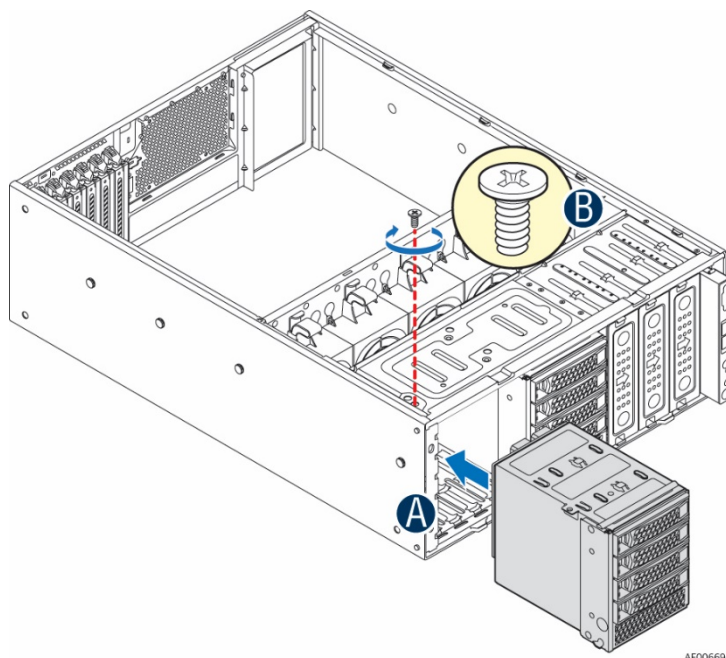
Remove the chassis side cover following instructions in section "Chassis Side Cover Removal".

Remove the front bezel following instructions in section "Removing the Front Bezel".

Remove the fixed drive trays.

Install the drive bays.

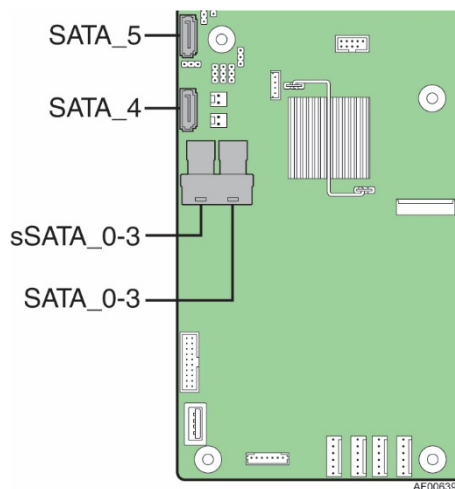
**Note:** The drive bay on the upper position should be installed first, then the second drive bay on the lower position.



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Cable connection:

On server board side, connect the miniSAS HD cable header to the server board connector labeled as "sSATA\_0-3" and "SATA\_0-3".

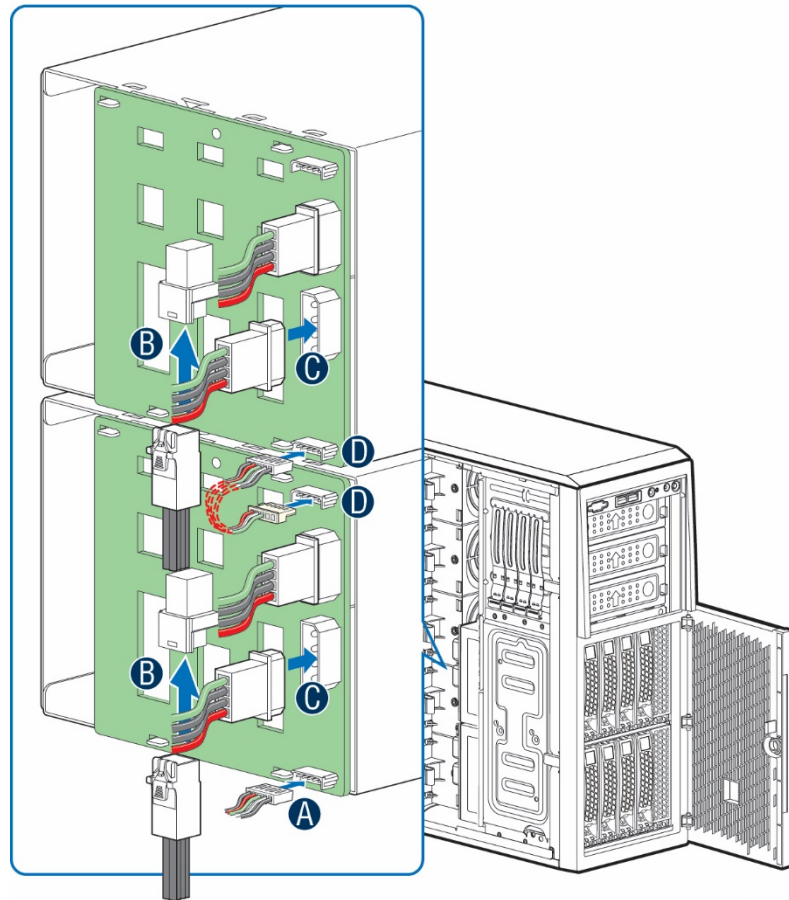


AF006393

On each backplane, connect one miniSAS HD cable to the connector labeled as “HDD\_0-3”. Connect the “HSBP\_I2C” header on the server board to the “I2C\_IN” header on the first backplane. Connect the “I2C\_OUT” header on the first backplane to the “I2C\_IN” header on the second backplane. A “mini SAS HD to mini SAS HD” cable example is shown as below.



The two backplanes are cascaded with an I2C cable as below.



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## 2.7.8 Upgrading the Fixed Drive Storage to 16x2.5" Hot-swap Drive Bay Storage

The server chassis can support two 8x3.5" hot-swap drive bays as an upgrade option from fixed drive storage.

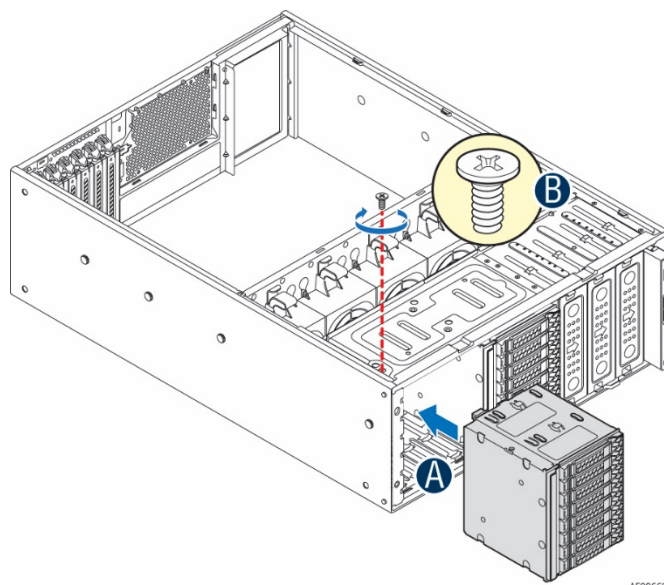
Remove the chassis side cover following instructions in section "Chassis Side Cover Removal".

Remove the front bezel following instructions in section "Removing the Front Bezel".

Remove the fixed drive trays.

Install the drive bays.

**Note:** The drive bay on the upper position should be installed first, then the second drive bay on the lower position.

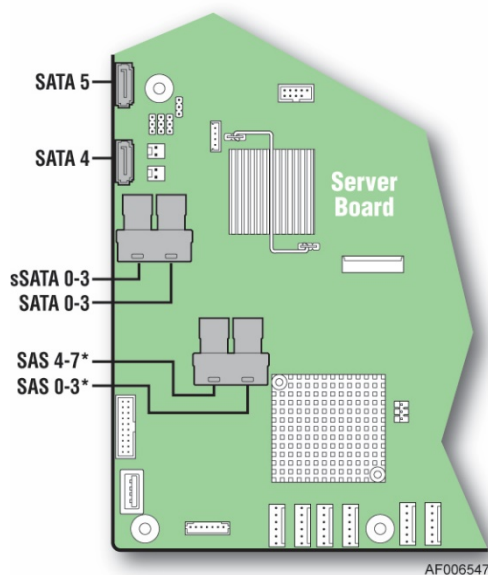


Cable connection:

On server board side, connect the two miniSAS HD cable headers to the server board connectors labeled as "sSATA\_0-3" and "SATA\_0-3", and connect the other two miniSAS HD cable headers to the server board connectors labeled as "SAS\_0-3" and "SAS\_4-7".

**Note:** The "SAS\_0-3" and "SAS\_4-7" are available on S2600CW2SR and S2600CWTSR.



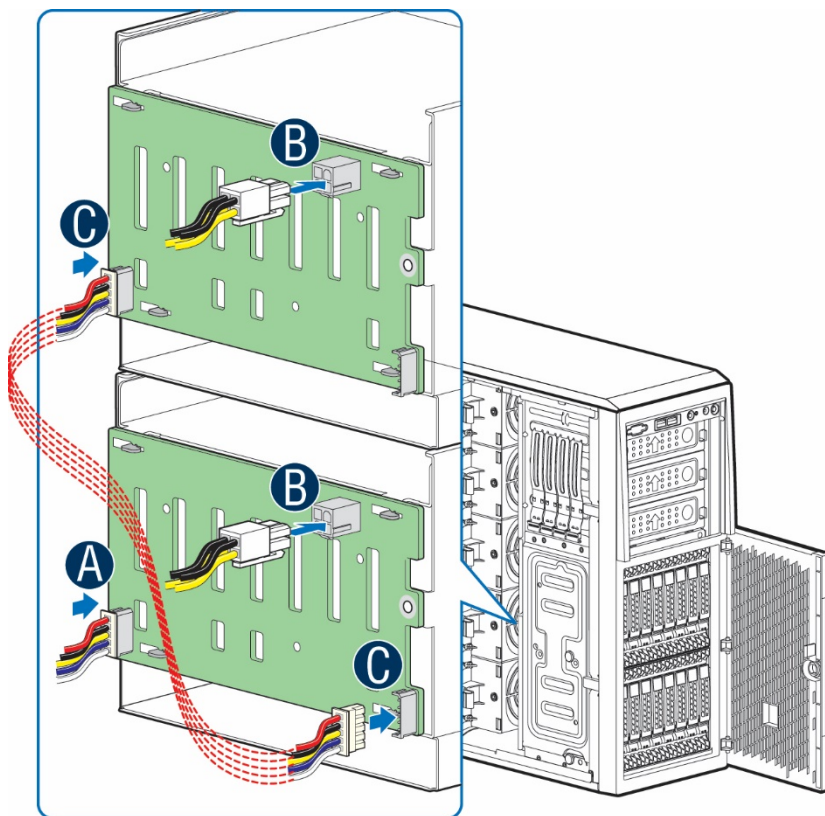


Connect the other end of the miniSAS HD cables to the backplane mini SAS HD connectors. Connect the “HSBP\_I2C” header on the server board to the “I2C\_IN” header on the first backplane. Connect the “I2C\_OUT” header on the first backplane to the “I2C\_IN” header on the second backplane.

An example of “mini SAS HD to mini SAS HD” cable is shown as below.



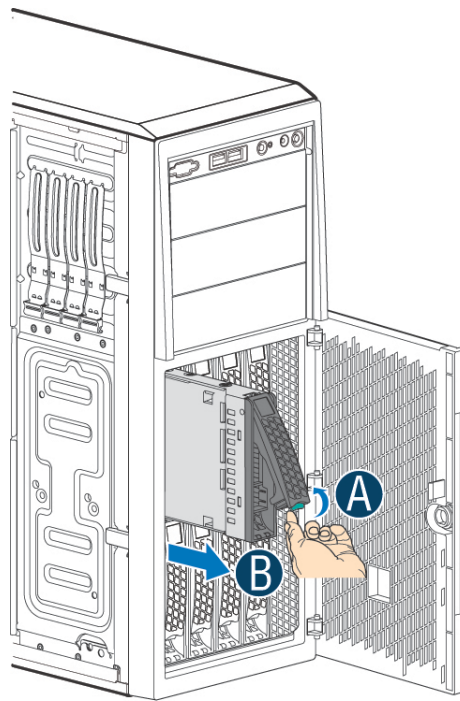
The two backplanes are cascaded with an I<sup>2</sup>C cable as below.



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## 2.7.9 4 x 3.5" Front Drive Bay Storage

### 2.7.9.1 3.5" Drive Carrier Extraction

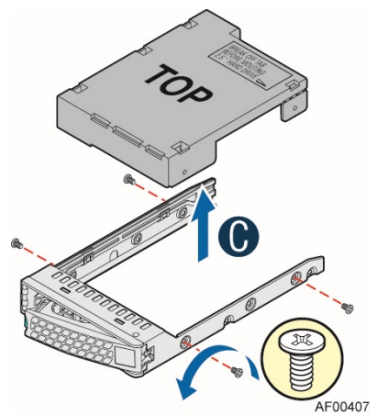


AF004652

**Figure 23. Installing Hot-swap Storage Devices – 3.5" Carrier Extraction**

1. Remove the drive carrier from the chassis by pressing the green button and pulling open the lever (see letter "A").
2. Pull the carrier out of the drive bay (see letter "B").

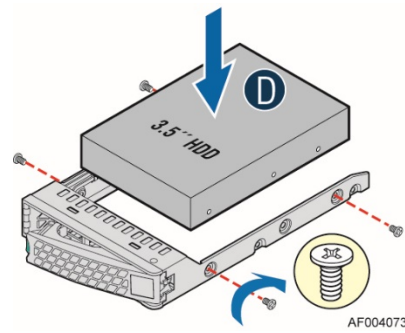
### 2.7.9.2 3.5" Hard Disk Drive Installation



AF004072

**Figure 24. 3.5" Hard Disk Drive Installation – Removing the Drive Blank**

1. Remove the four screws securing the plastic drive blank to the carrier.
2. Remove the drive blank from the carrier (see letter "C").

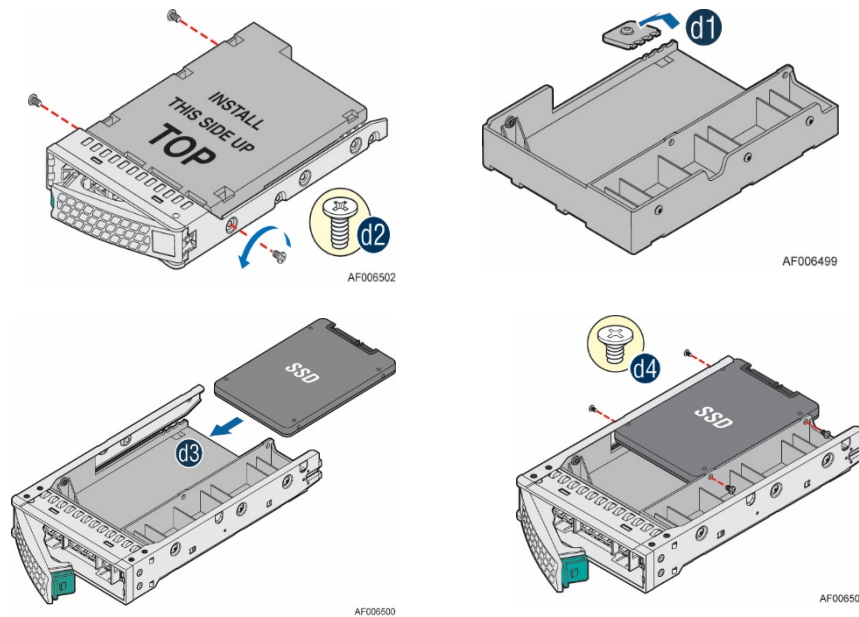


**Figure 25. 3.5" Hard Disk Drive Installation – Mounting the Drive to the Carrier**

3. Install the drive into the carrier. Verify the connector end of the drive is located towards the back of the carrier (see letter "D").
4. Secure the drive to the carrier using four screws.

### 2.7.9.3 Option to Install a 2.5" SSD into a 3.5" Carrier

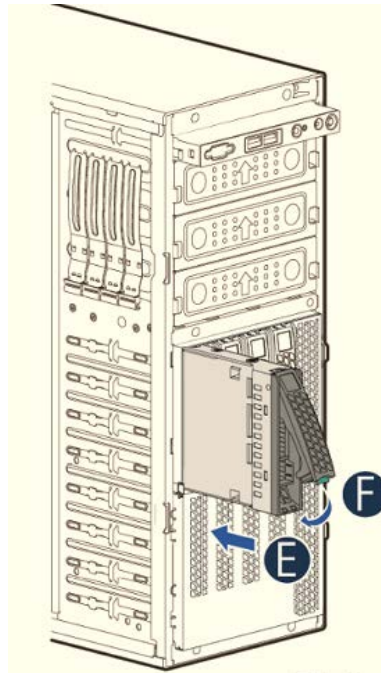
The 3.5" drive blank can be used as a 2.5" SSD bracket.



**Figure 26. Option to Install a 2.5" SSD into a 3.5" Carrier**

1. Remove the drive blank from the device carrier (see previous page).
2. Break off the small side tab from the drive blank, making the drive blank into a device bracket (see letter "d1").
3. Install the device bracket into the device carrier so that the hollow side of the device bracket is facing down.
4. Secure the device bracket with three screws (see letter "d2").
5. Turn the carrier assembly over.
6. Slide a 2.5" SSD into the device bracket and align the screw holes with the right and left rail (see letter "d3").
7. Secure the device using four screws (see letter "d4").

#### 2.7.9.4 3.5" Drive Carrier Insertion

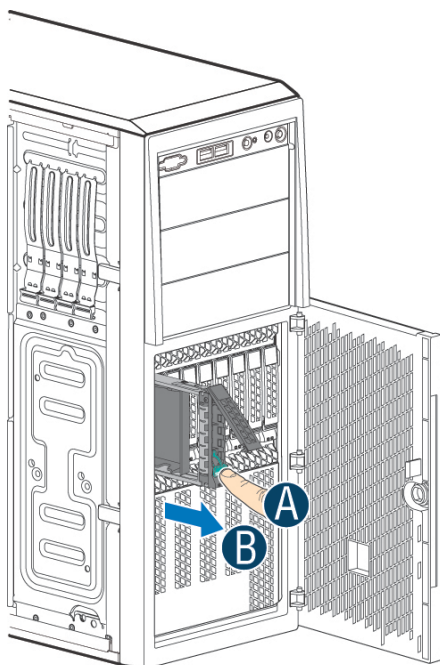


**Figure 27. Hard Disk Drive Installation – Inserting the 3.5" HDD Assembly**

1. With the lever open, insert the drive assembly into the drive bay (see letter "E").
2. Push in the lever to lock it into place (see letter "F").

## 2.7.10 8 x 2.5" Front Drive Bay Storage

### 2.7.10.1 2.5" Drive Carrier Extraction

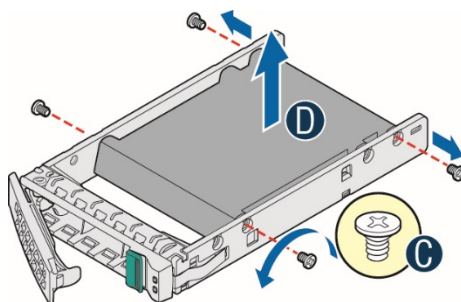


AF004650

**Figure 28. Installing Hot-swap Storage Devices – 2.5" Carrier Extraction**

1. Remove the drive carrier from the chassis by pressing the green button and pulling open the lever (see letter "A").
2. Pull the carrier out of the drive bay (see letter "B").

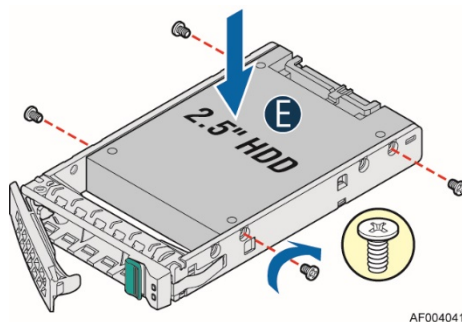
### 2.7.10.2 2.5" Hard Disk Drive (HDD) / Solid State Device (SSD) Installation



AF004040

**Figure 29. 2.5" Storage Device Installation – Removing the Drive Blank**

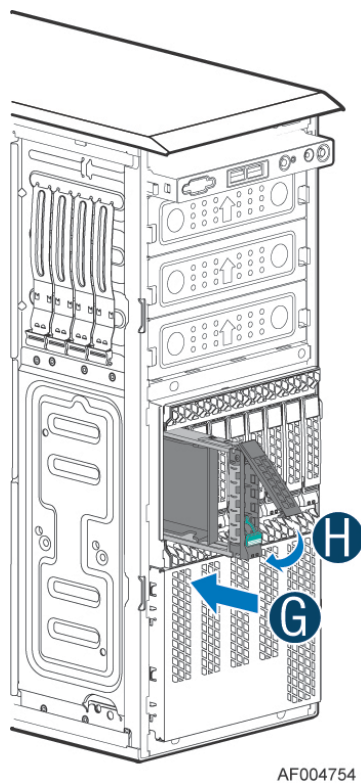
1. Remove the four screws securing the plastic drive blank to the carrier (see letter "C").
2. Remove the drive blank from the carrier (see letter "D").



**Figure 30. 2.5" Storage Device Installation – Mounting the Drive to the Carrier**

3. Install the storage device into the carrier. Verify the connector end of the drive is located towards the back of the carrier (see letter "E").
4. Secure the drive to the carrier using four screws.

### 2.7.10.3 2.5" Drive Carrier Insertion



**Figure 31. 2.5" Storage Device Installation – Inserting the 2.5" Drive Assembly**

1. With the lever open, insert the drive assembly into the chassis (see letter "G").
2. Push in the lever to lock it into place (see letter "H").

## 3. Option and Accessory Kit Integration and Service

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### **Purpose**

This chapter provides instructions for the integration of system components within a server chassis that has the server board and other system components pre-installed. It includes installation instructions for supported system options, and other available accessory option kits.

### **Before You Begin**

Before working with your server product, observe the safety and ESD precautions found in the Warnings section at the beginning of this manual.

### **Tools and Supplies Needed**

- Anti-static wrist strap and conductive foam pad (recommended)
- Phillips\* (cross head) screwdriver (#2 bit)

### **System Reference**

All references to left, right, front, top, and bottom assume the reader is facing the front of the chassis.

### **Internal Cable Routing**

See section 2.1 Internal Cable Routing.

### **Instruction Format**

Each procedure described in this section will follow an illustration first format. This format will give the reader the option to follow a quicker path to system integration by first seeing an illustration of the intended procedure. If necessary, the reader can then follow the step-by-step instructions that will accompany each procedure.

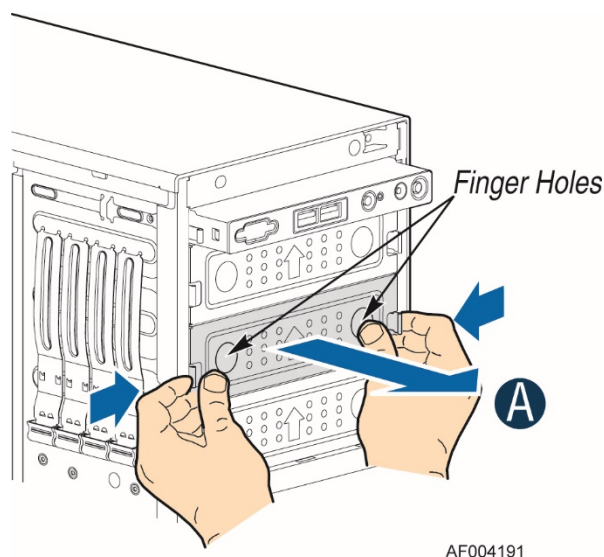
## 3.1 Optical Drive – Installation and Removal

This section provides installation and removal instructions for an optionally installed SATA optical drive for systems that support the option.

### 3.1.1 Optical Drive Installation

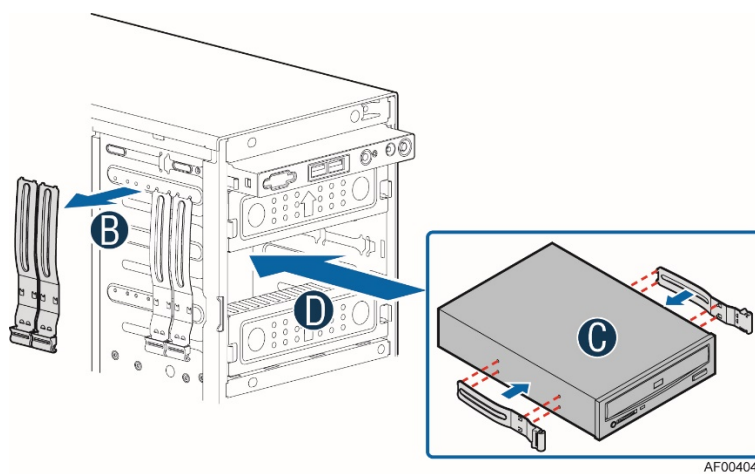
**Note:** The optical drive is NOT hot-swappable. Before removing or replacing the drive, you must first take the server out of service, turn off all peripheral devices connected to the system, turn off the system by pressing the power button, and unplug the power cord from the system or wall outlet.

1. Remove an EMI shield (see letter “A”).



**Figure 32. Removing the EMI Shield**

2. Get the slides from the chassis side (see letter “B”). Attach the slides to the optical drive by pressing the slides firmly into the side dimples on the optical drive (see letter “C”). Insert the drive/slide assembly into the device bay until the slides lock into place (see letter “D”).



**Figure 33. Installing the Optical Drive**

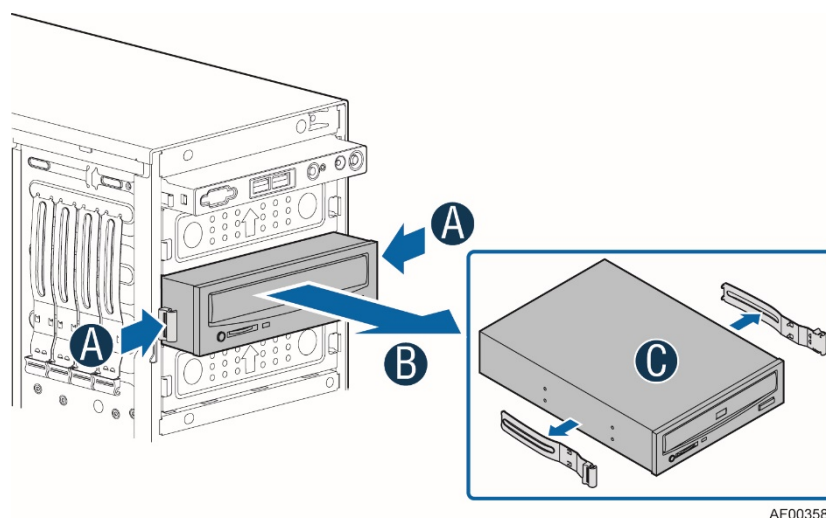
3. Connect the optical power cable and data cable.



## 3.1.2 Optical Drive Removal

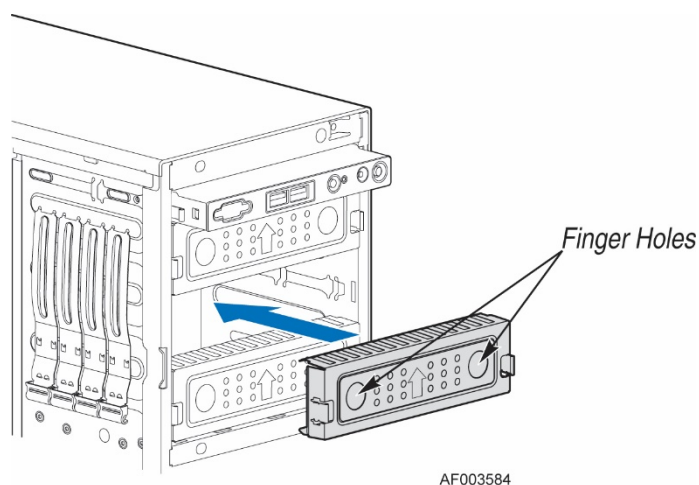
**Note:** The optical drive is NOT hot-swappable. Before removing or replacing the drive, you must first take the server out of service; turn off all peripheral devices connected to the system, turn off the system by pressing the power button, and unplugging the power cord from the system or wall outlet. To maintain proper system cooling, a filler panel must be installed if you do not install a device at this location.

1. Disconnect the power and data cables to the optical drive.
2. Press on the slide release latches (see letter “A”) and pull the optical drive or slide assembly from the chassis (see letter “B”). Remove the slides from the optical drive (see letter “C”).



**Figure 34. Removing the Optical Drive**

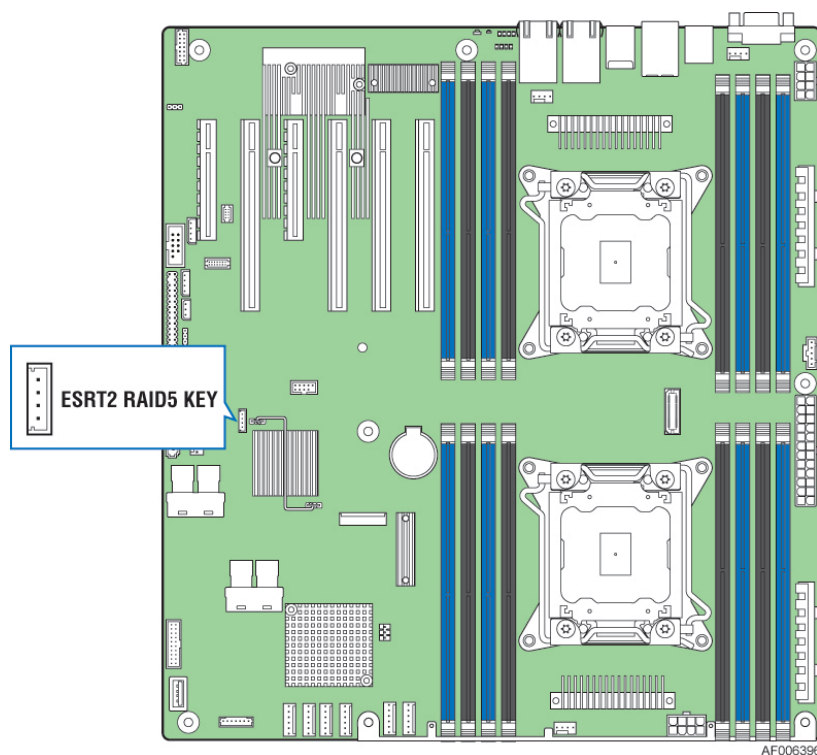
3. If not replacing with another drive, reinsert an EMI shield into the chassis.



**Figure 35. Re-inserting the Empty EMI Shield**

## 3.2 ESRT2 RAID5 Key – Installation / Removal

### 3.2.1 Installing the ESRT2 RAID 5 Key



**Figure 36. ESRT2 RAID 5 Key Location**

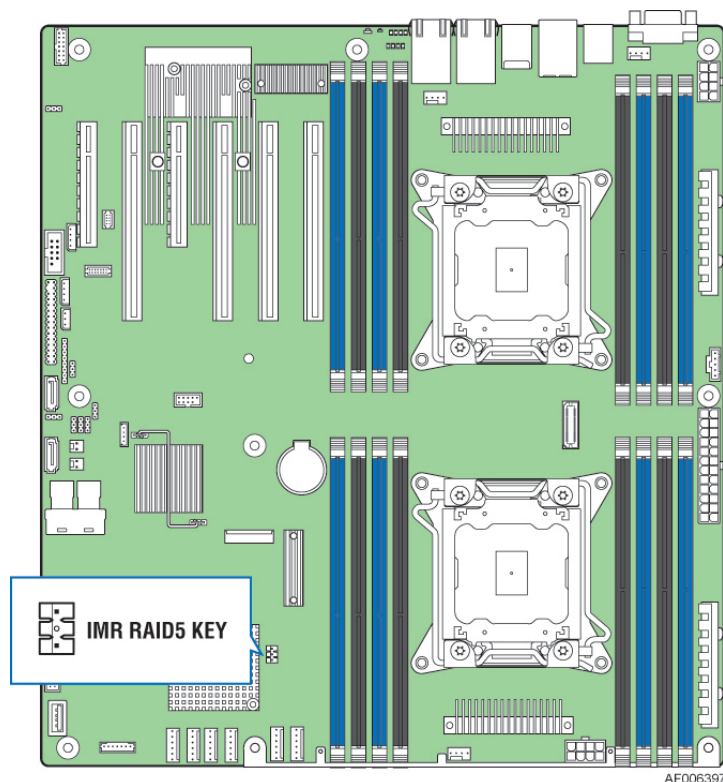
1. Remove the ESRT2 RAID 5 Key from its packaging.
2. Locate the key connector shown in the picture.
3. To install the key, place it over the connector and confirm the orientation of the key matches that of the connector.
4. Press the key down onto the connector.

### 3.2.2 Removing the ESRT2 RAID 5 Key

1. Power off the system and disconnect the power cable(s).
2. Remove the chassis side cover.
3. Using the Key pull tab, pull the key up until it disengages from the connector.

## 3.3 LSI IMR RAID5 Key – Installation / Removal

### 3.3.1 Installing the LSI IMR RAID 5 Key



**Figure 37. IMR RAID 5 Key Location**

1. Remove the LSI IMR RAID 5 Key from its packaging.
2. Locate the key connector shown in the picture.
3. To install the key, place it over the connector and confirm the orientation of the key matches that of the connector.
4. Press the key down onto the connector.

### 3.3.2 Removing the LSI IMR RAID 5 Key

1. Power off the system and disconnect the power cable(s).
2. Remove the chassis side cover.
3. Using the Key pull tab, pull the key up until it disengages from the connector.

## 3.4 Intel® RAID Smart Battery AXXRSBBU9 – Installation / Removal

Intel® RAID (Redundant Array of Inexpensive Disks) Controllers and Intel® Integrated RAID Modules provide reliability, high performance, and fault-tolerant disk subsystem management. A complete fault-tolerant strategy requires protection of all data, including the unwritten cached data in the RAM cache. If power is lost, the data in the RAM cache is lost. To avoid data loss, a battery can be added to supply power to the RAID RAM during an AC power outage or if the AC power cord is removed.

A battery backup unit (BBU) protects the integrity of the cached data on Intel® RAID Controllers by providing backup power if there is a complete AC power failure or a brief power outage. The Intel® RAID Smart Battery Backup Unit provides an inexpensive alternative to using an uninterruptible power supply (UPS) or it can act as a second level of fault tolerance when used with a UPS.

### 3.4.1 Intel® RAID Smart Battery Pre-Installation Considerations

**Warning:** Always ground yourself and/or use a ground strap before touching the RAID controller or the Intel® RAID Smart Battery AXXRSBBU9. Perform all installation work at an ESDsafe workstation. Use an ESD-safe Phillips\* screwdriver set to a maximum torque of 2.25 inch-pounds, and be sure the screwdriver is centered in the screw to avoid damaging the screw head. If you exceed the maximum torque specification, you may damage the board, connectors, or screws, and you will void the warranty of the board.

The batteries in the Intel® RAID Smart Battery AXXRSBBU9 must charge for at least four hours during fast charge, under normal operating conditions.

To protect your data, Intel recommends that you set the RAID Controller Write Policy to write-through until the battery unit is fully charged. When the battery unit is charged, you can change the Write Policy to write-back to take advantage of the performance improvements of data caching.

### 3.4.2 Installing the Intel® RAID Smart Battery

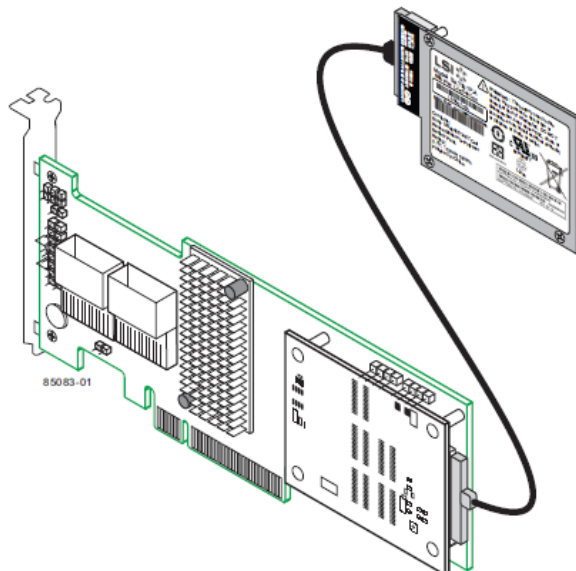
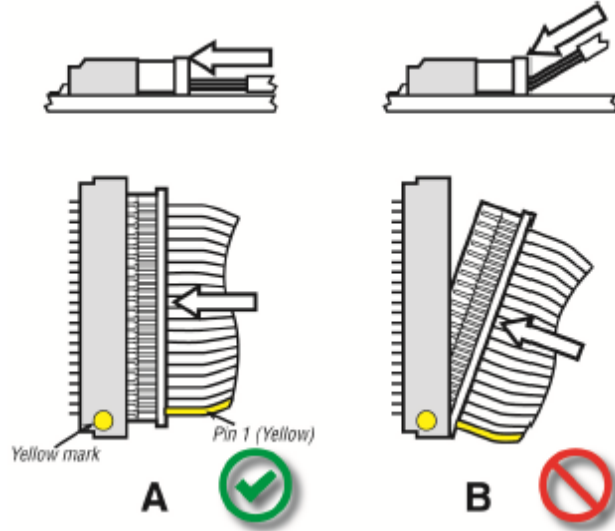
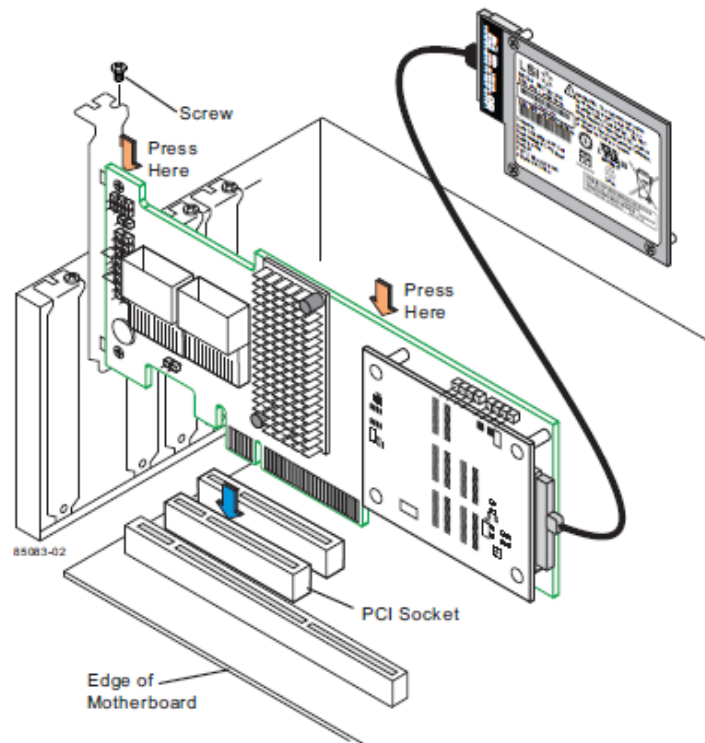


Figure 38. BBU Unit Connection to the RAID card

1. Remove the RAID Controller if it is already installed in the server system.
2. Ground yourself, and remove the Intel® RAID Smart Battery AXXRSBBU9 from the package.
3. Verify that the cache memory board is already installed on the supported RAID controller.
4. Connect AXXRSBBU9 to the Cache Memory Board on the RAID Controller



**Note:** Please carefully observe how the battery cable connectors are keyed and to avoid asserting unnecessary force when plugging in the cable.



**Figure 39. Installing the RAID Card again**

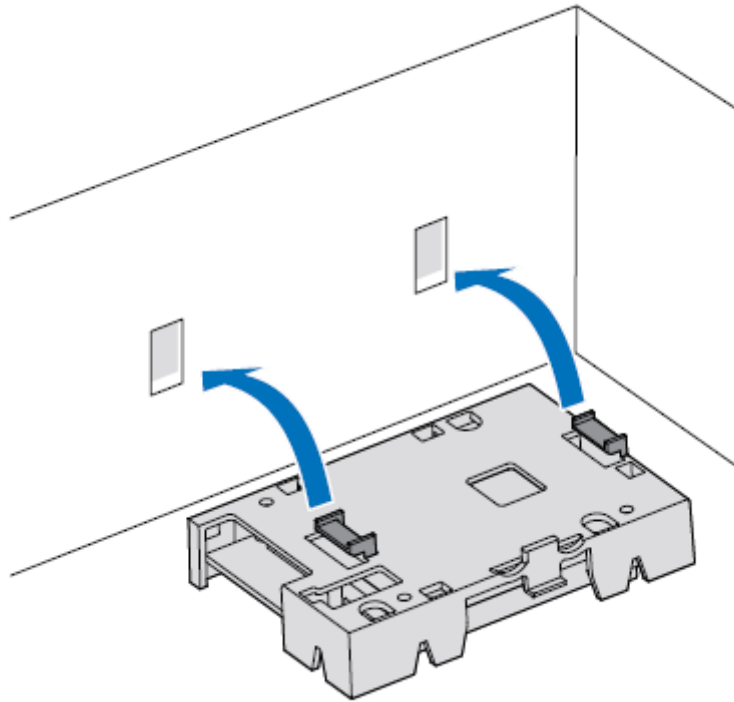
5. Install the RAID Controller in the Server System

### 3.4.3 Connecting the Plastic Battery Holder to the Chassis

The Intel® RAID Smart Battery AXXRSBBU9 is designed for easy attachment to either an Intel® pedestal or rack mount chassis.

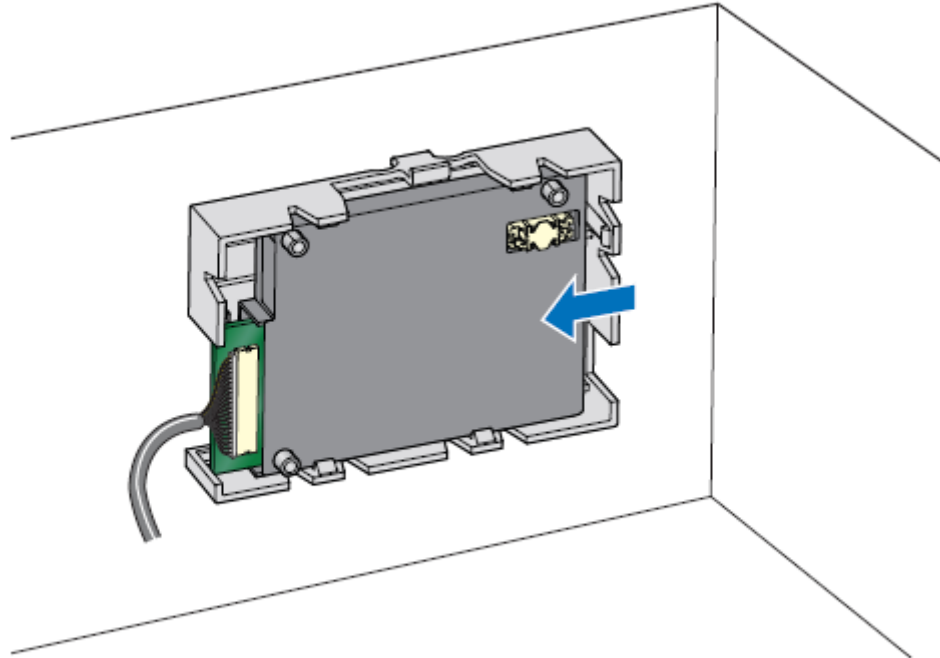
**Note:** If you are installing this component into a third-party chassis, you must first install an attachment mechanism, such as industrial-grade Velcro\*. Refer to your server chassis documentation or discuss an appropriate attachment mechanism with your server chassis manufacturer to ensure the attachment mechanism complies with the chassis requirements.

1. Locate the installation clips inside the chassis. They are on the left side of the chassis, near the rear. Remove the Mylar pad if there is a Mylar pad covering the mounting hole.



**Figure 40. Align the tabs with battery holder**

2. Align the tabs on the plastic battery holder with the clips on the chassis



**Figure 41. Slide the battery holder**

3. Slide the plastic battery holder toward the front of the system until the tabs engage with the clips in the chassis

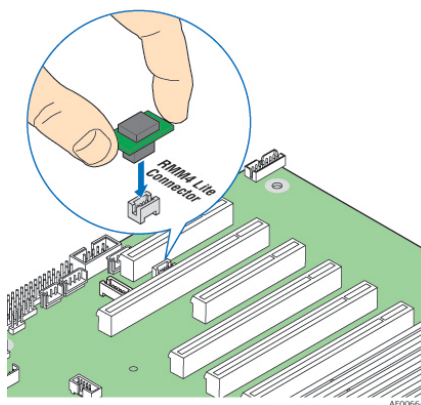
### 3.4.4 Removing the Intel® RAID Smart Battery

If the RAID controller is already installed in a computer, do the following to remove it before you install the Intel® RAID Smart Battery AXXRSBBU9

1. Shut down the computer, turn off the power, and unplug the power cord(s).
2. Remove the chassis cover and ground yourself before touching the RAID controller.
3. Carefully unplug all cables connected to the RAID controller. Press the Silver Spring at the connector end of the data cables to make sure the two tiny catches release.
4. Carefully remove the RAID controller from the server board. For more information on removing add-in cards, refer to the server board documentation.
5. Place the RAID controller on a flat, clean, static-free surface.

## 3.5 Intel® Remote Management Module 4 Lite Key – Installation / Removal

### 3.5.1 Intel® RMM4 Lite Key Installation



**Figure 42. Installing the Intel® RMM4 Lite**

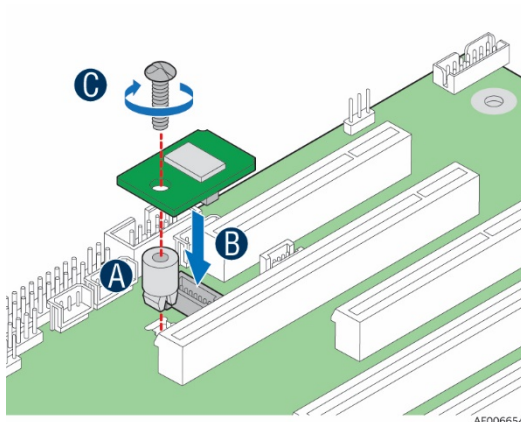
1. Remove the Intel® RMM4 Lite key from its packaging.
2. Locate the Intel® RMM4 Lite connector on the server board between the first two PCIe slots.
3. Place the Intel® RMM4 Lite key over the connector and match the orientation of the key to that of the connector.
4. Press the key down onto the connector.

### 3.5.2 Intel® RMM4 Lite Key Removal

1. Power off the system and disconnect the power cable(s).
2. Remove the chassis side cover.
3. Carefully grasp the key and pull it up until it disengages from the connector.

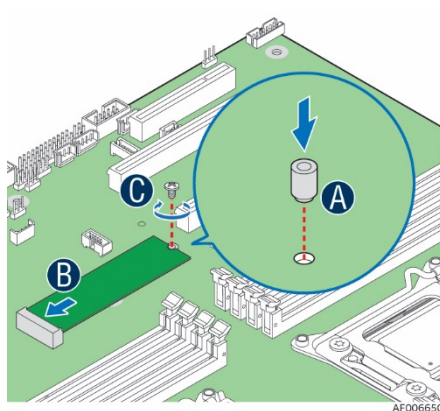


## 3.6 Trusted Platform Module (TPM) Installation



1. Locate the TPM module connector on the server board near the first PCIe slot.
2. Install the stand-off to the server board mounting hole (see letter "A").
3. Place the TPM module over the connector, match the orientation and press the key down onto the connector (see letter "B").
4. Secure the TPM module to the stand-off with the screw (see letter "C").

## 3.7 M.2 Installation



1. Locate the M.2 connector on the server board near the DIMM slot.
2. Install the stand-off to the server board mounting hole (see letter "A").
3. Slide the M.2 device into the connector (see letter "B").
4. Secure the TPM module to the stand-off with the screw (see letter "C").

## 4. System Software Updates and Configuration

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### 4.1 Updating the System Software Stack

The system includes a software stack to operate. This includes a BIOS, BMC firmware, ME firmware, and FRU & SDR data. A default software stack is loaded during the system manufacturing process. However, it may not be the latest available. For best operation and system reliability, it is highly recommended to update the system software stack to the latest available.

The latest system software stack can be downloaded from Intel at the following Intel web site:

<http://downloadcenter.intel.com>

At a minimum, after the initial configuration, the system's FRU and SDR data **MUST** be updated to ensure that the embedded platform management sub-system is configured properly. The system's FRU and SDR data is updated by running the **FRUSDR utility**. Properly loaded FRU and SDR data allows platform management to monitor the appropriate system sensors which are used to determine proper system cooling, best performance, and accurate error reporting. The FRUSDR Utility is included in the platform's System Update Package (SUP) which can be downloaded from the Intel web site referenced above. The System Update Package will include full system update instructions.

### 4.2 Using the BIOS Setup Utility

This section describes how to access and navigate the embedded <F2> BIOS Setup utility. This utility can be used to view and configure system settings that determine how the server operates.

#### 4.2.1 Entering BIOS Setup

To enter the BIOS Setup using a keyboard (or emulated keyboard), press the <F2> function key during boot time when the OEM or Intel Logo Screen or the POST Diagnostic Screen is displayed.

**Note:** *At initial system power-on, a USB Keyboard will not be functional until the USB controller has been initialized during the power on self-test (POST) process. When the USB controller is initialized, the system will beep once. Only after that time will the key strokes from a USB Keyboard be recognized allowing for access into the <F2> BIOS Setup utility.*

The following message will be displayed on the Diagnostic Screen or under the Quiet Boot Logo Screen:

Press <F2> to enter setup, <F6> Boot Menu, <F12> Network Boot

After pressing the <F2> key, the system will eventually load the BIOS Setup Utility and display the BIOS Setup Main Menu screen.

**Note:** *Should serious system errors occur during the POST process, the regular system boot will stop and the system will load the BIOS Setup Utility and display the Error Manager Screen. The Error Manager Screen will list and provide information about the specific boot errors detected.*

#### 4.2.2 No Access to the BIOS Setup Utility

If the BIOS Setup Utility is not accessible by hitting the <F2> key or other described access methods, it may be necessary to restore the BIOS default settings.

## 4.2.3 Navigating the BIOS Setup Utility

The BIOS Setup Utility consists of several menu screens, each holding either informational fields and/or configurable system setup options.

The bottom right portion of each menu screen provides a list of commands that are used to navigate through the Setup utility. These commands are displayed at all times.

If no Administrator or User password is used, all available settings are configurable and can be set by anyone with access to BIOS Setup.

System settings that are not configurable, because of security settings or configuration limits, will be greyed out and are not accessible.

**Table 2. BIOS Setup: Keyboard Command Bar**

Key	Option	Description
<Enter>	Execute Command	The <Enter> key is used to activate submenus when the selected feature is a submenu, or to display a pick list if a selected option has a value field, or to select a subfield for multi-valued features like time and date. If a pick list is displayed, the <Enter> key selects the currently highlighted item, undoes the pick list, and returns the focus to the parent menu.
<Esc>	Exit	The <Esc> key provides a mechanism for backing out of any field. When the <Esc> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered.  When the <Esc> key is pressed in any submenu, the parent menu is re-entered. When the <Esc> key is pressed in any major menu, the exit confirmation window is displayed and the user is asked whether changes can be discarded. If “No” is selected and the <Enter> key is pressed, or if the <Esc> key is pressed, the user is returned to where they were before <Esc> was pressed, without affecting any existing settings. If “Yes” is selected and the <Enter> key is pressed, the setup is exited and the BIOS returns to the main System Options Menu screen.
↑	Select Item	The up arrow is used to select the previous value in a pick list, or the previous option in a menu item's option list. The selected item must then be activated by pressing the <Enter> key.
↓	Select Item	The down arrow is used to select the next value in a menu item's option list, or a value fields pick list. The selected item must then be activated by pressing the <Enter> key.
← →	Select Menu	The left and right arrow keys are used to move between the major menu pages. The keys have no effect if a sub-menu or pick list is displayed.
<Tab>	Select Field	The <Tab> key is used to move between fields. For example, <Tab> can be used to move from hours to minutes in the time item in the main menu.
-	Change Value	The minus key on the keypad is used to change the value of the current item to the previous value. This key scrolls through the values in the associated pick list without displaying the full list.
+	Change Value	The plus key on the keypad is used to change the value of the current menu item to the next value. This key scrolls through the values in the associated pick list without displaying the full list. On 106-key Japanese keyboards, the plus key has a different scan code than the plus key on the other keyboards, but will have the same effect.

Key	Option	Description
<F9>	Setup Defaults	<p>Pressing the &lt;F9&gt; key causes the following to display:</p> <div data-bbox="695 247 1425 327" style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">Load Optimized Defaults? Yes No</p> </div> <p>If "Yes" is highlighted and &lt;Enter&gt; is pressed, all Setup fields are set to their default values. If "No" is highlighted and &lt;Enter&gt; is pressed, or if the &lt;Esc&gt; key is pressed, the user is returned to where they were before &lt;F9&gt; was pressed without affecting any existing field values.</p>
<F10>	Save and Exit	<p>Pressing the &lt;F10&gt; key causes the following message to display:</p> <div data-bbox="695 604 1425 684" style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">Save configuration and reset? Yes No</p> </div> <p>If "Yes" is highlighted and &lt;Enter&gt; is pressed, all changes are saved and the Setup is exited. If "No" is highlighted and &lt;Enter&gt; is pressed, or the &lt;Esc&gt; key is pressed, the user is returned to where they were before &lt;F10&gt; was pressed without affecting any existing values.</p>

## 5. System Features Overview

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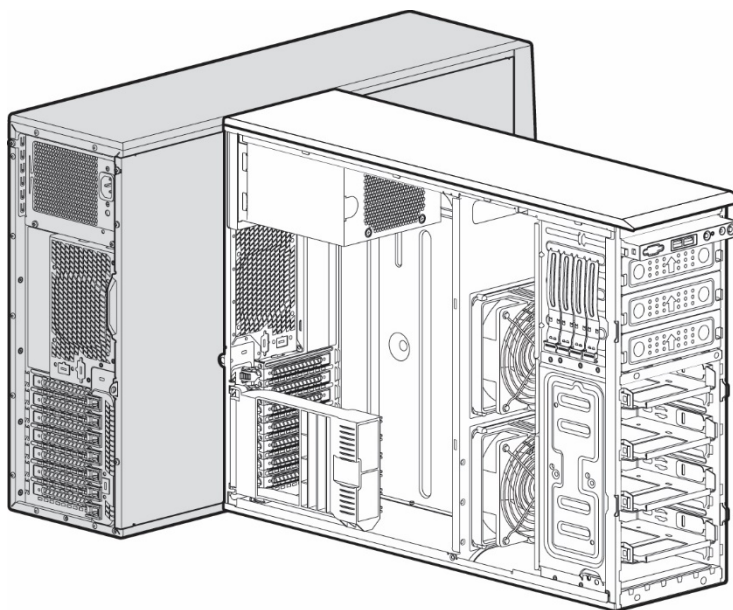
The intent of this chapter is to provide service personnel a reference to locate and identify the features associated with the Intel® Server Board S2600CW and Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX product family.

Additional information for this product family can be obtained from the following Intel documents which can be downloaded from the following Intel web site: <http://www.intel.com/support>

- Intel® Server Board S2600CW Technical Product Specification
- Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX Technical Product Specification

### 5.1 System Feature Reference Diagrams

This section provides a high level overview of the Intel® Server Chassis P4304XXMFEN2/P4304XXMUXX product family. It provides illustrations and diagrams showing the location of important components, features, and connections found throughout the server chassis.



AF006864

**Figure 43. Intel® Server Chassis P4304XXMFEN2 Features Overview**

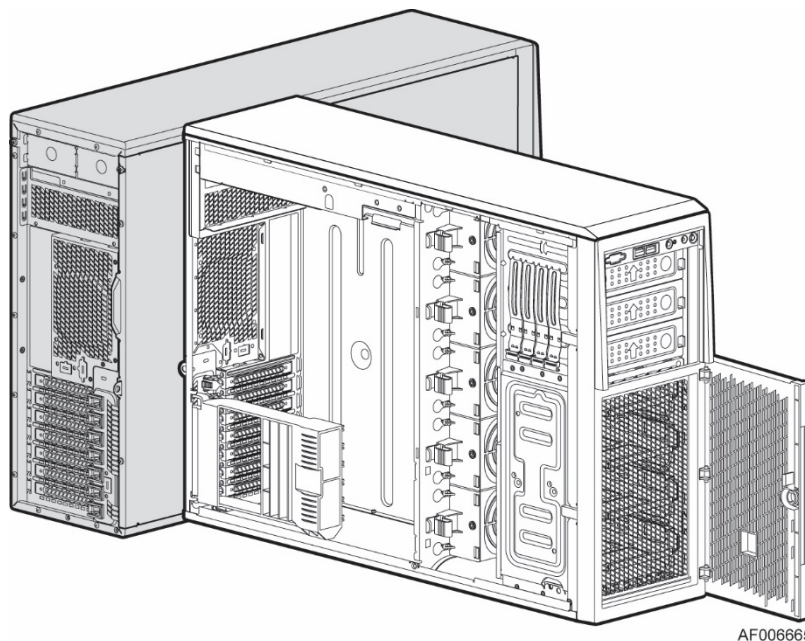


Figure 44. Intel® Server Chassis P4304XXMUXX Features Overview

### 5.1.1 Front Drive Bay Options

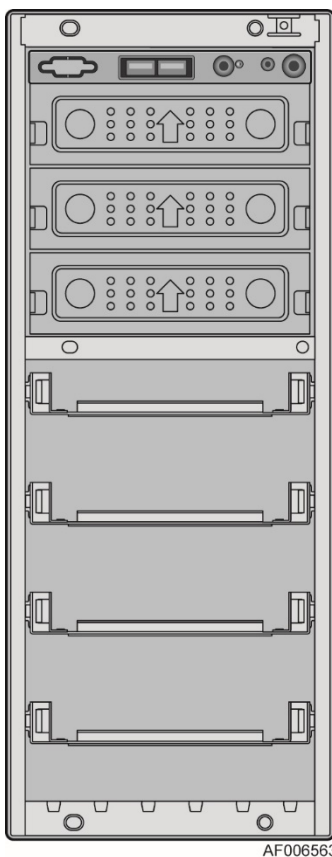
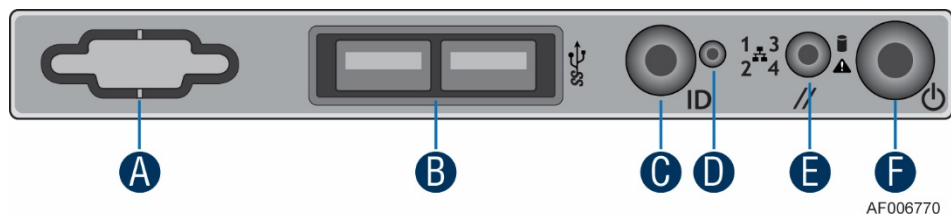


Figure 45. No Front Drive Bay Configuration – Chassis-only Building Block

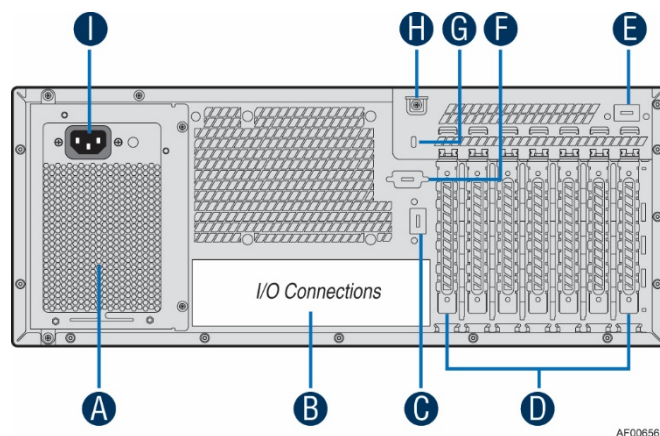
## 5.1.2 Control Panel Features



A	Reserved	B	USB Connectors
C	ID Button	D	NMI Button
E	System Reset Button	F	System Power Button

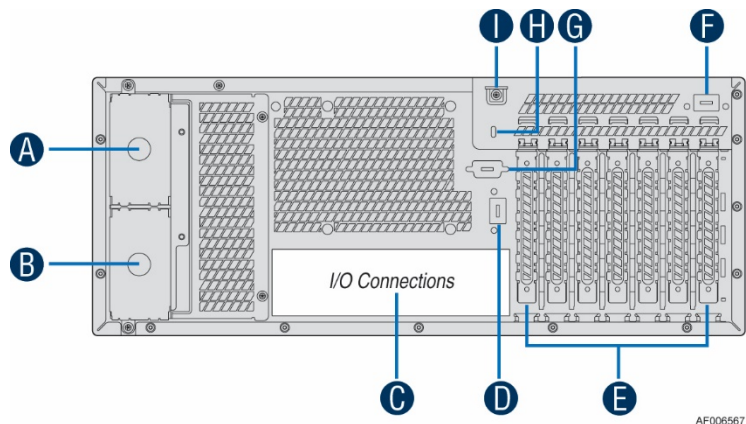
Figure 46. P4304XXMFEN2/P4304XXMUXX Front Panel

## 5.1.3 Back Panel Features



A	Power Supply	F	Serial-B Port (Optional)
B	IO Connectors	G	Kensington* Cable Lock Mounting Hole
C	RMM4 NIC Port (Optional)	H	Padlock Loop
D	Add in PCI-e cards	I	Power Connector
E	RMM4 NIC Port (Optional)		

Figure 47. P4304XXMFEN2 Back Panel

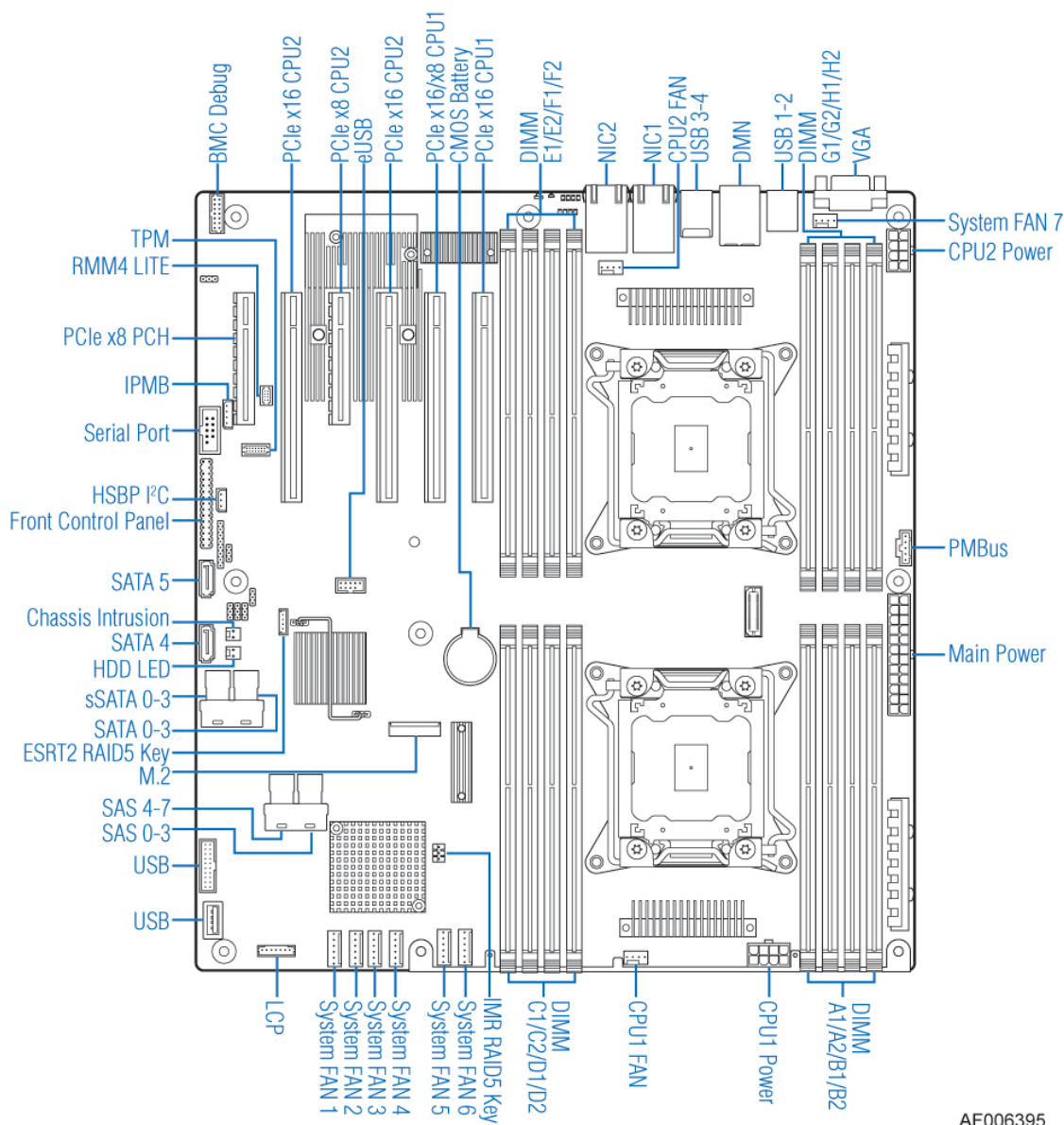


A	Power Connector (filler only)	F	RMM4 NIC Port (Optional)
B	Power Connector (filler only)	G	Serial-B Port (Optional)
C	IO Connectors	H	Kensington* Cable Lock Mounting Hole
D	RMM4 NIC Port (Optional)	I	Padlock Loop
E	Add in PCI-e cards		

**Figure 48. P4304XXMUXX Back Panel**

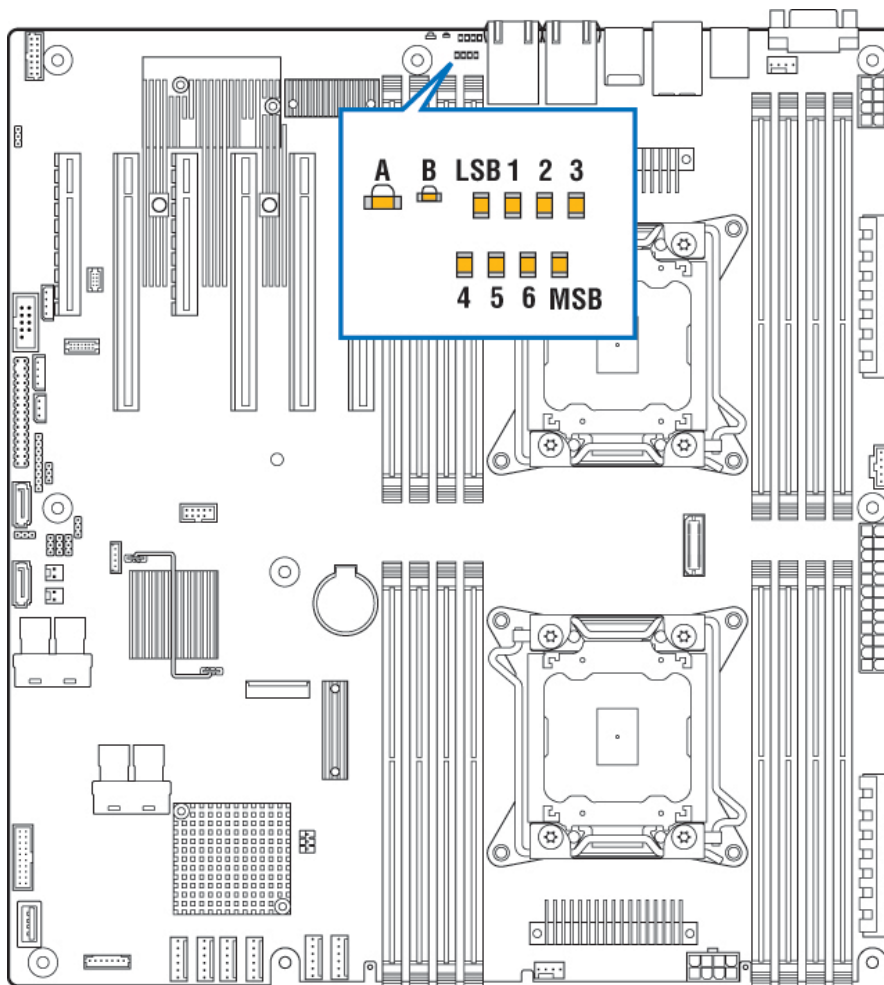


## 5.1.4 Server Board Features



AF006395

**Figure 49. Server Board Feature Identification**



AF006382

Callout	Description
A	System Status LED
B	System ID LED
LSB 1 2 3 4 5 6 MSB	POST Code Diagnostic LEDs

**Figure 50. Intel® Light-Guided Diagnostic LEDs – Server Board**

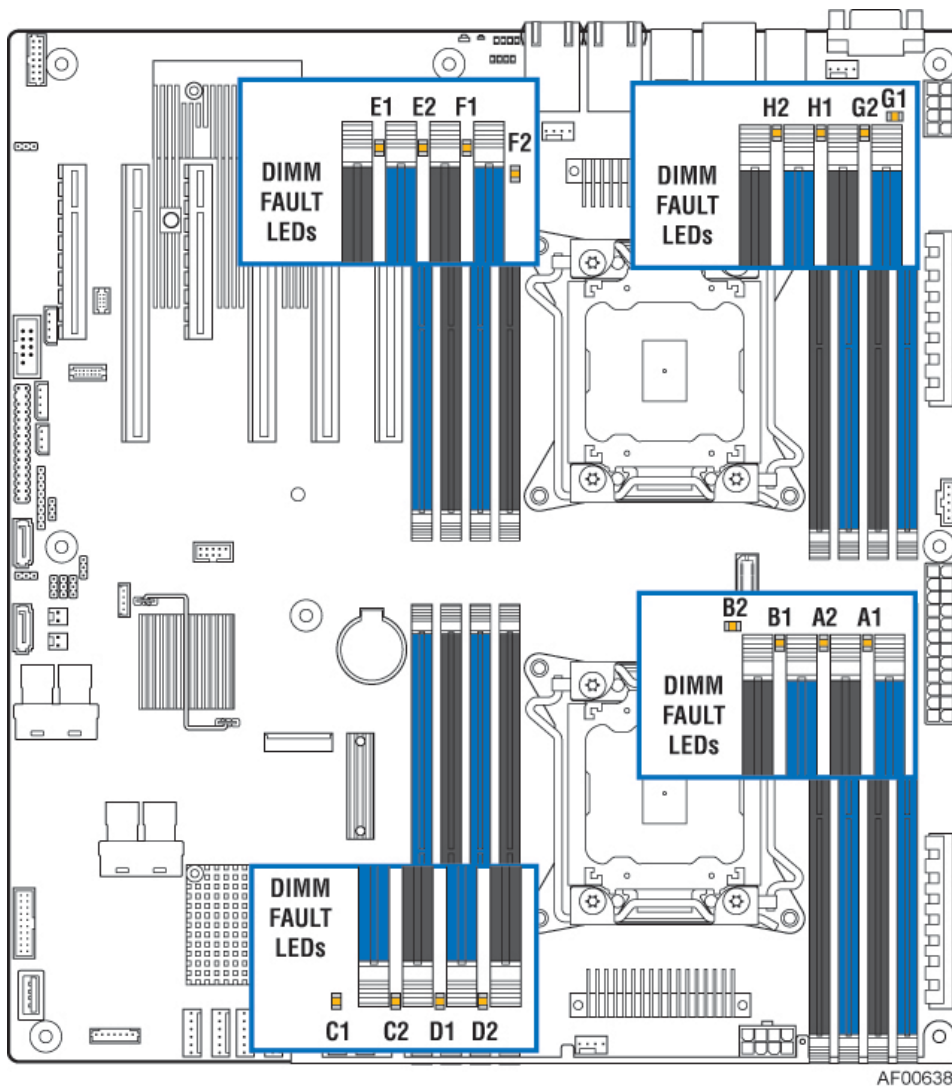


Figure 51. DIMM Fault LEDs

## 5.2 System Configuration and Recovery Jumpers

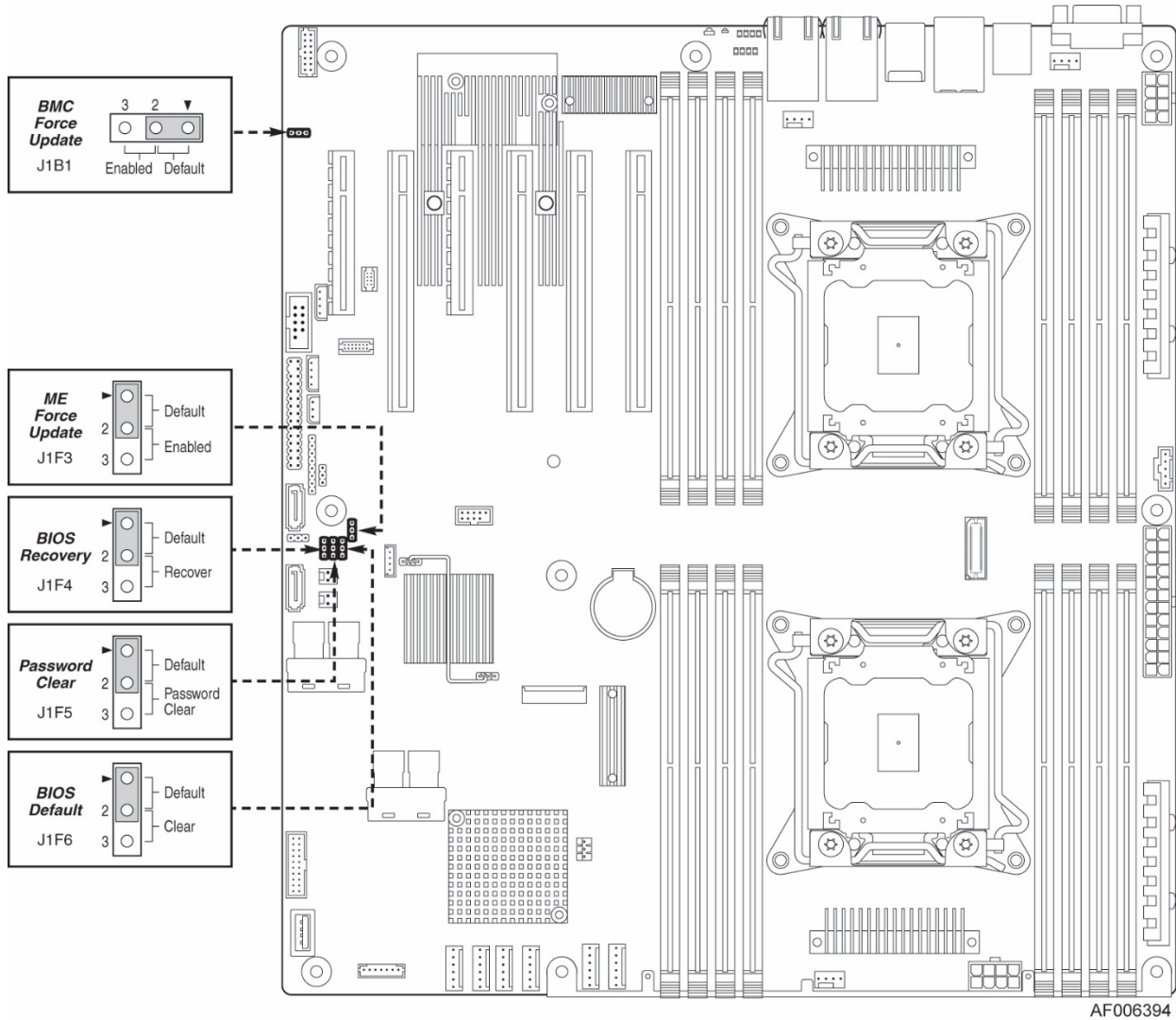


Figure 52. System Configuration and Recovery Jumpers

Jumper Name	Jumper Purpose
BIOS Recover	In the unlikely event the system BIOS gets corrupted, the system should automatically load an embedded backup image of the BIOS. If for any reason the BIOS backup does not automatically get installed, the BIOS recovery jumper can be used to force the system to boot to the uEFI shell and allow for a manual BIOS update. With the system powered off, move the jumper block from pins 1-2 (default) to pins 2-3. Power on the system. The system will boot into the embedded uEFI shell allowing for a BIOS update using the standard BIOS update files included in the System Update Package (SUP). When the update has finished, power down the system and move the jumper block back to its default position over pins 1-2.
ME Force Update	To place the system in a ME Force Update Mode, power off the system and move the jumper block to pins 2-3. When set, this option will disable all but the essential Management Engine functions. The default setting for this option is to have the jumper block installed over pins 1-2
Password Clear	To clear both the Administrator and User passwords (as set in BIOS Setup), power off the system and move the jumper block to pins 2-3. Power on the system. The passwords are cleared within five to ten seconds after the system is powered on. Power off the system and move the jumper block back to its default position over pins 1-2.

Jumper Name	Jumper Purpose
BIOS Default	To reset all BIOS setup options back to factory defaults, power off the system and move this jumper block to pins 2-3. Power on the system and allow the system to complete the power on self-test (POST) process. Power off the system. Move the jumper block back to its default position over pins 1-2.
BMC Force Update	To place the system in a BMC Force Update Mode, power off the system and move the jumper block to pins 2-3. When set, this option will disable all but the essential baseboard management functions. The default setting for this option is to have the jumper block installed over pins 1-2

## Appendix A: Getting Help

If you encounter an issue with your server chassis, follow these steps to obtain support:

1. Visit the following Intel support web page:  
<http://www.intel.com/support/>  
This web page provides 24x7 support when you need it to get the latest and most complete technical support information on all Intel Enterprise Server and Storage Platforms. Information available at the support site includes:
  - Latest BIOS, firmware, drivers and utilities
  - Product documentation, installation and quick start guides
  - Full product specifications, technical advisories and errata
  - Compatibility documentation for memory, hardware add-in cards, chassis support matrix and operating systems
  - Server and chassis accessory parts list for ordering upgrades or spare parts
  - A searchable knowledgebase to search for product information throughout the support site
2. If you are still unable to obtain a solution to your issue, send an email to Intel's technical support center using the online form available at  
<http://www.intel.com/support/feedback.htm?group=server>.
3. Lastly, you can contact an Intel support representative using one of the support phone numbers available at <http://www.intel.com/support/feedback.htm?group=server> (charges may apply).

Intel also offers Channel Program members around-the-clock 24x7 technical phone support on Intel® server boards, server chassis, server RAID controller cards, and Intel® Server Management at <http://www.intel.com/reseller/>.

**Note:** You will need to log in to the Reseller site to obtain the 24x7 number.

### Warranty Information

To obtain warranty information, visit the following Intel web site:

<http://www.intel.com/support/warranty>

## Appendix B: POST Code Diagnostic LED Decoder Table

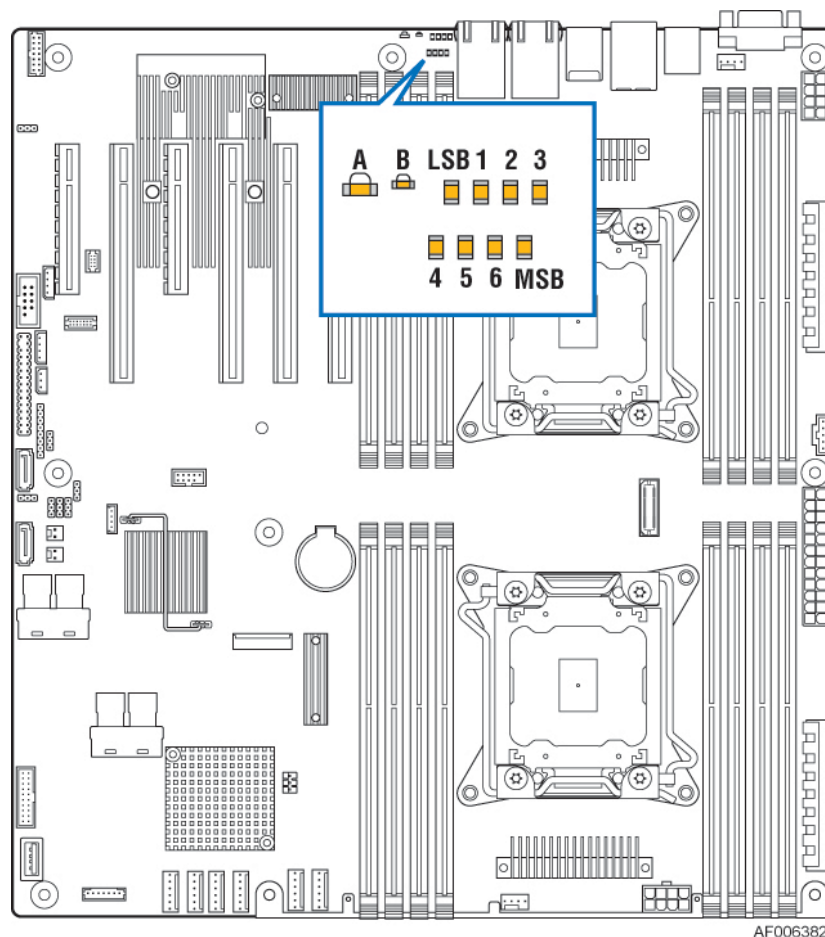
As an aid to assist in trouble shooting a system hang that occurs during a system's Power-On Self-Test (POST) process, the server board includes a bank of eight POST Code Diagnostic LEDs on the back edge of the server board.

During the system boot process, Memory Reference Code (MRC) and System BIOS execute a number of memory initialization and platform configuration processes, each of which is assigned a hex POST code number.

As each routine is started, the given POST code number is displayed to the POST Code Diagnostic LEDs on the back edge of the server board.

During a POST system hang, the displayed post code can be used to identify the last POST routine that was run prior to the error occurring, helping to isolate the possible cause of the hang condition.

Each POST code is represented by eight LEDs; four Green and four Amber. The POST codes are divided into two nibbles, an upper nibble and a lower nibble. The upper nibble bits are represented by Amber Diagnostic LEDs #4, #5, #6, #7. The lower nibble bits are represented by Green Diagnostics LEDs #0, #1, #2 and #3. If the bit is set in the upper and lower nibbles, the corresponding LED is lit. If the bit is clear, the corresponding LED is off.



**Figure 53. POST Diagnostic LED Location**

In the following example, the BIOS sends a value of ACh to the diagnostic LED decoder. The LEDs are decoded as follows:

**Note:** Diag LEDs are best read and decoded when viewing the LEDs from the back of the system.

**Table 3. POST Progress Code LED Example**

LEDs	Upper Nibble AMBER LEDs				Lower Nibble GREEN LEDs			
	MSB							LSB
	LED #7	LED #6	LED #5	LED #4	LED #3	LED #2	LED #1	LED #0
	8h	4h	2h	1h	8h	4h	2h	1h
Status	ON	OFF	ON	OFF	ON	ON	OFF	OFF
Results	1	0	1	0	1	1	0	0
	Ah				Ch			

Upper nibble bits = 1010b = Ah; Lower nibble bits = 1100b = Ch; the two are concatenated as ACh

### Early POST Memory Initialization MRC Diagnostic Codes

Memory Initialization at the beginning of POST includes multiple functions, including: discovery, channel training, validation that the DIMM population is acceptable and functional, initialization of the IMC and other hardware settings, and initialization of applicable RAS configurations.

The MRC Progress Codes are displays to the Diagnostic LEDs that show the execution point in the MRC operational path at each step.

**Table 4. MRC Progress Codes**

Checkpoint	Diagnostic LED Decoder								Description
	1 = LED On, 0 = LED Off								
	Upper Nibble				Lower Nibble				
	MSB							LSB	
	8h	4h	2h	1h	8h	4h	2h	1h	
LED	#7	#6	#5	#4	#3	#2	#1	#0	
MRC Progress Codes									
B0h	1	0	1	1	0	0	0	0	Detect DIMM population
B1h	1	0	1	1	0	0	0	1	Set DDR3 frequency
B2h	1	0	1	1	0	0	1	0	Gather remaining SPD data
B3h	1	0	1	1	0	0	1	1	Program registers on the memory controller level
B4h	1	0	1	1	0	1	0	0	Evaluate RAS modes and save rank information
B5h	1	0	1	1	0	1	0	1	Program registers on the channel level
B6h	1	0	1	1	0	1	1	0	Perform the JEDEC defined initialization sequence
B7h	1	0	1	1	0	1	1	1	Train DDR3 ranks
B8h	1	0	1	1	1	0	0	0	Initialize CLTT/OLTT
B9h	1	0	1	1	1	0	0	1	Hardware memory test and init
BAh	1	0	1	1	1	0	1	0	Execute software memory init
BBh	1	0	1	1	1	0	1	1	Program memory map and interleaving
BCh	1	0	1	1	1	1	0	0	Program RAS configuration
BFh	1	0	1	1	1	1	1	1	MRC is done

Should a major memory initialization error occur, preventing the system from booting with data integrity, a beep code is generated, the MRC will display a fatal error code on the diagnostic LEDs, and a system halt command is executed. Fatal MRC error halts do NOT change the state of the System Status LED, and they do NOT get logged as SEL events. The following table lists all MRC fatal errors that are displayed to the Diagnostic LEDs.

**Note:** Fatal MRC errors will display POST error codes that may be the same as BIOS POST progress codes displayed later in the POST process. The fatal MRC codes can be distinguished from the BIOS



POST progress codes by the accompanying memory failure beep code of 3 long beeps as identified in Table 8.

**Table 5. MRC Fatal Error Codes**

Checkpoint	Diagnostic LED Decoder								Description
	1 = LED On, 0 = LED Off								
	Upper Nibble				Lower Nibble				
	MSB							LSB	
	8h	4h	2h	1h	8h	4h	2h	1h	
LED	#7	#6	#5	#4	#3	#2	#1	#0	
MRC Fatal Error Codes									
E8h	1	1	1	0	1	0	0	0	No usable memory error 01h = No memory was detected from SPD read, or invalid config that causes no operable memory. 02h = Memory DIMMs on all channels of all sockets are disabled due to hardware memtest error. 03h = No memory installed. All channels are disabled.
E9h	1	1	1	0	1	0	0	1	Memory is locked by Intel Trusted Execution Technology and is inaccessible
EAh	1	1	1	0	1	0	1	0	DDR3 channel training error 01h = Error on read DQ/DQS (Data/Data Strobe) init 02h = Error on Receive Enable 03h = Error on Write Leveling 04h = Error on write DQ/DQS (Data/Data Strobe)
EBh	1	1	1	0	1	0	1	1	Memory test failure 01h = Software memtest failure. 02h = Hardware memtest failed. 03h = Hardware Memtest failure in Lockstep Channel mode requiring a channel to be disabled. This is a fatal error which requires a reset and calling MRC with a different RAS mode to retry.
EDh	1	1	1	0	1	1	0	1	DIMM configuration population error 01h = Different DIMM types (UDIMM, RDIMM, LRDIMM) are detected installed in the system. 02h = Violation of DIMM population rules. 03h = The 3rd DIMM slot cannot be populated when QR DIMMs are installed. 04h = UDIMMs are not supported in the 3rd DIMM slot. 05h = Unsupported DIMM Voltage.
EFh	1	1	1	0	1	1	1	1	Indicates a CLTT table structure error

**BIOS POST Progress Codes**

The following table provides a list of all POST progress codes.

**Table 6. POST Progress Codes**

Checkpoint	Diagnostic LED Decoder								Description
	1 = LED On, 0 = LED Off								
	Upper Nibble				Lower Nibble				
	MSB							LSB	
LED #	#7	#6	#5	#4	#3	#2	#1	#0	
SEC Phase									
01h	0	0	0	0	0	0	0	1	First POST code after CPU reset
02h	0	0	0	0	0	0	1	0	Microcode load begin
03h	0	0	0	0	0	0	1	1	CRAM initialization begin
04h	0	0	0	0	0	1	0	0	Pei Cache When Disabled
05h	0	0	0	0	0	1	0	1	SEC Core At Power On Begin.
06h	0	0	0	0	0	1	1	0	Early CPU initialization during Sec Phase.
07h	0	0	0	0	0	1	1	1	Early SB initialization during Sec Phase.
08h	0	0	0	0	1	0	0	0	Early NB initialization during Sec Phase.
09h	0	0	0	0	1	0	0	1	End Of Sec Phase.
0Eh	0	0	0	0	1	1	1	0	Microcode Not Found.
0Fh	0	0	0	0	1	1	1	1	Microcode Not Loaded.
PEI Phase									
10h	0	0	0	1	0	0	0	0	PEI Core
11h	0	0	0	1	0	0	0	1	CPU PEIM
15h	0	0	0	1	0	1	0	1	NB PEIM
19h	0	0	0	1	1	0	0	1	SB PEIM
MRC Process Codes – MRC Progress Code Sequence is executed – See Table 4. MRC Progress Codes									
PEI Phase continued...									
31h	0	0	1	1	0	0	0	1	Memory Installed
32h	0	0	1	1	0	0	1	0	CPU PEIM (Cpu Init)
33h	0	0	1	1	0	0	1	1	CPU PEIM (Cache Init)
34h	0	0	1	1	0	1	0	0	CPU PEIM (BSP Select)
35h	0	0	1	1	0	1	0	1	CPU PEIM (AP Init)
36h	0	0	1	1	0	1	1	0	CPU PEIM (CPU SMM Init)
4Fh	0	1	0	0	1	1	1	1	Dxe IPL started
DXE Phase									
60h	0	1	1	0	0	0	0	0	DXE Core started
61h	0	1	1	0	0	0	0	1	DXE NVRAM Init
62h	0	1	1	0	0	0	1	0	SB RUN Init
63h	0	1	1	0	0	0	1	1	Dxe CPU Init
68h	0	1	1	0	1	0	0	0	DXE PCI Host Bridge Init
69h	0	1	1	0	1	0	0	1	DXE NB Init
6Ah	0	1	1	0	1	0	1	0	DXE NB SMM Init
70h	0	1	1	1	0	0	0	0	DXE SB Init
71h	0	1	1	1	0	0	0	1	DXE SB SMM Init

Checkpoint	Diagnostic LED Decoder								Description
	1 = LED On, 0 = LED Off								
	Upper Nibble				Lower Nibble				
	MSB							LSB	
	8h	4h	2h	1h	8h	4h	2h	1h	
LED #	#7	#6	#5	#4	#3	#2	#1	#0	
72h	0	1	1	1	0	0	1	0	DXE SB devices Init
78h	0	1	1	1	1	0	0	0	DXE ACPI Init
79h	0	1	1	1	1	0	0	1	DXE CSM Init
90h	1	0	0	1	0	0	0	0	DXE BDS Started
91h	1	0	0	1	0	0	0	1	DXE BDS connect drivers
92h	1	0	0	1	0	0	1	0	DXE PCI Bus begin
93h	1	0	0	1	0	0	1	1	DXE PCI Bus HPC Init
94h	1	0	0	1	0	1	0	0	DXE PCI Bus enumeration
95h	1	0	0	1	0	1	0	1	DXE PCI Bus resource requested
96h	1	0	0	1	0	1	1	0	DXE PCI Bus assign resource
97h	1	0	0	1	0	1	1	1	DXE CON_OUT connect
98h	1	0	0	1	1	0	0	0	DXE CON_IN connect
99h	1	0	0	1	1	0	0	1	DXE SIO Init
9Ah	1	0	0	1	1	0	1	0	DXE USB start
9Bh	1	0	0	1	1	0	1	1	DXE USB reset
9Ch	1	0	0	1	1	1	0	0	DXE USB detect
9Dh	1	0	0	1	1	1	0	1	DXE USB enable
A1h	1	0	1	0	0	0	0	1	DXE IDE begin
A2h	1	0	1	0	0	0	1	0	DXE IDE reset
A3h	1	0	1	0	0	0	1	1	DXE IDE detect
A4h	1	0	1	0	0	1	0	0	DXE IDE enable
A5h	1	0	1	0	0	1	0	1	DXE SCSI begin
A6h	1	0	1	0	0	1	1	0	DXE SCSI reset
A7h	1	0	1	0	0	1	1	1	DXE SCSI detect
A8h	1	0	1	0	1	0	0	0	DXE SCSI enable
A9h	1	0	1	0	1	0	0	1	DXE verifying SETUP password
ABh	1	0	1	0	1	0	1	1	DXE SETUP start
ACh	1	0	1	0	1	1	0	0	DXE SETUP input wait
ADh	1	0	1	0	1	1	0	1	DXE Ready to Boot
A Eh	1	0	1	0	1	1	1	0	DXE Legacy Boot
AFh	1	0	1	0	1	1	1	1	DXE Exit Boot Services
B0h	1	0	1	1	0	0	0	0	RT Set Virtual Address Map Begin
B1h	1	0	1	1	0	0	0	1	RT Set Virtual Address Map End
B2h	1	0	1	1	0	0	1	0	DXE Legacy Option ROM init
B3h	1	0	1	1	0	0	1	1	DXE Reset system
B4h	1	0	1	1	0	1	0	0	DXE USB Hot plug
B5h	1	0	1	1	0	1	0	1	DXE PCI BUS Hot plug
B6h	1	0	1	1	0	1	1	0	DXE NVRAM cleanup
B7h	1	0	1	1	0	1	1	1	DXE Configuration Reset
00h	0	0	0	0	0	0	0	0	INT19

Checkpoint	Diagnostic LED Decoder								Description
	1 = LED On, 0 = LED Off								
	Upper Nibble				Lower Nibble				
	MSB							LSB	
LED #	#7	#6	#5	#4	#3	#2	#1	#0	
S3 Resume									
E0h	1	1	1	0	0	0	0	0	S3 Resume PEIM (S3 started)
E1h	1	1	1	0	0	0	0	1	S3 Resume PEIM (S3 boot script)
E2h	1	1	1	0	0	0	1	0	S3 Resume PEIM (S3 Video Repost)
E3h	1	1	1	0	0	0	1	1	S3 Resume PEIM (S3 OS wake)
BIOS Recovery									
F0h	1	1	1	1	0	0	0	0	PEIM which detected forced Recovery condition
F1h	1	1	1	1	0	0	0	1	PEIM which detected User Recovery condition
F2h	1	1	1	1	0	0	1	0	Recovery PEIM (Recovery started)
F3h	1	1	1	1	0	0	1	1	Recovery PEIM (Capsule found)
F4h	1	1	1	1	0	1	0	0	Recovery PEIM (Capsule loaded)

## Appendix C: POST Code Errors

Most error conditions encountered during POST are reported using POST Error Codes. These codes represent specific failures, warnings, or are informational. POST Error Codes may be displayed in the Error Manager Display screen, and are always logged to the System Event Log (SEL). Logged events are available to System Management applications, including Remote and Out of Band (OOB) management. There are exception cases in early initialization where system resources are not adequately initialized for handling POST Error Code reporting. These cases are primarily Fatal Error conditions resulting from initialization of processors and memory, and they are handled by a Diagnostic LED display with a system halt.

The following table lists the supported POST Error Codes. Each error code is assigned an error type which determines the action the BIOS will take when the error is encountered. Error types include Minor, Major, and Fatal. The BIOS action for each is defined as follows:

- **Minor:** The error message is displayed on the screen or on the Error Manager screen, and an error is logged to the SEL. The system continues booting in a degraded state. The user may want to replace the erroneous unit. The POST Error Pause option setting in the BIOS setup does not have any effect on this error.
- **Major:** The error message is displayed on the Error Manager screen, and an error is logged to the SEL. The POST Error Pause option setting in the BIOS setup determines whether the system pauses to the Error Manager for this type of error so the user can take immediate corrective action or the system continues booting.

Note that for 0048 “Password check failed”, the system halts, and then after the next reset/reboot will display the error code on the Error Manager screen.

- **Fatal:** The system halts during post at a blank screen with the text **“Unrecoverable fatal error found. System will not boot until the error is resolved” and “Press <F2> to enter setup”** The POST Error Pause option setting in the BIOS setup does not have any effect with this class of error.

When the operator presses the **F2** key on the keyboard, the error message is displayed on the Error Manager screen, and an error is logged to the SEL with the error code. The system cannot boot unless the error is resolved. The user needs to replace the faulty part and restart the system.

**Note:** The POST error codes in the following table are common to all current generation Intel server platforms. Features present on a given server board/system will determine which of the listed error codes are supported.

**Table 7. POST Error Codes and Messages**

Error Code	Error Message	Response
0012	System RTC date/time not set	Major
0048	Password check failed	Major
0140	PCI component encountered a PERR error	Major
0141	PCI resource conflict	Major
0146	PCI out of resources error	Major
0191	Processor core/thread count mismatch detected	Fatal
0192	Processor cache size mismatch detected	Fatal
0194	Processor family mismatch detected	Fatal
0195	Processor Intel(R) QPI link frequencies unable to synchronize	Fatal
0196	Processor model mismatch detected	Fatal
0197	Processor frequencies unable to synchronize	Fatal

Error Code	Error Message	Response
5220	BIOS Settings reset to default settings	Major
5221	Passwords cleared by jumper	Major
5224	Password clear jumper is Set	Major
8130	Processor 01 disabled	Major
8131	Processor 02 disabled	Major
8160	Processor 01 unable to apply microcode update	Major
8161	Processor 02 unable to apply microcode update	Major
8170	Processor 01 failed Self Test (BIST)	Major
8171	Processor 02 failed Self Test (BIST)	Major
8180	Processor 01 microcode update not found	Minor
8181	Processor 02 microcode update not found	Minor
8190	Watchdog timer failed on last boot	Major
8198	OS boot watchdog timer failure	Major
8300	Baseboard management controller failed self test	Major
8305	Hot Swap Controller failure	Major
83A0	Management Engine (ME) failed self test	Major
83A1	Management Engine (ME) Failed to respond.	Major
84F2	Baseboard management controller failed to respond	Major
84F3	Baseboard management controller in update mode	Major
84F4	Sensor data record empty	Major
84FF	System event log full	Minor
8500	Memory component could not be configured in the selected RAS mode	Major
8501	DIMM Population Error	Major
8520	DIMM_A1 failed test/initialization	Major
8521	DIMM_A2 failed test/initialization	Major
8522	DIMM_A3 failed test/initialization	Major
8523	DIMM_B1 failed test/initialization	Major
8524	DIMM_B2 failed test/initialization	Major
8525	DIMM_B3 failed test/initialization	Major
8526	DIMM_C1 failed test/initialization	Major
8527	DIMM_C2 failed test/initialization	Major
8528	DIMM_C3 failed test/initialization	Major
8529	DIMM_D1 failed test/initialization	Major
852A	DIMM_D2 failed test/initialization	Major
852B	DIMM_D3 failed test/initialization	Major
852C	DIMM_E1 failed test/initialization	Major
852D	DIMM_E2 failed test/initialization	Major
852E	DIMM_E3 failed test/initialization	Major
852F	DIMM_F1 failed test/initialization	Major
8530	DIMM_F2 failed test/initialization	Major
8531	DIMM_F3 failed test/initialization	Major
8532	DIMM_G1 failed test/initialization	Major
8533	DIMM_G2 failed test/initialization	Major
8534	DIMM_G3 failed test/initialization	Major
8535	DIMM_H1 failed test/initialization	Major

Error Code	Error Message	Response
8536	DIMM_H2 failed test/initialization	Major
8537	DIMM_H3 failed test/initialization	Major
8538	DIMM_J1 failed test/initialization	Major
8539	DIMM_J2 failed test/initialization	Major
853A	DIMM_J3 failed test/initialization	Major
853B	DIMM_K1 failed test/initialization	Major
853C	DIMM_K2 failed test/initialization	Major
853D	DIMM_K3 failed test/initialization	Major
853E	DIMM_L1 failed test/initialization	Major
853F (Go to 85C0)	DIMM_L2 failed test/initialization	Major
8540	DIMM_A1 disabled	Major
8541	DIMM_A2 disabled	Major
8542	DIMM_A3 disabled	Major
8543	DIMM_B1 disabled	Major
8544	DIMM_B2 disabled	Major
8545	DIMM_B3 disabled	Major
8546	DIMM_C1 disabled	Major
8547	DIMM_C2 disabled	Major
8548	DIMM_C3 disabled	Major
8549	DIMM_D1 disabled	Major
854A	DIMM_D2 disabled	Major
854B	DIMM_D3 disabled	Major
854C	DIMM_E1 disabled	Major
854D	DIMM_E2 disabled	Major
854E	DIMM_E3 disabled	Major
854F	DIMM_F1 disabled	Major
8550	DIMM_F2 disabled	Major
8551	DIMM_F3 disabled	Major
8552	DIMM_G1 disabled	Major
8553	DIMM_G2 disabled	Major
8554	DIMM_G3 disabled	Major
8555	DIMM_H1 disabled	Major
8556	DIMM_H2 disabled	Major
8557	DIMM_H3 disabled	Major
8558	DIMM_J1 disabled	Major
8559	DIMM_J2 disabled	Major
855A	DIMM_J3 disabled	Major
855B	DIMM_K1 disabled	Major
855C	DIMM_K2 disabled	Major
855D	DIMM_K3 disabled	Major
855E	DIMM_L1 disabled	Major
855F (Go to 85D0)	DIMM_L2 disabled	Major

Error Code	Error Message	Response
8560	DIMM_A1 encountered a Serial Presence Detection (SPD) failure	Major
8561	DIMM_A2 encountered a Serial Presence Detection (SPD) failure	Major
8562	DIMM_A3 encountered a Serial Presence Detection (SPD) failure	Major
8563	DIMM_B1 encountered a Serial Presence Detection (SPD) failure	Major
8564	DIMM_B2 encountered a Serial Presence Detection (SPD) failure	Major
8565	DIMM_B3 encountered a Serial Presence Detection (SPD) failure	Major
8566	DIMM_C1 encountered a Serial Presence Detection (SPD) failure	Major
8567	DIMM_C2 encountered a Serial Presence Detection (SPD) failure	Major
8568	DIMM_C3 encountered a Serial Presence Detection (SPD) failure	Major
8569	DIMM_D1 encountered a Serial Presence Detection (SPD) failure	Major
856A	DIMM_D2 encountered a Serial Presence Detection (SPD) failure	Major
856B	DIMM_D3 encountered a Serial Presence Detection (SPD) failure	Major
856C	DIMM_E1 encountered a Serial Presence Detection (SPD) failure	Major
856D	DIMM_E2 encountered a Serial Presence Detection (SPD) failure	Major
856E	DIMM_E3 encountered a Serial Presence Detection (SPD) failure	Major
856F	DIMM_F1 encountered a Serial Presence Detection (SPD) failure	Major
8570	DIMM_F2 encountered a Serial Presence Detection (SPD) failure	Major
8571	DIMM_F3 encountered a Serial Presence Detection (SPD) failure	Major
8572	DIMM_G1 encountered a Serial Presence Detection (SPD) failure	Major
8573	DIMM_G2 encountered a Serial Presence Detection (SPD) failure	Major
8574	DIMM_G3 encountered a Serial Presence Detection (SPD) failure	Major
8575	DIMM_H1 encountered a Serial Presence Detection (SPD) failure	Major
8576	DIMM_H2 encountered a Serial Presence Detection (SPD) failure	Major
8577	DIMM_H3 encountered a Serial Presence Detection (SPD) failure	Major
8578	DIMM_J1 encountered a Serial Presence Detection (SPD) failure	Major
8579	DIMM_J2 encountered a Serial Presence Detection (SPD) failure	Major
857A	DIMM_J3 encountered a Serial Presence Detection (SPD) failure	Major
857B	DIMM_K1 encountered a Serial Presence Detection (SPD) failure	Major
857C	DIMM_K2 encountered a Serial Presence Detection (SPD) failure	Major
857D	DIMM_K3 encountered a Serial Presence Detection (SPD) failure	Major
857E	DIMM_L1 encountered a Serial Presence Detection (SPD) failure	Major
857F (Go to 85E0)	DIMM_L2 encountered a Serial Presence Detection (SPD) failure	Major
85C0	DIMM_L3 failed test/initialization	Major
85C1	DIMM_M1 failed test/initialization	Major
85C2	DIMM_M2 failed test/initialization	Major
85C3	DIMM_M3 failed test/initialization	Major
85C4	DIMM_N1 failed test/initialization	Major
85C5	DIMM_N2 failed test/initialization	Major
85C6	DIMM_N3 failed test/initialization	Major
85C7	DIMM_P1 failed test/initialization	Major
85C8	DIMM_P2 failed test/initialization	Major
85C9	DIMM_P3 failed test/initialization	Major
85CA	DIMM_R1 failed test/initialization	Major
85CB	DIMM_R2 failed test/initialization	Major



Error Code	Error Message	Response
85CC	DIMM_R3 failed test/initialization	Major
85CD	DIMM_T1 failed test/initialization	Major
85CE	DIMM_T2 failed test/initialization	Major
85CF	DIMM_T3 failed test/initialization	Major
85D0	DIMM_L3 disabled	Major
85D1	DIMM_M1 disabled	Major
85D2	DIMM_M2 disabled	Major
85D3	DIMM_M3 disabled	Major
85D4	DIMM_N1 disabled	Major
85D5	DIMM_N2 disabled	Major
85D6	DIMM_N3 disabled	Major
85D7	DIMM_P1 disabled	Major
85D8	DIMM_P2 disabled	Major
85D9	DIMM_P3 disabled	Major
85DA	DIMM_R1 disabled	Major
85DB	DIMM_R2 disabled	Major
85DC	DIMM_R3 disabled	Major
85DD	DIMM_T1 disabled	Major
85DE	DIMM_T2 disabled	Major
85DF	DIMM_T3 disabled	Major
85E0	DIMM_L3 encountered a Serial Presence Detection (SPD) failure	Major
85E1	DIMM_M1 encountered a Serial Presence Detection (SPD) failure	Major
85E2	DIMM_M2 encountered a Serial Presence Detection (SPD) failure	Major
85E3	DIMM_M3 encountered a Serial Presence Detection (SPD) failure	Major
85E4	DIMM_N1 encountered a Serial Presence Detection (SPD) failure	Major
85E5	DIMM_N2 encountered a Serial Presence Detection (SPD) failure	Major
85E6	DIMM_N3 encountered a Serial Presence Detection (SPD) failure	Major
85E7	DIMM_P1 encountered a Serial Presence Detection (SPD) failure	Major
85E8	DIMM_P2 encountered a Serial Presence Detection (SPD) failure	Major
85E9	DIMM_P3 encountered a Serial Presence Detection (SPD) failure	Major
85EA	DIMM_R1 encountered a Serial Presence Detection (SPD) failure	Major
85EB	DIMM_R2 encountered a Serial Presence Detection (SPD) failure	Major
85EC	DIMM_R3 encountered a Serial Presence Detection (SPD) failure	Major
85ED	DIMM_T1 encountered a Serial Presence Detection (SPD) failure	Major
85EE	DIMM_T2 encountered a Serial Presence Detection (SPD) failure	Major
85EF	DIMM_T3 encountered a Serial Presence Detection (SPD) failure	Major
8604	POST Reclaim of non-critical NVRAM variables	Minor
8605	BIOS Settings are corrupted	Major
8606	NVRAM variable space was corrupted and has been reinitialized	Major
8607	Recovery boot has been initiated. Note: The Primary BIOS image may be corrupted or the system may hang during POST. A BIOS update is required.	Fatal
92A3	Serial port component was not detected	Major
92A9	Serial port component encountered a resource conflict error	Major
A000	TPM device not detected.	Minor

Error Code	Error Message	Response
A001	TPM device missing or not responding.	Minor
A002	TPM device failure.	Minor
A003	TPM device failed self test.	Minor
A100	BIOS ACM Error	Major
A421	PCI component encountered a SERR error	Fatal
A5A0	PCI Express component encountered a PERR error	Minor
A5A1	PCI Express component encountered an SERR error	Fatal
A6A0	DXE Boot Services driver: Not enough memory available to shadow a Legacy Option ROM.	Minor

## POST Error Beep Codes

The following table lists the POST error beep codes. Prior to system video initialization, the BIOS uses these beep codes to inform users on error conditions. The beep code is followed by a user-visible code on the POST Progress LEDs.

**Table 8. POST Error Beep Codes**

Beeps	Error Message	POST Progress Code	Description
1	USB device action	N/A	Short beep sounded whenever USB device is discovered in POST, or inserted or removed during runtime.
1 long	Intel® TXT security violation	0xAE, 0xAF	System halted because Intel® Trusted Execution Technology detected a potential violation of system security.
3	Memory error	Multiple	System halted because a fatal error related to the memory was detected.
3 long and 1	CPU mismatch error	0xE5, 0xE6	System halted because a fatal error related to the CPU family/core/cache mismatch was detected.
The following Beep Codes are sounded during BIOS Recovery.			
2	Recovery started	N/A	Recovery boot has been initiated.
4	Recovery failed	N/A	Recovery has failed. This typically happens so quickly after recovery is initiated that it sounds like a 2-4 beep code.

The Integrated BMC may generate beep codes upon detection of failure conditions. Beep codes are sounded each time the problem is discovered, such as on each power-up attempt, but are not sounded continuously. Codes that are common across all Intel server boards and systems that use same generation chipset are listed in the following table. Each digit in the code is represented by a sequence of beeps whose count is equal to the digit.

**Table 9. Integrated BMC Beep Codes**

Code	Associated Sensors	Reason for Beep
1-5-2-1	No CPUs installed or first CPU socket is empty.	CPU1 socket is empty, or sockets are populated incorrectly CPU1 must be populated before CPU2.
1-5-2-4	MSID Mismatch	MSID mismatch occurs if a processor is installed into a system board that has incompatible power capabilities.
1-5-4-2	Power fault	DC power unexpectedly lost (power good dropout) – Power unit sensors report power unit failure offset
1-5-4-4	Power control fault (power good assertion timeout).	Power good assertion timeout – Power unit sensors report soft power control failure offset
1-5-1-2	VR Watchdog Timer sensor assertion	VR controller DC power on sequence was not completed in time.
1-5-1-4	Power Supply Status	The system does not power on or unexpectedly powers off and a Power Supply Unit (PSU) is present that is an incompatible model with one or more other PSUs in the system.

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