



# **Intel® Server System R2000WT Product Family**

## **System Integration and Service Guide**

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

Rev 1.6

September 2017

Intel® Server Boards and Systems

## ***Document Revision History***

<b>Date</b>	<b>Revision Number</b>	<b>Modifications</b>
September 2014	1.0	First External Public Release
December 2014	1.1	Chapter 5 added – System Packaging Assembly Instructions
April 2015	1.2	<ul style="list-style-type: none"> <li>• Corrected accessory kit content list section 1.2</li> <li>• Updated Disclaimer Statement</li> <li>• Changed server board mounting screw torque from 8 in-lbs to 12 in-lbs</li> </ul>
May 2016	1.3	<ul style="list-style-type: none"> <li>• Added “Figure 86. No Front Drive Bay Configuration – Chassis only building block (Intel® Server Chassis R2000WTXXX)”</li> </ul>
October 2016	1.4	<ul style="list-style-type: none"> <li>• Added note in page 18 “system cover installation” – System is not intended to be installed and used in a home, school or public area.</li> <li>• Added notes on for tool less top covers in Chapter 2.2 “system Cover Removal / Intallation</li> </ul>
November 2016	1.5	<ul style="list-style-type: none"> <li>• Chapter 2.9 – Added caution rack mount simbol</li> </ul>
September 2017	1.6	<ul style="list-style-type: none"> <li>• Updated Chaper 5.1 System Packaging Assembly Instructions</li> </ul>

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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

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## 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

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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>.

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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 used 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 system. 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 maybe installed in the system

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

**Chapter 5 – System Packaging Assembly** – Provides package assembly instructions when re-using the Intel packaging the system was originally shipped in.

### System Service

**Chapter 6 - System Features Overview** – provides a high level overview of the Intel® Server System R2000WT product family. In this chapter, you will find a list of the server system features and illustrations identifying the major system components.

**Chapter 7 – FRU Replacement** – provides guidance for the replacement of system components considered as field replaceable units (FRUs).

**Appendix A – Getting Help**

**Appendix B – System Cable Routing Diagrams**

**Appendix C – System Status LED Operating States and Definition**

**Appendix D – POST Code Diagnostic LED Decoder Table**

**Appendix E – 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 System References**

For this information or software	Use this Document or Software
For in-depth technical information about this product family	<ul style="list-style-type: none"> <li>Intel® Server Board S2600WTR Technical Product Specification</li> <li>Intel® Server System R2000WT Product Family Technical Product Specification</li> <li>Intel® Remote Management Module 4 (Intel® RMM4) and Integrated BMC User Guide</li> <li>Intel® Remote Management Module 4 Technical Product Specification</li> <li>Intel® I/O Expansion Modules Hardware Specification</li> <li>Intel® Server System BIOS Setup Utility Guide</li> <li>Intel® Server Platform Firmware Specification Update</li> <li>Product Safety and Regulatory Compliance - Intel® Xeon® Processor E5-2600 v3 and E5-2600 v4</li> </ul> <a href="http://www.intel.com/p/en_US/support/highlights/server/s2600wt?wapkw=s2600wt+family">http://www.intel.com/p/en_US/support/highlights/server/s2600wt?wapkw=s2600wt+family</a>
For system integration instructions and service guidance	<ul style="list-style-type: none"> <li>Intel® Server System R2000WT product family System Integration and Service Guide</li> </ul> <a href="http://www.intel.com/p/en_US/support/highlights/server/s2600wt?wapkw=s2600wt+family">http://www.intel.com/p/en_US/support/highlights/server/s2600wt?wapkw=s2600wt+family</a>
For server configuration guidance and compatibility	Intel® S2600WTR Product Family Configuration Guide rev 2.x Intel® Server Configurator tool <a href="http://serverconfigurator.intel.com">http://serverconfigurator.intel.com</a>
For system power budget guidance	Intel® Server Board S2600WTR Product Family Power Budget Tool and Thermal Configuration Guide <a href="https://downloadcenter.intel.com/product/78562/Intel-Server-Board-S2600WT-Family">https://downloadcenter.intel.com/product/78562/Intel-Server-Board-S2600WT-Family</a>
For system firmware updates, onboard device drivers, and software to manage your Intel® Server System.	<a href="https://downloadcenter.intel.com/product/78562/Intel-Server-Board-S2600WT-Family">https://downloadcenter.intel.com/product/78562/Intel-Server-Board-S2600WT-Family</a>
For a complete list of supported processors, memory, add-in cards, and peripherals:	<a href="http://www.intel.com/p/en_US/support/category/server/s2600wt/doc_guide#">http://www.intel.com/p/en_US/support/category/server/s2600wt/doc_guide#</a>

The server system has support for several software utilities which can be used to configure system parameters and aid in troubleshooting system issues. All available utilities can be downloaded from the following Intel web site: <http://downloadcenter.intel.com/>

**Table 2. System Utility Software**

To do this:	Use this utility:
To obtain full system information	Intel® SYSINFO Utility – Various OS support
To read System Event Log (SEL)	Intel® SELVIEW Utility – Various OS support
Configure, Save and Restore various system options	Intel® SYSCFG Utility – Various OS support
Test onboard feature functionality	Intel® Platform Confidence Test (PCT) – uEFI only
To update system software	<ul style="list-style-type: none"> <li>System Update Package (SUP) – uEFI only</li> <li>Intel® One Boot Flash Update (OFU) – Various OS Support</li> </ul>
To configure and manage Intel® RAID Controllers	Intel® RAID Web Console 2 Utility – Various OS support
Server Management Software	Intel® Active System Console

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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 R2312WTxxx**

- + Intel® Server Board S2600WTR (iPC **S2600WT2R** or iPC **S2600WTTR**)

### **Intel® Server Chassis R2000WTxxx**

- + Intel® Server Board S2600WTR (iPC **S2600WT2R** or iPC **S2600WTTR**)

- + 8 x 2.5" Front Drive Bay Accessory Kit Options

**or**

- + 8 x 3.5" Front Drive Bay Accessory Kit Option

If your system came with the server board pre-installed in the chassis, you can skip this chapter and proceed to *Chapter 2 - Essential System Component Installation and Service* to continue the system integration.

In addition to the Intel Server building blocks defined above, the following system components (NOT included) will also be needed to complete the full system integration:

- Appropriate SAS/SATA Data Cables
- Appropriate Riser Card(s)
- Appropriate Power Supply Module(s)
- Intel® Xeon® processor E5-2600 v3 and E5-2600 v4 product family
- DDR4 memory
- Appropriate Power Cable
- Desired Storage Devices
- Desired Optional Server Accessories

For a complete list of supported Intel system components and accessories, please reference the following Intel documents:

- Intel® S2600WT Product Family Configuration Guide rev 2.x

## **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 (#1 and #2 bits)

## **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.

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## **System Integration Advisory Note**

It is highly recommended that the system integration process defined in the following sections within this chapter be performed in the order specified. Following these instructions will result in the proper installation of critical system components and provide recommended cable routing. Deviating from the prescribed process may result in improper system assembly, a longer integration process, and a less than desired system appearance.

---

## 1.1 Intel® Server Chassis Identification

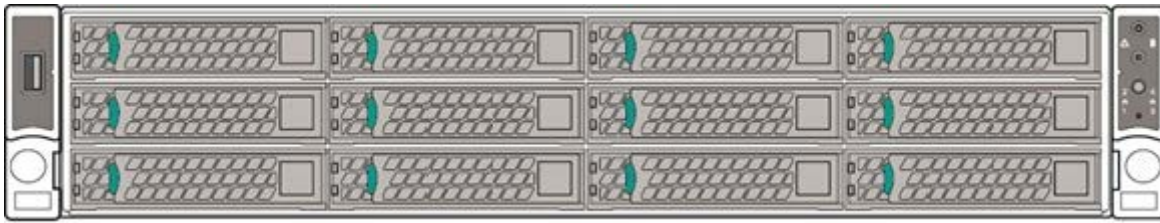


Figure 1. Intel® Server Chassis R2312WTxxx – 12 x 3.5” Front Drive Bay

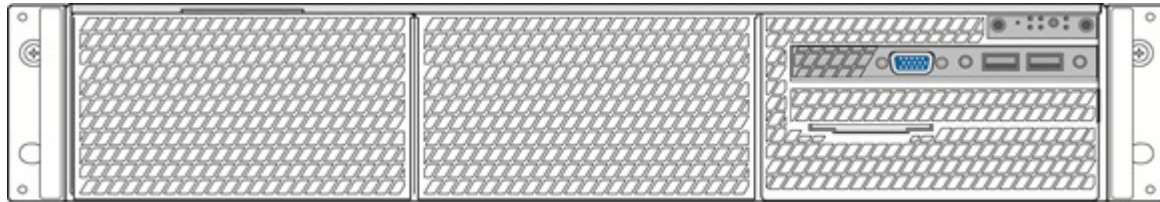


Figure 2. Intel® Server Chassis R2000WTxxx – No Front Drive Bay Installed

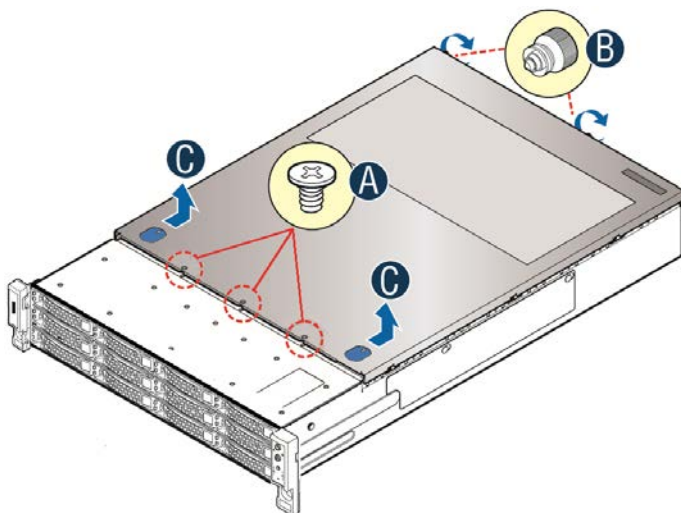
## 1.2 Prepare Chassis for Assembly

As received, the Intel Server Chassis will include several components within a boxed accessory kit or placed within the chassis.

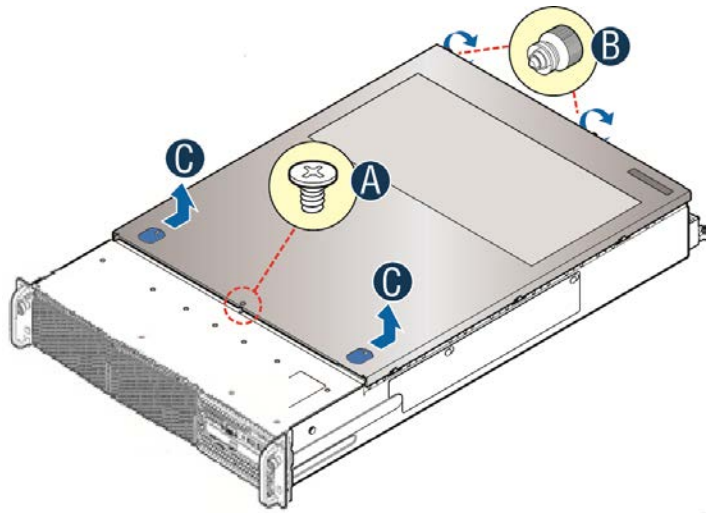
### Remove the System Cover

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

**Note:** Intel Implemented a tool less top cover (top screws removed). Depending on which system you have follow the instructions mentioned above.



R2312WTxxxx



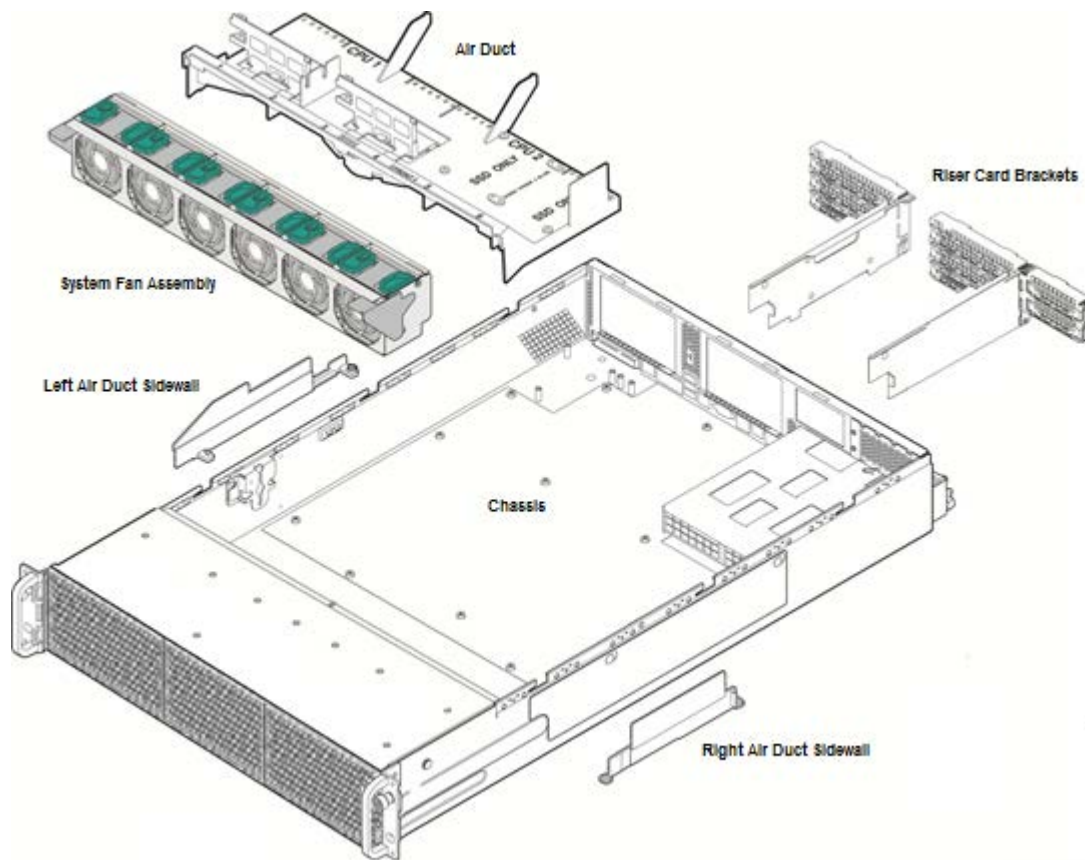
R2000WTxxxx

- Remove the top cover screws (see letter "A"). This step is not required on tool less top cover.
- Loosen the two captive thumb screws located on the back edge of the system cover (See letter "B")
- Slide cover back and lift upward (see letter "C").

**Note:** Equipment is serviced and maintained only by service persons / technically qualified persons.

The System is not intended to be installed and used in a home, school or public area accessible to the general population; and safety instructions state that thumbscrews should be tightened with a tool after both initial installation and subsequent access to the panel.

## **Chassis Component Identification**



**Figure 3. Chassis Components**

The accessory kit and or system packaging will include the following components:

- The left and right black plastic air duct side walls
- Optical drive power cable and mounting clip
- Separate bags of screws for mounting the server board and riser card assembly
- RAID Maintenance Free Backup Unit (RMFBU) mounting plate and screws
- DIMM Blanks
- 2 black mylar processor socket spacers
- Note: spare screws included in kit.

The chassis will include the following components. Each should be removed:

- Clear plastic air duct

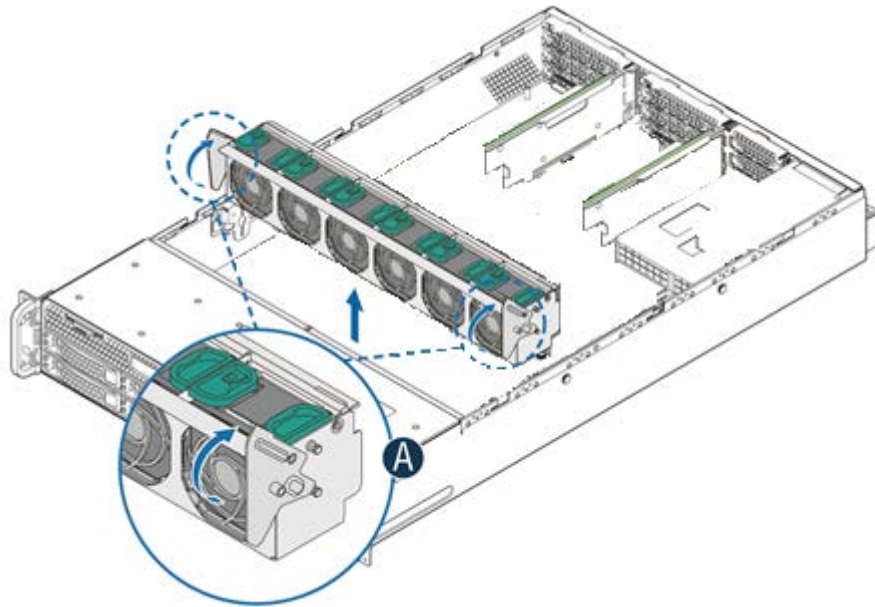


- A box with two processor heat sinks
- Two riser card brackets
- The system fan assembly

To remove the fan assembly:

- Lift the latches located on each end of the fan assembly until each latch is fully disengaged from the latch receivers on the chassis side wall.
- Grasp each end of the fan assembly and pull straight up until the assembly is fully disengaged from the assembly receivers on the chassis side wall.
- Carefully place the fan assembly face down onto a flat surface. Do NOT rest the fan assembly on the fan connectors located on the bottom side of the fan assembly. Doing so may damage the connectors.

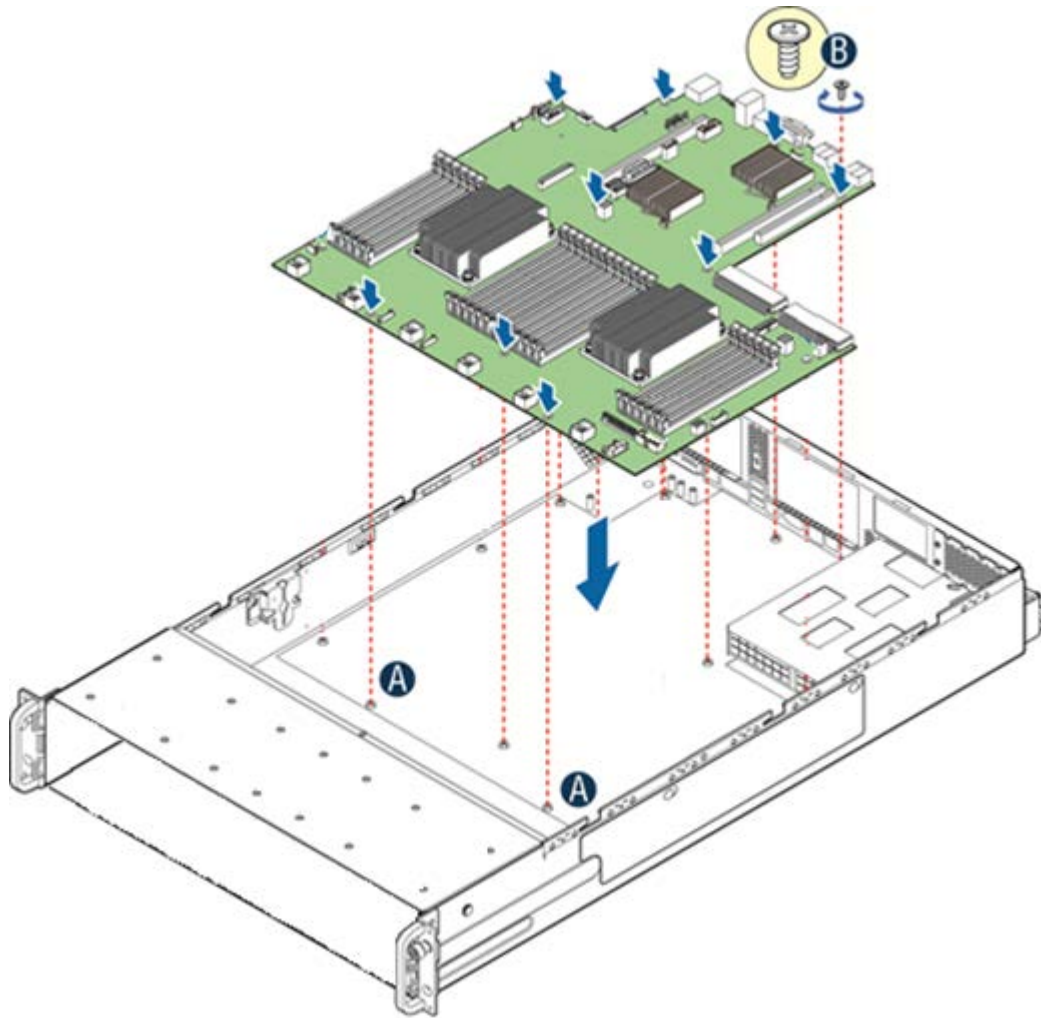
**Figure 4. System Fan Assembly Removal**



## 1.3 System Assembly

### Server Board Installation

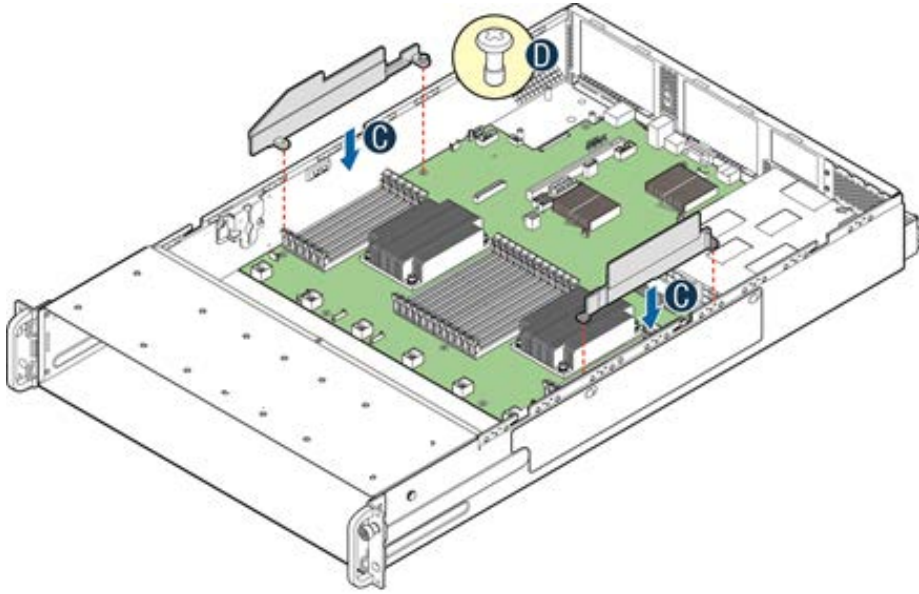
Figure 5. Server Board Installation



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

- Clear the area for server board placement by carefully moving aside any cables that may be taped to the chassis base
- Remove the server board from its anti-static bag
- Holding the server board by its edges, 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 and each server board mounting hole is aligned with a threaded chassis standoff.
- The server board is accurately placed when the two end screw holes nearest the front edge of the server board (See letter "A") sit securely onto the shouldered chassis standoffs
- Using 12 in-lbs torque, fasten down the server board with 9 screws in the positions shown in Figure 5

## Air Duct Side Wall Installation



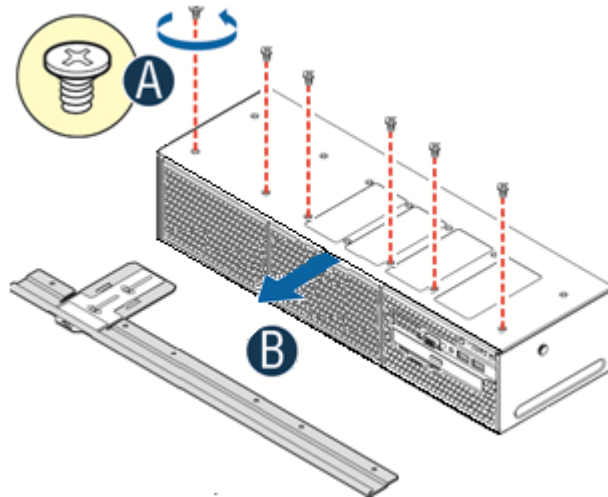
**Figure 6. Air Duct Side Wall Installation**

- Locate the two black plastic air duct sidewalls
- Following the illustration above, fasten down the appropriate air duct side wall onto each side of the server board using 8 in/lbs torque for each screw. (See letter "C")

### 1.3.1 8 x 2.5" Front Drive Bay Module Installation (Intel® Server Chassis R2000WTxxx and Intel® Server System R2208WTxxxx)

Continue with the instructions in this section for installation of several available 8 x 2.5" front drive bay accessory kits into the system. If an 8 x 3.5" front drive bay module accessory kit is being installed, proceed to section 1.3.4.

#### **Remove Drive Bay Retention Bracket**

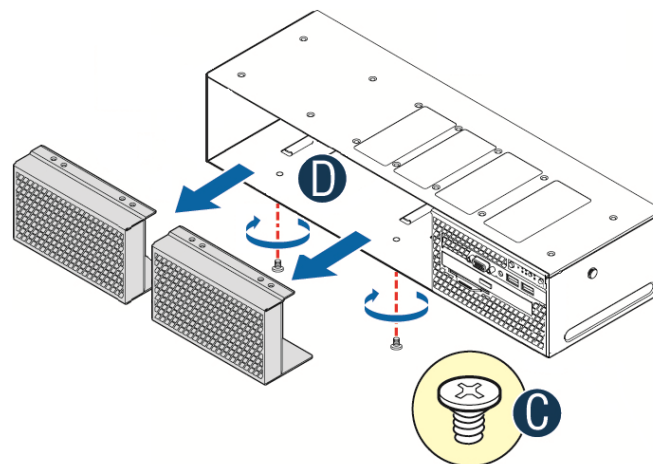


**Figure 7. R2000WTxxx Drive Bay Retention Bracket Removal**

- To extract the drive bay retention bracket, remove the 6 fastener screws from the top front edge of the drive bay and pull out the metal bracket. Set aside the retention bracket and screws for re-installation at a later time.

#### **Remove Drive Bay Filler Panel(s)**

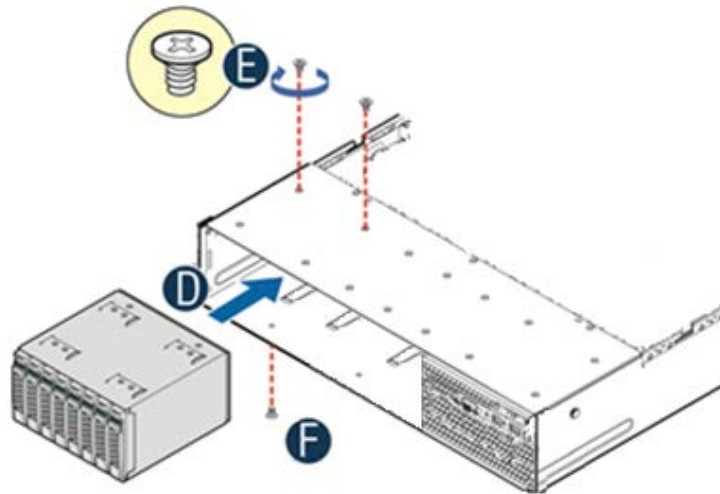
The chassis includes a drive bay filler panel for each drive bay location that doesn't have a drive bay pre-installed. Remove a filler panel for each 8 x 2.5" drive bay module being installed.



- Carefully place the chassis on its side.
- From the bottom of the chassis, remove the fastener screw securing the drive bay filler panel (see letter 'C')
- Carefully return the chassis to its original position
- Slide out the drive bay filler panel (see letter 'D')

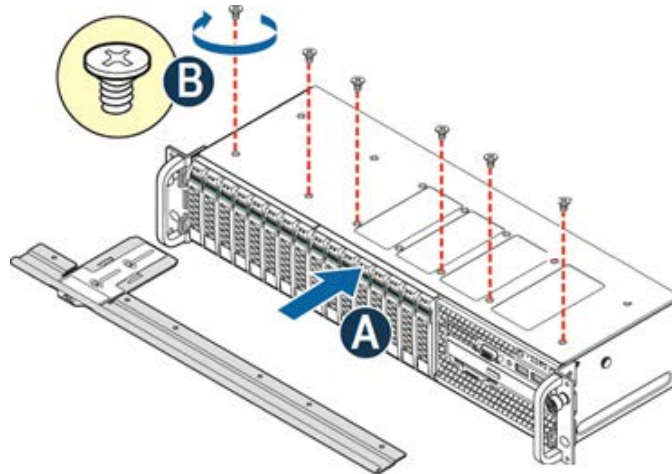
## **Insert 8 x 2.5" drive bay module**

**Figure 8. 8 x 2.5" Drive Bay Module Installation**



- Carefully unpackage the 8 x 2.5" drive bay module from the accessory kit
- Slide the 8 x 2.5" drive bay module into the server chassis (see letter 'D').
- Using two fastener screws on the top back edge of the drive bay, secure the drive bay to the chassis (See Letter 'E') (8 in/lbs torque for each screw)
- Repeat steps 1-3 for the second drive bay module (if applicable)
- Carefully place the chassis on its side and secure each installed drive bay module with one additional screw on the bottom of the chassis (see letter 'F'). (8 in/lbs torque for each screw)
- Carefully return the chassis to its original position

## **Install Drive Bay Retention Bracket**



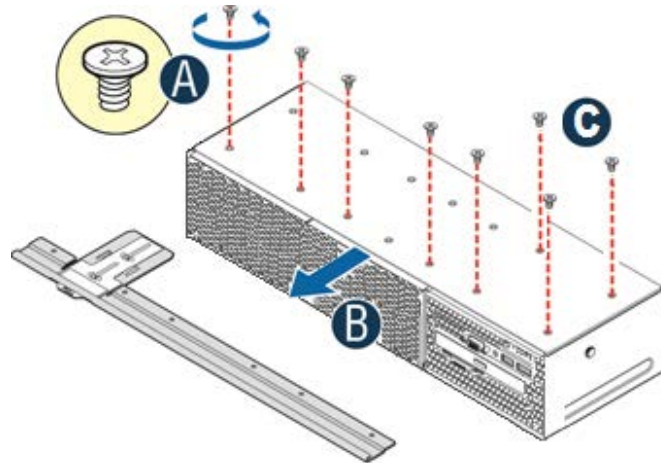
**Figure 9. R2000WTxxx Drive Bay Retention Bracket Installation**

- Locate the drive bay retention bracket and screws
- Carefully slide the drive bay retention bracket into the gap between the top of the drive bay module(s) and the bottom of the drive bay sheet metal. (see letter 'A').
- Secure the retention bracket with six fastener screws (see letter 'B'). (8 in/lbs torque for each screw)
- Continue to section 1.3.5

### 1.3.2 8 x 3.5" Front Drive Bay Module Installation (Intel® Server Chassis R2000WTxxxx Only)

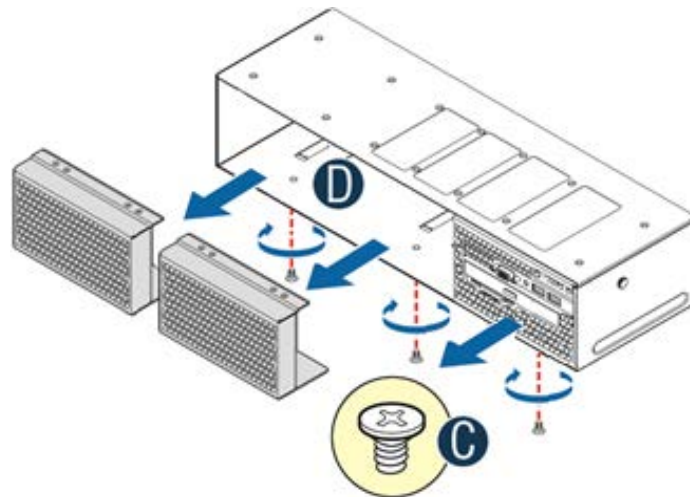
This section describes the installation of Intel Accessory Kit A2U8X35S3HSDK into an Intel® Server Chassis R2000WTxxxx. Skip this section if your chassis already has a drive bay installed.

#### **Remove Drive Bay Retention Bracket and I/O Bay Module Retention Screws**



- To extract the drive bay retention bracket, remove the 6 fastener screws from the top front edge of the drive bay (See Letter 'A') and pull out the metal bracket (see letter 'B')
- Remove the 2 fastener screws from the back edge of the drive bay over the I/O Bay Module (see letter 'C')

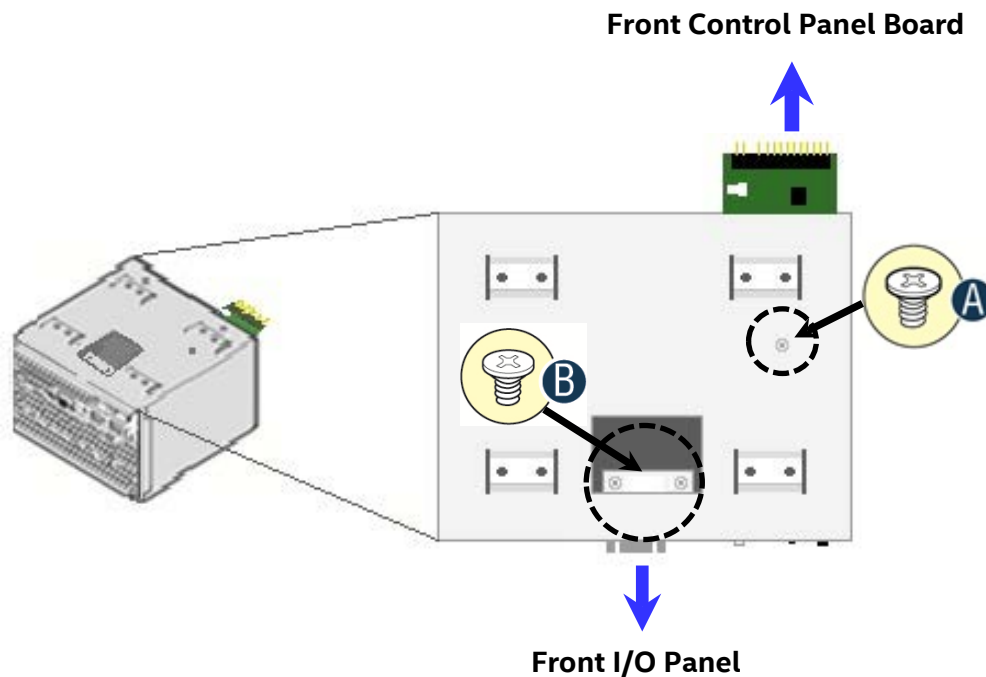
#### **Remove Drive Bay Filler Panels and I/O Bay Module**



- Carefully place the chassis on its side
- From the bottom of the chassis, remove the fastener screws securing the drive bay filler panels and I/O Bay Module (see letter 'C')
- Carefully return the chassis to its original position
- Slide out the drive bay filler panels (see letter 'D')
- Carefully slide out the I/O Bay Module. Cables do not need to be disconnected from the I/O Bay Module



## **Remove Front Control Panel and Front I/O Panel from I/O Bay Module**



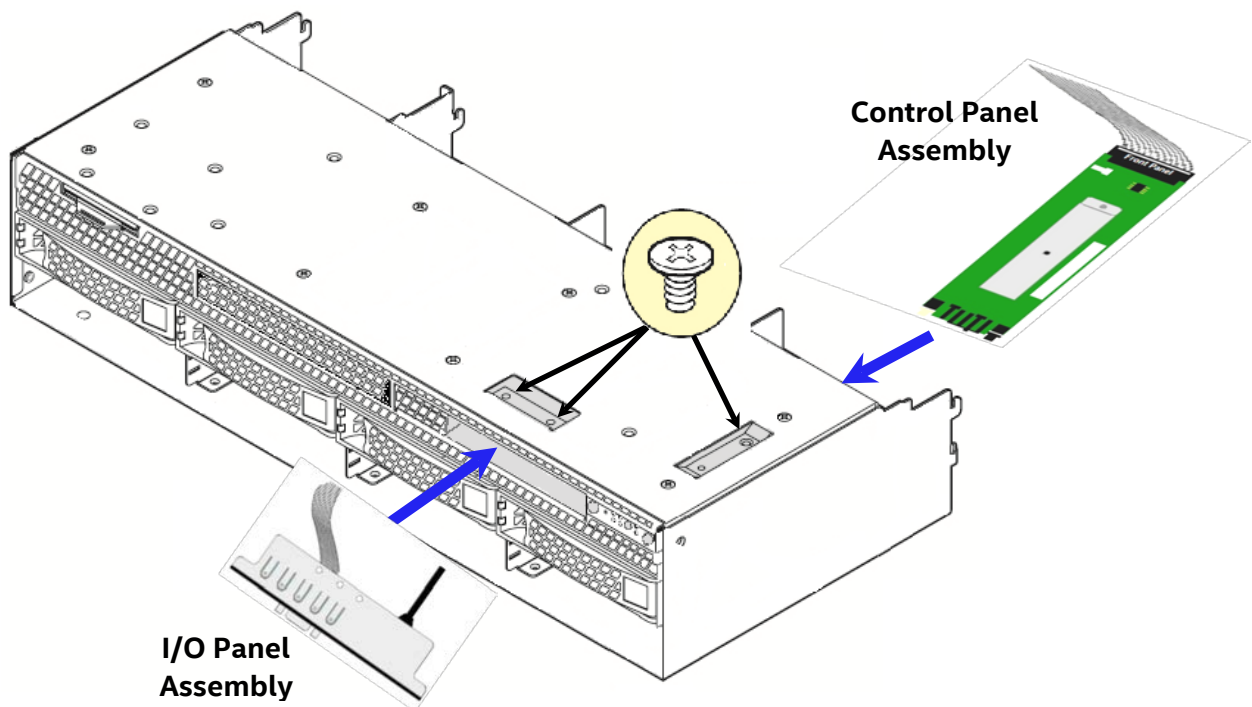
**Figure 10. Control Panel and Front I/O Panel Removal from I/O Bay Module**

Note: For this extraction process, the cables do not need to be detached from the assemblies

- Remove the Front Control Panel fastener screw located on the top right side of the I/O module bay (see letter 'A')
- Carefully extract the Front Control Panel assembly by pulling it out from the back of the I/O Module Bay
- Remove the two Front I/O Panel fastener screws accessed from the top center of the I/O Module (see letter 'B')
- Carefully extract the I/O panel assembly from the front of the I/O module bay. Feed the cables forward from the back of the I/O module bay as you pull out the I/O panel assembly



## **Install Front Control Panel Assembly and I/O Panel Assembly into 8 x 3.5" Front Drive Bay Module**



**Figure 11. Front Control Pane and Front I/O Panel Installation into 8x3.5" Drive Bay Module**

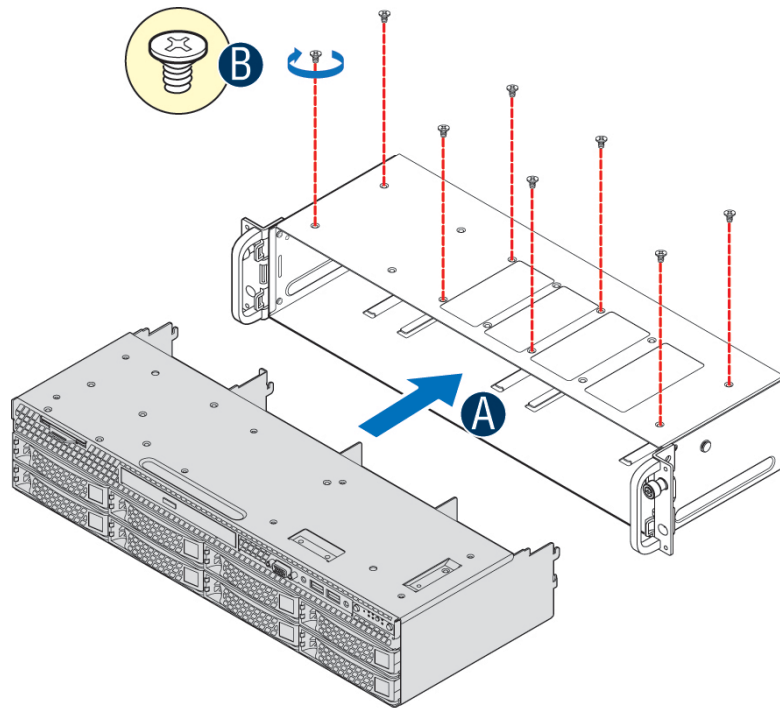
- Remove the 8 x 3.5" Drive Bay Module from its packaging
- Insert the Control Panel board into the back of the drive bay module as shown in Figure 9.

Note: Ensure the plastic gasket over the control panel buttons is securely in place before installing the control panel board into the drive bay module

- The control panel is properly positioned when the buttons are protruding from the Control Panel face plate on the front of the drive bay module and the screw holes on the top of the assembly are aligned.
- Using a single screw, secure the Control Panel Assembly to the drive bay module (8 in/lbs torque)
- Ensure the Control Panel cable is securely attached to the control panel board
- Carefully feed the Black USB cable and Grey ribbon cable of the I/O Panel Assembly into the I/O Panel slot on the front of the drive bay module. Cables should come out the back of the drive bay
- Position the I/O panel assembly into the I/O panel slot
- Ensure the screw holes on the top of the drive bay module and the I/O panel assembly are aligned
- Secure the assembly using two fastener screws (8 in/lbs torque)

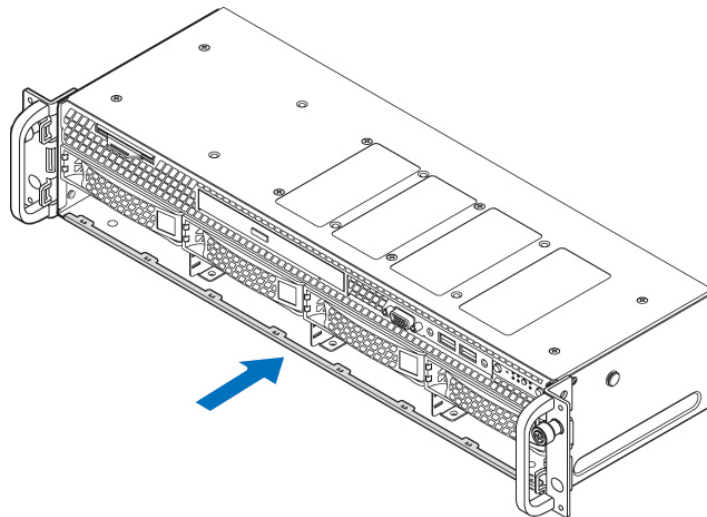
## **Install 8 x 3.5" Front Drive Bay Module into Chassis**

**Figure 12. 8x3.5" Front Drive Bay Module Installation**



AF006605

- Remove the bottom four drive trays from the drive bay module
- Slide the 8 x 3.5" Front Drive Bay module into the front of the chassis (see letter 'A')
- Push the drive bay module in far enough so that the screw holes on the top of the drive bay are properly aligned
- Using 8 fastener screws, secure the drive bay module to the chassis (8 in/lbs torque) (see letter 'B')
- Locate the drive bay retention clip



AF006606

**Figure 13. 8x3.5" Front Drive Bay Retention Clip Installation**

- Slide the drive bay retention clip over the bottom edge of the drive bay assembly as shown in the illustration. The retention clip should clamp together the bottom of the drive bay module to the chassis base.

### 1.3.3 Internal Cable Routing and Connections

All cables in the system that need to be routed from front-to-back, should be routed using the cable channels between the chassis sidewalls and the air duct sidewalls as shown in the following illustration. When routing cables 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. See Appendix B for additional System Cable routing illustrations.

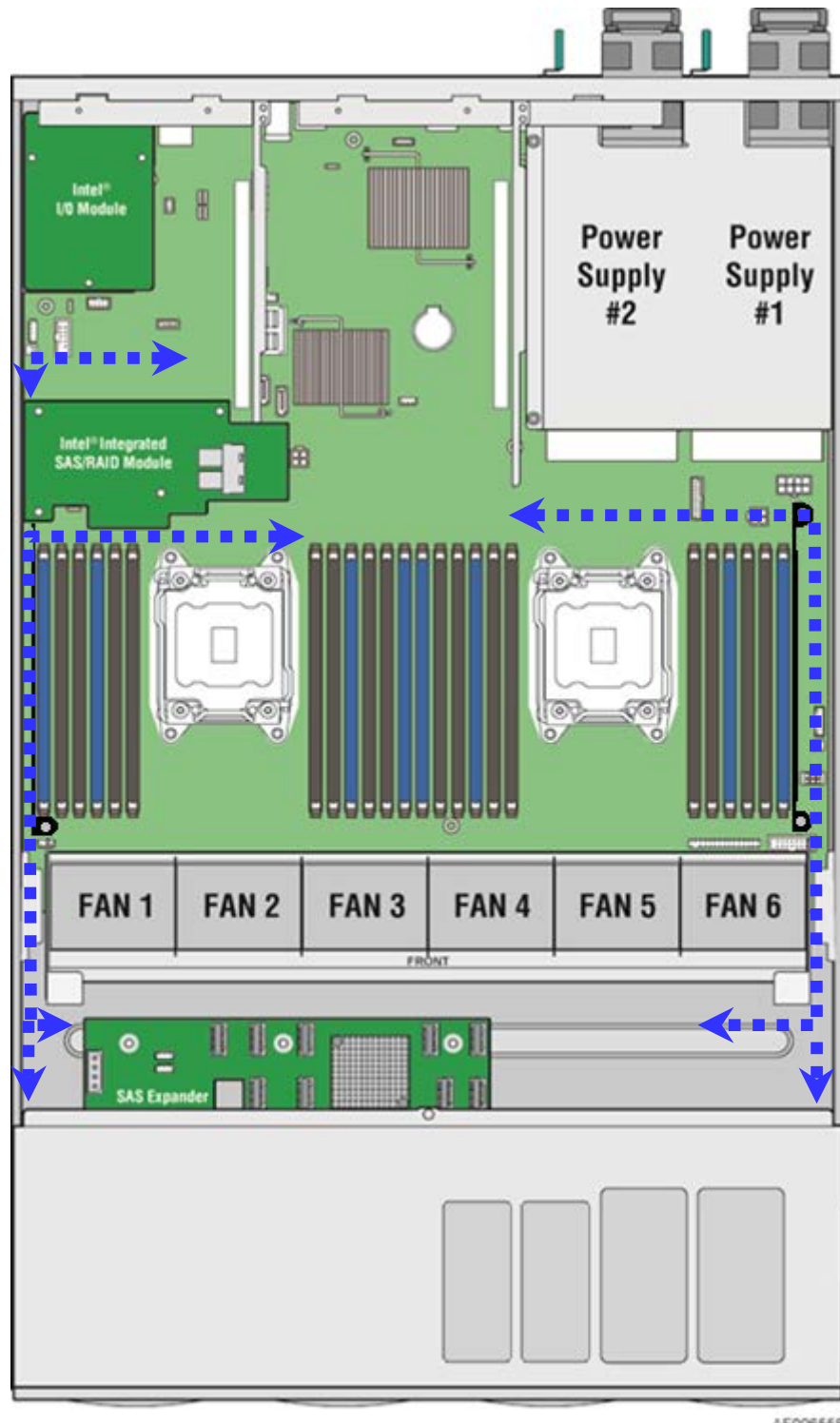


Figure 14. Cable Routing Diagram

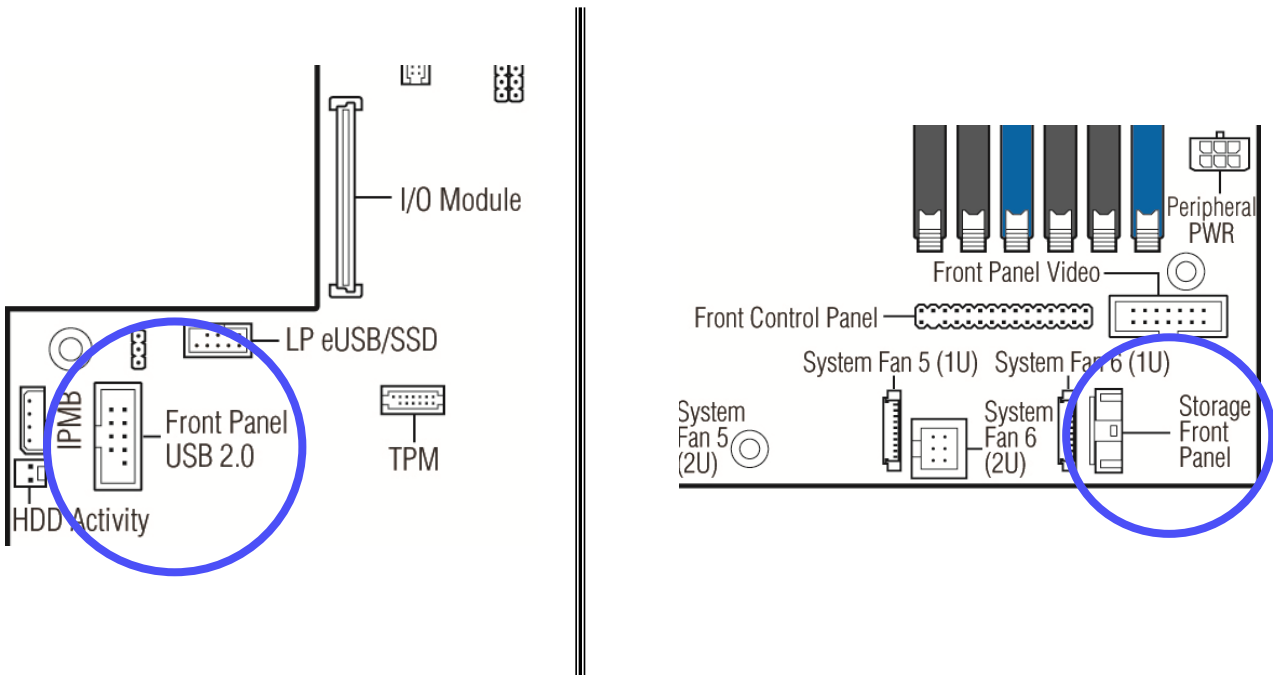
#### **Connect Internal Cables for Front Control Panel and Front I/O**

**Intel® Server Chassis R2312WTxxx Only**

The following cable connections apply to the Intel® Server Chassis R2312WTxxxx only.

This system includes rack handles with integrated USB, System Control Buttons, and various LED features that must be cabled to the appropriate connectors on the server board. Cables from each rack handle are pre-routed into the chassis requiring that they only be connected to the server board when installed.

**Figure 15. R2312WTxxx Front Control Panel and Front I/O Internal Cable Connections**

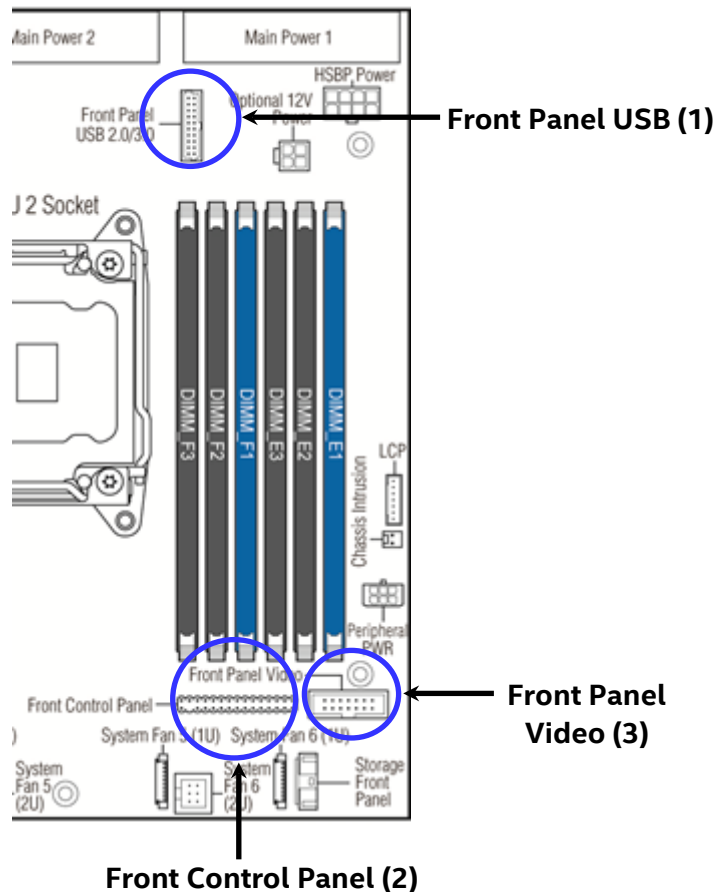


- Locate the Gray 10-pin flat ribbon cable pre-routed on the left inner side wall of the chassis
- Connect this cable to the Black 10-pin connector located near the left edge half way towards the back of the server board labeled "Front Panel USB 2.0"
- Locate the Gray high density 30-pin cable pre-routed to the right inner side wall of the chassis
- Connect this cable to the White 30-pin connector on the right front corner of the server board labeled "Storage Front Panel"

## Intel® Server Chassis R2000WT Configurations

The following Front Panel cable connections apply to all configurations of the Intel® Server Chassis R2000WTxxx.

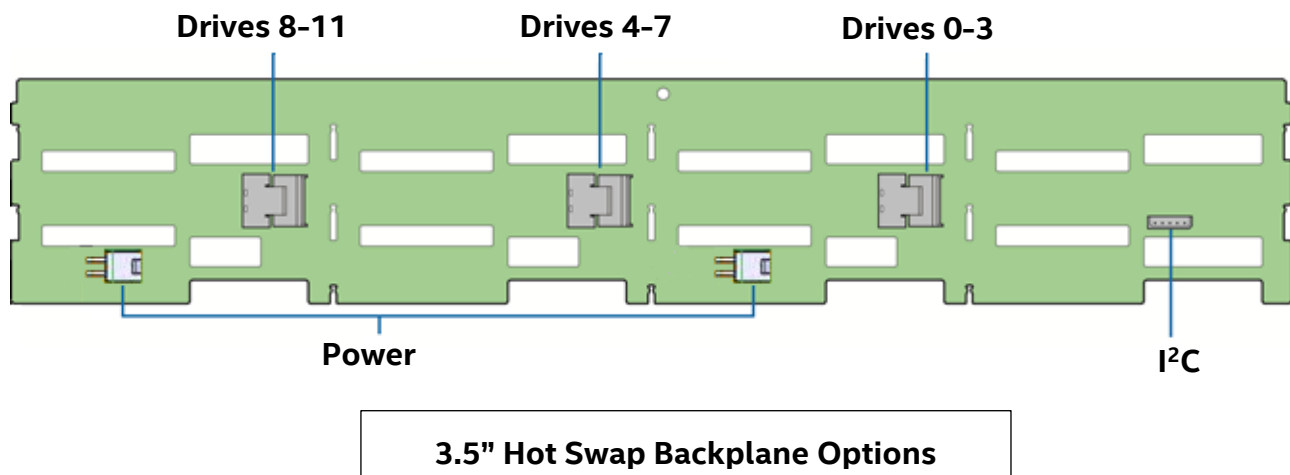
This system includes front panel USB, Video, Control Buttons, and various LED features that must be cabled to the appropriate connectors on the server board. Cables should be routed in the following order: (1) Front Panel USB, (2) Front Control Panel, and (3) Front Panel Video



**Figure 16. R2000WTxxx Front Control Panel and Front I/O Internal Cable Connections**

- Route the Black round USB cable to the Blue 20-pin connector on the server board labeled “Front Panel USB 2.0/3.0”. The cable should be routed as close to the chassis side wall as possible.
- Route the folded 30-pin Gray ribbon cable to the matching 30-pin header on the server board labeled “Front Control Panel”
- Route the 14-pin Gray folded ribbon cable to the 14-pin black shrouded connector on the server board labeled “Front Panel Video”

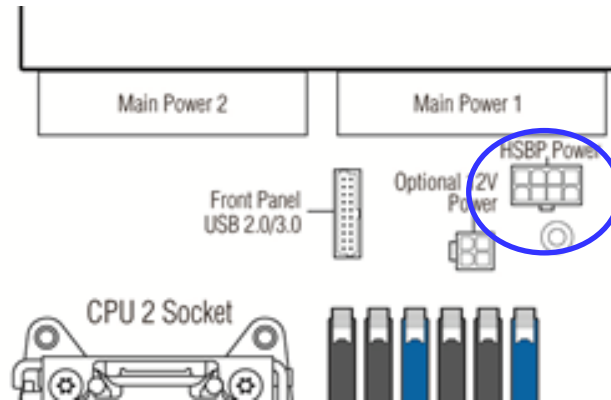
Note: All three front panel cables should be routed beneath the fan assembly receiver feature on the right chassis sidewall.



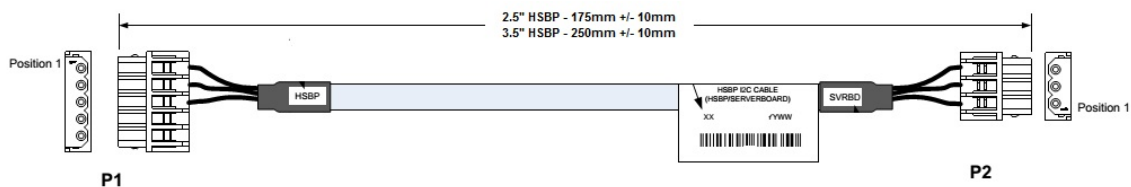
- Locate the backplane power cable



- 18

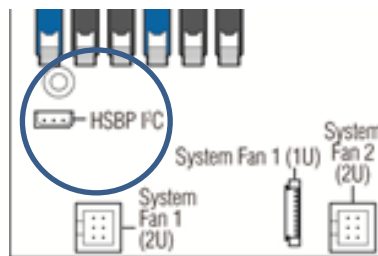


- Route the backplane power cable along the chassis sidewall, to the area behind the drive bay
- Connect the White 2x2 pin cable connector(s) (labeled 'BP#') to the matching White 2x2 power connector(s) on the backplane (silk screened 'PWR') (See Figure 15. Hot Swap Backplane Connectors)
- Once the cable is attached on both ends, carefully press the cable as low as possible into the cable routing channel.
- Locate the backplane I2C cable



**Figure 19. Hot Swap Backplane I<sup>2</sup>C Cable**

- Attach the 1x5 pin connector (labeled "HSBP") of the I2C cable to the matching 1x5 pin connector (silk screened "HSBP I2C") on the backplane
- Route the backplane I2C cable next to the nearest chassis sidewall and connect the other end of the I2C cable to the 1x3 pin connector (silk screened "HSBP I2C") on the server board



**Figure 20. Hot Swap Backplane I2C Internal Cable Connection**



- If more than one 8 x 2.5" backplane is being installed (R2000WTXXX only), locate the I2C jumper cable and connect one end of the cable to the I2C-OUT connector of backplane #1 and the other end of the cable to the I2C- IN connector of backplane #2.

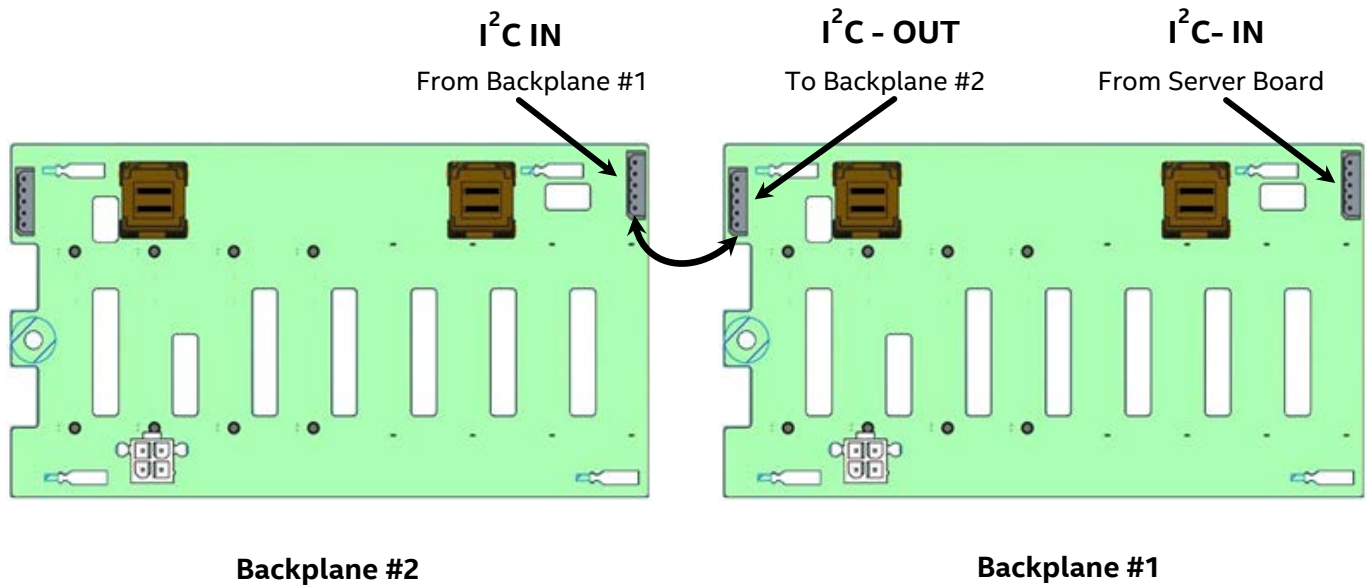


Figure 21. Dual 8x2.5" Hot Swap Backplane I2C Jumper Cable Installation

## SAS/SATA Data Cable connections

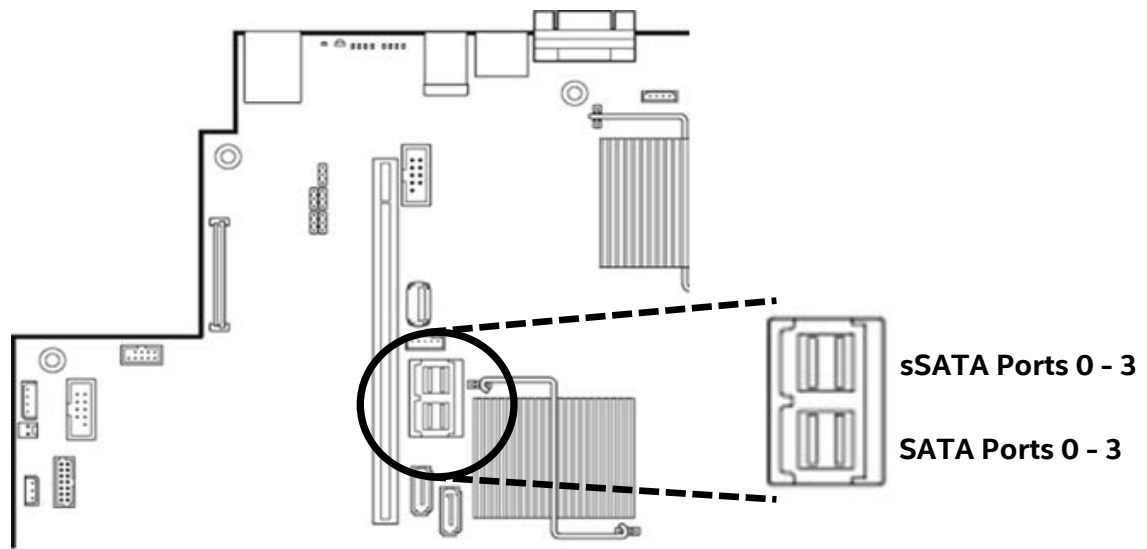
SAS/SATA Data cable connections will vary depending on the system configuration. This section will only describe cable connections when using the onboard SATA controllers. For other add-in storage options, refer to the appropriate option installation sections available in this document.

- Locate the appropriate SAS/SATA Data cables



- Attach the P1 end of the SAS/SATA Data cables to the mini-SAS HD connectors on the backplane
- Route the SAS/SATA DATA cables from the backplane to the back of the system via the cable channels next to the chassis sidewalls

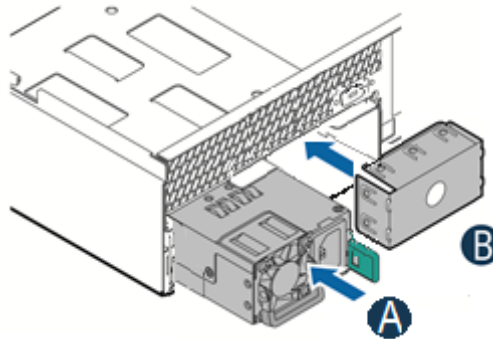




**Figure 22. On-Board Mini-SAS HD Connectors for embedded SATA Support**

- Attach the P2 end of the SATA Data cables to the on-board Mini-SAS HD connectors for embedded SATA support (see illustration).

### 1.3.4 Power Supply Installation



**Figure 23. Power Supply and Power Supply Bay Filler Installation**

- Insert the power supply module into the power supply bay until it clicks and locks into place (see letter 'A').
- Single power supply configurations require the filler panel to be installed (see letter 'B').

## 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 section 2.5.

### **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 in between the chassis sidewalls and the air duct side walls, as shown in the following illustration. When routing cables 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. See Appendix B. System Cable Routing Diagrams for additional cable routing details.

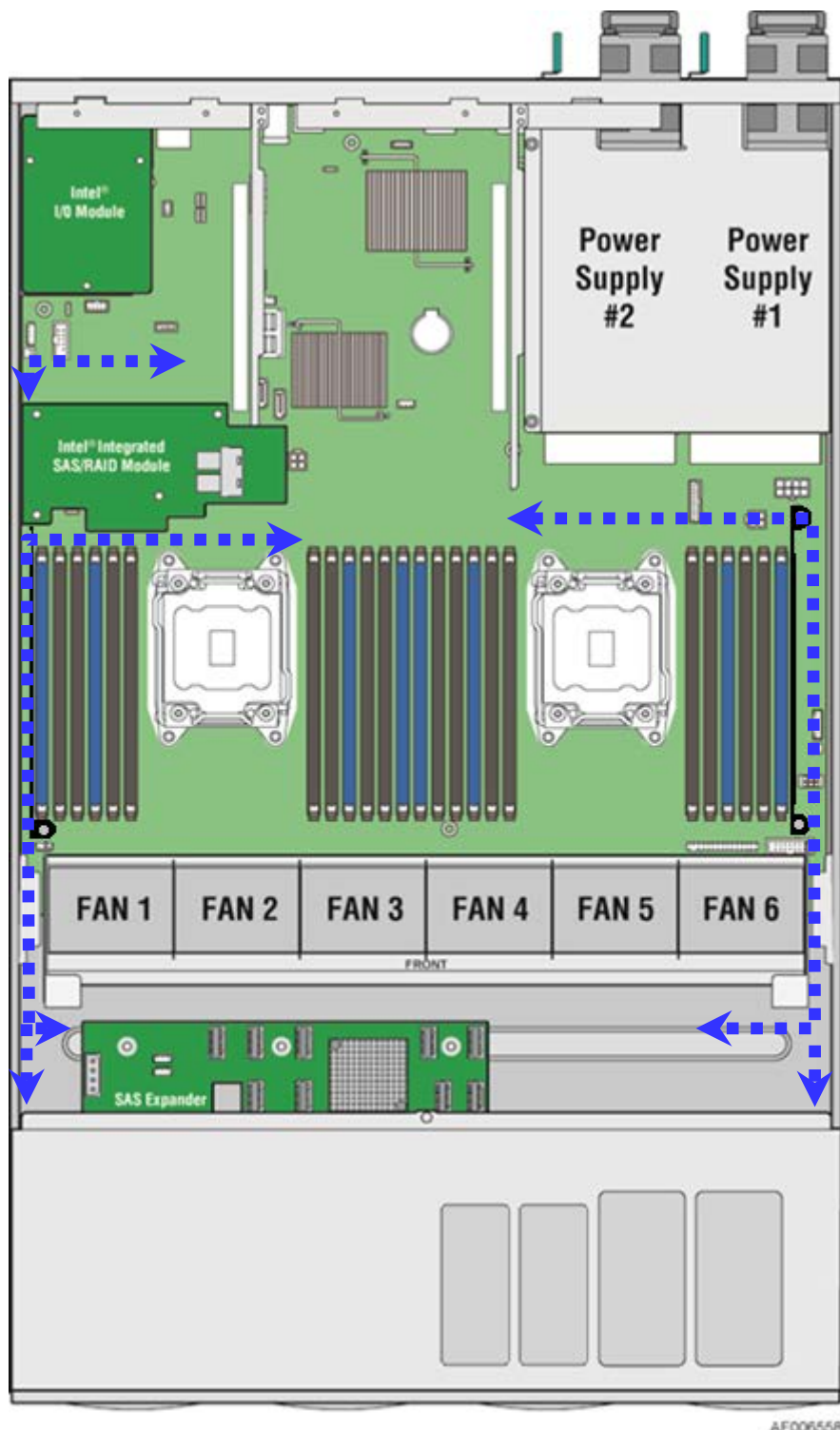


Figure 24. Internal Cable Routing

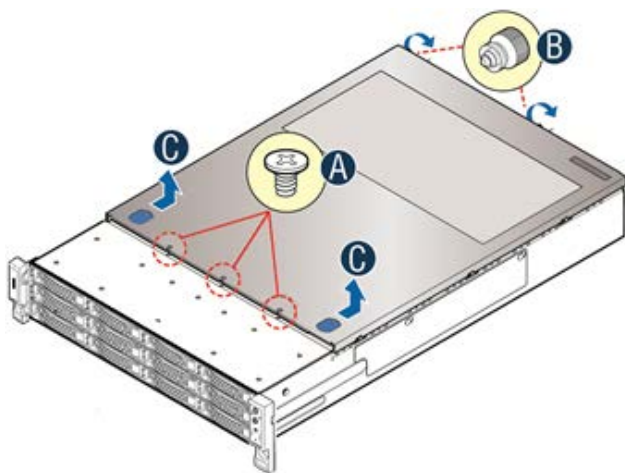
## 2.2 System Cover Removal / Installation

### 2.2.1 System Cover Removal

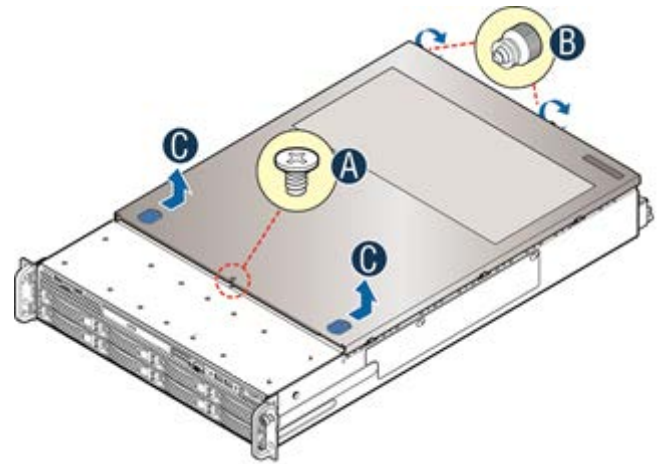
The server system must be operated with the system cover in place to ensure proper cooling. The top cover must be removed to add or replace components inside of the system. Before removing the top cover, power down the system and unplug all peripheral devices and the power cable(s).

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

**Note:** Intel implemented a tool less top cover (removed top screws). Below instructions will guide removal process for both top covers.



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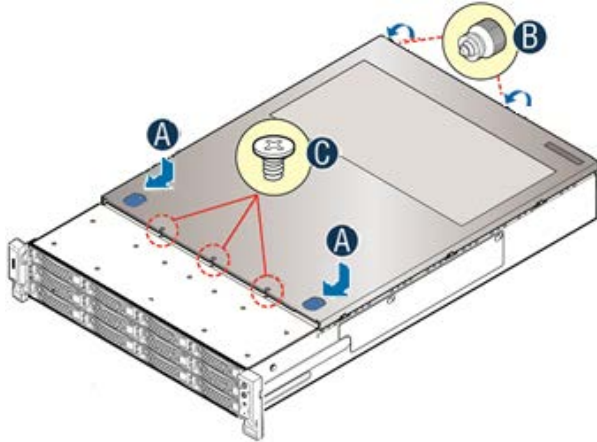


All other R2000WT product family Systems

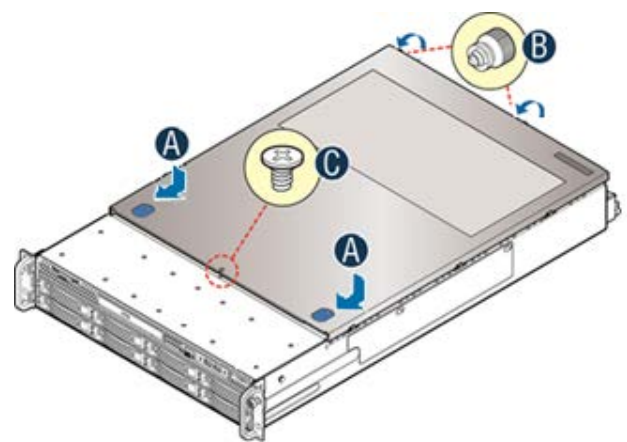
- Remove the top cover screws (see letter 'A'). This steps is not required on tool less top covers.
- Loosen the two captive thumb screws located on the back edge of the system cover (See letter 'B')
- Slide cover back and lift upward (see letter 'C').

## 2.2.2 System Cover Installation

- Place the system cover onto the chassis and slide forward until the front edge of the system cover is



R2312WTxxx



All other R2000WT product family Systems

pressed up against the back edge of the front drive bay. (see letter 'A')

- Hand tighten the two captive thumb screws at the back of the chassis (see letter 'B')
- Install the top cover screw(s) (see letter 'C'). This step is not required on tool less top cover.

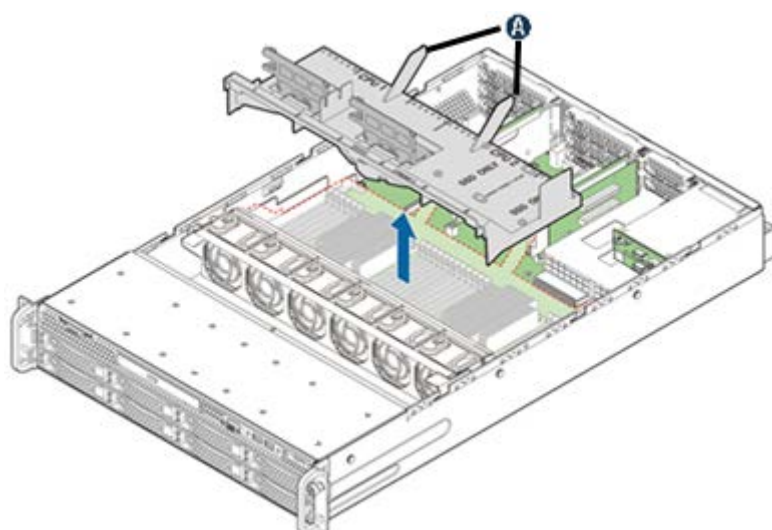
**Note:** Equipment is serviced and maintained only by service persons / technically qualified persons. The System is not intended to be installed and used in a home, school or public area accessible to the general population; and safety instructions state that thumbscrews should be tightened with a tool after both initial installation and subsequent access to the panel.

## 2.3 Air Duct Removal / Installation

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

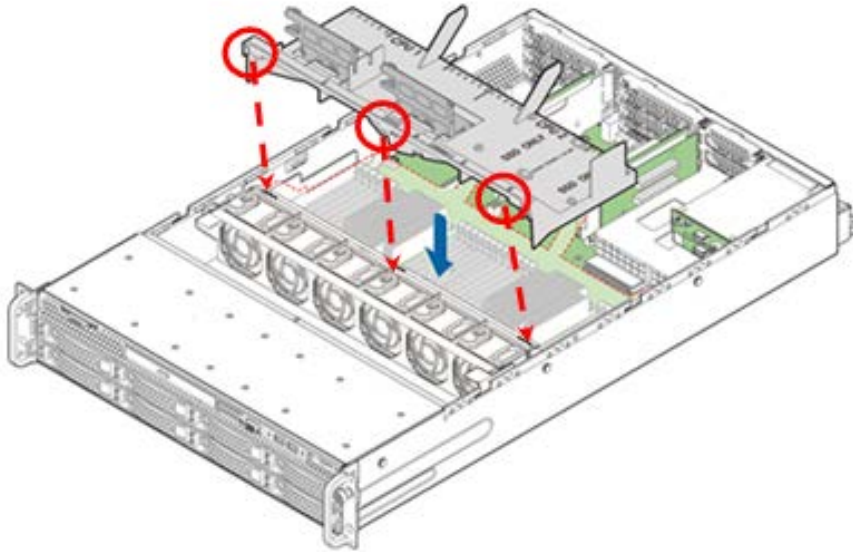
### 2.3.1 Air Duct Removal

Figure 25. Air Duct Removal



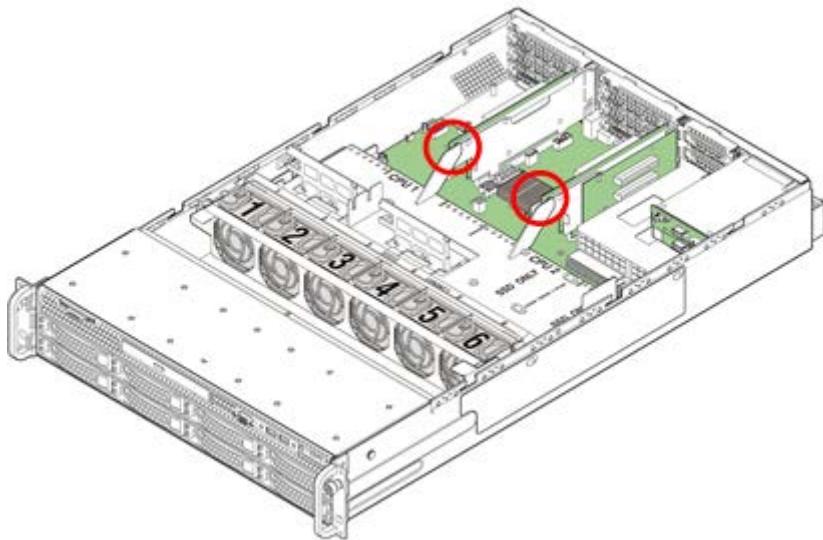
- To remove the air duct, unlatch the rear tabs 'A' from underneath each riser card assembly.
- Using rear tab posts, lift the air duct straight up until tabs on the front edge of the air duct are free from the fan assembly.

### 2.3.2 Air Duct Installation



**Figure 26. Air Duct Installation**

- Align the three tabs on the front edge of the air duct with the matching slots on the fan assembly
- Lower the air duct into the system ensuring the three tabs are securely installed in the fan assembly



- Press down on the back edge of the air duct so that the tabs at the end of each air duct post snaps underneath the top edge of the riser card assemblies. The air duct should lay flat and secure

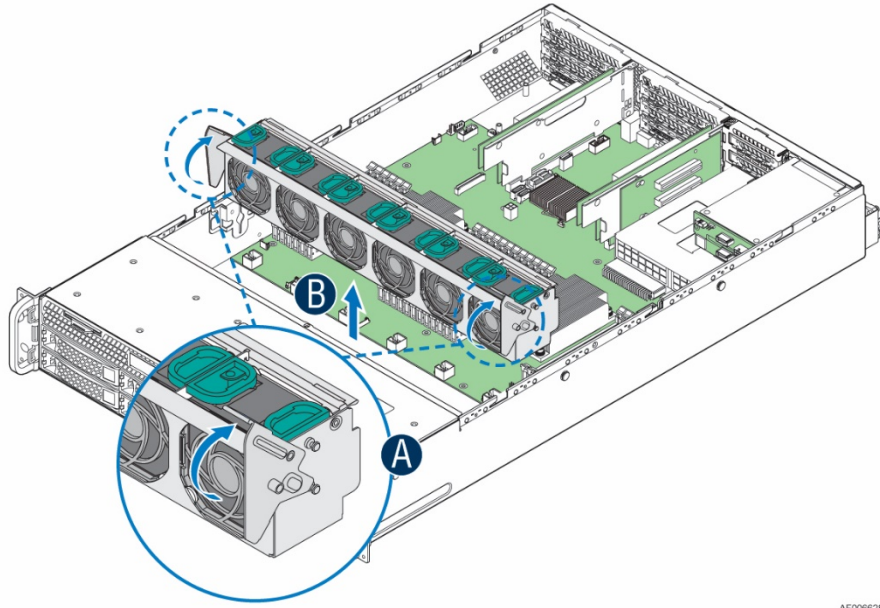
## 2.4 System Fan Assembly Removal / Installation

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

Figure 27. System Fan Assembly Removal



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To remove the system fan assembly:

- Lift the latches located on each end of the fan assembly until each latch is fully disengaged from the latch receivers on the chassis side wall. (see letter 'A')
- Grasp each end of the fan assembly and pull straight up (see letter 'B')
- Carefully place the fan assembly face down onto a flat surface. Do NOT rest the fan assembly on the fan connectors located on the bottom side of the fan assembly. Doing so may damage the connectors.

## 2.4.2 System Fan Assembly Installation

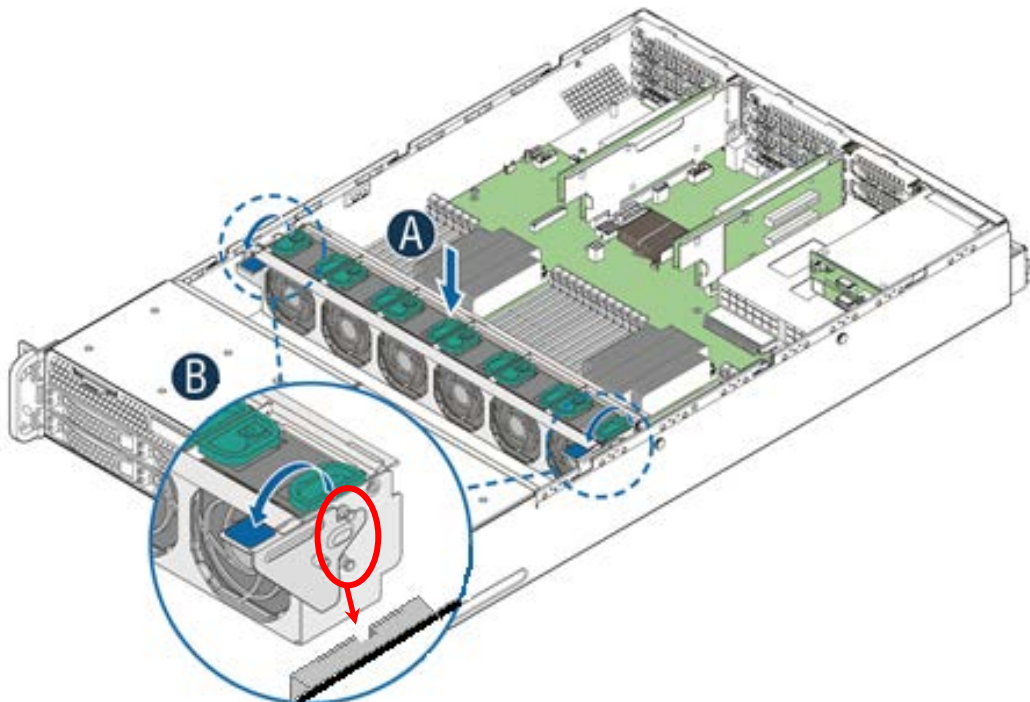


Figure 28. System Fan Assembly Installation

To install the system fan assembly:

- Ensure that all cables are clear of the fan assembly keep out area on the base of the chassis
- Ensure the latches on both sides of the fan assembly are fully rotated up
- Position the fan assembly over the chassis so that the latches are oriented toward the front of the chassis (see letter 'A')
- Align the two guide pins on each side of the fan assembly with the latch receivers located on each chassis sidewall (see letter 'B')
- Carefully lower the fan assembly into the latch receivers
- Push down on both ends of the fan assembly until fully seated
- Rotate each latch down to lock the fan assembly in place

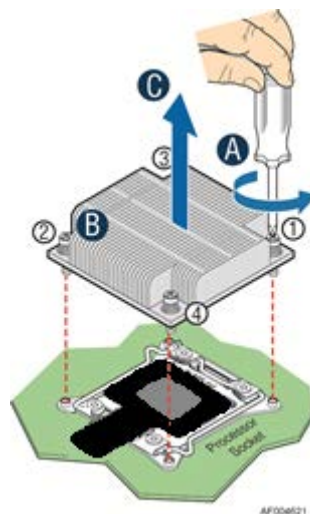


## 2.5 Processor (CPU) Installation / Removal

The CPU-1 processor + CPU heat sink must be installed first. The CPU-2 heat sink must be installed at all times, with or without a processor installed. When no processor is installed in a socket, one of the provided black mylar spacers should be attached to the top side of the plastic processor socket cover. This is a serviceability feature that identifies that a socket has no processor present when only a heat sink is installed.



### 2.5.1 Processor Heatsink(s) Removal



**Figure 29. Processor Heatsink Removal – Shown with NO processor installed**

The heatsink is attached to the server board/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 (see letter 'A'). (IMPORTANT: Do not fully loosen.)
- Proceed to screw 2 and loosen it by giving it two rotations and stop (see letter 'B'). 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 (see letter 'C').

**NOTE:** the bottom side of the heat sink will include a thermal interface material (TIM). Care should be taken NOT to displace or touch this material

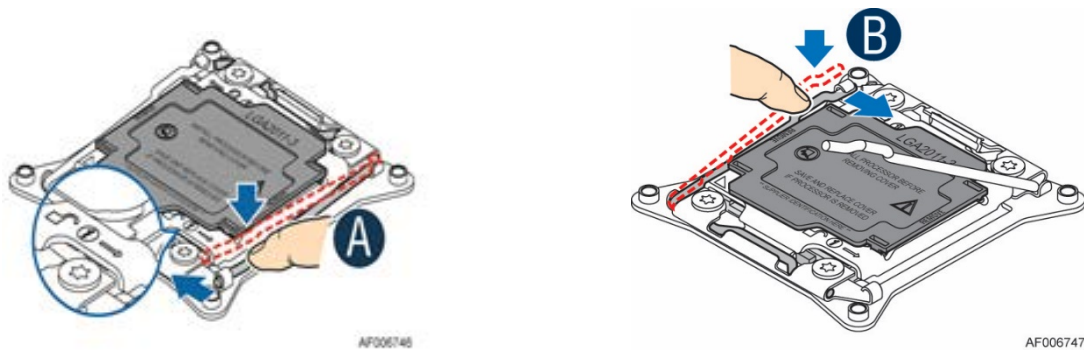
## 2.5.2 Processor Installation

**Caution:** The 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” at the beginning of this document.

**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.

**Note:** The following illustrations do not show the black mylar spacer attached to the processor socket cover. This was done for illustration clarity purposes only. The black mylar spacer does NOT need to be removed from the processor socket cover to perform a processor installation procedure.

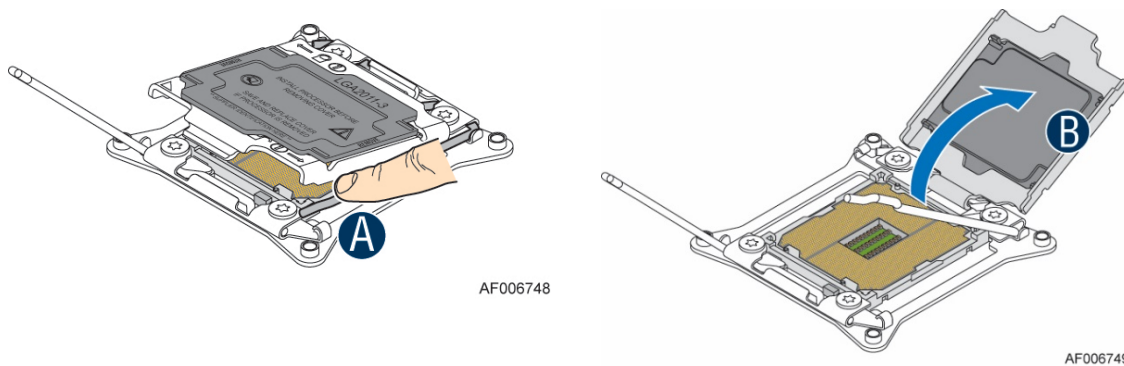
- Unlatch the processor socket load plate



**Figure 30. Processor Installation – Open the Socket Lever**

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

- Lift open the Load Plate.



**Figure 31. Processor Installation– Open the Load Plate**

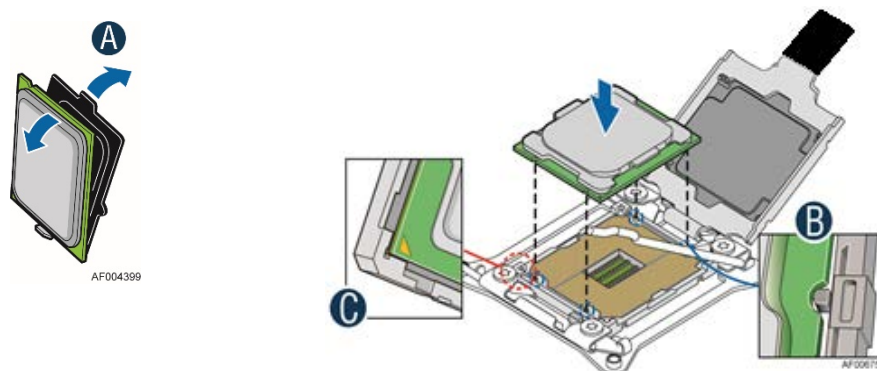
Rotate the right lever handle down until it releases the Load Plate (see letter ‘A’). While holding down the lever handle, with your other hand, lift open the Load Plate (see letter ‘B’).

- Install the Processor (CPU)

**CAUTION:** The pins inside the processor socket are extremely sensitive. Other than the processor, no object should make contact with the pins inside the processor socket. **A damaged processor socket pin will render the socket inoperable, and will produce erroneous processor or other system errors if used.**

**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** processor into the socket!

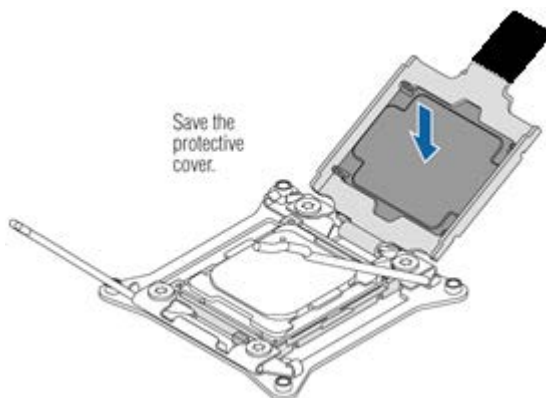
**NOTE:** When possible, a processor insertion tool should be used when placing the processor into the processor socket .



**Figure 32. Processor Installation – Install the Processor**

Remove processor from its packaging. If present, carefully remove the protective cover from the bottom side of the processor, taking care not to touch any processor 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 processor into the socket.

- Remove the plastic processor socket cover.

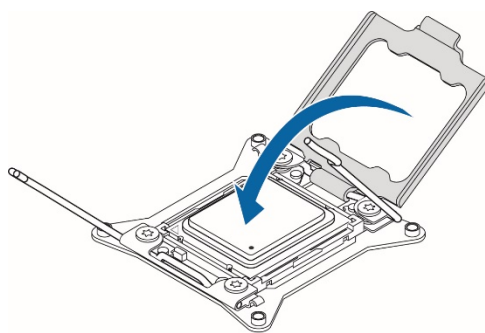


**Figure 33. Processor Installation – Remove the Socket Cover**

Remove the socket cover by pressing it out of the load plate. If attached, the black mylar spacer does not have to be de-attached from the plastic socket cover.

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

- Close the Load Plate.

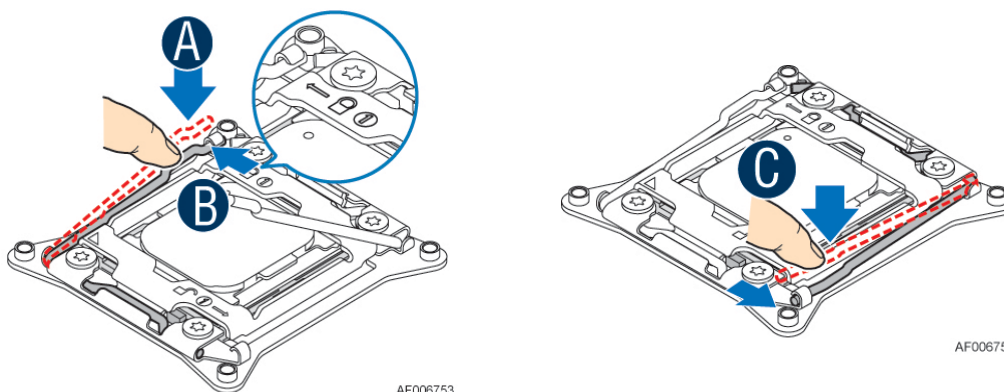


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**Figure 34. Processor Installation – Close the Load Plate**

Carefully lower the load plate down over the processor.

- Lock down the Load Plate.

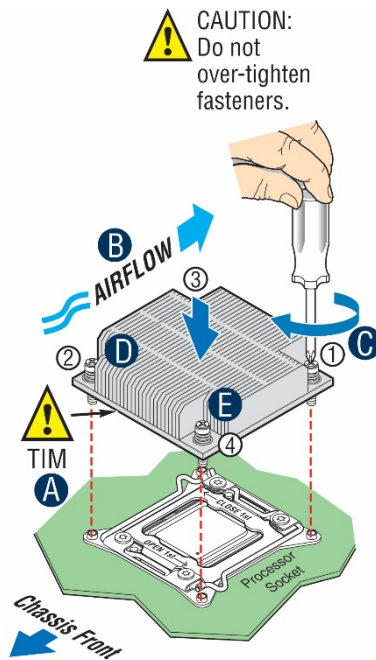


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**Figure 35. Processor Installation – Latch the Locking Lever**

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 36. Processor Heatsink Installation**

- If present, remove the protective film covering the Thermal Interface Material (TIM) on the bottom side of the heatsink (see letter 'A').
- Align heatsink fins to the front and back of the chassis for correct airflow. Airflow goes from front-to-back of chassis (see letter 'B').
- Each heatsink has four captive fasteners and should be tightened in a diagonal manner using the following procedure:
- 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.)
- Proceed to screw 2 and engage screw threads by giving it two rotations and stop (see letter 'D'). Similarly, engage screws 3 and 4.
- 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

- Remove the processor heatsink (see section 2.5.1)
- Unlatch the CPU Load Plate (see section 2.5.2)
- Lift open the Load Plate (see section 2.5.2)
- 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.
- 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 1st DIMM (Blue Slot) on each channel, then slot 2, then slot 3. Only remove factory installed DIMM blanks when populating the slot with memory.
- DIMM Population on CPU-2 – Install DIMMs in order; Channels E, F, G, and H. Start with 1st DIMM (Blue Slot) on each channel, then slot 2, then slot 3. Only remove factory installed DIMM blanks when populating the slot with memory.
- The following system configurations require that specific memory slots be populated at all times using either a DIMM or supplied DIMM Blank:

Figure 37. DIMM Blank



- ❖ **R2312WTxxxx** and **R2224WTxxxx** (Storage Models) – 3.5"x12 and 2.5"x24 Front drive bays
  - Memory slots 2 and 3 populated for all memory channels
- ❖ **R2308WTxxxx**, **R2208WTxxxx**, and **R2216WTxxxx** (All non-storage models)
  - Memory slot 3 populated for all memory channels

### 2.6.2 DDR4 DIMM Installation

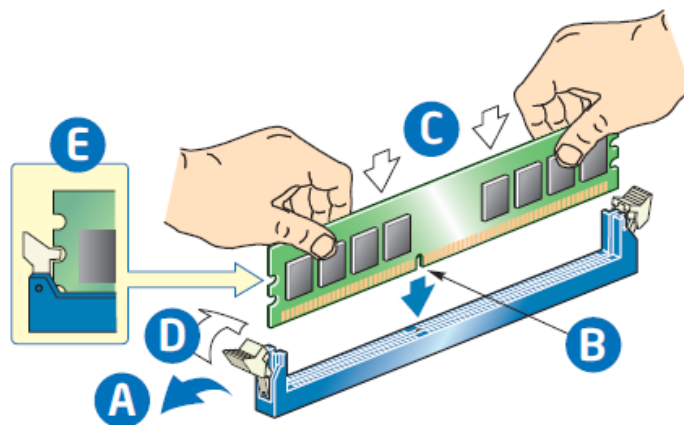
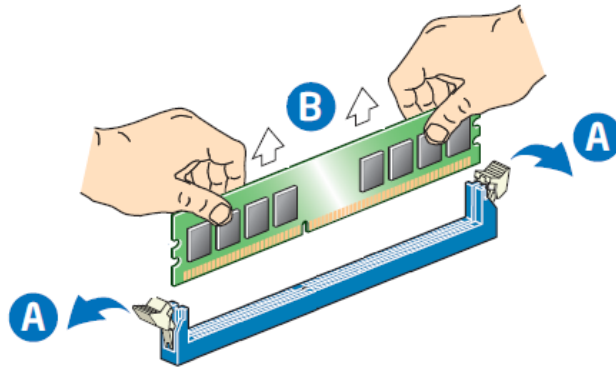


Figure 38. DDR4 DIMM Installation

- 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').
- 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').
- 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 39. DDR4 DIMM Removal**

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



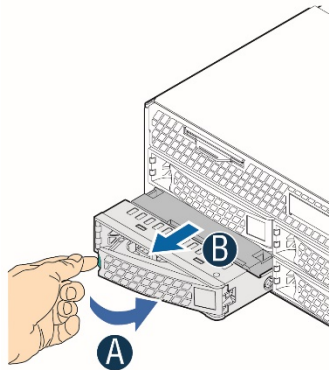
## 2.7 Storage Device Installation / Removal

The 2U server system has support for several different storage device options. This section provides instruction for the installation and removal of front drive bay storage devices and internal fixed mount 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.

### 2.7.1 8 x 3.5" and 12 x 3.5" Front Drive Bay Storage

#### 2.7.1.1 3.5" Drive Carrier Extraction

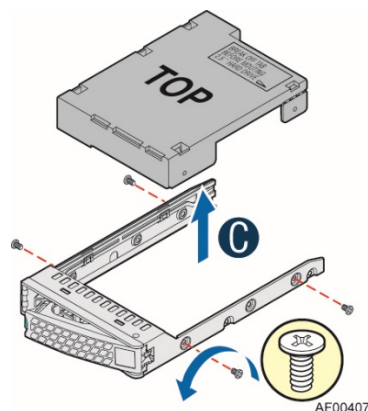


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**Figure 40. Installing Hot-swap storage devices – 3.5" carrier extraction**

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

#### 2.7.1.2 3.5" Hard Disk Drive Installation

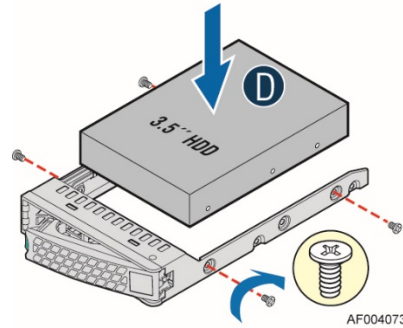


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**Figure 41. 3.5" Hard Disk Drive Installation – Remove the drive blank**

- Remove the four screws securing the plastic drive blank to the carrier
- Remove the drive blank from the carrier (see letter 'C').





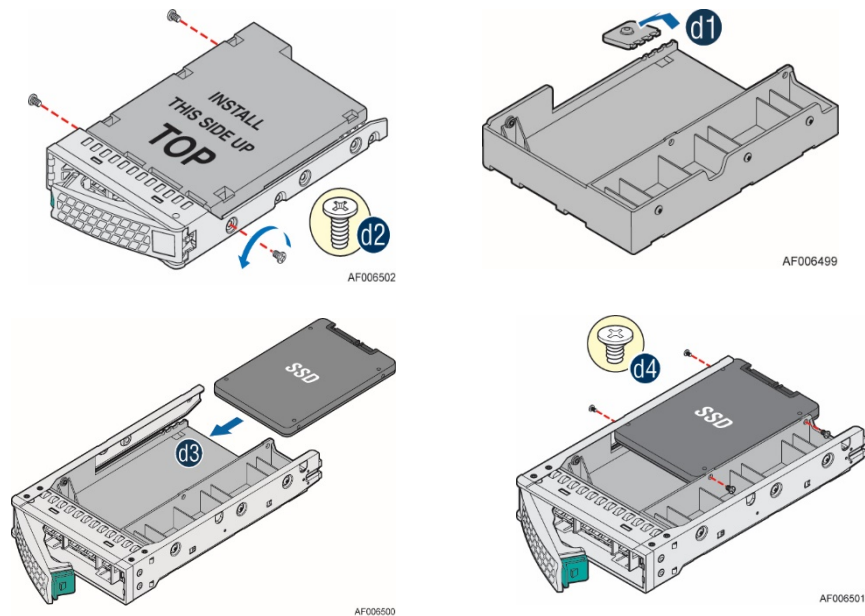
**Figure 42. 3.5" Hard Disk Drive Installation – Mounting drive to carrier**

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

### 2.7.1.3 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.

**Note:** Due to degraded performance and reliability concerns, the use of the 3.5" drive blank as a 2.5" device bracket is intended to support SSD type storage devices only. Installing a 2.5" hard disk drive into the 3.5" drive blank cannot be supported.

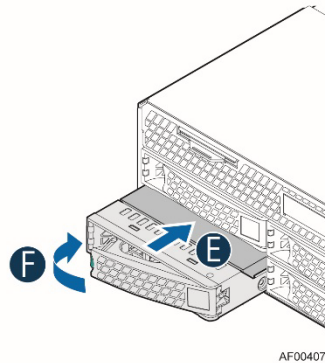


**Figure 43. Option to install 2.5" SSD into a 3.5" carrier**

- Remove drive blank from the device carrier (See previous page)
- Break off the small side tab from the drive blank, making the drive blank into a device bracket (see letter 'd1')
- Install the device bracket into the device carrier so that the hollow side of the device bracket is facing down
- Secure the device bracket with three screws (see letter 'd2')
- Turn the carrier assembly over
- Slide a 2.5" SSD into the device bracket and align the screw holes with the right and left rail (see letter 'd3')

- Secure the device using four screws (see letter 'd4')

#### 2.7.1.4 3.5" Drive Carrier Insertion

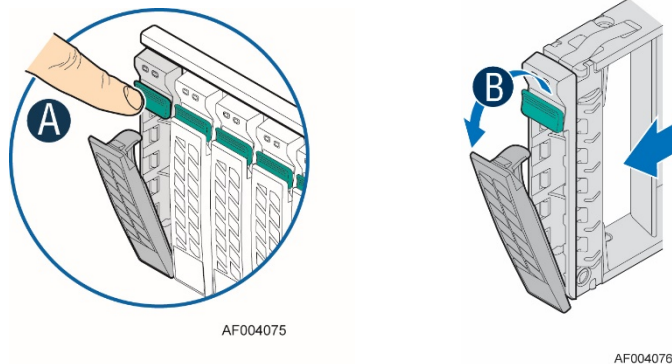


**Figure 44. Hard Disk Drive Installation – Inserting 3.5" HDD assembly**

- With the lever open, insert the drive assembly into the drive bay (see letter 'E')
- Push in the lever to lock it into place (see letter 'F')

#### 2.7.2 8 x 2.5", 16 x 2.5", and 24 x 2.5" Front Drive Bay Storage

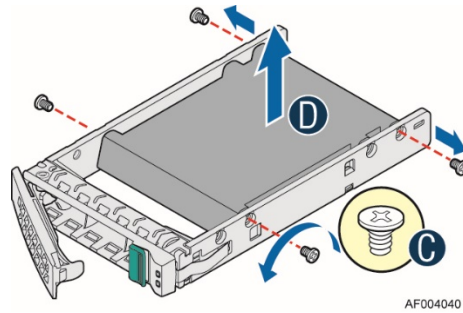
##### 2.7.2.1 2.5" Drive Carrier Extraction



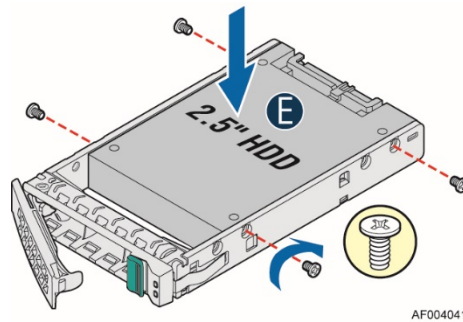
**Figure 45. Installing Hot-swap storage devices – 2.5" carrier extraction**

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

## 2.7.2.2

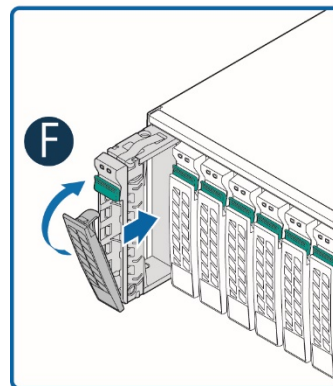
**2.5" Hard Disk Drive (HDD) / Solid State Device (SSD) Installation****Figure 46. 2.5" Storage Device Installation – Remove the drive blank**

- Remove the four screws securing the plastic drive blank to the carrier (see letter 'C')
- Remove the drive blank from the carrier (see letter 'D')

**Figure 47. 2.5" Storage Device Installation – Mount Drive to Carrier**

- 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').
- Secure the drive to the carrier using four screws

## 2.7.2.3

**2.5" Drive Carrier Insertion****Figure 48. 2.5" Storage Device Installation – Inserting 2.5" Drive assembly**

- With the lever open, insert the drive assembly into the chassis
- Push in the lever to lock it into place (see letter 'F')

**2.7.3 Internal Fixed Mount SATA SSD – Installation / Removal**

The system has support for upto two internal fixed mounted SATA Solid State Devices (SSDs). SSD's can be mounted to either of the two available air duct options. SSD installation and removal procedures are the same for both air ducts.

### 2.7.3.1 Internal Fixed Mount Solid State Drive Installation

- From the system's accessory kit, locate the peripheral device power cable.

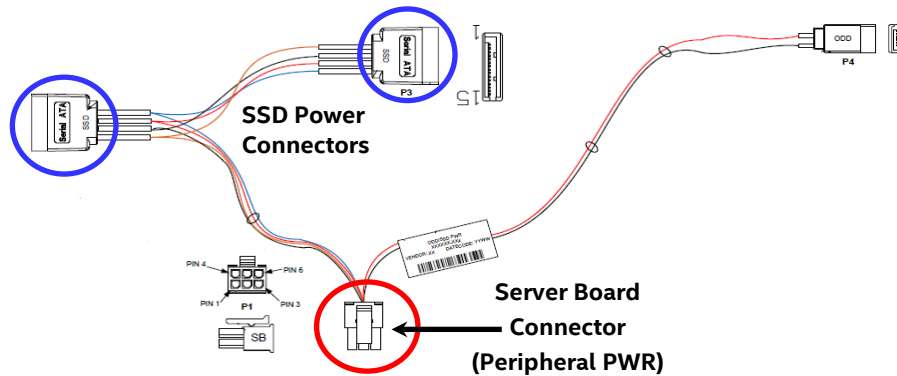
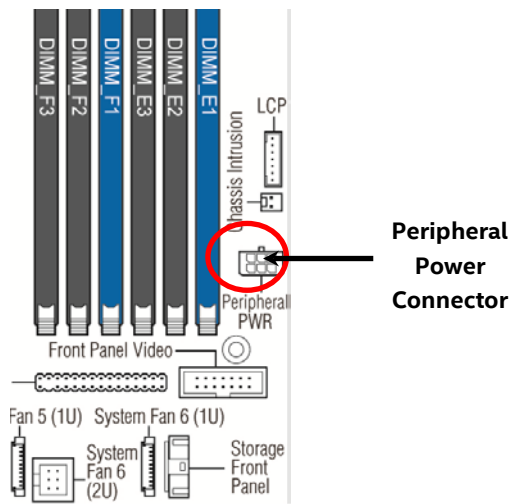
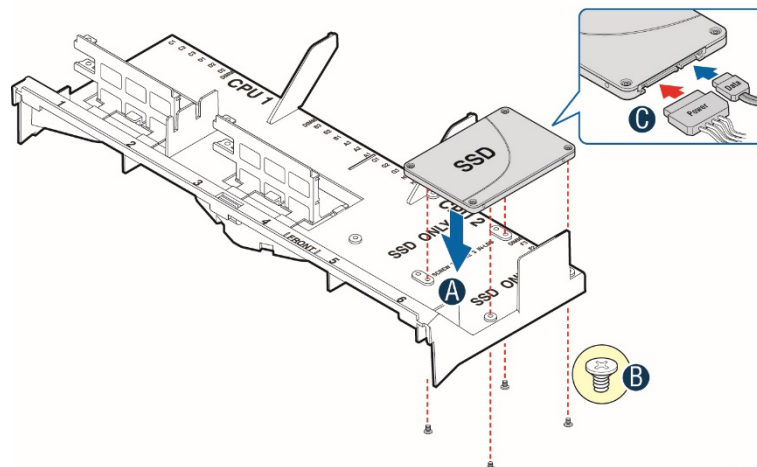


Figure 49. Peripheral Device Power Cable

- Connect the 2x3 cable connector (labeled “SB”) to the server board “Peripheral PWR” connector



- Locate the SATA cable and install it to either the “SATA 4” or “SATA 5” ports on the server board



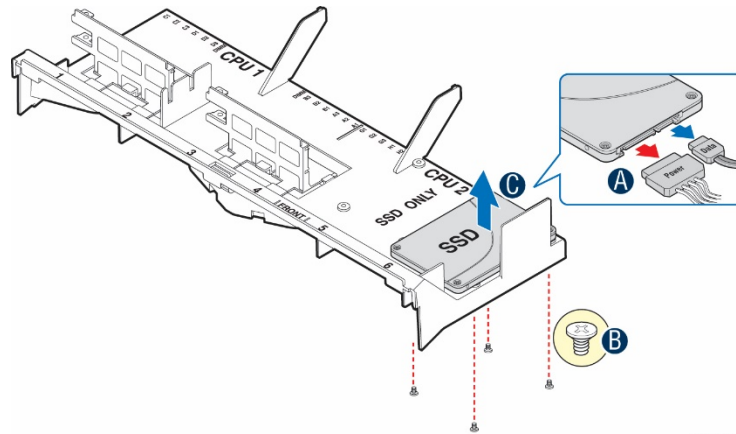
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**Figure 50. Internal fixed mount SSD Installation**

- Place the Solid State Drive onto the air duct (see letter 'A').
- Secure the Solid State Drive with four screws (see letter 'B').
- Install the air duct (see section 2.3.2)
- Attach the SATA and Power cables to the SSD (see letter 'C').

### 2.7.3.2 Internal Fixed Mount Solid State Drive Removal

**NOTE:** The internal SSD 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.



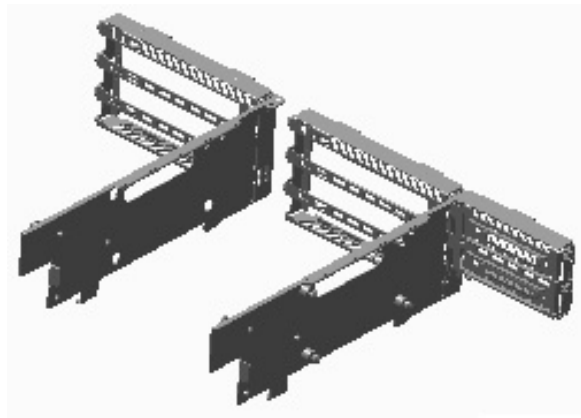
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**Figure 51. Removing an internal fixed mount SSD**

- Remove the system cover (see section 2.2.1)
- Detach the SATA and Power cables from the back of the SSD (see letter 'A').
- Remove the air duct from the system (see section 2.3.1)
- Remove the four screws to release the Solid State Drive (see letter 'B').
- Remove the SSD from the air duct (see letter 'C').

## 2.8 Riser Card Assembly - Removal / Integration / Installation

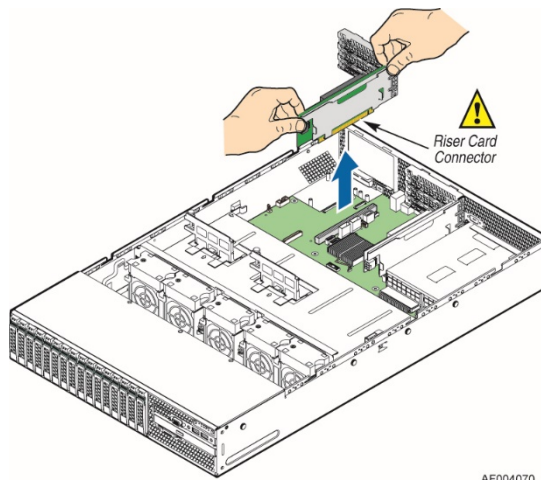
The server system can support up to three PCI riser cards via two riser card assemblies.



**Figure 52. Riser Card Bracket Assemblies**

This section will provide instructions for the removal and installation of the riser card assemblies from/to the system, mounting a riser card option to the bracket, and installation of an add in card into the riser assembly.

### 2.8.1 Riser Card Assembly Removal

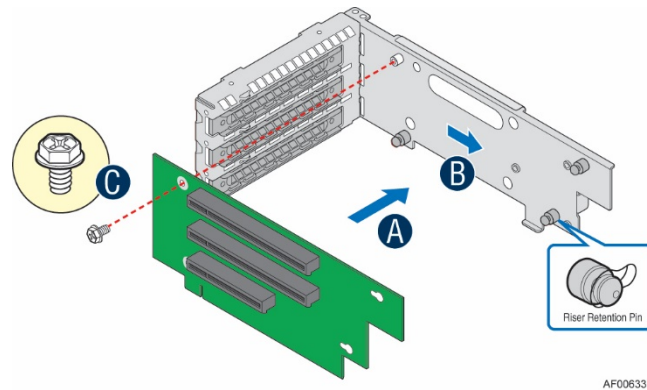


**Figure 53. PCI Riser Assembly Removal**

- Disconnect any cables attached to any add-in cards. Grasp the riser assembly with both hands and pull up to remove from the system.

## 2.8.2 Mounting a Riser Card Option to the Riser Bracket

Depending on the system model, your server may or may not have all three riser cards installed. This section describes the process of adding a riser card option to the riser bracket.

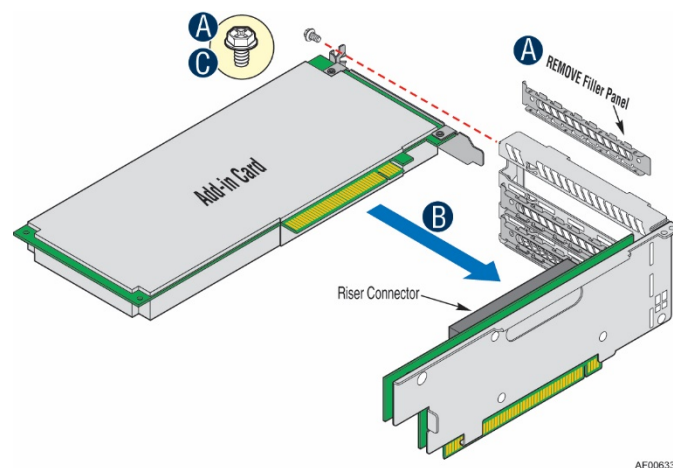


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**Figure 54. Riser Card Installation to Riser Bracket**

- Remove the riser bracket from the chassis (see section 2.8.1)
- Remove the fastener screw from the riser bracket (see letter 'C')
- Locate and remove the riser card option from its packaging
- Place the riser card onto the bracket so that the three bracket pins fit into the matching key holes on the riser card. (see letter 'A')
- Slide the riser card in the direction shown, locking the riser card to the bracket (see letter 'B')
- Install the fastener screw to secure the riser card to the bracket. (see letter 'C')

## 2.8.3 PCI Add-in Card Installation



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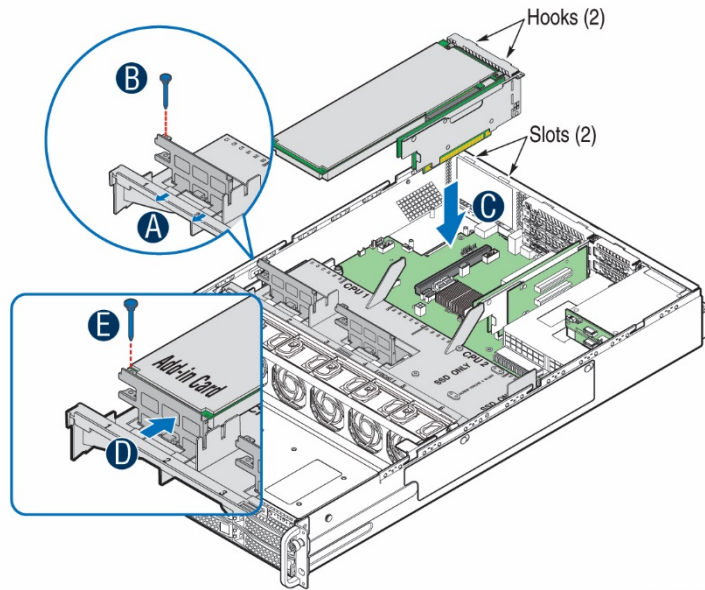
**Figure 55. PCI Add-In Card Installation**

- Remove the PCI riser assembly from the system. (see section 2.8.1)
- Remove the filler panel from the add-in card slot and remove the fastener screw as shown (see letter 'A')
- Insert the add-in card until it is fully seated inside the PCI slot on the riser card (see letter 'B')
- Secure the add-in card to the riser bracket with the fastener screw as shown (see letter 'C')

**NOTE:** For add-in cards with internal cable connectors, it may be necessary to connect cables before installing the riser card assembly into the system.



## 2.8.4 PCI Riser Assembly Installation



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**Figure 56. Installing PCI Riser Assembly**

**Note:** Steps 1, 2, 5, 6, and 7 are only needed when a full-length PCI card is installed on the riser assembly.

- Slide back the blue card guide on the air duct (see letter 'A')
- If installed, remove the blue plastic pin from the card guide (see letter 'B')
- Position the riser card's edge connector over the riser slot on the server board and align the two hooks on the back edge of the riser assembly with the slots on the back of the chassis
- Once aligned, press the riser assembly straight down into the riser slot (see letter 'C') **NOTE:** Do NOT rock the riser assembly into place; doing so may damage the contact pins within the riser slot
- Slide forward the card guide to lock in the back edge of the full-length add-in card (see letter 'D')
- Locate the blue plastic pin to secure the back edge of the full-length add-in card to the card guide
- Insert the blue plastic pin into the card guide and through the matching hole in the add-in card (see letter 'E')
- Connect any cables to the add-in cards that require them. See your add-in card documentation for additional information



## 2.9 Rack Handles – Installation / Removal

The system includes a set of rack handles designed to secure a system into a rack or cabinet and to aid with pulling systems from or pushing systems into a rack or cabinet.

**Note:** The system should never be carried solely by the rack handles. Intel recommends carrying the system using two people or to use a cart when moving the system from one location to another.



**CAUTION:** Slide/rail mounted equipment is not to be use as a shelf or a work space

### 2.9.1 Installing the Rack Handles

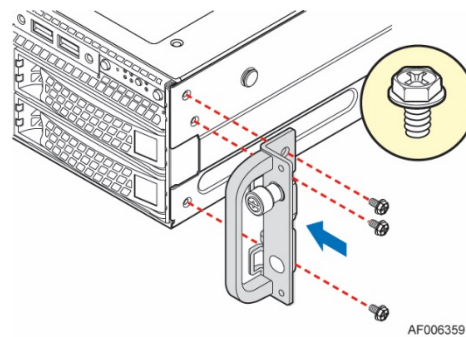
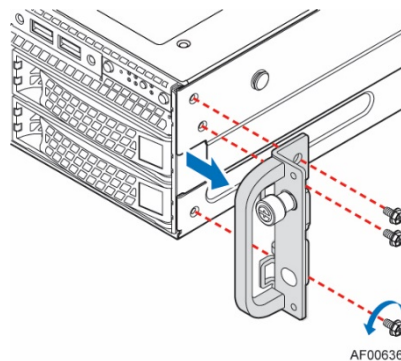


Figure 57. Installing the Rack Handle

- Locate the rack handles
- Align the rack handle with the three holes on the side of the server system
- Attach the rack handle to the server system with three screws using 8 in/lbs torque

### 2.9.2 Removing the Rack Handles



- Remove the three screws holding the rack handle to the chassis

## 3. Option and Accessory Kit Integration and Service

---

### **Purpose**

This chapter provides instructions for the integration of system components within a server system 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**

1. Anti-static wrist strap and conductive foam pad (recommended)
2. Phillips\* (cross head) screwdriver (#1 and #2 bits)

### **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**

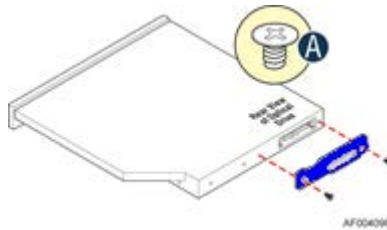
Each procedure described in this section will follow an illustration first format. This format will give the reader the option to follow a quicker path to system integration by first seeing an illustration of the intended procedure. If necessary, the reader can then follow the step-by-step instructions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

## 3.1 Slimline Optical Drive – Installation and Removal

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

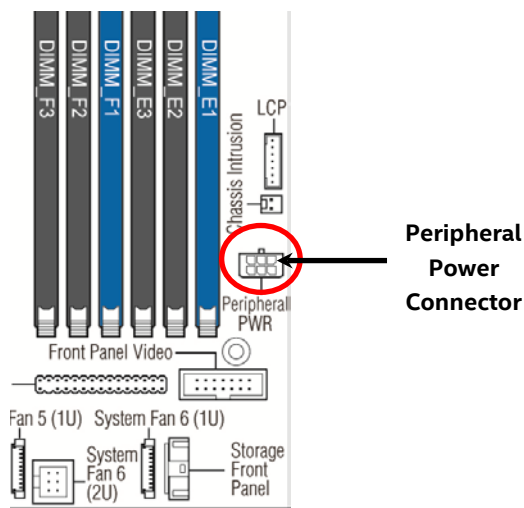
### 3.1.1 Slimline Optical Drive Installation

**NOTE:** The slimline 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.



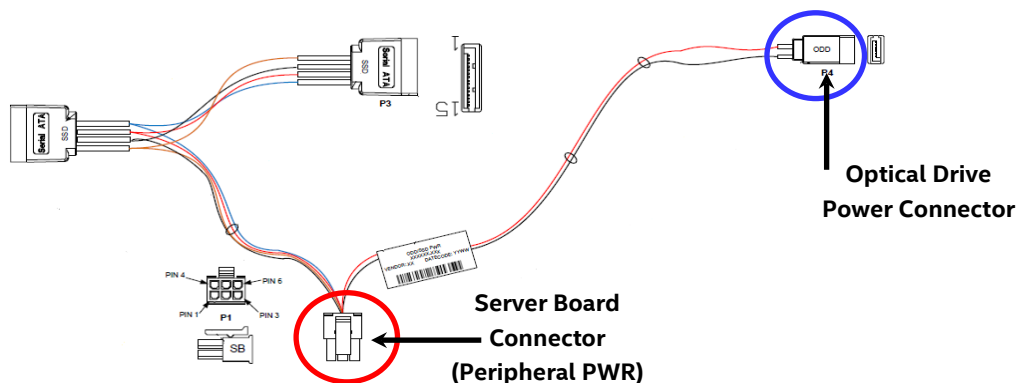
**Figure 58. Installing the Plastic Mounting Clip to an Optical Drive**

- From the system's accessory kit, locate the Blue plastic mounting clip and fasten it to the back of the optical using two screws as shown (see letter “A”)
- From the system's accessory kit, locate the peripheral device power cable



**Figure 59. Peripheral Power Connector**

- Connect the 2x3 cable connector (labeled “SB”) to the server board “Peripheral PWR” connector



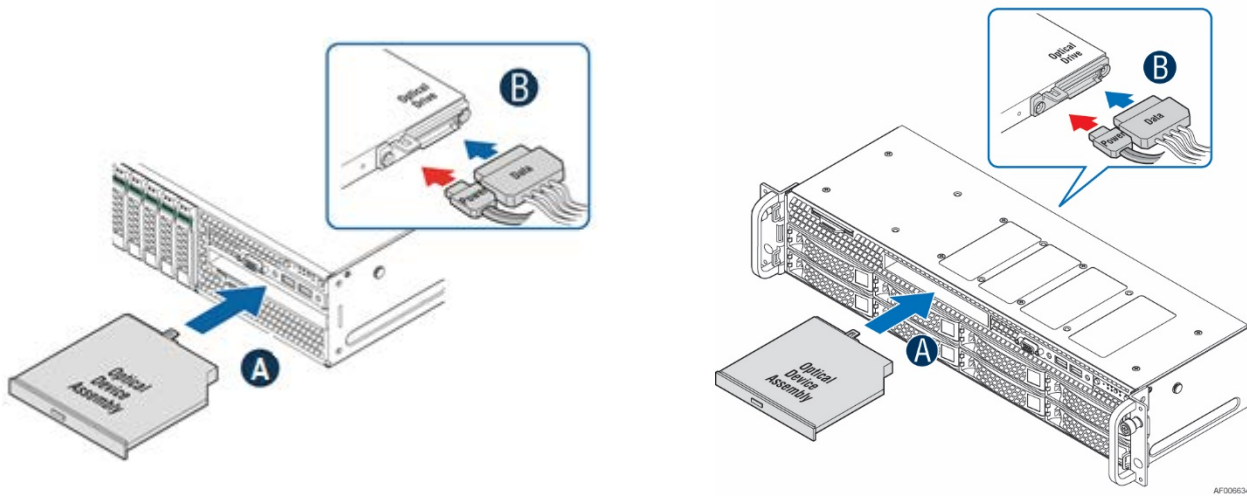
**Figure 60. 7-pin Single SATA Port Connectors**

- Locate the SATA cable and install it to either the “SATA 4” or “SATA 5” ports on the server board

- Route the SATA cable to the back of the optical drive bay

**NOTE:** All cables in the system that need to be routed front-to-back or back-to-front, should be routed using the cable channels along each chassis sidewall. No cables should be routed through the center of the system.

- If installed, remove the optical drive bay filler plate from the chassis



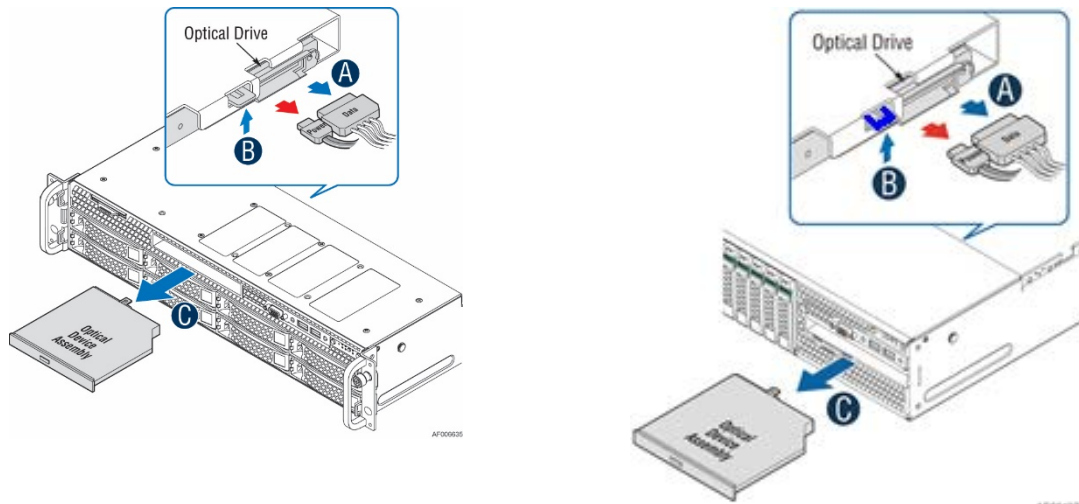
**Figure 61. Optical Drive Installation**

- Push the optical drive into the drive bay until it snaps and locks into place (see letter 'A')
- Connect the power and SATA cables to the optical drive as shown (see letter 'B')

### 3.1.2 Slimline Optical Drive Removal

**NOTE:** The slimline 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



**Figure 62. Removing the Slimline Optical Drive**

- Remove the system cover – See section 2.2.1
- Detach the SATA and Power cables from the back of the optical drive (see letter 'A')
- Detach the optical drive from the drive bay by carefully lifting up on the blue release tab located on the back of the optical drive (see letter 'B')
- Slide the optical drive out of the drive bay (see letter 'C')
- If no device will be installed in this location, install the supplied filler panel in this location

## 3.2 Power Supply Module – Installation / Removal

### 3.2.1 Power Supply Module Installation

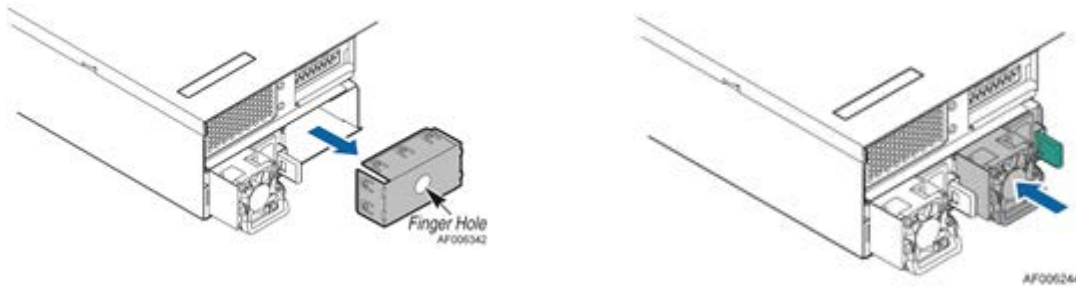


Figure 63. Power Supply Module Installation

- (If installed) Remove the insert from the chassis power supply bay
- Insert the power supply module into the power supply bay
- Push the power supply module into the bay until it locks into place

### 3.2.2 Power Supply Module Removal

**Caution:** The power supply is only hot-swappable (system does not have to be powered down) if the system is configured with two power supply modules operating in a 1+1 Redundant configuration only.

Systems with a single power supply installed or a system operating in a 2+0 non-redundant power mode, **MUST** be powered OFF before removing the power supply module from the system.

- Detach the power cord from the power supply to be removed
- Using the handle, pull the power supply module from the system while pushing the green latch in the direction shown

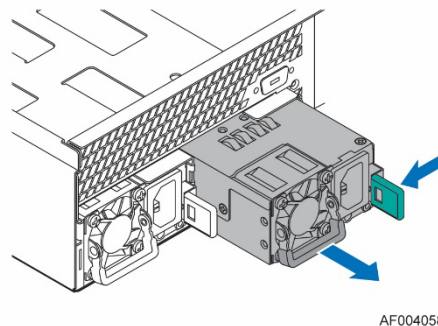
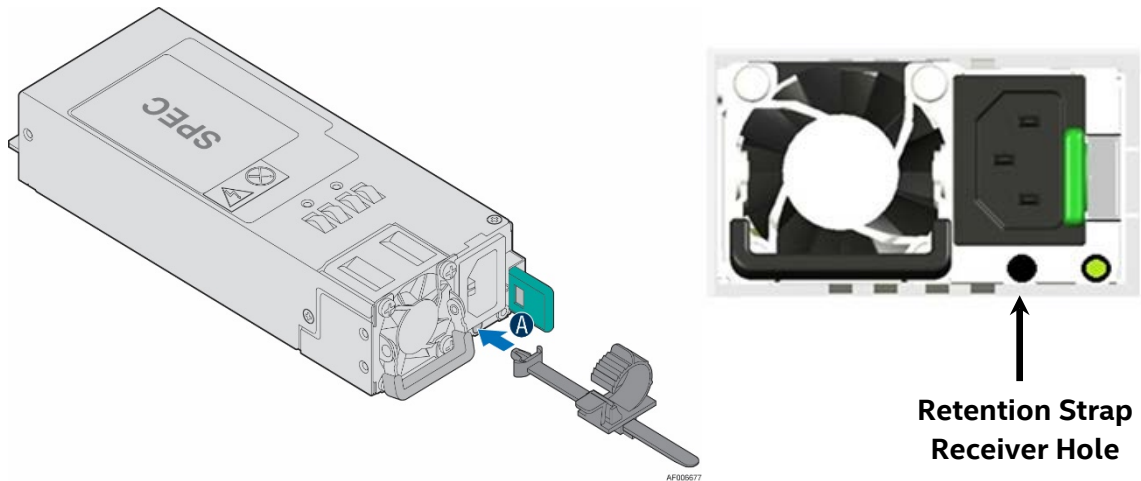


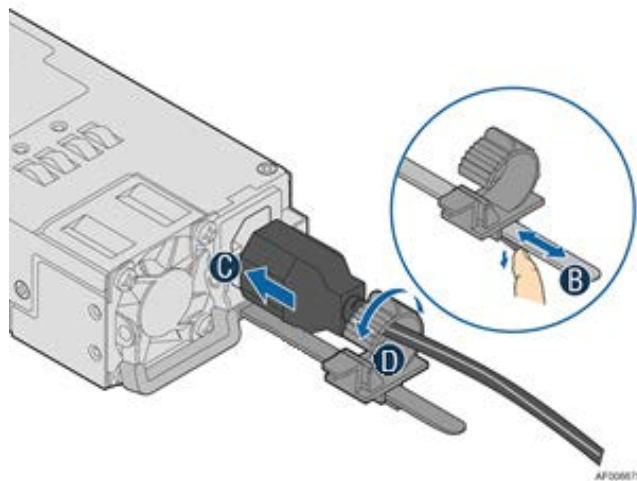
Figure 64. Power Supply Module Removal

### 3.3 Power Cord Retention Strap Installation



**Figure 65. Power Cord Retention Strap Installation**

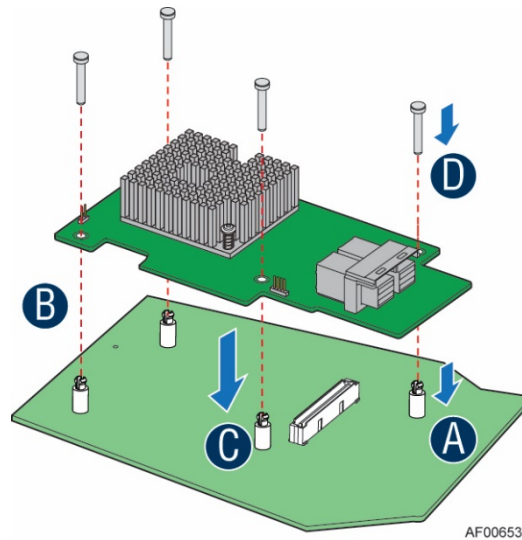
- Locate the power cord retention strap from the system accessory kit
- Insert the locking tab end of the Retention Strap into the receiver hole located beneath the power cord receptacle on the back of the power supply module (see letter 'A')



- While pushing up the locking tab on the bottom of the slider, adjust the slider to the desired position (see letter 'B')
- Install the power cord into the power cord receptacle on the back side of the power supply (see letter 'C')
- Pull the slider strap over the power cord and lock it securely into place (see letter 'D')

To remove the power cord from the Retention Strap

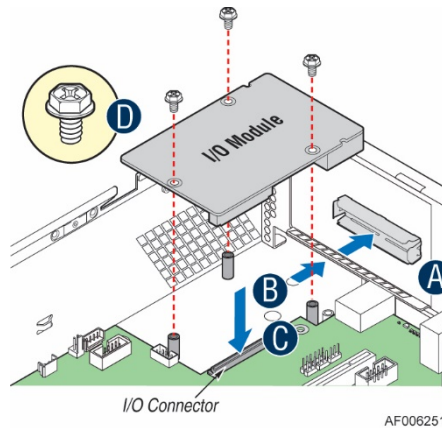
- Push down on the slider tab to release the slider strap
- Pull the slider strap back over the power cord
- Remove power cord





## 3.5 Intel® I/O Expansion Module – Installation / Removal

### 3.5.1 Intel® I/O Expansion Module Installation

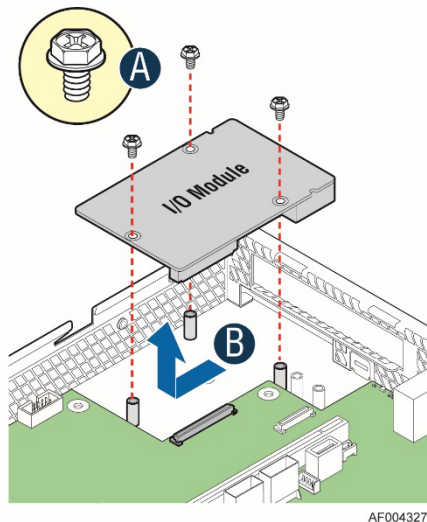


**Figure 67. Installing Intel® I/O Expansion Module**

- To remove the filler panel, squeeze the side panels and push it out of the chassis (see letter 'A')
- Attach the I/O module port stickers to the outside of the chassis back panel
- Carefully angle and insert the rear I/O connectors of the I/O module into the cut-out on the chassis back panel and position the module over the server board connector (see letter 'B'). Care should be taken NOT to damage the I/O shield material when placing the I/O module into the back panel cut-out.
- Carefully press down on the module to engage the connectors (see letter 'C')
- Secure the module with three screws as shown (see letter 'D')

### 3.5.2 Intel® I/O Expansion Module Removal

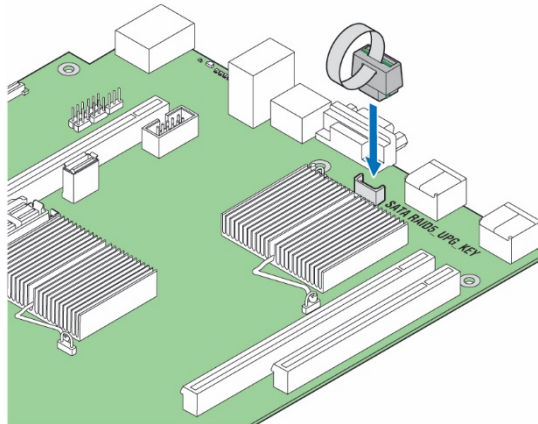
**Figure 68. Removing an I/O Expansion Module**



- Power off the server and detach the power cable(s)
- Detach all cables from the I/O Module
- Remove the system cover – See Page 50
- Remove the three screws as shown (see letter 'A').
- Carefully pull up on the I/O Module until it disengages from the server board (see letter 'B').
- If no replacement module is to be installed, re-install the I/O expansion module bay filler panel into the system back panel (Note: the filler panel snaps into the back panel from the outside of the chassis)

## 3.6 SATA RAID 5 Upgrade Key – Installation / Removal

### 3.6.1 Installing the SATA RAID 5 Upgrade Key



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**Figure 69. Installing the SATA RAID 5 Upgrade Key**

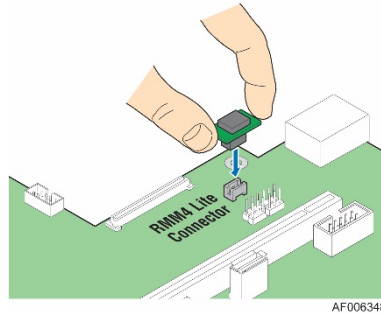
- Remove the SATA 5 Upgrade Key from its packaging
- Locate the white 4-pin key connector behind the onboard NIC 2 port on the back edge of the server board.
- To install the key, place it over the connector and confirm the orientation of the key matches that of the connector
- Press the key down onto the connector.

### 3.6.2 Removing the SATA RAID 5 Upgrade Key

- Power off the system and disconnect the power cable(s)
- Remove the system cover (see section 2.2.1)
- Using the Key pull tab, pull the key up until it disengages from the connector

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

### 3.7.1 Intel® RMM4 Lite Key Installation



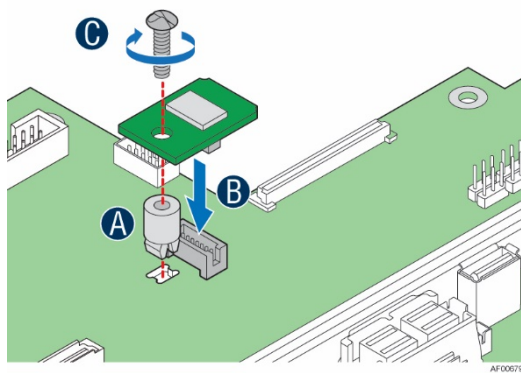
**Figure 70. Installing the Intel® RMM4 Lite**

- Remove the Intel® RMM4 Lite key from its packaging
- Locate the Intel® RMM4 Lite connector on the server board near the back of the server board next to the I/O Module connector
- Place the Intel® RMM4 Lite key over the connector and match the orientation of the key to that of the connector
- Press the key down onto the connector

### 3.7.2 Intel® RMM4 Lite Key Removal

- Power off the system and disconnect the power cable(s)
- Remove the system cover (see section 2.2.1)
- Carefully grasp the key and pull it up until it disengages from the connector

## 3.8 Trusted Platform Module (TPM) Installation



**Figure 71. Trusted Platform Module (TPM) Installation**

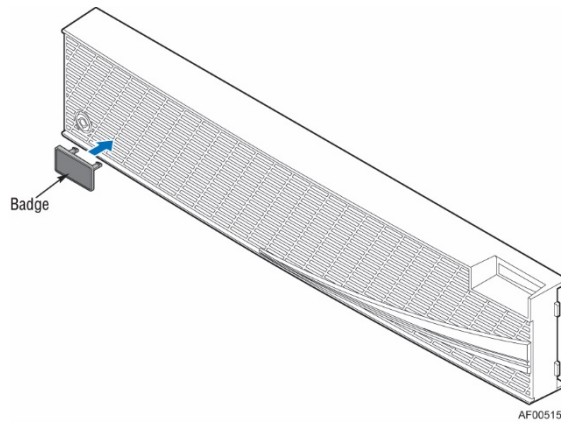
- Locate the TPM module connector on the server board near the Riser Slot 1.
- Insert the plastic stand-off into the server board mounting hole (see letter "A").
- Place the TPM module over the connector, match the orientation and press the key down onto the connector (see letter "B").
- Secure the TPM module to the stand-off with the fastener screw (see letter "C").

## 3.9 Front Bezel – Installation / Removal

The system supports the installation of an optional front bezel (Intel product code A2UBEZEL). The Bezel kit includes a plastic lockable front bezel and multiple bezel Snap-ons allowing for OEM differentiation.

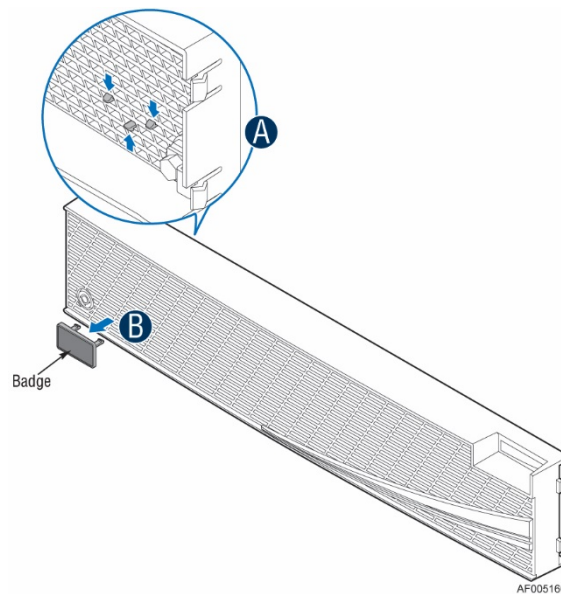
### 3.9.1 Bezel Snap-ons

The bezel kit provides three different bezel Snap-ons to allow for OEM differentiation; two different size badging Snap-ons, and one decorative wave Snap-on.



**Figure 72. Installing the Snap-on to the front bezel**

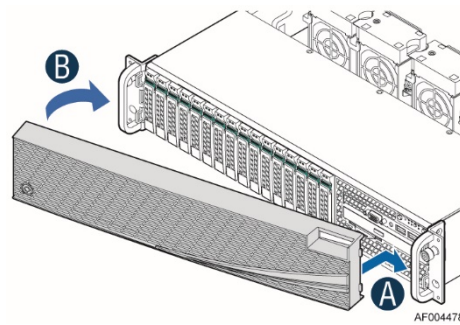
To mount the Snap-on to the bezel, insert the Snap-on hooks into the bezel and press to snap it into place.



**Figure 73. Removing the Snap-on from the front bezel**

To remove the Snap-on from the bezel, squeeze the hooks at the rear of the Snap-on to release it (see letter 'A'). Then remove the Snap-on from the bezel (see letter 'B').

### 3.9.2 Front Bezel Installation

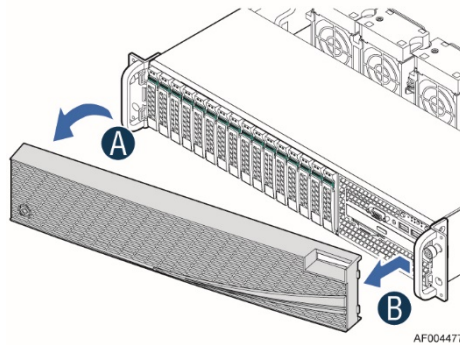


**Figure 74. Installing the Front Bezel**

Note: Before installing the bezel, you must install the rack handles (see section 2.9.1)

- Lock the right side of the bezel to the rack handle (see letter 'A').
- Rotate the left side of the bezel towards the chassis
- Press the left side of the bezel into the rack handle until it clicks into place (see letter 'B').
- Lock the bezel

### 3.9.3 Front Bezel Removal



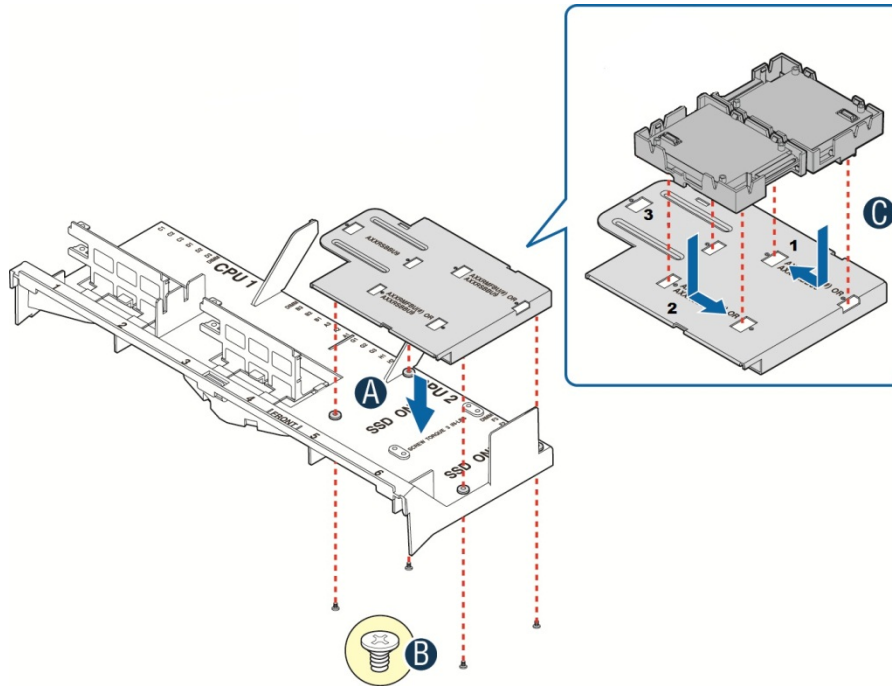
**Figure 75. Removing the Front Bezel**

If your system includes a front bezel, follow these steps to remove it from the chassis:

- Unlock the bezel
- Pull out the left side of the bezel from the rack handle (see letter 'A').
- Rotate the left side of the bezel out away from the chassis to release the latches on the right side from the rack handle (see letter 'B').

### 3.10 Intel® RAID Maintenance Free Backup Unit (RMFBU) – Mounting Bracket Installation

Figure 76. Intel® RMFBU Installation



- Locate the RMFBU mounting bracket from the system accessory kit
- Place the RMFBU bracket onto the air duct (see letter 'A')
- Secure the RMFBU bracket to the air duct using the four fastener screws (see letter 'B')
- Slide and lock the RMFBU onto the bracket (see letter 'C')



## 3.11 2 x 2.5" Rear Mount Backplane Module Accessory Kit Installation

Two 2.5" SATA Hot Swap  
Drive Bay Option

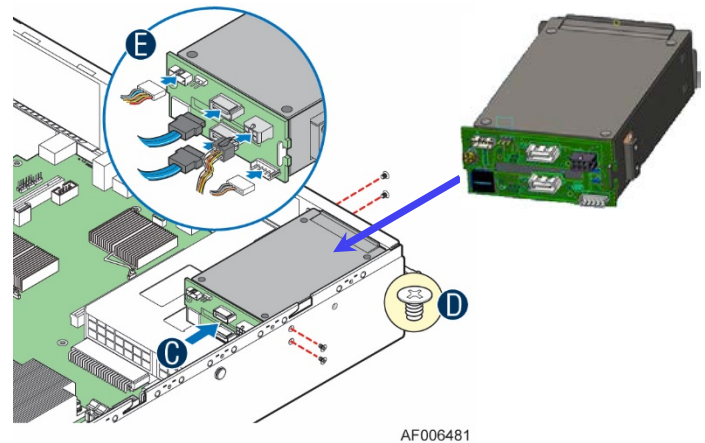
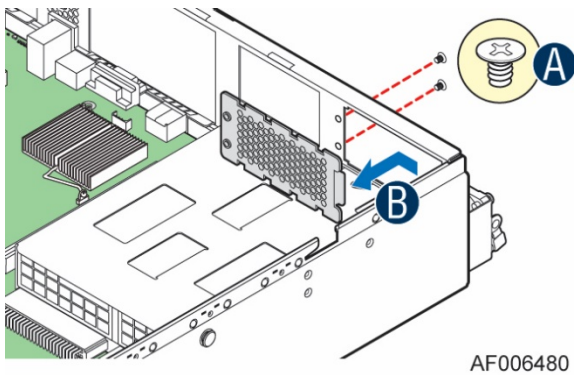
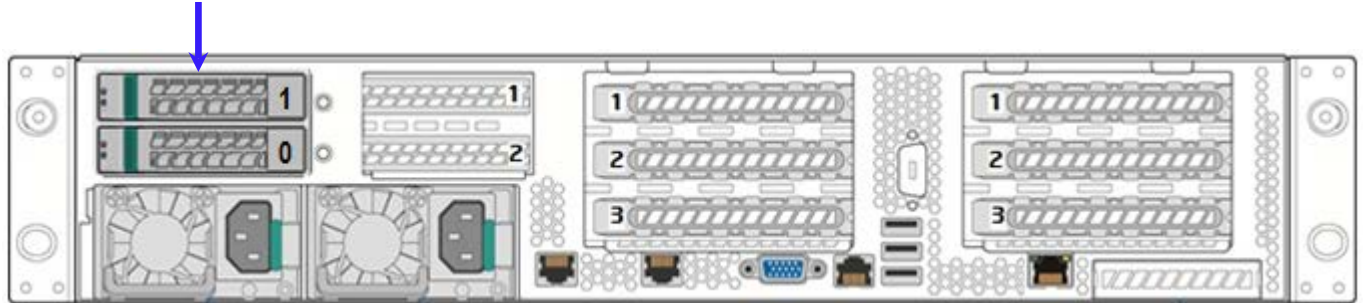
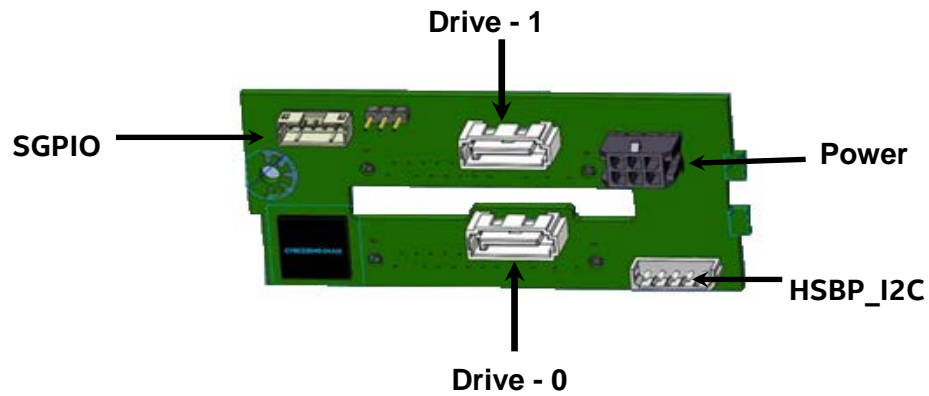


Figure 77. 2 x 2.5" Rear Mount Backplane Module Installation

- Remove the two fastener screws securing the bay cover plate to the chassis (see letter 'A')
- Unlatch and remove the bay cover plate from the chassis (see letter 'B')
- Carefully remove the backplane module from its packaging
- Position the drive bay module over the power supply bay and slide back (see letter 'C')
- Secure the drive bay module to the chassis using four fastener screws; two on the chassis sidewall, and two on the chassis back panel. (see letter 'D')

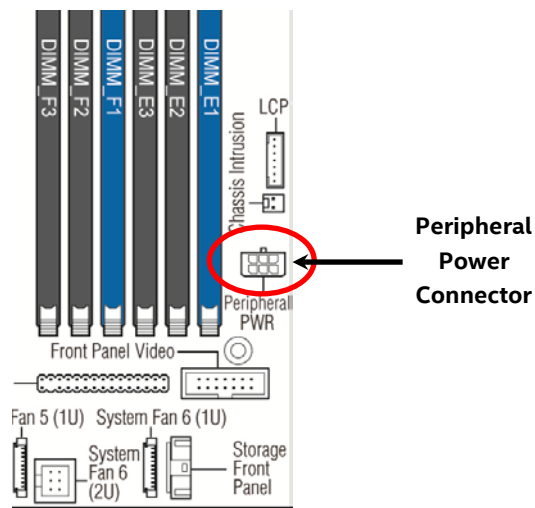
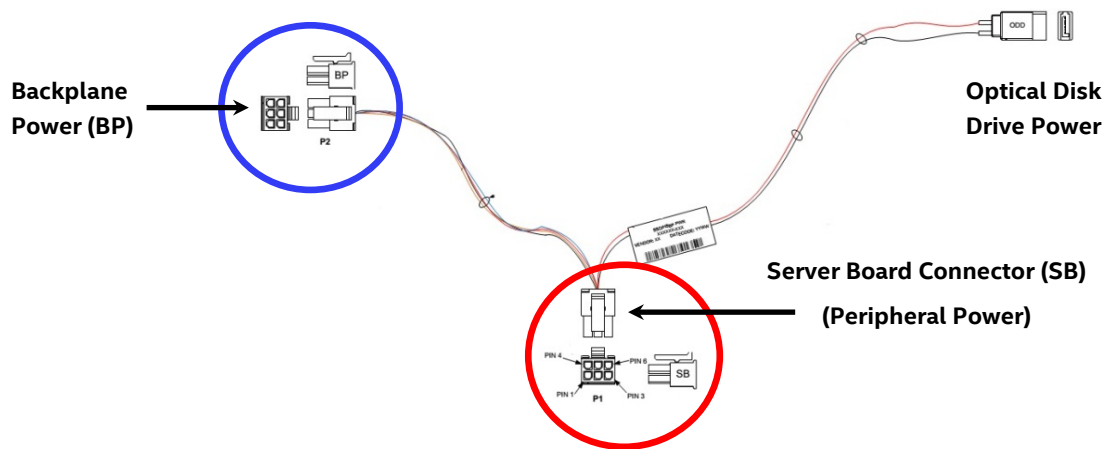




**Figure 78. Rear Backplane Cable Connectors**

- From the backplane accessory kit, locate the peripheral device power cable

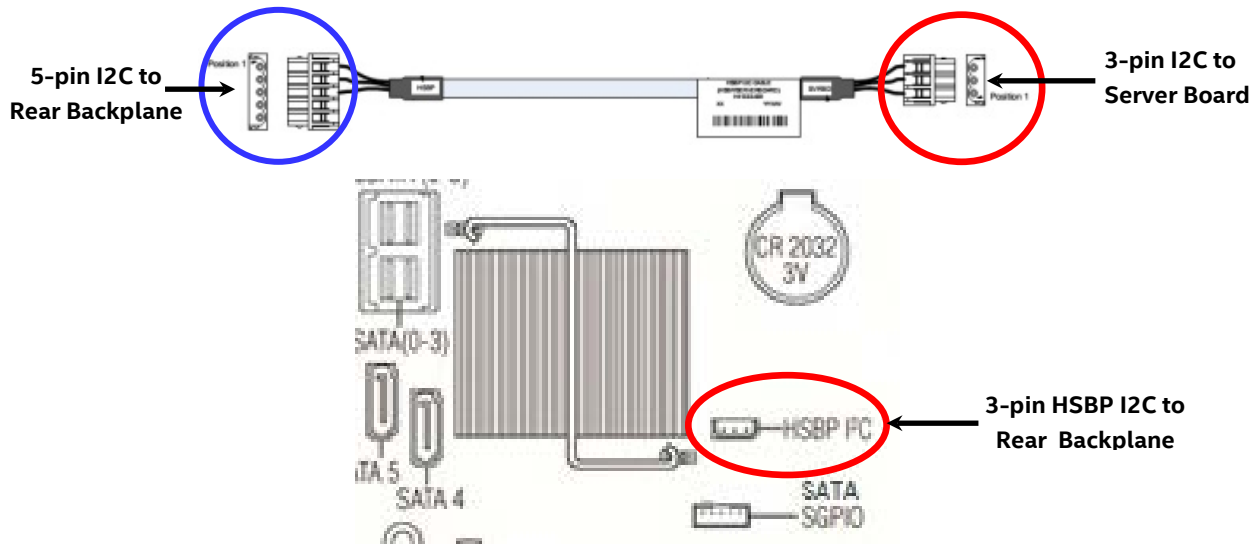
**Figure 79. Rear HSBP Power Cable - iPN G99319**



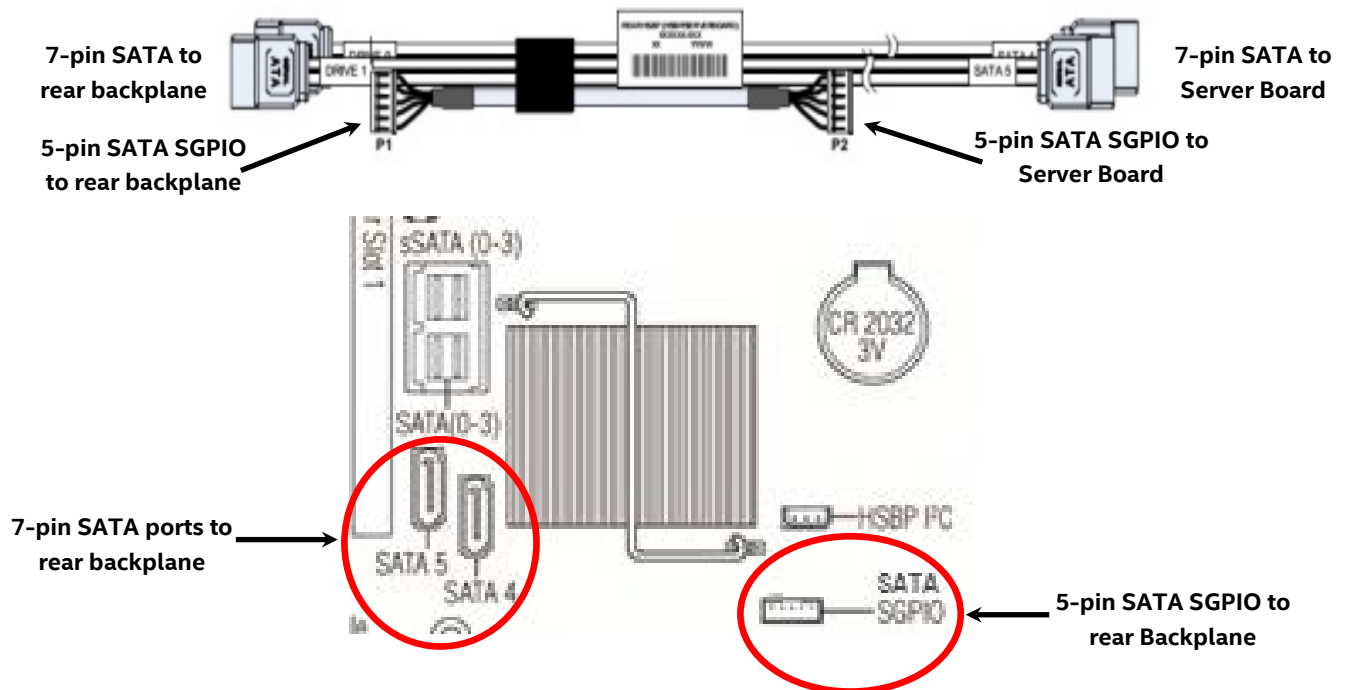
- Connect the 2x3 cable connector (labeled "SB") to the server board "Peripheral PWR" connector
- Connect the 2x3 cable connector (labeled "BP") to the backplane "PWR" connector

- From the backplane accessory kit, locate the I2C cable

**Figure 80. Rear HSBP I2C Cable – iPN H41333**



- Connect the 5-pin I2C cable connector to the matching “HSBP\_I2C” connector on the backplane
- Connect the 3-pin I2C cable connector to the matching “HSBP\_I2C” connector on the server board
- From the backplane accessory kit, locate the Rear HSBP SGPIO & SATA Cable Bundle



**Figure 81. Rear HSBP SATA & SGPIO Cable Bundle – iPN H41068**

- Match and connect the 7-pin SATA “Drive 0” and “Drive 1” cable connectors to the “Drive\_0” and “Drive\_1” connectors on the backplane
- Connect the 5-pin SATA SGPIO cable connector to the “SGPIO” connector on the backplane
- Match and connect the 7-pin “SATA 4” and “SATA 5” cable connectors to the “SATA\_4” and “SATA\_5” connectors on the server board
- Connect the 5-pin SATA SGPIO cable connector to the “SGPIO” connector on the server board

## 3.12 Intel® RAID Expander Card Installation

Depending on the front drive bay configuration, 2.5" or 3.5" drive support, and storage device technology type, 6Gb/s SAS/SATA or 12 Gb/s SAS, the 2U server system can support different Intel® SAS RAID Expander card options.

### 3.12.1 2.5" Front Drive Bay Support

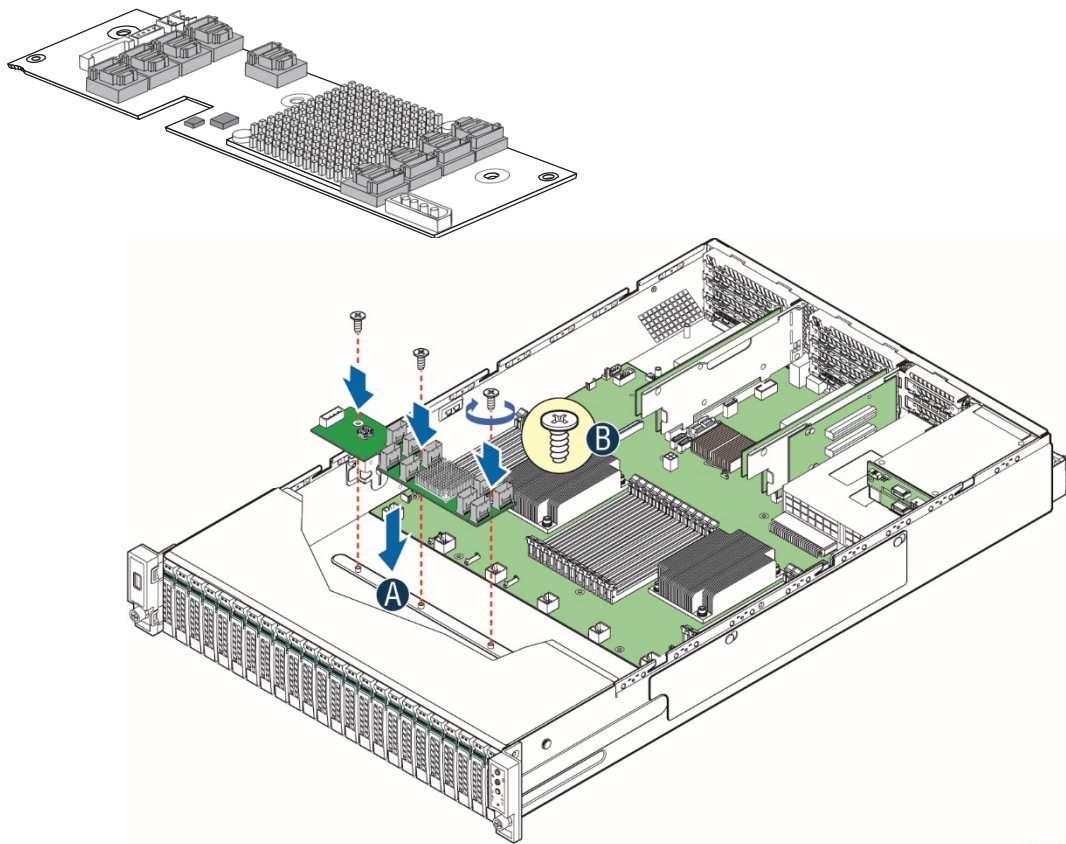
For Intel® Server Systems **R2208WTxxxx**, **R2216WTxxxx**, and **R2224WTxxxx**, an Intel® Raid Expander Mezzanine Card option is mounted internally behind the front drive bays.

Intel product codes: **RES2CV360** (6Gb) and **RES3TV360** (12Gb)

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**Note:** In order to attach the 6Gb RES2CV360 RAID Expander Card to a 12Gb compatible backplane, you must use miniSAS (SFF8087)-to-miniSAS HD (SFF8643) cables from Intel® Accessory Kit AXXCBLEXPDM5.

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**Figure 82. SAS Expander Mezzanine Card Installation**

- Locate the Intel RAID Expander Mezzanine Card
- Remove the system cover (see section 2.2.1)
- Remove the air duct (see section 2.3.1)
- Remove the system fan assembly (see section 2.4.1)
- Attach the rubber bumpers to the white circle targets on the bottom side of the RAID Expander card

- Align the three screw holes of the RAID Expander card with the matching threaded holes on the base of the chassis directly behind the front drive bays
- Secure the RAID Expander card to the chassis using three fastener screws (8 in/lbs torque for each screw)
- Locate the power splitter cable from the RAID Expander kit
- Attach the power splitter cable to the power cable designated for use on the middle drive bay module
- Attach the 1x4-pin power connector from the splitter cable to the RAID Expander card
- Attach the 2x2-pin power connector from the splitter to the middle hot swap backplane

### 3.12.2 3.5" Front Drive Bay Support

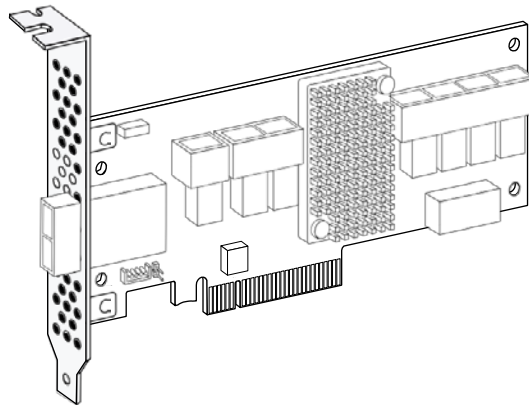
For the Intel® Server System **R2308WTxxxx** and **R2312WTxxxx**, an Intel® Raid Expander PCIe\* add-in card option installs into any available PCIe\* add-in card slot.

Intel product code **RES2SV240** (6Gb) and **RES3FV288** (12Gb)

---

**Note:** Expander to backplane cables that are included in the 6 Gb RES2SV240 Kit are NOT compatible for use with 12 Gb compatible backplanes used in this 2U product family. Appropriate miniSAS (SFF8087)-to-miniSAS HD (SFF8643) cables must be obtained to attach the 6 Gb RES2CV240 RAID Expander card to a 12 Gb compatible backplane. See the *Intel® Server Board S2600WT Product Family Spares/Accessories List and Configuration Guide* for a list of available cable kits compatible for this configuration.

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### 3.12.3 Intel® RAID Expander Card Cabling Overview

The following diagrams identify SAS Expander card connectors to be used when cabling the expander card to the system backplane(s) and to the add-in SAS RAID card. Care should be taken when connecting cables from the RAID expander card to the connectors on the backplane because each connector is pre-programmed at the factory to provide specific drive ID mapping. Improper connections may provide undesirable drive mappings.

See Appendix B. for System Cable Routing Diagrams

Figure 83. 12 Gb Intel® RAID Expander Card RES3FV288 Connector Identification

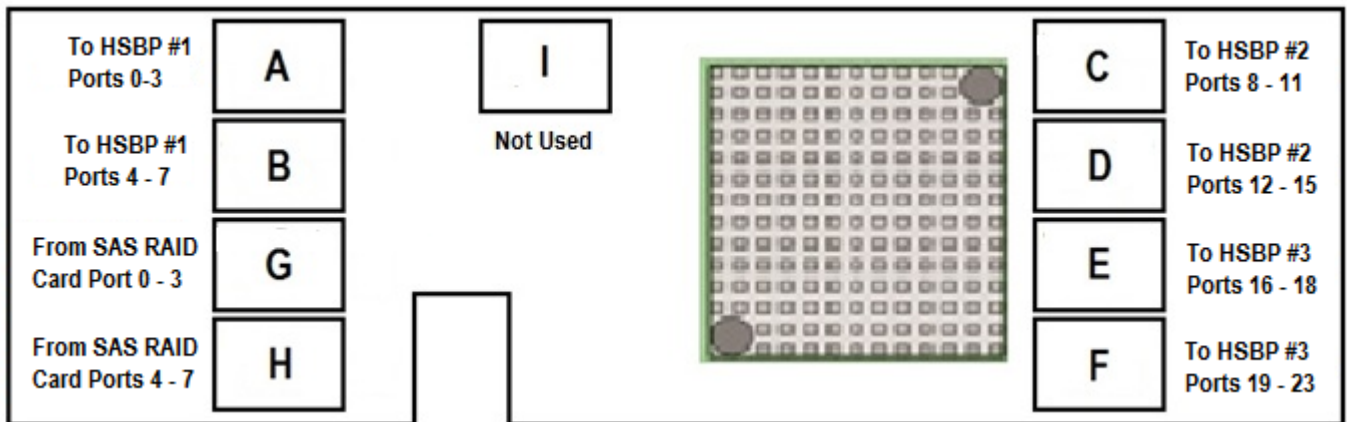
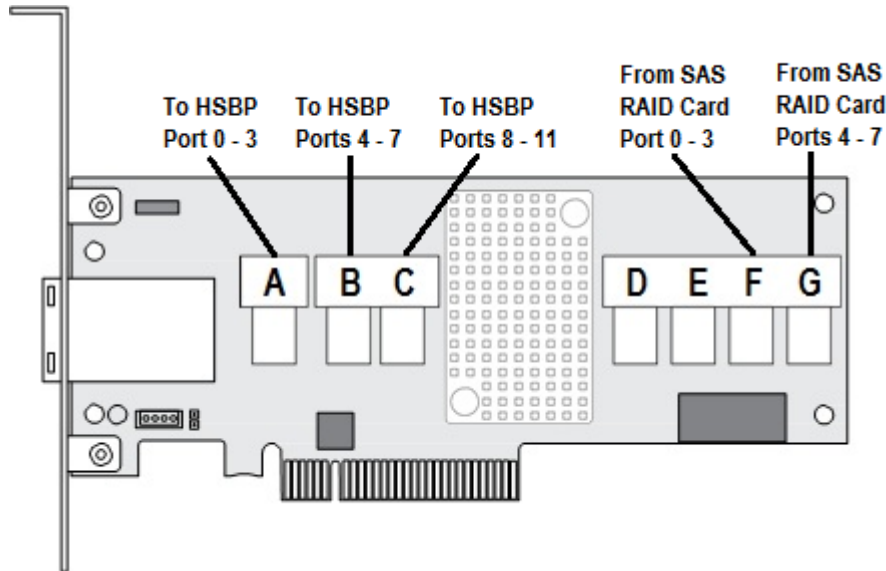
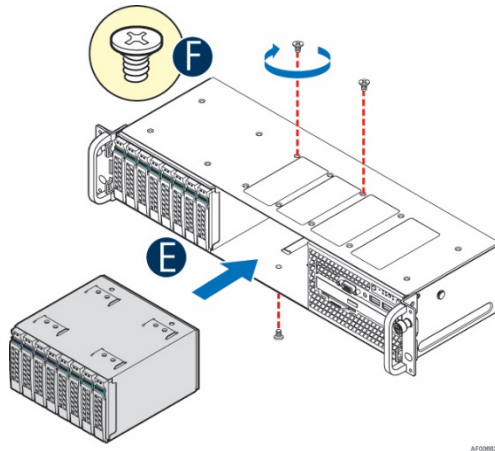


Figure 84. Internal 12 Gb Intel® RAID Expander Card RES3TV360 - Connector Identification Block Diagram

### 3.13 R2208WT... to R2216WT... Upgrade

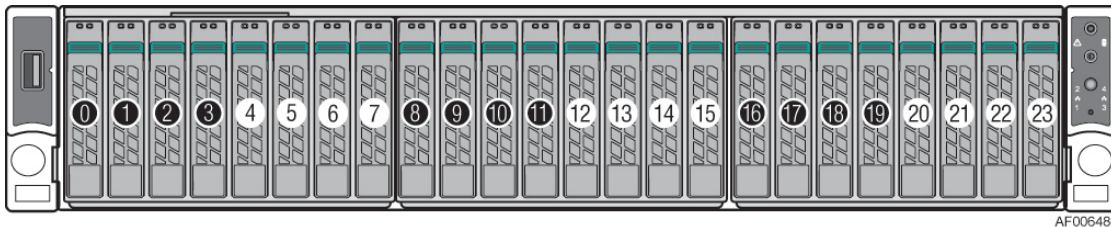
The R2208WT... 8 x 2.5" server system can be upgraded to a 16 x 2.5" drive system with the addition of one of several available 8 x 2.5" Front Drive Bay Module accessory kits. Installation of the drive bay module into the chassis is the same for each. Refer to section 1.3.3 for installation instructions.

Depending on the system configuration requirements, it may also be necessary to install a Intel® RAID expander card. See section 3.12 for SAS RAID Expander card installation instructions.



### 3.14 R2208WTxxx / R2216WTxxx to R2224xxx Upgrade

The R2208WT... 8 x 2.5" server system and R2216WT... server system can be upgraded to a 24 x 2.5" drive system with the addition of several different 8 x 2.5" Front Drive Bay Module accessory kits available.



In order to upgrade an eight or sixteen drive system to a 24 drive system, the following accessory kits must be installed:

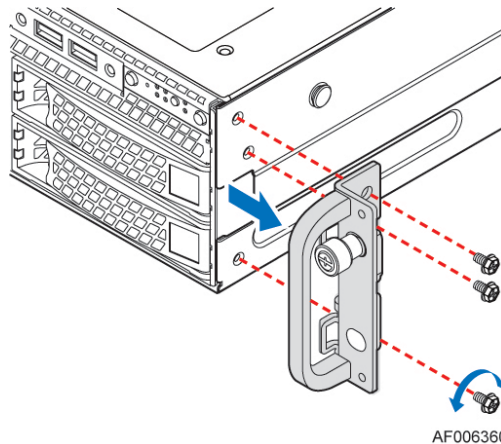
- 8 x 2.5" Front Drive Bay Module Accessory Kit option (several types available)
- 1U/2U Rack Handle Spare / Accessory Kit (Intel product code A2UHANDLKIT)
- Intel® RAID Expander Card – Intel product code RES3TV360 (12Gb)

#### **Prepare system for upgrade**

- Remove the system cover (see section 2.2.1)
- Remove the air duct (see section 2.3.1)
- Remove the system fan assembly (see section 2.4.1)
- Disconnect the front panel cables for the Front USB ports, Front Video port, and Front Control Panel from the server board ( See Figure 14)
- Disconnect all cables from the 1st (left most) drive bay module

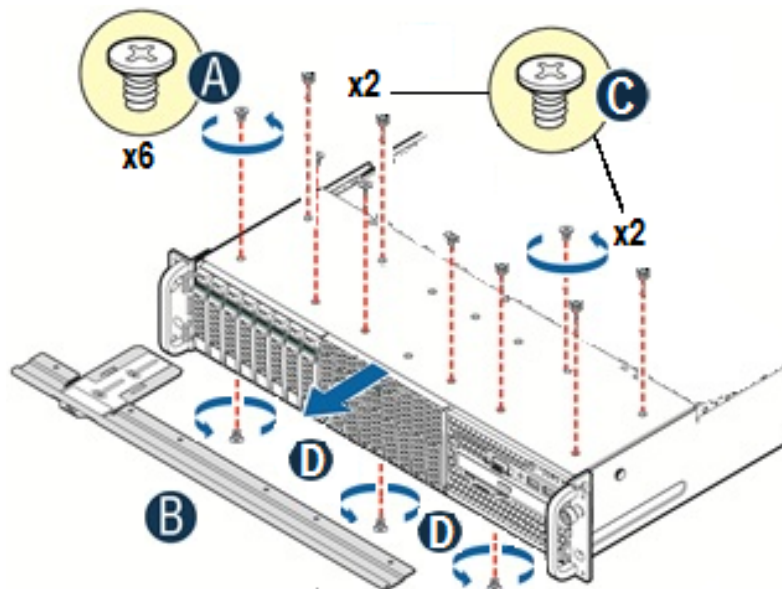


## **Remove the standard rack handles**



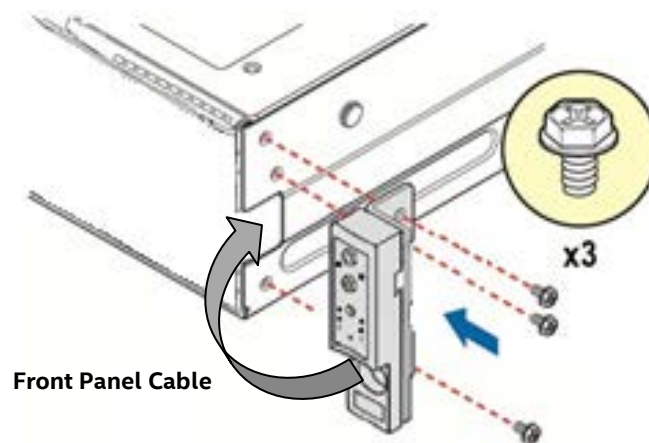
- Remove the three screws holding each rack handle to the chassis

## **Remove drive bay retention bracket, 1st drive bay module, and I/O bay module**

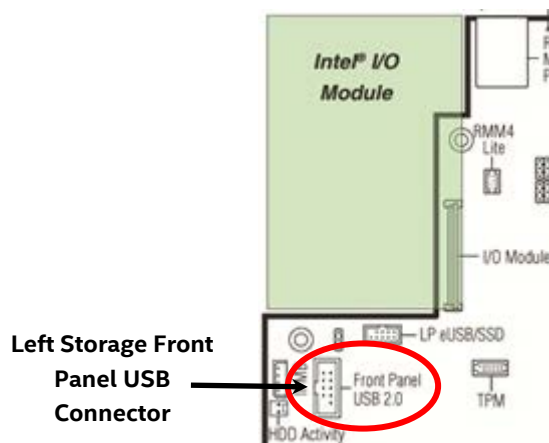


- Remove the 6 fastener screws from the top front edge of the drive bay (See Letter 'A') and pull out the metal bracket (see letter 'B')
- Remove fastener screws over the 1st (left most) drive bay module and I/O Bay Module (see letter 'C')
- Carefully place the chassis on its side.
- From the bottom of the chassis, remove the fastener screw securing 1st (left most) drive bay module, the I/O Bay Module, and drive bay filler panel (if installed) (see letter 'D')
- Carefully return the chassis to its original position
- Slide out the 1st (left most) drive bay module and drive bay filler panel (if installed) and the I/O Bay Module

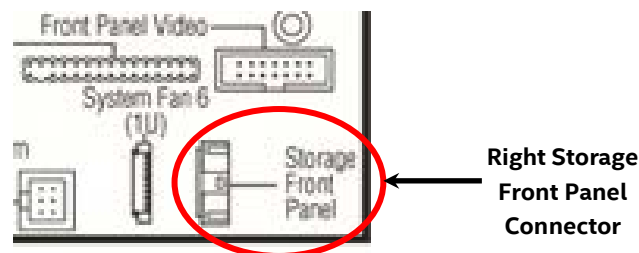
## **Install the storage rack handles**



- Locate the Left (with USB port) and Right (with control panel) storage rack handle assemblies from Intel Accessory Kit A2UHANDLKIT
- Lay each rack handle assembly near the left and right chassis corners and route the ribbon cables from each rack handle along the inside of each chassis side wall towards the back of the drive bay
- Attach the left and right rack handle assemblies to the chassis using three fastener screws each (8 in/lbs torque for each screw). Note that the ribbon cables should fit inside cutouts in the chassis sidewall.
- Attach the Left USB flat cable to the Black 10-pin server board connector labeled “FP\_USB”



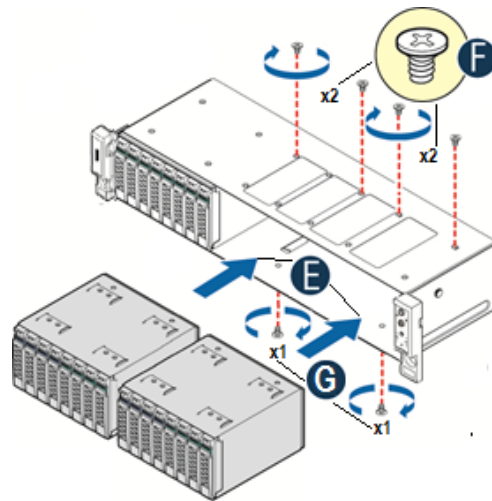
- Attach the Right front panel ribbon cable to the White 30-pin connector labeled “Storage\_FP” on the front right corner of the server board



- Ensure that the ribbon cables are routed within the cable channel inside each chassis sidewall, then secure them using fastener tape strips

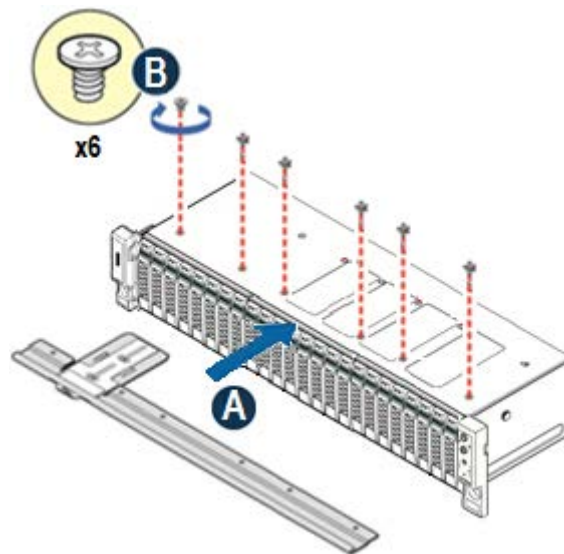
## Install the 8 x 2.5" drive bay module(s)





- Slide all 8x2.5" drive bay module(s) into the chassis (see letter 'E')
- Secure the top side of each drive bay module with two fastener screws each (see letter 'F') (8 in/lbs torque for each screw)
- Carefully place the chassis on its side and secure the bottom side of each drive bay module with one fastener screw (see letter 'G') (8 in/lbs torque for each screw)
- Carefully return the chassis to its original position

## **Install drive bay retention bracket**



- Locate the drive bay retention bracket and screws
- Carefully slide the drive bay retention bracket into the gap between the top of the drive bay module(s) and the bottom of the drive bay sheet metal. (see letter 'A').
- Secure the retention bracket with six fastener screws (see letter 'B'). (8 in/lbs torque for each screw)
- Connect a power cable to each of the hot swap backplanes

Note: if installing a RAID expander card, do NOT attach the power cable to the middle hot swap backplane. This will be attached at a later time.

## **Install Intel® RAID Expander Card into the chassis**

See section 3.12

## 4. System Software Updates and Configuration

---

### 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. For information, see “Restoring the BIOS Defaults”.

## 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 3. BIOS Setup: Keyboard Command Bar**

Key	Option	Description
<b>&lt;Enter&gt;</b>	▪ 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.
<b>&lt;Esc&gt;</b>	▪ 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 field's 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.
<b>&lt;Tab&gt;</b>	▪ 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.

Key	Option	Description
–	▪ Change Value	<ul style="list-style-type: none"> <li>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.</li> </ul>
+	▪ Change Value	<ul style="list-style-type: none"> <li>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.</li> </ul>
<F9>	▪ Setup Defaults	<ul style="list-style-type: none"> <li>Pressing the &lt;F9&gt; key causes the following to display: <div data-bbox="695 611 1425 709" data-label="Text"> <div>Load Optimized Defaults?</div> <div>Yes No</div> </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> </li> </ul>
<F10>	▪ Save and Exit	<ul style="list-style-type: none"> <li>Pressing the &lt;F10&gt; key causes the following message to display: <div data-bbox="695 1056 1425 1155" data-label="Text"> <div>Save configuration and reset?</div> <div>Yes No</div> </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> </li> </ul>

## 5. System Packaging Assembly Instructions

---

The original Intel packaging, in which the server system was delivered, is designed to provide protection to a fully configured system and was tested to meet ISTA (International Safe Transit Association) Test Procedure 3A (2008). The packaging was also designed to be re-used for shipment after system integration has been completed.

The original packaging includes two layers of boxes – an inner box and the outer shipping box, and various protective inner packaging components. The boxes and packaging components are designed to function together as a protective packaging system. When reused, all of the original packaging material must be used, including both boxes and each inner packaging component. In addition, all inner packaging components **MUST** be reinstalled in the proper location to ensure adequate protection of the system for subsequent shipment.

---

**NOTE:** The design of the inner packaging components does not prevent improper placement within the packaging assembly. There is only one correct packaging assembly that will allow the package to meet the ISTA (International Safe Transit Association) Test Procedure 3A (2008) limits.

Failure to follow the specified packaging assembly instructions may result in damage to the system during shipment.

---

### 5.1 Accessory Kit

All loose components planned to ship with the system should be placed inside the Accessory Kit box (iPN H49460-001). Piece parts shown in the following photograph are for reference purposes only. Actual Accessory Kit contents may vary.



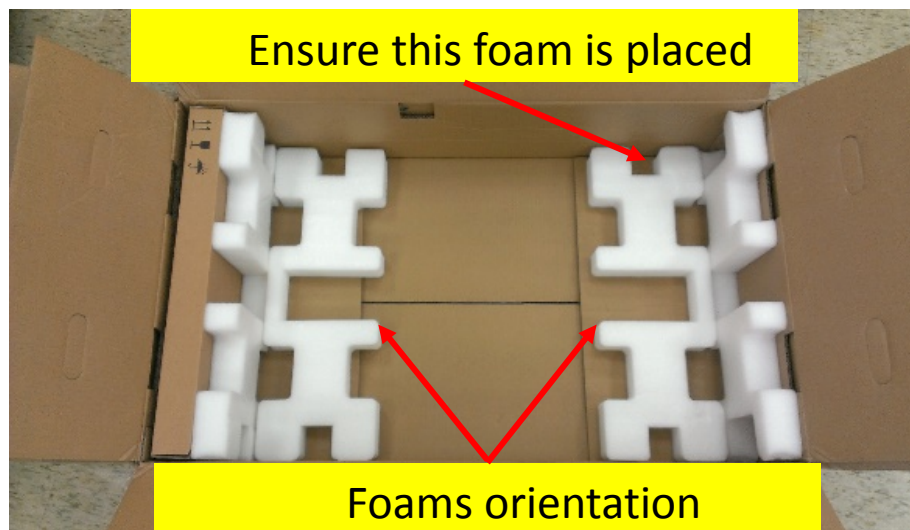
**NOTE:** The center cavity of the Accessory Kit Box was designed to support the optional system Front Bezel accessory (A2UBEZEL). The front bezel accessory should **NOT** be pre-installed to the system before placing the system into the shipping box.

## 5.2 System Packaging Assembly Instructions



**Figure 85. Package Assembly Orientation Reference Diagram**

- Place 4 foam inserts into the inner box as shown
- Place the Accessory Kit box between the end foam insert and the bottom foam insert as shown



- Carefully place the system into the shipping bag. Tape the bag shut.
- Carefully lower the system into the inner shipping box as shown





- Insert 1 foam insert on each side of the system as shown. Ensure the bottom tabs of the 2 side foam inserts fit into the end slots of the bottom foam inserts



- At the back of the system, place the corrugated cardboard insert (iPN H49478-001) between the foam insert and the system back panel as shown





- At the front of the system, between the Accessory box and the system front panel, place the corrugated cardboard insert (iPN - H49478-001)
- Place 2 remaining foam inserts on top of the system in the positions shown.



- Fold the top flaps of the inner box closed. End flaps first, followed by side flaps.
  - NOTE: By design, the two side flaps will not meet. Do not tape side flaps shut



- Fold the top flaps of the outer box. End flaps first, followed by the side flaps.
- Tape the outer box using an H-pattern. Across the center first, followed by both ends



## 6. System Service - System Features Overview

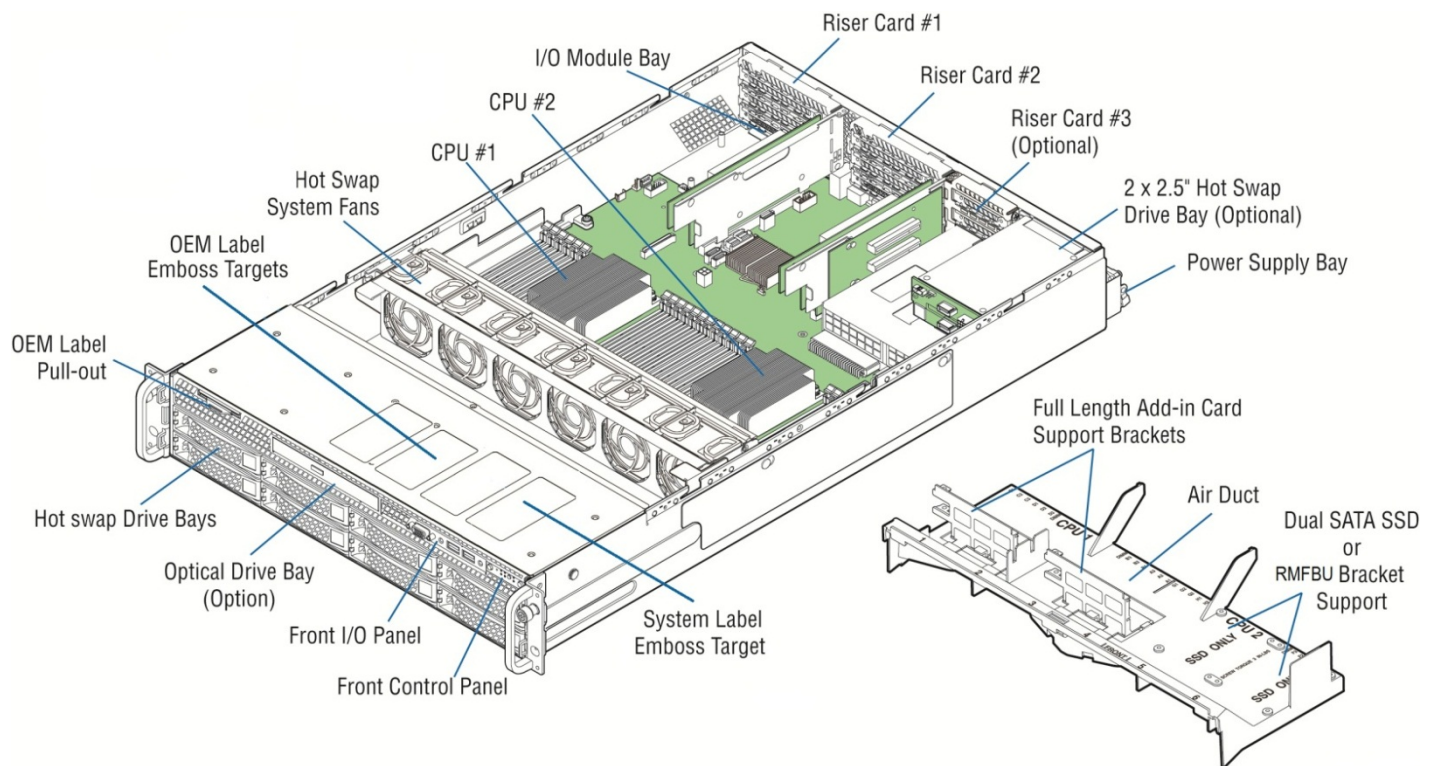
The intent of this chapter is to provide service personnel a reference to locate and identify the features associated with the Intel® Server System R2000WT product family. It also provides guidance for the removal and installation of field replaceable units (FRUs).

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 System R2000WT Technical Product Specification
- Intel® Server Board S2600WTR Technical Product Specification

### 6.1 System Feature Reference Diagrams

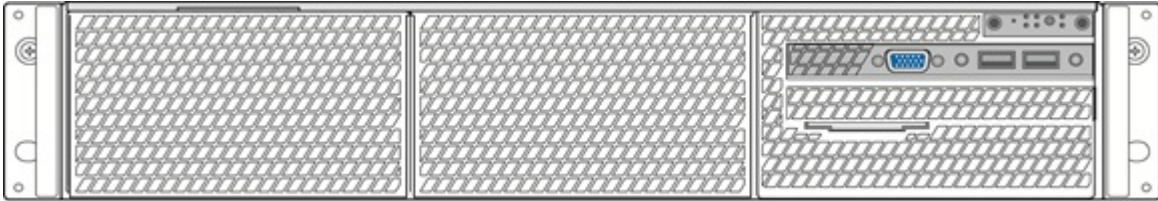
This section provides a high level overview of the Intel® Server System R2000WT product family. It provides illustrations and diagrams showing the location of important components, features, and connections found throughout the server system.



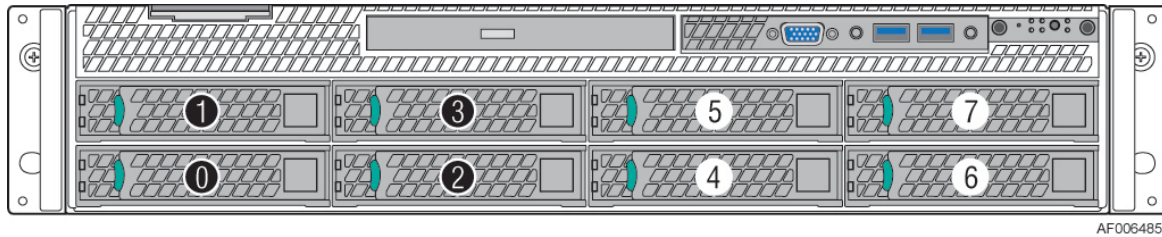
**Figure 86. Intel® Server System R2000WT Features Overview**



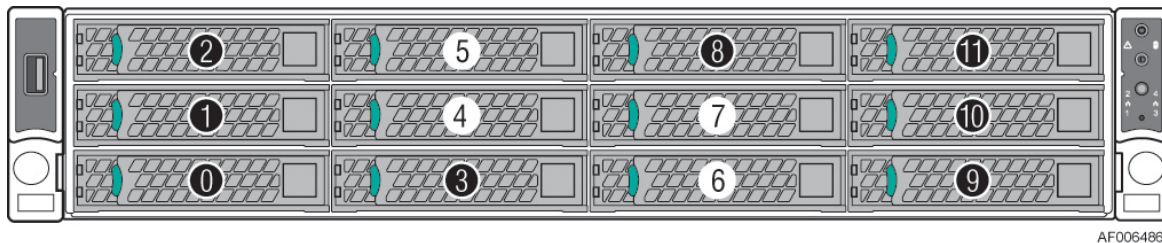
## 6.1.1 Front Drive Bay Options



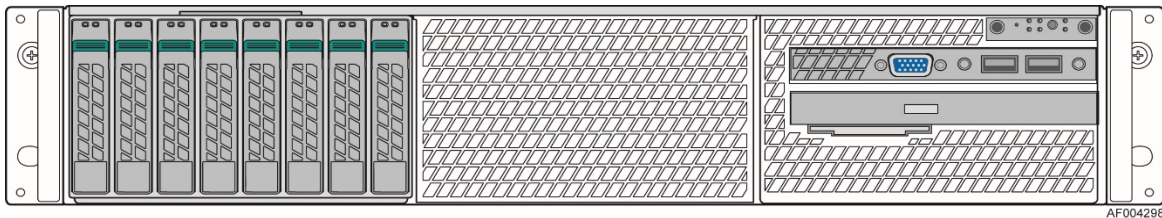
**Figure 87. No Front Drive Bay Configuration - Chassis only building block (Intel® Server Chassis R2000WTXXX)**



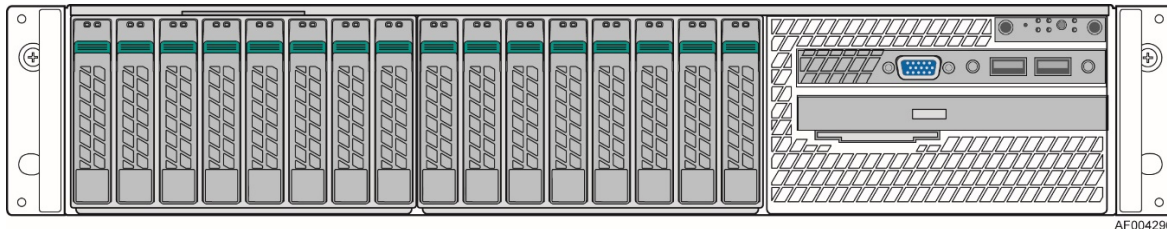
**Figure 88. 8 x 3.5" Drive Bay Configuration (R2308WT....)**



**Figure 89. 12 x 3.5" Drive Bay Configuration (R2312WT... – Storage System – Chassis only and System)**



**Figure 90. 8 x 2.5" Drive Bay Configuration (R2208WT....)**



**Figure 91. 16 x 2.5" Drive Bay Configuration (R2216WT....)**

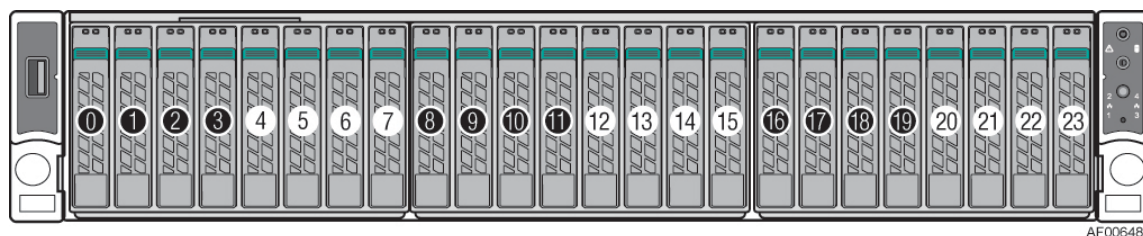


Figure 92. 24 x 2.5" Drive Bay Configuration (R2224WT.... – Storage System)

## 6.1.2 Control Panel Features

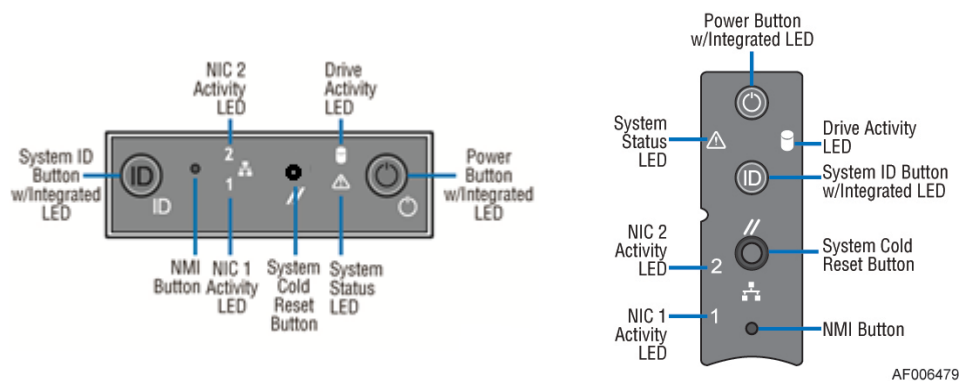
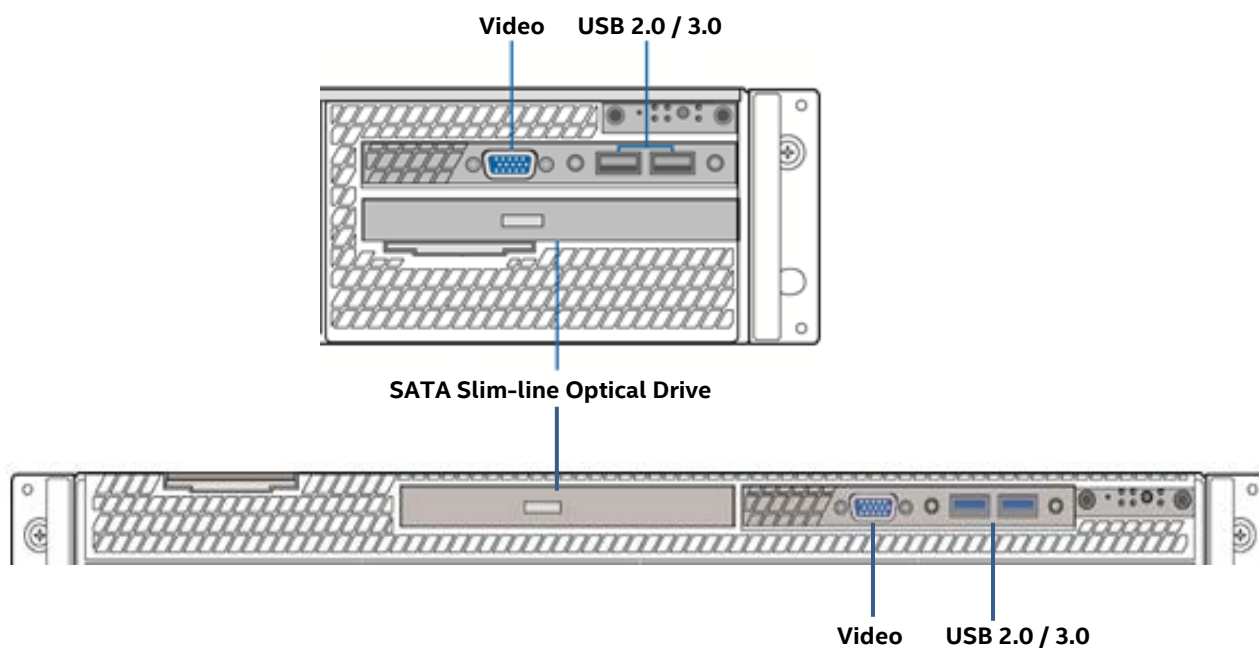


Figure 93. Control Panel Features



## 6.1.3 Front I/O Features (Non-Storage Systems)

Figure 94. Front I/O Panel Features

## 6.1.4 Back Panel Features

Figure 95. Back Panel Features

## 6.1.5 Server Board Features

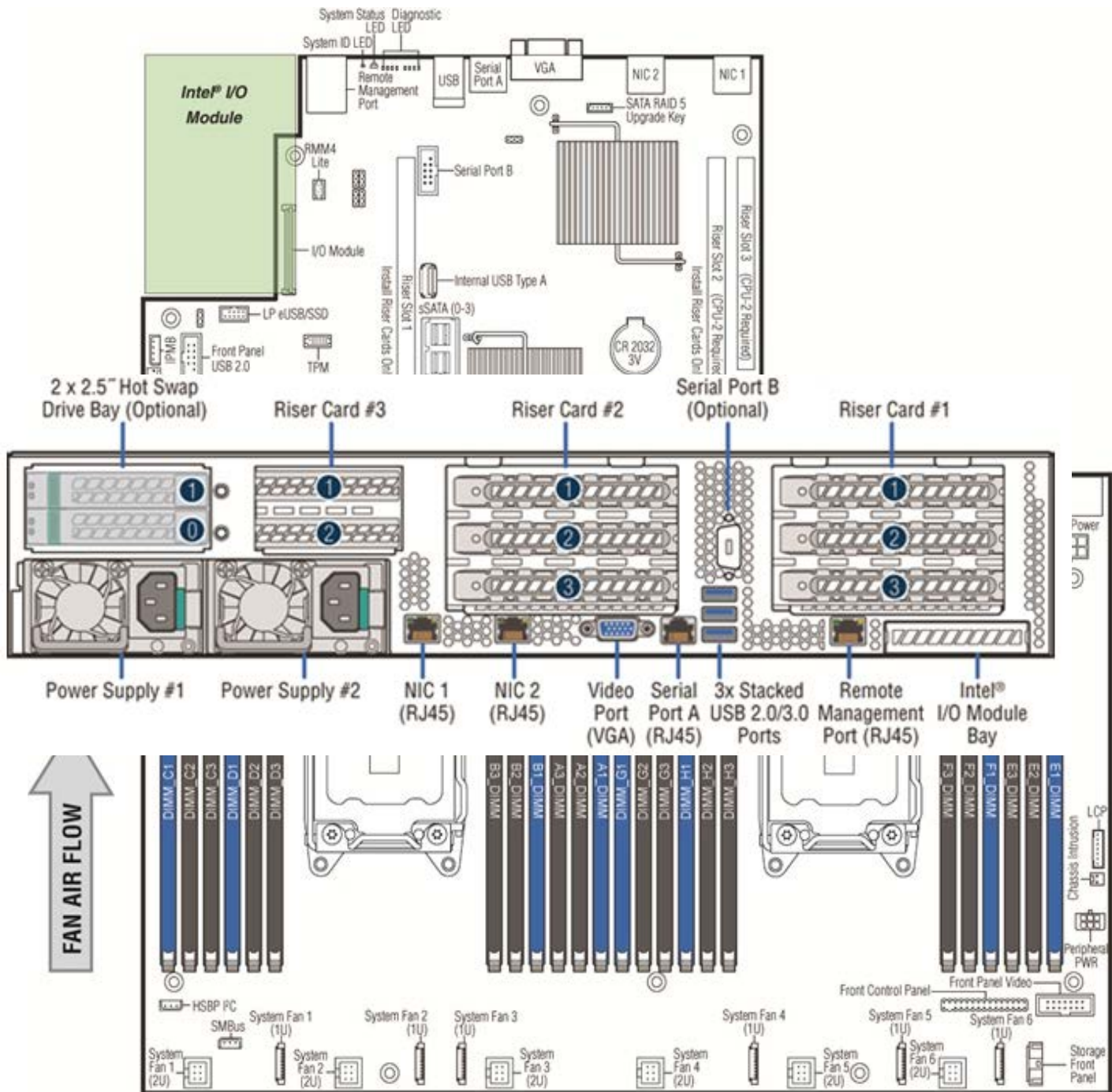
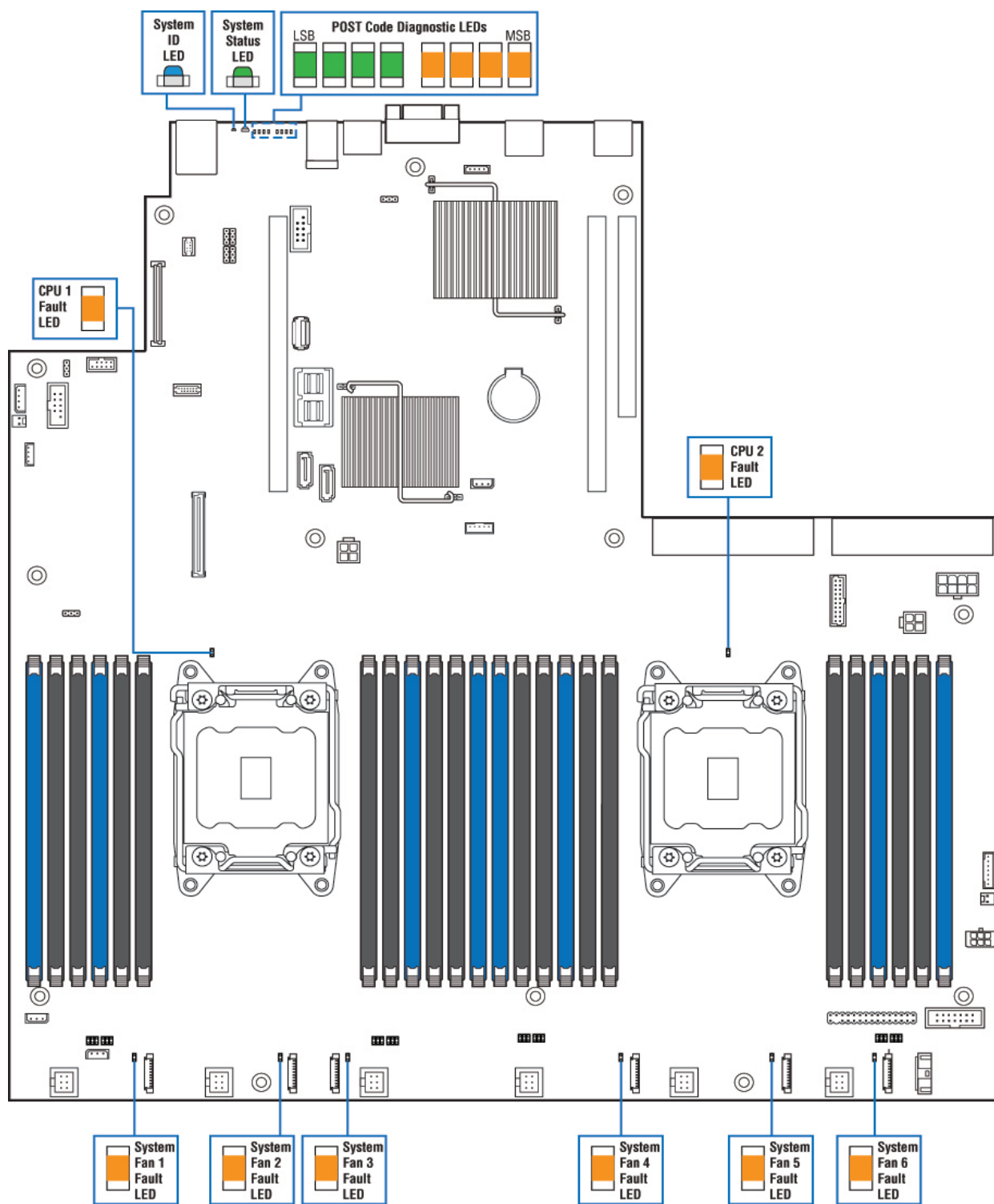


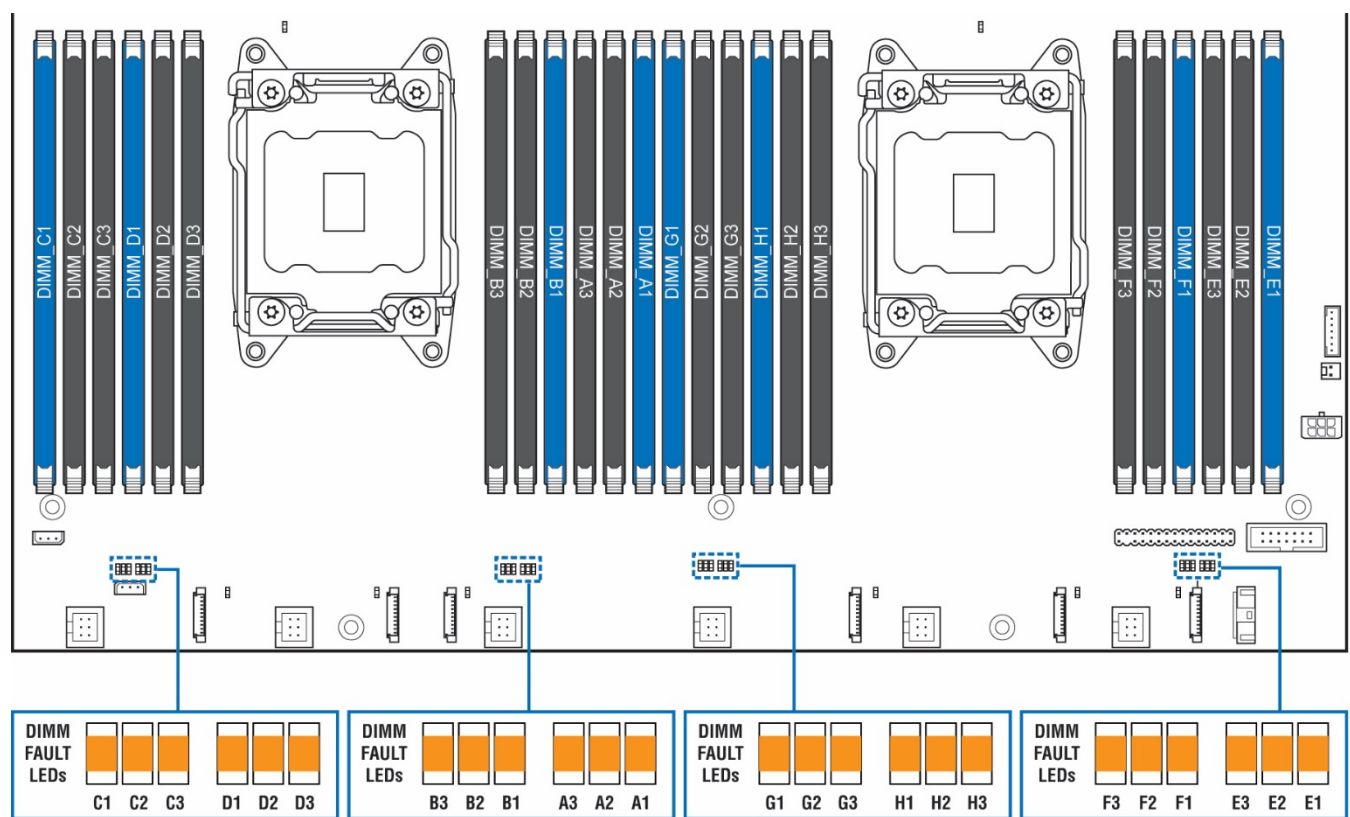
Figure 96. Server Board Feature Identification



AF006475

Figure 97. Intel® Light-Guided Diagnostic LEDs - Server Board





AF006403

Figure 98. DIMM Fault LEDs



## 6.2 System Configuration and Recovery Jumpers

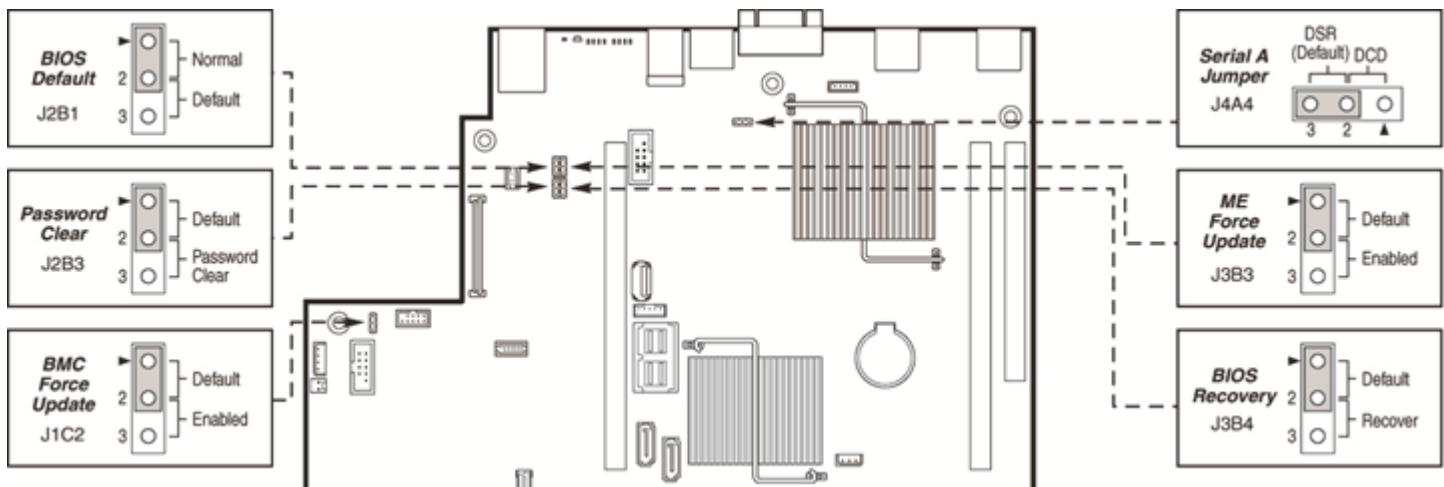


Figure 99. System Configuration and Recovery Jumpers

The following sections describe how each jumper block is used.

### 6.2.1 BIOS Default Jumper Block

This jumper resets BIOS options, configured using the <F2> BIOS Setup Utility, back to their original default factory settings.

---

**Note:** This jumper does not reset Administrator or User passwords. In order to reset passwords, the Password Clear jumper must be used

---

1. Power down the server and unplug the power cord(s)
2. Remove the system top cover and move the "BIOS DFLT" jumper from pins 1 - 2 (default) to pins 2 - 3 (Set BIOS Defaults)
3. Wait 5 seconds then move the jumper back to pins 1 - 2
4. Re-install the system top cover
5. Re-Install system power cords

---

**Note:** The system will automatically power on after AC is applied to the system.

---

6. During POST, access the <F2> BIOS Setup utility to configure and save desired BIOS options

**Note:**

After resetting BIOS options using the BIOS Default jumper, the Error Manager Screen in the <F2> BIOS Setup Utility will display two errors:

- 0012 System RTC date/time not set
- 5220 BIOS Settings reset to default settings

Note also that the system time and date may need to be reset.

### 6.2.2 Serial Port 'A' Configuration Jumper

Pin 7 of the RJ45 Serial A connector is configurable to support either a DSR (Default) signal or a DCD signal. Pin 7 signals are changed by moving the jumper on the jumper block labeled "J4A4", located behind the connector, from pins 1-2 (default) to pins 2-3.

## 6.2.3 Password Clear Jumper Block

This jumper causes both the User password and the Administrator password to be cleared if they were set. The operator should be aware that this creates a security gap until passwords have been installed again through the <F2> BIOS Setup utility. This is the only method by which the Administrator and User passwords can be cleared unconditionally. Other than this jumper, passwords can only be set or cleared by changing them explicitly in BIOS Setup or by similar means. No method of resetting BIOS configuration settings to default values will affect either the Administrator or User passwords.

1. Power down the server. For safety, unplug the power cord(s)
2. Remove the system top cover
3. Move the “*Password Clear*” jumper from pins 1 - 2 (default) to pins 2 - 3 (password clear position)
4. Re-install the system top cover and re-attach the power cords
5. Power up the server and access the <F2> BIOS Setup utility
6. Verify the password clear operation was successful by viewing the Error Manager screen. Two errors should be logged:
  - 5221 Passwords cleared by jumper
  - 5224 Password clear jumper is set
7. Exit the BIOS Setup utility and power down the server. For safety, remove the AC power cords
8. Remove the system top cover and move the “*Password Clear*” jumper back to pins 1 - 2 (default)
9. Re-install the system top cover and reattach the AC power cords.
10. Power up the server
11. **Strongly recommended:** Boot into <F2> BIOS Setup immediately, go to the Security tab and set the Administrator and User passwords if you intend to use BIOS password protection

## 6.2.4 Management Engine (ME) Firmware Force Update Jumper Block

When the ME Firmware Force Update jumper is moved from its default position, the ME is forced to operate in a reduced minimal operating capacity. This jumper should only be used if the ME firmware has gotten corrupted and requires re-installation. The following procedure should be followed.

---

**Note:** System Update files are included in the System Update Packages (SUP) posted to Intel's Download center web site. <http://downloadcenter.intel.com>

---

1. Turn off the system.
2. Remove the AC power cords

---

**Note:** If the ME FRC UPD jumper is moved with AC power applied to the system, the ME will not operate properly.

---

3. Remove the system top cover
4. Move the “*ME FRC UPD*” Jumper from pins 1 - 2 (default) to pins 2 - 3 (Force Update position)
5. Re-install the system top cover and re-attach the AC power cords
6. Power on the system
7. Boot to the EFI shell
8. Change directories to the folder containing the update files
9. Update the ME firmware using the following command:
 

```
iflash32 /u /ni <version#>_ME.cap
```
10. When the update has successfully completed, power off the system
11. Remove the AC power cords
12. Remove the system top cover
13. Move the “*ME FRC UPD*” jumper back to pins 1-2 (default)

14. Re-attach the AC power cords
15. Power on system

## 6.2.5 BMC Force Update Jumper Block

The BMC Force Update jumper is used to put the BMC in Boot Recovery mode for a low-level update. It causes the BMC to abort its normal boot process and stay in the boot loader without executing any Linux code.

This jumper should only be used if the BMC firmware has gotten corrupted and requires re-installation. The following procedure should be followed:

---

**Note:** System Update files are included in the System Update Packages (SUP) posted to Intel's Download center web site. <http://downloadcenter.intel.com>

---

1. Turn off the system.
2. Remove the AC power cords

---

**Note:** If the BMC FRC UPD jumper is moved with AC power applied to the system, the BMC will not operate properly.

---

3. Remove the system top cover
4. Move the "BMC FRC UPD" Jumper from pins 1 - 2 (default) to pins 2 - 3 (Force Update position)
5. Re-install the system top cover and re-attach the AC power cords
6. Power on the system
7. Boot to the EFI shell
8. Change directories to the folder containing the update files
9. Update the BMC firmware using the following command:

FWPIAUPD -u -bin -ni -b -o -pia -if=usb <file name.BIN>

10. When the update has successfully completed, power off the system
11. Remove the AC power cords
12. Remove the system top cover
13. Move the "BMC FRC UPD" jumper back to pins 1-2 (default)
14. Re-attach the AC power cords
15. Power on system
16. Boot to the EFI shell
17. Change directories to the folder containing the update files
18. Re-install the board/system SDR data by running the FRUSDR utility
19. After the SDRs have been loaded, reboot the server

## 6.2.6 BIOS Recovery Jumper

When the BIOS Recovery jumper block is moved from its default pin position (pins 1-2), the system will boot using a backup BIOS image to the uEFI shell, where a standard BIOS update can be performed. See the BIOS update instructions that are included with System Update Packages (SUP) downloaded from Intel's download center web site. This jumper is used when the system BIOS has become corrupted and is non-functional, requiring a new BIOS image to be loaded on to the server board.

---

**Note:** The BIOS Recovery jumper is ONLY used to re-install a BIOS image in the event the BIOS has become corrupted. This jumper is NOT used when the BIOS is operating normally and you need to update the BIOS from one version to another.

---

The following procedure should be followed.

---

**Note:** System Update Packages (SUP) can be downloaded from Intel's download center web site.

<http://downloadcenter.intel.com>

---

1. Turn off the system.
2. For safety, remove the AC power cords
3. Remove the system top cover
4. Move the "BIOS Recovery" jumper from pins 1 - 2 (default) to pins 2 - 3 (BIOS Recovery position)
5. Re-install the system top cover and re-attach the AC power cords
6. Power on the system
7. The system will automatically boot to the EFI shell. Update the BIOS using the standard BIOS update instructions provided with the system update package
8. After the BIOS update has successfully completed, power off the system. For safety, remove the AC power cords from the system
9. Remove the system top cover
10. Move the BIOS Recovery jumper back to pins 1-2 (default)
11. Re-install the system top cover and re-attach the AC power cords
12. Power on the system and access the <F2> BIOS Setup utility.
13. Configure desired BIOS settings
14. Hit the <F10> key to save and exit the utility.

## 7. System Service - FRU Replacement

---

### **Purpose**

This chapter provides instruction for the removal and installation of system components considered as field replaceable. Instruction for the removal and installation of add-in options is documented in Chapters 2 and 3. These include:

- Processors
- Memory
- Riser Cards
- Add-in cards
- I/O Modules
- Storage Devices
- Power Supplies
- SATA Optical Drive

### **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.

## 7.1 Replacing the System Battery

The battery on the server board powers the Real Time Clock for up to 10 years in the absence of power. When the battery starts to weaken, it loses voltage, and stored server settings and system clock and date settings may be lost.

Battery Specification:

- Lithium
- 3V
- Coin CR-2032

Contact your customer service representative or dealer for a list of approved devices.

**Warning:** *Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.*

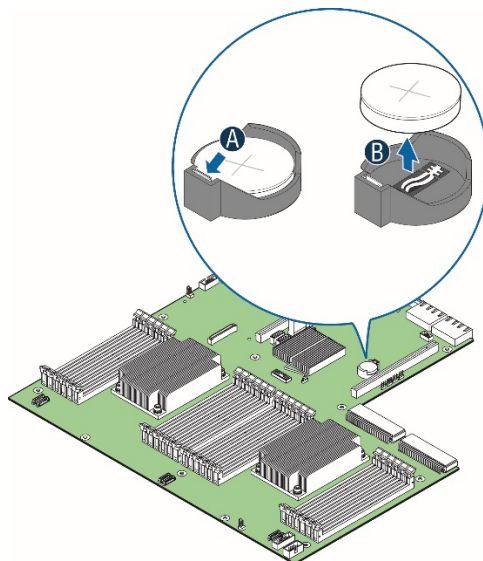
**Advarsel:** Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

**Advarsel:** Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

**Varning:** Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

**Varoitus:** Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

- Locate the battery on the server board.
- Gently press the metal clip as shown to release the battery (see letter "A").
- Remove the battery from the plastic socket (see letter "B").



AF004458

**Figure 100. Replacing the Backup Battery**

- Dispose of the battery according to local ordinance.
- Remove the new lithium battery from its package, and, being careful to observe the correct polarity, insert it in to the battery socket.

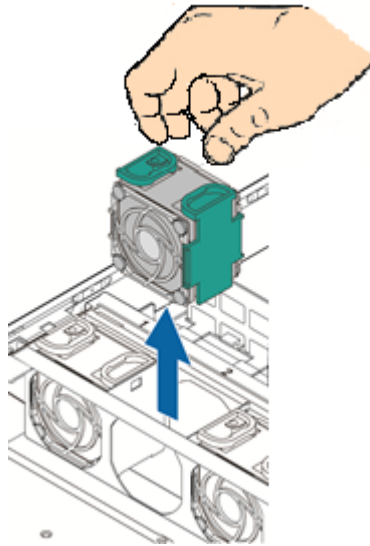
**Note:** *The <F2> BIOS Setup Utility must be accessed and setting must be set and saved to restore configuration settings*

## 7.2 Replacing the System Fan

System fans used in the Intel Server System R2000WT product family are hot-swappable.

### 7.2.1 To remove a failed system fan

- Remove the system top cover (see section 2.2.1)
- Squeeze the two loop handles on the top side of the fan, and pull straight up until it clears the fan assembly bracket



**Figure 101. System Fan Installation**

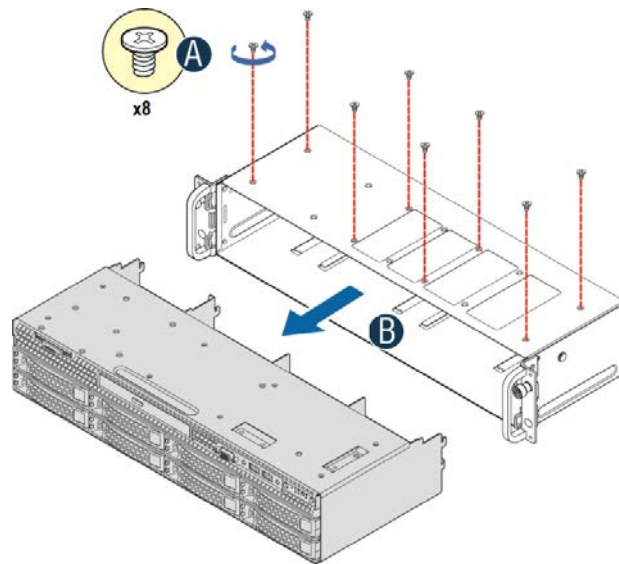
### 7.2.2 To install a new system fan

- Locate the replacement fan (Intel product Code – FR2UFAN60HSW)
- Orient the fan so the arrow located on the top side of the fan points to the back of the system
- Insert the fan into the fan assembly bracket
- Push down until it is firmly seated into the server board connector
- Re-install system top cover (see section 2.2.2)

## 7.3 Replacing the Standard Front Control Panel (R2308WTxxx)

### 7.3.1 Standard Front Control Panel Removal (R2308WTxxx)

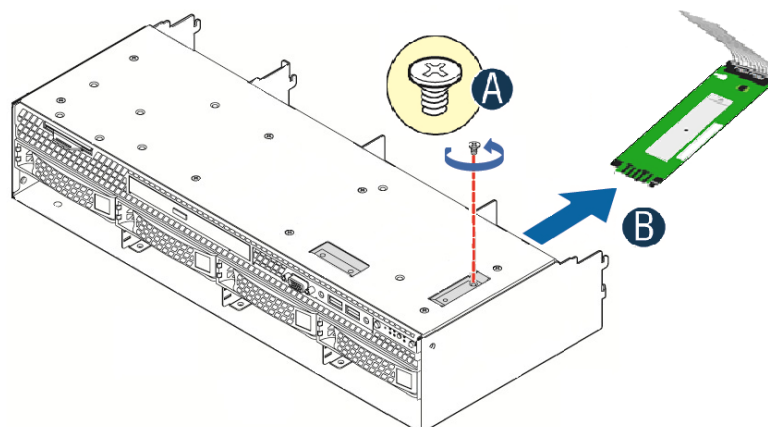
- Power off the system and remove all power cords
- Remove the system top cover (see section 2.2.1)
- Remove the air duct (see section 2.3.1)
- Remove the system fan assembly (see section 2.4.1)
- From the server board, disconnect the Round Black Front Panel USB cable, 14-pin Grey Front Panel Video ribbon cable, and the 30-pin Grey front panel ribbon cable
- From the hotswap backplane, disconnect the 2x2-pin backplane power cable, all cables connected to the mini-SAS HD connectors, and the 5-pin I2C cable
- Identify and remove the bottom four storage drives from the drive bay
- Remove the eight screws from the top of the drive bay (see letter 'A')



- From the back side of the drive bay module, carefully push it out the front of the chassis (see letter 'B').

**Note:** As the module slides out from the chassis, the retention clip found on the front bottom edge of the drive bay module will disengage. When loose, remove and set it aside for re-installation.

- Remove the screw securing the Control Panel assembly to the drive bay module (see letter 'A')



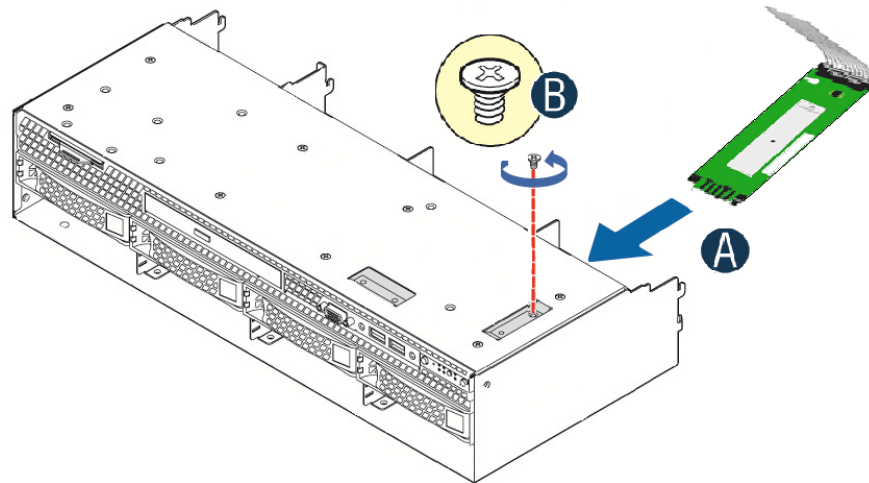
- Remove the control panel board from the back of the drive bay module (see letter 'B')



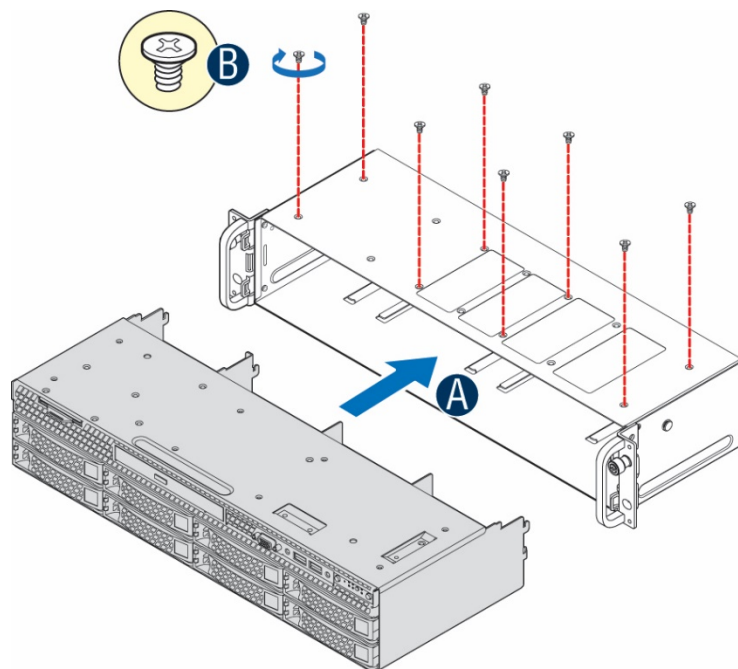
### 7.3.2 Standard Front Control Panel Installation (R2308WTxxx)

- Locate and remove the replacement control panel board from its packaging - Intel Product Code - FXXFPANEL
- Connect the 30-pin ribbon cable to the new control panel
- Install the control panel board into the back of the drive bay module (see letter 'A')

Note: Ensure the plastic gasket over the control panel buttons is securely in place before installing the control panel board into the drive bay module.



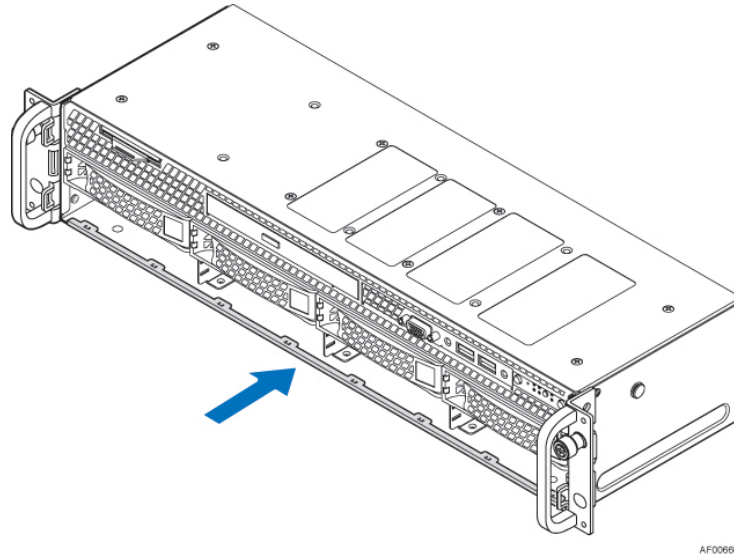
- The control panel is properly positioned when the buttons are protruding from the Control Panel face plate on the front of the drive bay module and the screw holes on the top of the assembly are aligned.
- Using a single screw, secure the Control Panel Assembly to the drive bay module (8 in/lbs torque) (see letter 'B')
- Ensure the Control Panel cable is securely attached to the control panel board
- Slide the 8 x 3.5" Front Drive Bay module into the front of the chassis (see letter 'A')



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- Ensure the screw holes on the top of the drive bay are properly aligned

- Using 8 fastener screws, secure the drive bay module to the chassis (8 in/lbs torque) (see letter 'B')
- Locate the drive bay retention clip
- Slide the drive bay retention clip over the bottom edge of the drive bay assembly as shown in the following illustration. The retention clip should clamp together the bottom of the drive bay module to the chassis base.



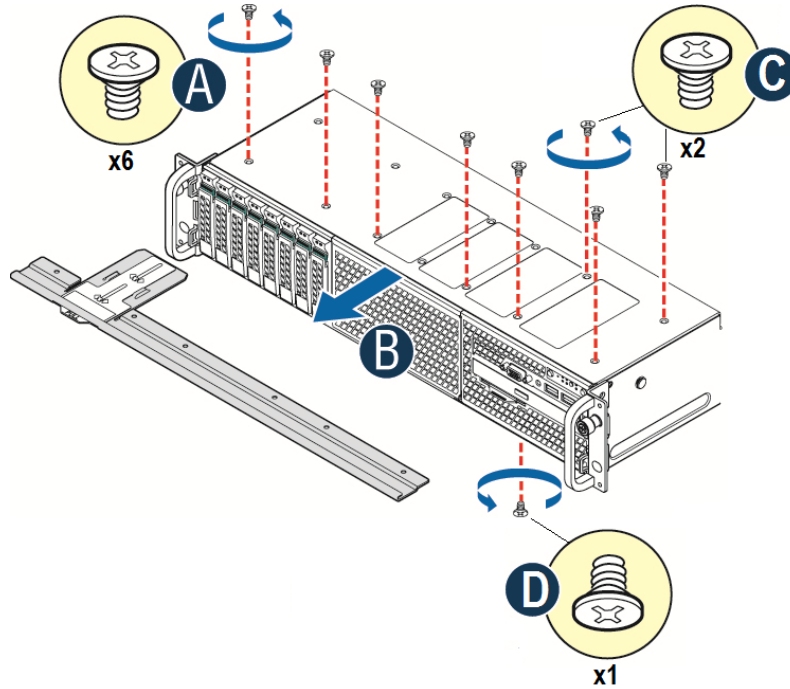
- Re-attach all cables described in steps 5 & 6 of the removal process
- Install storage drives into the same drive bays as where they were removed from
- Install system fan assembly (see section 2.4.2)
- Install air duct (see section 2.3.2)

## 7.4 Replacing the Standard Front Control Panel (R2208WTxxx & R2216WTxxx)

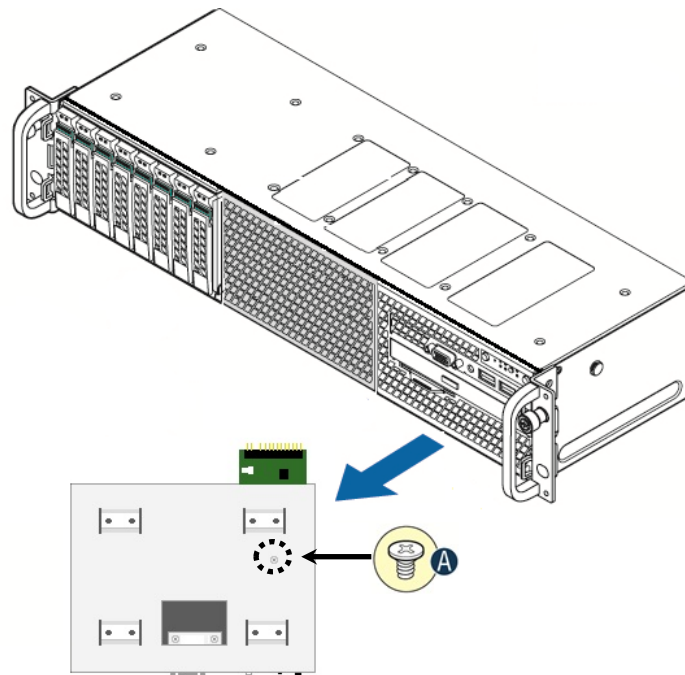
### 7.4.1 Standard Front Control Panel Removal (R2208WTxxx & R2216WTxxx)

- Power off the system and remove all power cords
- Remove the system top cover (see section 2.2.1)
- Remove the air duct (see section 2.3.1)
- Remove the system fan assembly (see section 2.4.1)
- From the server board, disconnect the black round front panel USB cable, 14-pin grey front panel video ribbon cable, and the 30-pin grey front panel ribbon cable
- If a SATA optical drive is installed, disconnect the SATA cable and the peripheral power cable from the server board
- Extract the drive bay retention bracket. To extract the drive bay retention bracket, remove the 6 fastener screws from the top front edge of the drive bay (see Letter 'A') and pull out the metal bracket (see letter 'B')
- Remove the 2 fastener screws from the back edge of the drive bay over the I/O Bay Module (see letter 'C')

- Carefully place the system on its side and remove the fastener screw from the bottom of the I/O Bay module (see letter 'D')



- Carefully return the server to its original position
- Carefully remove the I/O Bay module from the chassis

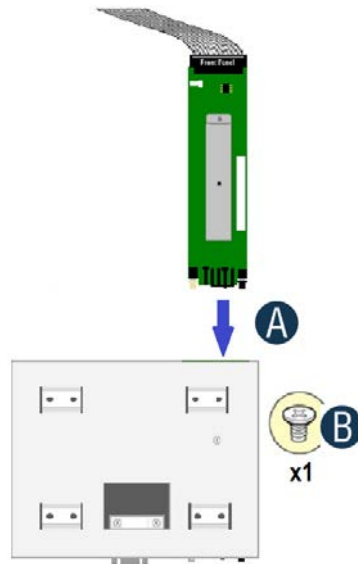


- Remove fastener screw used to secure Front Panel board to the I/O Bay Module (see letter 'A')
- Remove Front Panel board from the back of the I/O Bay Module

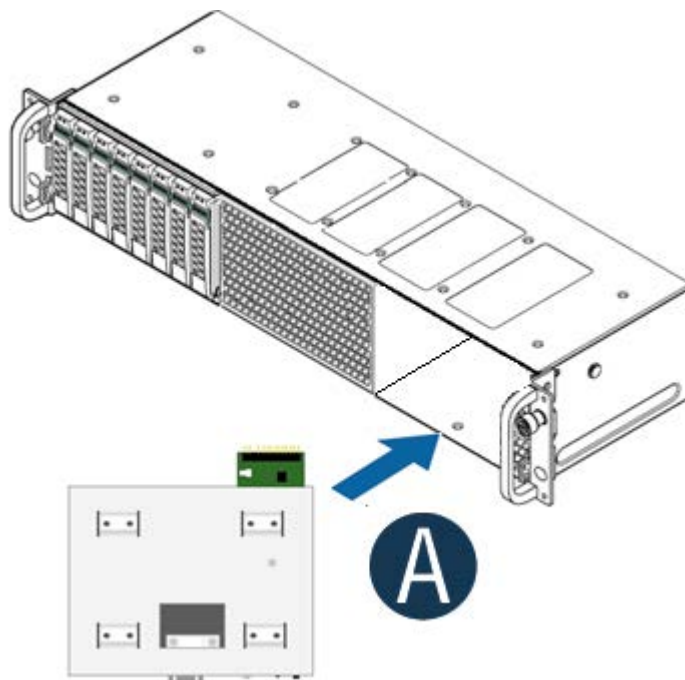
## 7.4.2 Standard Front Control Panel Installation (R2208WTxxx & R2216WTxxx)

- Locate and remove the replacement control panel board from its packaging - Intel Product Code - FXXFPANEL
- Connect the 30-pin ribbon cable to the new control panel
- Install the control panel board into the back of the drive bay module (see letter 'A')

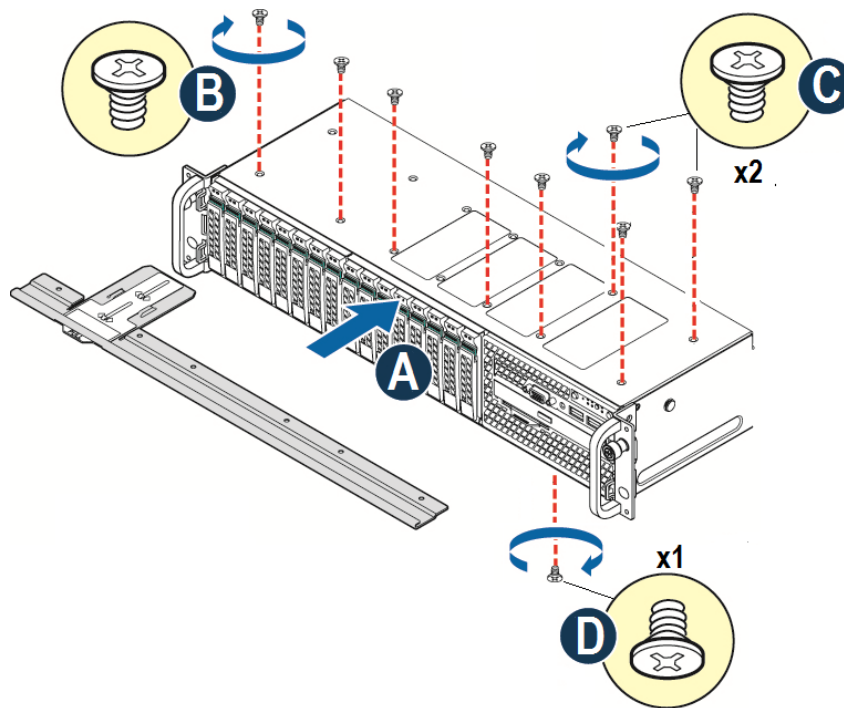
Note: Ensure the plastic gasket over the control panel buttons is securely in place before installing the control panel board into the drive bay module.



- The control panel is properly positioned when the buttons are protruding from the Control Panel face plate on the front of the drive bay module and the screw holes on the top of the assembly are aligned.
- Using a single screw, secure the Control Panel Assembly to the drive bay module (8 in/lbs torque) (see letter 'B')
- Ensure the Control Panel cable is securely attached to the control panel board
- Install the I/O Bay Module into the chassis (see letter 'A')



- Install the drive bay retention bracket into the gap between the top of the drive bay modules and the chassis (see letter 'A')

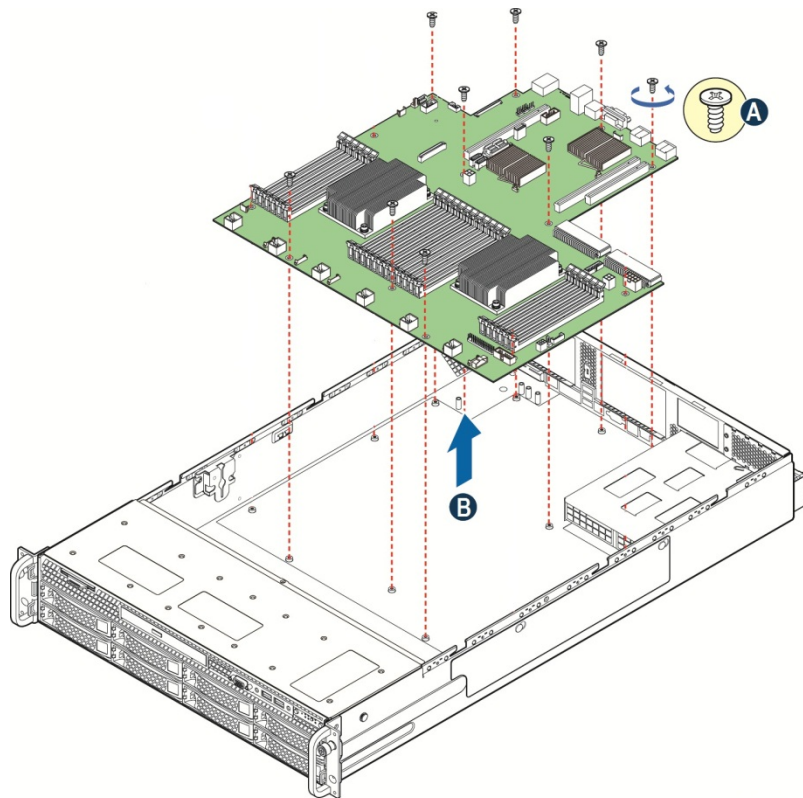


- Secure the drive bay retention bracket to the chassis using six fastener screws (8 in/lbs torque) (see letter 'B')
- Secure the I/O Module bay to the chassis using two fastener screws (8 in/lbs torque) (see letter 'C')
- Carefully place the system on its side and secure the bottom of the I/O module bay to the chassis using 1 fastener screw (8 in/lbs torque) (see letter 'D')
- Re-attach all cables described in steps 5 & 6 of the removal process
- Install system fan assembly (see section 2.4.2)
- Install air duct (see section 2.3.2)

## 7.5 Replacing the Server Board

### 7.5.1 Server Board Removal

- Power off system and remove power cords from each power supply module
- Disconnect all externally attached cables
- Remove the system cover (see section 2.2.1)
- Remove power supply modules (see section 3.2.2)
- (If Installed) remove all cables from devices mounted to the air duct
- Remove air duct (see section 2.3.1)
- Remove System Fan Assembly (see section 2.4.1)
- Disconnect all cables attached to add-in PCIe add-cards and I/O modules
- Remove riser card assemblies (see section 2.8.1)
- Remove all options installed onto the server board including (if installed): Intel® I/O Module, Intel® SAS RAID Module, Intel® RAID 5 option key, Intel® RMM 4 Lite key, TPM Module, eUSB SSD
- Remove Processors (see section 2.5)
- Remove all DIMMs (see section 2.6.3)
- Disconnect and clear from the server board area all cables attached to connectors on the server board
- Remove the two air duct sidewalls located on each side of the server board
- Remove nine fastener screws used to secure the server board to the chassis (see letter 'A')



**Figure 102. Server Board Removal**

- Carefully lift server board from the chassis and place into anti-static bag



## 7.5.2 Server Board Installation

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

- Verify that all cables are clear of the area in which the server board will be installed
- Remove the server board from its anti-static bag
- 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 the two end screw holes nearest the front edge of the server board (See letter "A") sit securely onto the shouldered chassis standoffs
- Fasten down the server board with 9 screws using 8 in/lbs torque (see letter 'B')

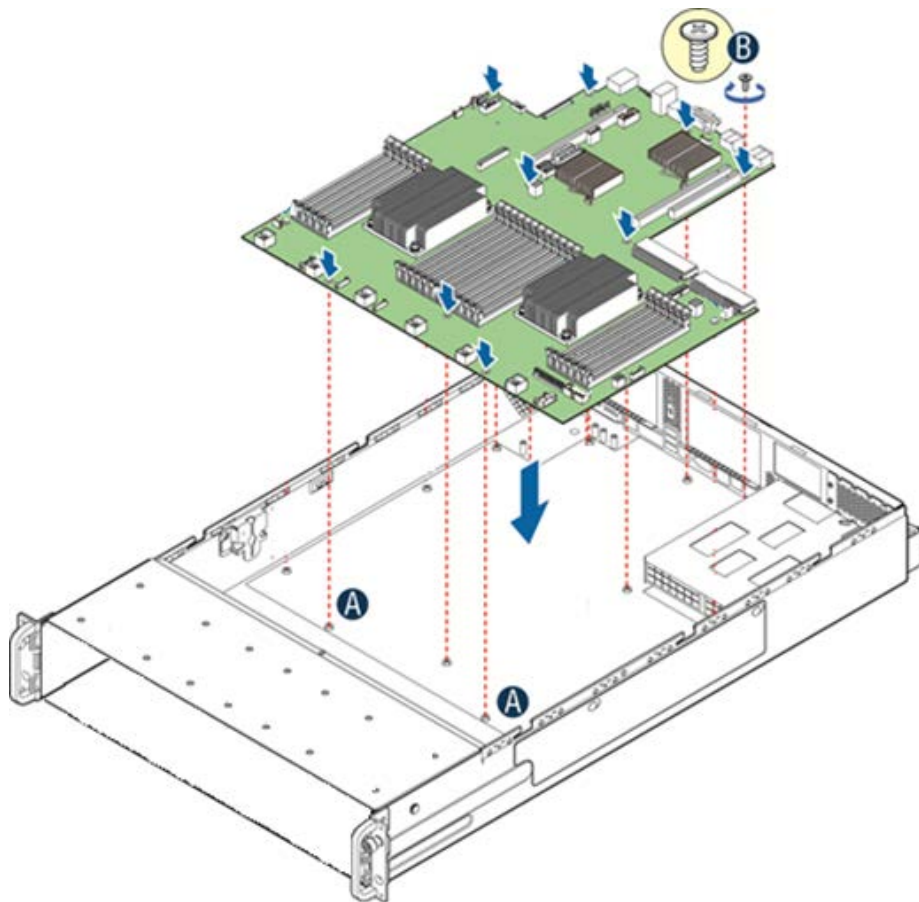
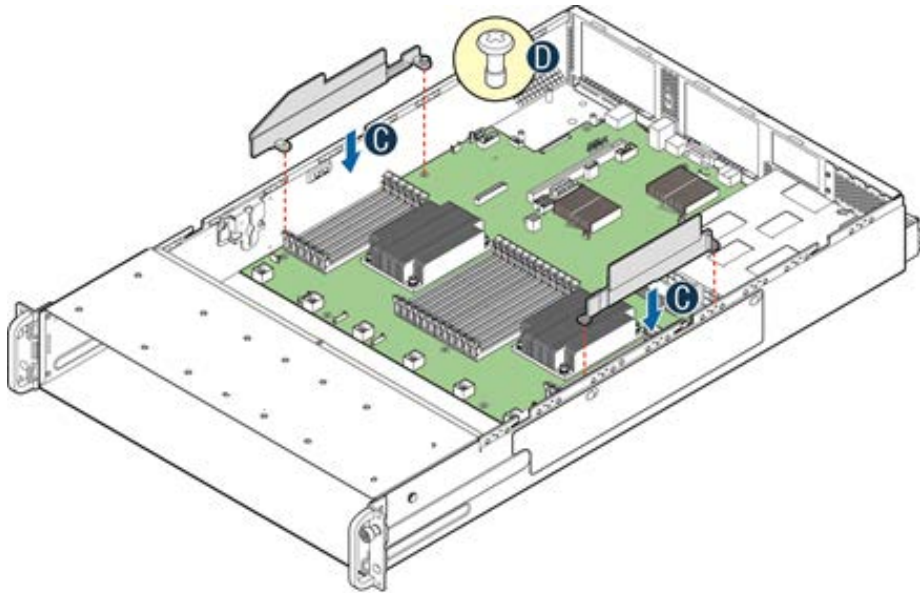


Figure 103. Server Board Installation

- Locate the two black plastic air duct sidewalls
- Fasten down the appropriate air duct side wall onto each side of the server board using 8 in/lbs torque for each screw (See letter 'C')



**Figure 104. Air Duct Sidewall Installation**

- Re-attach all cables previously removed from the server board
- Install processor(s) (see section 2.5.2)
- Install DIMMs (see section 2.6.2)
- Re-Install all options previously removed from the server board
- Re-Install riser card assemblies (see section 2.8.4)
- Re-attach all internal cables previously detached from add-in cards and modules
- Re-install system fan assembly (see section 2.4.2)
- Re-install air duct
- (If installed) re-attach cables to any device mounted to the air duct
- Install power supply module(s) (see section 3.2.1)
- Install system cover (see section 2.2.2)



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## Appendix A: Getting Help

If you encounter an issue with your server system, 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/p/en\\_US/support/contactsupport](http://www.intel.com/p/en_US/support/contactsupport)

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

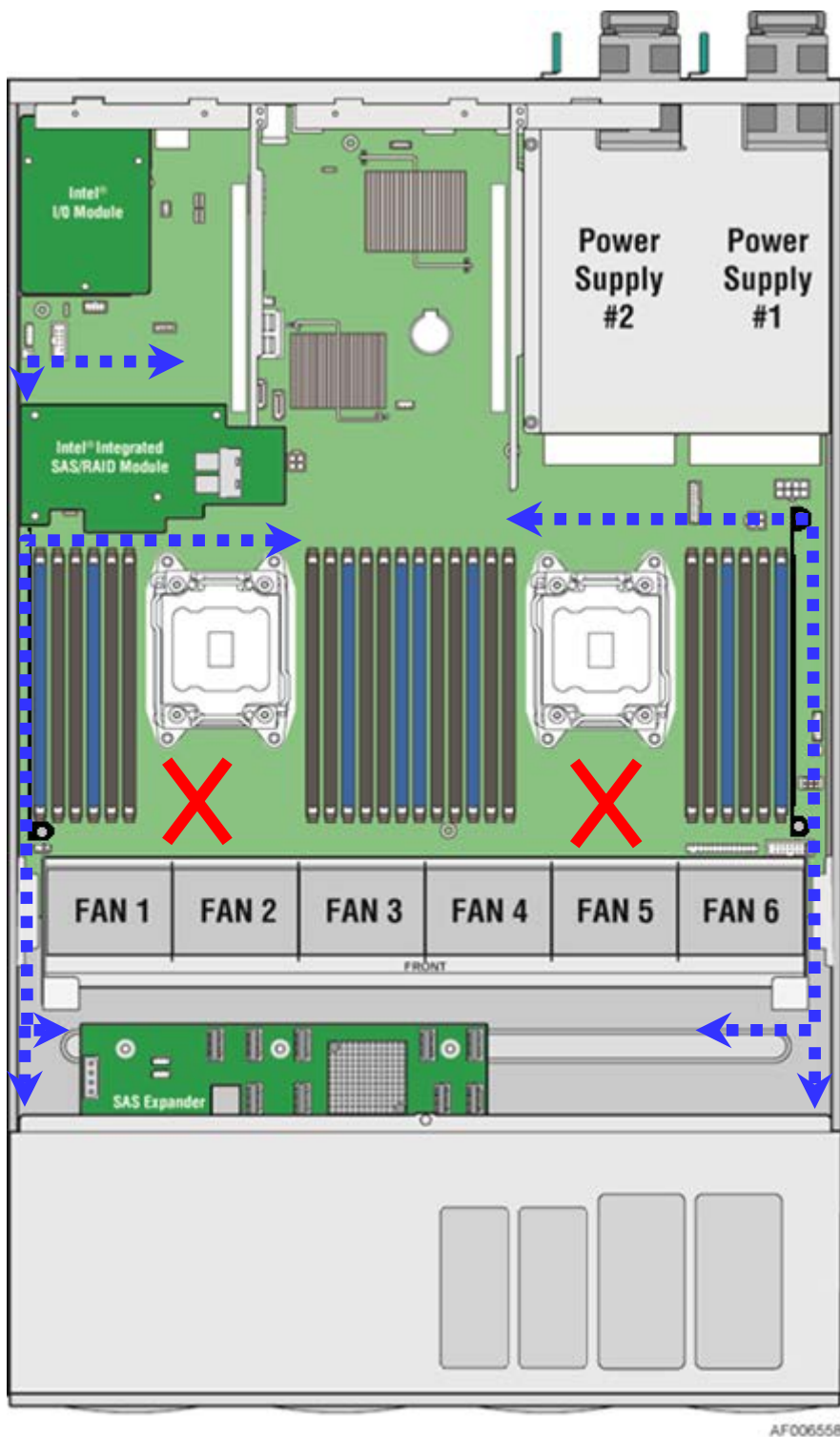
To obtain warranty information, visit the following Intel web site:

[http://www.intel.com/p/en\\_US/support/warranty](http://www.intel.com/p/en_US/support/warranty)

## Appendix B: System Cable Routing Diagrams

The system fan assembly must be removed when routing cables from front-to-back. All cables should be routed using the cable channels in between the chassis sidewalls and the air duct side walls, as shown in the following illustration. When routing cables 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.

Figure 105. System Cable Routing Channels



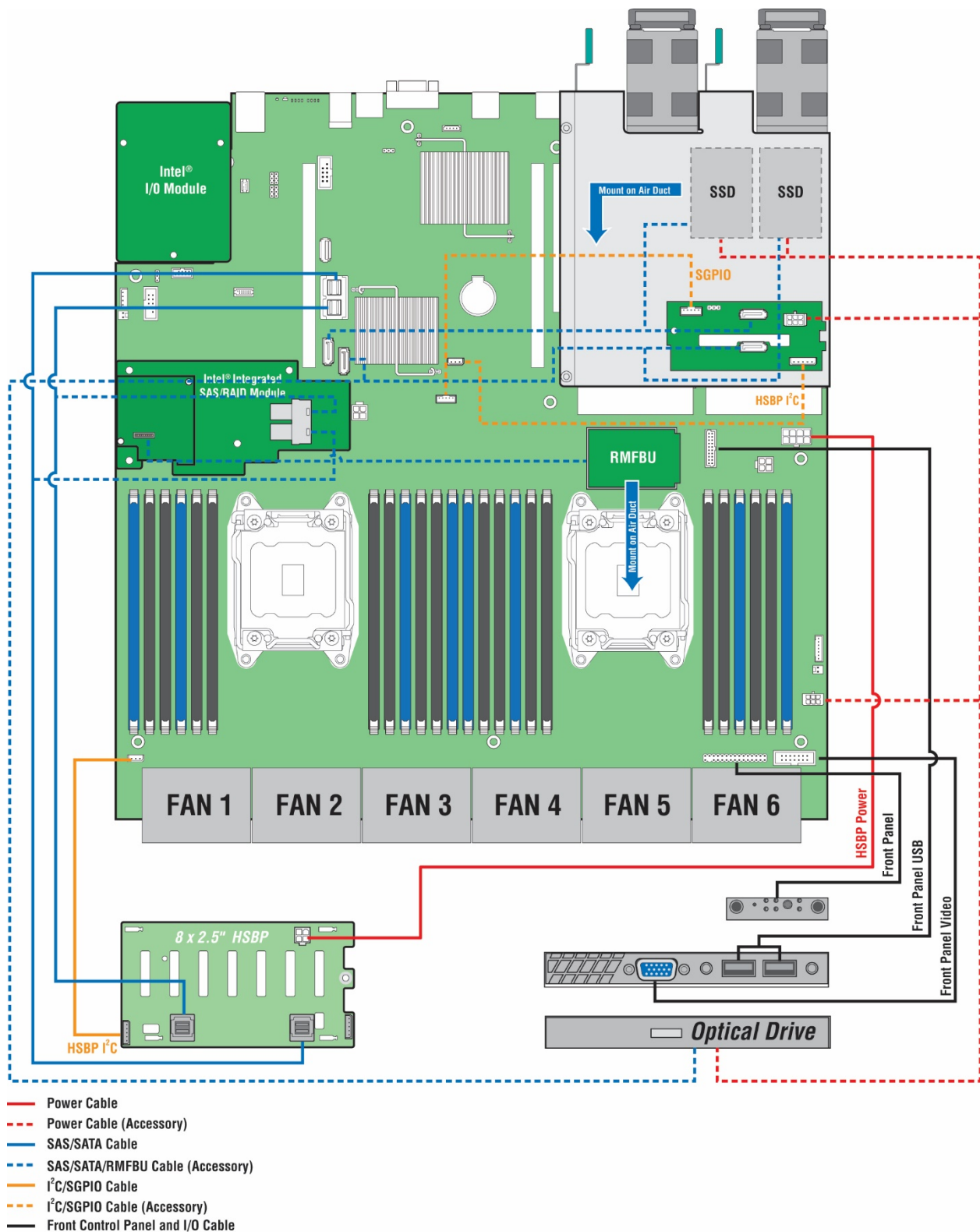
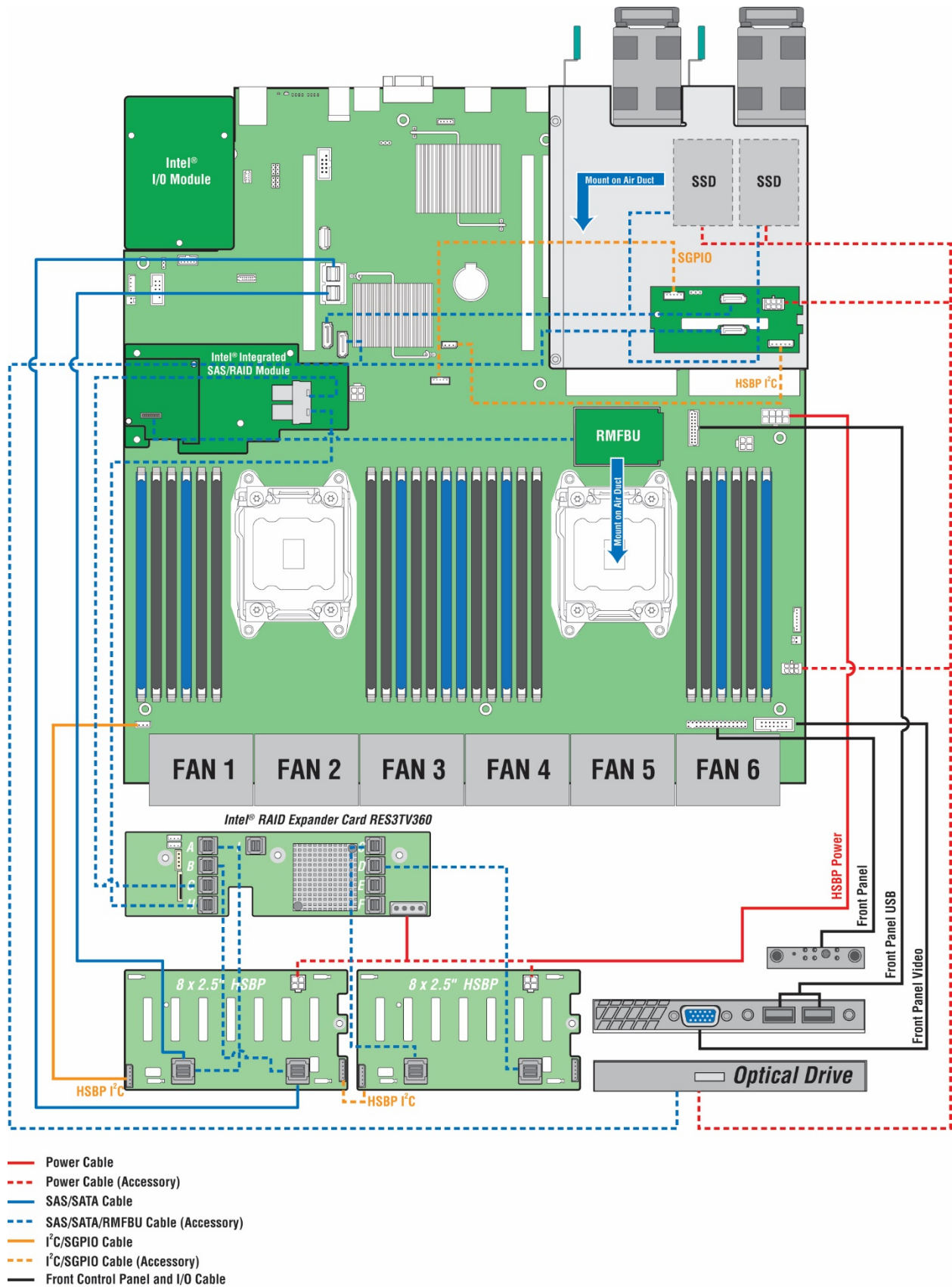
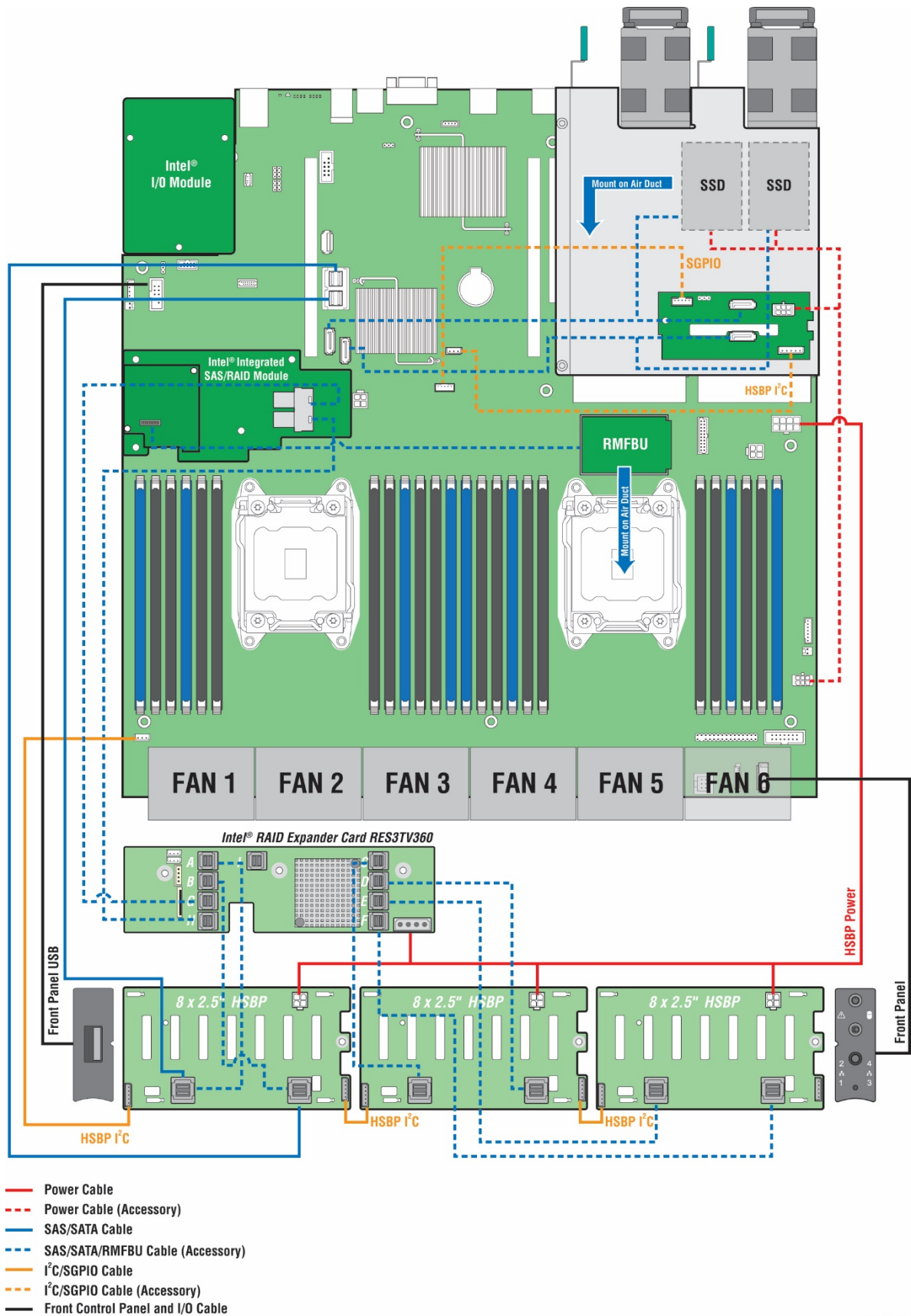


Figure 106. Intel® Server System R2208WTxxxx - Cable Routing Diagram



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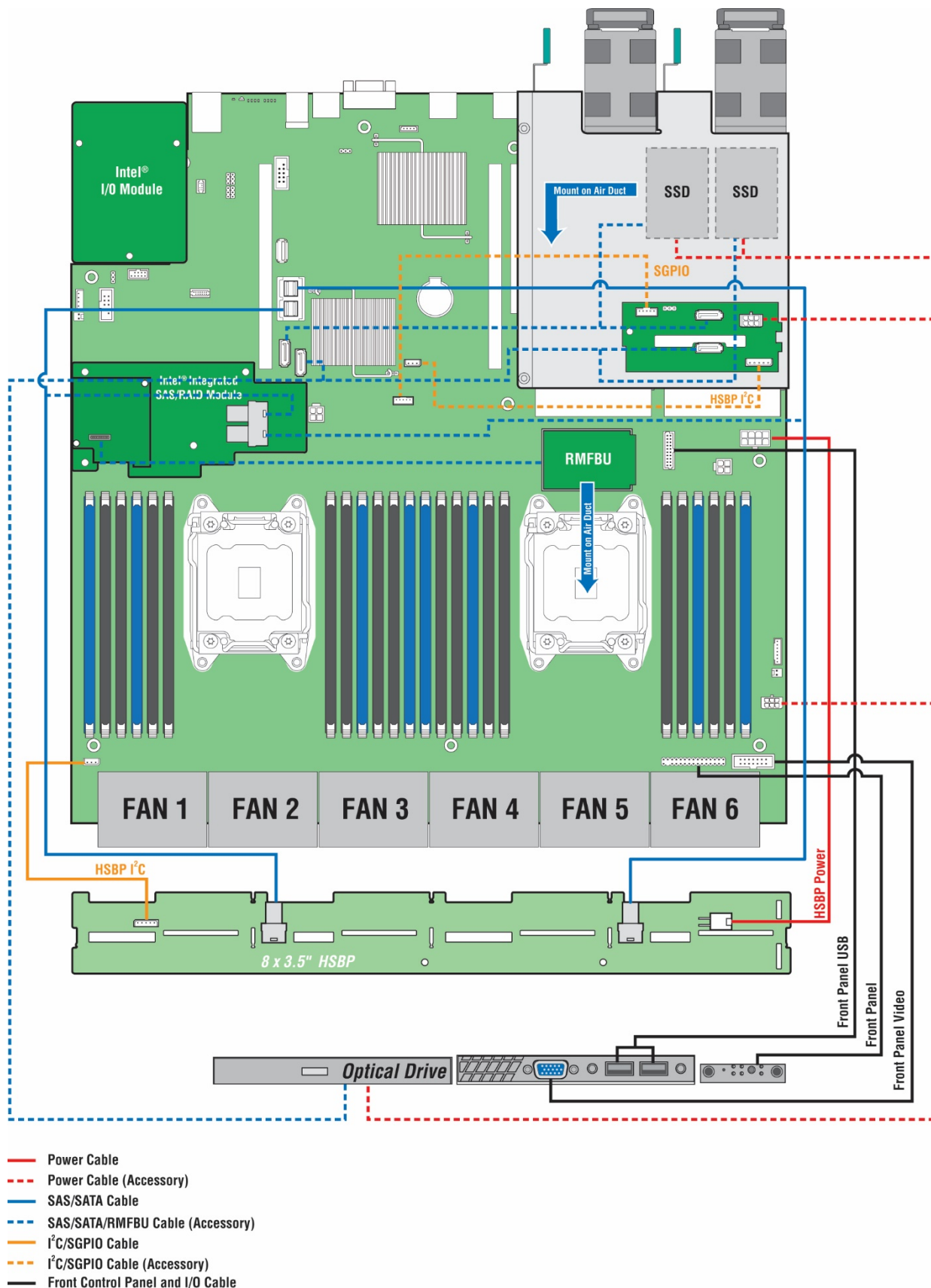
Figure 107. Intel® Server System R2216WTxxxx - Cable Routing Diagram



AF006806

Figure 108. Intel® Server System R2224WTxxxx - Cable Routing Diagram

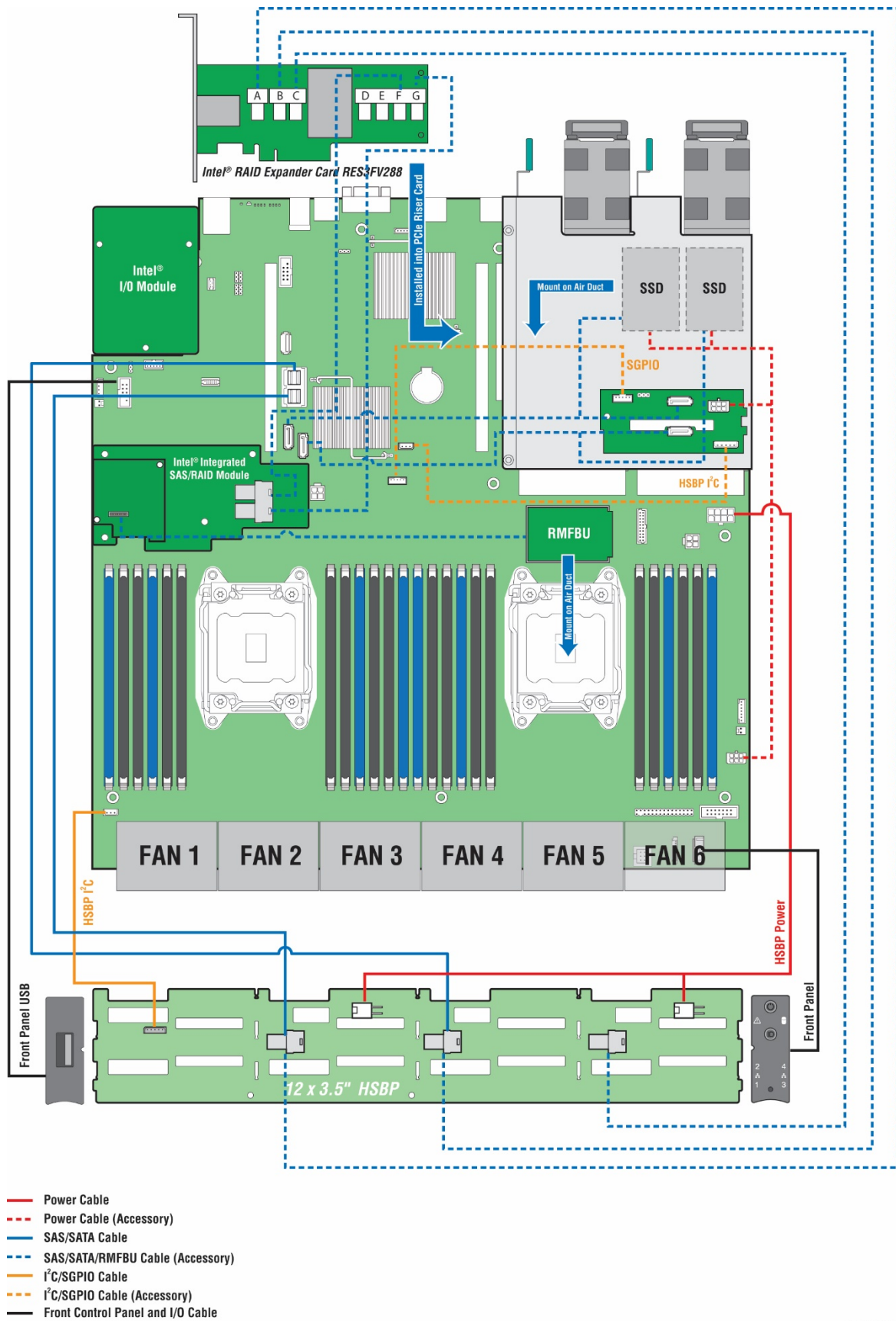




AF006802

Figure 109. Intel® Server System R2308WTxxxx - Cable Routing Diagram





AF006803

Figure 110. Intel® Server System R2312WTxxxx - Cable Routing Diagram

## Appendix C: System Status LED Operating States and Definition

The server board includes a bi-color System Status LED. The System Status LED on the server board is tied directly to the System Status LED on the front panel. This LED indicates the current health of the server. Possible LED states include solid green, blinking green, blinking amber, and solid amber.

When the server is powered down (transitions to the DC-off state or S5), the BMC is still on standby power and retains the sensor and front panel status LED state established before the power-down event.

When AC power is first applied to the system, the status LED turns solid amber and then immediately changes to blinking green to indicate that the BMC is booting. If the BMC boot process completes with no errors, the status LED will change to solid green.

**Table 4. System Status LED State Definitions**

Color	State	Criticality	Description
Off	System is not operating	Not ready	<ul style="list-style-type: none"> <li>System is powered off (AC and/or DC).</li> <li>System is in EuP Lot6 Off Mode.</li> <li>System is in S5 Soft-Off State.</li> </ul>
Green	Solid on	Ok	<p>Indicates that the System is running (in S0 State) and its status is 'Healthy'. The system is not exhibiting any errors. AC power is present and BMC has booted and manageability functionality is up and running.</p> <p>After a BMC reset, and in conjunction with the Chassis ID solid ON, the BMC is booting Linux*. Control has been passed from BMC uBoot to BMC Linux* itself. It will be in this state for ~10~20 seconds</p>
Green	~1 Hz blink	Degraded - system is operating in a degraded state although still functional, or system is operating in a redundant state but with an impending failure warning	<p>System degraded:</p> <ul style="list-style-type: none"> <li>Redundancy loss such as power-supply or fan. Applies only if the associated platform sub-system has redundancy capabilities.</li> <li>Fan warning or failure when the number of fully operational fans is less than minimum number needed to cool the system.</li> <li>Non-critical threshold crossed – Temperature (including HSBP temp), voltage, input power to power supply, output current for main power rail from power supply and Processor Thermal Control (Therm Ctrl) sensors.</li> <li>Power supply predictive failure occurred while redundant power supply configuration was present.</li> <li>Unable to use all of the installed memory (more than 1 DIMM installed).</li> <li>Correctable Errors over a threshold and migrating to a spare DIMM (memory sparing). This indicates that the system no longer has spared DIMMs (a redundancy lost condition). Corresponding DIMM LED lit.</li> <li>In mirrored configuration, when memory mirroring takes place and system loses memory redundancy.</li> <li>Battery failure.</li> </ul>

Color	State	Criticality	Description
			<ul style="list-style-type: none"> <li>BMC executing in uBoot. (Indicated by Chassis ID blinking at 3Hz). System in degraded state (no manageability). BMC uBoot is running but has not transferred control to BMC Linux*. Server will be in this state 6-8 seconds after BMC reset while it pulls the Linux* image into flash.</li> <li>BMC Watchdog has reset the BMC.</li> <li>Power Unit sensor offset for configuration error is asserted.</li> <li>HDD HSC is off-line or degraded.</li> </ul>
Amber	~1 Hz blink	Non-critical - System is operating in a degraded state with an impending failure warning, although still functioning	<p>Non-fatal alarm – system is likely to fail:</p> <ul style="list-style-type: none"> <li>Critical threshold crossed – Voltage, temperature (including HSBP temp), input power to power supply, output current for main power rail from power supply and PROCHOT (Therm Ctrl) sensors.</li> <li>VRD Hot asserted.</li> <li>Minimum number of fans to cool the system not present or failed</li> <li>Hard drive fault</li> <li>Power Unit Redundancy sensor – Insufficient resources offset (indicates not enough power supplies present)</li> <li>In non-sparing and non-mirroring mode if the threshold of correctable errors is crossed within the window</li> </ul>
Amber	Solid on	Critical, non-recoverable – System is halted	<p>Fatal alarm – system has failed or shutdown:</p> <ul style="list-style-type: none"> <li>CPU CATERR signal asserted</li> <li>MSID mismatch detected (CATERR also asserts for this case).</li> <li>CPU 1 is missing</li> <li>CPU Thermal Trip</li> <li>No power good – power fault</li> <li>DIMM failure when there is only 1 DIMM present and hence no good memory present.</li> <li>Runtime memory uncorrectable error in non-redundant mode.</li> <li>DIMM Thermal Trip or equivalent</li> <li>SSB Thermal Trip or equivalent</li> <li>CPU ERR2 signal asserted</li> <li>BMC/Video memory test failed. (Chassis ID shows blue/solid-on for this condition)</li> <li>Both uBoot BMC FW images are bad. (Chassis ID shows blue/solid-on for this condition)</li> <li>240VA fault</li> <li>Fatal Error in processor initialization: <ul style="list-style-type: none"> <li>Processor family not identical</li> <li>Processor model not identical</li> <li>Processor core/thread counts not identical</li> <li>Processor cache size not identical</li> <li>Unable to synchronize processor frequency</li> <li>Unable to synchronize QPI link frequency</li> </ul> </li> <li>Uncorrectable memory error in a non-redundant mode</li> </ul>

## Appendix D: POST Code Diagnostic LED Decoder Table

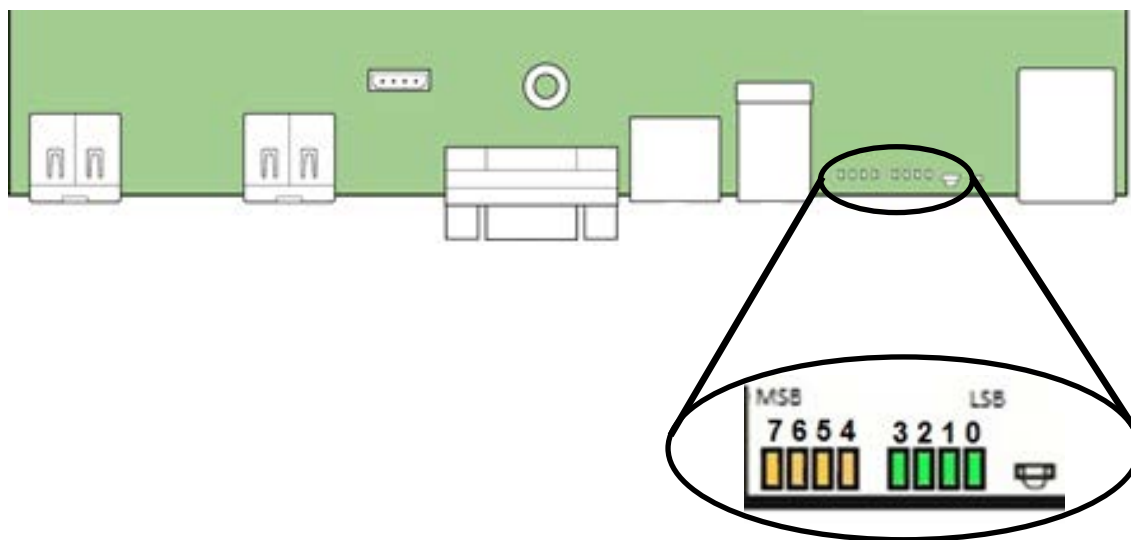
As an aid to assist in trouble shooting a system hang that occurs during a system's Power-On Self Test (POST) process, the server board includes a bank of eight POST Code Diagnostic LEDs on the back edge of the server board.

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 111. 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 5. 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 6. 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 59.

**Table 7. 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. 3h = 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 3h = 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 8. POST 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	
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 55. 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
72h	0	1	1	1	0	0	1	0	DXE SB devices Init



Checkpoint	Diagnostic LED Decoder								
	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	Description
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
S3 Resume									
E0h	1	1	1	0	0	0	0	0	S3 Resume PEIM (S3 started)

Checkpoint	Diagnostic LED Decoder								
	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	Description
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 E: 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 9. 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

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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

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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

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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
85CC	DIMM_R3 failed test/initialization	Major

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Error Code	Error Message	Response
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
A001	TPM device missing or not responding.	Minor
A002	TPM device failure.	Minor



Error Code	Error Message	Response
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 10. 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 11. 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.

## NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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