System x3690 X5
Types 7147, 7148, 7149, and 7192

# Problem Determination and Service Guide

System x3690 X5
Types 7147, 7148, 7149, and 7192

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**Note:** Before using this information and the product it supports, read the general information in "Notices" on page 409 and the *IBM Safety Information*, *IBM Environmental Notices and User's Guide*, on the IBM *Documentation* CD, and the *IBM Warranty Information* document that comes with the server.

**Eleventh Edition (July 2012)**

# Contents

# Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
（安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

## Guidelines for trained service technicians

This section contains information for trained service technicians.

## Inspecting for unsafe conditions

Use the information in this section to help you identify potential unsafe conditions in an IBM product that you are working on. Each IBM product, as it was designed and manufactured, has required safety items to protect users and service technicians from injury. The information in this section addresses only those items. Use good judgment to identify potential unsafe conditions that might be caused by non-IBM alterations or attachment of non-IBM features or options that are not addressed in this section. If you identify an unsafe condition, you must determine how serious the hazard is and whether you must correct the problem before you work on the product.

Consider the following conditions and the safety hazards that they present:

- Electrical hazards, especially primary power. Primary voltage on the frame can cause serious or fatal electrical shock.
- Explosive hazards, such as a damaged CRT face or a bulging capacitor.
- Mechanical hazards, such as loose or missing hardware.

To inspect the product for potential unsafe conditions, complete the following steps:

1. Make sure that the power is off and the power cord is disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe any sharp edges.
3. Check the power cord:
   - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.

- Make sure that the power cord is the correct type, as specified in "Power cords" on page 240.
- Make sure that the insulation is not frayed or worn.

4. Remove the top cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## Guidelines for servicing electrical equipment

Observe the following guidelines when servicing electrical equipment:

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, power surges, and missing safety grounds.
- Use only approved tools and test equipment. Some hand tools have handles that are covered with a soft material that does not provide insulation from live electrical currents.
- Regularly inspect and maintain your electrical hand tools for safe operational condition. Do not use worn or broken tools or testers.
- Do not touch the reflective surface of a dental mirror to a live electrical circuit. The surface is conductive and can cause personal injury or equipment damage if it touches a live electrical circuit.
- Some rubber floor mats contain small conductive fibers to decrease electrostatic discharge. Do not use this type of mat to protect yourself from electrical shock.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Locate the emergency power-off (EPO) switch, disconnecting switch, or electrical outlet so that you can turn off the power quickly in the event of an electrical accident.
- Disconnect all power before you perform a mechanical inspection, work near power supplies, or remove or install main units.
- Before you work on the equipment, disconnect the power cord. If you cannot disconnect the power cord, have the customer power-off the wall box that supplies power to the equipment and lock the wall box in the off position.
- Never assume that power has been disconnected from a circuit. Check it to make sure that it has been disconnected.
- If you have to work on equipment that has exposed electrical circuits, observe the following precautions:
  - Make sure that another person who is familiar with the power-off controls is near you and is available to turn off the power if necessary.
  - When you are working with powered-on electrical equipment, use only one hand. Keep the other hand in your pocket or behind your back to avoid creating a complete circuit that could cause an electrical shock.
  - When you use a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on a suitable rubber mat to insulate you from grounds such as metal floor strips and equipment frames.

- Use extreme care when you measure high voltages.
- To ensure proper grounding of components such as power supplies, pumps, blowers, fans, and motor generators, do not service these components outside of their normal operating locations.
- If an electrical accident occurs, use caution, turn off the power, and send another person to get medical aid.

## Safety statements

**Important:**

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

## Statement 1

**DANGER**

**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

| **To Connect:** | **To Disconnect:** |
|---|---|
| 1. Turn everything OFF. | 1. Turn everything OFF. |
| 2. First, attach all cables to devices. | 2. First, remove power cords from outlet. |
| 3. Attach signal cables to connectors. | 3. Remove signal cables from connectors. |
| 4. Attach power cords to outlet. | 4. Remove all cables from devices. |
| 5. Turn device ON. | |

## Statement 2

**CAUTION:**
**When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.**

*Do not:*

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

**Dispose of the battery as required by local ordinances or regulations.**

## Statement 3

**CAUTION:**
**When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:**

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

**DANGER**

**Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.**

**Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

## Statement 4

≥ 18 kg (39.7 lb)

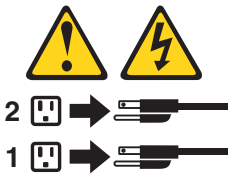
≥ 32 kg (70.5 lb)

≥ 55 kg (121.2 lb)

**CAUTION:**
**Use safe practices when lifting.**

## Statement 5

**CAUTION:**
**The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**




## Statement 8

**CAUTION:**
**Never remove the cover on a power supply or any part that has the following label attached.**

**Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

## Statement 26

**CAUTION:**
**Do not place any object on top of rack-mounted devices.**

**Statement 35:**


**CAUTION:**
**Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in splattered metal, burns, or both.**

**Attention:** This server is suitable for use on an IT power distribution system whose maximum phase-to-phase voltage is 240 V under any distribution fault condition.

**Important:** Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger.

**United Kingdom - Notice to Customers:**

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

# Chapter 1. Start here

You can solve many problems without outside assistance by following the troubleshooting procedures in this documentation and on the World Wide Web.

This document describes the diagnostic tests that you can perform, troubleshooting procedures, and explanations of error messages and error codes. The documentation that comes with your operating system and software also contains troubleshooting information.

## Diagnosing a problem

Before you contact IBM or an approved warranty service provider, follow these procedures in the order in which they are presented to diagnose a problem with your server.

1. **Return the server to the condition it was in before the problem occurred.** If any hardware, software, or firmware was changed before the problem occurred, if possible, reverse those changes. This might include any of the following items:
   - Hardware components
   - Device drivers and firmware
   - System software
   - UEFI firmware
   - System input power or network connections
2. **View the light path diagnostics LEDs and event logs.** The server is designed for ease of diagnosis of hardware and software problems.
   - **Light path diagnostics LEDs:** See "Light path diagnostics" on page 67 for information about using light path diagnostics LEDs.
   - **Event logs:** See "Event logs" on page 35 for information about notification events and diagnosis.
   - **Software or operating-system error codes:** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's website for documentation.
3. **Run IBM Dynamic System Analysis (DSA) and collect system data.** Run Dynamic System Analysis (DSA) to collect information about the hardware, firmware, software, and operating system. Have this information available when you contact IBM or an approved warranty service provider. For instructions for running DSA, see the *Dynamic System Analysis Installation and User's Guide*.

   To download the latest version of DSA code and the *Dynamic System Analysis Installation and User's Guide*, go to http://www.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=SERV-DSA .
4. **Check for and apply code updates.** Fixes or workarounds for many problems might be available in updated UEFI firmware, device firmware, or device drivers.

   **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

a. **Install UpdateXpress system updates.** You can install code updates that are packaged as an UpdateXpress System Pack or UpdateXpress CD image. An UpdateXpress System Pack contains an integration-tested bundle of online firmware and device-driver updates for your server. In addition, you can use IBM ToolsCenter Bootable Media Creator to create bootable media that is suitable for applying firmware updates and running preboot diagnostics. For more information about UpdateXpress System Packs, see http://www.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=SERV-XPRESS and "Updating the firmware" on page 379. For more information about the Bootable Media Creator, see http://www.ibm.com/support/entry/portal/docdisplay?brand=5000008&lndocid=TOOL-BOMC .

   Be sure to separately install any listed critical updates that have release dates that are later than the release date of the UpdateXpress System Pack or UpdateXpress image (see step 4b).

b. **Install manual system updates.**

   1) **Determine the existing code levels.**

      In DSA, click **Firmware/VPD** to view system firmware levels, or click **Software** to view operating-system levels.

   2) **Download and install updates of code that is not at the latest level.**

      To display a list of available updates for the server, go to http://www.ibm.com/support/fixcentral/ .

      When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

5. **Check for and correct an incorrect configuration.** If the server is incorrectly configured, a system function can fail to work when you enable it; if you make an incorrect change to the server configuration, a system function that has been enabled can stop working.

   a. **Make sure that all installed hardware and software are supported.** See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to verify that the server supports the installed operating system, optional devices, and software levels. If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you contact IBM or an approved warranty service provider for support.

   b. **Make sure that the server, operating system, and software are installed and configured correctly.** Many configuration problems are caused by loose power or signal cables or incorrectly seated adapters. You might be able to solve the problem by turning off the server, reconnecting cables, reseating adapters, and turning the server back on. For information about performing the checkout procedure, see "About the checkout procedure" on page 47. For information about configuring the server, see "Configuring the server" on page 380.

6. **See controller and management software documentation.** If the problem is associated with a specific function (for example, if a RAID hard disk drive is marked offline in the RAID array), see the documentation for the associated controller and management or controlling software to verify that the controller is correctly configured.

   Problem determination information is available for many devices such as RAID and network adapters.

For problems with operating systems or IBM software or devices, go to http://www.ibm.com/supportportal/ .

7. **Check for troubleshooting procedures and RETAIN tips.** Troubleshooting procedures and RETAIN tips document known problems and suggested solutions. To search for troubleshooting procedures and RETAIN tips, go to http://www.ibm.com/supportportal/ .
8. **Use the troubleshooting tables.** See "Troubleshooting tables" on page 49 to find a solution to a problem that has identifiable symptoms.

   A single problem might cause multiple symptoms. Follow the troubleshooting procedure for the most obvious symptom. If that procedure does not diagnose the problem, use the procedure for another symptom, if possible.

   If the problem remains, contact IBM or an approved warranty service provider for assistance with additional problem determination and possible hardware replacement. To open an online service request, go to http://www.ibm.com/support/electronic/portal/ . Be prepared to provide information about any error codes and collected data.

## Undocumented problems

If you have completed the diagnostic procedure and the problem remains, the problem might not have been previously identified by IBM. After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no light path diagnostics LEDs or log entries indicate a hardware component failure, contact IBM or an approved warranty service provider for assistance.

To open an online service request, go to http://www.ibm.com/support/electronic/portal/ . Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

# Chapter 2. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur in your IBM® System x3690 X5 Types7147, 7148, 7149, and 7192 server and the optional IBM MAX5 for System x (MAX5) memory expansion module. It describes the diagnostic tools that come with the server, error codes and suggested actions, and instructions for replacing failing components in the server and the MAX5 memory expansion module (see "MAX5 features and specifications" on page 27 for more information about the MAX5 expansion module).

**Important:** The IBM MAX5 for System x is a Listed Accessory for use with the IBM System x3690 X5 only.

If you are adding an optional MAX5 or scaling to another server, see the rack instructions that comes with the cable option kit.

The most recent version of this document is available at http://www.ibm.com/systems/support/.

Replaceable components are of four types:

- **Consumable parts:** Purchase and replacement of consumable parts (components, such as batteries and printer cartridges, that have depletable life) is your responsibility. If IBM acquires or installs a consumable part at your request, you will be charged for the service.
- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For a list of replaceable components for the server, see "Replaceable server components" on page 231.

For information about the terms of the warranty and getting service and assistance, see the *Warranty Information* document that comes with the server. For information about getting service and assistance, see "Getting help and information from the World Wide Web" on page 406.

## Related documentation

In addition to this document, the following documentation also comes with the server:

- *Installation and User's Guide*

  This document is in Portable Document Format (PDF) on the IBM *Documentation* CD. It provides general information about setting up and cabling the server, including information about features, and how to configure the server. It also contains detailed instructions for installing, removing, and connecting some optional devices that the server supports.
- *Rack Installation Instructions*

  This printed document contains instructions for installing the server in a rack.
- *Safety Information*

  This document is in PDF on the IBM *Documentation* CD. It contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.
- *IBM Warranty Information*

  This printed document contains the warranty terms and a pointer to the IBM Statement of Limited Warranty on the IBM Web site.
- *Environmental Notices and User Guide*

  This document is in PDF format on the IBM *Documentation* CD. It contains translated environmental notices.
- *IBM License Agreement for Machine Code*

  This document is in PDF on the IBM *Documentation* CD. It provides translated versions of the *IBM License Agreement for Machine Code* for your product.
- *Licenses and Attributions Document*

  This document is in PDF format on the IBM *Documentation* CD. It provides the open source notices.

Depending on the server model, additional documentation might be included on the IBM *Documentation* CD.

The ToolsCenter for System x and BladeCenter is an online information center that contains information about tools for updating, managing, and deploying firmware, device drivers, and operating systems. The ToolsCenter for System x and BladeCenter is at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

The server might have features that are not described in the documentation that comes with the server. The documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. These updates are available from the IBM Web site. To check for updated documentation and technical updates, complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Publications lookup**.
4. From the **Product family** menu, select **System x3690 X5** and click **Go**.

## Notices and statements in this document

The caution and danger statements that appear in this document are also in the multilingual *Safety Information* document, which is on the IBM *Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

## Server features and specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

*Table 1. Server features and specifications*

**Microprocessor:**

- Supports up to two of the following Intel Xeon™ EX versions of the 6000 and 7000 Series or E7 Series microprocessors, depending on your model (the server comes with one microprocessor installed):
  - Four-core with 12 MB or 18 MB shared among cores
  - Six-core Turbo with 12 MB or 18 MB shared among cores
  - Eight-core Turbo with 18 MB or 24 MB shared among cores (depending on your model)
  - Ten-core Turbo with 24 MB or 30 MB shared among cores
- Level-3 cache
- Four QuickPath Interconnect (QPI) links speed up to 6.4 Giga Transfers (GT) per second, with four QPI links per microprocessor
- Four Scalable Memory Interface (SMI) links speed up to 6.4 GT per second, with four SMI links per microprocessor
- Intel EX core chipset (I/O Hub)
- Intel 7500 or 7510 scalable memory buffer (depending on your model) with up to eight memory ports (memory channels) when the optional memory tray is installed (four ports on the system board and four ports on the optional memory tray). Each port controls four DIMMs.
- HyperThreading

**Note:**

- Use the Setup utility program to determine the type and speed of the microprocessors.
- For a list of supported microprocessors, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

**Memory (depending on the model):**

- Slots: 16 dual inline memory module connectors (on the system board).
- Minimum: 2 GB
- Maximum: 512 GB (on the base system board)

  **Note:**
  1. If you purchase and install the optional 16-DIMM memory tray, another 512 GB of additional memory is available (depending on the model).
  2. If you purchase and attach the optional 32-DIMM IBM MAX5 for System x memory expansion module, another 1 TB of additional memory is available (depending on the model).
  3. The server can support a total of 2 TBs of memory when both the optional memory tray and the MAX5 are installed (depending on the model).
- Type: 1333 MHz PC3-10600R-999, 1333 MHz PC3L-10600, 1600 MHz PC3-12800, or 1066 MHz PC3-8500 (single-rank, double-rank, or quad-rank), ECC, 240 pin, DDR3 registered SDRAM DIMMs only
  - PC3-10600R-999 is available in 2 GB, 4 GB, and 16 GB DIMMs
  - PC3L-10600 is available in 16 GB LP-RDIMMs (supported on Machine Types 7147 and 7192 only)
  - PC3-12800 is available in 16 GB DIMMs
  - PC3-8500 is available in 8 GB, 16 GB, and 32 GB DIMMs
- Supports l.35-volt (low-voltage) and 1.5-volt registered DIMMs (see "Replacing a memory module" on page 278 for more information).

**Scalability:**

- Scales with the IBM MAX5 for System x memory expansion module with QPI links for additional memory

**Note:** When you add an optional MAX5 to your server configuration and you plan to use the optional USB flash device with VMware ESXi embedded hypervisor software, see the documentation that comes with the USB flash device and the operating system installation instructions for installing VMware ESXi (or ESX, depending on your environment) on your server at the IBM website at http://www.ibm.com/systems/support/. The documentation provides additional installation and configuration information that you need to follow before you use the MAX5.

**Drive expansion bays, depending on the model):**

- The server can support up to 24 hot-swap drives using the supported SAS\SATA backplane configurations. The following drives are supported:
- 2.5-inch hot-swap SAS or hot-swap SATA hard disk drive
- 1.8-inch hot-swap solid state drive (SSD)
- 2.5-inch hot-swap solid state drive (SSD)

**Note:** Configurations with all 1.8-inch drive backplanes can support one additional simple-swap drive if you purchase the optional Simple-swap 2.5-inch SATA Drive and Backplate kit.

*Table 1. Server features and specifications (continued)*

| | | |
|---|---|---|
| **Optional SATA optical drives:**<br>• optional DVD/CD-ROM BlueRay (cable comes mounted to the optical drive bracket in the server)<br><br>**Hot-swap fans:**<br><br>The server comes standard with five speed-controlled hot-swap fans for N+1 redundancy.<br><br>**PCI expansion slots (depending on your model):**<br>• Two PCI riser-card slots on the system board provides up to five PCI adapter slots (depending on the riser card installed in the server):<br>– PCI riser slot 1 supports the:<br>- PCI riser card with two PCI Express Gen2 x8 adapter slots or the optional PCI riser cards with one PCI Express Gen2 x16 adapter slot<br>– PCI riser slot 2 supports the:<br>- PCI riser card with three PCI Express Gen2 x8, low-profile adapter slots | **Integrated functions:**<br>• Integrated Management Module (IMM), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote hard disk drive capabilities<br>• Broadcom BCM5709C Gb Ethernet controller with TCP/IP Offload Engine (TOE) and Wake on LAN support<br>• Light path diagnostics<br>• Eight Universal Serial Bus (USB) 2.0 ports:<br>– Two on the front of the chassis<br>– Four on the rear of the chassis<br>– Two internal (on the low-profile riser-card in which one connection is for the optional USB flash device with embedded hypervisor software)<br>• Two Ethernet ports on system board and two additional ports when the optional Emulex 10GbE Custom Adapter for IBM System x or the optional Emulex 10GbE Integrated Virtual Fabric Adapter II for IBM System x is installed<br>• One System Management RJ-45 on the rear to connect to a systems management network. This system management connector is dedicated to the IMM functions.<br>• One serial port<br>• Two QPI ports | **Power supply:**<br>• Server comes standard with one power supply<br>• Maximum of four 675-watt ac (110 or 220 V ac auto-sensing) hot-swap power supplies for N+N redundancy support.<br><br>**Note:** The server can run fully configured with two power supplies. For redundancy support, you must install the optional IBM Power Interposer for Redundant Power option kit.<br><br>**Video controller (integrated into IMM):**<br>• Matrox G200eV (two analog ports - one front and one rear that can be connected at the same time)<br>**Note:** The maximum video resolution is 1280 x 1024 at 75 Hz.<br>– SVGA compatible video controller<br>– DDR2 250 MHz SDRAM video memory controller<br>– Avocent Digital Video Compression<br>– Video memory is not expandable |

*Table 1. Server features and specifications (continued)*

**RAID controllers:**

- A ServeRAID M1015 SAS/SATA adapter that provides RAID levels 0, 1, and 10 (comes standard on some models).
- An optional ServeRAID M5015 SAS/SATA adapter that provides RAID levels 0, 1, 5, 10, and 50 can also be purchased.
- An optional ServeRAID M5016 SAS/SATA adapter that provides RAID levels 0, 1, and 10 support can also be purchased.
- An optional ServeRAID B5015 SSD adapter (for solid state drives) that provides RAID levels 1 and 5 can also be purchased.
- An optional ServeRAID M5016 SAS/SATA adapter that provides RAID levels, 0, 1, and 10 support can also be purchased.
- An optional IBM 6 Gigabit SSD Host Bus Adapter can also be purchased.

**Size:**

- Height: 86 mm (3.5 inches, 2U)
- Depth: 698 mm (27.4 inches)
- Width: 429 mm (16.8 inches)
- Maximum weight: 31.3 kg (69 lb) when fully configured

**Acoustical noise emissions:**

- Sound power, idling: 6.2 bels maximum
- Sound power, operating: 6.6 bels maximum

**Environment:**

- Air temperature:
  - Enclosure on: 10° to 35°C (50° to 95°F); altitude: 0 to 914.4 m (3000 ft). Decreased system temperature by 0.75° for every 1000 ft. increase in altitude.
  - Enclosure off: 5° to 45°C (41° to 113`°F)
  - Shipment: -40°C to +60°C (-40°F to 140°F
- Humidity:
  - Enclosure on: 20% to 80%; maximum dew point: 21°C (70°F)
  - Enclosure off: 8% to 80%; maximum dew point: 27°C (80°F)
  - Shipment: 5% to 100%
- Particulate contamination:

  **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see "Particulate contamination" on page 411.

**Airflow:**

- Normal airflow: 40 cubic feet per minute (CFM)
- Typical airflow: 65 CFM
- Maximum airflow: 90 CFM

**Heat output:**

Approximate heat output:

- Minimum configuration: 662 Btu per hour (194 watts)
- Maximum configuration: 2302 Btu per hour (779 watts)

**Electrical input:**

- Sine-wave input (47 - 63 Hz) required
- Input voltage low range:
  - Minimum: 90 V ac
  - Maximum: 137 V ac
- Input voltage high range:
  - Minimum: 180 V ac
  - Maximum: 265 V ac
- Input kilovolt-amperes (kVA), approximately:
  - Minimum: 0.194 kVA
  - Maximum: 1.5 kVA

**Notes:**

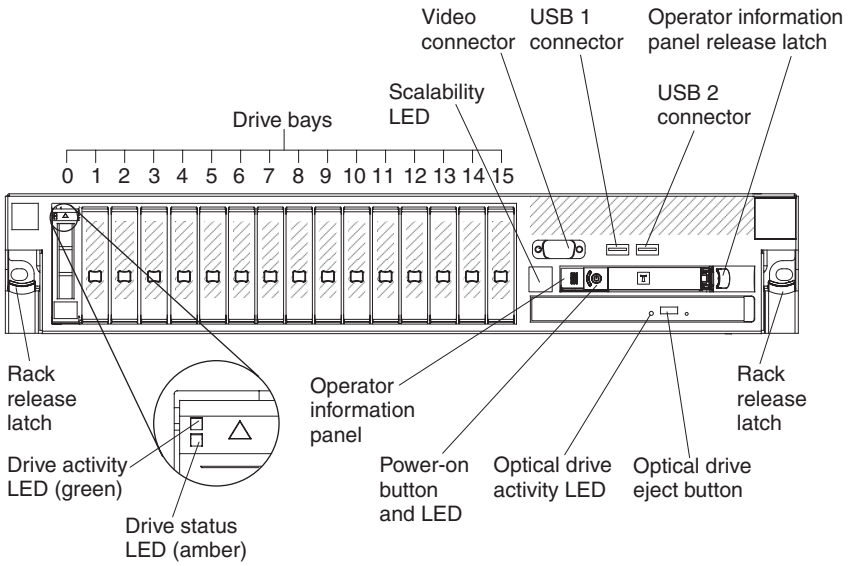
1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use.
2. The sound levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The noise emission level stated in the declared (upper limit) sound-power level, in bels, for a random sample of system.

## Server controls, LEDs, and power

This section describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off. For the location of the LEDs on the system board, see "System-board LEDs" on page 23.

### Front view

The following illustration shows the controls, LEDs, and connectors on the front of the server.



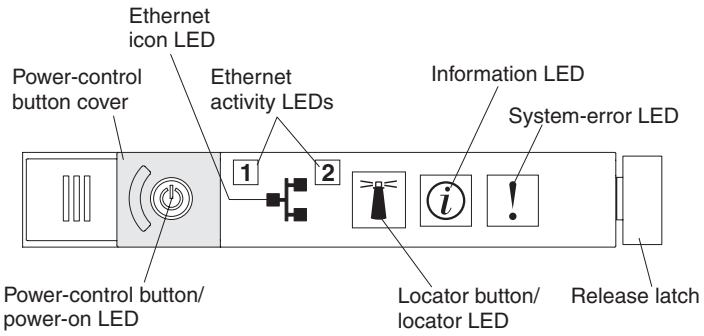

- **Rack release latches:** Press the latches on each front side of the server to slide it our of the rack.
- **Hard disk drive or solid state drive activity LEDs:** These LEDs are used on SAS or SATA hard disk drives and solid state drives. Each hot-swap drive has an activity LED, and when this LED is flashing, it indicates that the drive is in use.
- **Hard disk drive or solid state drive status LEDs:** These LEDs are used on SAS or SATA hard disk drives or solid state drive. When these LEDs are lit, it indicates that the drive has failed. If an optional IBM ServeRAID controller is installed in the server, when this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.
- **CD/DVD eject button (Optional):** Press this button to release a DVD or CD from the CD/DVD drive.
- **CD/DVD drive activity LED (Optional):** When this LED is lit, it indicates that the CD/DVD drive is in use.
- **Scalability LED:** When this (white) LED is lit, this indicates that the server is connected to another server or MAX5 to form multi-node configurations.
- **Operator information panel:** This panel contains controls and LEDs that provide information about the status of the server.
- **Operator information panel release latch:** Push the blue release latch to the left to pull out the light path diagnostics panel and view the light path diagnostics LEDs and buttons. See "Light path diagnostics" on page 67 for more information about the light path diagnostics.
- **Video connector:** Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.

**Note:** The maximum video resolution is 1280 x 1024 at 75 Hz.

- **USB connectors:** Connect a USB device, such as a USB mouse, keyboard, or other device to any of these connectors.

## Operator information panel

The following illustration shows the controls and LEDs on the operator information panel.




- **Power-control button and power-on LED:** Press this button to turn the server on and off manually or to wake the server from a reduced-power state. The states of the power-on LED are as follows:

  **Off:** AC power is not present, or the power supply or the LED itself has failed.

  **Flashing rapidly (4 times per second):** The server is turned off and is not ready to be turned on. The power-control button is disabled. This lasts approximately 1 to 3 minutes.

  **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.

  **Lit:** The server is turned on.

  **Fading on and off:** The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM Web interface. See "Logging on to the Web interface" on page 395 for information on logging on to the IMM Web interface.
- **Ethernet activity LEDs:** When any of these LEDs is flashing or flickering, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port that corresponds to that LED.
- **Locator button/LED:** Use this blue LED to visually locate the server among other servers. This LED is also used as a presence detection button. You can use IBM Systems Director to light this LED remotely. This LED is controlled by the IMM. When you press the locator button, the LED will be lit and it will continue to be lit until you press it again to turn it off. Press the locator button to visually locate the server among the others servers. In a two-node configuration, this LED will be lit on the primary server and this LED will blink on the secondary server during POST, if the button is pressed or an IPMI command is issued to turn on the LED. It is also used as the physical presence for the Trusted Platform Module (TPM).
- **Information LED:** When this amber LED is lit, it indicates that a noncritical event has occurred. Check the system-event log for additional information. See "Event logs" on page 35 for information about the event logs.
- **System-error LED:** When this amber LED is lit, it indicates that a system error has occurred. A system-error LED is also on the rear of the server. An LED on

the light path diagnostics panel on the operator information panel is also lit to help isolate the error. This LED is controlled by the IMM.

- **Hard disk drive or solid state drive activity LED:** When this green LED is lit, it indicates that one of the drives is in use.

  **Notes:**

  1. For a SAS drive, a hard disk drive activity LED is shown in two places: on the hard disk drive and on the operator information panel.
  2. For a SATA drive, hard disk drive activity is indicated only by the hard disk drive activity LED on the operator information panel.
  3. For a solid state drive, solid state drive activity is indicated only by the hard disk drive activity LED on the operator information panel.

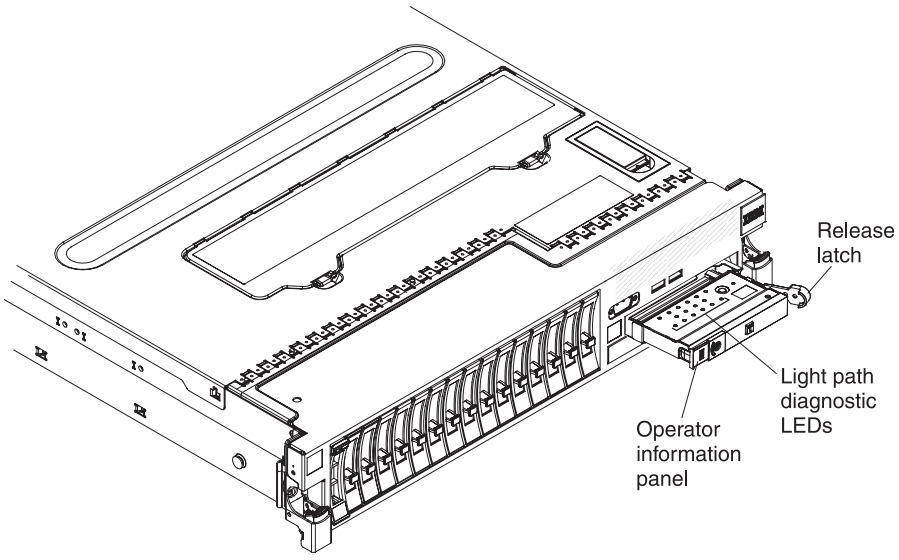
## Light path diagnostics panel

The light path diagnostics panel is located on the top of the operator information panel.

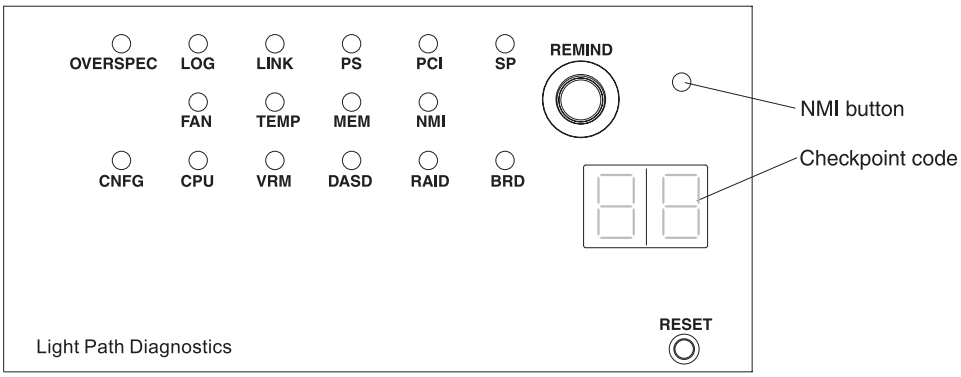
**Note:** The system service label on the underside of the cover also provides information about the location of the light path diagnostics LEDs.

To access the light path diagnostics panel, push the blue release latch on the operator panel to the left. Pull forward on the panel until the hinge of the operator panel is free of the server chassis. Then pull down on the panel, so that you can view the light path diagnostics panel information.

**Note:** When you slide the light path diagnostics panel out of the server to check the LEDs or checkpoint codes, do not run the server continuously with light path diagnostics panel outside of the server. The panel should only be outside of the server a short time. The light path diagnostics panel must remain in the server when the server is running to ensure proper cooling.




The following illustration shows the LEDs and controls on the light path diagnostics panel.



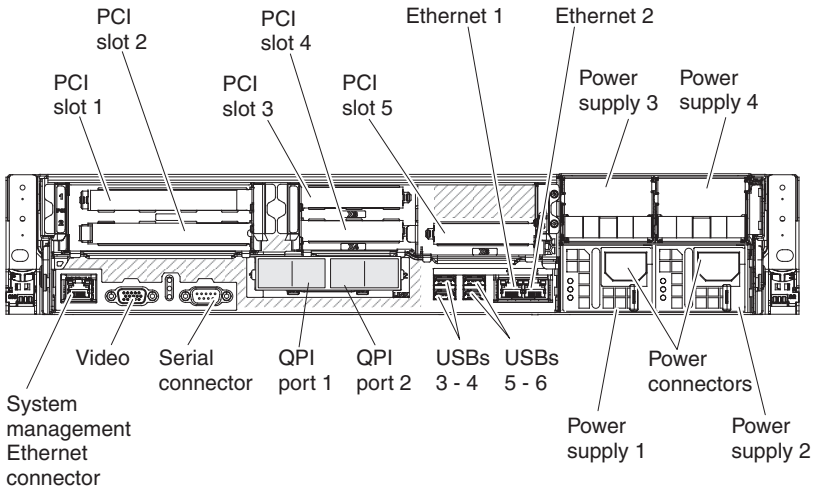

- **Remind button:** This button places the system-error LED on the front panel into Remind mode. In Remind mode, the system-error LED flashes every 2 seconds until the problem is corrected, the system is restarted, or a new problem occurs.

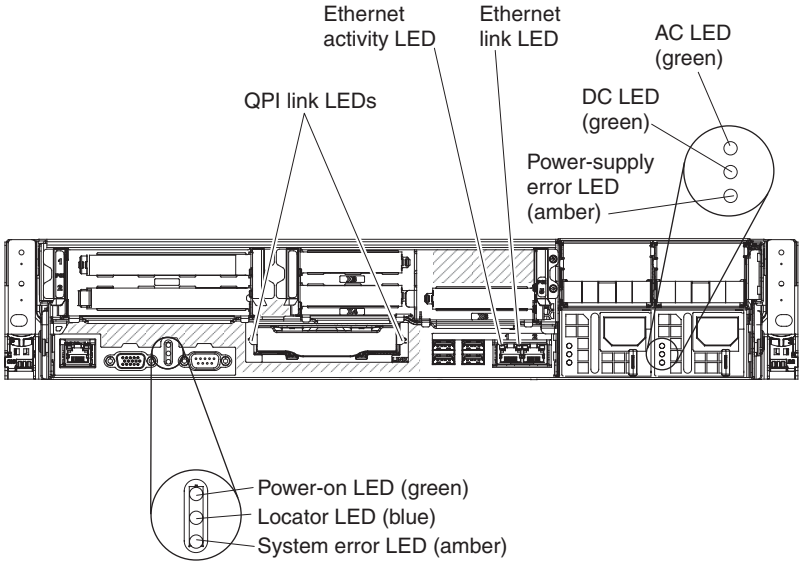
  By placing the system-error LED indicator in Remind mode, you acknowledge that you are aware of the last failure but will not take immediate action to correct the problem.
- **NMI button:** Press this button to force a nonmaskable interrupt to the microprocessor. You can use it to force a blue screen memory dump. Use this button only when you are directed to do so by the IBM service support.
- **Checkpoint code display:** This display provides a checkpoint code that indicates the point at which the system stopped during the boot block and POST. A checkpoint code is either a byte or a word value that is produced by UEFI. The display does not provide error codes or suggest components to be replaced.
- **Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button. The Reset button is in the lower-right corner of the light path diagnostics panel.

For additional information about the light path diagnostics panel LEDs, see “Light path diagnostics LEDs” on page 70.

## Rear view

The following illustrations show the connectors and LEDs on the rear of the server.






- **QPI ports:** Insert either a QPI cable or a filler panel in each of these connectors.

  **Attention:** When you handle the QPI cables, take precautions to avoid damaging the high density interface. Dropping and incorrectly connecting the QPI cables can damage the high density interface. Store the protective covers that come on the end of the QPI cables for reuse when you perform maintenance on the server or when you remove the cables for some reason.
- **PCI riser slot 1:** Insert the PCI riser card with two slots or the PCI riser cards with one slot into this slot. Standard models of the server come with two PCI Express riser assemblies. See "Replacing an adapter" on page 257 for the supported adapters for these riser-cards.
- **PCI slot 2:** Insert the PCI riser card with three slots into this slot. Standard models of the server come with two PCI Express riser assemblies. See "Replacing an adapter" on page 257 for information about adapters that this riser card supports.
- **Power connector:** Connect the power cord to this connector.
- **AC power LED:** Each hot-swap power supply has an ac power LED and a dc power LED. When the ac power LED is lit, it indicates that sufficient power is being supplied to the power supply through the power cord. During normal operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see "Power-supply LEDs" on page 78.
- **DC power LED:** Each hot-swap power supply has a dc power LED and an ac power LED. When the dc power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During normal operation, both the ac and dc power LEDs are lit. For any other combination of LEDs, see "Power-supply LEDs" on page 78.
- **System-error LED:** When this LED is lit, it indicates that a system error has occurred. An LED on the light path diagnostics panel is also lit to help isolate the error. This LED is functionally equivalent to the system-error LED on the front of the server.
- **Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. This LED is functionally equivalent to the Power-on LED on the front of the server. The states of the power-on LED are as follows:

  **Off:** AC power is not present, or the power supply or the LED itself has failed.

**Flashing rapidly (4 times per second):** The server is turned off and is not ready to be turned on. The power-control button is disabled. This lasts approximately 1 to 3 minutes.

**Flashing slowly (once per second):** The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.

**Lit:** The server is turned on.

**Fading on and off:** The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM Web interface. See "Logging on to the Web interface" on page 395 for information about logging on to the IMM Web interface.

- **Locator LED:** Use this LED to visually locate the server among other servers. You can use IBM Systems Director to light this LED remotely. This LED is functionally equivalent to the locator LED on the front of the server.
- **Video connector:** Connect a monitor to this connector. The video connectors on the front and rear of the server can be used simultaneously.

  **Note:** The maximum video resolution is 1280 x 1024 at 75 Hz.
- **Serial connector:** Connect a 9-pin serial device to this connector. The serial port is shared with the integrated management module (IMM). The IMM can take control of the shared serial port to perform text console redirection and to redirect serial traffic, using Serial over LAN (SOL).
- **USB connectors:** Connect a USB device, such as a USB mouse, keyboard, or other device to any of these connectors.
- **Systems-management Ethernet connector:** Use this connector to connect the server to a network for full systems-management information control.
- **QPI link LEDs**

  When these LEDs are lit, they indicate that there is an active link connection to the MAX5 or another x3690 server.
- **Ethernet activity LEDs:** When these LEDs are lit, they indicate that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.
- **Ethernet link LEDs:** When these LEDs are lit, they indicate that there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port.
- **Ethernet connectors:** Use either of these connectors to connect the server to a network. When you use the Ethernet 1 connector, the network can be shared with the IMM through a single network cable.

## Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor (the integrated management module) is shutdown; however, the server can respond to requests from the service processor, such as a remote request to turn on the server. The power-on LED flashes to indicate that the server is connected to ac power but is not turned on.

### Turning on the server

Approximately 5 seconds after the server is connected to ac power, one or more fans might start running to provide cooling while the server is connected to power and the power-on button LED will blink quickly. Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active (the power-on LED will blink slowly), and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.

**Note:** When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI options.

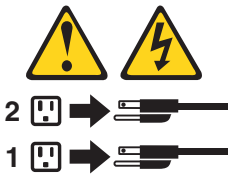
### Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

#### Statement 5

**CAUTION:**
**The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**




The server can be turned off in any of the following ways:

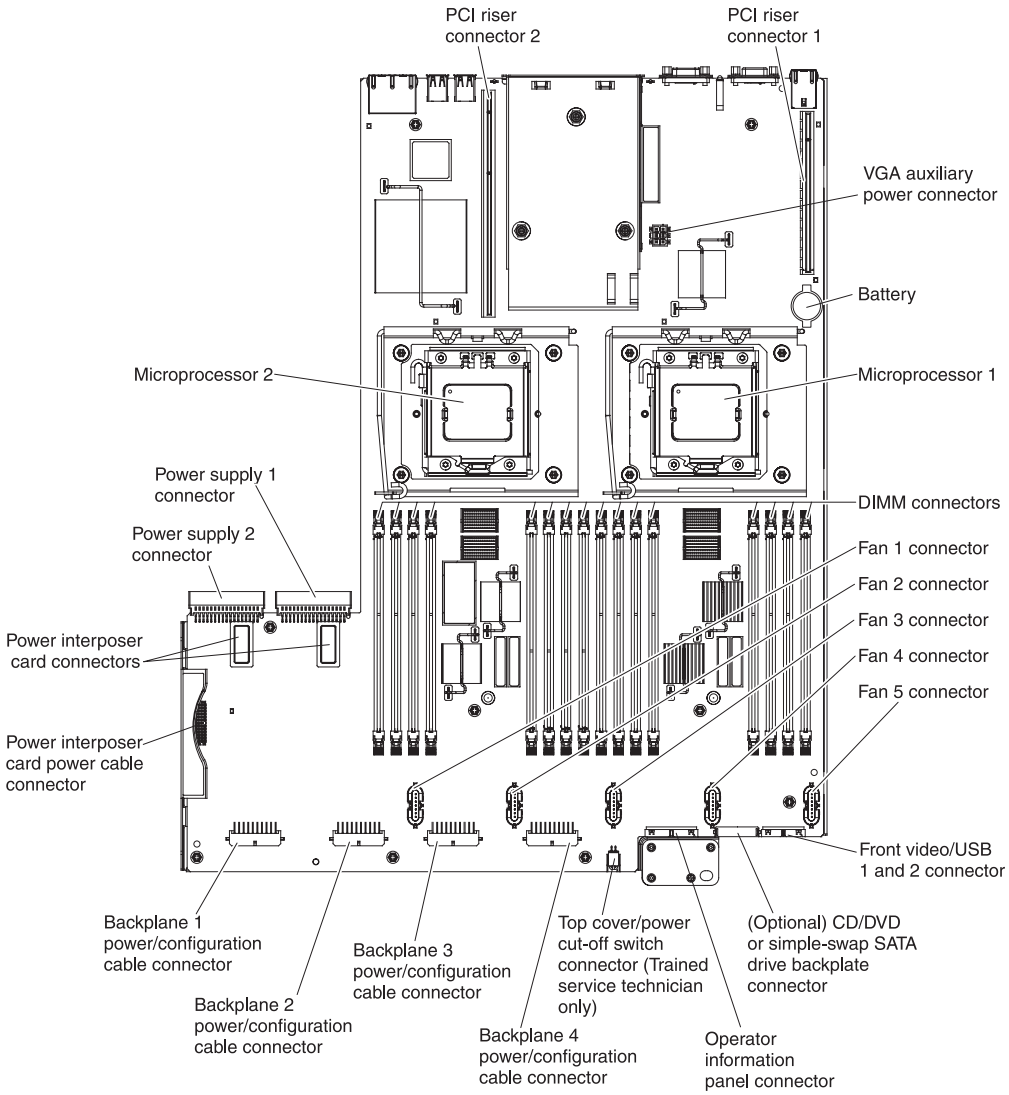
- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will turn off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- The integrated management module (MM) can turn off the server as an automatic response to a critical system failure.

## Server internal LEDs, connectors, and jumpers

The illustrations in this section show the connectors, LEDs, and jumpers on the internal boards. The illustrations might differ slightly from your hardware.

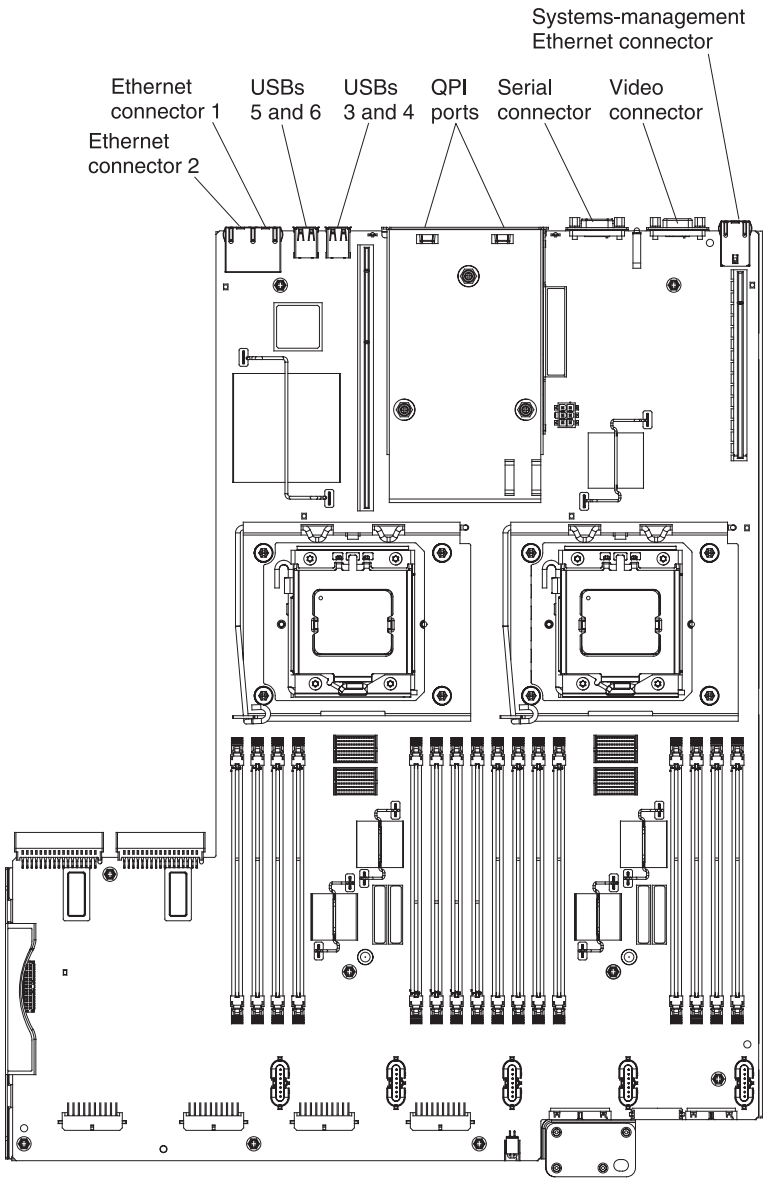
## System-board internal connectors

The following illustration shows the internal connectors on the system board.



## System-board external connectors

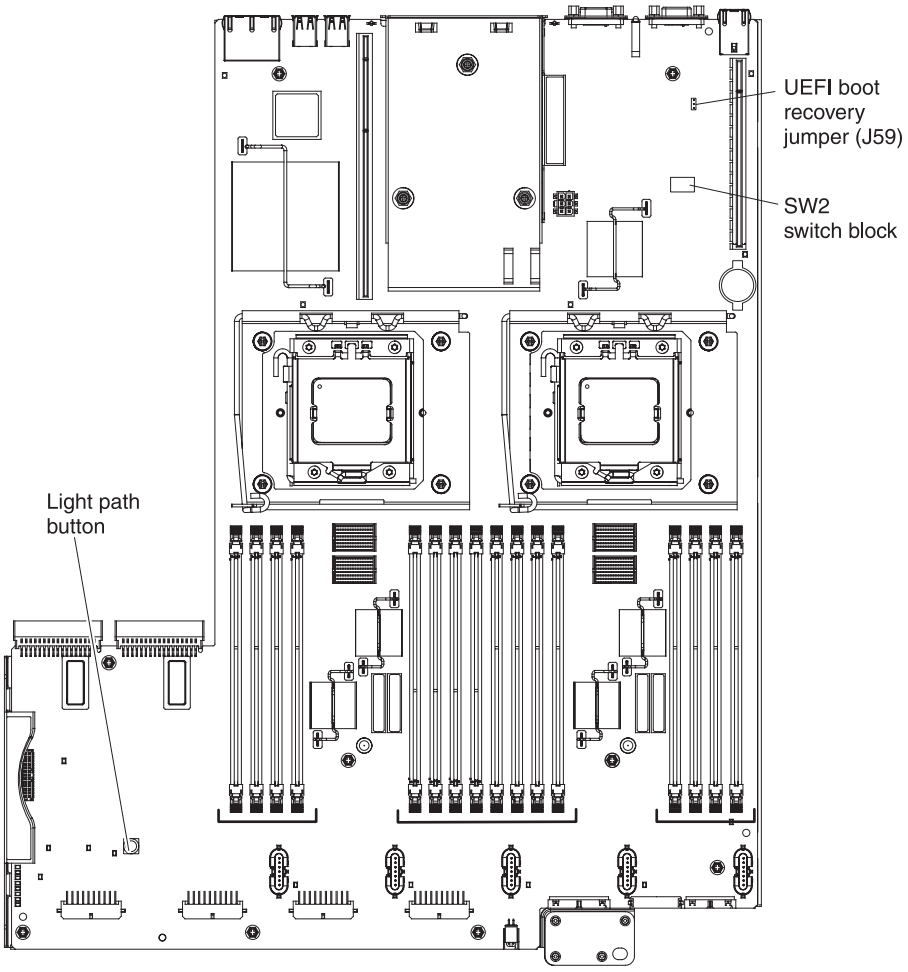
The following illustration shows the external connectors on the system board:



## System-board switches and jumpers

The following illustration shows the locations and descriptions of the switches and jumpers.

**Note:** If there is a clear protective sticker on the top of the switch block, you must remove and discard it to access the switch:




The following table describes the jumpers on the system board.

*Table 2. System board jumpers*

| Jumper number | Jumper name | Jumper setting |
|---|---|---|
| J59 | UEFI boot recovery jumper | • Pins 1 and 2: Normal (default) Loads the primary server firmware ROM page.<br>• Pins 2 and 3: Loads the secondary (backup) server firmware ROM page. |

*Table 2. System board jumpers (continued)*

| Jumper number | Jumper name | Jumper setting |
|---|---|---|
| **Note:**<br>1. If no jumper is present, the server responds as if the pins are set to 1 and 2.<br>2. Changing the position of the UEFI boot recovery jumper from pins 1 and 2 to pins 2 and 3 before the server is turned on alters which flash ROM page is loaded. Do not change the jumper pin position after the server is turned on. This can cause an unpredictable problem. | | |

**Light path button:** Press this button to light the LEDs on the system board after the power source has been removed from the server after the server automatically shuts down because the cover was removed while the server was running.

The following table describes the functions of the SW2 switch block on the system board.

*Table 3. System board SW2 switch block definition*

| Switch number | Default position | Description |
|---|---|---|
| 1 | Off | Clear CMOS memory. When this switch is toggled to On, it clears the data in CMOS memory, which clears the power-on password. |
| 2 | Off | Reserved. |
| 3 | Off | Power-on password override. Changing the position of this switch bypasses the power-on password check the next time the server is turned on and starts the Setup utility so that you can change or delete the power-on password. You do not have to move the switch back to the default position after the power-on password in overridden.<br><br>Changing the position of this switch does not affect the administrator password check if an administrator password is set.<br><br>See “Passwords” on page 388 for more information about passwords. |
| 4 | Off | Reserved |
| 5 | Off | Reserved |
| 6 | Off | Reserved |
| 7 | Off | Reserved |
| 8 | Off | Reserved |

**Important:**

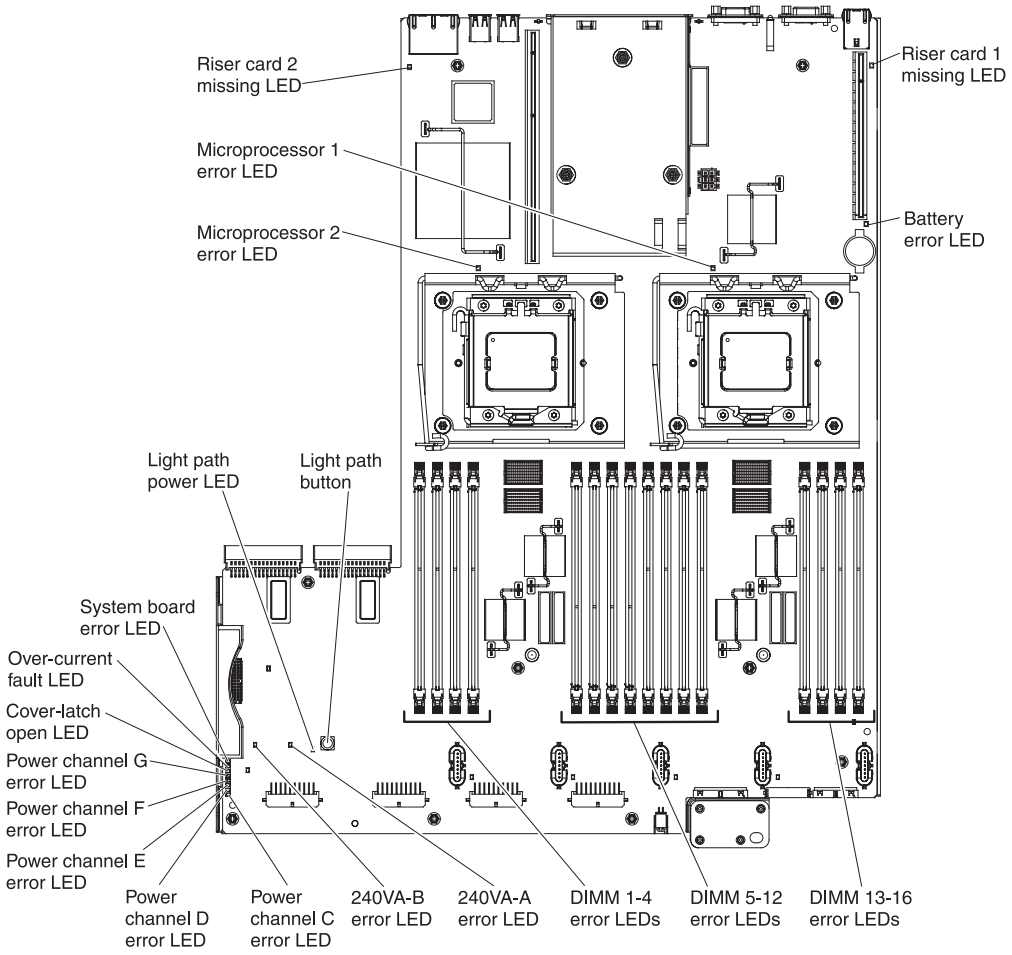
1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the

information in “Safety” on page vii, “Installation guidelines” on page 243, “Handling static-sensitive devices” on page 245, and “Turning off the server” on page 17.

2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

## System-board LEDs

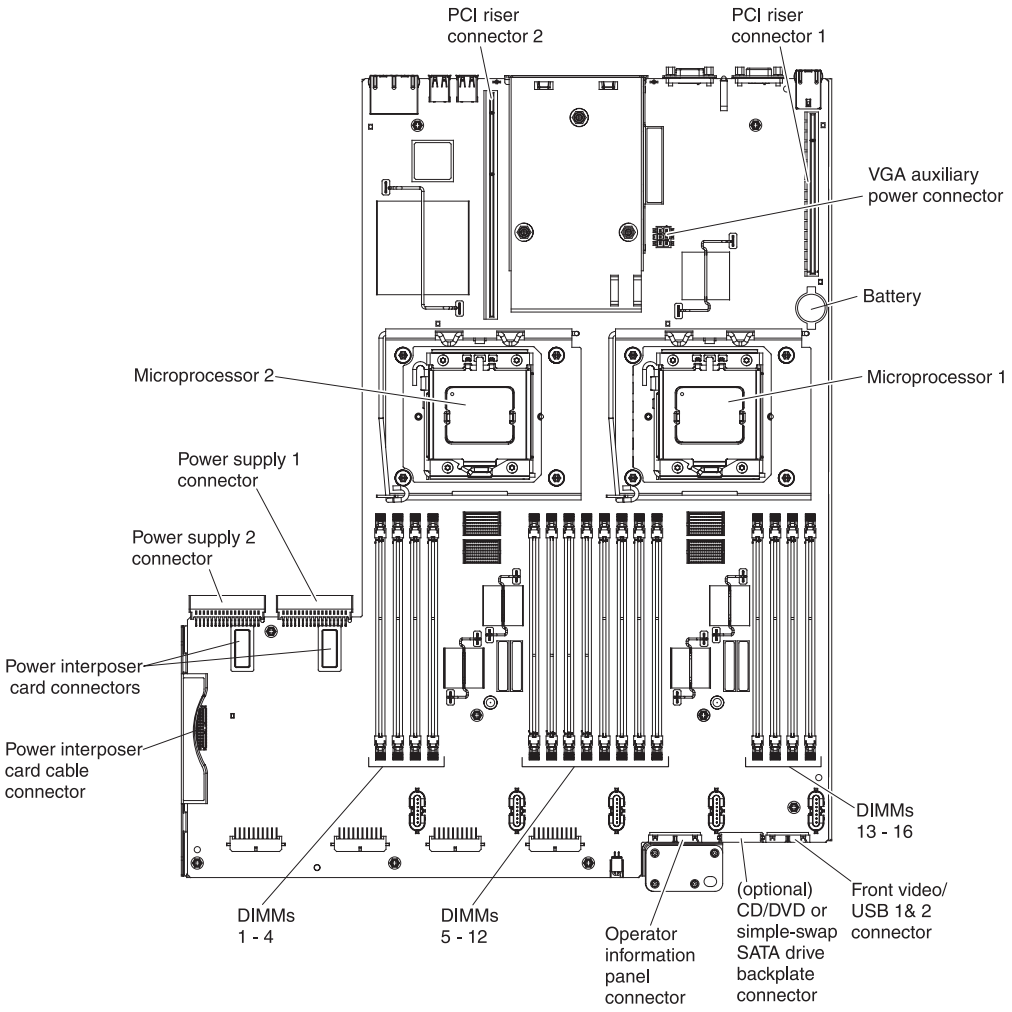
The following illustration shows the light-emitting diodes (LEDs) on the system board:




For more information, see Table 6 on page 70.

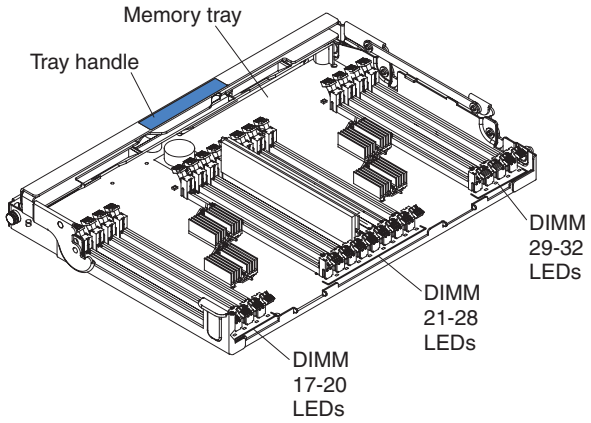
## System-board optional device connectors

The following illustration shows the connectors for user-installable optional devices:




## Optional 16-DIMM memory tray

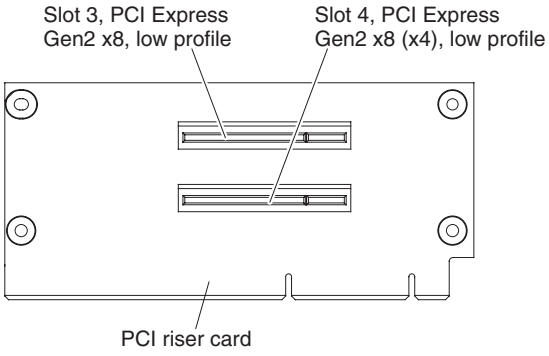
The following illustration shows the connectors and LEDs on the optional 16-DIMM memory tray.



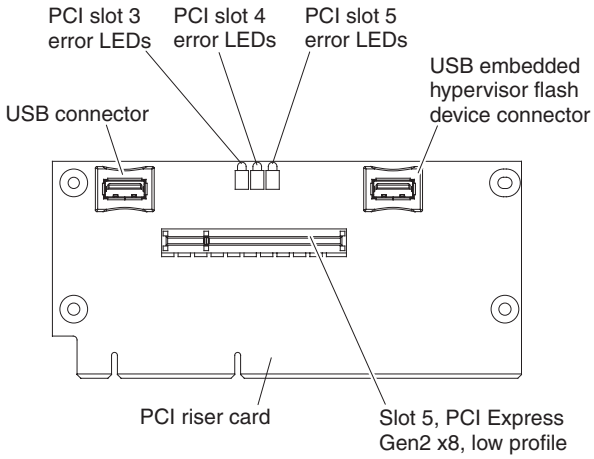

## PCI riser card with three slots

The following illustrations show the connectors and LEDs on the optional three-slot PCI riser card:

**Side 1:**

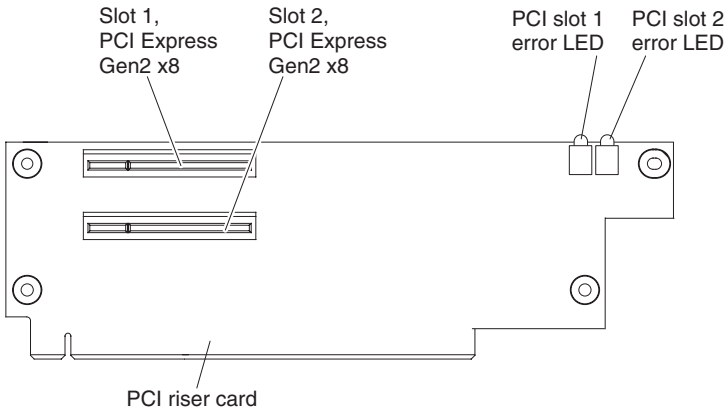



**Side 2:**



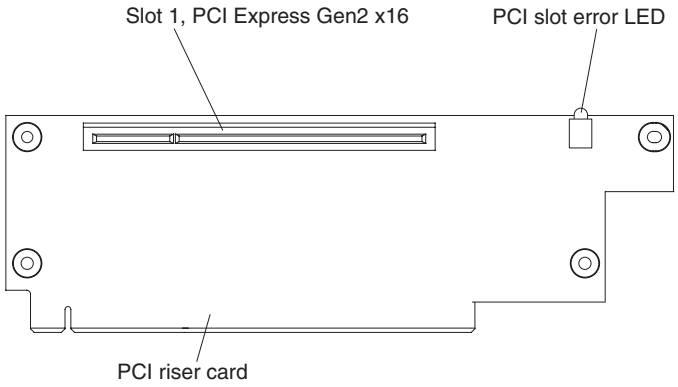
## PCI riser card with two slots

The following illustrations show the connector and LEDs on the optional two-slot PCI riser card:




## PCI riser card with one slot

The following illustration shows the connector and LED on the optional one-slot PCI riser card:



## MAX5 features and specifications

The following information is a summary of the features and specifications of the MAX5 memory expansion module:

*Table 4. MAX5 Features and operating specifications*

| | | |
|---|---|---|
| • Intel 7500 or 7510 scalable memory buffer (depending on your model) with eight memory ports (four DIMMs on each port)<br>• Xcellerated Memory Technology<br>• EXA chip set<br>• QuickPath Interconnect (QPI) architecture technology:<br>  – Four 6.4 Giga Transfers (GT) per second QuickPath Interconnect links (for up to 2 microprocessors)<br>  – Three 10.0 GT per second EXA scalability links<br>• Scalability:<br>  – Connects to the x3690 X5 (2U) rack servers using QPI cables<br><br>**Note:** When you add an optional MAX5 to your server configuration and you plan to use the optional USB flash device with VMware ESXi embedded hypervisor software, see the documentation that comes with the USB flash device and the operating system installation instructions for installing VMware ESXi (or ESX, depending on your environment) on your server at the IBM website at http://www.ibm.com/systems/support/. The documentation provides additional installation and configuration information that you need to follow before you use the MAX5. | **DIMMs (depending on the model):**<br>• Minimum: 2 DIMMs (two 2 GB DIMMs (4 GB))<br>• Maximum: 32 DIMM slots (up to 1 TB of memory, depending on the DIMM size)<br>• Type of DIMMs: PC3-10600R-999 1333 MHz, PC3L-10600 1333 MHz, or PC3-8500R 1066 MHz, ECC, DDR3 registered SDRAM dual inline memory modules (DIMMs)<br>• Supports 2 GB, 4 GB, 8 GB, 16 GB or 16 GB LP-RDIMMs, 32 GB DIMMs<br>**Note:** The PC3L-10600 16 GB LP-RDIMMs are supported in the MAX5s with Intel 7510 scalable memory buffer only.<br>• Supports l.35-volt (low-voltage) and 1.5-volt registered DIMMs (see “Replacing a MAX5 memory module” on page 366 for more information).<br><br>**Fans:**<br>• Five hot-swap 40 mm fans | **Power supply:**<br>• One 675-watt (110 - 220 V ac auto-sensing) standard<br>• Supports up to two 675-watt (110 - 220 V ac auto-sensing) hot-swap power supplies with built-in fans for redundancy support<br><br>**Light path diagnostics LEDs:**<br>• Board LED<br>• Configuration LED<br>• Fan LEDs<br>• Link LED (for QPI and EXA links)<br>• Locate LED<br>• Memory LEDs<br>• Power-on LED<br>• Power supply LEDs |

*Table 4. MAX5 Features and operating specifications (continued)*

| | | |
|---|---|---|
| **Acoustical noise emissions:** For maximum system configurations (32 DIMMs installed)<br>• Sound power (idling): 6.2 bels<br>• Sound power (operating): 6.8 bels<br><br>**Size:**<br>• Height: 4.4 cm (1.73 in.)<br>• Depth: 72.4 cm (28.5 in.)<br>• Width:48.3 cm (19.0 in.)<br>• Weight: approximately 12.8 kg (28.2 lb) for a standard unit; when fully configured, 15.4 kg (33.9 lb) | **Environment:**<br>• Air temperature:<br>– Enclosure on: 10° to 35°C (50° to 95°F); altitude: 0 to 914.4 m (3000 ft). Decreased system temperature by 0.75° for every 1000 ft. increase in altitude.<br>– Enclosure off: 5° to 45°C (41° to 113``°F)<br>– Shipment: -40°C to +60°C (-40°F to 140°F<br>• Humidity:<br>– Enclosure on: 20% to 80%; maximum dew point: 21°C (70°F)<br>– Enclosure off: 8% to 80%; maximum dew point: 27°C (80°F)<br>– Shipment: 5% to 100%<br>• Particulate contamination:<br>**Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see "Particulate contamination" on page 411. | **Heat output**<br><br>Approximate heat output:<br>• Minimum configuration: 314 Btu per hour (92 watts)<br>• Maximum configuration 2048 Btu per hour (600 watts)<br><br>**Electrical input:**<br>• Sine-wave input (50 - 60 Hz) required<br>• Input voltage low range:<br>– Minimum: 90 V ac<br>– Maximum: 136 V ac<br>• Input voltage high range:<br>– Minimum: 198 V ac<br>– Maximum: 264 V ac<br>• Approximate input kilovolt-amperes (kVA):<br>– Minimum: 0.1 kVA<br>– Maximum: 0.6 kVA<br><br>**Note:**<br>1. Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features that are in use.<br>2. These levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average stated values because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate. |

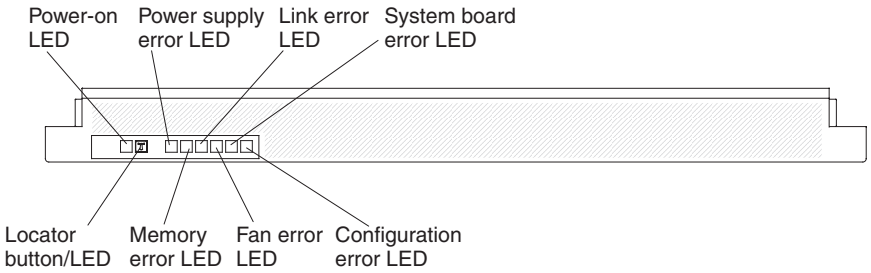
## MAX5 indicators, LEDs, and power

This section describes the indicators and light-emitting diodes (LEDs) on the front and rear of the IBM MAX5 for System x (MAX5) memory expansion module.

### Front view

The following illustration shows the indicators on the front of the MAX5 expansion module. All of the LEDs are controlled by the server integrated management module (IMM).

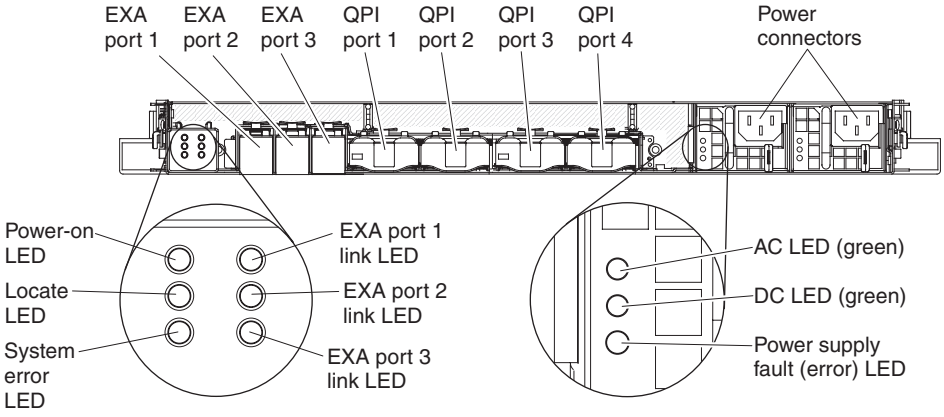
**Note:** The MAX5 expansion module does not have a power-on button. The MAX5 and all of its functions are controlled by the server to which it is connected.




- **Operator information panel:** This panel contains the indicators for the MAX5 expansion module.
  - **Power-on LED:** When this green LED is lit, it indicates that the MAX5 is powered on.
  - **Locate LED:** Use this blue LED to locate the MAX5 expansion module. The locate LED also has a button that you can press to light up other servers or other MAX5 expansion modules to which the MAX5 is connected.
  - **Power supply fault (error) LED:** When this amber LED is lit, it indicates a faulty hot-swap power-supply.
  - **Memory error LED:** When this amber LED is lit, it indicates a DIMM problem.
  - **Link error LED:** When this amber LED is lit, indicates that a QPI link fault or a EXA link fault has occurred. The port LED for the link that has been disconnected will not be lit on the rear of the MAX5. EXA link LEDs are on the rear of the MAX5 expansion module and the QPI link LEDs are on the server to which the MAX5 is connected.
  - **Fan error LED:** When this amber LED is lit, it indicates a fan error.
  - **System board error LED:** When this amber LED is lit, it indicates a MAX5 system-board tray error.
  - **Configuration error LED:** When this amber LED is lit, it indicates a configuration error. The memory error LED might be lit to indicate a memory configuration error.

## Rear view

The following illustration shows the indicators on the rear of the IBM MAX5 for System x (MAX5) memory expansion module:




- **Power-on LED:** When this green LED is lit, it indicates that the MAX5 is powered on. This LED is functionally equivalent to the power-on LED on the front of the MAX5.
- **Locate LED:** When this blue LED is lit, it indicates that the command from the server IMM to the MAX5 is complete. Use this blue LED to locate the MAX5 expansion module. The front locate LED also has a button that you can press to light up other servers or other MAX5 expansion modules to which the MAX5 is connected to. This LED is functionally equivalent to the Locate LED on the front of the MAX5.
- **System error LED:** When this LED is lit, it indicates that a system error has occurred.
- **QPI ports:** Insert either a QPI cable or a filler panel in each of these connectors.

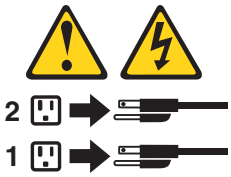
  **Attention:** When you handle the QPI cables, take precautions to avoid damaging the high density interface. Dropping and incorrectly connecting the QPI cables can damage the high density interface. Store the protective covers that come on the end of the QPI cables for reuse when you perform maintenance on the server or MAX5 or when you remove the cables for some reason.
- **Power connector:** Connect the power cord to this connector.
- **AC power LED:** Each hot-swap power supply has an ac power LED and a dc power LED. When the ac power LED is lit, it indicates that sufficient power in coming into the power supply through the power cord. During typical operation, both the ac and dc power LEDs are lit.
- **DC power LED:** Each hot-swap power supply has a dc power LED and an ac power LED. When the dc power LED is lit, it indicates that power supply is supplying adequate dc power to the MAX5 expansion module. During normal operation, both the ac and dc power LEDs are lit.
- **Power supply fault (error) LED:** When this amber LED is lit, it indicates a faulty hot-swap power supply.
- **EXA link LED:** When this green LED is lit, it indicates that a EXA link is functioning.

## Turning the MAX5 on and off

Because the MAX5 expansion module is controlled by the server, turning on the MAX5 refers to connecting the MAX5 power cord into the power source and pressing the power-control button on a host server that is connected to the MAX5 expansion module and is configured to identify the expansion module. Normally, the operating system on the server starts and the server issues a power-on request to the MAX5. The IBM MAX5 for System x (MAX5) memory expansion module is turned off only if the connected server issues a power-off request, and you have disconnected the MAX5 power cord from the power source. You cannot turn off the MAX5 expansion module manually.

### Statement 5

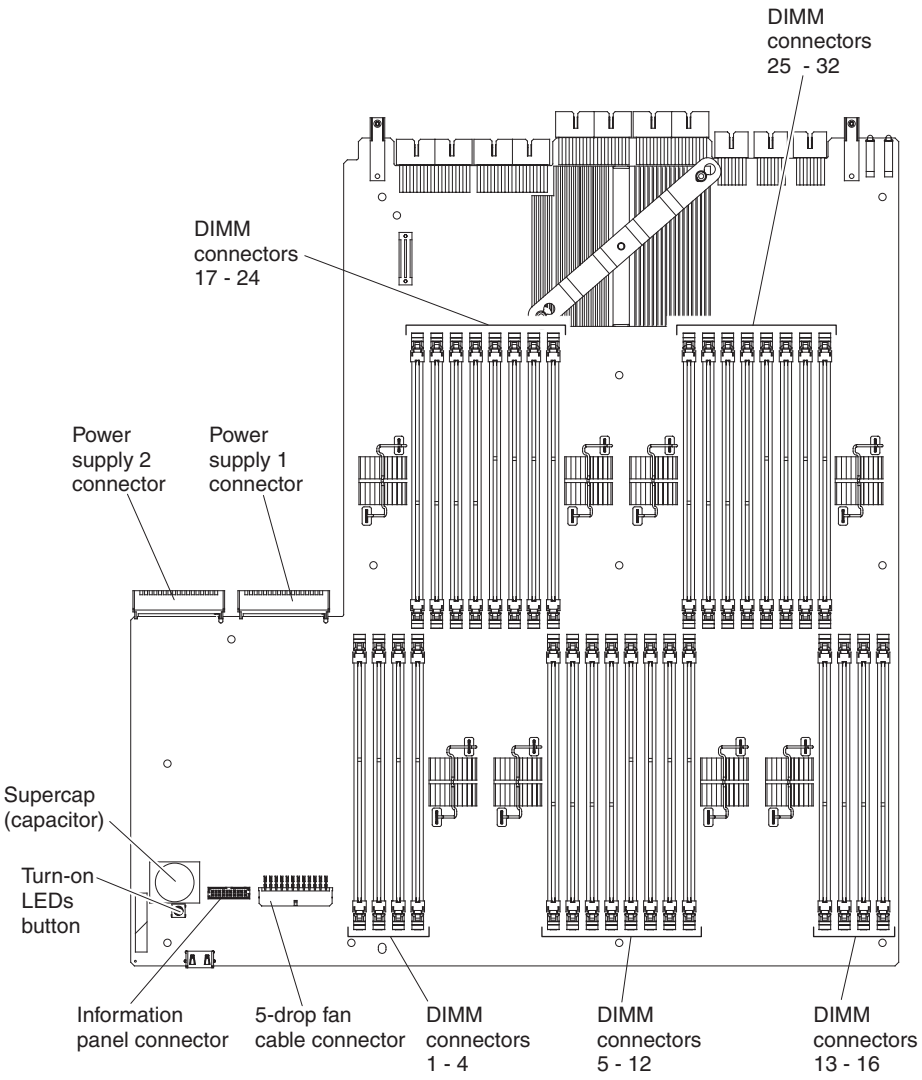
**CAUTION:**
**The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**




You can disconnect the MAX5 expansion module power cords from the power source to shut off all power immediately without damaging the MAX5, but it might cause an unrecoverable error and loss of data on the connected server.

## MAX5 internal connectors and buttons

The illustrations in this section show the internal connectors and buttons on the MAX5 system-board tray. The illustrations might differ slightly from your hardware.



# Chapter 3. Diagnostics

This chapter describes the diagnostic tools that are available to help you solve problems that might occur in the server.

If you cannot diagnose and correct a problem by using the information in this chapter, see Chapter 1, "Start here," on page 1 and "Getting help and technical assistance," on page 405 for more information.

## Diagnostic tools

The following tools are available to help you diagnose and solve hardware-related problems:

- **Light path diagnostics**

  Use light path diagnostics to diagnose system errors quickly. See "Light path diagnostics" on page 67 for more information.

- **POST error codes and event logs**

  The power-on self-test (POST) generates messages to indicate successful test completion or the detection of a problem. See "Event logs" on page 35 and "POST error codes" on page 38 for more information.

- **Troubleshooting tables**

  These tables list problem symptoms and actions to correct the problems. See "Troubleshooting tables" on page 49 for more information.

- **IBM Dynamic System Analysis**

  Two editions of IBM Dynamic System Analysis (DSA) are available for diagnosing problems, DSA Portable and DSA Preboot:

  – DSA Portable

    DSA Portable collect and analyze system information to aid in diagnosing server problems. DSA Portable runs on the server's operating system and collect the following information about the server:

    - Drive health information
    - Event logs for ServeRAID controllers and service processors
    - Installed hardware, including PCI and USB information
    - Installed applications and hot fixes
    - Kernel modules
    - Light path diagnostics status
    - Microprocessor, input/out hub, and UEFI error logs
    - Network interfaces and settings
    - RAID controller configuration
    - Scalability link status
    - Service processor (integrated management module) status and configuration
    - System configuration
    - Vital product data, firmware, and UEFI configuration

    DSA Portable create a DSA log, which is a chronologically ordered merge of the system-event log (as the IPMI event log), the integrated management module (IMM) chassis-event log (as the ASM event log), and the

operating-system event logs. You can send the DSA log as a file to IBM service (when requested by service) or view the information as a text file or HTML file.

**Note:** Use the latest available version of DSA to make sure you are using the most recent configuration data. For documentation and download information for DSA, see http://www.ibm.com/systems/management/.

For additional information, see "IBM Dynamic System Analysis" on page 80.

– DSA Preboot

DSA Preboot diagnostic program is stored in the integrated USB memory on the server. DSA Preboot collects and analyzes system information to aid in diagnosing server problems, as well as offering a rich set of diagnostic tests of the major components of the server. DSA Preboot collects the following information about the server:

- Drive health information
- Event logs for ServeRAID controllers and service processors
- Installed hardware, including PCI and USB information
- Light path diagnostics status
- Microprocessor, input/out hub, and UEFI error logs
- Network interfaces and settings
- RAID controller configuration
- Scalability link status
- Service processor (integrated management module) status and configuration
- System configuration
- Vital product data, firmware, and UEFI configuration

DSA Preboot also provides diagnostics for the following system components (when they are installed):

1. Broadcom network adapter
2. IMM 12C bus
3. Lightpath diagnostics panel
4. Memory modules
5. Microprocessors
6. Optical devices (CD or DVD)
7. SAS or SATA drives
8. Tape drives (SCSI)

See "Running the DSA Preboot diagnostic programs" on page 81 for more information on running the DSA Preboot program on the server.

- **Integrated Management Module (IMM)**

The Integrated Management Module (IMM) combines service processor functions, video controller, and remote presence and blue-screen capture features in a single chip. The IMM provides advanced service-processor control, monitoring, and alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM lights LEDs to help you diagnose the problem, records the error in the IMM event log, and alerts you to the problem. Optionally, the IMM also provides a virtual presence capability for remote server management capabilities. The IMM provides remote server management through the following industry-standard interfaces:

– Intelligent Platform Management Protocol (IPMI) version 2.0

– Simple Network Management Protocol (SNMP) version 3
– Common Information Model (CIM)
– Web browser

For more information about the Integrated Management Module (IMM), see "Using the integrated management module" on page 391, "Integrated management module (IMM) error messages" on page 168, and the *Integrated Management Module User's Guide* at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=MIGR-5079770&brandind=5000008.

- **IBM Electronic Service Agent**

  IBM Electronic Service Agent is a software tool that monitors the server for hardware error events and automatically submits electronic service requests to IBM service. Also, it can collect and transmit system configuration information on a scheduled basis so that the information is available to you and your support representative. It uses minimal system resources, is available free of charge and can be downloaded from the Web. For more information and to download IBM Electronic Service Agent, go to http://www.ibm.com/support/electronic/

## Event logs

Error codes and messages are displayed in the following types of event logs.

- **POST event log:** This log contains the three most recent error codes and messages that were generated during POST. You can view the contents of the POST event log from the Setup utility (see "Starting the Setup utility" on page 384). For more information about POST error codes, see "POST error codes" on page 38.
- **System-event log:** This log contains POST and system management interrupt (SMI) events and all events that are generated by the baseboard management controller that is embedded in the integrated management module (IMM). You can view the contents of the system-event log through the Setup utility and through the Dynamic System Analysis (DSA) program (as IPMI event log).

  The system-event log is limited in size. When it is full, new entries will not overwrite existing entries; therefore, you must periodically clear the system-event log through the Setup utility. When you are troubleshooting an error, you might have to save and then clear the system-event log to make the most recent events available for analysis. For more information about the system-event log, see "System-event log" on page 167

  Messages are listed on the left side of the screen, and details about the selected message are displayed on the right side of the screen. To move from one entry to the next, use the Up Arrow (↑) and Down Arrow (↓) keys.

  Some IMM sensors cause assertion events to be logged when their setpoints are reached. When a setpoint condition no longer exists, a corresponding deassertion event is logged. However, not all events are assertion-type events.
- **Integrated management module (IMM) event log:** This log contains a filtered subset of all IMM, POST, and system management interrupt (SMI) events. You can view the IMM event log through the IMM Web interface. For more information, see "Logging on to the Web interface" on page 395. You can also view the IMM event log through the Dynamic System Analysis (DSA) program (as the ASM event log). For more information about IMM error messages, see "Integrated management module (IMM) error messages" on page 168.
- **DSA event log:** This log is generated by the Dynamic System Analysis (DSA) program, and it is a chronologically ordered merge of the system-event log (as the IPMI event log), the IMM chassis-event log (as the ASM event log), and the

operating-system event logs. You can view the DSA event log through the DSA program (see "Viewing event logs without restarting the server"). For more information about DSA and DSA messages, see "IBM Dynamic System Analysis" on page 80 and "DSA messages" on page 82.

## Viewing event logs through the Setup utility

To view the POST event log or system-event log, complete the following steps:

1. Turn on the server.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the event logs.
3. Select **System Event Logs** and use one of the following procedures:
   - To view the POST event log, select **POST Event Viewer**.
   - To view the system-event log, select **System Event Log**.

## Viewing event logs without restarting the server

If the server is not hung and the IMM is connected to a network, methods are available for you to view one or more event logs without having to restart the server.

If you have installed Dynamic System Analysis (DSA) Portable, you can use it to view the system-event log (as the IPMI event log), or the IMM event log (as the ASM event log), the operating-system event logs, or the merged DSA log. You can also use DSA Preboot to view these logs, although you must restart the server to use DSA Preboot. The server comes with DSA Preboot stored in integrated USB memory. To install DSA Portable or check for and download a later version of DSA Preboot CD image, go to http://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=SERV-DSA&brandind=5000008.

If IPMItool is installed in the server, you can use it to view the system-event log. Most recent versions of the Linux operating system come with a current version of IPMItool. For an overview of IPMI, go to http://www.ibm.com/developerwork/linux/blueprints/ and click **Using Intelligent Platform Management Interface (IPMI) on IBM Linux platforms**.

You can view the IMM event log through the **Event Log** link in the integrated management module (IMM) Web interface. For more information, see "Logging on to the Web interface" on page 395.

The following table describes the methods that you can use to view the event logs, depending on the condition of the server. The first three conditions generally do not require that you restart the server.

*Table 5. Methods for viewing event logs*

| Condition | Action |
|---|---|
| The server is not hung and is connected to a network (using an operating system controlled network ports). | Use any of the following methods:<br>• Run DSA Portable to view the diagnostic event log (requires IPMI driver) or create an output file that you can send to IBM service and support (using ftp or local copy).<br>• Use IPMItool to view the system-event log (requires IPMI driver).<br>• Use the Web browser interface to the IMM to view the system-event log locally (requires RNDIS USB LAN driver). |
| The server is not hung and is not connected to a network (using an operating system controlled network ports). | Use any of the following methods:<br>• Run Portable DSA to view the diagnostic event log (requires IPMI driver) or create an output file that you can send to IBM service and support (using a local copy).<br>• Use IPMItool to view the system-event log (requires IPMI driver).<br>• Use the Web browser interface to the IMM to view the system-event log locally (requires RNDIS USB LAN driver). For more information, see "Obtaining the IP address for the IMM" on page 394 and "Logging on to the Web interface" on page 395. |
| The integrated management module (IMM) is connected to a network and AC power is applied - the server state might be hung, not hung, or powered off. | Use any of the following methods:<br>• Use IPMItool over the network to the IMM external IP address to view the system-event log.<br>• Use the Web browser interface to the IMM to view the system-event log. In the Web browser, type the IP address for the IMM and go to the Event Log page. For more information, see "Obtaining the IP address for the IMM" on page 394 and "Logging on to the Web interface" on page 395. |
| The server is hung and no communication can be made with the IMM. | Restart the server and press F2 to start DSA Preboot and view the diagnostic event log (see "Running the DSA Preboot diagnostic programs" on page 81 for more information).<br><br>Alternatively, you can restart the server and press F1 to start the Setup utility and view the POST event log or system-event log. For more information, see "Viewing event logs through the Setup utility" on page 36. |

## Clearing the error logs

To clear the event logs, complete the following steps.

**Note:** The POST event log is automatically cleared each time the server is restarted.

1. Turn on the server.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set both a power-on password and an administrator password, you must type the administrator password to view the event logs.
3. Use one of the following procedures:
   - To clear the IMM system-event log, select **System Event Logs --> System Event Log**. Select **Clear System Event Log**; then, press Enter twice.

# POST

When you turn on the server, it performs a series of tests to check the operation of the server components and some optional devices in the server. This series of tests is called the power-on self-test, or POST.

**Note:** This server does not use beep codes for server status.

If a power-on password is set, you must type the password and press Enter (when you are prompted), for POST to run.

If POST detects a problem an error message is displayed. See “POST error codes” for more information.

If POST detects a problem, an error message is sent to the POST event log.

## POST error codes

The following table describes the POST error codes and suggested actions to correct the detected problems. These errors can appear as severe, warning, or informational.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 0010002 | Microprocessor not supported. | 1. Reseat the following components one at a time, in the order shown, restarting the server each time.<br>a. (Trained service technician only) Microprocessor 1.<br>b. (Trained service technician only) Microprocessor 2 (if installed.)<br>2. (Trained service technician only) Remove microprocessor 2 and restart the server.<br>3. (Trained service technician only) Remove microprocessor 1 and install microprocessor 2 in the microprocessor 1 connector. Restart the server. If the error is corrected, then microprocessor 1 is bad and must be replaced.<br>4. Replace the following components one at a time, in the order shown, restarting the server each time.<br>a. (Trained service technician only) Microprocessor 1.<br>b. (Trained service technician only) Microprocessor 2.<br>c. (Trained service technician only) System board. |
| 0011000 | Invalid microprocessor type. | 1. Update the server firmware to the latest level (see "Updating the firmware" on page 379).<br>2. (Trained service technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Removing a microprocessor and heat sink" on page 331 and "Replacing a microprocessor and heat sink" on page 333). |
| 0011002 | Microprocessor mismatch. | 1. Run the Setup utility and select **System Information → System Summary → Processor** to view the microprocessor information to compare the installed microprocessor specifications.<br>2. (Trained service technician only) Remove and replace one of the microprocessors so that they both match (see "Removing a microprocessor and heat sink" on page 331 and "Replacing a microprocessor and heat sink" on page 333). |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 0011004 | Microprocessor failed built-in self-test (BIST) | 1. Update the server firmware to the latest level (see "Updating the firmware" on page 379).<br>2. (Trained service technician only) Reseat microprocessor 2.<br>3. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. (Trained service technician only) Microprocessor<br>b. (Trained service technician only) System board |
| 001100A | Microcode updated failed. | 1. Update the server firmware to the latest level (see "Updating the firmware" on page 379).<br>2. (Trained service technician only) Replace the microprocessor. |
| 0050001 | DIMM disabled. | 1. Make sure that the DIMM is installed correctly (see "Replacing a memory module" on page 278) for more information.<br>2. If the DIMM was disabled because of a memory error, following the suggested actions for that error event and restart the server.<br>3. Check the IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>4. If no memory error is recorded in the event logs and no DIMM connector LED is lit, re-enable the DIMM through the Setup utility (see "Starting the Setup utility" on page 384) or the Advanced Settings Utility (ASU). |
| 0051003 | Uncorrectable DIMM error | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the system board. |
| 0051006 | DIMM mismatch detected | Make sure that the DIMMs match and are installed in the correct sequence (see "Replacing a memory module" on page 278). |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 0051009 | No memory detected. | 1. Make sure that the server contains DIMMs.<br>2. Reseat the DIMMs.<br>3. Install DIMMs in the correct sequence (see "Replacing a memory module" on page 278). |
| 005100A | No usable memory detected. | 1. Make sure that the server contains DIMMs.<br>2. Reseat the DIMMs.<br>3. Install DIMMs in the correct sequence (see "Replacing a memory module" on page 278).<br>4. Clear CMOS memory to re-enable all the memory connectors (see Table 2 on page 21). |
| 0058001 | PFA threshold exceeded | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. At the next maintenance opportunity, swap the affected DIMM (as indicated by the light path LED or event log entry) to a different memory channel. See "Replacing a memory module" on page 278 for information on DIMM population sequence.<br>3. If the PFA re-occurs (on the same DIMM), replace the affected DIMM as indicated by the light path LED or event log entry (check for previous history of PFA).<br>4. If the problem remains with the same DIMM connector, inspect the DIMM connector for debris or damage. If the DIMM connector is damaged, (train technician only) replace the system board. |
| 0058007 | DIMM population is unsupported. | 1. Reseat the DIMMs, and then restart the server.<br>2. Remove the lowest-numbered DIMM pair of those that are identified, and replace it with an identical pair of known good DIMMs, then restart the server.<br>3. Return the removed DIMMs, one pair at a time, to their original connectors, restarting the server after each pair, until a pair fails. Replace the DIMMs in the failed pair with identical known good DIMMs, restarting the server after each DIMM is installed. Replace the failed DIMM. Repeat this step until you have tested all removed DIMMs.<br>4. (Trained service technician only) Replace the system board. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 0058008 | DIMM failed memory test. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the system board. |
| 00580A1 | Invalid DIMM population for mirroring mode | 1. If a fault LED is lit, resolve the failure.<br>2. Install the DIMMs in the correct sequence (see "Replacing a memory module" on page 278). |
| 00580A4 | Memory population changed. | Information only. Memory has been added, moved, or changed. |
| 00580A5 | Mirror failover complete | Information only. Memory redundancy has been lost. Check the event log for uncorrected DIMM failure events. |
| 00580B0 | Memory SMI LINK failure | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Check the DIMM connector or pins on the system board for damage.<br>3. Check the microprocessor and microprocessor socket for damage.<br>4. Use the microprocessor installation tool to remove and replace a microprocessor.<br>5. (Trained technician only) replace the system board. |
| 00580B1 | Memory SMI LINK failover | No action; information only. |
| 0068002 | CMOS battery cleared. | 1. Reseat the battery.<br>2. Clear the CMOS memory (see Table 3 on page 22).<br>3. Replace the following components one at a time, in the following order, restarting the server after each one:<br>a. Battery<br>b. (Trained service technician only) System board. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 2011001 | PCI PERR | 1. Check the riser-card LEDs.<br>2. Reseat all affected adapters and riser cards.<br>3. Update the PCI adapter firmware.<br>4. Remove the adapter from the riser card.<br>5. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Adapter<br>b. (Trained service technician only) System board |
| 2018001 | PCI Express uncorrected or uncorrected error | 1. Check the riser-card LEDs.<br>2. Reseat all affected adapters and riser cards.<br>3. Update the PCI adapter firmware.<br>4. Remove the adapter from the riser card.<br>5. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Adapter<br>b. (Trained service technician only) System board |
| 2018002 | Option ROM resource allocation failure | Informational message that some devices might not be initialized.<br>1. If possible, rearrange the order of the adapters in the PCI slots to change the load order of the optional-device ROM code.<br>2. Run the Setup utility, select **Start Options**, and change the boot priority to change the load order of the optional-device ROM code.<br>3. Run the Setup utility and disable some other resources, if their functions are not being used, to make more space available.<br>a. Select **Start Options**, then **PXE Network** to disable the integrated Ethernet controller ROM.<br>b. Select **Network**, then **PXE Configuration**, to disable the ROM of the adapter in the PCI slots.<br>c. Select **Devices and I/O Ports** to disable any of the integrated devices.<br>4. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Each adapter<br>b. (Trained service technician only) System board |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 3000007<br>3010007<br>3020007<br>3030007<br>3040007<br>3050007<br>3060007<br>3070007<br>3080007<br>3090007<br>3100007<br>3110007<br>3120007<br>3130007<br>3140007<br>3150007<br>3160007<br>3170007<br>3180007<br>3190007 | Firmware fault detected, system halted | 1. Update the server firmware to the latest level. For more information and tools for updating, managing, configuring, and deploying firmware, go to http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.<br>2. Undo any recent configuration changes, or clear CMOS memory to restore the settings to the default values (see Table 3 on page 22).<br>3. Remove any recently installed hardware. |
| 3038003 | Firmware corrupted | 1. Switch to the backup firmware bank, then updated to the latest level of firmware.<br>2. Run the Setup utility, select **Load Default Settings**, and save the settings to recover the server firmware.<br>3. (Trained service technician only) Replace the system board. |
| 3048005 | Booted secondary (backup) server firmware | Information only. The backup switch was used to boot the secondary bank. |
| 3048006 | Booted secondary (backup) server firmware image because of automated boot recovery (ABR) | 1. Run the Setup utility, select **Load Default Settings**, and save the settings to recover the primary UEFI settings.<br>2. Turn off the server and remove it from the power source.<br>3. Reconnect the server to the power source, then turn on the server. |
| 3058000A | RTC date/time is incorrect | 1. Adjust the date and time settings in the Setup utility, and then restart the server.<br>2. Reseat the battery.<br>3. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Battery (consumable)<br>b. (Trained service technician only) System board |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 3058001 | System configuration invalid | 1. Run the Setup utility, and select **Save Settings**.<br>2. Run the Setup utility, select **Load Default Settings**, and save the settings.<br>3. Reseat the following components one at a time in the order shown, restarting the server each time:<br>a. Battery<br>b. Failing device (if the device is a FRU, then it must be reseated by a trained service technician only)<br>4. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Battery<br>b. Failing device (if the device is a FRU, then it must be replaced by a trained service technician only)<br>c. (Trained service technician only) System board |
| 3058004 | Three boot failure | 1. Undo any recent system changes, such as new settings or newly installed devices.<br>2. Make sure that the server is attached to a reliable power source.<br>3. Remove all hardware that is not listed on the ServerProven Web site at http://www.ibm.com/servers/eserver/serverproven/compat/us/.<br>4. Make sure that the operating system is not corrupted.<br>5. Run the Setup utility, save the configuration, and then restart the server.<br>6. See "Problem determination tips" on page 229. |
| 3108007 | System configuration restored to default settings | Information only. This is message is usually associated with the CMOS battery clear event. |
| 3138002 | Boot configuration error | 1. Remove any recent configuration changes made to the Setup utility.<br>2. Run the Setup utility, select **Load Default Settings**, and save the settings. |
| 3808000 | IMM communication failure | 1. Remove power from the server for 30 seconds, and then reconnect the server to power and restart it.<br>2. Update the IMM firmware to the latest level (see "Updating the firmware" on page 379).<br>3. (Trained service technician only) Replace the system board. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 3808002 | Error updating system configuration to IMM | 1. Remove power from the server, and then reconnect the server to power and restart it.<br>2. Run the Setup utility and select **Save Settings**.<br>3. Update the IMM firmware to the latest level (see "Updating the firmware" on page 379). |
| 3808003 | Error retrieving system configuration from IMM | 1. Remove power from the server, and then reconnect the server to power and restart it.<br>2. Run the Setup utility and select **Save Settings**.<br>3. Update the IMM firmware to the latest level (see "Updating the firmware" on page 379). |
| 3808004 | IMM system event log full | • When using out-of-band, use the IMM Web interface or IPMItool to clear the logs from the operating system.<br>• When using the local console:<br>1. Run the Setup utility (see "Using the Setup utility" on page 384).<br>2. Select **System Event Log**.<br>3. Select **Clear System Event Log**.<br>4. Restart the server. |
| 3818001 | Core Root of Trust Measurement (CRTM) update failed | 1. Run the Setup utility, select **Load Default Settings**, and save the settings.<br>2. (Trained service technician only) Replace the system board. |
| 3818002 | Core Root of Trust Measurement (CRTM) update aborted | 1. Run the Setup utility, select **Load Default Settings**, and save the settings.<br>2. (Trained service technician only) Replace the system board. |
| 3818003 | Core Root of Trust Measurement (CRTM) flash lock failed | 1. Run the Setup utility, select **Load Default Settings**, and save the settings.<br>2. (Trained service technician only) Replace the system board. |
| 3818004 | Core Root of Trust Measurement (CRTM) system error | 1. Run the Setup utility, select **Load Default Settings**, and save the settings.<br>2. (Trained service technician only) Replace the system board. |
| 3818005 | Current Bank Core Root of Trust Measurement (CRTM) capsule signature invalid | 1. Run the Setup utility, select **Load Default Settings**, and save the settings.<br>2. (Trained service technician only) Replace the system board. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Error code | Description | Action |
|---|---|---|
| 3818006 | Opposite bank CRTM capsule signature invalid | 1. Switch the server firmware bank to the backup bank (see "Starting the backup server firmware" on page 391).<br>2. Run the Setup utility, select **Load Default Settings**, and save the settings.<br>3. Switch the bank back to the primary bank.<br>4. (Trained service technician only) Replace the system board. |
| 3818007 | CRTM update capsule signature invalid | 1. Run the Setup utility, select **Load Default Settings**, and save the settings.<br>2. (Trained service technician only) Replace the system board. |
| 3828004 | AEM power capping disabled | 1. Check the settings and the event logs.<br>2. Make sure that the Active Energy Manager feature is enabled in the Setup utility. Select **System Settings**, **Power**, **Active Energy Manager**, and **Capping Enabled**.<br>3. Update the server firmware to the latest level (see "Updating the firmware" on page 379).<br>4. Update the IMM firmware to the latest level (see "Updating the firmware" on page 379). |

# Checkout procedure

The checkout procedure is the sequence of tasks that you should follow to diagnose a problem in the server.

## About the checkout procedure

Before you perform the checkout procedure for diagnosing hardware problems, review the following information:

- Read the safety information that begins on page "Safety" on page vii.
- IBM Dynamic System Analysis (DSA) provides the primary methods of testing the major components of the server, such as the system board, Ethernet controller, keyboard, mouse (pointing device), serial ports, and hard disk drives. You can also use them to test some external devices. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic programs to confirm that the hardware is working correctly.
- When you run DSA, a single problem might cause more than one error message. When this happens, correct the cause of the first error message. The other error messages usually will not occur the next time you run DSA.

  **Exception:** If multiple error codes or light path diagnostics LEDs indicate a microprocessor error, the error might be in the microprocessor or in the

microprocessor socket. See “Microprocessor problems” on page 58 for information about diagnosing microprocessor problems.

- Before you run diagnostic programs, you must determine whether the failing server is part of a shared hard disk drive cluster (two or more servers sharing external storage devices). If it is part of a cluster, you can run all diagnostic programs except the ones that test the storage unit (that is, a hard disk drive in the storage unit) or the storage adapter that is attached to the storage unit. The failing server might be part of a cluster if any of the following conditions is true:
  - You have identified the failing server as part of a cluster (two or more servers sharing external storage devices).
  - One or more external storage units are attached to the failing server and at least one of the attached storage units is also attached to another server or unidentifiable device.
  - One or more servers are located near the failing server.

  **Important:** If the server is part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as “quick” or “normal” tests, because this might enable the hard disk drive diagnostic tests.
- If the server is halted and a POST error code is displayed, see “POST error codes” on page 38. If the server is halted and no error message is displayed, see “Troubleshooting tables” on page 49 and “Solving undetermined problems” on page 228.
- For information about power-supply problems, see “Solving power problems” on page 226 and “Power-supply LEDs” on page 78.
- For intermittent problems, check the event log; see “Event logs” on page 35 and “DSA messages” on page 82.

## Performing the checkout procedure

To perform the checkout procedure, complete the following steps:

1. Is the server part of a cluster?
   - **No:** Go to step 2.
   - **Yes:** Shut down all failing servers that are related to the cluster. Go to step 2.
2. Complete the following steps:
   a. Check the power supply LEDs (see “Power-supply LEDs” on page 78).
   b. Turn off the server and all external devices.
   c. Check all internal and external devices for compatibility at http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
   d. Check all cables and power cords.
   e. Set all display controls to the middle positions.
   f. Turn on all external devices.
   g. Turn on the server. If the server does not start, see “Troubleshooting tables” on page 49.
   h. Check the system-error LED on the operator information panel. If it is flashing, check the light path diagnostics LEDs (see “Light path diagnostics” on page 67).

      **Note:** When you slide the light path diagnostics panel out of the server to check the LEDs or checkpoint codes, do not run the server continuously with light path diagnostics panel outside of the server. The panel should

only be outside of the server a short time. The light path diagnostics panel must remain in the server when the server is running to ensure proper cooling.

i. Check for the following results:
   - Successful completion of POST (see "POST" on page 38 for more information)
   - Successful completion of startup, which is indicated by a readable display of the operating-system desktop

3. Is there a readable image on the monitor screen?
   - **No:** Find the failure symptom in "Troubleshooting tables"; if necessary, see "Solving undetermined problems" on page 228.
   - **Yes:** Run DSA (see "Running the DSA Preboot diagnostic programs" on page 81).
     – If DSA reports an error, follow the instructions in "DSA messages" on page 82.
     – If DSA does not report an error but you still suspect a problem, see "Solving undetermined problems" on page 228.

## Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms.

If you cannot find a solution to the problem in these tables, see "DSA messages" on page 82 for information about testing the server and "Running the DSA Preboot diagnostic programs" on page 81 for additional information about running DSA Preboot program that is stored in integrated USB memory on the server. For additional information to help you solve problems, see Chapter 1, "Start here," on page 1.

If you have just added new software or a new optional device and the server is not working, complete the following steps before you use the troubleshooting tables:

1. Check the system-error LED on the operator information panel; if it is lit, check the light path diagnostics LEDs (see "Light path diagnostics" on page 67).
2. Remove the software or device that you just added.
3. Run IBM Dynamic System Analysis (DSA) to determine whether the server is running correctly (for information about using DSA, see "DSA messages" on page 82.
4. Reinstall the new software or new device.

## CD/DVD drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The CD-ROM/DVD-ROM drive is not recognized. | 1. Make sure that:<br>• The SATA connector to which the CD or DVD drive is attached (primary or secondary) is enabled in the Setup utility.<br>• All cables and jumpers are installed correctly.<br>• The correct device driver is installed for the CD or DVD drive.<br>2. Run the CD or DVD drive diagnostic programs.<br>3. Reseat the following components:<br>a. CD or DVD drive<br>b. CD or DVD drive cable<br>4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.<br>5. (Trained service technician only) Replace the system board. |
| A CD or DVD is not working correctly. | 1. Clean the CD or DVD.<br>2. Replace the CD or DVD with new CD or DVD media.<br>3. Run the CD or DVD drive diagnostic programs (see "IBM Dynamic System Analysis" on page 80).<br>4. Reseat the CD or DVD drive (see "Removing a CD/DVD drive" on page 272 and "Replacing a CD/DVD drive" on page 273).<br>5. Replace the CD or DVD drive. |
| The CD or DVD drive tray is not working. | 1. Make sure that the server is turned on.<br>2. Insert the end of a straightened paper clip into the manual tray-release opening.<br>3. Reseat the CD or DVD drive (see "Removing a CD/DVD drive" on page 272 and "Replacing a CD/DVD drive" on page 273).<br>4. Replace the CD or DVD drive. |

## Hypervisor problems

| | |
|---|---|
| • **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**<br>• **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**<br>• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.** | |
| **Symptom** | **Action** |
| If an optional embedded hypervisor flash device is not listed in the expected boot order, does not appear in the list of boot devices, or a similar problem has occurred. | 1. Make sure that the optional embedded hypervisor flash device is selected on the boot manager (<F12> Select Boot Device) at startup.<br>2. Make sure that the embedded hypervisor flash device is seated in the connector correctly (see "Removing a USB embedded hypervisor flash device" on page 304 and "Replacing a USB embedded hypervisor flash device" on page 306).<br>3. See the documentation that comes with the optional embedded hypervisor flash device for setup and configuration information.<br>4. Make sure that other software works on the server. |

## General problems

| | |
|---|---|
| • **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**<br>• **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**<br>• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.** | |
| **Symptom** | **Action** |
| A cover latch is broken, an LED is not working, or a similar problem has occurred. | If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician (see Chapter 5, "Removing and replacing components," on page 243 to determine whether the part is a CRU or a FRU). |
| The server cover was removed while running and the server shut off. | Replace the server cover and restart the server. |
| System hung; screen is on but never goes to F1. | See "Nx boot failure" on page 166 and "Recovering from a UEFI update failure or UEFI image corruption" on page 164 for more problem-solving information. |

## Hard disk drive problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| Not all drives are recognized by the DSA hard disk drive diagnostic test. | Remove the drive that is indicated by DSA (see "Removing 2.5-inch and 1.8-inch hot-swap drives" on page 260); then, run the hard disk drive diagnostic test again (see "IBM Dynamic System Analysis" on page 80). If the remaining drives are recognized, replace the drive that you removed with a new one. |
| The server stops responding during the hard disk drive diagnostic test. | Remove the hard disk drive that was being tested when the server stopped responding (see "Removing 2.5-inch and 1.8-inch hot-swap drives" on page 260), and run the diagnostic test again (see "IBM Dynamic System Analysis" on page 80). If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one (see "Replacing 2.5-inch and 1.8-inch hot-swap drives" on page 262). |
| A hard disk drive has failed, and the associated amber hard disk drive status LED is lit. | Replace the failed hard disk drive (see "Removing 2.5-inch and 1.8-inch hot-swap drives" on page 260 and "Replacing 2.5-inch and 1.8-inch hot-swap drives" on page 262. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| A newly installed hard disk drive is not recognized. | 1. Observe the associated amber hard disk drive status LED. If the LED is lit, it indicates a drive fault.<br>2. If the LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the hard disk drive backplane.<br>3. Observe the associated green hard disk drive activity LED and the amber status LED:<br>• If the green activity LED is flashing and the amber status LED is not lit, the drive is recognized by the controller and is working correctly. Run the DSA hard disk drive test to determine whether the drive is detected.<br>• If the green activity LED is flashing and the amber status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.<br>• If neither LED is lit or flashing, check the hard disk drive backplane (go to step 4).<br>• If the green activity LED is flashing and the amber status LED is lit, replace the drive. If the activity of the LEDs remains the same, go to step 4. If the activity of the LEDs changes, return to step 1.<br>4. Make sure that the hard disk drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.<br>5. Reseat the backplane power cable and repeat steps 1 through 3.<br>6. Reseat the backplane signal cable and repeat steps 1 through 3.<br>7. Suspect the backplane signal cable or the backplane:<br>a. Replace the affected backplane signal cable.<br>b. Replace the affected backplane.<br>8. Run the DSA tests for the SAS/SATA adapter and hard disk drives (see "Running the DSA Preboot diagnostic programs" on page 81).<br>• If the adapter passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.<br>• Replace the backplane.<br>• If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.<br>• If the adapter fails the test, replace the adapter.<br>9. See "Problem determination tips" on page 229. |
| Multiple hard disk drives fail. | Make sure that the hard disk drive, SAS/SATA RAID adapter, and server device drivers and firmware are at the latest level.<br>**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. |
| Multiple hard disk drives are offline. | 1. Review the storage subsystem logs for indications of problems within the storage subsystem, such as backplane or cable problems.<br>2. See "Problem determination tips" on page 229. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| A replacement hard disk drive does not rebuild. | 1. Make sure that the hard disk drive is recognized by the adapter (the green hard disk drive activity LED is flashing).<br>2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings. |
| A green hard disk drive activity LED does not accurately represent the actual state of the associated drive. | 1. If the green hard disk drive activity LED does not flash when the drive is in use, run the DSA disk drive test (see "Running the DSA Preboot diagnostic programs" on page 81.<br>2. Use one of the following procedures:<br>• If the drive passes the test, replace the backplane.<br>• If the drive fails the test, replace the drive. |
| An amber hard disk drive status LED does not accurately represent the actual state of the associated drive. | 1. If the amber hard disk drive LED and the RAID adapter software do not indicate the same status for the drive, complete the following steps:<br>a. Turn off the server.<br>b. Reseat the SAS/SATA adapter.<br>c. Reseat the backplane signal cable and backplane power cable.<br>d. Reseat the hard disk drive.<br>e. Turn on the server and observe the activity of the hard disk drive LEDs.<br>2. See "Problem determination tips" on page 229. |

## Intermittent problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| A problem occurs only occasionally and is difficult to diagnose. | 1. Make sure that:<br>• All cables and cords are connected securely to the rear of the server and attached devices.<br>• When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down.<br>2. Check the event logs (see "Event logs" on page 35).<br>3. See "Solving undetermined problems" on page 228. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The server resets (restarts) occasionally. | 1. If the reset occurs during POST and the POST watchdog timer is enabled (click **System Settings --> Integrated Management Module --> POST Watchdog Timer** in the Setup utility to see the POST watchdog setting), make sure that sufficient time is allowed in the watchdog timeout value (**POST Watchdog Timer**). If the server continues to reset during POST, see "POST error codes" on page 38 and "DSA messages" on page 82.<br>2. If the reset occurs after the operating system starts, disable any automatic server restart (ASR) utilities, such as the IBM Automatic Server Restart IPMI Application for Windows, or any ASR devices that are be installed.<br>**Note:** ASR utilities operate as operating-system utilities and are related to the IPMI device driver. If the reset continues to occur after the operating system starts, the operating system might have a problem; see "Software problems" on page 66.<br>3. If neither condition applies, check the event logs (see "Event logs" on page 35). |

## Keyboard, mouse, or pointing-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| All or some keys on the keyboard do not work. | 1. Make sure that:<br>• The keyboard cable is securely connected.<br>• The server and the monitor are turned on.<br>2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.<br>3. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for information about keyboard compatibility.<br>4. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.<br>5. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Keyboard<br>b. (Trained service technician only) System board |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The mouse or pointing device does not work. | 1. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for information about mouse compatibility.<br>2. Make sure that:<br>• The mouse or pointing-device cable is securely connected to the server.<br>• If you are using a pointing device, the keyboard and mouse or pointing-device cables are not reversed.<br>• The mouse or pointing-device device drivers are installed correctly.<br>• The server and the monitor are turned on.<br>• The mouse option is enabled in the Setup utility.<br>3. If you are using a USB mouse or pointing device and it is connected to a USB hub, disconnect the mouse or pointing device from the hub and connect it directly to the server.<br>4. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Mouse or pointing device<br>b. (Trained service technician only) System board |

## Memory problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The amount of system memory that is displayed is less than the amount of installed physical memory. | **Note:** If you change memory, you must update the memory configuration in the Setup utility.<br>1. Make sure that:<br>• No error LEDs are lit on the operator information panel, on the memory tray, or on the MAX5 memory expansion module.<br>• Memory mirroring does not account for the discrepancy.<br>• The memory modules are seated correctly (see "Removing a memory module" on page 277 and "Replacing a memory module" on page 278).<br>• You have installed the correct type of memory.<br>• If you changed the memory, you updated the memory configuration in the Setup utility.<br>• All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.<br>2. Check the POST event log:<br>• If a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.<br>• If a DIMM was disabled by the user or by POST, run the Setup utility and enable the DIMM.<br>3. Run memory diagnostics (see "IBM Dynamic System Analysis" on page 80).<br>4. Make sure that there is no memory mismatch when the server is at the minimum memory configuration ( see "Replacing a memory module" on page 278 for information about DIMM rules and population sequence).<br>5. For the system board, memory tray, and the MAX5 memory expansion module, add one pair of DIMMs at a time, making sure that the DIMMs in each pair match ( see "Replacing a memory module" on page 278 and "Replacing a MAX5 memory module" on page 366).<br>6. Reseat the DIMM.<br>7. Restart the server. |
| Multiple rows of DIMMs in a branch are identified as failing. | 1. Reseat the DIMMs; then, restart the server.<br>2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical pair of known good DIMMs; then, restart the server. Repeat as necessary. If the failures continue after all identified pairs are replaced, go to step 4.<br>3. Return the removed DIMMs, one pair at a time, to their original connectors, restarting the server after each pair, until a pair fails. Replace each DIMM in the failed pair with an identical known good DIMM, restarting the server after each DIMM. Replace the failed DIMM. Repeat step 3 until you have tested all removed DIMMs.<br>4. Replace the lowest-numbered DIMM pair of those identified; then, restart the server. Repeat as necessary.<br>5. (Trained service technician only) Replace the system board. |

## Microprocessor problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The server goes directly to the POST Event Viewer when it is turned on. | 1. Correct any errors that are indicated by the light path diagnostics LEDs (see "Light path diagnostics LEDs" on page 70).<br>2. Make sure that the server supports all the microprocessors and that the microprocessors match in speed, type, and cache size. To view the microprocessor information, run the Setup utility and select **System Information → System Summary → Processor**.<br>3. (Trained service technician only) Make sure that microprocessor 1 is seated correctly.<br>4. (Trained service technician only) Remove microprocessor 2 and restart the server.<br>5. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. (Trained service technician only) Microprocessor<br>b. (Trained service technician only) System board |

## Monitor and video problems

Some IBM monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor. If you cannot diagnose the problem, call for service.

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| Testing the monitor. | 1. Make sure that the monitor cables are firmly connected.<br>2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server.<br>3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver.<br>4. (Trained service technician only) Replace the system board. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The screen is blank. | 1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.<br>2. Make sure that:<br>• The server is turned on. If there is no power to the server, see "Power problems" on page 62.<br>• The monitor cables are connected correctly.<br>• The monitor is turned on and the brightness and contrast controls are adjusted correctly.<br>3. Make sure that the correct server is controlling the monitor, if applicable.<br>4. Make sure that damaged server firmware is not affecting the video; see "Updating the firmware" on page 379.<br>5. Observe the checkpoint LEDs on the system board; if the codes are changing, go to step 6.<br>6. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Monitor<br>b. Video adapter (if one is installed)<br>c. (Trained service technician only) System board.<br>7. See "Solving undetermined problems" on page 228. |
| The monitor works when you turn on the server, but the screen goes blank when you start some application programs. | 1. Make sure that:<br>• The application program is not setting a display mode that is higher than the capability of the monitor.<br>• You installed the necessary device drivers for the application.<br>2. Run video diagnostics (see "Running the DSA Preboot diagnostic programs" on page 81).<br>• If the server passes the video diagnostics, the video is good; see "Solving undetermined problems" on page 228.<br>• (Trained service technician only) If the server fails the video diagnostics, replace the system board. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted. | 1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.<br>**Attention:** Moving a color monitor while it is turned on might cause screen discoloration.<br>Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.<br>**Notes:**<br>a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).<br>b. Non-IBM monitor cables might cause unpredictable problems.<br>2. Reseat the monitor cable.<br>3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:<br>a. Monitor cable<br>b. Video adapter (if one is installed)<br>c. Monitor<br>d. (Trained service technician only) System board. |
| Wrong characters appear on the screen. | 1. If the wrong language is displayed, update the server firmware to the latest level (see "Updating the firmware" on page 379) with the correct language.<br>2. Reseat the monitor cable.<br>3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:<br>a. Monitor cable<br>b. Video adapter (if one is installed)<br>c. Monitor<br>d. (Trained service technician only) System board. |

## Optional-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| An IBM optional device that was just installed does not work. | 1. Make sure that:<br>• The device is designed for the server (see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/).<br>• You followed the installation instructions that came with the device and the device is installed correctly.<br>• You have not loosened any other installed devices or cables.<br>• You updated the configuration information in the Setup utility. Whenever memory or any other device is changed, you must update the configuration.<br>2. Reseat the device that you just installed.<br>3. Replace the device that you just installed. |
| An IBM optional device that worked previously does not work now. | 1. Make sure that all of the cable connections for the device are secure.<br>2. If the device comes with test instructions, use those instructions to test the device.<br>3. If the failing device is a SCSI device, make sure that:<br>• The cables for all external SCSI devices are connected correctly.<br>• The last device in each SCSI chain, or the end of the SCSI cable, is terminated correctly.<br>• Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the server.<br>4. Reseat the failing device.<br>5. Replace the failing device. |

## Power problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The power-control button does not work, and the reset button does work (the server does not start).<br>**Note:** The power-control button will not function until approximately 1 to 3 minutes after the server has been connected to ac power. | 1. Make sure that the top cover is closed and latched correctly.<br>2. Make sure that the top cover/power cut-off switch cable is seated correctly.<br>3. Make sure that the power-control button on the server is working correctly:<br>a. Disconnect the server power cords.<br>b. Reconnect the power cords.<br>c. Reseat the operator information panel cables, and then repeat steps 3a and 3b.<br>• If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.<br>• If the server does not start, bypass the power-control button by using the force power-on jumper (see "Server internal LEDs, connectors, and jumpers" on page 18). If the server starts, reseat the operator information panel. If the problem remains, replace the operator information panel.<br>4. Make sure that the reset button is working correctly:<br>a. Disconnect the server power cords.<br>b. Reconnect the power cords.<br>c. Reseat the operator information panel cable, and then repeat steps 3a and 3b.<br>• If the server starts, replace the operator information panel.<br>• If the server does not start, go to step 5.<br>5. Make sure that:<br>• The power cords are correctly connected to the server and to a working electrical outlet.<br>• The type of memory that is installed is correct.<br>• The DIMMs are fully seated.<br>• The LEDs on the power supply do not indicate a problem.<br>• The microprocessors are installed in the correct sequence.<br>6. Reseat the following components:<br>a. DIMMs<br>b. Power supplies<br>c. Top cover/power cut-off switch cable<br>7. Replace the components listed in step 6 one at a time, in the order shown, restarting the server each time.<br>8. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.<br>9. See "Power-supply LEDs" on page 78.<br>10. See "Solving undetermined problems" on page 228. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The server does not start. | Check the seven 12-volt power LEDs (A, B, C, D, E, F, and G) on the system board. See "Server internal LEDs, connectors, and jumpers" on page 18 for the LED locations.<br>1. If the Channel 240VA-A power LED is lit, check components in the following order:<br>a. Remove all optical drives and fans. Try restarting the server. If the server starts, reinstall the optical drive and fans, one at a time, starting the server each time, to isolate the defective device.<br>b. Replace the failing device.<br>c. (Trained service technician only) Replace the system board.<br>2. If the Channel 240VA-B power LED is lit, check components in the following order:<br>a. Remove the all hard disk drives or solid state drives and drive backplanes. Try restarting the server. If the server starts, reinstall the hard disk drives or solid state drives and drive backplanes one at a time, starting the server each time, to isolate the defective device.<br>b. Replace the failing device.<br>c. (Trained service technician only) Replace the system board.<br>3. If the Channel C power LED is lit, check components in the following order.<br>a. Remove the all PCI Express adapters. Try restarting the server. If the server starts, reinstall the PCI Express adapters one at a time, starting the server each time, to isolate the defective device.<br>b. Replace the failing device.<br>c. (Trained service technician only) Replace the system board.<br>4. If the Channel D power LED is lit, check components in the following order:<br>a. Remove the all PCI Express adapters, hard disk drives and solid state drives, and drive backplanes. Try restarting the server. If the server starts, reinstall the PCI Express adapters, hard disk drives and solid state drives, and drive backplanes one at a time, starting the server each time, to isolate the defective device.<br>b. Replace any failing device.<br>c. (Trained service technician only) Replace the system board.<br>Continued on the next page. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The server does not start. (Continued) | If the Channel E power LED is lit, check components in the following order:<br>1. (Trained service technician only) Remove the all microprocessors. (Trained service technician only) toggle the switch block (SW2), switch 3 to allow the server to power-on. See Table 3 on page 22 for the location of the SW2 switch block on the system board. Try restarting the server. If the server starts, reinstall the microprocessors one at a time, starting the server each time, to isolate the defective device.<br>2. (Trained service technician only) Replace microprocessor.<br>3. (Trained service technician only) Replace the system board.<br><br>If the Channel F power LED is lit, check components in the following order:<br>1. Remove the memory tray. Try restarting the server. If the server starts, reinstall the memory tray. Restart the server. if the problem remains:<br>2. Replace any failing device.<br>3. (Trained service technician only) Replace the system board.<br><br>If the Channel G power LED is lit, check components in the following order:<br>1. Remove the DIMMs from the system board. Try restarting the server. If the server starts, reinstall the each DIMM pair that was removed one pair at a time, starting the server each time, to isolate the defective device.<br>2. Replace any failing DIMMs.<br>3. (Trained service technician only) Replace the system board. |
| The server does not turn off. | 1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:<br>a. Press Ctrl+Alt+Delete.<br>b. Turn off the server by pressing the power-control button and hold it down for 5 seconds.<br>c. Restart the server.<br>d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server.<br>2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board. |
| The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit. | See "Solving undetermined problems" on page 228. |

## Serial-device problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The number of serial ports that are identified by the operating system is less than the number of installed serial ports. | 1. Make sure that:<br>• Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.<br>• The serial-port adapter (if one is present) is seated correctly.<br>2. Reseat the serial port adapter.<br>3. Replace the serial port adapter. |
| A serial device does not work. | 1. Make sure that:<br>• The device is compatible with the server.<br>• The serial port is enabled and is assigned a unique address.<br>• The device is connected to the correct connector (see "Server internal LEDs, connectors, and jumpers" on page 18).<br>2. Reseat the following components:<br>a. Failing serial device<br>b. Serial cable<br>3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time.<br>4. (Trained service technician only) Replace the system board. |

## ServerGuide problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The *ServerGuide Setup and Installation* CD will not start. | 1. Make sure that the server supports the ServerGuide program and has a startable (bootable) CD or DVD drive. See the readme file that is part of the ISO image at http://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=TOOL-CENTER.<br>2. Make sure that you burned the CD or DVD from an image (do not burn the CD or DVD ISO file as a data disk)<br>3. Make sure that you burn the CD or DVD as *disk at once* (not track at once).<br>4. If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence.<br>5. If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive. |

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| The MegaRAID Storage Manager program cannot view all installed drives, or the operating system cannot be installed. | 1. Make sure that the hard disk drive is connected correctly.<br>2. Make sure that the SAS/SATA hard disk drive cables are securely connected. |
| The operating-system installation program continuously loops. | Make more space available on the hard disk. |
| The ServerGuide program will not start the operating-system CD. | Make sure that the operating-system CD is supported by the ServerGuide program. For a list of supported operating-system versions, go to http://www.ibm.com/systems/management/serverguide/sub.html, click IBM Service and Support Site, click the link for your ServerGuide version, and scroll down to the list of supported Microsoft Windows operating systems. |
| The operating system cannot be installed; the option is not available. | Make sure that the server supports the operating system. If it does, either no logical drive is defined (SCSI RAID servers), or the ServerGuide System Partition is not present. Run the ServerGuide program and make sure that setup is complete. |

## Software problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| You suspect a software problem. | 1. To determine whether the problem is caused by the software, make sure that:<br>• The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict.<br>• The software is designed to operate on the server.<br>• Other software works on the server.<br>• The software works on another server.<br>2. If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.<br>3. Contact the software vendor. |

## Universal Serial Bus (USB) port problems

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**

| Symptom | Action |
|---|---|
| A USB device does not work. | 1. Make sure that:<br>• The correct USB device driver is installed.<br>• The operating system supports USB devices.<br>2. Make sure that the USB configuration options are set correctly in the Setup utility (see "Using the Setup utility" on page 384 for more information).<br>3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server. |

## Video problems

See "Monitor and video problems" on page 58.

# Light path diagnostics

Light path diagnostics is a system of LEDs on various external and internal components of the server. When an error occurs, LEDs are lit throughout the server. By viewing the LEDs in a particular order, you can often identify the source of the error.

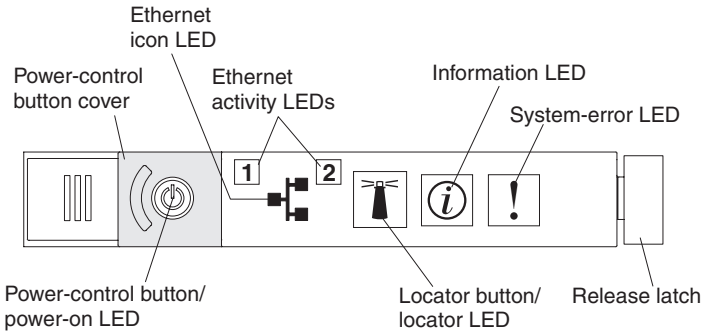
When LEDs are lit to indicate an error, they remain lit when the server is turned off, provided that the server is still connected to power and the power supply is operating correctly and the top cover is closed and latched correctly.

Before you work inside the server to view light path diagnostics LEDs, read the safety information that begins on page "Safety" on page vii and "Handling static-sensitive devices" on page 245.

If an error occurs, view the light path diagnostics LEDs in the following order:

1. Look at the operator information panel on the front of the server.
   - If the information LED is lit, it indicates that information about a suboptimal condition in the server is available in the IMM system-event log or in the system-event log.
   - If the system-error LED is lit, it indicates that an error has occurred; go to step 2.

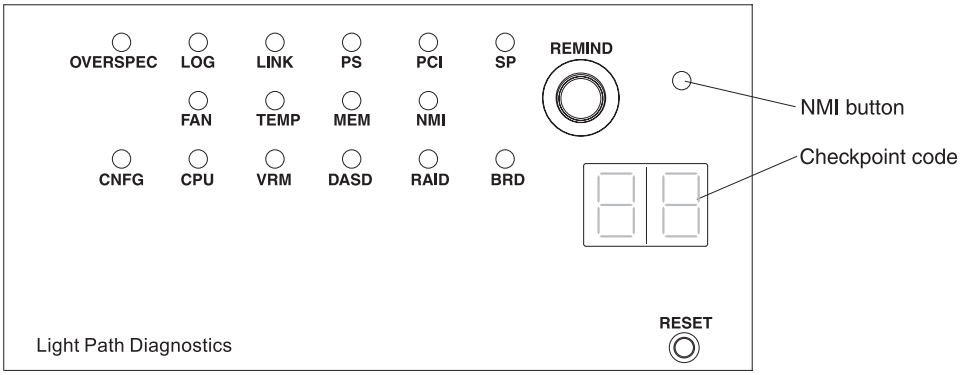
   The following illustration shows the operator information panel:




2. To view the light path diagnostics panel, slide the blue release latch on the operator panel to the left. Pull forward on the panel until the hinge of the operator panel is free of the server chassis. Then pull down on the panel so that you can view the light path diagnostics panel information. This reveals the light path diagnostics panel. Lit LEDs on this panel indicate the type of error that has occurred.

   **Note:** When you slide the light path diagnostics panel out of the server to check the LEDs or checkpoint codes, do not run the server continuously with the light path diagnostics panel outside of the server. The panel should only be outside of the server a short time. The light path diagnostics panel must remain in the server when the server is running to ensure proper cooling.

   The following illustration shows the light path diagnostics panel:




   Note any LEDs that are lit, and then reinstall the light path diagnostics panel in the server.

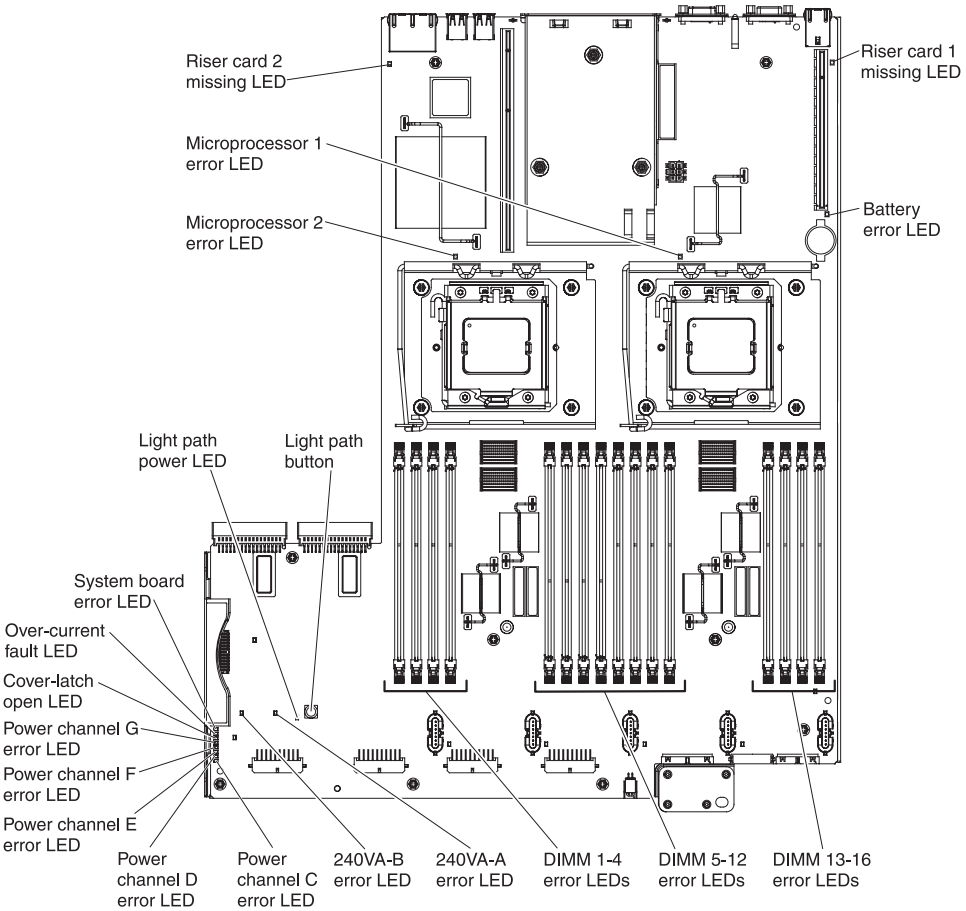
   - **Remind button:** Press this button to place the system-error LED on the front information panel into Remind mode. By placing the system-error LED indicator in Remind mode, you acknowledge that you are aware of the last failure but will not take immediate action to correct the problem. In Remind mode, the system-error LED flashes rapidly until one of the following conditions occurs:
     - All known errors are corrected.
     - The server is restarted.
     - A new error occurs, causing the system-error LED to be lit again.
   - **NMI button:** The NMI button on the front panel will come on when this button is pressed. Press this button to force a nonmaskable interrupt to the microprocessor. You might have to use a pen or the end of a straightened paper clip to press the button. It allows you to blue screen the server and take a memory dump (use this button only when directed by the IBM service support).

- **Checkpoint code display:** This display provides a checkpoint code that indicates the point at which the system stopped during the boot block and POST. A checkpoint code is either a byte or a word value that is produced by UEFI. The display does not provide error codes or suggest components to be replaced.
- **Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button. The Reset button is in the lower-right corner of the light path diagnostics panel.

Look at the system service label inside the server cover, which gives an overview of internal components that correspond to the LEDs on the light path diagnostics panel. This information and the information in "Light path diagnostics LEDs" on page 70 can often provide enough information to diagnose the error.

3. Remove the server cover and look inside the server for lit LEDs. Certain components inside the server have LEDs that are lit to indicate the location of a problem.

   The following illustration shows the LEDs and connectors on the system board.



## Light path diagnostics LEDs

The following table describes the LEDs on the light path diagnostics panel and suggested actions to correct the detected problems. For additional information, see "Server controls, LEDs, and power" on page 11 and the "System-board LEDs" on page 23 for the location of the system board LEDs.

**Note:** Check the IMM system-event log or system event log for additional information before replacing a FRU.

*Table 6. Light path diagnostics panel LEDs*

| | | |
|---|---|---|
| • **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**<br>• **See Chapter 3, "Parts listing", in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**<br>• **If a action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.** | | |
| **LED** | **Description** | **Action** |
| None, but the system error LED is lit. | An error has occurred and cannot be isolated. The error is not represented by a path. | Use the Setup utility to check the system event log for information about the error (see "Using the Setup utility" on page 384). |
| OVER SPEC | The power supplies are using more power than their maximum rating. | If the OVER SPEC LED is lit, use one of the following procedures:<br>1. Turn off the server, disconnect the power from the server, and install additional power supplies. Two power supplies are needed for a fully configured server in non-redundant mode. Four power supplies are required to support fully loaded, redundant operation.<br>2. Remove any recently installed options.<br>3. Restart the server to see whether the problem remains. |
| LOG | An error occurred. | Check the IMM system event log and the system-event log for information about the error. Replace any components that are identified in the error logs. |
| LINK | QPI or EXA expansion port or cable fault. (scaled systems or systems with MAX5 attached) | 1. Check the QPI expansion port link LEDs on the server to identify the failed port or cable (LED is below and to the side of the rear QPI ports).<br>2. Check the EXA port link LEDs on the MAX5 (if attached) to identify the failed port or cable.<br>3. Reseat the cable.<br>4. Replace the cable. |
| PS | A power supply is not detected or has failed. | 1. Check the power-supply in the server and the MAX5 that has an lit amber LED (see "Power-supply LEDs" on page 78).<br>2. Make sure that the power supplies are seated correctly.<br>3. Remove one of the power supplies to isolate the failed power supply.<br>4. Replace the failed power supply. |

*Table 6. Light path diagnostics panel LEDs (continued)*

| • **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**<br>• **See Chapter 3, "Parts listing", in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**<br>• **If a action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.** | | |
|---|---|---|
| **LED** | **Description** | **Action** |
| PCI | An error has occurred on a PCI bus or on the system board. An additional LED is lit on one of the riser cards. | 1. Check the system-event log for information about the error.<br>2. Check the LEDs on the PCI riser cards to identify the component that caused the error.<br>3. If you cannot isolate the failing adapter by using the LEDs and the information in the system-event log, remove one adapter at a time from the failing PCI bus; and restart the server after each adapter is removed.<br>4. Replace the following components, in the order shown, restarting the server each time:<br>• PCI riser card<br>• (Trained service technician only) Replace the system board. |
| SP | A service processor error has been detected. | 1. Remove power from the server; then, reconnect the server to power and restart the server.<br>2. Update the IMM firmware (see "Updating the firmware" on page 379).<br>3. (Trained service technician only) Replace the system board, if the problem remains. |
| FAN | A fan has failed, is operating too slowly, or has been removed. The TEMP LED might also be lit. | 1. Check the LEDs on the server and the front of the MAX5 (if installed).<br>2. Reseat the failing fan, which is indicated by a lit LED on the fan.<br>3. Replace the failing fan. |
| TEMP | The system temperature has exceeded a threshold level. A failing fan can cause the TEMP LED to be lit. | 1. Make sure that the air vents are not blocked.<br>2. Determine whether a fan has failed. If it has, replace it.<br>3. Make sure that the heat sink is seated correctly.<br>4. Make sure that the room temperature is not too high. See "Server features and specifications" on page 8 and "System reliability guidelines" on page 244 for the server temperature information. |
| MEM | Memory failure. | Check the event logs, see "Event logs" on page 35 for applicable memory events; then, follow the steps as indicated in the POST error codes (see "POST error codes" on page 38) or IMM error messages (see "Integrated management module (IMM) error messages" on page 168). |
| NMI | A nonmaskable interrupt has occurred. | Check the system-event log for information about the error. |

*Table 6. Light path diagnostics panel LEDs (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing", in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If a action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| LED | Description | Action |
|---|---|---|
| CNFG | A hardware configuration error has occurred. | 1. If the CNFG LED and the CPU LED are lit, complete the following steps to correct the problem:<br>a. Check the microprocessors that were just installed to make sure that they are compatible with each other (see "Replacing a microprocessor and heat sink" on page 333 for additional information about microprocessor requirements).<br>b. (Trained service technician only) Replace the incompatible microprocessor.<br>c. Check the system-event logs for information about the error. Replace any components that are identified in the error log.<br>2. If the CNFG LED and the MEM LED are both lit, complete the following steps:<br>a. Make sure that the DIMM configuration is supported (see "Replacing a memory module" on page 278 for DIMM requirements and installation sequence information).<br>b. Replace the DIMMs with a supported configuration. |
| CPU | An invalid microprocessor configuration or a microprocessor has failed (both the CPU LED and the CNFG LED might be lit). | 1. If the CNFG LED is lit, the system issues an invalid microprocessor configuration error. Complete the following steps to correct the problem:<br>a. Check the microprocessors that were just installed to make sure that they are compatible with each other (see "Replacing a microprocessor and heat sink" on page 333 for additional information about microprocessor requirements) and use the Setup utility and select **System Information → System Summary → Processor** to verify the microprocessors information.<br>b. (Trained service technician only) Replace the incompatible microprocessor.<br>c. Check the system-event logs for information about the error. Replace any components that are identified in the error log.<br>2. If the CPU LED is lit and the CNFG LED is not lit, complete the following steps:<br>a. (Trained service technician only) Make sure that the failing microprocessor, which is indicated by a lit LED on the system board, is installed correctly. See "Replacing a microprocessor and heat sink" on page 333 for information about installation and requirements. |
| VRM | Reserved. | |

*Table 6. Light path diagnostics panel LEDs (continued)*

| • **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**<br>• **See Chapter 3, "Parts listing", in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**<br>• **If a action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.** | | |
|---|---|---|
| **LED** | **Description** | **Action** |
| DASD | A hard disk drive has failed or is missing. | 1. Check the LEDs on the hard disk drives for the drive with a lit status LED and reseat the hard disk drive.<br>2. Make sure that the cables are correctly connected to the hard disk drive backplane.<br>3. For more information, see “Hard disk drive problems” on page 52.<br>4. If the error remains, replace the following components in the order listed, restarting the server after each:<br>a. Replace the hard disk drive.<br>b. Replace the hard disk drive backplane.<br>5. If the error remains, replace the following components one at a time, in the order listed, restarting the server after each:<br>a. Replace the hard disk drive.<br>b. Replace the hard disk drive backplane.<br>6. If the problem remains, go to http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| RAID | Reserved. | |
| BRD | An error has occurred on the system board. | 1. Check the LEDs on the server and the front of the MAX5 (if installed).<br>2. Check the LEDs on the system board to identify the component that caused the error. The BRD LED can be lit due to any of the following reasons:<br>• Battery<br>• Missing PCI riser-card assembly<br>• 12V channel fault<br>• Failed system board<br>• Failed MAX5 system-board tray (if attached<br>3. Check the system-event log for information about the error.<br>4. Replace any failed or missing replacement components, such as the battery or PCI riser-card assembly.<br>5. (Trained service technician only) replace the server system board.<br>6. Replace the MAX5 system-board tray.<br>Continued on the next page. |

*Table 6. Light path diagnostics panel LEDs (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing", in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If a action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| LED | Description | Action |
|---|---|---|
| BRD (Continued) | An error has occurred on the system board. | If the BRD LED on the light path diagnostics panel is lit, and any of the seven 12 V channel error LEDs (A, B, C, D, E, F, or G) on the system board are lit, use one of the following procedures.<br><br>If the 12 V channel 240VA-A error LED is lit, complete the following steps:<br>1. Turn off the server and disconnect the power from the server.<br>2. Remove the optical drive and fans one at a time.<br>3. Restart the server to see whether the problem remains.<br>4. Reinstall each device that you removed in step 2 one at a time, starting the server each time, to isolate the failing device.<br>5. Replace any failing device.<br>6. (Trained service technician only) Replace the system board.<br><br>If the 12 V channel 240VA-B error LED is lit, complete the following steps:<br>1. Turn off the server and disconnect the power from the server.<br>2. Remove the hard disk drives or solid state drives and drive backplanes.<br>3. Restart the server to see whether the problem remains.<br>4. Reinstall each device that you removed in step 2 one at a time, starting the server each time, to isolate the failing device.<br>5. Replace any failing device.<br>6. (Trained service technician only) Replace the system board.<br><br>(Continued on the next page) |

*Table 6. Light path diagnostics panel LEDs (continued)*

| • **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**<br>• **See Chapter 3, "Parts listing", in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**<br>• **If a action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.** | | |
|---|---|---|
| **LED** | **Description** | **Action** |
| BRD (Continued) | An error has occurred on the system board. | If the 12 V channel C error LED is lit, complete the following steps:<br>1. Turn off the server and disconnect the power from the server.<br>2. Remove all installed PCI Express adapters.<br>3. Restart the server to see whether the problem remains.<br>4. Reinstall each device that you removed in step 2 one at a time, starting the server each time, to isolate the failing device.<br>5. Replace any failing device.<br>6. (Trained service technician only) Replace the system board.<br><br>If the 12 V channel D error LED is lit, complete the following steps:<br>1. Turn off the server and disconnect the power from the server.<br>2. Remove all installed PCI Express adapters, hard disk drives or solid state drives, and drive backplanes.<br>3. Restart the server to see whether the problem remains.<br>4. Reinstall each device that you removed in step 2 one at a time, starting the server each time, to isolate the failing device.<br>5. Replace any failing device.<br>6. (Trained service technician only) Replace the system board.<br><br>(Continued on the next page.) |

*Table 6. Light path diagnostics panel LEDs (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3, "Parts listing", in the *Problem Determination and Service Guide* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If a action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| LED | Description | Action |
|---|---|---|
| BRD (Continued) | An error has occurred on the system board. | If the 12 V channel E error LED is lit, complete the following steps:<br>1. Turn off the server and disconnect the power from the server.<br>2. Remove all installed microprocessors.<br>3. (Trained service technician only) toggle the switch block (SW2), switch 3 to allow the server to power-on. See Table 3 on page 22 for the location of the SW2 switch block on the system board.<br>4. Restart the server to see whether the problem remains.<br>5. Reinstall each device that you removed in step 2 one at a time, starting the server each time, to isolate the failing device.<br>6. Replace any failing device.<br>7. (Trained service technician only) Replace the system board.<br><br>If the 12 V channel F error LED is lit, complete the following steps:<br>1. Turn off the server and disconnect the power from the server.<br>2. Remove the memory tray.<br>3. Restart the server to see whether the problem remains.<br>4. Reinstall each device that was removed in step 2 one at a time, starting the server each time, to isolate the failing device.<br>5. Replace any failing device.<br>6. (Trained service technician only) Replace the system board.<br><br>(Continued on the next page) |
| BRD (Continued) | An error has occurred on the system board. | If the 12 V channel G error LED is lit, complete the following steps:<br>1. Turn off the server and disconnect the power from the server.<br>2. Remove the DIMMs from the system board.<br>3. Restart the server to see whether the problem remains.<br>4. Reinstall each DIMM pair that was removed in step 2 one pair at a time, starting the server each time, to isolate the failing device.<br>5. Replace any failing DIMMs.<br>6. (Trained service technician only) Replace the system board. |

The following table lists additional light path LEDs on the system board. See "System-board LEDs" on page 23 for the location of these LEDs on the system board.

*Table 7. other light path LEDs on the server*

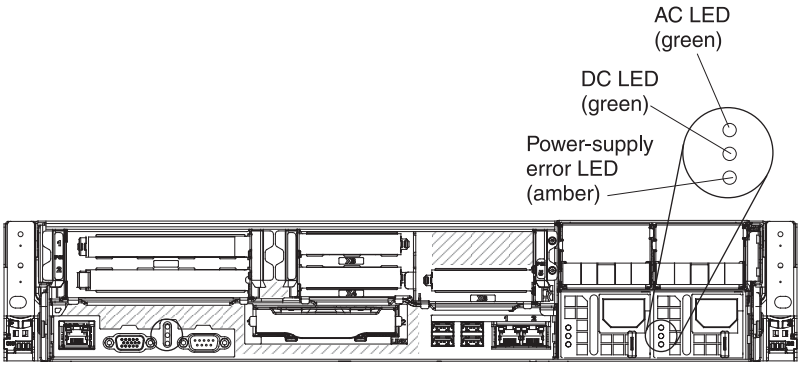
| LED | Description | Action |
|---|---|---|
| Cover-latch fault LED | The server cover was open while the server was running, which caused the server to turn off. | If the Cover latch fault LED is lit, complete the following steps:<br>1. Check the system-event log for information about the error.<br>2. Replace the server cover.<br>3. Restart the server. |
| Over-current error LED | An electrical over-current error has occurred, which caused the power supplies to shutdown. | If the Over-current error LED is lit (see "System-board LEDs" on page 23 for the location of the LED), complete the following steps:<br>1. Turn off the server and disconnect the power from the server.<br>2. Remove all newly installed options.<br>3. Restart the server to see whether the problem remains.<br>4. Reinstall each device that was removed in step 2 one pair at a time, starting the server each time, to isolate the failing device.<br>5. Replace any failing device.<br>6. (Trained service technician only) Replace the system board. |

## Power-supply LEDs

The following minimum configuration is required for the DC LED on the power supply to be lit:
- Power supply
- Power cord

The following minimum configuration is required for the server to start:
- One microprocessor in microprocessor socket 1
- Two 1 GB DIMMs on the system board and two 1 GB DIMMs on the memory tray (if installed). If a MAX5 expansion module is connected to the server, two 2 GB DIMMs on the MAX5 memory expansion module.
- One power supply
- Power cord
- Five cooling fans

The following illustration shows the locations of the power-supply LEDs.



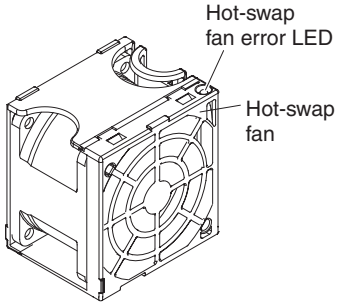

The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the power-on LED on the operator information panel and suggested actions to correct the detected problems.

| Power-supply LEDs | | | Description | Action | Notes |
|---|---|---|---|---|---|
| **AC** | **DC** | **Error** | | | |
| On | On | Off | Normal operation | | |
| Off | Off | Off | No ac power to the server or a problem with the ac power source. | 1. Check the ac power to the server.<br>2. Make sure that the power cord is connected to a functioning power source.<br>3. Restart the server. If the error remains, check the power-supply LEDs.<br>4. Replace the power-supply. | This is a normal condition when no ac power is present. |
| Off | Off | On | No ac power to the server or a problem with the ac power source and the power-supply had detected an internal problem. | • Make sure that the power cord is connected to a functioning power source.<br>• Replace the power supply. | This happens only when a second power supply is providing power to the server. |

| Power-supply LEDs | | | Description | Action | Notes |
|---|---|---|---|---|---|
| AC | DC | Error | | | |
| Off | On | Off | Faulty power-supply | Replace the power supply. | |
| Off | On | On | Faulty power-supply | Replace the power supply. | |
| On | Off | Off | Power-supply not fully seated, faulty system board, faulty power-supply, top cover not fully closed, or the top cover cable is not seated correctly. | 1. Make sure that the top cover is closed and latched correctly.<br>2. Reseat the power supply.<br>3. If the 240 V failure LED on the system board is not lit, replace the power-supply.<br>4. If the 240 V failure LED on the system board is lit, (trained service technician only) replace the system board. | Typically indicates a power-supply is not fully seated. |
| On | Off | On | Faulty power-supply | Replace the power supply. | |
| On | On | On | Power-supply is faulty | Replace the power supply. | |

## Fan LEDs

The following illustration shows the location of the fan LEDs:



## IBM Dynamic System Analysis

IBM Dynamic System Analysis (DSA) collects and analyzes system information to aid in diagnosing server problems. DSA collects the following information about the server:

- Drive health information
- Event logs for ServeRAID controllers and service processors
- Hardware inventory, including PCI and USB information
- Installed applications and hot fixes (available in DSA Portable only)
- Kernel modules (available in DSA Portable only)
- Light path diagnostics status
- Network interfaces and settings
- Performance data and details about processes that are running
- RAID and controller configuration
- Service processor (integrated management module) status and configuration
- System configuration
- Vital product data and firmware information

For system-specific information about the action that you should take as a result of a message that DSA generates, see "DSA messages" on page 82.

If you cannot find a problem by using DSA, see "Solving undetermined problems" on page 228 for information about testing the server.

**Note:**

1. In a multi-node environment, each server has a unique DSA interface. You can view server-specific information, such as event logs, from these unique DSA interfaces.
2. DSA Preboot might appear to be unresponsive when you start the program. This is normal operation while the program loads.

Make sure that the server has the latest version of the DSA code. To obtain DSA code and the *Dynamic System Analysis Installation and User's Guide*, go to http://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-DSA.

## DSA editions

Two editions of Dynamic System Analysis are available:

- **DSA Portable**

  DSA Portable Edition runs within the operating system; you do not have to restart the server to run it. It is packaged as a self-extracting file that you download from the Web. When you run the file, it self-extracts to a temporary folder and performs comprehensive collection of hardware and operating-system information. After it runs, it automatically deletes the temporary files and folder and leaves the results of the data collection and diagnostics on the server.

  If you are able to start the server, use DSA Portable.

- **DSA Preboot**

  DSA Preboot runs outside of the operating system; you must restart the server to run it. It is provided in the flash memory on the server, or you can create a bootable media such as a CD, DVD, ISO, USB, or PXE using the IBM ToolsCenter Bootable Media Creator (BoMC). For more details, see the BoMC

*User Guide* at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=TOOL-BOMC&brandind=5000016. In addition to the capabilities of the other editions of DSA, DSA Preboot includes diagnostic routines that would be disruptive to run within the operating-system environment (such as resetting devices and causing loss of network connectivity). It has a graphical user interface that you can use to specify which diagnostics to run and to view the diagnostic and data collection results.

DSA Preboot provides diagnostics for the following system components, if they are installed:

- Broadcom network adapter
- Optical devices (CD or DVD)
- Tape drives (SCSI, SAS, or SATA)
- Memory
- Microprocessor
- Checkpoint panel
- I2C bus
- SAS and SATA drives

If you are unable to restart the server or if you need comprehensive diagnostics, use DSA Preboot.

The System x3690 X5 server comes with DSA Preboot diagnostics code on the integrated USB flash memory. Utilities are available to reset and update the diagnostics code on the integrated USB flash device, if the diagnostic partition becomes damaged and does not start the DSA Preboot diagnostic programs. For more information and to download the utilities, go to http://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-DSA.

## Running the DSA Preboot diagnostic programs

**Note:** The DSA memory test might take up to 30 minutes to run. If the problem is not a memory problem, skip the memory test.

To run the DSA Preboot diagnostic programs that is stored in integrated flash memory on the server, complete the following steps:

1. If the server is running, turn off the server and all attached devices.
2. Turn on all attached devices; then, turn on the server.
3. When the prompt `<F2> Diagnostics` is displayed, press F2.

   **Note:** The DSA Preboot diagnostic program might appear to be unresponsive for an unusual length of time when you start the program. This is normal operation while the program loads.
4. Optionally, select **Quit to DSA** to exit from the stand-alone memory diagnostic program.

   **Note:** After you exit from the stand-alone memory diagnostic environment, you must restart the server to access the stand-alone memory diagnostic environment again.
5. Select **gui** to display the graphical user interface, or select **cmd** to display the DSA interactive menu.
6. Follow the instructions on the screen to select the diagnostic test to run.

If the server stops during testing and you cannot continue, restart the server and try running the DSA Preboot diagnostic programs again. If the problem remains, replace the component that was being tested when the server stopped.

## Diagnostic text messages

Diagnostic text messages are displayed while the tests are running. A diagnostic text message contains one of the following results:

**Passed:** The test was completed without any errors.

**Failed:** The test detected an error.

**Aborted:** The test could not proceed because of the server configuration

Additional information concerning test failures is available in the extended diagnostic results for each test.

## Viewing the test log results

To view the test log for the results when the tests are completed, click the **Success** link in the Status column, if you are running the DSA graphical user interface, or type **:x** to exit the Execute Tests menu, if you are running the DSA interactive menu, or select **Diagnostic Event Log** in the graphical user interface. To transfer DSA Preboot collections to an external USB device, type the **copy** command in the DSA interactive menu.

- If you are running the DSA graphical user interface (GUI), click the **Success** link in the Status column.
- If you are running the DSA interactive menu (CLI), type **:x** to exit the Execute Tests menu; then, select the **completed tests** to view the results.

## DSA messages

As you run the diagnostic programs, text messages are displayed on the screen and are saved in the test log. A diagnostic text message indicates that a problem has been detected and provides the action you should take as a result of the text message.

The following table describes the messages that the diagnostic programs might generate and suggested actions to correct the detected problems. Follow the suggested actions in the order in which they are listed in the column.

*Table 8. DSA messages*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 089-801-xxx | CPU | CPU Stress Test | Aborted | Internal program error. | 1. Turn off and restart the system.<br>2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>3. Run the test again.<br>4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. Turn off and restart the system if necessary to recover from a hung state.<br>7. Run the test again.<br>8. Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved:<br>a. (Trained service technician only) Microprocessor<br>9. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 089-802-xxx | CPU | CPU Stress Test | Aborted | System resource availability error. | 1. Turn off and restart the system.<br>2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>3. Run the test again.<br>4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.ibm.com/support/docview.wss?uid=psg1 MIGR-4JTS2T and select your system to display a matrix of available firmware. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. Turn off and restart the system if necessary to recover from a hung state.<br>7. Run the test again.<br>8. Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved:<br>a. (Trained service technician only) Microprocessor<br>9. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 089-803-xxx | CPU | CPU Stress Test | Aborted | Test aborted. Memory size insufficient to run the test. At least 1 GB required. | 1. Turn off and restart the system if necessary to recover from a hung state.<br>2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>3. Run the test again.<br>4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. Turn off and restart the system if necessary to recover from a hung state.<br>7. Run the test again.<br>8. Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved:<br>a. (Trained service technician only) Microprocessor<br>9. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 089-901-xxx | CPU | CPU Stress Test | Failed | Test failure. | 1. Turn off and restart the system if necessary to recover from a hung state.<br>2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>3. Run the test again.<br>4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. Turn off and restart the system if necessary to recover from a hung state.<br>7. Run the test again.<br>8. Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved:<br>a. (Trained service technician only) Microprocessor<br>9. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-801-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: the IMM returned an incorrect response length. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-802-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: the test cannot be completed for an unknown reason. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-803-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: the node is busy; try later. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-804-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: invalid command. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-805-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: invalid command for the given LUN. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-806-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: timeout while processing the command. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
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| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-807-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: out of space. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-808-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: reservation canceled or invalid reservation ID. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-809-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: request data was truncated. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-810-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: request data length is invalid. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
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| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-811-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: request data field length limit is exceeded. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
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| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-812-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C Test stopped a parameter is out of range. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
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| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-813-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: cannot return the number of requested data bytes. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-814-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: requested sensor, data, or record is not present. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-815-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: invalid data field in the request. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-816-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: the command is illegal for the specified sensor or record type. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-817-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: a command response could not be provided. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-818-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: cannot execute a duplicated request. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-819-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: a command response could not be provided; the SDR repository is in update mode. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-820-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: a command response could not be provided; the device is in firmware update mode. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code and IMM firmware are at the latest level.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-821-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: a command response could not be provided; IMM initialization is in progress. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-822-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: the destination is unavailable. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-823-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: cannot execute the command; insufficient privilege level. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-824-xxx | IMM | IMM $I^2C$ Test | Aborted | IMM I2C test stopped: cannot execute the command. | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-901-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the H8 bus (Bus 0) | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Remove power from the system.<br>8. (Trained service technician only) Replace the system board.<br>9. Reconnect the system to power and turn on the system.<br>10. Run the test again.<br>11. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-902-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the light path bus (Bus 1). | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Turn off the system and disconnect it from the power source.<br>8. Reseat the light path diagnostics panel.<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. Turn off the system and disconnect it from the power source.<br>12. (Trained service technician only) Replace the system board.<br>13. Reconnect the system to the power source and turn on the system.<br>14. Run the test again.<br>Continued on the next page. |
| 166-902-xxx (Continued) | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the memory bus. | 1. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-903-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the DIMM bus (Bus 2). | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Disconnect the system from the power source.<br>8. Replace the DIMMs one at a time, and run the test again after replacing each DIMM.<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. Turn off the system and disconnect it from the power source.<br>12. Reseat all of the DIMMs.<br>13. Reconnect the system to the power source and turn on the system.<br>14. Run the test again.<br>15. Turn off the system and disconnect it from the power source.<br>Continued on the next page. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-903-xxx (Continued) | | | | | 1. (Trained service technician only) Replace the system board.<br>2. Reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-904-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the power supply bus (Bus 3). | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Reseat the power supply.<br>8. Run the test again.<br>9. Turn off the system and disconnect it from the power source.<br>10. (Trained service technician only) Replace the system board.<br>11. Reconnect the system to the power source and turn on the system.<br>12. Run the test again.<br>13. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-905-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the HDD bus (Bus 4). | **Note:** Ignore the error if the hard disk drive backplane is not installed.<br>1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Turn off the system and disconnect it from the power source.<br>8. Reseat the hard disk drive backplane.<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. Turn off the system and disconnect it from the power source.<br>12. (Trained service technician only) Replace the system board.<br>13. Reconnect the system to the power source and turn on the system.<br>14. Run the test again.<br>15. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-906-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the memory configuration bus (Bus 5). | 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the system to the power source and turn on the system.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Turn off the system and disconnect it from the power source.<br>8. (Trained service technician only) Replace the system board.<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-909-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the VPD bus (memory expansion module BUS 0). | 1. Turn off the server and disconnect it from the power source. You must disconnect the server from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the server to the power source and turn on the server.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Turn off the system and disconnect it from the power source.<br>8. Reseat the MAX5 memory expansion module scalability cables (QPI and EXA).<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. Turn off the system and disconnect it from the power source.<br>12. Reseat the MAX5 memory expansion module system-board tray.<br>13. Reconnect the system to the power source and turn on the system.<br>14. Run the test again.<br>Continued on the next page. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-909-xxx (Continued) | | | | | 1. Turn off the system and disconnect it from the power source.<br>2. (Trained service technician only) Replace the MAX5 system-board tray.<br>3. Reconnect the system to the power source and turn on the system.<br>4. Run the test again.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-910-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the Voltage Regulator bus (Memory Drawer BUS1) | 1. Turn off the server and disconnect it from the power source. You must disconnect the server from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the server to the power source and turn on the server.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Turn off the system and disconnect it from the power source.<br>8. Reseat the MAX5 power supply.<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. Turn off the system and disconnect it from the power source.<br>12. (Trained service technician only) Replace the MAX5 system-board tray.<br>13. Reconnect the system to the power source and turn on the system.<br>14. Run the test again.<br>15. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-911-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the Voltage Regulator bus (Memory Drawer BUS 2). | 1. Turn off the server and disconnect it from the power source. You must disconnect the server from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the server to the power source and turn on the server.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Turn off the system and disconnect it from the power source.<br>8. Reseat the MAX5 power supply.<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. Turn off the system and disconnect it from the power source.<br>12. (Trained service technician only) Replace the microprocessor.<br>13. Run the test again.<br>14. Turn off the system and disconnect it from the power source.<br>15. (Trained service technician only) Replace the MAX5 system-board tray.<br>16. Reconnect the system to the power source and turn on the system.<br>17. Run the test again.<br>18. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-912-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the Clock bus (Memory Drawer BUS 3). | 1. Turn off the server and disconnect it from the power source. You must disconnect the server from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the server to the power source and turn on the server.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Turn off the system and disconnect it from the power source.<br>8. Reseat the MAX5 power supply.<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. Turn off the system and disconnect it from the power source.<br>12. (Trained service technician only) Replace the microprocessor.<br>13. Run the test again.<br>14. Turn off the system and disconnect it from the power source.<br>15. (Trained service technician only) Replace the MAX5 system-board tray.<br>16. Reconnect the system to the power source and turn on the system.<br>17. Run the test again.<br>18. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 166-913-xxx | IMM | IMM $I^2C$ Test | Failed | The IMM indicates a failure in the Power Supply bus (Memory Drawer BUS 4). | 1. Turn off the server and disconnect it from the power source. You must disconnect the server from ac power to reset the IMM.<br>2. After 45 seconds, reconnect the server to the power source and turn on the server.<br>3. Run the test again.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Turn off the system and disconnect it from the power source.<br>8. Reseat the MAX5 power supply.<br>9. Reconnect the system to the power source and turn on the system.<br>10. Run the test again.<br>11. Turn off the system and disconnect it from the power source.<br>12. (Trained service technician only) Replace the microprocessor.<br>13. Run the test again.<br>14. Turn off the system and disconnect it from the power source.<br>15. (Trained service technician only) Replace the MAX5 system-board tray.<br>16. Reconnect the system to the power source and turn on the system.<br>17. Run the test again.<br>18. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-801-xxx | Memory | Memory Test | Aborted | Test canceled: the system UEFI programmed the memory controller with an invalid CBAR address | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>4. Run the test again.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-802-xxx | Memory | Memory Test | Aborted | Test canceled: the end address in the E820 function is less than 16 MB. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that all DIMMs are enabled in the Setup utility.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-803-xxx | Memory | Memory Test | Aborted | Test canceled: could not enable the processor cache. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>4. Run the test again.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-804-xxx | Memory | Memory Test | Aborted | Test canceled: the memory controller buffer request failed. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>4. Run the test again.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-805-xxx | Memory | Memory Test | Aborted | Test canceled: the memory controller display/alter write operation was not completed. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>4. Run the test again.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-806-xxx | Memory | Memory Test | Aborted | Test canceled: the memory controller fast scrub operation was not completed. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>4. Run the test again.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-807-xxx | Memory | Memory Test | Aborted | Test canceled: the memory controller buffer free request failed. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>4. Run the test again.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-808-xxx | Memory | Memory Test | Aborted | Test canceled: memory controller display/alter buffer execute error. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>4. Run the test again.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

Table 8. DSA messages (continued)

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-809-xxx | Memory | Memory Test | Aborted | Test canceled program error: operation running fast scrub. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-810-xxx | Memory | Memory Test | Aborted | Test stopped: unknown error code xxx received in COMMONEXIT procedure. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-811-xxx | Memory | Memory Test | Aborted | Test Aborted: could not locate SMBIOS key_SM_ | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-812-xxx | Memory | Memory Test | Aborted | Test Aborted: SMBIOS type 0 structure indicates invalid machine ID that is not supported. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-813-xxx | Memory | Memory Test | Aborted | Test Aborted: microprocessor "n" cannot turn off the error reporting. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-814-xxx | Memory | Memory Test | Aborted | Test aborted: microprocessor "n" cannot disable scrubbing | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-815-xxx | Memory | Memory Test | Aborted | Test Aborted: Program error: Quick memory menu item selection problem | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-816-xxx | Memory | Memory Test | Aborted | Test Aborted: Program error: Quick memory menu item selection problem | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-818-xxx | Memory | Memory Test | Aborted | Test Aborted: Unable to locate _SM_key when locating SMBIOS structured data for memory DIMM information. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-819-xxx | Memory | Memory Test | Aborted | Test Aborted: START-END address ranges in the restricted area of memory. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-821-xxx | Memory | Memory Test | Aborted | Test Aborted: variable range MTRR registers are larger than fixed range MTRR registers | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-822-xxx | Memory | Memory Test | Aborted | Test Aborted: Invalid MTRR service request | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-824-xxx | Memory | Memory Test | Aborted | Test Aborted: Node interleave must be OFF | 1. Turn off and restart the system.<br>2. Press F1 to go into the Setup utility and turn off the Node Interleave.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-826-xxx | Memory | Memory Test | Aborted | Test Aborted: Memory controller is disabled. | 1. Turn off and restart the system.<br>2. Press F1 to go into the Setup utility and make sure that the memory controller is **Enabled**.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-827-xxx | Memory | Memory Test | Aborted | Test Aborted: ECC feature is disabled | 1. Turn off and restart the system.<br>2. Press F1 to go into the Setup utility and make sure that ECC generation is **Enabled**.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-844-xxx | Memory | Memory Test | Aborted | Test Aborted: Cannot mask MSR machine check control MASK registers. | 1. Turn off and restart the system.<br>2. Press F1 to go into the Setup utility and check the settings.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-845-xxx | Memory | Memory Test | Aborted | Test Aborted: Cannot clear MSR machine Check Control registers. | 1. Turn off and restart the system.<br>2. Press F1 to go into the Setup utility and check the settings.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-855-xxx | Memory | Memory Test | Aborted | Test Aborted: No RSDT signature key in RSDT structure table in ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-856-xxx | Memory | Memory Test | Aborted | Test Aborted: Corrupted RSDT key. Refer to RSDT structures in ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-858-xxx | Memory | Memory Test | Aborted | Test Aborted: Invalid SRAT type. Refer to ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-859-xxx | Memory | Memory Test | Aborted | Test Aborted: Invalid XSECSRA T Type. Refer to ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-860-xxx | Memory | Memory Test | Aborted | Test Aborted: No OEMx type 1. Refer to ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-861-xxx | Memory | Memory Test | Aborted | Test Aborted: No SRAT type 1. Refer to ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
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| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-862-xxx | Memory | Memory Test | Aborted | Test Aborted: No OEM1 table. Refer to ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-863-xxx | Memory | Memory Test | Aborted | Test Aborted: No IBMERROR key in OEM1 table. Refer to ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
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| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-864-xxx | Memory | Memory Test | Aborted | Test Aborted: No GAS General Address Structure type 0 in OEM1 table. Refer to ACPI tables. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-865-xxx | Memory | Memory Test | Aborted | Test Aborted: No XSECSRAT key in OEMx table. Refer to ACPI tables | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-866-xxx | Memory | Memory Test | Aborted | Test Aborted: EFI/SAL: Invalid parameter from Get Memory Map function | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-867-xxx | Memory | Memory Test | Aborted | Test Aborted: EFI/SAL: Buffer not allocated in Get Memory Map function. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-868-xxx | Memory | Memory Test | Aborted | Test Aborted: EFI/SAL: Buffer too small in Get Memory Map function | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-869-xxx | Memory | Memory Test | Aborted | Test Aborted: EFI/SAL: Invalid parameter from Get Memory Map function | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-870-xxx | Memory | Memory Test | Aborted | Test Aborted: SRAT/ XSECSRAT is ok, but the CPU domain numbering is invalid | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-871-xxx | Memory | Memory Test | Aborted | Test Aborted: Data miscompare encountered due to address overlapping, overshooting, or data corruption | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-877-xxx | Memory | Memory Test | Aborted | Test Aborted: Mirroring is enabled. | 1. Turn off and restart the system.<br>2. Press F1 to go into the Setup utility and **Disable** the Memory Mirroring.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-878-xxx | Memory | Memory Test | Aborted | Test Aborted: Sparing is enabled in PCI space. | 1. Turn off and restart the system.<br>2. Press F1 to go into the Setup utility and **Disable** the Memory Sparing.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-885-xxx | Memory | Memory Test | Aborted | Test Aborted: microprocessor does not support MTRR functions and cannot uncache available memory space. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-886-xxx | Memory | Memory Test | Aborted | Test Aborted: E820 function call indicates not enough memory available for testing. | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-894-xxx | Memory | Memory Test | | Unexpected error code | 1. Turn off and restart the system.<br>2. Run the test again.<br>3. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 201-899-xxx | Memory | Memory Test | Aborted | User Aborted: | Test was terminated by user before completion. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-901-xxx | Memory | Memory Test | Failed | Test failure: single-bit error, failing DIMM z. | 1. Turn off the system and disconnect it from the power source.<br>2. Reseat DIMM z.<br>3. Reconnect the system to power and turn on the system.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Replace the failing DIMMs.<br>8. Re-enable all memory in the Setup utility (see "Using the Setup utility" on page 384).<br>9. Run the test again.<br>10. Replace the failing DIMM.<br>11. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 201-902-xxx | Memory | Memory Test | Failed | Test failure: single-bit and multi-bit error, failing DIMM z | 1. Turn off the system and disconnect it from the power source.<br>2. Reseat DIMM z.<br>3. Reconnect the system to power and turn on the system.<br>4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>5. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>6. Run the test again.<br>7. Replace the failing DIMMs.<br>8. Re-enable all memory in the Setup utility see "Using the Setup utility" on page 384).<br>9. Run the test again.<br>10. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 202-801-xxx | Memory | Memory Stress Test | Aborted | Internal program error. | 1. Turn off and restart the system.<br>2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Using the Setup utility" on page 384.<br>4. Run the test again.<br>5. Turn off and restart the system if necessary to recover from a hung state.<br>6. Run the memory diagnostics to identify the specific failing DIMM.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 202-802-xxx | Memory | Memory Stress Test | Failed | General error: memory size is insufficient to run the test. | 1. Make sure that all memory is enabled by checking the Available System Memory in the Resource Utilization section of the DSA event log. If necessary, enable all memory in the Setup utility (see "Using the Setup utility" on page 384).<br>2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>3. Run the test again.<br>4. Run the standard memory test to validate all memory.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 202-901-xxx | Memory | Memory Stress Test | Failed | Test failure. | 1. Run the standard memory test to validate all memory.<br>2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>3. Turn off the system and disconnect it from power.<br>4. Reseat the DIMMs.<br>5. Reconnect the system to power and turn on the system.<br>6. Run the test again.<br>7. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 215-801-xxx | Optical Drive | • Verify Media Installed<br>• Read/ Write Test<br>• Self-Test<br><br>Messages and actions apply to all three tests. | Aborted | Unable to communicate with the device driver. | 1. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>2. Run the test again.<br>3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged.<br>4. Run the test again.<br>5. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559.<br>6. Run the test again.<br>7. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>8. Run the test again.<br>9. Replace the CD/DVD drive.<br>10. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 215-802-xxx | Optical Drive | • Verify Media Installed<br>• Read/ Write Test<br>• Self-Test<br><br>Messages and actions apply to all three tests. | Aborted | The media tray is open. | 1. Close the media tray and wait 15 seconds.<br>2. Run the test again.<br>3. Insert a new CD/DVD into the drive and wait for 15 seconds for the media to be recognized.<br>4. Run the test again.<br>5. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged.<br>6. Run the test again.<br>7. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>8. Run the test again.<br>9. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559.<br>10. Run the test again.<br>11. Replace the CD/DVD drive.<br>12. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 215-803-xxx | Optical Drive | • Verify Media Installed<br>• Read/ Write Test<br>• Self-Test<br><br>Messages and actions apply to all three tests. | Failed | The disc might be in use by the system. | 1. Wait for the system activity to stop.<br>2. Run the test again<br>3. Turn off and restart the system.<br>4. Run the test again.<br>5. Replace the CD/DVD drive.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 215-901-xxx | Optical Drive | • Verify Media Installed<br>• Read/ Write Test<br>• Self-Test<br><br>Messages and actions apply to all three tests. | Aborted | Drive media is not detected. | 1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds.<br>2. Run the test again.<br>3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged.<br>4. Run the test again.<br>5. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559.<br>6. Run the test again.<br>7. Replace the CD/DVD drive.<br>8. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 215-902-xxx | Optical Drive | • Verify Media Installed<br>• Read/ Write Test<br>• Self-Test<br><br>Messages and actions apply to all three tests. | Failed | Read miscompare. | 1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds.<br>2. Run the test again.<br>3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged.<br>4. Run the test again.<br>5. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559.<br>6. Run the test again.<br>7. Replace the CD/DVD drive.<br>8. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 215-903-xxx | Optical Drive | • Verify Media Installed<br>• Read/ Write Test<br>• Self-Test<br><br>Messages and actions apply to all three tests. | Aborted | Could not access the drive. | 1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds.<br>2. Run the test again.<br>3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged.<br>4. Run the test again.<br>5. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.<br>6. Run the test again.<br>7. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559.<br>8. Run the test again.<br>9. Replace the CD/DVD drive.<br>10. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 215-904-xxx | Optical Drive | • Verify Media Installed<br>• Read/ Write Test<br>• Self-Test<br><br>Messages and actions apply to all three tests. | Failed | A read error occurred. | 1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds.<br>2. Run the test again.<br>3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged.<br>4. Run the test again.<br>5. For additional troubleshooting information, go to http://www.ibm.com/support/docview.wss?uid=psg1MIGR-41559.<br>6. Run the test again.<br>7. Replace the CD/DVD drive.<br>8. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 217-800-xxx | SAS/SATA Hard Drive | Disk Drive Test | Aborted | The hard drive self-test detected a failure. | 1. Reseat all hard disk drive backplane connections at both ends.<br>2. Reseat the all drives.<br>3. Run the test again.<br>4. Make sure that the firmware is at the latest level.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 217-900-xxx | SAS/SATA Hard Drive | Disk Drive Test | Failed | The hard drive self-test was canceled. | 1. Reseat all hard disk drive backplane connections at both ends.<br>2. Reseat the all drives.<br>3. Run the test again.<br>4. Make sure that the firmware is at the latest level.<br>5. Run the test again.<br>6. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 405-901-xxx | BroadCom Ethernet Device | Test Control Registers | Failed | | 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>2. Run the test again.<br>3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component.<br>4. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL.<br>Continued on the next page. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 405-901-xxx (Continued) | BroadCom Ethernet Device | Test MII Registers | Failed | | 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>2. Run the test again.<br>3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component.<br>4. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 405-902-xxx | BroadCom Ethernet Device | Test EEPROM | Failed | | 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>2. Run the test again.<br>3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component.<br>4. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 405-903-xxx | BroadCom Ethernet Device | Test Internal Memory | Failed | | 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>2. Run the test again.<br>3. Check the interrupt assignments in the PCI Hardware section of the DSA event log. If the Ethernet device is sharing interrupts, if possible, use the Setup utility see "Using the Setup utility" on page 384) to assign a unique interrupt to the device.<br>4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 405-904-xxx | BroadCom Ethernet Device | Test Interrupt | Failed | | 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>2. Run the test again.<br>3. Check the interrupt assignments in the PCI Hardware section of the DSA event log. If the Ethernet device is sharing interrupts, if possible, use the Setup utility see "Using the Setup utility" on page 384) to assign a unique interrupt to the device.<br>4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 405-905-xxx | Broadcom Ethernet Device | Test Loop back at MAC Layer | Failed | | 1. Check the Ethernet cable for damage and make sure that the cable type and connection are correct.<br>2. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>3. Run the test again.<br>4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

*Table 8. DSA messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.**
- **Go to the IBM support Web site at http://www.ibm.com/supportportal/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.**

| Message number | Component | Test | State | Description | Action |
|---|---|---|---|---|---|
| 405-906-xxx | BroadCom Ethernet Device | Test Loop back at Physical Layer | Failed | | 1. Check the Ethernet cable for damage and make sure that the cable type and connection are correct.<br>2. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>3. Run the test again.<br>4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component.<br>5. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |
| 405-907-xxx | BroadCom Ethernet Device | Test LEDs | Failed | | 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 379.<br>2. Run the test again.<br>3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component.<br>4. If the failure remains, go to the IBM Web site for more troubleshooting information at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&lndocid=SERV-CALL. |

## Recovering from a UEFI update failure or UEFI image corruption

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

If the server firmware has become corrupted, such as from a power failure during an update, you can recover the server firmware in either of two ways:

- **In-band method:** Recover server firmware, using either the boot block jumper (Automated Boot Recovery) and a server Firmware Update Package Service Pack.
- **Out-of-band method:** Use the IMM Web interface to update the firmware, using the latest server firmware update package.

**Note:** You can obtain a server update package from one of the following sources:

- Download the server firmware update from the World Wide Web.
- Contact your IBM service representative.

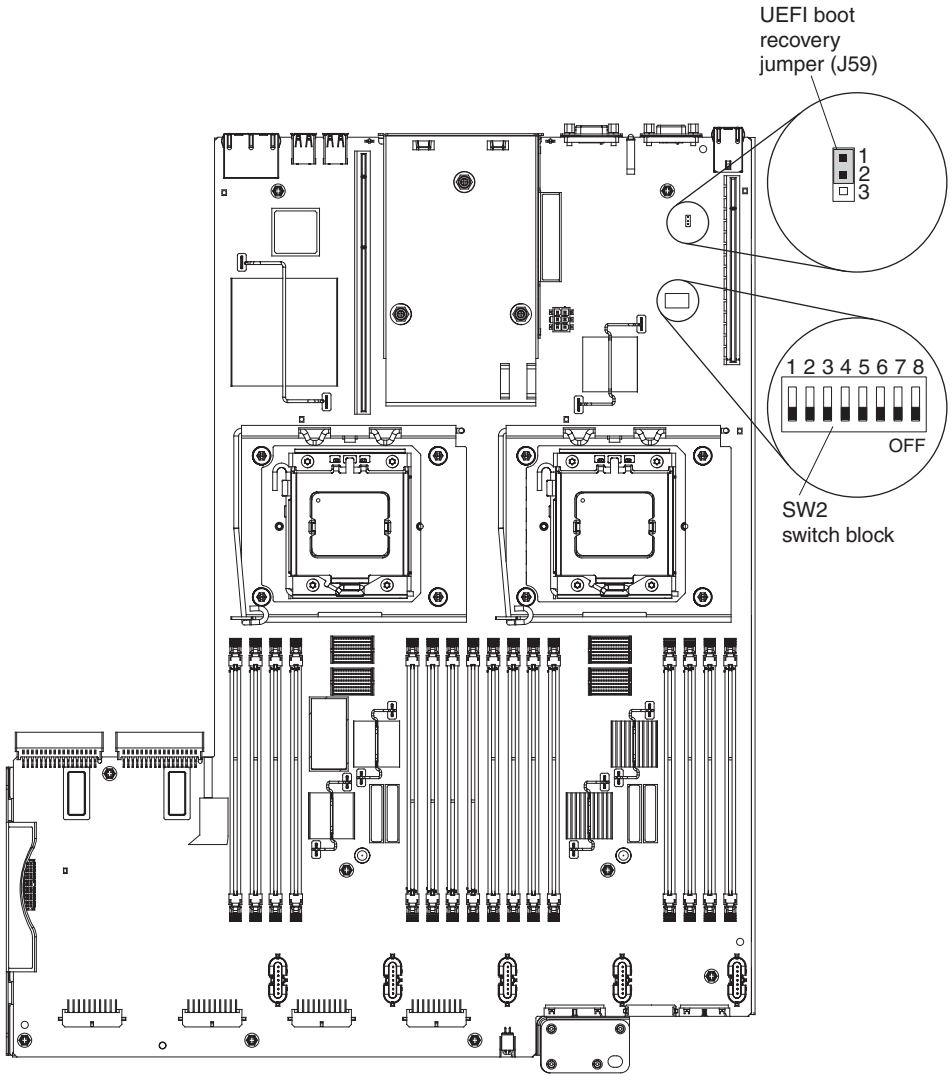
To download the server firmware update package from the World Wide Web, go to http://www.ibm.com/supportportal/.

The flash memory of the server consists of a primary bank and a backup bank. You must maintain a bootable IBM System x Server Firmware (server firmware) image in the backup bank. If the server firmware in the primary bank becomes corrupted, you can either manually boot the backup bank with the boot block jumper, or in the case of image corruption, this will occur automatically with the Automated Boot Recovery function.

**In-band manual recovery method**

To recover the server firmware and restore the server operation to the primary bank, complete the following steps:

1. Turn off the server, and disconnect all power cords and external cables.
2. Remove the server cover. See “Removing the server top cover” on page 246 for more information.
3. Locate the UEFI boot recovery jumper block (J59) on the system board.




4. Move the jumper from pins 1 and 2 to pins 2 and 3 to enable the UEFI recovery mode.
5. Reinstall the server cover; then, reconnect all power cords.
6. Restart the server. The power-on self-test (POST) starts.
7. Boot the server to an operating system that is supported by the IBM Flash UEFI Update package that you downloaded.
8. Perform the firmware update by following the instructions that are in the firmware update package readme file.
9. Copy the downloaded firmware update package into a directory.
10. From a command line, type *filename*-s, where *filename* is the name of the executable file that you downloaded with the firmware update package.
11. Turn off the server and disconnect all power cords and external cables, and then remove the server cover.
12. Move the UEFI boot recovery jumper back to the primary position (pins 1 and 2).
13. Reinstall the server cover, and then reconnect all the power cables.
14. Restart the server.

**In-band automated boot recovery method**

**Note:** Use this method if the BRD LED on the light path diagnostics panel is lit and there is a log entry or `Booting Backup Image` is displayed on the firmware splash screen; otherwise, use the in-band manual recovery method.

1. Boot the server to an operating system that is supported by the firmware update package that you downloaded.
2. Perform the firmware update by following the instructions that are in the firmware update package readme file.
3. Restart the server.
4. At the firmware splash screen, press F3 when prompted to restore to the primary bank. The server boots from the primary bank.

**Out-of-band method:** See the IMM documentation.

For more information about UEFI-compliant firmware, go to http://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=MIGR-5083207&brandind=5000008.

## Automated boot recovery (ABR)

While the server is starting, if the integrated management module detects problems with the server firmware in the primary bank, the server automatically switches to the backup firmware bank and gives you the opportunity to recover the firmware in the primary bank. For instructions for recovering the UEFI firmware, see "Recovering from a UEFI update failure or UEFI image corruption" on page 164. After you have recovered the firmware in the primary bank, complete the following steps:

1. Restart the server.
2. When the prompt press `F3 to restore to primary` is displayed, press F3 to start the server from the primary bank.

## Nx boot failure

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (power-on self-test). If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the Nx boot failure feature causes the server to revert to the default UEFI configuration and start the Setup utility so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board.

To specify the number of consecutive restart attempts in the Setup utility that will trigger the Nx boot failure feature, complete the following steps. The available values are 3, 6, 9, and 255 (disable Nx boot failure).

1. From the Setup utility main menu, select **System Settings**..
2. Next select **Operating Modes**.
3. Select **POST Attempts Limit**.
4. Modify the configuration settings and select **Save Settings**; then, exit Setup.

## System-event log

The system event log contains messages of three types:

**Information**
Information messages do not require action; they record significant system-level events, such as when the server is started.

**Warning**
Warning messages do not require immediate action; they indicate possible problems, such as when the recommended maximum ambient temperature is exceeded.

**Error** Error messages might require action; they indicate system errors, such as when a fan is not detected.

Each message contains date and time information, and it indicates the source of the message (POST or the IMM).

Some messages in the system-event log are issued based on the sensor names and other messages are issued based on the device instance; this can result in two different messages being logged for the same event. For example, if fan 4 in the MAX5 is removed, the following two event messages will be logged for the same fan event:

- Numeric sensor "MEU Fan 4 Tach" going low (lower critical) has asserted
- Device "Fan 9" detected as absent

The following table lists the fan that is associated with each sensor string and the device on which the fan is located.

*Table 9. Event message and the device on which the fan is located*

| Event message | Physical fan location | Function |
|---|---|---|
| "Fan 1" | Host server fan 1 | presence |
| "Fan 2" | Host server fan 2 | presence |
| "Fan 3' | Host server fan 3 | presence |
| "Fan 4" | Host server fan 4 | presence |
| "Fan 5" | Host server fan 5 | presence |
| "Fan 6" | MAX5 fan 1 | presence |
| "Fan 7" | MAX5 fan 2 | presence |
| "Fan 8" | MAX5 fan 3 | presence |
| "Fan 9" | MAX5 fan 4 | presence |
| "Fan 10" | MAX5 fan 5 | presence |
| Numeric sensor "Fan 1A Tach" | Host server fan 1 | speed |
| Numeric sensor "Fan 2A Tach" | Host server fan 2 | speed |
| Numeric sensor "Fan 3A Tach" | Host server fan 3 | speed |
| Numeric sensor "Fan 4A Tach" | Host server fan 4 | speed |
| Numeric sensor "Fan 5A Tach" | Host server fan 5 | speed |

*Table 9. Event message and the device on which the fan is located (continued)*

| Event message | Physical fan location | Function |
|---|---|---|
| Numeric sensor "MEU Fan 1 Tach" | MAX5 fan 1 | speed |
| Numeric sensor "MEU Fan 2 Tach" | MAX5 fan 2 | speed |
| Numeric sensor "MEU Fan 3 Tach" | MAX5 fan 3 | speed |
| Numeric sensor "MEU Fan 4 Tach" | MAX5 fan 4 | speed |
| Numeric sensor "MEU Fan 5 Tach" | MAX5 fan 5 | speed |

# Integrated management module (IMM) error messages

The following sections describe the IMM error messages and suggested actions to correct the detected problems the server or the MAX5 memory expansion module. For more information about IMM, see the *Integrated Management Module User's Guide* at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=MIGR-5079770&brandind=5000008.

## Server IMM error messages

The following table describes the IMM error messages and suggested actions to correct the detected server problems.

For IMM error messages that are generated when the MAX5 is attached to the System x3690 X5 server, see "IMM error messages detected when a MAX5 is attached to the server" on page 209.

*Table 10. System x3690 X5 IMM error messages*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80010901-0c01xxxx | Numeric sensor Ambient Temp going high (upper critical) has asserted. | Error | An upper critical sensor going high has asserted. | 1. Reduce the ambient temperature.<br>2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server. |
| | Numeric sensor Ambient Temp going high (upper non-recoverable) has asserted. | Error | An upper nonrecoverable sensor going high has asserted. | 1. Reduce the ambient temperature.<br>2. Check the server airflow. Make sure that nothing is blocking the air from coming into or preventing the air from exiting the server. |
| 80010202-0701xxxx | Numeric sensor Planar 3.3V going low (lower critical) has asserted. | Error | A lower critical sensor going low has asserted. | (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80010902-0701xxxx | Numeric sensor Planar 3.3V going high (upper critical) has asserted. | Error | An upper critical sensor going high has asserted. | (Trained service technician only) Replace the system board. |
| 80010202-0701xxxx | Numeric sensor Planar 5V going low (lower critical) has asserted. | Error | A lower critical sensor going low has asserted. | (Trained service technician only) Replace the system board. |
| 80010902-0701xxxx | Numeric sensor Planar 5V going high (upper critical) has asserted. | Error | An upper critical sensor going high has asserted. | (Trained service technician only) Replace the system board. |
| 80010202-2801xxxx | Numeric sensor Planar VBAT going low (lower critical) has asserted. | Error | A lower critical sensor going low has asserted. | Replace the 3 V battery. |
| 80010204-1d01xxxx<br>80010204-1d02xxxx<br>80010204-1d03xxxx<br>80010204-1d04xxxx<br>80010204-1d05xxxx | Numeric sensor Fan *n* A Tach going low (lower critical) has asserted.(*n* = fan number) | Error | A lower critical sensor going low has asserted. | 1. Reseat the failing fan *n*, which is indicated by a lit LED near the fan connector on the system board. See "System-event log" on page 167 and Table 9 on page 167 for more information about how the fan event messages are issued and the fan number and the device on which the fan is located.<br>2. Replace the failing fan.<br>(*n* = fan number) |
| 816f0125-1d01xxxx<br>816f0125-1d02xxxx<br>816f0125-1d03xxxx<br>816f0125-1d04xxxx<br>816f0125-1d05xxxx | Numeric sensor Fan *n* detected as present. | Info | A fan was detected as being present. | No action; information only. |
| | Numeric sensor Fan *n* detected as absent. | Info | A fan was detected as being absent. | No action; information only. |
| 806f011b-0701xxxx | The connector System board has encountered a configuration error. | Error | An interconnect configuration error has occurred. | Reseat the front video cable on the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f0007-0301xxxx<br>806f0007-0302xxxx | The Processor CPU *n* Status has Failed with IERR.(*n* = microprocessor number) | Error | A processor failed - IERR condition has occurred. | 1. Make sure that the latest levels of firmware and device drivers are installed for all adapters and standard devices, such as Ethernet, SCSI, and SAS. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>2. Update the firmware (UEFI and IMM) to the latest level "Updating the firmware" on page 379).<br>3. Run the DSA program for the hard disk drives and other I/O devices.<br>4. Reseat the adapter.<br>5. Replace the adapter.<br>6. (Trained service technician only) Replace microprocessor *n*.<br>7. (Trained service technician only) Replace the system board.<br>(*n* = microprocessor number) |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f0107-0301xxxx<br>806f0107-0302xxxx | An Over-Temperature Condition has been detected on the Processor CPU *n* Status.(*n* = microprocessor number) | Error | An overtemperature condition has occurred for microprocessor *n*.(*n* = microprocessor number) | 1. Make sure that the fans are operating, that there are no obstructions to the airflow (front and rear of the server), that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed.<br>2. Make sure that the heat sink for microprocessor *n* is installed correctly.<br>3. (Trained service technician only) Replace microprocessor *n*.<br>(*n* = microprocessor number) |
| 806f0207-0301xxxx<br>806f0207-0302xxxx | The Processor CPU *n* Status has Failed with FRB1/BIST condition.(*n* = microprocessor number) | Error | A processor failed - FRB1/BIST condition has occurred. | 1. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>2. Make sure that the installed microprocessors are compatible with each other (see "Replacing a microprocessor and heat sink" on page 333 for information about microprocessor requirements).<br>3. (Trained service technician only) Reseat microprocessor *n*.<br>4. (Trained service technician only) Replace microprocessor *n*.<br>(*n* = microprocessor number) |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f0507-0301xxxx<br>806f0507-0302xxxx | The Processor CPU *n* Status has a Configuration Mismatch.(*n* = microprocessor number) | Error | A processor configuration mismatch has occurred. | 1. Make sure that the installed microprocessors are compatible with each other (see "Replacing a microprocessor and heat sink" on page 333 for information about microprocessor requirements).<br>2. Update the server firmware to the latest level (see "Updating the firmware" on page 379).<br>3. (Trained service technician only) Replace the incompatible microprocessor. |
| 806f0607-0301xxxx<br>806f0607-0302xxxx | An SM BIOS Uncorrectable CPU complex error for Processor CPU *n* Status has asserted.(*n* = microprocessor number) | Error | An SMBIOS uncorrectable CPU complex error has asserted. | 1. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>2. Make sure that the installed microprocessors are compatible with each other (see "Replacing a microprocessor and heat sink" on page 333 for information about microprocessor requirements).<br>3. (Trained service technician only) Reseat microprocessor *n*.<br>4. (Trained service technician only) Replace microprocessor *n*.<br>(*n* = microprocessor number) |
| 80070608-1406xxxx | Sensor 5V Power Good has transitioned to non-recoverable | Error | | (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80070608-140cxxxx | Sensor CPU_1_8V_PG has transitioned to non-recoverable | Error | | (Trained service technician only) Replace the system board. |
| 80070608-1403xxxx | Sensor CPU_12_VIO has transsitioned to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 80070608-1403xxxx | Sensor CPU1 VRD has transitioned to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 80070608-1403xxxx | Sensor CPU2 VRD has transitioned to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 80070201-0301xxxx<br>80070201-0302xxxx | Sensor CPU *n* OverTemp has transitioned to critical from a less severe state.(*n* = microprocessor number) | Error | A sensor has changed to Critical state from a less severe state. | 1. Make sure that the fans are operating, that there are no obstructions to the airflow (front and rear of the server), that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed.<br>2. Check the ambient temperature. You must be operating within the specifications.<br>3. Make sure that the heat sink for microprocessor *n* is installed correctly.<br>4. (Trained service technician only) Replace microprocessor *n*.<br>(*n* = microprocessor number) |
| 80070301-0301xxxx<br>80070301-0302xxxx | Sensor CPU *n* OverTemp has transitioned to non-recoverable from a less severe state.(*n* = microprocessor number) | Error | A sensor has changed to Nonrecoverable state from a less severe state. | 1. Make sure that the fans are operating, that there are no obstructions to the airflow (front and rear of the server), that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed.<br>2. Make sure that the heat sink for microprocessor *n* is installed correctly.<br>3. (Trained service technician only) Replace microprocessor *n*.<br>(*n* = microprocessor number) |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Sensor CPU *n* OverTemp has transitioned to critical from a non-recoverable state.(*n* = microprocessor number) | Error | A sensor has changed to Critical state from Nonrecoverable state. | 1. Make sure that the fans are operating, that there are no obstructions to the airflow (front and fear of the server), that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed.<br>2. Check the ambient temperature. You must be operating within the specifications.<br>3. Make sure that the heat sink for microprocessor *n* is installed correctly.<br>4. (Trained service technician only) Replace microprocessor *n*.<br>(*n* = microprocessor number) |
| | Sensor CPU *n* OverTemp has transitioned to non-recoverable.(*n* = microprocessor number) | Error | A sensor has changed to Nonrecoverable state. | 1. Make sure that the fans are operating, that there are no obstructions to the airflow (front and rear of the server), that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed.<br>2. Check the ambient temperature. You must be operating within the specifications.<br>3. Make sure that the heat sink for microprocessor *n* is installed correctly.<br>4. (Trained service technician only) Replace microprocessor *n*.<br>(*n* = microprocessor number) |
| 80070221-1f01xxxx | Sensor Ext QPI Link 1 has transitioned to critical from a less severe state | Error | A QPI link connectivity error is detected. | 1. Check the QPI cable.<br>2. Replace the QPI cable. |
| 80070221-1f01xxxx | Sensor Ext QPI Link 2 has transitioned to critical from a less severe state | Error | A QPI link connectivity error is detected. | 1. Check the QPI cable.<br>2. Replace the QPI cable. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80070608-140axxxx | Sensor IOH 1.1V VRD has transitioned to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 80070608-140bxxxx | Sensor IOH 1.5V VRD has transitioned to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 80070608-140cxxxx | Sensor IOH 1.8V VRD has transitioned to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 8003010c-2581xxxx | Sensor Lane Failover has asserted | Info | A memory lane failover event has occurred. | No action; Informational only. |
| 8003010e-0701xxxx | Sensor Memory Resize has asserted | Info | A memory resize event has occurred. | No action; Informational only. |
| 806f0113-1701xxxx | A bus timeout has occurred on system %1.(%1 = CIM_ComputerSystem.ElementName) | Error | A bus timeout has occurred. | 1. Remove the adapter from the PCI slot that is indicated by a lit LED.<br>2. Replace the riser-card assembly.<br>3. Remove all PCI adapters.<br>4. (Trained service technicians only) Replace the system board. |
| 806f0313-1701xxxx | A software NMI has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName) | Error | A software NMI has occurred. | 1. Check the device driver.<br>2. Reinstall the device driver.<br>3. Update all device drives to the latest level.<br>4. Update the firmware (UEFI and IMM) (see "Updating the firmware" on page 379). |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f000f-2201ffff | The System %1 encountered a POST Error.(%1 = CIM_ComputerSystem.ElementName) | Error | A POST error has occurred.(Sensor = ABR Status) | 1. Recover the server firmware from the backup page:<br>a. Restart the server.<br>b. At the prompt, press F3 to recover the firmware.<br>2. Update the server firmware to the latest level (see "Updating the firmware" on page 379). **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>3. Remove components one at a time, restarting the server each time, to see if the problem goes away.<br>4. If the problem remains, (trained service technician) replace the system board. |
| 806f000f-2201ffff | The System %1 encountered a POST Error.(%1 = CIM_ComputerSystem.ElementName) | Error | A POST error has occurred.(Sensor = Firmware Error) | 1. Update the server firmware on the primary page. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>2. (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f0813-2582xxxx | A Uncorrectable Bus Error has occurred on system %1.(%1 = CIM_ComputerSystem.ElementName) | Error | A bus uncorrectable error has occurred.(Sensor = Critical Int PCI) | 1. Check the system-event log.<br>2. Check the PCI error LEDs.<br>3. Remove the adapter from the indicated PCI slot.<br>4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>5. (Trained service technician only) Replace the system board. |
| 806f0813-2584xxxx | A Uncorrectable Bus Error has occurred on system %1.(%1 = CIM_ComputerSystem.ElementName) | Error | A bus uncorrectable error has occurred.(Sensor = Critical Int CPU) | 1. Check the system-event log.<br>2. Check the microprocessor error LEDs.<br>3. Remove the failing microprocessor from the system board.<br>4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>5. Make sure that the two microprocessors are matching.<br>6. (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | A Uncorrectable Bus Error has occurred on system %1.(%1 = CIM_ComputerSystem.ElementName) | Error | A bus uncorrectable error has occurred.(Sensor = Critical Int DIM) | 1. Check the system-event log.<br>2. Check the DIMM error LEDs.<br>3. Remove the failing DIMM from the system board.<br>4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>5. Make sure that the installed DIMMs are supported and configured correctly.<br>6. (Trained service technician only) Replace the system board. |
| 80070219-0701xxxx | Sensor Sys Board Fault has transitioned to critical from a less severe state. | Error | A sensor has changed to Critical state from a less severe state. | 1. Check the system-event log.<br>2. Check for an error LED on the system board.<br>3. Replace any failing device.<br>4. Check for a server firmware update. **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>5. (Trained service technician only) Replace the system board. |
| 806f0008-0a01xxxx<br>806f0008-0a02xxxx<br>806f0008-0a03xxxx<br>806f0008-0a04xxxx | Power Supply *n* has been added (*n* = power supply number) | Info | Power supply *n* is normal. | No action; informational only. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Power Supply *n* has been removed (*n* = power supply number) | | Power supply *n* is normal. | No action; informational only. |
| 806f0108-0a01xxxx<br>806f0108-0a02xxxx<br>806f0108-0a03xxxx<br>806f0108-0a04xxxx | The Power Supply (Power Supply: *n*) has Failed.(*n* = power supply number) | Error | Power supply *n* has failed.(*n* = power supply number) | 1. If the power-on LED is lit, complete the following steps:<br>a. Reduce the server to the minimum configuration.<br>b. Reinstall the components one at a time, restarting the server each time.<br>c. If the error recurs, replace the component that you just reinstalled.<br>2. Reseat power supply *n*.<br>3. Replace power supply *n*.<br>(*n* = power supply number) |
| 806f0308-0a01xxxx<br>806f0308-0a02xxxx<br>806f0308-0a03xxxx<br>806f0308-0a04xxxx | PS *n* Status has lost input (*n* = power supply number) | Info | Power supply *n* is normal. | No action; informational only. |
| 81070608-0a01xxxx<br>81070608-0a02xxxx<br>81070608-0a03xxxx<br>81070608-0a04xxxx | Sensor PS *n* 12V OC has deasserted the transition to non-recoverable | Info | Power supply *n* is normal. | No action; informational only. |
| 80070608-0a01xxxx<br>80070608-0a02xxxx<br>80070608-0a03xxxx<br>80070608-0a04xxxx | Sensor PS *n* 12V OC has transitioned to non-recoverable (*n* = power supply number) | Error | An error has been detected for Power supply *n*. | 1. Check the power supply LEDs.<br>2. Check for a current overload in the server.<br>3. Reseat the power supply.<br>4. Replace the power supply |
| 81070608-0a01xxxx<br>81070608-0a02xxxx<br>81070608-0a03xxxx<br>81070608-0a04xxxx | Sensor PS *n* 12V OV has deasserted the transition to non-recoverable (*n* = power supply number) | Info | Power supply *n* is normal. | No action; informational only. |
| 80070608-0a01xxxx<br>80070608-0a02xxxx<br>80070608-0a03xxxx<br>80070608-0a04xxxx | Sensor PS *n* 12V OV has transitioned to non-recoverable (*n* = power supply number) | Error | An error has been detected for Power supply *n*. | 1. Check the power supply LEDs.<br>2. Reseat the power supply.<br>3. Replace the power supply |
| 81070608-0a01xxxx<br>81070608-0a02xxxx<br>81070608-0a03xxxx<br>81070608-0a04xxxx | Sensor PS *n* 12V UV has deasserted the transition to non-recoverable (*n* = power supply number) | Info | Power supply *n* is normal. | No action; informational only. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80070608-0a01xxxx<br>80070608-0a02xxxx<br>80070608-0a03xxxx<br>80070608-0a04xxxx | Sensor PS *n* 12V UV has transitioned to non-recoverable (*n* = power supply number) | Error | An error has been detected for Power supply *n*. | 1. Check the power supply LEDs.<br>2. Reseat the power supply.<br>3. Replace the power supply |
| | Sensor PS *n* CSF has deasserted the transition to non-recoverable (*n* = power supply number) | Info | Power supply *n* is normal. | No action; informational only. |
| | Sensor PS *n* CSF has transitioned to non-recoverable (*n* = power supply number) | Error | An error has been detected for Power supply *n*. | 1. Check the power supply LEDs.<br>2. Check for power supply mismatch.<br>3. Reseat the power supply.<br>4. Replace the power supply |
| | Sensor PS *n* has transitioned to a less severe state from critical (*n* = power supply number) | Info | Power supply *n* is normal. | No action; informational only. |
| | Sensor PS *n* has transitioned to a critical from a less severe state (*n* = power supply number) | Error | An error has been detected for Power supply *n*. | 1. Check the power supply LEDs.<br>2. Check the power supply fan.<br>3. Reseat the power supply.<br>4. Replace the power supply |
| 81070208-0a01xxxx<br>81070208-0a02xxxx<br>81070208-0a03xxxx<br>81070208-0a04xxxx | Sensor PS *n* Therm has transitioned to a less severe state from critical (*n* = power supply number) | Info | Power supply *n* is normal. | No action; informational only. |
| 80070208-0a01xxxx<br>80070208-0a02xxxx<br>80070208-0a03xxxx<br>80070208-0a04xxxx | Sensor PS *n* Therm Fault has transitioned to critical from a less severe state.(*n* = power supply number) | Error | A sensor has changed to Critical state from a less severe state. | 1. Make sure that there are no obstructions, such as bundled cables, to the airflow from the power-supply fan.<br>2. Replace power supply *n*.<br>(*n* = power supply number) |
| 81070608-0a01xxxx<br>81070608-0a02xxxx<br>81070608-0a03xxxx<br>81070608-0a04xxxx | Sensor PS *n* VCO has deasserted the transition to non-recoverable (*n* = power supply number) | Info | Power supply *n* is normal. | No action; informational only. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80070608-0a01xxxx<br>80070608-0a02xxxx<br>80070608-0a03xxxx<br>80070608-0a04xxxx | Sensor PS *n* VCO has transitioned to non-recoverable (*n* = power supply number) | Error | An error has been detected for Power supply *n*. | 1. Check the power supply LEDs.<br>2. Reseat the power supply.<br>3. Replace the power supply |
| 80070204-0a01xxxx<br>80070204-0a02xxxx<br>80070204-0a03xxxx<br>80070204-0a04xxxx | Sensor PS *n* xxxx Fault has transitioned to critical from a less severe state.(*n* = power supply number) | Error | A sensor has changed to Critical state from a less severe state. | 1. Make sure that there are no obstructions, such as bundled cables, to the airflow from the power-supply fan. See "System-event log" on page 167 and Table 9 on page 167 for more information about how the fan event messages are issued and the fan number and the device on which the fan is located.<br>2. Replace power supply *n*.<br>(*n* = power supply number) |
| 80070608-1404xxxx | Sensor SAS VRD has transitioned to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 81070608-1405xxxx | Sensor VRD 3.3V has deasserted the transition to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 80070608-1405xxxx | Sensor VRD 3.3V has transitioned to non-recoverable | Error | A VRD error is detected. | (Trained service technician only) Replace the system board. |
| 80070618-0701xxxx | Sensor VT Fault has transitioned to non-recoverable. | Error | A sensor has changed to Nonrecoverable state. | 1. Check the power-supply LEDs.<br>2. Follow the actions in "Power-supply LEDs" on page 78 and "Power problems" on page 62.<br>3. Replace the failing power supply.<br>4. (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Sensor Pwr Rail A Fault has transitioned to non-recoverable. | Error | A sensor has changed to Nonrecoverable state. | 1. Turn off the server and disconnect it from power.<br>2. Remove the optical drive, fans, hard disk drives, and hard disk drive backplane.<br>3. Reinstall each device, one at a time, starting the server each time to isolate the failing device.<br>4. Replace the failing device.<br>5. (Trained service technician only) Replace the system board. |
| | Sensor Pwr Rail B Fault has transitioned to non-recoverable. | Error | A sensor has changed to Nonrecoverable state. | 1. Turn off the server and disconnect it from power.<br>2. Remove the optical drive, fans, hard disk drives, and hard disk drive backplane.<br>3. Reinstall each device, one at a time, starting the server each time to isolate the failing device.<br>4. Replace the failing device.<br>5. (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Sensor Pwr Rail C Fault has transitioned to non-recoverable. | Error | A sensor has changed to Nonrecoverable state. | 1. Turn off the server and disconnect it from power.<br>2. Remove the SAS/SATA RAID riser card, the DIMMs in connectors 1 through 8, and the (Trained service technician only) microprocessor in socket 1.<br>3. Reinstall each device, one at a time, starting the server each time to isolate the failing device.<br>4. Replace the failing device.<br>5. (Trained service technician only) Replace the system board. |
| | Sensor Pwr Rail D Fault has transitioned to non-recoverable. | Error | A sensor has changed to Nonrecoverable state. | 1. Turn off the server and disconnect it from power.<br>2. (Trained service technician only) Remove the microprocessor from socket 1.<br>3. Reinstall the microprocessor in socket 1 and restart the server.<br>4. (Trained service technician only) Replace the failing microprocessor.<br>5. (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Sensor Pwr Rail E Fault has transitioned to non-recoverable. | Error | A sensor has changed to Nonrecoverable state. | 1. Turn off the server and disconnect it from power.<br>2. Remove the PCI riser card from PCI riser-card connector 2 and the (Trained service technician only) microprocessor from socket 2.<br>3. Reinstall each device, one at a time, starting the server each time to isolate the failing device.<br>4. Replace the failing device.<br>5. (Trained service technician only) Replace the system board. |
| | Sensor Pwr Rail F Fault has transitioned to non-recoverable | Error | A sensor has changed to Nonrecoverable state. | 1. Turn off the server and disconnect it from power.<br>2. Reseat all of the DIMMs that are on the memory tray.<br>3. If the problem remains, remove the memory tray and try again.<br>4. If the problem goes away, replace the memory tray. |
| | Sensor Pwr Rail G Fault has transitioned to non-recoverable. | Error | A sensor has changed to Nonrecoverable state. | 1. Turn off the server and disconnect it from power.<br>2. Reseat all of the DIMMs that are on the system board.<br>3. If the problem remains, (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 800b010a-1e81xxxx<br>800b010a-1e82xxxx<br>800b010a-1e83xxxx<br>800b010a-1e84xxxx<br>800b010a-1e85xxxx<br>800b010a-1e86xxxx | Redundancy Cooling Zone 1 has been reduced. | Error | Redundancy has been lost and is insufficient to continue operation. | 1. Make sure that the connectors on fans 1 and 2 are not damaged.<br>2. Make sure that the fan 1 and 2 connectors on the system board are not damaged.<br>3. Make sure that the fans are correctly installed.<br>4. Reseat the fans.<br>5. Replace the fans. |
| | Sensor RAID Error has transitioned to critical from a less severe state. | Error | A sensor has changed to Critical state from a less severe state. | 1. Check the hard disk drive amber status LEDs to identify the failed hard disk drive or check the RAID controller system management software event logs.<br>2. Reseat the hard disk drive for which the status LED is lit.<br>3. Replace the defective hard disk drive. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 816f000d-0400xxxx<br>816f000d-0401xxxx<br>816f000d-0402xxxx<br>816f000d-0403xxxx<br>816f000d-0404xxxx<br>816f000d-0405xxxx<br>816f000d-0406xxxx<br>816f000d-0407xxxx<br>816f000d-0408xxxx<br>816f000d-0409xxxx<br>816f000d-040axxxx<br>816f000d-040bxxxx<br>816f000d-040cxxxx<br>816f000d-040dxxxx<br>816f000d-040exxxx<br>816f000d-040fxxxx<br>816f000d-0410xxxx<br>816f000d-0411xxxx<br>816f000d-0412xxxx<br>816f000d-0413xxxx<br>816f000d-0414xxxx<br>816f000d-0415xxxx<br>816f000d-0416xxxx<br>816f000d-0417xxxx<br>816f000d-0418xxxx<br>816f000d-0419xxxx<br>816f000d-041axxxx<br>816f000d-041bxxxx<br>816f000d-041cxxxx<br>816f000d-041dxxxx<br>816f000d-041exxxx<br>816f000d-041fxxxx | The Drive *n* Status has been removed from unit Drive 0 Status.(*n* = hard disk drive number) | Error | A drive has been removed. | 1. Reseat hard disk drive *n*.(*n* = hard disk drive number). Wait 1 minute or more before reinstalling the drive.<br>2. Replace the hard disk drive.<br>3. Make sure that the disk firmware and RAID controller firmware is at the latest level.<br>4. Check the SAS cable. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f010d-0400xxxx<br>806f010d-0401xxxx<br>806f010d-0402xxxx<br>806f010d-0403xxxx<br>806f010d-0404xxxx<br>806f010d-0405xxxx<br>806f010d-0406xxxx<br>806f010d-0407xxxx<br>806f010d-0408xxxx<br>806f010d-0409xxxx<br>806f010d-040axxxx<br>806f010d-040bxxxx<br>806f010d-040cxxxx<br>806f010d-040dxxxx<br>806f010d-040exxxx<br>806f010d-040fxxxx<br>806f010d-0410xxxx<br>806f010d-0411xxxx<br>806f010d-0412xxxx<br>806f010d-0413xxxx<br>806f010d-0414xxxx<br>806f010d-0415xxxx<br>806f010d-0416xxxx<br>806f010d-0417xxxx<br>806f010d-0418xxxx<br>806f010d-0419xxxx<br>806f010d-041axxxx<br>806f010d-041bxxxx<br>806f010d-041cxxxx<br>806f010d-041dxxxx<br>806f010d-041exxxx<br>806f010d-041fxxxx | The Drive *n* Status has been disabled due to a detected fault.(*n* = hard disk drive number) | Error | A drive has been disabled because of a fault. | 1. Run the hard disk drive diagnostic test on drive *n*.<br>2. Reseat the following components:<br>a. Hard disk drive (wait 1 minute or more before reinstalling the drive).<br>b. Cable from the system board to the backplane<br>3. Replace the following components one at a time, in the order shown, restarting the server each time:<br>a. Hard disk drive<br>b. Cable from the system board to the backplane<br>c. Hard disk drive backplane<br>(*n* = hard disk drive number) |
| 806f050d-0400xxxx<br>806f050d-0431xxxx | Array %1 is in critical condition.(%1 = CIM_ComputerSystem.ElementName) | Error | An array is in Critical state.(Sensor = Drive *n* Status)(*n* = hard disk drive number) | 1. Make sure that the RAID controller firmware and hard disk drive firmware is at the latest level.<br>2. Make sure that the SAS cable is connected correctly.<br>3. Replace the SAS cable.<br>4. Replace the controller.<br>5. Replace the hard disk drive that is indicated by a lit status LED. |

*Table 10. System x3690 X5 IMM error messages (continued)*

| • **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**<br>• **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**<br>• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.** | | | | |
|---|---|---|---|---|
| **Event ID** | **Message** | **Severity** | **Description** | **Action** |
| 806f060d-0400xxxx<br>806f060d-0431xxxx | Array %1 has failed.(%1 = CIM_ComputerSystem.ElementName) | Error | An array is in Failed state.(Sensor = Drive *n* Status)(*n* = hard disk drive number) | 1. Make sure that the RAID controller firmware and hard disk drive firmware is at the latest level.<br>2. Make sure that the SAS cable is connected correctly.<br>3. Replace the SAS cable.<br>4. Replace the controller.<br>5. Replace the hard disk drive that is indicated by a lit status LED. |
| 806f010c-0781xxxx | Uncorrectable error detected for Memory Device n on subsystem System Memory. | Error | A memory uncorrectable error has occurred. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f010c-2581xxxx | Memory uncorrectable error detected for DIMM All DIMMs on Memory Subsystem All DIMMs. | Error | A memory uncorrectable error has occurred. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f050c-0781xxxx | Memory Logging Limit reached for Memory Device n on subsystem System Memory | Error | The memory logging limit has been reached. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. At the next maintenance opportunity, swap the affected DIMM (as indicated by the light path LED or event log entry) to a different memory channel. See "Replacing a memory module" on page 278 for information on DIMM population sequence.<br>3. If the PFA re-occurs (on the same DIMM), replace the affected DIMM as indicated by the light path LED or event log entry (check for previous history of PFA).<br>4. If the problem remains with the same DIMM connector, inspect the DIMM connector for debris or damage. If the DIMM connector is damaged, (train technician only) replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f050c-2581xxxx | Memory Logging Limit Reached for DIMM All DIMMs on Memory Subsystem All DIMMs. | Error | The memory logging limit has been reached. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. At the next maintenance opportunity, swap the affected DIMM (as indicated by the light path LED or event log entry) to a different memory channel. See "Replacing a memory module" on page 278 for information on DIMM population sequence.<br>3. If the PFA re-occurs (on the same DIMM), replace the affected DIMM as indicated by the light path LED or event log entry (check for previous history of PFA).<br>4. If the problem remains with the same DIMM connector, inspect the DIMM connector for debris or damage. If the DIMM connector is damaged, (train technician only) replace the system board. |
| 806f070c-2581xxxx | Memory DIMM Configuration Error for All DIMMs on Memory Subsystem All DIMMs. | Error | A DIMM configuration error has occurred. | Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f010c-2581xxxx | Memory uncorrectable error detected for DIMM 1 of the DIMMs on Memory Subsystem One of the DIMMs. | Error | A memory uncorrectable error has occurred. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f050c-2581xxxx | Memory Logging Limit Reached for DIMM One of the DIMMs on Memory Subsystem One of the DIMMs. | Error | The memory logging limit has been reached. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. At the next maintenance opportunity, swap the affected DIMM (as indicated by the light path LED or event log entry) to a different memory channel. See "Replacing a memory module" on page 278 for information on DIMM population sequence.<br>3. If the PFA re-occurs (on the same DIMM), replace the affected DIMM as indicated by the light path LED or event log entry (check for previous history of PFA).<br>4. If the problem remains with the same DIMM connector, inspect the DIMM connector for debris or damage. If the DIMM connector is damaged, (train technician only) replace the system board. |
| 806f070c-2581xxxx | Memory DIMM Configuration Error for One of the DIMMs on Memory Subsystem One of the DIMMs. | Error | A DIMM configuration error has occurred. | Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Memory uncorrectable error detected for Memory Device *n* on subsystem System Memory.(*n* = DIMM number) | Error | A memory uncorrectable error has occurred. | 1. If the server failed the POST memory test, reseat the DIMMs.<br>2. Replace any DIMM that is indicated by a lit error LED.<br>**Note:** You do not have to replace DIMMs by pairs.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. Run the DSA memory test.<br>5. (Trained service technician only) Replace the system board. |
| | Memory Logging Limit Reached for Memory Device *n* on subsystem System Memory.(*n* = DIMM number) | Error | The memory logging limit has been reached. | 1. Update the server firmware to the latest level (see "Updating the firmware" on page 379).<br>**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>2. Reseat the DIMMs and run the DSA memory test.<br>3. Replace any DIMM that is indicated by a lit error LED. |
| | Memory DIMM Configuration Error for Memory Device *n* on subsystem System Memory.(*n* = DIMM number) | Error | A DIMM configuration error has occurred. | Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Sensor DIMM *n* Temp has transitioned to critical from a less severe state.(*n* = DIMM number) | Error | A sensor has changed to Critical state from a less severe state. | 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed.<br>2. Make sure that ambient temperature is within the specifications.<br>3. If a fan has failed, complete the action for a fan failure.<br>4. Replace DIMM *n*.<br>(*n* = DIMM number) |
| 806f030c-0781xxxx | Scrub Failure for "Planar DIMMs" on subsystem "System Memory" | Error | A Memory Scrub failure has been detected. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f030c-2581xxxx | Scrub Failure All DIMMs on subsystem System Memory | Error | A Memory Scrub failure has been detected. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the system board. |
| 806f030c-2581xxxx | Scrub Failure One of the DIMMs on subsystem System Memory | Error | A Memory Scrub failure has been detected. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f040c-0781xxxx | Memory Device n disabled on subsystem System Memory | Info | The DIMM has been disabled. | 1. Make sure that the DIMM is installed correctly (see "Replacing a memory module" on page 278) for more information.<br>2. If the DIMM was disabled because of a memory error, follow the suggested actions for that error event and restart the server.<br>3. Check the IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>4. If no memory error is recorded in the event logs and no DIMM connector LED is lit, re-enable the DIMM through the Setup utility (see "Starting the Setup utility" on page 384) or the Advanced Settings Utility (ASU). |
| 806f040c-2581xxxx | All DIMMs disabled on subsystem System Memory | Info | The DIMM has been disabled. | 1. Make sure that the DIMM is installed correctly (see "Replacing a memory module" on page 278) for more information.<br>2. If the DIMM was disabled because of a memory error, follow the suggested actions for that error event and restart the server.<br>3. Check the IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>4. If no memory error is recorded in the event logs and no DIMM connector LED is lit, re-enable the DIMM through the Setup utility (see "Starting the Setup utility" on page 384) or the Advanced Settings Utility (ASU). |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f040c-2581xxxx | One of the DIMMs disabled on subsystem System Memory | Info | The DIMM has been disabled. | 1. Make sure that the DIMM is installed correctly (see "Replacing a memory module" on page 278) for more information.<br>2. If the DIMM was disabled because of a memory error, follow the suggested actions for that error event and restart the server.<br>3. Check the IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>4. If no memory error is recorded in the event logs and no DIMM connector LED is lit, re-enable the DIMM through the Setup utility (see "Starting the Setup utility" on page 384) or the Advanced Settings Utility (ASU). |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f0021-2582xxxx | Fault in slot System board on system %1.(%1 = CIM_ComputerSystem.ElementName)<br><br>All PCI Error<br>One of PCI | Error | | 1. Check the riser-card LEDs.<br>2. Reseat the affected adapters and riser card.<br>3. Update the server firmware (UEFI and IMM) and adapter firmware.<br>**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>4. Make sure that the adapter is on the serverproven list.<br>5. Remove both adapters.<br>6. Replace the PCIe adapter.<br>7. Replace the riser card.<br>8. (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f0021-2201xxxx | Fault in slot System board on system %1.(%1 = CIM_ComputerSystem.ElementName)<br><br>No Op ROM Space | Error | | 1. Check the riser-card LEDs.<br>2. Reseat the affected adapters and riser card.<br>3. Update the server firmware (UEFI and IMM) and adapter firmware.<br>**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>4. Make sure that the adapter is on the serverproven list.<br>5. Remove both adapters.<br>6. Replace the PCIe adapter.<br>7. Replace the riser card.<br>8. (Trained service technician only) Replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f0021-3101xxxx<br>806f0021-3102xxxx<br>806f0021-3103xxxx<br>806f0021-3104xxxx<br>806f0021-3105xxxx | Fault in slot System board on system %1.(%1 = CIM_ComputerSystem.ElementName)<br><br>PCI 1<br>PCI 2<br>PCI 3<br>PCI 4<br>PCI 5 | Error | | 1. Check the riser-card LEDs.<br>2. Reseat the affected adapters and riser card.<br>3. Update the server firmware (UEFI and IMM) and adapter firmware.<br>**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.<br>4. Make sure that the adapter is on the serverproven list.<br>5. Remove both adapters.<br>6. Replace the PCIe adapter.<br>7. Replace the riser card.<br>8. (Trained service technician only) Replace the system board. |
| 800b010c-2581xxxx | Redundancy Bckup Mem Status has been reduced. | Error | Redundancy has been lost and is insufficient to continue operation. | 1. Check the system-event log for DIMM failure events (uncorrectable or PFA) and correct the failures.<br>2. Re-enable mirroring in **System Settings** in the Setup utility (see "Using the Setup utility" on page 384 for more information). |
| 8007020c-2581xxxx | Sensor MemSpareErrN has transitioned to critical from a less severe state. (N = memory DIMM number) | Error | A fatal communication error has occurred between the microprocessor and the memory buffer chip set. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Check the DIMM connector for damage or debris.<br>3. (Trained technician only) replace the system board. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80070202-0701xxxx | Sensor Planar Fault has transitioned to critical from a less severe state. | Error | A sensor has changed to Critical state from a less severe state. | (Trained service technician only) Replace the system board. |
| 40000001-00000000 | IMM Network Initialization Complete. | Info | An IMM network has completed initialization. | No action; information only. |
| 40000002-00000000 | Certificate Authority %1 has detected a %2 Certificate Error.(%1 = IBM_CertificateAuthority. CADistinguishedName; %2 = CIM_PublicKeyCertificate. ElementName) | Error | A problem has occurred with the SSL Server, SSL Client, or SSL Trusted CA certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated by the **Generate a New Key and Certificate Signing Request** link. | 1. Make sure that the certificate that you are importing is correct.<br>2. Try importing the certificate again. |
| | Ethernet Data Rate modified from %1 to %2 by user %3.(%1 = CIM_EthernetPort.Speed; %2 = CIM_EthernetPort.Speed; %3 = user ID) | Info | A user has modified the Ethernet port data rate. | No action; information only. |
| | Ethernet Duplex setting modified from %1 to %2 by user %3.(%1 = CIM_EthernetPort.FullDuplex; %2 = CIM_EthernetPort.FullDuplex; %3 = user ID) | Info | A user has modified the Ethernet port duplex setting. | No action; information only. |
| | Ethernet MTU setting modified from %1 to %2 by user %3.(%1 = CIM_EthernetPort.ActiveMaximum TransmissionUnit; %2 = CIM_EthernetPort.ActiveMaximum TransmissionUnit; %3 = user ID) | Info | A user has modified the Ethernet port MTU setting. | No action; information only. |
| | Ethernet Duplex setting modified from %1 to %2 by user %3.(%1 = CIM_EthernetPort.NetworkAddresses; %2 = CIM_EthernetPort.NetworkAddresses; %3 = user ID) | Info | A user has modified the Ethernet port MAC address setting. | No action; information only. |
| | Ethernet interface %1 by user %2.(%1 = CIM_EthernetPort.EnabledState; %2 = user ID) | Info | A user has enabled or disabled the Ethernet interface. | No action; information only. |
| | Hostname set to %1 by user %2.(%1 = CIM_DNSProtocolEndpoint.Hostname; %2 = user ID) | Info | A user has modified the host name of the IMM. | No action; information only. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | IP address of network interface modified from %1 to %2 by user %3.(%1 = CIM_IPProtocolEndpoint.IPv4Address; %2 = CIM_StaticIPAssignmentSettingData. IPAddress; %3 = user ID) | Info | A user has modified the IP address of the IMM. | No action; information only. |
| | IP subnet mask of network interface modified from %1 to %2 by user %3s.(%1 = CIM_IPProtocolEndpoint.SubnetMask; %2 = CIM_StaticIPAssignmentSetting Data.SubnetMask; %3 = user ID) | Info | A user has modified the IP subnet mask of the IMM. | No action; information only. |
| | IP address of default gateway modified from %1 to %2 by user %3s.(%1 = CIM_IPProtocolEndpoint.Gateway IPv4Address; %2 = CIM_StaticIPAssignmentSetting Data.Default GatewayAddress; %3 = user ID) | Info | A user has modified the default gateway IP address of the IMM. | No action; information only. |
| | OS Watchdog response %1 by %2.(%1 = Enabled or Disabled; %2 = user ID) | Info | A user has enabled or disabled an OS Watchdog. | No action; information only. |
| 4000000d-00000000 | DHCP[%1] failure, no IP address assigned.(%1 = IP address, *xxx.xxx.xxx.xxx*) | Info | A DHCP server has failed to assign an IP address to the IMM. | 1. Make sure that the network cable is connected.<br>2. Make sure that there is a DHCP server on the network that can assign an IP address to the IMM. |
| | Remote Login Successful. Login ID: %1 from %2 at IP address %3.(%1 = user ID; %2 = ValueMap(CIM_ProtocolEndpoint. ProtocolIFType; %3 = IP address, *xxx.xxx.xxx.xxx*) | Info | A user has successfully logged in to the IMM. | No action; information only. |
| | Attempting to %1 server %2 by user %3.(%1 = Power Up, Power Down, Power Cycle, or Reset; %2 = IBM_ComputerSystem.ElementName; %3 = user ID) | Info | A user has used the IMM to perform a power function on the server. | No action; information only. |
| 40000010-00000000 | Security: Userid: ' had %2 login failures from WEB client at IP address %3.(%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*) | Error | A user has exceeded the maximum number of unsuccessful login attempts from a Web browser and has been prevented from logging in for the lockout period. | 1. Make sure that the correct login ID and password are being used.<br>2. Have the system administrator reset the login ID or password. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 40000011-00000000 | Security: Login ID: ' had %2 login failures from CLI at %3.(%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*) | Error | A user has exceeded the maximum number of unsuccessful login attempts from the command-line interface and has been prevented from logging in for the lockout period. | 1. Make sure that the correct login ID and password are being used.<br>2. Have the system administrator reset the login ID or password. |
| 40000012-00000000 | Remote access attempt failed. Invalid userid or password received. Userid is ' from WEB browser at IP address %2.(%1 = user ID; %2 = IP address, *xxx.xxx.xxx.xxx*) | Error | A user has attempted to log in from a Web browser by using an invalid login ID or password. | 1. Make sure that the correct login ID and password are being used.<br>2. Have the system administrator reset the login ID or password. |
| 40000013-00000000 | Remote access attempt failed. Invalid userid or password received. Userid is ' from TELNET client at IP address %2.(%1 = user ID; %2 = IP address, *xxx.xxx.xxx.xxx*) | Error | A user has attempted to log in from a Telnet session by using an invalid login ID or password. | 1. Make sure that the correct login ID and password are being used.<br>2. Have the system administrator reset the login ID or password. |
| 40000026-00000000 | The Chassis Event Log (CEL) on system %1 cleared by user %2.(%1 = CIM_ComputerSystem.ElementName; %2 = user ID) | Info | A user has cleared the IMM event log. | No action; information only. |
| | IMM reset was initiated by user %1.(%1 = user ID) | Info | A user has initiated a reset of the IMM. | No action; information only. |
| 40000016-00000000 | ENET[0] DHCP-HSTN=%1, DN=%2, IP@=%3, SN=%4, GW@=%5, DNS1@=%6.(%1 = CIM_DNSProtocolEndpoint.Hostname; %2 = CIM_DNSProtocolEndpoint. DomainName; %3 = CIM_IPProtocolEndpoint.IPv4Address; %4 = CIM_IPProtocolEndpoint.SubnetMask; %5 = IP address, *xxx.xxx.xxx.xxx*; %6 = IP address, *xxx.xxx.xxx.xxx*) | Info | The DHCP server has assigned an IMM IP address and configuration. | No action; information only. |
| 40000017-00000000 | ENET[0] IP-Cfg:HstName=%1, IP@%2, NetMsk=%3, GW@=%4.(%1 =<br><br>CIM_DNSProtocolEndpoint. Hostname; %2 = CIM_StaticIPSettingData. IPv4Address; %3 = CIM_StaticIPSettingData. SubnetMask; %4 = CIM_StaticIPSettingData. DefaultGatewayAddress) | Info | An IMM IP address and configuration have been assigned using client data. | No action; information only. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 40000018-00000000 | LAN: Ethernet[0] interface is no longer active. | Info | The IMM Ethernet interface has been disabled. | No action; information only. |
| 40000019-00000000 | LAN: Ethernet[0] interface is now active. | Info | The IMM Ethernet interface has been enabled. | No action; information only. |
| | DHCP setting changed to by user %1.(%1 = user ID) | Info | A user has changed the DHCP mode. | No action; information only. |
| | IMM: Configuration %1 restored from a configuration file by user %2.(%1 = CIM_ConfigurationData. ConfigurationName; %2 = user ID) | Info | A user has restored the IMM configuration by importing a configuration file. | No action; information only. |
| 4000001c-00000000 | Watchdog %1 Screen Capture Occurred.(%1 = OS Watchdog or Loader Watchdog) | Error | An operating-system error has occurred, and the screen capture was successful. | 1. Reconfigure the watchdog timer to a higher value.<br>2. Make sure that the IMM Ethernet over USB interface is enabled in **System Settings** in the Setup utility (see "Using the Setup utility" on page 384 for more information).<br>3. Reinstall the RNDIS or cdc_ether device driver for the operating system.<br>4. Disable the watchdog.<br>5. Check the integrity of the installed operating system. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 4000001c-00000000 | Watchdog %1 Failed to Capture Screen.(%1 = OS Watchdog or Loader Watchdog) | Error | An operating-system error has occurred, and the screen capture failed. | 1. Reconfigure the watchdog timer to a higher value.<br>2. Make sure that the IMM Ethernet over USB interface is enabled in **System Settings** in the Setup utility (see "Using the Setup utility" on page 384 for more information).<br>3. Reinstall the RNDIS or cdc_ether device driver for the operating system.<br>4. Disable the watchdog.<br>5. Check the integrity of the installed operating system.<br>6. Update the IMM firmware.<br>**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. |
| 4000001e-00000000 | Running the backup IMM main application. | Error | The IMM has resorted to running the backup main application. | Update the IMM firmware.<br>**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. |
| 4000001f-00000000 | Please ensure that the IMM is flashed with the correct firmware. The IMM is unable to match its firmware to the server. | Error | The server does not support the installed IMM firmware version. | Update the IMM firmware to a version that the server supports.<br>**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | IMM reset was caused by restoring default values. | Info | The IMM has been reset because a user has restored the configuration to its default settings. | No action; information only. |
| 40000021-00000000 | IMM clock has been set from NTP server %1.(%1 = IBM_NTPService.ElementName) | Info | The IMM clock has been set to the date and time that is provided by the Network Time Protocol server. | No action; information only. |
| 40000022-00000000 | SSL data in the IMM configuration data is invalid. Clearing configuration data region and disabling SSL+H25. | Error | There is a problem with the certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated through the **Generate a New Key and Certificate Signing Request** link. | 1. Make sure that the certificate that you are importing is correct.<br>2. Try to import the certificate again. |
| | Flash of %1 from %2 succeeded for user %3.(%1 = CIM_ManagedElement.ElementName; %2 = Web or LegacyCLI; %3 = user ID) | Info | A user has successfully updated one of the following firmware components:<br>• IMM main application<br>• IMM boot ROM<br>• Server firmware (UEFI)<br>• Diagnostics<br>• System power backplane<br>• Remote expansion enclosure power backplane<br>• Integrated service processor<br>• Remote expansion enclosure processor | No action; information only. |

*Table 10. System x3690 X5 IMM error messages (continued)*

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Flash of %1 from %2 failed for user %3.(%1 = CIM_ManagedElement.ElementName; %2 = Web or LegacyCLI; %3 = user ID) | Info | An attempt to update a firmware component from the interface and IP address has failed. | Try to update the firmware again. |
| | The Chassis Event Log (CEL) on system %1 is 75% full.(%1 = CIM_ComputerSystem.ElementName) | Info | The IMM event log is 75% full. When the log is full, older log entries are replaced by newer ones. | To avoid losing older log entries, save the log as a text file and clear the log. |
| 40000025-00000000 | The Chassis Event Log (CEL) on system %1 is 100% full.(%1 = CIM_ComputerSystem.ElementName) | Info | The IMM event log is full. When the log is full, older log entries are replaced by newer ones. | To avoid losing older log entries, save the log as a text file and clear the log. |
| 40000027-00000000 | %1 Platform Watchdog Timer expired for %2.(%1 = OS Watchdog or Loader Watchdog; %2 = OS Watchdog or Loader Watchdog) | Error | A Platform Watchdog Timer Expired event has occurred. | 1. Reconfigure the watchdog timer to a higher value.<br>2. Make sure that the IMM Ethernet over USB interface is enabled in **System Settings** in the Setup utility. (see "Using the Setup utility" on page 384 for more information).<br>3. Reinstall the RNDIS or cdc_ether device driver for the operating system.<br>4. Disable the watchdog.<br>5. Check the integrity of the installed operating system. |
| | IMM Test Alert Generated by %1.(%1 = user ID) | Info | A user has generated a test alert from the IMM. | No action; information only. |
| 40000029-00000000 | Security: Userid: ' had %2 login failures from an SSH client at IP address %3.(%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, *xxx.xxx.xxx.xxx*) | Error | A user has exceeded the maximum number of unsuccessful login attempts from SSH and has been prevented from logging in for the lockout period. | 1. Make sure that the correct login ID and password are being used.<br>2. Have the system administrator reset the login ID or password. |

## IMM error messages detected when a MAX5 is attached to the server

The following table describes the IMM error messages and suggested actions to correct the detected problems when a MAX5 is attached to the server: See "System-event log" on page 167 and Table 9 on page 167 for additional information about the fan event messages and the device on which the fan is located.

*Table 11. IMM error messages detected when MAX5 is attached to the server*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 800b0108-1381xxxx<br>800b0108-1382xxxx | Redundancy lost for Power Group 1 has asserted | Error | Power supply redundancy has been lost. | Install additional power supplies. |
| | Redundancy Power Group 1 has been restored | Info | Redundant power has been restored. | No action; information only. |
| | Failure no longer predicted on EPOW fault | Info | The EPOW fault failure is no longer predicted. | No action; information only. |
| 816f0507-2584xxxx | 2S CPU has recovered from a configuration mismatch | Info | The configuration mismatch on 2S CPU has recovered. | No action; information only. |
| 806f0507-2584xxxx | 2S CPU has a configuration mismatch | Error | A configuration mismatch has occurred on 2S CPU. | 1. Check to make sure that matched microprocessors are installed. See "Replacing a microprocessor and heat sink" on page 333 for information about installation requirements.<br>2. (Trained service technician only) Replace the microprocessor. |
| | CPU Type Check has recovered from a configuration mismatch | Info | The CPU Type Check configuration mismatch has recovered. | No action; information only. |
| | CPU Type Check has a configuration mismatch | Error | A configuration mismatch was detected on the CPU Type Check. | 1. Check to make sure that matched microprocessors are installed. See "Replacing a microprocessor and heat sink" on page 333 for information about installation requirements.<br>2. (Trained service technician only) Replace the microprocessor. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f0507-2584xxxx | Missing Boot CPU has recovered from a configuration mismatch | Info | The missing boot CPU has recovered from a configuration mismatch. | No action; information only. |
| 806f0507-2584xxxx | Missing Boot CPU has a configuration mismatch | Error | A CPU is missing from microprocessor socket 1. | (Trained service technician only) Install a microprocessor in microprocessor socket 1. |
| | Memory Expansion Unit 1 detected as absent | Info | The MAX5 memory expansion module is not working properly. | Check the MAX5 memory expansion module cables and power connections. |
| | A hardware change occurred on system Host | Info | Changes were made to the host system hardware. | No action; information only. |
| | The firmware or software on system Host are compatible | Info | The required firmware and software are compatible. | No action; information only. |
| | A hardware change occurred on system Host | Info | The host system hardware was changed. | No action; information only. |
| 806f032b-2101xxxx | A firmware or software incompatibility was detected on the system Host | Error | The FPGA firmware between the memory expansion module and the host system does not match. | Update all firmware to the latest level (see "Updating the firmware" on page 379). |
| | Numeric sensor Fan *n* detected as present. | Info | A fan was detected as being present. | No action; information only. |
| | Numeric sensor Fan *n* detected as absent. | Info | A fan was detected as being absent. | No action; information only. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80010204-1d06xxxx<br>80010204-1d07xxxx<br>80010204-1d08xxxx<br>80010204-1d09xxxx<br>80010204-1d0axxxx | Numeric sensor MEU Fan *n* Tach going low (lower critical) has asserted.(*n* = fan number) | Error | A lower critical sensor going low has asserted. | 1. Reseat the failing fan *n*, which is indicated by a lit LED near the fan connector on the MAX5 memory expansion module. See "System-event log" on page 167 and Table 9 on page 167 for more information about how the fan event messages are issued and the fan number and the device on which the fan is located.<br>2. Replace the failing fan.<br>(*n* = fan number) |
| 8003010c-1881xxxx | Sensor Lane FailoverMEU has asserted | Info | A memory lane failover event has occurred. | No action; information only. |
| 806f070c-1881xxxx | Configuration error for Memory Device *n* in Memory Expansion Unit 1 on subsystem System Memory has deasserted | Info | MAX5 memory expansion module configuration error deasserted. | No action; information only. |
| | Memory Logging Limit removed for Memory Device *n* in Memory Expansion Unit 1 on subsystem System Memory | Info | MAX5 memory expansion module memory logging limit deasserted. | No action; information only. |
| | Uncorrectable error recovery detected for Memory Device *n* in Memory Expansion Unit 1 on subsystem System Memory | Info | MAX5 memory expansion module memory Bank *n* error recovered. | No action; information only. |
| | MEU Bank *n* Status on subsystem System Memory throttled | Info | MAX5 memory expansion module throttling asserted. | No action; information only. |
| | Configuration Error for Memory Device *n* in Memory Expansion Unit 1 on subsystem System Memory | Error | MAX5 memory expansion module memory configuration error detected. | 1. Check the system event log.<br>2. Correct any memory errors in the MAX5 memory expansion module. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Memory Logging Limit reached for Memory Device *n* in Memory Expansion Unit 1 on subsystem System Memory | Error | MAX5 memory expansion module memory error limit reached. | 1. Check the system event log.<br>2. Correct any memory errors in the MAX5 memory expansion module. |
| | MEU Bank *n* Status disabled on subsystem System Memory | Info | MAX5 memory expansion module memory Bank*n* has been disabled. | No action; information only. |
| | Uncorrectable error detected for Memory Device *n* in Memory Expansion Unit 1 on subsystem System Memory | Error | MAX5 memory expansion module memory error detected. | 1. Check the system event log.<br>2. Correct any memory errors in the MAX5 memory expansion module. |
| | MEU Bank *n* Status on subsystem System Memory is no longer throttled | Info | MAX5 memory expansion module throttling deasserted. | No action; information only. |
| | MEU Bank *n* Status enabled on subsystem System Memory | Info | MAX5 memory expansion module memory Bank*n* enabled. | No action; information only. |
| | Sensor MEU OverTemp has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module OverTemp deasserted. | No action; information only. |
| | Sensor MEU OverTemp has transitioned to non-recoverable | Error | MAX5 memory expansion module OverTemp asserted. | 1. Check the MAX5 memory expansion module LEDs.<br>2. Check the event log.<br>3. Replace any failed fans in the MAX5 memory expansion module. |
| | Sensor MEU OverTemp has deasserted the transition to non-recoverable from a less severe state | Info | MAX5 memory expansion module temperature returned to normal. | No action; information only. |
| | Sensor MEU OverTemp has transitioned to a less severe state from critical | Info | MAX5 memory expansion module temperature returned to normal. | No action; information only. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| | Sensor MEU OverTemp has transitioned to non-recoverable | Error | MAX5 memory expansion module OverTemp asserted. | 1. Check the MAX5 memory expansion module LEDs.<br>2. Check the event log.<br>3. Replace any failed fans in the MAX5 memory expansion module. |
| | Sensor MEU OverTemp has transitioned to critical from a non-recoverable state | Error | MAX5 memory expansion module OverTemp asserted. | 1. Check the MAX5 memory expansion module LEDs.<br>2. Check the event log.<br>3. Replace any failed fans in the MAX5 memory expansion module. |
| | Sensor MEU OverTemp has transitioned to non-recoverable from a less severe state | Error | MAX5 memory expansion module OverTemp asserted. | 1. Check the MAX5 memory expansion module LEDs.<br>2. Check the event log.<br>3. Replace any failed fans in the MAX5 memory expansion module. |
| | Sensor MEU OverTemp has transitioned to critical from a less severe state | Error | MAX5 memory expansion module OverTemp asserted. | 1. Check the MAX5 memory expansion module LEDs.<br>2. Check the event log.<br>3. Replace any failed fans in the MAX5 memory expansion module. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 8007020c-1881xxxx | Sensor MemSpareErrMEU has transitioned to critical from a less severe state | Error | A memory spare lane error has occurred on the memory expansion module. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Check the DIMM connector for damage or debris.<br>3. (Trained technician only) replace the MAX5 system board tray. |
| 80070202-1801xxxx | Sensor MEU VRD FAULT has transitioned to a less severe state from critical | Info | MAX5 memory expansion module VRD deasserted. | No action; information only. |
| 80070202-1801xxxx | Sensor MEU VRD FAULT has transitioned to critical from a less severe state | Error | MAX5 memory expansion module voltage failure. | 1. Check the MAX5 memory expansion module LEDs.<br>2. Check the event log.<br>3. Replace the MAX5 memory expansion module main board. |
| | MEU DIMMs on subsystem System Memory is no longer throttled | Info | MAX5 memory expansion module throttling deasserted. | No action; information only. |
| 816f070c-1881xxxx | Configuration Error for MEU DIMMs on subsystem System Memory has deasserted | Info | MAX5 memory expansion module configuration error deasserted. | No action; information only. |
| 816f050c-1881xxxx | Memory Logging Limit removed for MEU DIMMs on subsystem System Memory | Info | MAX5 memory expansion module memory logging limit deasserted. | No action; information only. |
| 816f040c-1881xxxx | MEU DIMMs enabled on subsystem System Memory | Info | MAX5 memory expansion module memory DIMMs*n* enabled. | No action; information only. |
| 816f010c-1881xxxx | Uncorrectable error recovery detected for MEU DIMMs on Subsystem System Memory | Info | MAX5 memory expansion module memory DIMMs *n* error recovered. | No action; information only. |
| | MEU DIMMs on subsystem System Memory throttled | Info | MAX5 memory expansion module throttling asserted. | No action; information only. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f070c-1881xxxx | Configuration Error for MEU DIMMs on subsystem "System Memory | Error | MAX5 memory expansion module memory configuration error detected. | 1. Make sure that the DIMM is installed correctly (see "Replacing a memory module" on page 278) for more information.<br>2. If the DIMM was disabled because of a memory error, follow the suggested actions for that error event and restart the server.<br>3. Check the IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>4. If no memory error is recorded in the event logs and no DIMM connector LED is lit, re-enable the DIMM through the Setup utility (see "Starting the Setup utility" on page 384) or the Advanced Settings Utility (ASU). |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f040c-1881xxxx | MEU DIMMs disabled on subsystem System Memory | Error | DIMM has been disabled. | 1. Make sure that the DIMM is installed correctly (see "Replacing a memory module" on page 278) for more information.<br>2. If the DIMM was disabled because of a memory error, follow the suggested actions for that error event and restart the server.<br>3. Check the IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>4. If no memory error is recorded in the event logs and no DIMM connector LED is lit, re-enable the DIMM through the Setup utility (see "Starting the Setup utility" on page 384) or the Advanced Settings Utility (ASU). |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f050c-1881xxxx | Memory Logging Limit reached for MEU DIMMs on subsystem System Memory | Error | The memory logging limit has been reached. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. At the next maintenance opportunity, swap the affected DIMM (as indicated by the light path LED or event log entry) to a different memory channel. See "Replacing a memory module" on page 278 for information on DIMM population sequence.<br>3. If the PFA re-occurs (on the same DIMM), replace the affected DIMM as indicated by the light path LED or event log entry (check for previous history of PFA).<br>4. If the problem remains with the same DIMM connector, inspect the DIMM connector for debris or damage. If the DIMM connector is damaged, (train technician only) replace the MAX5 system board tray. |
| 806f040c-1881xxxx | MEU DIMMs disabled on subsystem System Memory | Info | MAX5 memory expansion module memory DIMMs *n* has been disabled. | No action; information only. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f030c-1881xxxx | Scrub Failure for "MEU DIMMs" on subsystem "System Memory" | Error | A Memory Scrub failure has been detected. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the MAX5 system board tray. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 806f010c-1881xxxx | Uncorrectable Error detected for MEU DIMMs on subsystem System Memory | Error | MAX5 memory expansion module memory error detected. | 1. Check IBM support site for an applicable RETAIN tip or firmware update that applies to this memory error.<br>2. Swap the affected DIMM with a DIMM of the same size and type from a different memory channel.<br>3. Run the Setup utility to enable all the DIMMs.<br>4. If the DIMM still fails on a different memory channel, replace the DIMM.<br>5. If the swapped DIMM fails on the original DIMM connector, inspect the DIMM connector for debris or damage. If the connector is damaged, (trained technician only) replace the MAX5 system board tray. |
| 81070608-1881xxxx | Sensor MEU PS2 VCO has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80070608-1881xxxx | Sensor MEU PS2 VCO has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 2 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 2. |
| 81070608-1881xxxx | Sensor MEU PS2 12V OC has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| 80070608-1881xxxx | Sensor MEU PS2 12V OC has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 2 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 2. |
| | Sensor MEU PS2 CSF has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| | Sensor MEU PS2 CSF has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 2 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 2. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 81070608-0a01xxxx | Sensor MEU PS1 CSF has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| | Sensor MEU PS1 CSF has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 1 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 1 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 1. |
| 81070608-1881xxxx | Sensor MEU PS1 VCO has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| 80070608-1881xxxx | Sensor MEU PS1 VCO has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 1 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 1 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 1. |
| 81070608-1881xxxx | Sensor MEU PS1 12V OC has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80070608-1881xxxx | Sensor MEU PS1 12V OC has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 1 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 1 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 1. |
| 81070608-1881xxxx | Sensor MEU PS2 12V UV has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| 80070608-1881xxxx | Sensor MEU PS2 12V UV has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 2 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 2. |
| 81070608-1881xxxx | Sensor MEU PS1 12V UV has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| 80070608-1881xxxx | Sensor MEU PS1 12V UV has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 1 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 1 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 1. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 81070608-1881xxxx | Sensor MEU PS2 12V OV has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| 80070608-1881xxxx | Sensor MEU PS2 12V OV has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 2 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 2. |
| 81070608-1881xxxx | Sensor MEU PS1 12V OV has deasserted the transition to non-recoverable | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| 80070608-1881xxxx | Sensor MEU PS1 12V OV has transitioned to non-recoverable | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 1 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 1. |
| 81070208-1881xxxx | Sensor MEU PS2 Fan has transitioned to a less severe state from critical | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 80070208-1881xxxx | Sensor MEU PS2 Fan has transitioned to critical from a less severe state | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 2 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 2. |
| 81070208-1881xxxx | Sensor MEU PS2 Therm has transitioned to a less severe state from critical | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| 80070208-1881xxxx | Sensor MEU PS2 Therm has transitioned to critical from a less severe state | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 2 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 2. |
| 81070208-1881xxxx | Sensor MEU PS1 Fan has transitioned to a less severe state from critical | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| 80070208-1881xxxx | Sensor MEU PS1 Fan has transitioned to critical from a less severe state | Error | MAX5 memory expansion module power supply 1 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 1 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 1. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 81070208-1881xxxx | Sensor MEU PS1 Therm has transitioned to a less severe state from critical | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| 80070208-1881xxxx | Sensor MEU PS1 Therm has transitioned to critical from a less severe state | Error | MAX5 memory expansion module power supply 1 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 1 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 1. |
| | MEU PS 2 Status has returned to OK status | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| 816f0008-1881xxxx | MEU PS 2 Status has been removed from container "MEU PS 2 Status | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| 806f0308-1881xxxx | MEU PS 2 Status has lost input | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| 806f0108-1881xxxx | MEU PS 2 Status has failed | Error | MAX5 memory expansion module power supply 2 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 2 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 2. |
| 806f0008-1881xxxx | MEU PS 2 Status has been added to container MEU PS 2 Status | Info | MAX5 memory expansion module power supply 2 is now normal. | No action; information only. |
| 816f0108-1881xxxx | MEU PS 1 Status has returned to OK status | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |

*Table 11. IMM error messages detected when MAX5 is attached to the server (continued)*

| Event ID | Message | Severity | Description | Action |
|---|---|---|---|---|
| 816f0008-1881xxxx | MEU PS 1 Status" has been removed from container "MEU PS 1 Status | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| 806f0308-1881xxxx | MEU PS 1 Status has lost input | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| 806f0108-1881xxxx | MEU PS 1 Status has failed | Error | MAX5 memory expansion module power supply 1 error detected. | 1. Check MAX5 memory expansion module LEDs.<br>2. Check MAX5 memory expansion module power supply 1 LEDs.<br>3. Replace the MAX5 memory expansion module power supply 1. |
| 806f0008-1881xxxx | MEU PS 1 Status has been added to container MEU PS 1 Status | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |
| 806f0308-1881xxxx | MEU PS 1 Status has lost input | Info | MAX5 memory expansion module power supply 1 is now normal. | No action; information only. |

## Solving power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition. To diagnose a power problem, use the following general procedure:

1. Turn off the server and disconnect all ac power cords.
2. Make sure that the server is cover is closed and latched correctly.
3. Check the power-fault LEDs on the system board (see “Power problems” on page 62).
4. Check for loose cables in the power subsystem. Also check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.
5. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start (see “Solving undetermined problems” on page 228 for the minimum configuration).
6. Reconnect all ac power cords and turn on the server. If the server starts successfully, reseat the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, see “Power-supply LEDs” on page 78 to replace the components in the minimum configuration one at a time until the problem is isolated.

## Solving Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Try the following procedures:

- Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.
- Make sure that the Ethernet cable is installed correctly.
  - The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
  - If you set the Ethernet controller to operate at 100 Mbps, you must use Category 5 cabling.
  - If you directly connect two servers (without a hub), or if you are not using a hub with X ports, use a crossover cable. To determine whether a hub has an X port, check the port label. If the label contains an X, the hub has an X port.
- Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Check the Ethernet controller LEDs on the rear panel of the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
  - The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
  - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check the LAN activity LED on the rear of the server. The LAN activity LED is lit when data is active on the Ethernet network. If the LAN activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check for operating-system-specific causes of the problem.
- Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

## Solving undetermined problems

If Dynamic System Analysis (DSA) did not diagnose the failure or if the server is inoperative, use the information in this section.

If you suspect that a software problem is causing failures (continuous or intermittent), see “Software problems” on page 66.

Corrupted data in CMOS memory or corrupted UEFI firmware can cause undetermined problems. To reset the CMOS data, use the CMOS jumper to clear the CMOS memory and override the power-on password; see “System-board switches and jumpers” on page 21. If you suspect that the UEFI firmware is corrupted, see “Recovering from a UEFI update failure or UEFI image corruption” on page 164.

If the power supplies are working correctly, complete the following steps:

1. Turn off the server.
2. Make sure that the server cover is closed and latched correctly.
3. Make sure that the server top cover/power cut-off switch cable is connected correctly.
4. Make sure that the server is cabled correctly.
5. Remove or disconnect the following devices, one at a time, until you find the failure. Turn on the server and reconfigure it each time.
   - Any external devices.
   - Surge-suppressor device (on the server).
   - Printer, mouse, and non-IBM devices.
   - Each adapter.
   - Hard disk drives.
   - Memory modules. The minimum configuration requirement is 1 GB DIMM in slots 3.
6. Turn on the server.

If the problem is solved when you remove an adapter from the server but the problem recurs when you reinstall the same adapter, suspect the adapter; if the problem recurs when you replace the adapter with a different one, suspect the riser card.

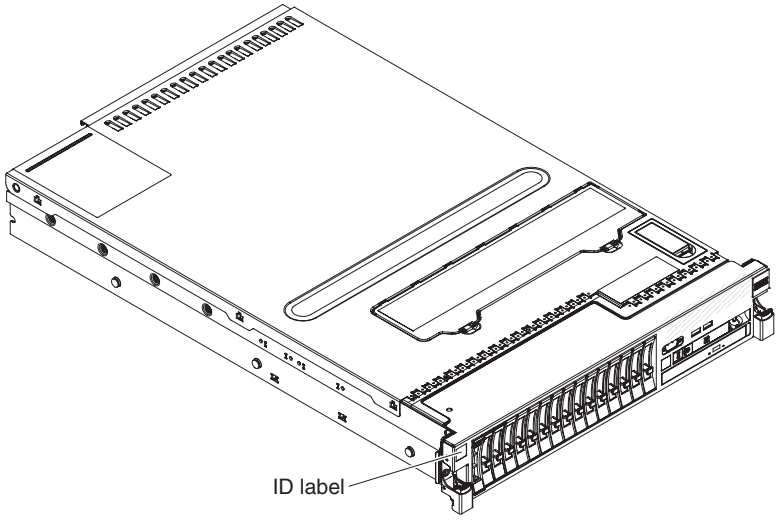
If you suspect a networking problem and the server passes all the system tests, suspect a network cabling problem that is external to the server.

## Problem determination tips

Because of the variety of hardware and software combinations that can encounter, use the following information to assist you in problem determination.

The model number and serial number are located on the ID label on the front of the server as shown in the following illustration.

**Note:** The illustrations in this document might differ slightly from your hardware.




- Machine type and model
- Microprocessor or hard disk drive upgrades
- Failure symptom
  - Does the server fail the Dynamic System Analysis diagnostic tests?
  - What occurs? When? Where?
  - Does the failure occur on a single server or on multiple servers?
  - Is the failure repeatable?
  - Has this configuration ever worked?
  - What changes, if any, were made before the configuration failed?
  - Is this the original reported failure?
- Diagnostic program type and version level
- Hardware configuration (print screen of the system summary)
- UEFI firmware level
- IMM firmware level
- Operating-system software

You can solve some problems by comparing the configuration and software setups between working and nonworking servers. When you compare servers to each other for diagnostic purposes, consider them identical only if all the following factors are exactly the same in all the servers:

- Machine type and model
- UEFI firmware level
- IMM firmware level
- Adapters and attachments, in the same locations

- Address jumpers, terminators, and cabling
- Software versions and levels
- Diagnostic program type and version level
- Setup utility settings
- Operating-system control-file setup

See “Getting help and technical assistance,” on page 405 for information about calling IBM for service.

# Chapter 4. Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192

The following replaceable components are available for the System x3690 X5 Types 7147, 7148, 7149, and 7192 server, except as specified otherwise in "Replaceable server components." For an updated parts listing, go to http://www.ibm.com/supportportal/.

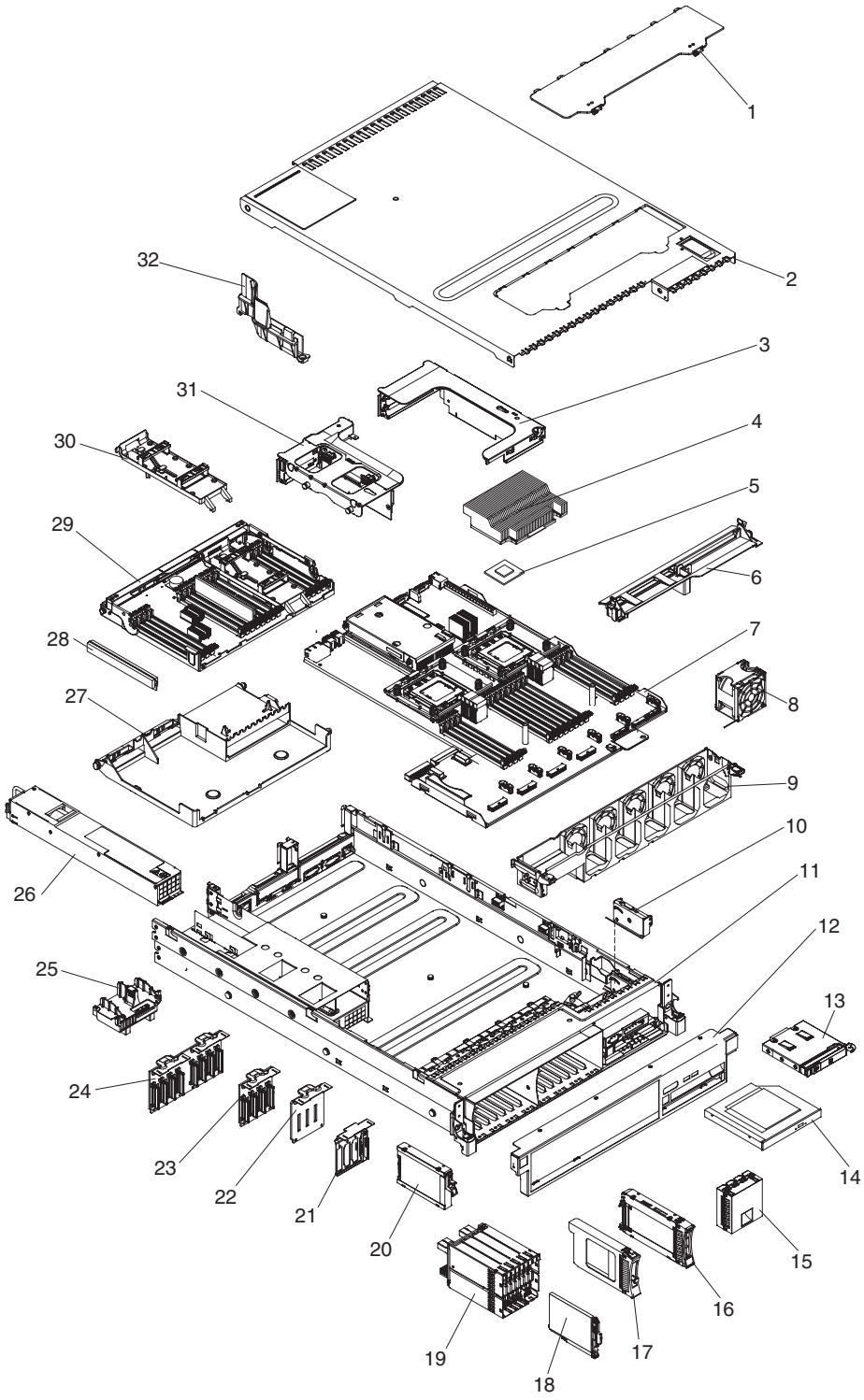
## Replaceable server components

The four types of replaceable components are:

- **Consumables:** Purchase and replacement of consumables (components, such as batteries and printer cartridges, that have depleting life) is your responsibility. If IBM acquires or installs a consumable component at your request, you will be charged for the service.
- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty and getting service and assistance, see the *Warranty Information* document that comes with the server. For more information about getting service and assistance, see "Getting help and technical assistance," on page 405.

The following illustration shows the major components in the server. The illustrations in this document might differ slightly from your hardware.




The following table lists the part numbers for the server components.

*Table 12. Parts listing, Types 7147, 7148, 7149, and 7192*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| 2 | Top cover (All models) | 69Y2296 | | |

*Table 12. Parts listing, Types 7147, 7148, 7149, and 7192 (continued)*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| 3 | PCI Express Gen2 riser card assembly, x16 full-length | 69Y2330 | | |
| | PCI Express Gen2 riser card assembly, x16 half-length | 69Y2329 | | |
| | PCI Express Gen2 riser card assembly, x8 two-slot (all models) | 69Y2328 | | |
| 4 | Heat sink assembly (all models) | | | 49Y9936 |
| 5 | Microprocessor, 1.73 GHz, 105W, 4C, Xeon E6510 | | | 49Y9932 |
| 5 | Microprocessor, 1.86 GHz, 95W, 4C, Xeon E7520 | | | 49Y9931 |
| 5 | Microprocessor, 1.86 GHz, 18M, 95W, 6C, Xeon E7-4807 | | | 88Y5696 |
| 5 | Microprocessor, 1.86 GHz, 95W, 6C, Xeon L7545 | | | 49Y9928 |
| 5 | Microprocessor, 1.86 GHz, 105W, 6C, Xeon E7530 | | | 49Y9930 |
| 5 | Microprocessor, 2.00 GHz, 105W, 6C, Xeon E7540 | | | 49Y9929 |
| 5 | Microprocessor, 2.00 GHz, 105W, 6C, Xeon E6540 | | | 49Y9934 |
| 5 | Microprocessor, 2.67 GHz, 130W, 6C, Xeon X7542 | | | 49Y9935 |
| 5 | Microprocessor, 1.73 GHz, 18M, 105W, 6C, Xeon E7-2803 (models A1x, A1X) | | | 88Y5701 |
| 5 | Microprocessor, 1.86 GHz, 95W, 8C, Xeon L7555 | | | 49Y9926 |
| 5 | Microprocessor, 2.00 GHz, 130W, 8C, Xeon X7550 | | | 49Y9927 |
| 5 | Microprocessor, 2.00 GHz, 130W, 8C, Xeon X6550 | | | 49Y9933 |
| 5 | Microprocessor, 2.00 GHz, 18M, 105W, 8C, Xeon E7-2820 (model A2x) | | | 88Y5700 |
| 5 | Microprocessor, 2.27 GHz, 130W, 8C, Xeon X7560 | | | 49Y9925 |
| 5 | Microprocessor, 2.67 GHz, 24M, 130W, 8C, Xeon E7-8837 (model C1x) | | | 88Y5691 |
| 5 | Microprocessor, 2.00 GHz, 24M, 130W, 10C, Xeon E7-2850 (model A5x) | | | 88Y5731 |
| 5 | Microprocessor, 2.13 GHz, 24M, 105W, 8C, Xeon E7-2830 (model A3x) | | | 88Y5699 |
| 5 | Microprocessor, 2.13 GHz, 30M, 105W, 10C, Xeon E7-8867 | | | 88Y5688 |
| 5 | Microprocessor, 2.26 GHz, 24M, 130W, 10C, Xeon E7-2860 (models A6x, d1x, D2x, F1x, F2x) | | | 88Y5698 |
| 5 | Microprocessor, 2.40 GHz, 30M, 130W, 10C, Xeon E7-2870 (models A7x, H1x, H2x, H3x, H7Y) | | | 88Y5697 |
| 6 | Air baffle, microprocessor (this part is included in part number 69Y2300) (all models) | | | |
| 7 | System board:<br>• Intel 7500 scalable memory buffer<br>• Use in Machine Types 7148 and 7149 only | | | 49Y9497 |
| 7 | System board:<br>• Intel 7510 scalable memory buffer<br>• Use in Machine Types 7147 and 7192 only<br><br>(models A1xx, A2x, A3x, A5x, A6x, A7x, C1x, D1x, D2x, F1x, F2x, H1x, H2, H3x, A1X, H7Y) | | | 81Y8964 |

*Table 12. Parts listing, Types 7147, 7148, 7149, and 7192 (continued)*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| 8 | Fan, hot-swap 60 mm (all models) | 69Y2273 | | |
| 9 | Fan cage assembly (all models) | 69Y2297 | | |
| 10 | Bracket assembly, top cover/power cut-off switch (all models) | | | 69Y2284 |
| 11 | Chassis assembly (without front bezel) - (all models) | | | 69Y2298 |
| 12 | Bezel (all models) | 69Y2293 | | |
| 13 | Operator information panel assembly (all models) | 44E4372 | | |
| 14 | DVD-ROM drive | 44W3256 | | |
| 15 | Filler, 4x4 hot-swap drive bay | 49Y5359 | | |
| 15 | Hard disk drive, 2.5-inch SAS, hot-swap 73 GB 15K | 42D0673 | | |
| 16 | Hard disk drive, 2.5-inch SAS, hot-swap 146 GB 10K | 42D0633 | | |
| 16 | Hard disk drive, 2.5-inch SAS, hot-swap 146 GB 15K | 42D0678 | | |
| 16 | Hard disk drive, 2.5-inch, SAS hot-swap 300 GB 10K | 42D0638 | | |
| 16 | Hard disk drive, 2.5-inch, SAS hot-swap 500 GB 7.2K | 42D0708 | | |
| 16 | Solid state drive, 2.5-inch SAS hot-swap 50 GB | 43W7717 | | |
| 17 | Filler, single drive bay (2.5-inch drive) (all models) | 44T2248 | | |
| 18 | Solid state drive, 1.8-inch, SAS hot-swap 50 GB | 43W7737 | | |
| 19 | Backplane cage assembly, 8x1.8-inch SAS/SATA hot-swap (model 3Dx,3Fx, 3Jx, D1x, D2x, H1x, H2x, H3x, H7Y) | | 59Y6222 | |
| 20 | Hard disk drive, 2.5-inch simple-swap SATA 500 GB | 43W7689 | | |
| 21 | Backplate/cable assembly, single simple-swap SATA | | 69Y2282 | |
| 22 | Filler, 4x4 drive backplane (all models) | 69Y2286 | | |
| 23 | Backplane, 4x2.5-inch SAS/SATA hot-swap drive (models 1Rx, 2Rx, 3Gx, 3Rx, 4Rx, 3Sx,, 4Sx, 2Dx, 4RX, A2x, A3x, A5x, A6x, A7x, C1x, F1x, F2x) | | 43V7070 | |
| 24 | Backplane, 8x2.5-inch SAS/SATA hot-swap drive | | 69Y0650 | |
| 25 | Power interposer card (models 2Cx, 2Dx, 3Dx, 3Jx, D1x, D2x, F1x, F2x, H1x, H2x, H3x, H7Y) | | 49Y9480 | |
| 26 | Power supply, 675 Watt (all models) | 39Y7218 | | |
| 27 | DIMM air baffle | 69Y2291 | | |
| 28 | Memory, 2 GB DDR3 1333 MHz ECC LP RDIMM | 49Y1443 | | |
| 28 | Memory, 2 GB PC3-10600R-999 DDR3 ECC (model 4Rx) | 44T1491 | | |
| 28 | Memory, 4 GB PC3-10600R-999 DDR3 ECC (models 1Rx, 2Rx, 3Rx, 3Gx, 4Rx, and ARx, F1x, F2x) | 44T1598 | | |
| 28 | Memory, 4 GB (1.35V) PC3L-10600R-999 CL9 DDR3 ECC (models A1x, A2x, A3x, A5x, A6x, A7x, C1x, D1x, D2x, F1x, F2x, A1X) | 49Y1425 | | |
| 28 | Memory, 4 GB PC3-12800 DDR3 | 49Y1561 | | |
| 28 | Memory, 4 GB PC3-8500-777 DDR3 ECC | 46C7452 | | |
| 28 | Memory, 8 GB PC3-8500-777 DDR3 ECC | 46C7488 | | |
| 28 | Memory, 8 GB (1.35V) PC3L-8500R-777 CL7 DDR3 ECC | 49Y1417 | | |

*Table 12. Parts listing, Types 7147, 7148, 7149, and 7192 (continued)*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| 28 | Memory, 16 GB (1.35V) PC3-10600 DDR3 ECC | 49Y1564 | | |
| 28 | Memory, 16 GB (1.35V) PC3-10600 DDR3 ECC | 49Y1568 | | |
| 28 | Memory, 16 GB (1.35V) PC3L-10600 LP DDR3 ECC (for Machine Types 7147 and 7192 only) | 49Y1563 | | |
| 28 | Memory, 16 GB PC3-8500-777 DDR3 ECC | 46C7489 | | |
| 28 | Memory, 16 GB (1.35V) PC3L-8500R-777 CL7 DDR3 ECC (models H1x, H2x, H3x, H7Y) | 49Y1418 | | |
| 28 | Memory, 32 GB (1.35V) PC3L-8500R-777 CL7 DDR3 ECC | 90Y3101 | | |
| 29 | Memory tray (with no memory board) (models 2Cx, 2Dx, 3Dx, 3Fx, 3Jx, F1x, F2x) | 69Y2274 | | |
| 30 | RAID battery tray (this part is included in part number 69Y2300) | | | |
| 31 | PCI Express Gen2 riser card assembly, x8 low-profile (models A2x, A3x, A5x, A6x, A7x, C1x, D1x, D2x, F1x, F2x, H1x, H2x, H3x, H7Y) | 49Y6576 | | |
| 32 | SAS cable guide (this part is included in part number 69Y2300) | | | |
| | Tray, RAID battery/flash power module | 88Y5874 | | |
| | Memory tray and board assembly (machine types 7148 and 7149) | 49Y6531 | | |
| | Memory tray and board assembly (machine types 7147 and 7192) (models F1x, F2x, H1x, H2x, H3x, H7Y) | 81Y8956 | | |
| | Emulex 10Gb Ethernet Custom Adapter for IBM System x (all models) | 49Y4202 | | |
| | Emulex 10Gb Ethernet Integrated Virtual Fabric Adapter II for IBM System x (Models D1x, D2x, F1x, F2x, H1x, H2x, H3x, H7Y) | 49Y7942 | | |
| | Cable, ServeRAID M5100 Series 425mm Flash Power Module | 90Y7310 | | |
| | Cable management arm (all models) | 49Y4817 | | |
| | Cable, operator panel (all models) | | 69Y2276 | |
| | Cable, power/configuration (4-drive backplane) (models A2x A3x, A5x, A6x, A7x, C1x, F1x, F2x, 1Rx, 2Rx, 3Gx 3Rx, 4Rx, 3Sx, 4Sx, 2Dx, 3Dx, 3Fx, 3Jx, 4RX) | 69Y2278 | | |
| | Cable, power/configuration (8-drive backplane) | 69Y2279 | | |
| | Cable, Y-power | 39M5523 | | |
| | Cable, power (solid state drives) (all models) | 69Y2289 | | |
| | Cable kit, SAS signal, 820 mm and 950 mm (all models) | 69Y2281 | | |
| | Cable, DVD and simple-swap SATA signal/power assembly (all models) | | 90Y7299 | |
| | Cable, video power (models AC1, AC3, AC4, CTO, MCI) | | 69Y2283 | |
| | Cable, USB/video (all models) | | 69Y2277 | |
| | Cable, power (power interposer card) (models 2Dx, 3Dx, 3Fx, 3Jx, D1x, D2x, F1x, F2x) | | 69Y2280 | |

*Table 12. Parts listing, Types 7147, 7148, 7149, and 7192 (continued)*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| | Cable, QPI 2U/2U | 69Y2287 | | |
| | Cable, QPI 2U/1U (models 2Dx, 3Sx, 4Sx, F1x, F2x) | 40K6751 | | |
| | Cord, Y-jumper power | 39M5523 | | |
| | Cord, 2.8m line (models A1x, A2x, A3x, A5x, A6x, A7x, C1x, D1x, D2x, F1x, F2x, A1X, 1Rx, 2Rx, 3Rx, 3Gx, 4Rx, ARx, 3Sx, 4Sx, 3Dx, 3Fx, 3Jx, 2Dx, 4Rx) | 39M5377 | | |
| | Filler, QPI ports (all models except 2Dx, 3Sx, and 4Sx) | 69Y2290 | | |
| | Filler, DVD drive bay (all models) | 49Y4868 | | |
| | Filler, SATA drive bay | 49Y5360 | | |
| | Filler, PCI riser slot (models ARx, A1x, A1X) | 69Y2292 | | |
| | Filler, power supply bay (all models) | 49Y4821 | | |
| | Slide lock-out disabler | 69Y2301 | | |
| | Labels, system service (all models) | 69Y2299 | | |
| | Label kit (Machine Types 7147 and 7192) | 88Y5762 | | |
| | Miscellaneous parts kit (all models) | | 69Y2300 | |
| | ServeRAID M5016 SAS/SATA adapter (Machine Types 7147 and 7192) | 90Y4304 | | |
| | ServeRAID M5015 SAS/SATA adapter battery carrier kit (this part is included in part number 69Y2300) | | | |
| | ServeRAID M5015 SAS/SATA adapter | 46M0851 | | |
| | ServeRAID M1015 SAS/SATA adapter | 46M0861 | | |
| | ServeRAID B5015 Solid State Drive (SSD) adapter (models AC1, AC3, AC4, CTO, MC1, A1x, D1x, D2x, A1X) | 46M0970 | | |
| | 6Gb Solid State Drive (SSD) Host Bus Adapter (models AC1, AC3, AC4, CTO, MC1 | 46M0913 | | |
| | 4x4 Drive Backplane ServeRAID Expansion adapter | 46M0997 | | |
| | Rack latch kit, 2U (all models) | | 69Y2295 | |
| | Slide rail kit (all models) | | 60Y0328 | |
| | Thermal grease kit (All models) | | | 41Y9292 |
| | Hypervisor, embedded USB flash device | 42D0545 | | |
| | Battery, 3.0 volt | 15F8409 | | |
| | Alcohol wipe, Canada | | | 41Y8746 |
| | Alcohol wipe, Brazil/Mexico | | | 41Y8747 |
| | Alcohol wipe, Taiwan/Japan | | | 41Y8748 |
| | Alcohol wipe, China/Malaysia | | | 41Y8749 |
| | Alcohol wipe, Australia/UK | | | 41Y8750 |
| | Alcohol wipe, Korea | | | 41Y8751 |
| | Alcohol wipe, Hungary | | | 41Y8753 |
| | Alcohol wipe, Latin America | | | 41Y8754 |
| | Alcohol wipe, China | | | 41Y8757 |

*Table 12. Parts listing, Types 7147, 7148, 7149, and 7192 (continued)*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| | Alcohol wipe, Hong Kong | | | 41Y8758 |
| | Alcohol wipe, India | | | 41Y8759 |
| | Alcohol wipe, Singapore | | | 41Y8760 |
| | Alcohol wipe, other countries | | | 41Y8752 |

## Consumable parts

Consumable parts are not covered by the IBM Statement of Limited Warranty. The following consumable parts are available for purchase from the retail store.

*Table 13. Consumable parts, Types 7147, 7148, 7149, and 7192*

| Index | Description | Part number |
|---|---|---|
| | ServeRAID M5015 battery | 43W4342 |
| | ServeRAID M5100 Series Super Capacitor Pack (flash power module) | 81Y4579 |

To order a consumable part, complete the following steps:

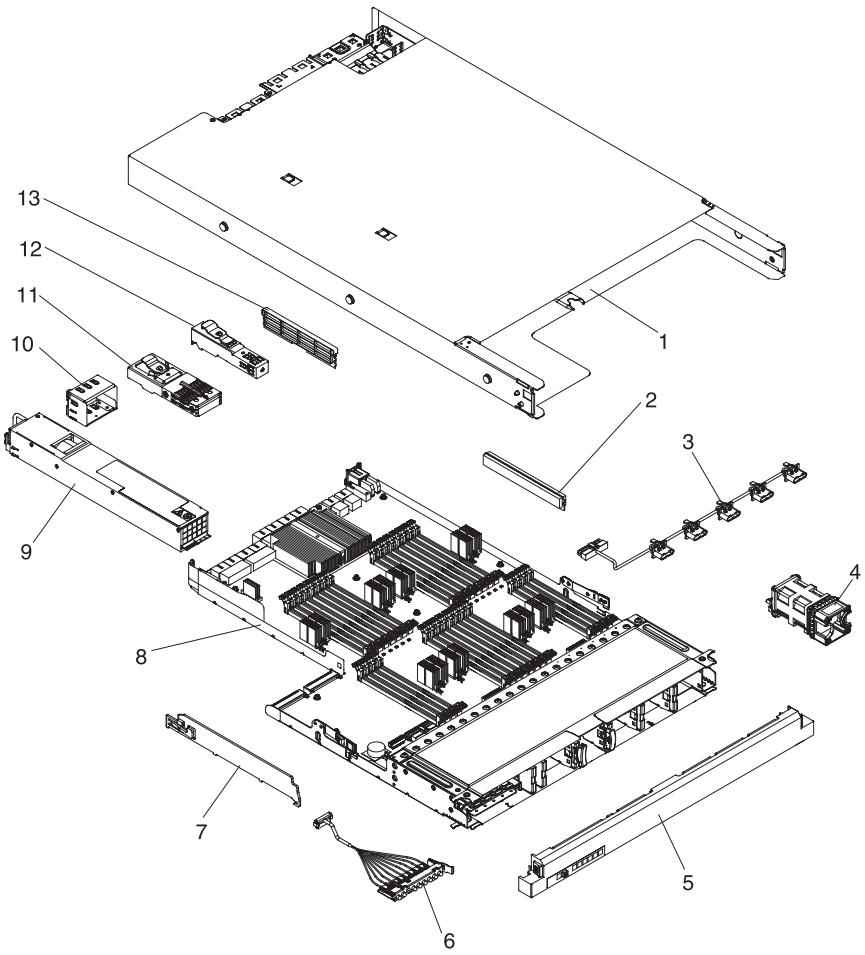
1. Go to http://www.ibm.com.
2. From the **Products** menu, select **Upgrades, accessories & parts**.
3. Click **Obtain maintenance parts**; then, follow the instructions to order the part from the retail store.

If you need help with your order, call the toll-free number that is listed on the retail parts page, or contact your local IBM representative for assistance.

# Replaceable MAX5 components

The following replaceable components are available for the IBM MAX5 for System x (MAX5) memory expansion module.

The following illustration shows the major components in the MAX5. The illustrations in this document might differ slightly from your hardware.




The following table lists the replaceable components in the MAX5 expansion module:

*Table 14. MAX5 memory expansion module parts listing*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| 1 | Chassis assembly (without the front bezel) (all models) | | | 40K6743 |
| 2 | Memory, 2 GB PC3-10600R-999 DDR3 ECC | 44T1491 | | |
| 2 | Memory, 4 GB PC3-10600R-999 DDR3 ECC | 44T1598 | | |
| 2 | Memory, 4 GB (1.35V) PC3L-10600R-999 CL9 DDR3 ECC (for MAX5s with Intel 7510 scalable memory buffer) | 49Y1425 | | |
| 2 | Memory, 4 GB PC3-8500-777 DDR3 ECC | 46C7452 | | |
| 2 | Memory, 8 GB (1.35V) PC3L-8500R-777 CL7 DDR3 ECC (for MAX5s with Intel 7510 scalable memory buffer) | 49Y1417 | | |

*Table 14. MAX5 memory expansion module parts listing (continued)*

| Index | Description | CRU part number (Tier 1) | CRU part number (Tier 2) | FRU part number |
|---|---|---|---|---|
| 2 | Memory, 8 GB PC3-8500-777 DDR3 ECC | 46C7488 | | |
| 2 | Memory, 16 GB (1.35V) PC3L-10600 LP DDR3 ECC (for MAX5s with Intel 7510 scalable memory buffer) | 49Y1563 | | |
| 2 | Memory, 16 GB (1.35V) PC3L-8500R-777 CL7 DDR3 ECC (for MAX5s with Intel 7510 scalable memory buffer) | 49Y1418 | | |
| 2 | Memory, 16 GB PC3-8500-777 DDR3 ECC | 46C7489 | | |
| 2 | Memory, 32 GB (1.35V) PC3L-8500R-777 CL7 DDR3 ECC (for MAX5s with Intel 7510 scalable memory buffer) | 90Y3101 | | |
| 3 | Cable assembly, five-drop fan | 40K6746 | | |
| 4 | Fan assembly, hot-swap (all models) | 40K6745 | | |
| 5 | Bezel (all models) | 40K6747 | | |
| 6 | Information panel assembly | 68Y9656 | | |
| 7 | Air baffle | 40K6748 | | |
| 8 | System-board tray assembly:<br>• Intel 7500 scalable memory buffer<br>• Use in MAX5 models that attaches to System x3690 X5, machine types 7148 and 7149 | | 40K6744 | |
| 8 | System-board tray assembly:<br>• Intel 7510 scalable memory buffer<br>• Use in MAX5 models that attaches to System x3690 X5, machine types 7147 and 7192 | | 40K6774 | |
| 9 | Power supply, 675 Watt hot-swap | 39Y7218 | | |
| 10 | Power supply filler | 49Y5331 | | |
| 11 | QPI filler | 68Y9713 | | |
| 12 | EXA filler | 68Y9703 | | |
| 13 | DIMM filler | 44V8227 | | |
| | Service label | 40K6775 | | |
| | Cable, 3U QPI scalability | 40K6751 | | |
| | Cable, EXA scalability | 40K6752 | | |

## Power cords

For your safety, a power cord with a grounded attachment plug to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

Power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S.): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

Power cords for a specific country or region are usually available only in that country or region.

| **Power cord part number** | **Used in these countries and regions** |
|---|---|
| 39M5206 | China |
| 39M5102 | Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea |
| 39M5123 | Afghanistan, Albania, Algeria, Andorra, Angola, Armenia, Austria, Azerbaijan, Belarus, Belgium, Benin, Bosnia and Herzegovina, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic of), Congo (Republic of), Cote D'Ivoire (Ivory Coast), Croatia (Republic of), Czech Republic, Dahomey, Djibouti, Egypt, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Finland, France, French Guyana, French Polynesia, Germany, Greece, Guadeloupe, Guinea, Guinea Bissau, Hungary, Iceland, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos (People's Democratic Republic of), Latvia, Lebanon, Lithuania, Luxembourg, Macedonia (former Yugoslav Republic of), Madagascar, Mali, Martinique, Mauritania, Mauritius, Mayotte, Moldova (Republic of), Monaco, Mongolia, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Slovakia, Slovenia (Republic of), Somalia, Spain, Suriname, Sweden, Syrian Arab Republic, Tajikistan, Tahiti, Togo, Tunisia, Turkey, Turkmenistan, Ukraine, Upper Volta, Uzbekistan, Vanuatu, Vietnam, Wallis and Futuna, Yugoslavia (Federal Republic of), Zaire |
| 39M5130 | Denmark |
| 39M5144 | Bangladesh, Lesotho, Macao, Maldives, Namibia, Nepal, Pakistan, Samoa, South Africa, Sri Lanka, Swaziland, Uganda |

| Power cord part number | Used in these countries and regions |
|---|---|
| 39M5151 | Abu Dhabi, Bahrain, Botswana, Brunei Darussalam, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dominica, Gambia, Ghana, Grenada, Iraq, Ireland, Jordan, Kenya, Kuwait, Liberia, Malawi, Malaysia, Malta, Myanmar (Burma), Nigeria, Oman, Polynesia, Qatar, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, Sierra Leone, Singapore, Sudan, Tanzania (United Republic of), Trinidad and Tobago, United Arab Emirates (Dubai), United Kingdom, Yemen, Zambia, Zimbabwe |
| 39M5158 | Liechtenstein, Switzerland |
| 39M5165 | Chile, Italy, Libyan Arab Jamahiriya |
| 39M5172 | Israel |
| 39M5095 | 220 - 240 V<br><br>Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela |
| 39M5076 | 110 - 120 V<br><br>Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bolivia, Caicos Islands, Canada, Cayman Islands, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guam, Guatemala, Haiti, Honduras, Jamaica, Mexico, Micronesia (Federal States of), Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Thailand, Taiwan, United States of America, Venezuela |
| 39M5219 | Korea (Democratic People's Republic of), Korea (Republic of) |
| 39M5199 | Japan |
| 39M5226 | India |
| 39M5240 | Brazil |

# Chapter 5. Removing and replacing components

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit:** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by Trained service technicians.

See Chapter 4, "Parts listing, System x3690 X5 Types 7147, 7148, 7149, and 7192," on page 231 to determine whether a component is a Tier 1 CRU, Tier 2 CRU, or FRU.

For information about the terms of the warranty and getting service and assistance, see the *Warranty Information* document that comes with the server.

## Installation guidelines

**Attention:** Static electricity that is released to internal server components when the server is powered-on might cause the system to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when removing or installing a hot-swap devices.

Before you remove or replace a component, read the following information:

- Read the safety information that begins on page "Safety" on page vii and the guidelines in "Handling static-sensitive devices" on page 245. This information will help you work safely.
- Make sure that the devices that you are installing are supported. For a list of supported optional devices for the server (or MAX5, if one is connected to the server), see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, go to http://www.ibm.com/support/fixcentral/.

  **Important:**Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. For additional information about tools for updating, managing, and deploying firmware, see the ToolsCenter for System x and BladeCenter at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.
- Before you install optional devices, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a 19990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see Chapter 1, "Start

here," on page 1, "IBM Dynamic System Analysis" on page 80, and the *Problem Determination and Service Guide* for diagnostic information.

- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes to disk drives.
- Have a small flat-blade screwdriver available.
- You do not have to turn off the server to install or replace hot-swap power supplies, hot-swap fans, hot-swap drives, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source before you perform any steps that involve removing or installing riser cards.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.

## System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap fan within 30 seconds of removal.
- You have replaced a hot-swap drive within 2 minutes of removal.

- You do not operate the server without the air baffles installed. Operating the server without the air baffles might cause the microprocessor to overheat.

## Handling static-sensitive devices

**Attention:** Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

## Returning a device or component

If you are instructed to return a device or component, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

# Removing and replacing server components

This section provides information for removing and replacing components in the server.

## Removing and replacing consumable parts and Tier 1 CRUs

Replacement of consumable parts and Tier 1 CRUs is your responsibility. If IBM installs a consumable part or Tier 1 CRU at your request, you will be charged for the installation.

The illustrations in this document might differ slightly from your hardware.

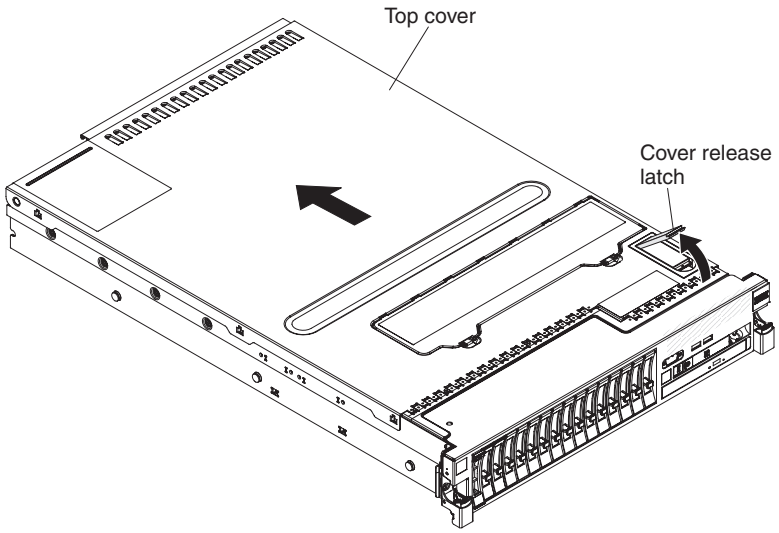
## Removing the server top cover

**Attention:** If you release the cover latch and remove the cover while the server is running, the server will lose power and turn off automatically. After you reinstall the cover, you can power-on the server again.

To remove the server top cover, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.

   **Note:** When the cover is removed from the server, the server automatically powers off. To view any LEDs on the system board, press the **Light path button** to light the LEDs.
3. If the server has been installed in a rack, slide the server out from the rack enclosure.
4. Press in on the blue tab on the cover-release latch and lift the cover release latch up (the cover slides to the rear). Lift the cover off the server and set it aside.

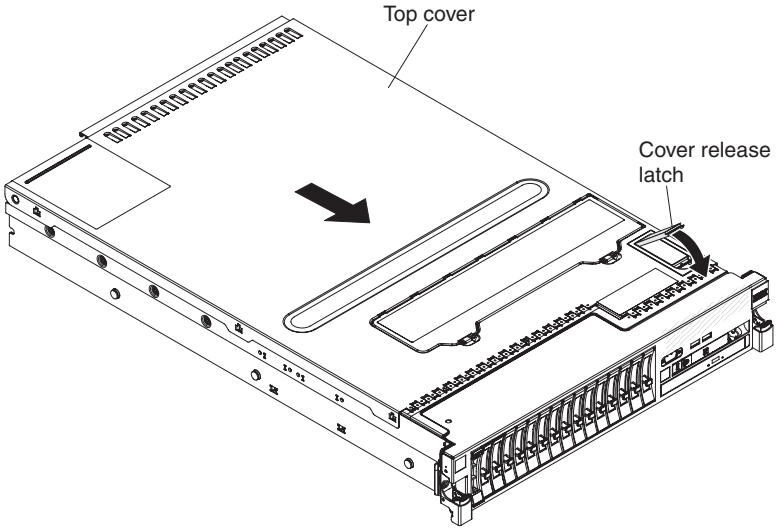


## Replacing the server top cover

To install the server cover, complete the following steps:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.
2. Align the cover over the server (toward the rear of the server) until the cover edges slip into position over the chassis.

   **Important:** Before sliding the cover forward, make sure that all the tabs on the cover engage the chassis correctly. If all the tabs do not engage the chassis correctly, it will be hard to remove the cover later.

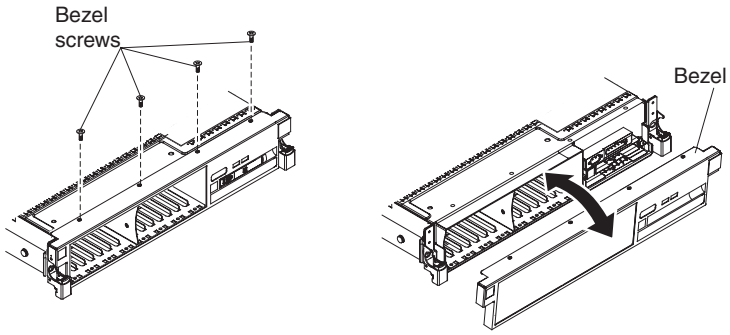



3. Slide the cover toward the front of the server; then, press down on the cover release latch until it clicks into place.
4. Slide the server back into the rack cabinet until it latches.
5. Reconnect the external cables and power cords.

## Removing the bezel

To remove the bezel, complete the following steps:

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Turn off the server (see “Turning off the server” on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Slide the server out of the rack.
4. Remove the drives and filler panels from the drive bays (see “Removing 2.5-inch and 1.8-inch hot-swap drives” on page 260).
5. Remove the screws from the bezel.

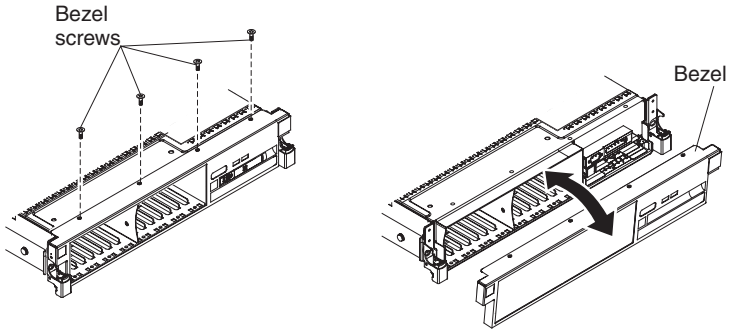



6. Pull the top of the bezel out slightly; then, rotate it downward until the tabs on the bottom of the bezel disengages from the chassis and set it aside.

## Replacing the bezel

To install the bezel, complete the following steps:

1. Insert the tabs on the bottom of the bezel into the holes on the chassis.
2. Rotate the bezel upward to the server and reinstall the bezel screws.

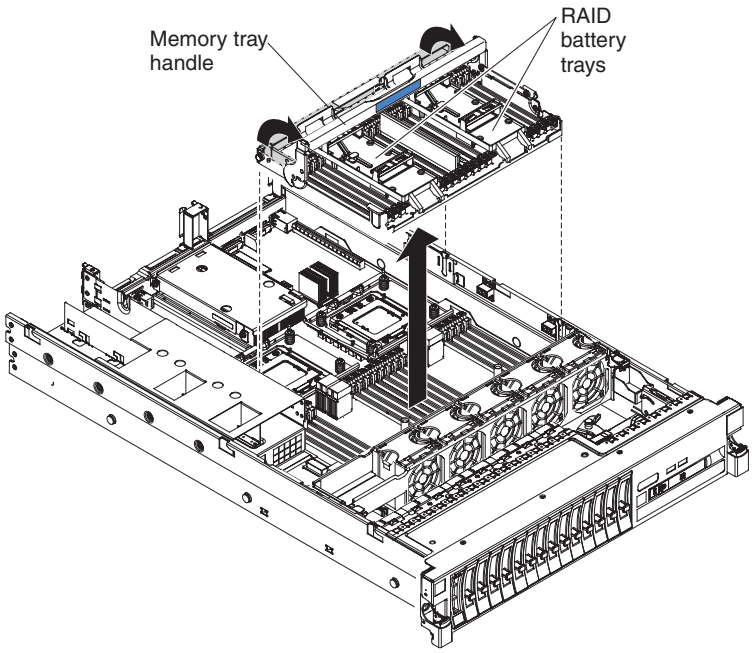



3. Reinstall the hard disk drives and drive bay filler panels into the drive bays.
4. Install the cover (see "Replacing the server top cover" on page 247).
5. Reconnect the power cords and any cables that you removed.
6. Slide the server into the rack.
7. Turn on the peripheral devices and the server.

## Removing the memory tray

To remove the memory tray, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. If the server has been installed in a rack, slide the server out from the rack enclosure.
4. Remove the top cover (see "Removing the server top cover" on page 246).
5. If any remote RAID adapter batteries are stored in the RAID battery trays on top of the memory tray, remove the battery tray from the memory tray and set it aside; then, grasp the memory tray handle by the blue touch points and rotate it all the way up (this disengages the memory tray from the connectors on the system board).



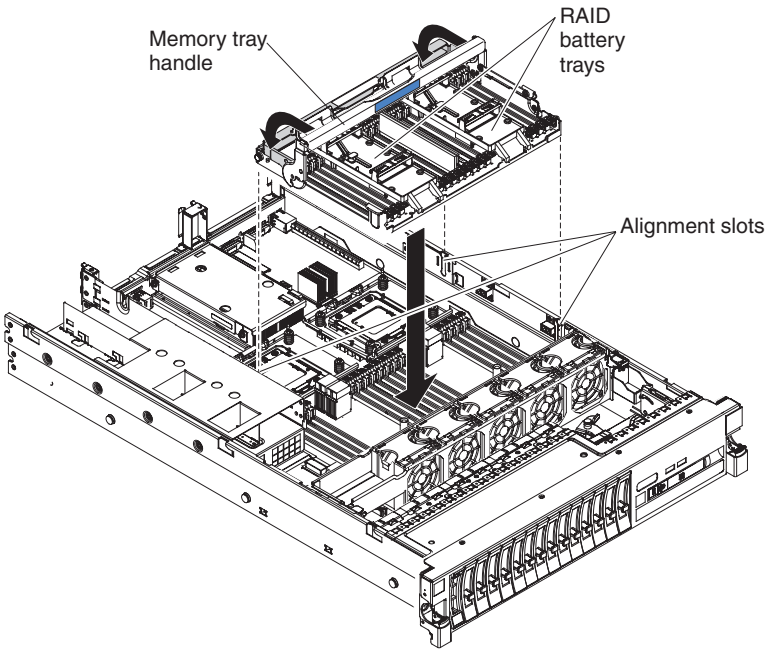

6. Lift the memory tray from the server and set it on a flat surface to avoid damaging the connector pins on the bottom of the tray.
7. If you are replacing the memory tray, remove the DIMMs (see "Removing a memory module" on page 277).
8. If you are instructed to return the memory tray, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the memory tray

To install the memory tray, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Reinstall the DIMMs (see "Replacing a memory module" on page 278).
3. Align the tabs on the sides of the memory tray with the slots on the power supply cage and the chassis wall and lower the memory tray into the server.

   **Note:** Before you install the new memory tray, make sure that there are no packaging material underneath memory tray.

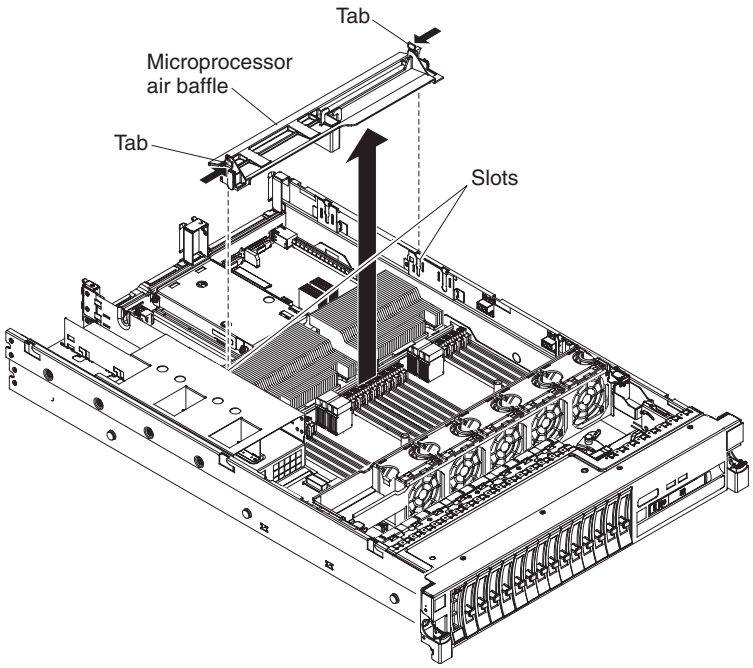



4. Rotate the memory tray handle toward the rear of the server until the memory tray is seated firmly and the handle is locked in place.
5. Reinstall the cover (see "Replacing the server top cover" on page 247).
6. Slide the server into the rack.
7. Reconnect the power cords and any cables that you removed.
8. Turn on the peripheral devices and the server.

## Removing the microprocessor air baffle

To remove the microprocessor air baffle, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the server cover (see "Removing the server top cover" on page 246).
4. If a riser-card assembly is installed in PCI riser slot 1, disconnect the cables that are connected to the adapters. Grasp the riser-card assembly and lift it out of the PCI riser-card slot on the system board.
5. Grasp the tabs on both sides of the baffle and pull the tabs away from the holes on the power supply cage and chassis wall to release it; then, slide the baffle all the way up out of the slots.

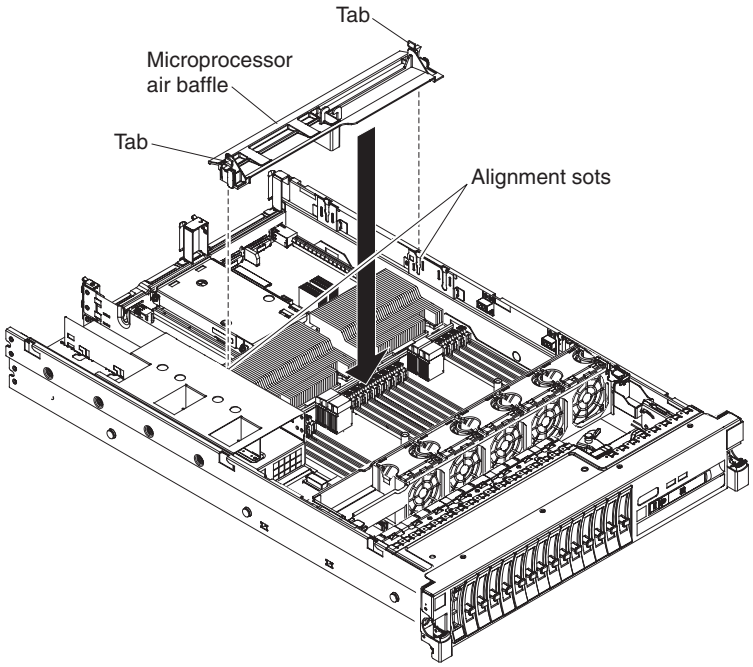



**Attention:** For proper cooling and airflow, replace the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.

## Replacing the microprocessor air baffle

To install the microprocessor air baffle, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the tabs on the air baffle with the slots on the power supply cage and the chassis wall; then, slide the air baffle down until it is seated firmly with the baffle tabs in the holes on the power supply cage and chassis wall.

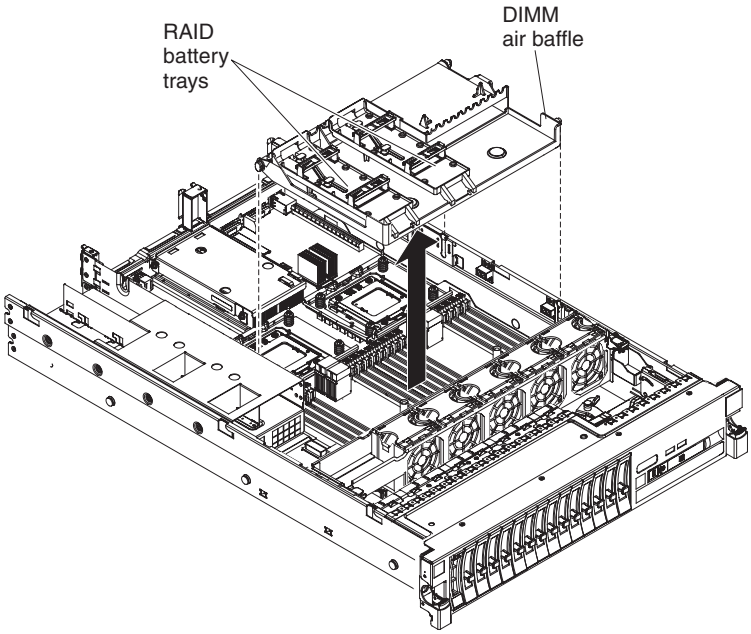


3. Reinstall the riser card assembly, if one was removed (see "Replacing a PCI riser-card assembly" on page 319); then, reconnect the cables to any adapters that were removed.
4. Reinstall the cover (see "Replacing the server top cover" on page 247).
5. Slide the server into the rack.
6. Reconnect the power cords and any cables that you removed.
7. Turn on the peripheral devices and the server.

## Removing the DIMM air baffle

To remove the DIMM air baffle, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Lift the DIMM air baffle from the server.

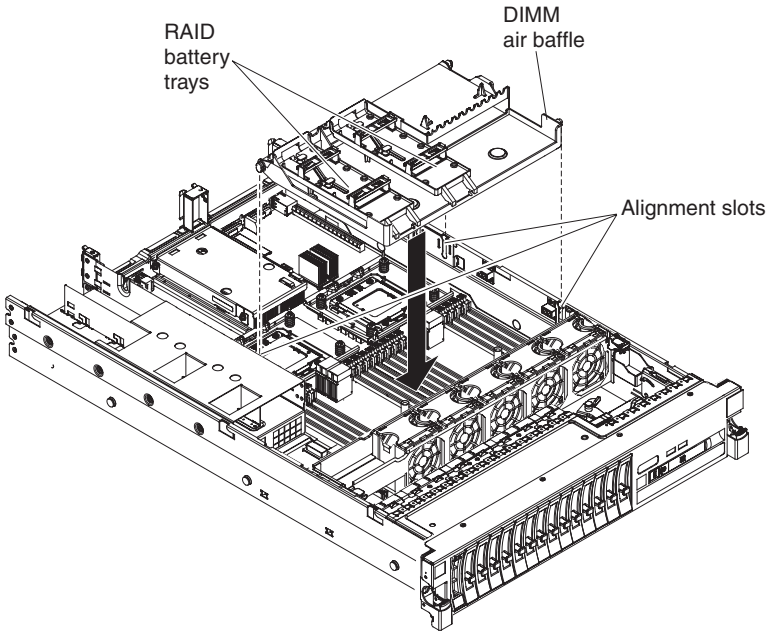



**Attention:** For proper cooling and airflow, replace the air baffle before you turn on the server. Operating the server with an air baffle removed might damage server components.

## Replacing the DIMM air baffle

To install the DIMM air baffle, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the tabs on the sides of the DIMM air baffle with the slots on the power supply cage and the chassis wall and lower the DIMM air baffle into the server.



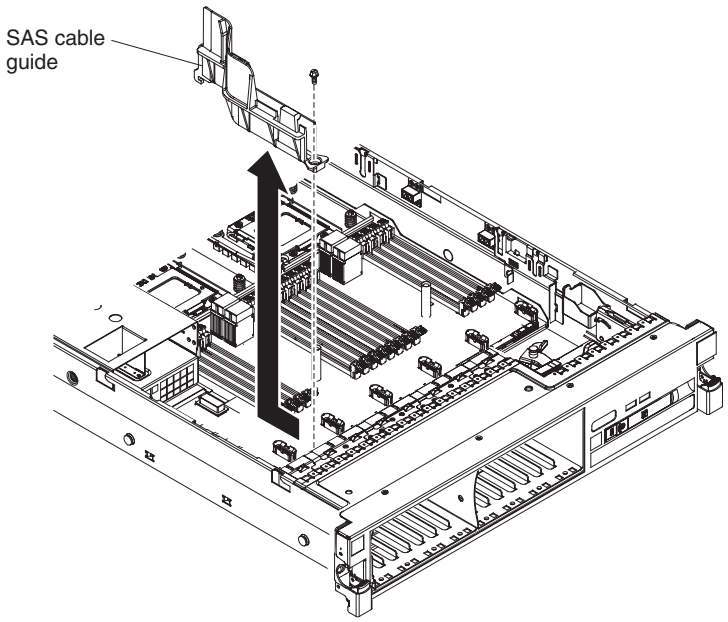

3. Reinstall the cover (see "Replacing the server top cover" on page 247).
4. Slide the server into the rack.
5. Reconnect the power cord and any cables that you removed.
6. Turn on the peripheral devices and the server.

   **Attention:** For proper cooling and airflow, replace the air baffle before turning on the server. Operating the server with an air baffle removed might damage server components.

## Removing the SAS cable guide

To remove the SAS cable guide, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 313).
5. Disconnect and remove any SAS cables from the cable guide, then remove the SAS cable guide.
   a. Remove the screw from the front of the cable guide (toward the front of the server).



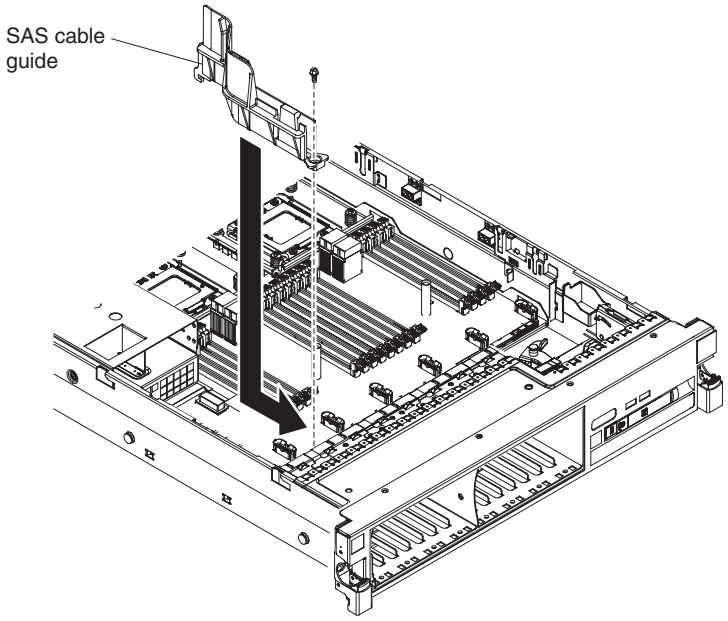

b. Grasp the cable guide and slide it toward the rear of the server to unhook the tab on the rear of the cable guide from the system board.

c. Lift the SAS cable guide out of the server

## Replacing the SAS cable guide

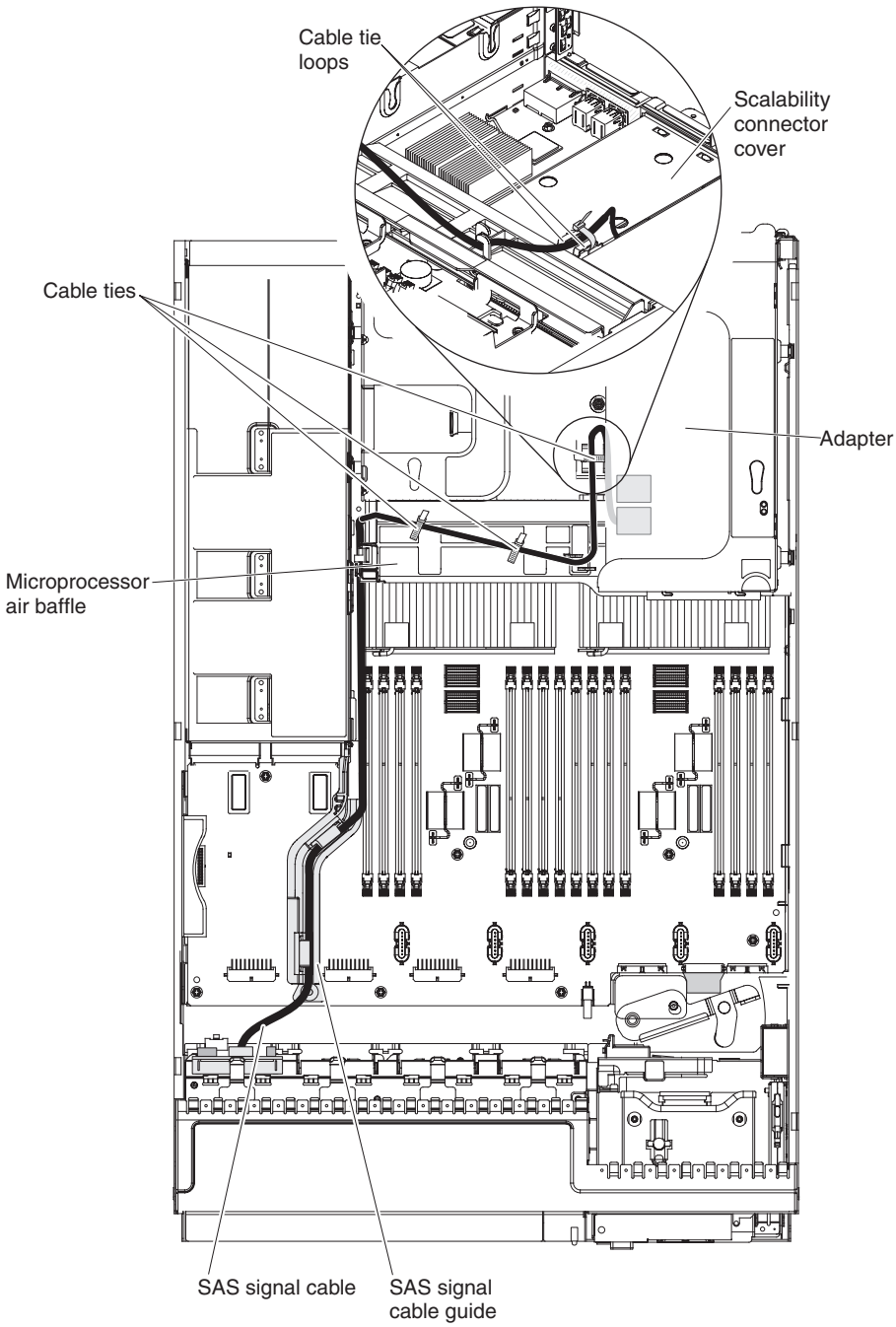
To replace the SAS cable guide, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Reinstall the SAS cable guide.
   a. Hook the tab on the rear of the cable guide underneath the system board (near the front of the power supply cage).




b. Secure the front of the cable guide to the system board using the screw that was removed earlier.

c. Reinstall any SAS cables that you removed earlier back into the SAS cable guide. Be sure to route the signal cables through the SAS cable guide and up and over the rear of the microprocessor air baffle; then, through the loops on the scalability connector cover and then to the adapter (see the following illustration). Use the cable ties (as shown in the illustration) that come with the drive backplane to secure the SAS cables so that they do not get in the way or get damaged.



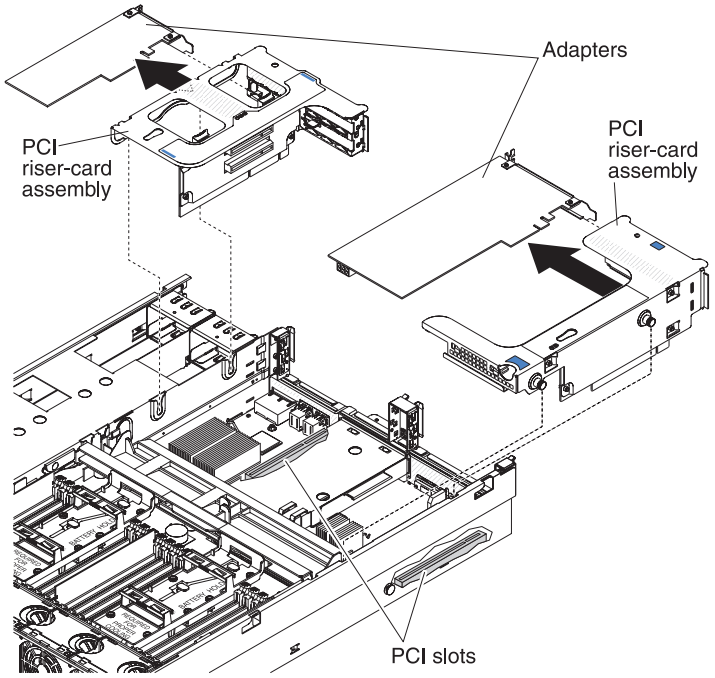

3. Reinstall the fan cage assembly (see "Replacing the fan cage assembly" on page 314).
4. Reinstall the cover (see "Replacing the server top cover" on page 247).
5. Slide the server into the rack.
6. Reconnect the power cords and any cables that you removed.

7. Turn on the peripheral devices and the server.

## Removing an adapter

To remove an adapter, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the server cover (see "Removing the server top cover" on page 246).
4. Disconnect any cables from the adapter.
5. Grasp the riser-card assembly by the blue touch points and pull it out of the connector on the system board.
6. Carefully grasp the adapter by its top edge or upper corners, and pull the adapter from the riser-card assembly.




7. Place the riser-card assembly on a flat, static-protective surface.
8. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when you install an adapter:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section.
- Standard models of the server comes with two PCI riser-cards installed. The server provides up to five PCI adapter slots (depending on the PCI riser-cards installed in the server). See "System-board optional device connectors" on page 24 for the location of the riser-card slots. The ServeRAID M1015 SAS/SATA adapter comes installed on some standard models of the server and supports RAID levels 0, 1, and 10. You can replace the IBM ServeRAID M1015 SAS/SATA adapter with the optional IBM ServeRAID M5015 SAS/SATA adapter, which provides RAID levels 0, 1, 5, 10, and 50 or the IBM ServeRAID M5016 SAS/SATA adapter, which provides RAID levels 0, 1, and 10 support. The optional IBM ServeRAID B5015 SSD adapter and the optional IBM 6 Gb Solid State Drive (SDD) Host Bus Adapter are also available for purchased. For configuration information, see the documentation that comes with the adapter or the ServeRAID documentation at http://www.ibm.com/systems/support/.

  **Note:** When you install an IBM ServeRAID M5015 SAS/SATA adapter or a ServeRAID M5014 SAS/SATA adapter that has an M5000 battery in the server, you must also use the ServeRAID M5000 Series Battery Remote Mount Cable option to mount the battery remotely in the server.

  The optional IBM ServeRAID M5016 SAS/SATA adapter comes with a ServeRAID M5100 Series 1 GB Flash/RAID 5 Upgrade for IBM System x cache card, which provides additional support for RAID levels 5 and 50.

  In addition, the IBM 4x4 Drive Backplane ServeRAID Expansion Adapter is available for purchase and provides additional SAS signal connectors to help support up to six SAS cables. See Table 15 on page 258 for the PCI slot priority installation sequence and the number of each adapter that can be installed in the server.

  **Attention:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
- Do not set the maximum digital video adapter resolution above 1280 x 11024 at 75 Hz for an LCD monitor. This is the highest resolution that is supported for any add-on video adapter that you install in the server.
- Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported
- The server does not support PCI-X adapters or legacy 5 V PCI adapters.
- When you install any PCI adapter, the power cords must be disconnected from the power source before you remove the PCI Express riser-card assembly. Otherwise, the active power management event signal will be disabled by the system-board logic, and the Wake on LAN feature might not work. However, after the server is powered-on locally, the active power manager active power management event signal will be enabled by the system-board logic.
- The following table provides information about the suggested PCI slot priority sequence in which to install the adapters and how many of each adapter the server supports. The slot priority sequence is dependent on the PCI riser cards installed in the server and other adapters that are installed in the riser cards. See "PCI riser card with three slots" on page 25, "PCI riser card with two slots" on page 26, and "PCI riser card with one slot" on page 26 for the locations of the PCI slots on the riser cards.

*Table 15. PCI slot priority sequence to install the adapter and the maximum number of cards allowed*

| Name of the Adapter | Suggested slot priority sequence in which to install the adapter | Maximum number of this adapter allowed in the server |
|---|---|---|
| IBM 4x4 Drive Backplane ServeRAID Expansion adapter | Slot 1 (only) | 1 |
| Emulex 10GB Dual-port Ethernet Custom Adapter of IBM System x | Slot 5 (only) | 1 |
| Emulex 10GbE Integrated Virtual Fabric Adapter II for IBM System x | Slot 5 (only) | 1 |
| IBM ServeRAID M1015 SAS/SATA Controller | 2, 4, 3, and then 1 | 2 |
| IBM ServeRAID M5015 SAS/SATA Controller | 2, 4, 3, and then 1 | 4 |
| IBM ServeRAID M5016 SAS/SATA Controller | 2, 4, 3, and then 1 | 4 |
| IBM ServeRAID B5015 Solid State Drive (SSD) Controller | 4, 3, 1, and then 2 | 4 |
| IBM 6Gb Solid State Drive (SSD) Host Bus Adapter | 4, 3, 1, and then 2 | 4 |

**Note:** When you install an IBM ServeRAID M5015 SAS/SATA adapter or a ServeRAID M5014 SAS/SATA adapter that has an M5000 battery in the server, you must also use the ServeRAID M5000 Series Battery Remote Mount Cable option to mount the battery remotely in the server.

- The server provides two PCI riser-card slots on the system board. The supported riser-cards provide up to five PCI adapter slots (depending on the riser cards installed in the server). Some models come with PCI riser-card assemblies with brackets installed. The following table lists the PCI slots on the supported riser cards and the supported adapters that you can install on the riser cards:

*Table 16. Supported riser cards and supported PCI adapters*

| Riser cards supported | Slot on the system board to install the riser card | PCI adapters that you can install in the riser card |
|---|---|---|
| PCI riser card with two PCI Express Gen2 x8 adapter slots | PCI riser slot 1 | • PCI Express Gen2 x8 three/fourth-length, full-height adapter<br>• PCI Express Gen2 x8 half-length, full-height adapter |
| (Optional) PCI riser cards with one PCI Express Gen2 x16 adapter slot | PCI riser slot 1 | • PCI Express Gen2 x16 full-length, full-height adapter **Note:** You cannot install the full-length, full-height adapter in the server when the optional memory tray is installed.<br>• PCI Express Gen2 x16 three/fourth-length, full-height adapter |
| PCI riser card with three PCI Express Gen2 x8 (x4) adapter slots | PCI riser slot 2 | • PCI Express Gen2 x8 low-profile adapter<br>• PCI Express Gen2 x8 (x4) low-profile adapter |

**Important:** The x8 (x4) designation for a PCI slot identifies a x8 slot that is wired for x4. If you install a x8 adapter in slot 4 that can downshift to the x4 bandwidth, it will run at the x4 bandwidth. The x8 connector can be used for x4 and x8 adapters. Check the information that comes with your adapter for compatibility information.

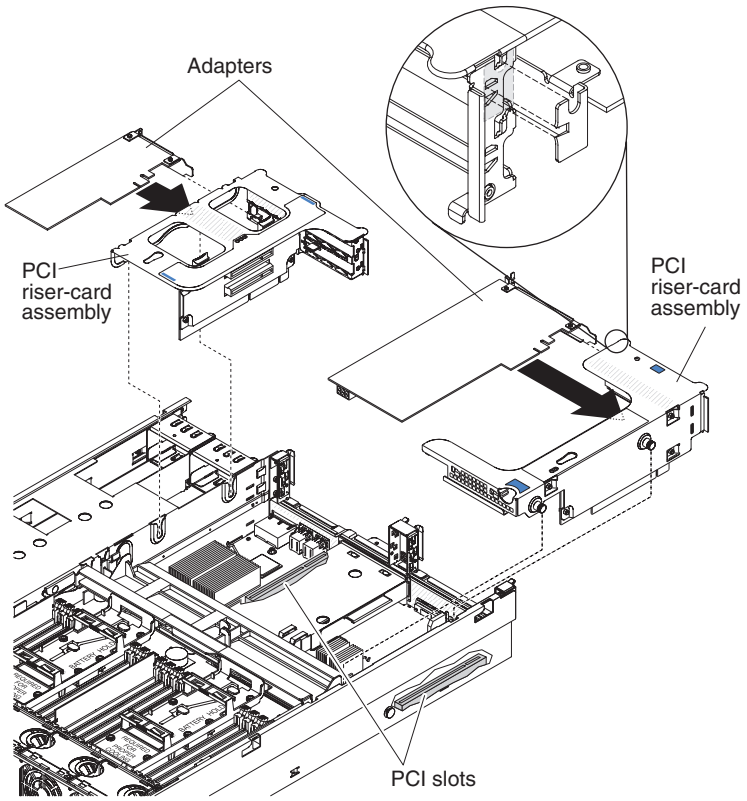
To install an adapter, complete the following steps:

**Note:**

1. The instructions in this section apply to any PCI adapter (for example, video graphics adapters or network adapters).
2. Do not set the maximum digital video adapter resolution above 1280 x 1024 at 75 Hz for an LCD monitor. This is the highest resolution that is supported for any add-on video adapter that you install in the server.
3. Any high-definition video-out connector or stereo connector on any add-on video adapter is not supported

1. Read the safety information that begins on page "Safety" on page vii and the "Installation guidelines" on page 243.
2. Follow the cabling instructions, if any come with the adapter. Route the adapter cables before you install the adapter.
3. Insert the adapter into the riser-card assembly, aligning the edge connector on the adapter with the connector on the riser-card assembly. Press the edge of the connector *firmly* into the riser-card assembly. Make sure that the adapter snaps into the riser-card assembly securely.

   **Attention:** When you install an adapter, make sure that the adapter is correctly seated in the riser-card assembly and that the riser-card assembly is securely seated in the riser-card connector on the system board before you turn on the server. An incorrectly seated adapter might cause damage to the system board, the riser-card assembly, or the adapter.




4. Install the riser-card assembly in the server (see “Replacing a PCI riser-card assembly” on page 319).
5. Perform any configuration tasks that are required for the adapter.
6. Install the cover (see “Replacing the server top cover” on page 247).
7. Slide the server into the rack.
8. Reconnect the power cord and any cables that you removed.
9. Turn on the peripheral devices and the server.

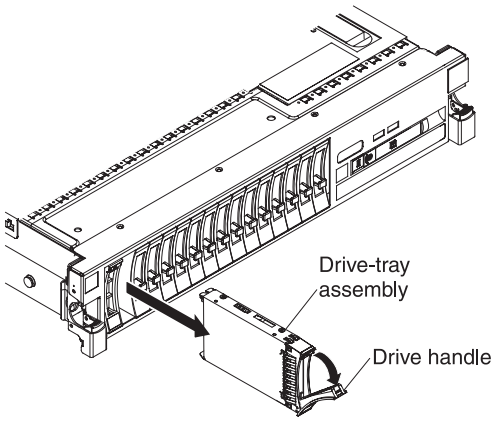
## Removing 2.5-inch and 1.8-inch hot-swap drives

To remove a hot-swap drive, complete the following steps.

**Attention:**

- To avoid damage to the drive connectors, make sure that the server cover is in place and fully closed whenever you install or remove a drive.
- To make sure that there is adequate system cooling, do not operate the server for more than 2 minutes without either a drive or a filler panel installed in each bay.

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Removing a 2.5-inch hot-swap drive:
   a. Slide the release latch (orange) up gently to unlock the drive handle



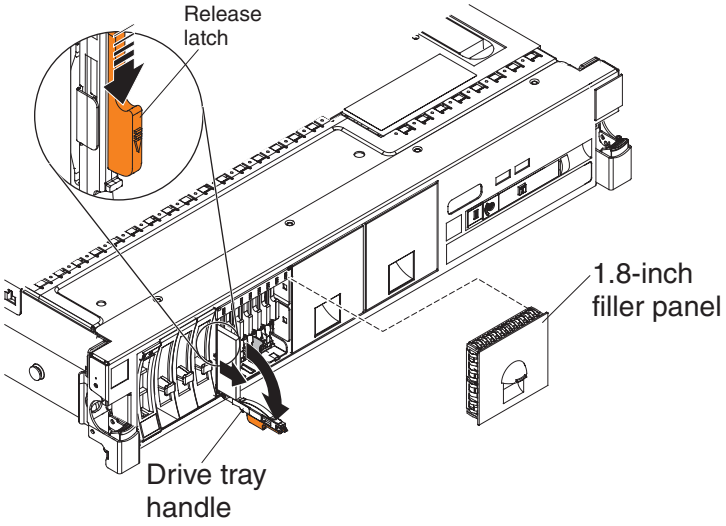

b. Grasp the handle and pull the drive out of the drive bay.

c. Skip to step 4.

3. Removing a 1.8-inch hot-swap drive:

   a. Remove the filler panel.

   b. Grasp the orange release latch on drive tray handle of the drive tray for the drive that you want to remove and slide the release latch down to unlock the drive-tray handle; then, rotate the drive tray handle down and the pull the handle toward you to slide the drive out of the bay. Lift the drive out of the drive tray.




4. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing 2.5-inch and 1.8-inch hot-swap drives

The following notes describe the type of drives that the server supports and other information that you must consider when you install a drive. For a list of supported drives, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- The server supports one optional ultra-slim SATA CD-RW/DVD-ROM optical drive.
- The server can support up to 24 hot-swap drives, using the supported SAS\SATA backplane configurations. The server supports 2.5-inch hot-swap SAS or hot-swap SATA hard disk drives, 2.5-inch hot-swap solid state drive, or 1.8-inch hot-swap solid state drives (see "Supported SAS/SATA drive backplane configurations" on page 265 for more information).

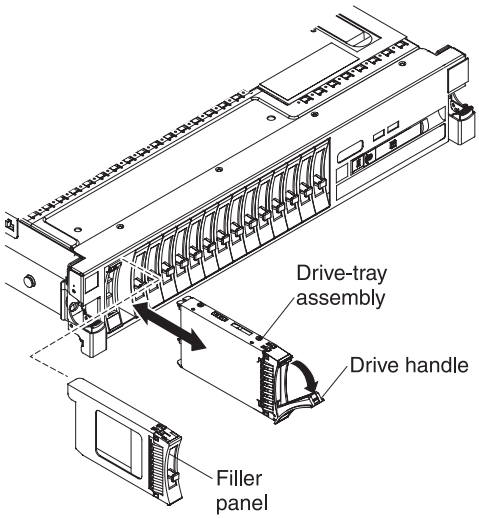
  **Note:** Configurations with all 1.8-inch drive backplanes can support one additional simple-swap drive if you purchase the optional Simple-swap 2.5-inch SATA Drive and Backplate kit.
- You can mix 2.5-inch hot-swap SAS and SATA hard disk drives, 2.5-inch hot-swap solid state drive, and 1.8-inch hot-swap solid state drives in the same server as long as they are not on the same array.
- When upgrading drive backplane configurations, all 1.8-inch SSD drive backplanes must be installed to the right of all 2.5-inch HDD or 2.5-inch SSD drive backplanes. All 2.5-inch backplanes installs to the left of all 1.8-inch backplanes. See "IDs for hot-swap drives" on page 264 for drive ID assignment information and "Supported SAS/SATA drive backplane configurations" on page 265 for information about the combination of supported drive backplane configurations.
- If you install the optional simple-swap SATA drive and backplate assembly, the backplate must be installed in the backplane slot closest to the information panel and the SATA drive must be installed in the drive-bay closest to the information panel.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, save the EMC shield and filler panel from the bay in the event that you later remove the device.
- For a complete list of supported optional devices for the server, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

For information on the supported combination of drive backplane configurations, see "Supported SAS/SATA drive backplane configurations" on page 265.

To install a hot-swap drive, complete the following steps:

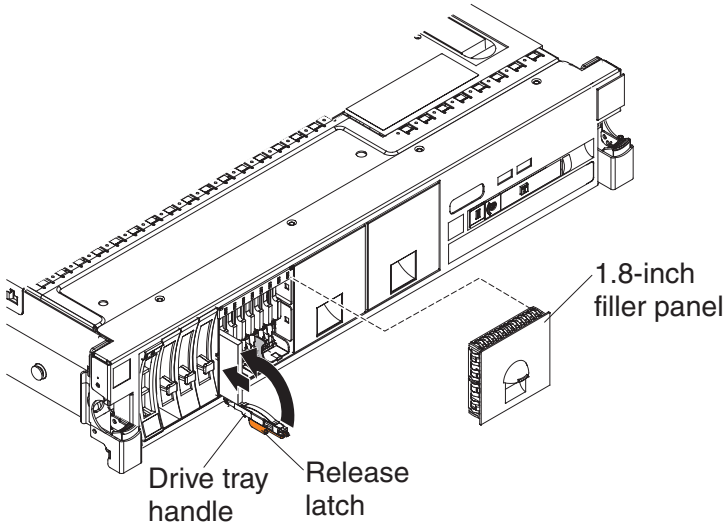
1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
3. Install a 2.5-inch hot-swap drive:
   a. Make sure that the drive-tray handle is in the open (unlocked) position.

b. Align the drive assembly with the guide rails in the bay.




c. Gently push the drive-tray assembly into the bay until the drive stops.
d. Rotate the drive-tray handle to the closed (locked) position.

4. Installing a 1.8-inch hot-swap drive:
   a. Insert the drive into the drive bay with the label side of the drive facing the right side of the server.




   b. Push the drive tray into the drive bay and rotate the drive tray handle to the closed position and slide the orange release latch up to secure the drive tray handle in place.
5. Check the drive status LED to verify that the drive is operating correctly. If the amber drive status LED for a drive is lit continuously, that drive is faulty and must be replaced. If the green drive activity LED is flashing, the drive is being accessed.

   **Note:** If the server is configured for RAID operation using a ServeRAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ServeRAID adapter documentation for additional information about RAID operation and complete instructions for using the ServeRAID adapter.

6. If you are installing additional hot-swap drives, do so now.
7. Turn on the peripheral devices and the server.

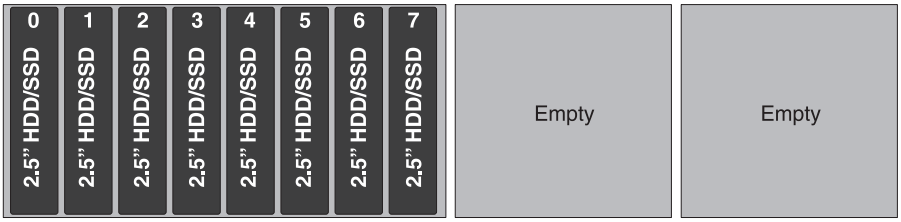
**IDs for hot-swap drives:**
The hot-swap-drive ID that is assigned to each drive is printed on the front of the server. The following illustration shows the location of the IDs of the drives. The ID numbers and the drive bay numbers are the same.

**Note:**

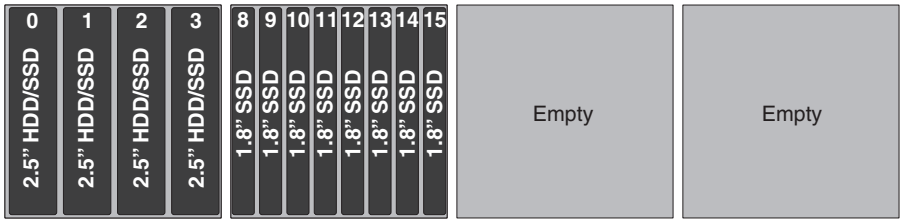
1. The drive bay IDs can vary, depending on the combination of the SAS/SATA backplanes installed in the server.
2. When upgrading drive backplane configurations, all 1.8-inch SSD drive backplanes must be installed to the right of all 2.5-inch drive backplanes. All 2.5-inch backplanes installs to the left of all 1.8-inch backplanes.
3. When you mix 2.5-inch and 1.8-inch drive backplane configurations in the same server, IMM resets the drive bay ID numbering by skipping bay ID numbers based on the number of 2.5-inch drive backplanes that are installed to the left of the 1.8-inch drives backplanes.

   For example, if the server has a 4x2.5-inch. drive backplane and a 8x1.8-inch backplane configuration, the drive bay IDs for the four drives in the 4x2.5-inch drive backplane is 0 through 3. IMM assigns the drive bay IDs for the eight drives in the 8x1.8-inch drive backplane to start with an ID of 8 through 15. Since the drive bay IDs for the drives in the 4x2.5-inch backplane were 0 through 3, IMM reset the IDs by a gap of four (because the backplane supports four drives), then the drive IDs in the 8x1.8-inch drive backplane starts with an ID of 8 through 15. If a 8x2.5inch drive backplane had been installed, instead of the 4x2.5-inch drive backplane, IMM would reset the IDs by a gap of eight, then the drive IDs for the drives in the 8x1.8-inch drive backplane would start at 16 through 23. See the following example illustrations and the illustrations in "Supported SAS/SATA drive backplane configurations" on page 265 for more information.

In the following illustration, the drive bay IDs are in sequential order because all of the drive backplanes are 2.5-inch backplanes:

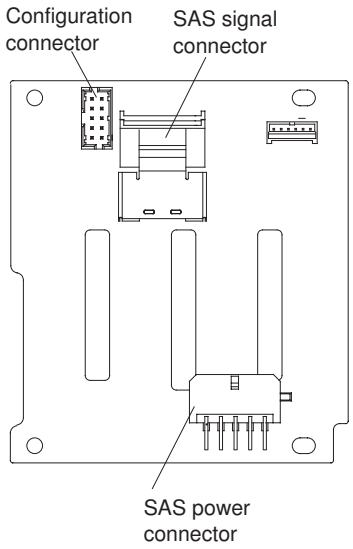



In the following illustration, you have a combination of drive backplanes. This example shows a 2.5-inch drive backplane and a 1.8-inch drive backplane installed in the server. In this instance, the drive bay IDs will require a gap in the bay ID numbering between the drive IDs in the 2.5-inch and 1.8-inch drive backplanes:

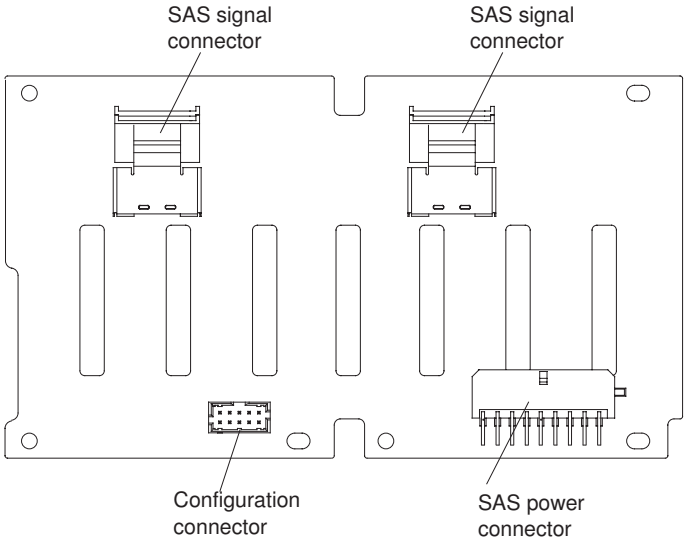


**Supported SAS/SATA drive backplane configurations:**
The following are illustrations of the hot-swap drive backplanes that are supported on the server.

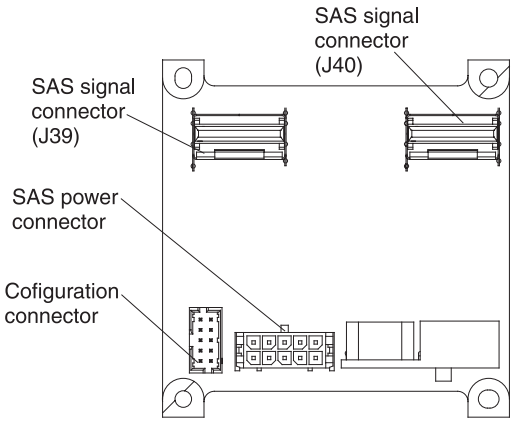
**4x2.5-inch drive backplane rear view:**




**8x2.5-inch drive backplane rear view:**




**8x1.8-inch drive backplane rear view:**

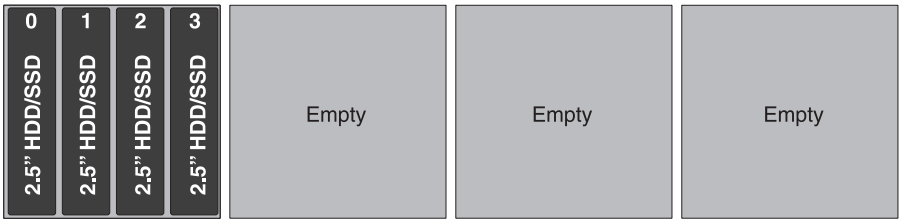



You can install a combination of 2.5-inch and 1.8-inch SAS/SATA drive backplanes in the server for the maximum drive capacity. However, any SAS/SATA adapter that you install in the server must be capable of supporting two internal, 4-lane SAS/SATA signal connectors. The following illustrations show the supported 2.5-inch and 1.8-inch SAS/SATA drive backplane configurations and drive IDs assigned by IMM:

**Note:** The drive bay IDs can vary, depending on the combination of the SAS/SATA drive backplanes installed in the server (see "IDs for hot-swap drives" on page 264 for more information).

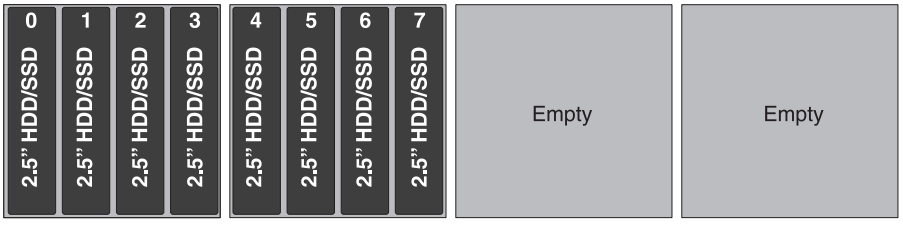
The following illustration shows the supported backplane configuration that you can use to support four drives:

This configuration consists of one 4x2.5-inch drive backplane and requires one SAS signal cable.

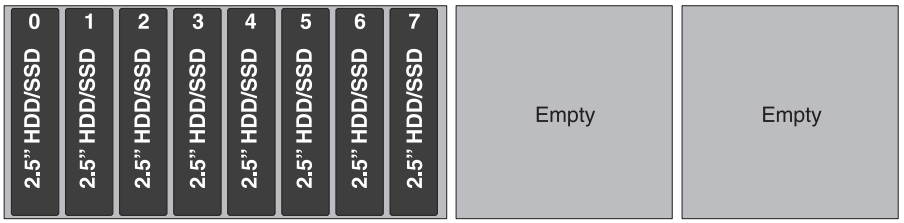



The following illustrations show the supported combination of drive backplane configurations that you can use to support eight drives:

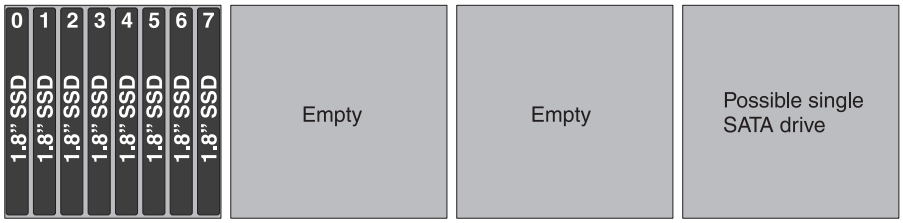
This configuration consists of two 4x2.5-inch drive backplanes and requires two SAS signal cables.




This configuration consists of one 8x2.5-inch drive backplane and requires two SAS signal cables.

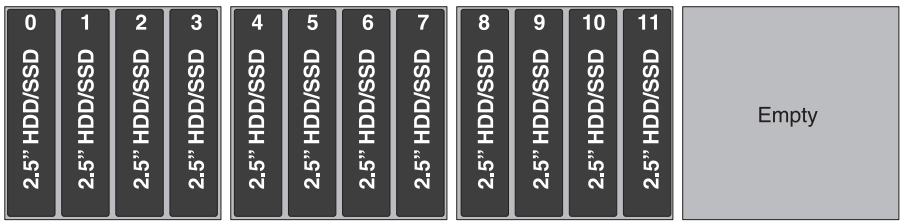



This configuration consists of one 8x1.8-inch drive backplane and requires two SAS signal cables. You can also install the optional simple-swap 2.5-inch SATA drive kit in this configuration.

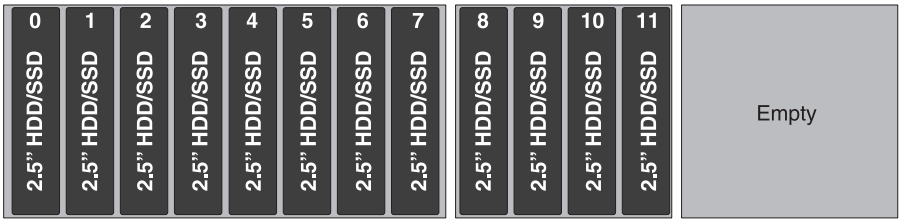



The following illustrations show the supported combination of drive backplane configurations that you can use to support 12 drives:

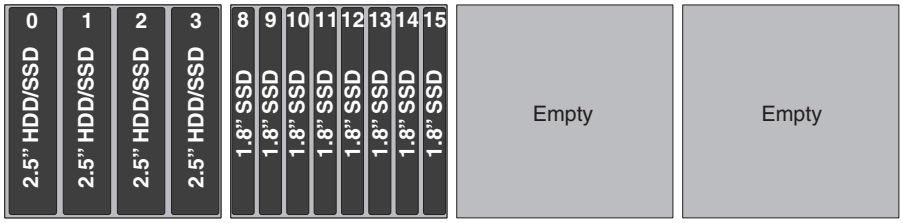
This configuration consists of three 4x2.5-inch drive backplanes and requires three SAS signal cables.




This configuration consists of one 8x2.5-inch drive backplane and one 4x2.5-inch drive backplane and requires three SAS signal cables.

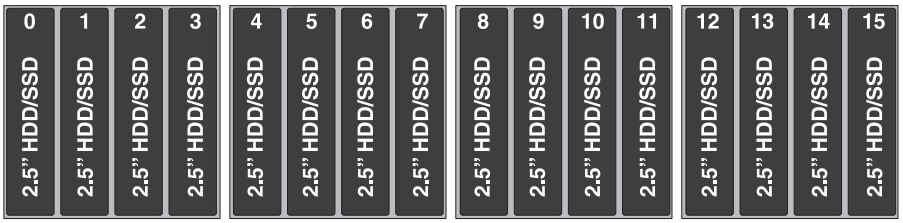



This configuration consists of one 4x2.5-inch drive backplane and one 8x1.8-inch drive backplane and requires three SAS signal cables.

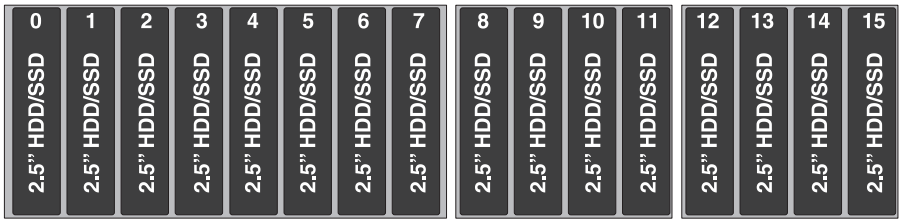



The following illustrations show the supported combination of drive backplane configurations that you can use to support 16 drives:

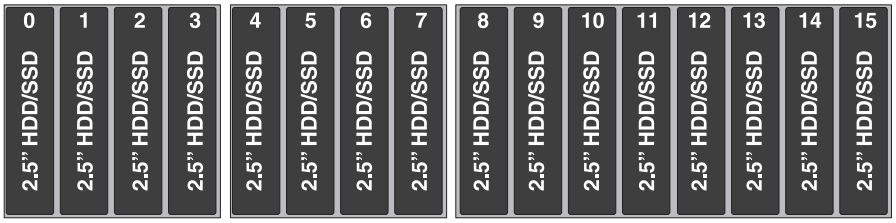
This configuration consists of four 4x2.5-inch drive backplanes and requires four SAS signal cables.



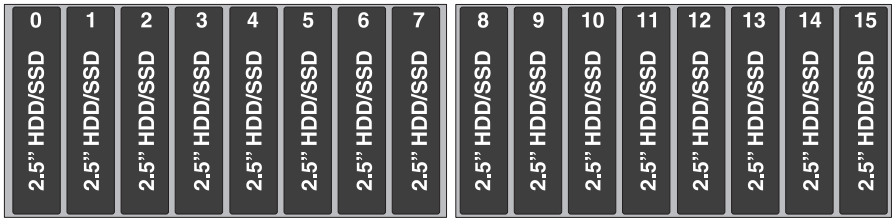

This configuration consists of one 8x2.5-inch drive backplane and two 4x2.5-inch drive backplanes and requires four SAS signal cables.



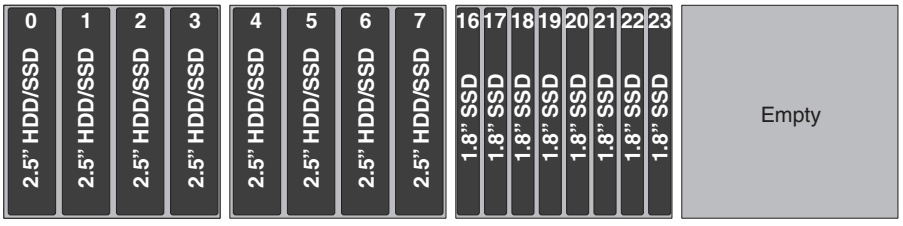

This configuration consists of two 4x2.5-inch drive backplanes and one 8x2.5-inch drive backplane and requires four SAS signal cables.



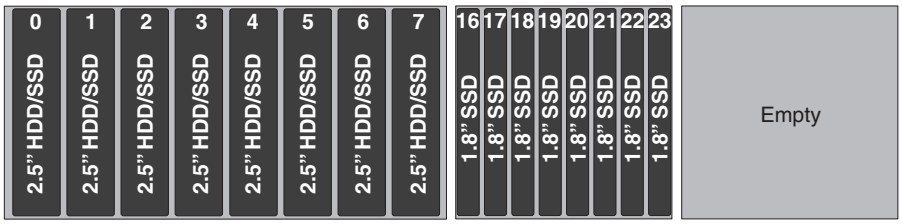

This configuration consists of two 8x2.5-inch drive backplanes and requires four SAS signal cables.



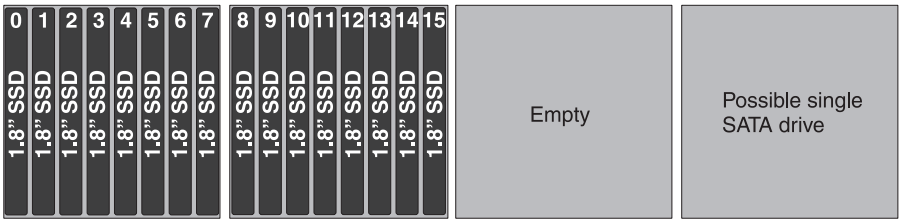

This configuration consists of two 4x2.5-inch drive backplanes and one 8x1.8-inch drive backplane and requires four SAS signal cables.




This configuration consists of one 8x2.5-inch drive backplane and one 8x1.8-inch drive backplane and requires four SAS signal cables.

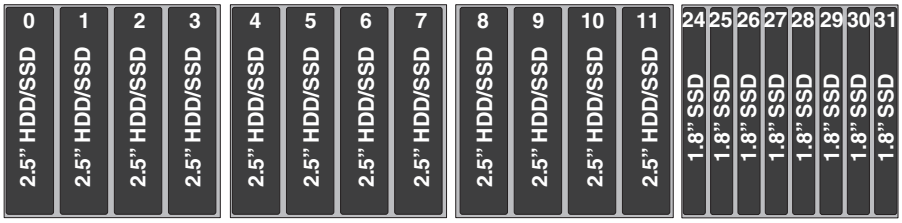



This configuration consists of two 8x1.8-inch drive backplanes and requires four SAS signal cables. You can also install the optional simple-swap 2.5-inch SATA drive kit in this configuration.



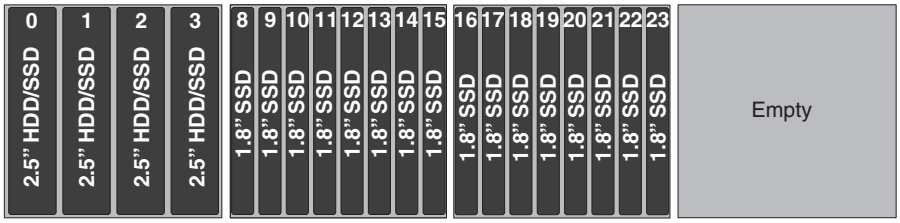

The following illustrations show the supported combination of drive backplane configurations that you can use to support 20 drives:

This configuration consists of three 4x2.5-inch drive backplanes and one 8x1.8-inch drive backplane and requires five SAS signal cables.



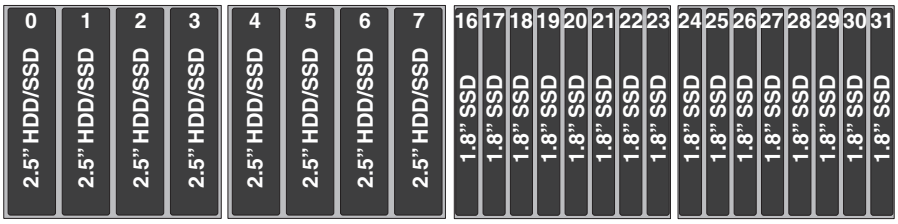

This configuration consists of one 8x2.5-inch drive backplane, one 4x2.5-inch drive backplane, and one 8x1.8-inch drive backplane and requires five SAS signal cables.


This configuration consists of one 4x2.5-inch drive backplane and two 8x1.8-inch drive backplanes and requires five SAS signal cables.

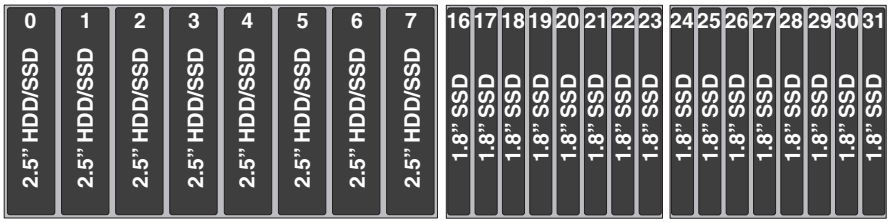


The following illustrations show the supported combination of drive backplane configurations that you can use to support 24 drives:

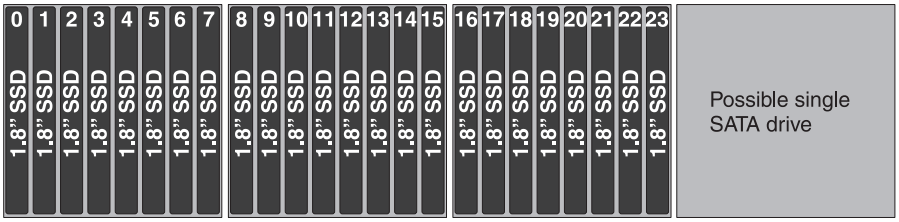
This configuration consists of two 4x2.5-inch drive backplanes and two 8x1.8-inch drive backplanes and requires six SAS signal cables.




This configuration consists of one 8x2.5-inch drive backplane and two 8x1.8-inch drive backplanes and requires six SAS signal cables.



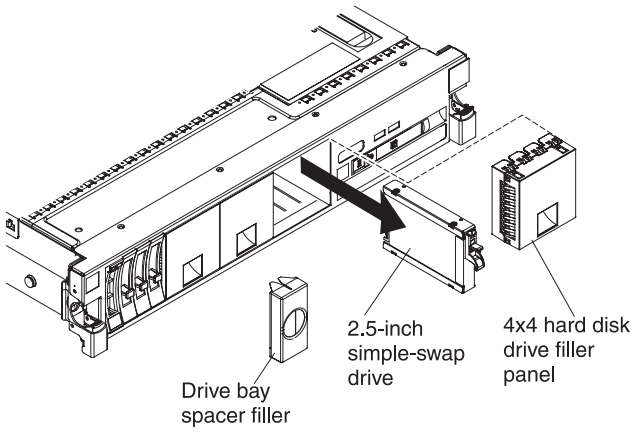

This configuration consists of three 8x1.8-inch drive backplanes and requires six SAS signal cables. You can also install the optional simple-swap 2.5-inch SATA drive kit in this configuration.




## Removing a simple-swap SATA drive

To remove a simple-swap SATA drive, complete the following steps:

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Turn off the server (see “Turning off the server” on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the 4x2.5-inch filler panel.
4. Grasp the black drive handle and press down on the blue release latch and slide the drive out of the drive bay.



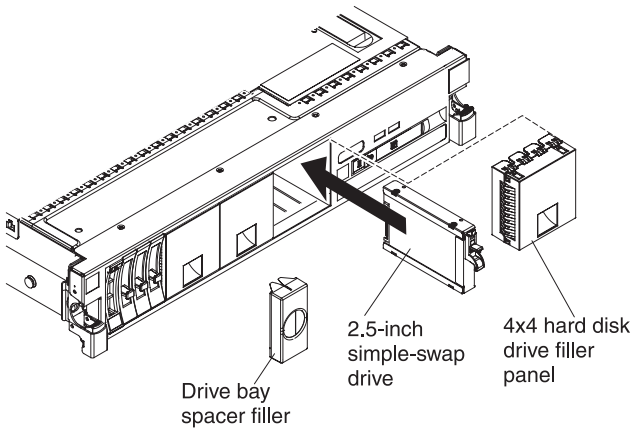

5. If you are instructed to return the drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a simple-swap SATA drive

To install a simple-swap SATA drive, complete the following steps:

**Note:** You must turn off the server before installing simple-swap drives in the server.

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the new drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
3. Grasp the black drive handle and press down on the blue release latch and align the drive assembly with the guide rails in the drive bay.

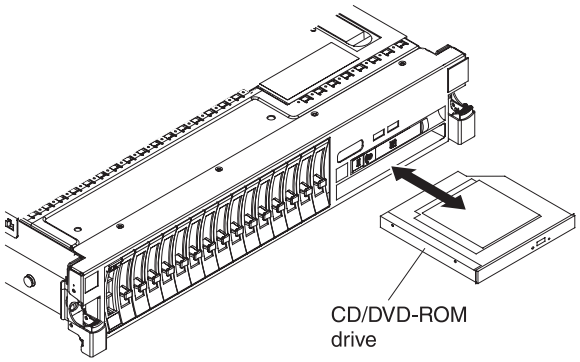



4. Gently push the drive assembly into the drive bay until the drive stops.
5. Reinstall the 4x4 filler panel that you removed
6. Turn on the peripheral devices and the server.

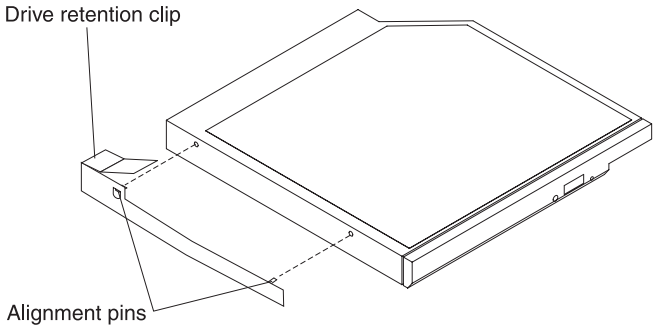
## Removing a CD/DVD drive

To remove a CD/DVD drive, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the server cover (see "Removing the server top cover" on page 246).
4. Press and hold the release tab down as you push the drive from the rear to slide it out of the bay.




5. Slide the drive-retention clip from the side of the drive. Save the clip to use when you install the replacement drive.




6. If you are instructed to return the CD/DVD drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a CD/DVD drive

The following notes describe the type of drives that the server supports and other information that you must consider when you install a CD/DVD drive. For a list of supported drives, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

- Locate the documentation that comes with the drive and follow those instructions in addition to the instructions in this chapter.
- Make sure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- The server supports one optional ultra-slim SATA CD-RW/DVD-ROM optical drive.

If you need to replace a CD/DVD drive, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the new optical drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.

   **Note:** If you are installing a drive that contains a laser, observe the following safety precaution.

   **Statement 3**

   **CAUTION:**
   **When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:**

   - **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
   - **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

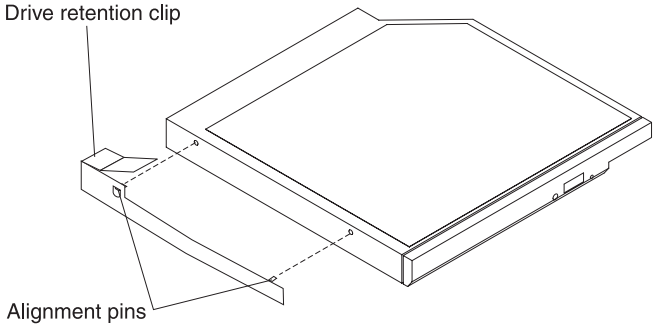
**DANGER**

**Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.**

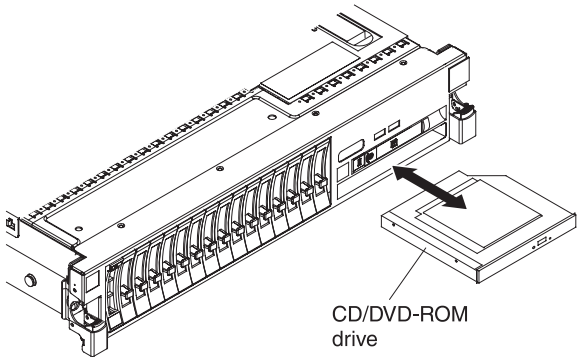
**Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

3. Attach the drive retention clip that you removed from the previous drive to the side of the new drive.




4. Align the drive in the drive bay and slide the drive into the CD/DVD drive bay until the drive clicks into place.

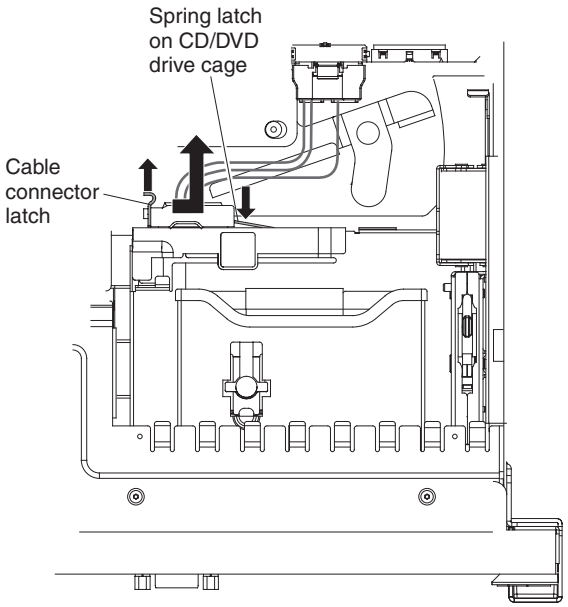



5. Reconnect the power cord and any cables that you removed.
6. Turn on the peripheral devices and the server.

## Removing the CD/DVD cable

To remove the CD/DVD cable, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 313).
5. Remove the CD/DVD drive (see "Removing a CD/DVD drive" on page 272).
6. From the front of the server, grasp the cable connector latch and pull it up toward the rear of the server; then, press down on the spring latch (right of the cable connector) and slide the cable connector to the right.

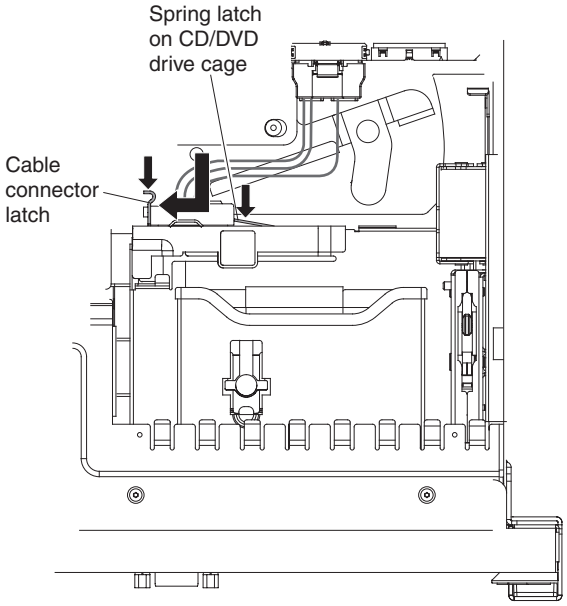



7. Remove the cable from the optical drive cage connector.
8. If you are instructed to return the CD/DVD cable, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

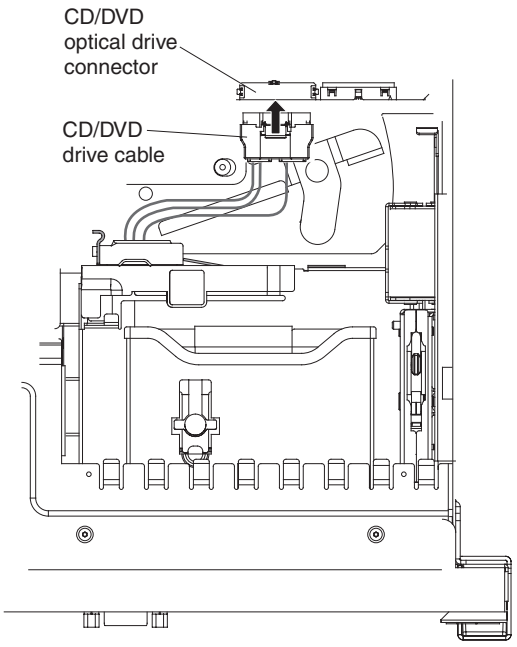
## Replacing the CD/DVD cable

To install the CD/DVD cable, complete the following cable:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the cable connector with the connector on the rear of the optical drive cage and press the cable connector into the optical drive cage connector until it is firmly seated.
3. Pull the cable connector latch up and hold it there while you slide the cable connector to the left; then, push the cable connector latch down to lock the cable in place.




4. Reconnect the CD/DVD drive cable to the system board.




5. Reinstall the CD/DVD drive (see "Replacing a CD/DVD drive" on page 273).

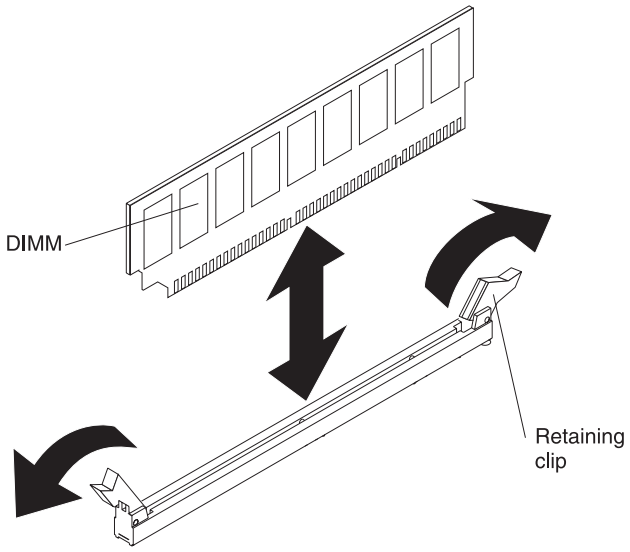
6. Reinstall the fan cage assembly (see “Replacing the fan cage assembly” on page 314).
7. Replace the cover (see “Replacing the server top cover” on page 247).
8. Slide the server into the rack.
9. Reconnect the power cord and any cables that you removed.
10. Turn on the peripheral devices and the server.

## Removing a memory module

To remove a dual inline memory module (DIMM), complete the following steps:

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Turn off the server (see “Turning off the server” on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see “Removing the server top cover” on page 246).
4. Remove the DIMM air baffle (see “Removing the DIMM air baffle” on page 252).
5. Carefully open the retaining clips on each end of the DIMM connector and remove the DIMM.

   **Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.




6. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a memory module

The following notes describe the types of DIMMs that the server supports and other information (depending on the model) that you must consider when you install DIMMs (see "System-board optional device connectors" on page 24 for the location of the DIMM connectors):

- Confirm that the server supports the DIMM that you are installing, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.
- The server supports only industry-standard double-data-rate 3 (DDR3), 1333 MHz PC3-10600R-999, 1066 MHz PC3-8500, or 1600 MHz PC3-12800, (single-rank, dual-rank, or quad-core), registered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC).
  - The specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

    *g*GB *e*R*x**f*-PC3-*wwwwwm-a-b-c-d*

    where:
    - *g*GB is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)
    - *e*R is the number of ranks

      1R = single-rank

      2R = dual-rank

      4R = quad-rank
    - x *f* is the device organization or bit width (for example, x4, x8, or x16)

      4 = x4 organization (4 DQ lines per SDRAM)

      8 = x8 organization

      16 = x16 organization
    - *wwwww* is the DIMM bandwidth, in MBps

      6400 = 6.40 GBps (PC3-800 SDRAMs, 8-byte primary data bus)

      8500 = 8.53 GBps (PC3-1066 SDRAMs, 8-byte primary data bus)

      10600 = 10.66 GBps (PC3-1333 SDRAMs, 8-byte primary data bus)

      12800 = 12.80 GBps PC3-1600 SDRAMs, 8-byte primary data bus)
    - *m* is the DIMM type

      E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

      R = Registered DIMM (RDIMM)

      U = Unbuffered DIMM with no ECC (x64-bit primary data bus)
    - *a* is the CAS latency, in clocks at maximum operating frequency
    - *b* is the JEDEC SPD Revision Encoding and Additions level
    - *c* is the reference design file for the design of the DIMM
    - *d* is the revision number of the reference design of the DIMM
- The server supports 1.35-volt (low-voltage) and 1.5-volt DIMMs. In addition, support is based on machine type as noted below:
  - Machine Types 7148 and 7149:
    - Supports 1.5-volt DIMMs at capacities of 2 GB, 4 GB, 8 GB, and 16 GB only.
  - Machine Types 7147 and 7192:
    - Supports low-voltage (1.35-volt) DIMMs at capacities of 4 GB, 8 GB, 16 GB or 16 GB LP-RDIMMs, 32 GB only.
    - When you mix 1.35-volt and 1.5-volt DIMMs in the server, the server will operate at the 1.5-volt rate.

- You can enable all DIMMs (1.35-volt and 1.5-volt) to operate at 1.5-volt in the Setup utility.

- Some server models come with the Intel 7500 scalable memory buffer or the Intel 7510 scalable memory buffer:
  - Machine Types 7148 and 7149 comes with the Intel 7500 scalable memory buffer
  - Machine Types 7147 and 7192 comes with the Intel 7510 scalable memory buffer
- Double-device data correction support is only available when 16 GB x4 DRAM technology DIMMs are installed in the server.
- The following table provides information about the maximum amount of memory that the server can support when you fully populate the server, the optional memory tray, and the optional IBM MAX5 for System x memory expansion module using the supported DIMMs.

*Table 17. The maximum amount of memory that server can support*

| **Number of DIMM connectors** | **Maximum memory** |
|---|---|
| 16 DIMMs on system board | up to 512 GB |
| 16 DIMMs on the optional memory tray | up to 512 GB |
| 32 DIMMs on the optional IBM MAX5 for System x memory expansion module | up to 1 TB GB |
| | Total = 2 TBs of memory |
| Note: The server can support a maximum 2 TBs of system memory when both the optional memory tray and the optional IBM MAX5 for System x memory expansion module is installed and fully populated with 32 GB (when supported and depending on the model) DIMMs. | |

- The server supports a maximum of 16 DIMMs (single-rank, dual-rank, or quad-rank) on the base system board. If you mix single-rank, dual-rank, or quad-rank DIMMs in the server, quad-rank DIMMs must be installed first.

  **Note:** To determine the type of a DIMM, see the label on the DIMM. The information on the label is in the format xxxxx nRxxx PC3-xxxxx-xx-xx-xxx. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (n=1) or dual-rank (n=2).
- The DIMM options that are available for the server are 2 GB, 4 GB, 8 GB, 16 GB, and 32 GB (when available and depending on the model)
- The server system board supports a minimum of 2 GB and a maximum of 512 GB (depending on the model) of system memory. However, the server can support an additional 512 GB of memory when the 16-DIMM optional memory tray is installed in the server, and an additional 1 TB of memory when the 32-DIMM optional IBM MAX5 for System x memory expansion module is attached to the server, for a total of 2 TBs of system memory, depending on the model.

  **Note:** The amount of usable memory is reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Setup utility. For additional information, see "Configuring the server" on page 380.

- The server system board provides four memory ports (memory channels) for each microprocessor and each memory port supports up to four DIMMs. The optional memory tray also provides four memory ports that supports up to four DIMMs per memory port.
- The following table shows the DIMM connectors on the system board and the memory tray that are associated with each microprocessor when the memory tray is also installed in the server:

*Table 18. DIMM connectors associated with each microprocessor*

| Microprocessor | DIMM connectors |
|---|---|
| Microprocessor socket 1 | 1 through 16 |
| Microprocessor socket 2 | 17 through 32 |

**Note:** When the memory tray is not installed in the server, DIMMs 1 through 16 are solely associated with microprocessor 1. Microprocessor 2 has access to DIMMs 1 through 16, but access is through microprocessor 1. This is important if load balancing is a necessity for your operating system or software load.

- When you replace a DIMM, the server provides automatic DIMM enablement capability without you having to go to Setup to enable the new DIMM manually.
- DIMMs must be installed in matched pairs (non-mirroring mode) or matched sets of four (memory mirroring mode).
- A minimum of two DIMMs must be installed for each microprocessor. For example, you must install a minimum of four DIMMs if the server has two microprocessors installed. However, to improve system performance, install a minimum of four DIMMs for each microprocessor.
- The maximum operating speed of the server is determined by the slowest DIMM installed in the server.
- The server comes with a minimum of two DIMMs installed in slots 1 and 8. When you install additional DIMMs, install them in the order shown in the following information in the non-mirroring mode and mirroring mode tables to optimize system performance.
- The server support memory sparing. Memory sparing reserves memory capacity for failover in the event of a DIMM failure, and the reserved capacity is subtracted from the total available memory. Memory sparing provides less redundancy than memory mirroring does. If a predetermined threshold of correctable errors is reached, the contents of the failing DIMM are copied to the spare memory, and the failing DIMM or rank is disabled. To enable memory sparing through the Setup utility, select System Settings > Memory.
- The server supports non-mirroring mode and memory-mirroring mode.
- **Non-mirroring mode**. When you use the non-mirroring mode, install DIMMs as indicated in the following tables.
  - The following table lists the DIMM installation sequence for non-mirroring mode when one or two microprocessors and no memory tray installed in the server:

*Table 19. non--mirroring mode (normal) DIMM population sequence when one or two microprocessors and no memory tray is installed*

| Pairs of DIMMs | Number of installed microprocessors | DIMM connector population sequence with no memory tray |
|---|---|---|
| Pair 1 | 1 or 2 | 1, 8 |

*Table 19. non--mirroring mode (normal) DIMM population sequence when one or two microprocessors and no memory tray is installed (continued)*

| Pairs of DIMMs | Number of installed microprocessors | DIMM connector population sequence with no memory tray |
|---|---|---|
| Pair 2 | 1 or 2 | 9, 16 |
| Pair 3 | 1 or 2 | 3, 6 |
| Pair 4 | 1 or 2 | 11, 14 |
| Pair 5 | 1 or 2 | 2, 7 |
| Pair 6 | 1 or 2 | 10, 15 |
| Pair 7 | 1 or 2 | 4, 5 |
| Pair 8 | 1 or 2 | 12, 13 |

  – The following table lists the DIMM installation sequence for non-mirroring mode when two microprocessors and a memory tray is installed in the server:

*Table 20. Non-mirroring mode (normal) DIMM population sequence when two microprocessors and a memory tray is installed*

| Pairs of DIMMs | Number of installed microprocessors | DIMM connector population sequence on the system board | DIMM connector population sequence on the memory tray |
|---|---|---|---|
| Pair 1 | 2 | 1, 8 | 17, 24 |
| Pair 2 | 2 | 9, 16 | 25, 32 |
| Pair 3 | 2 | 3, 6 | 19, 22 |
| Pair 4 | 2 | 11, 14 | 27, 30 |
| Pair 5 | 2 | 2, 7 | 18, 23 |
| Pair 6 | 2 | 10, 15 | 26, 31 |
| Pair 7 | 2 | 4, 5 | 20, 21 |
| Pair 8 | 2 | 12, 13 | 28, 29 |

- **Memory-mirroring mode**: When you use the memory mirroring feature, consider the following information:
  – Memory-mirroring mode replicates and stores data on sets of four DIMMs simultaneously. If a failure occurs, the memory controller switches from the set of memory DIMMs to the backup set of DIMMs. To enable memory mirroring through the Setup utility, select **System Settings → Memory**. For more information, see "Using the Setup utility" on page 384.
  – DIMMs must be installed in sets of four. The DIMMs in each set must be the same size and type. This is applicable also when you have the optional memory tray installed in the server and the optional IBM MAX5 for System x attached to the server. You must install DIMMs in sets of four DIMMs for memory-mirroring mode in each one (the server, memory tray, and the MAX5).
  – The maximum available memory is reduced to half of the installed memory when memory mirroring is enabled. For example, if you install 64 GB of memory, only 32 GB of addressable memory is available when you use memory mirroring.

– The following table lists the DIMM installation sequence for memory-mirroring mode when one or two microprocessors and no memory tray is installed in the server:

*Table 21. memory-mirroring mode DIMM population sequence when one or two microprocessors and no memory tray is installed*

| Sets of DIMMs | Number of installed microprocessors | DIMM connector population sequence with no memory tray |
|---|---|---|
| Set 1 | 1 or 2 | 1, 8, 9,16 |
| Set 2 | 1 or 2 | 3, 6, 11, 14 |
| Set 3 | 1 or 2 | 2, 7, 10, 15 |
| Set 4 | 1 or 2 | 4, 5, 12, 13 |

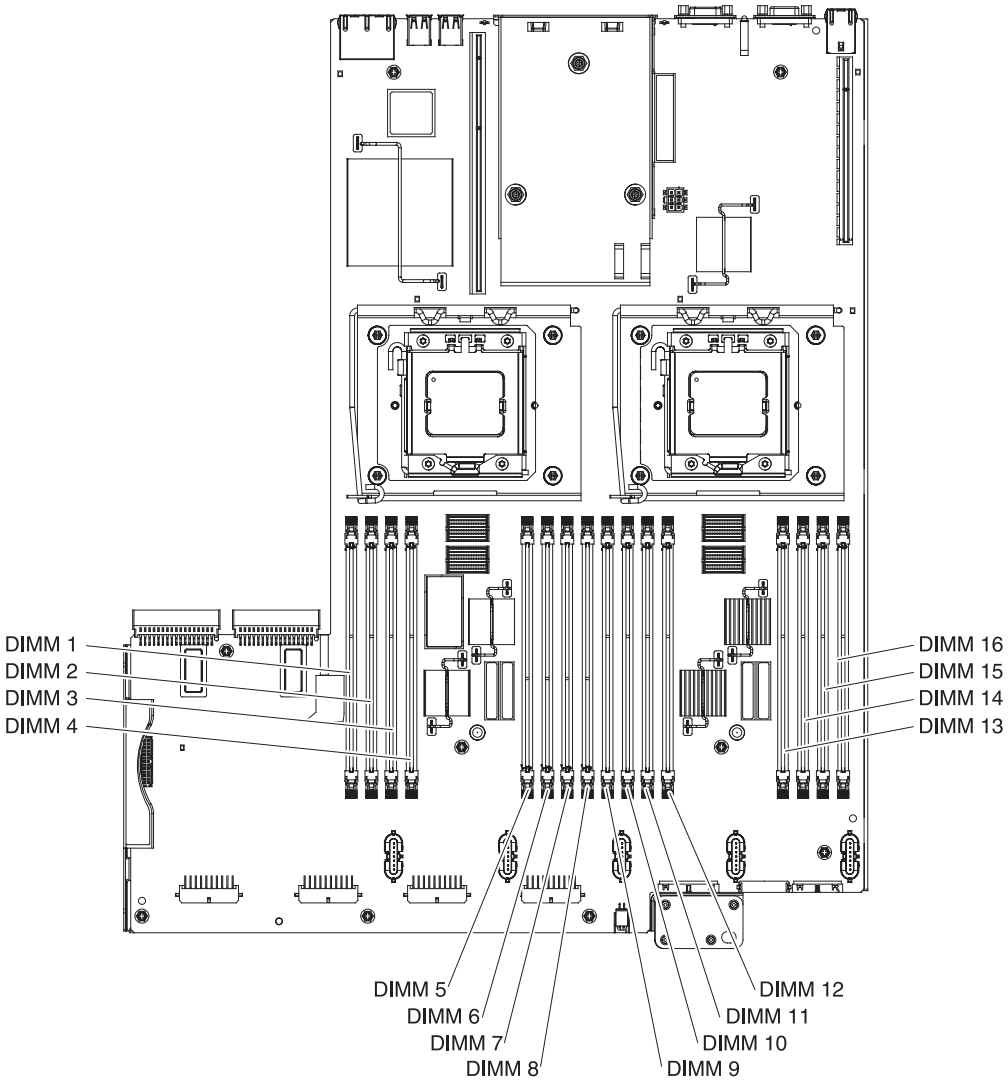
– The following table lists the DIMM installation sequence for memory-mirroring mode when two microprocessors and a memory tray is installed in the server:

*Table 22. Memory-mirroring mode DIMM population sequence when two microprocessors and a memory tray is installed*

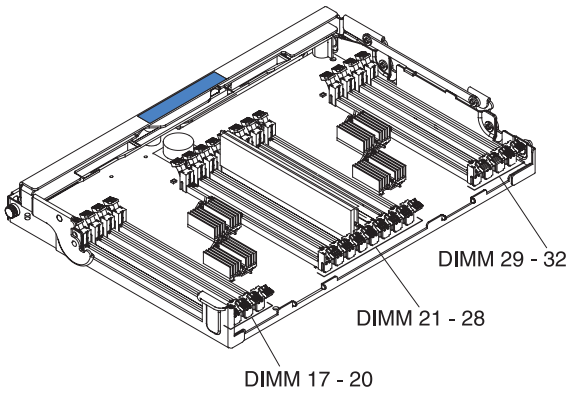
| Sets of DIMMs | Number of installed microprocessors | DIMM connector population sequence on the system board | DIMM connector population sequence on the memory tray |
|---|---|---|---|
| Set 1 | 2 | 1, 8, 9, 16 | 17, 24, 25, 32 |
| Set 2 | 2 | 3, 6, 11, 14 | 19, 22, 27, 30 |
| Set 3 | 2 | 2, 7, 10, 15 | 18, 23, 26, 31 |
| Set 4 | 2 | 4, 5, 12, 13 | 20, 21, 28, 29 |

- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.

The following illustration shows the location of the DIMM connectors on the system board.




The following illustration shows the location of the DIMMs on the optional memory tray:

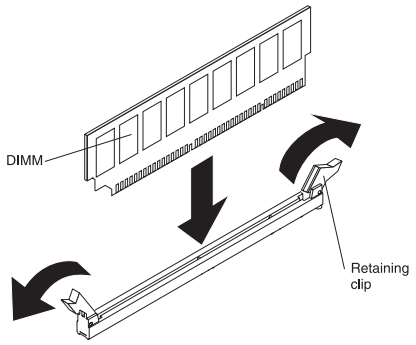



To install a DIMM, complete the following steps:

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.

2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the top cover (see “Removing the server top cover” on page 246).
4. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
5. Open the retaining clip on each end of the DIMM connector.

   **Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.




6. Turn the DIMM so that the DIMM keys align correctly with the connector.
7. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector (see “System-board optional device connectors” on page 24 for the locations of the DIMM connectors).
8. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

   **Note:** If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.
9. Reconnect the power cord and any cables that you removed.
10. Replace the cover (see “Replacing the server top cover” on page 247).
11. Turn on the peripheral devices and the server.

## Removing an IBM ServeRAID M1015 SAS/SATA Controller

To remove an IBM ServeRAID M1015 SAS/SATA controller, complete the following steps:

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Turn off the server (see “Turning off the server” on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see “Removing the server top cover” on page 246).
4. Disconnect the signal cables from the adapter.
5. Grasp the riser card assembly at the blue touch points it pull up until the riser-card assembly disengages from the connector on the system board.
6. Remove the adapter from the riser card.
7. If you are instructed to return the SAS/SATA adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing an IBM ServeRAID M1015 SAS/SATA Controller

**Note:**

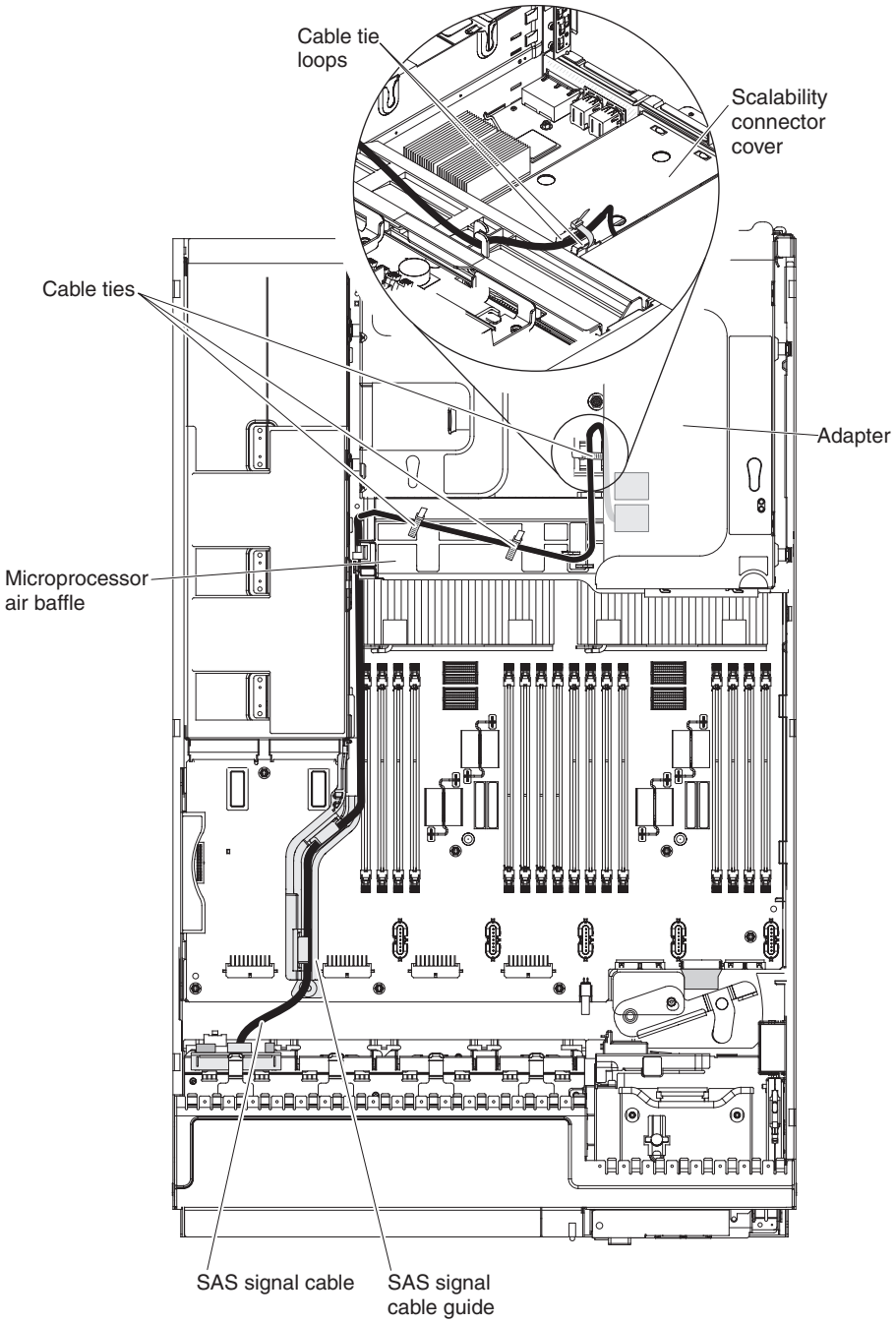
1. You can only use 2.5-inch hot-swap drives with this adapter.
2. When the IBM 4x4 Drive Backplane ServeRAID Expansion adapter is installed in the server, this adapter installs in slot 2 on the two-slot PCI riser card ( see “PCI riser card with two slots” on page 26).

Some server models come with an IBM ServeRAID M1015 SAS/SATA Controller installed. This adapter can be installed only in the PCI slots list in Table 15 on page 258. The IBM ServeRAID M1015 SAS/SATA adapter enables integrated RAID levels 0, 1, and 10 capability on hot-swap drives. For configuration information, see the ServeRAID documentation at http://www.ibm.com/systems/support/. To install the adapter if your server model did not come with this adapter, complete the following steps to install an IBM ServeRAID M1015 SAS/SATA Controller.

**Attention:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Touch the static-protective package that contains the new ServeRAID M1015 SAS/SATA adapter to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners of the adapter and remove it from the package.
3. Align the ServeRAID M1015 SAS/SATA adapter so that the keys align correctly with the connector on the riser-card assembly.
4. Insert the SAS/SATA adapter into the connector on the riser-card until it is firmly seated.

   **Attention:** Incomplete insertion might cause damage to the server or the adapter.
5. Reinstall the riser-card assembly onto the connector on the system board.
6. Reconnect the signal cables to the adapter. Be sure to route the signal cables through the SAS cable guide and up and over the rear of the microprocessor air baffle; then, through the loops on the scalability connector cover and then to the adapter (see the following illustration). Use the cable ties (as shown in the illustration) that come with the drive backplane to secure the SAS cables so that they do not get in the way or get damaged.




7. Replace the cover (see "Replacing the server top cover" on page 247).
8. Reconnect the power cord and any cables that you removed.
9. Slide the server in the rack.
10. Turn on the peripheral devices and the server.

## Removing an IBM ServeRAID M5015 SAS/SATA Controller

To remove an IBM ServeRAID M5015 SAS/SATA controller, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Disconnect the signal cables from the adapter.
5. Carefully grasp the riser-card assembly by the blue touch points and pull up until the riser-card assembly disengages from the connector on the system board.
6. Remove the adapter from the riser card.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing an IBM ServeRAID M5015 SAS/SATA Controller

You can purchase an optional IBM ServeRAID M5015 SAS/SATA controller. This adapter can be installed only in the PCI slots list in Table 15 on page 258. The ServeRAID M5015 adapter supports RAID levels 0, 1, 5, 10, and 50. For configuration information, see the ServeRAID documentation at http://www.ibm.com/systems/support/.

**Attention:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

**Note:**

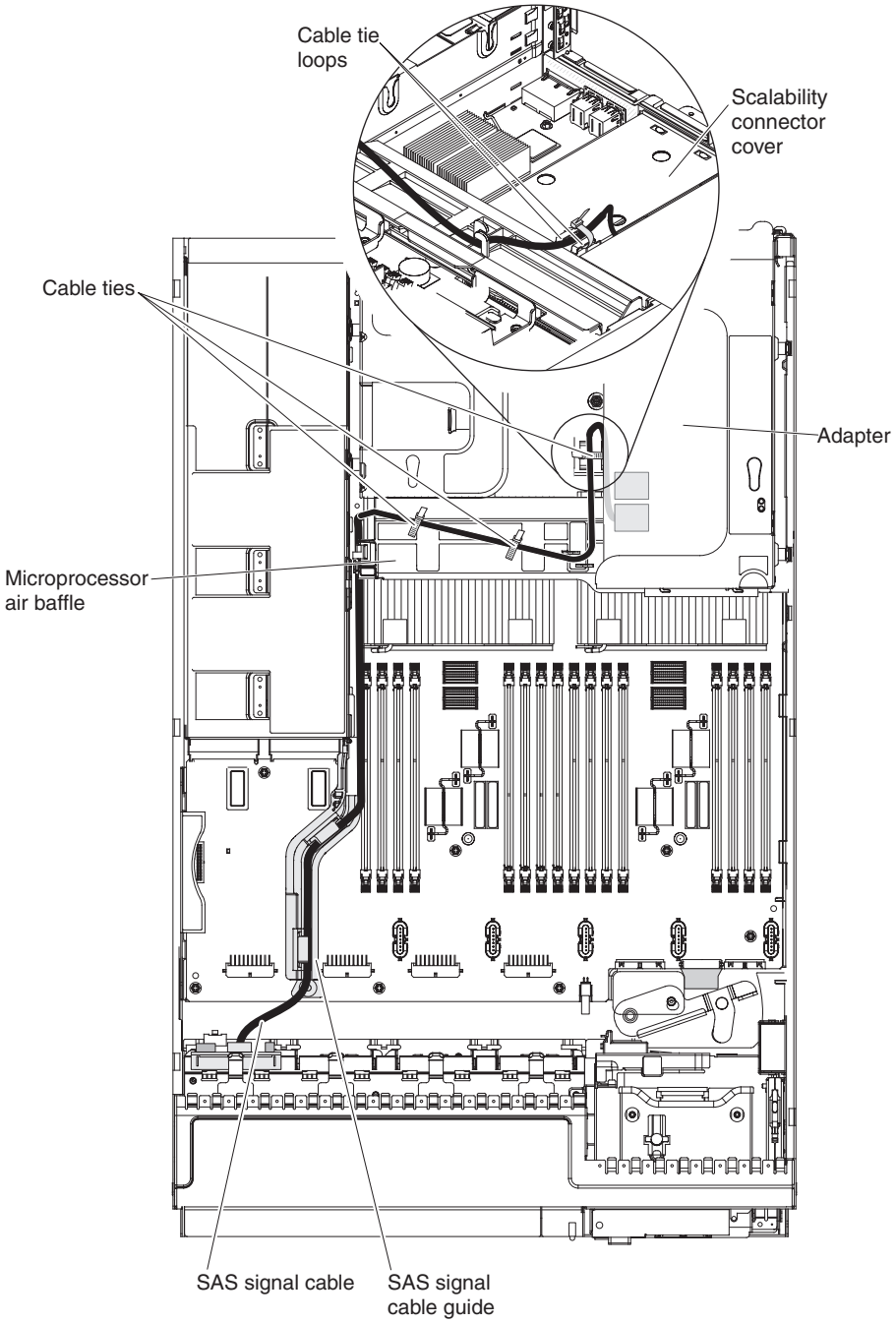
1. When you install an IBM ServeRAID M5015 SAS/SATA adapter or a ServeRAID M5014 SAS/SATA adapter that has an M5000 battery in the server, you must also use the ServeRAID M5000 Series Battery Remote Mount Cable option to mount the battery remotely in the server.
2. When the IBM 4x4 Drive Backplane ServeRAID Expansion adapter is installed in the server, this adapter installs in slot 2 on the two-slot PCI riser card (see "PCI riser card with two slots" on page 26).

To install an IBM ServeRAID M5015 SAS/SATA adapter, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the new ServeRAID M5015 SAS/SATA adapter to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners of the adapter and remove it from the package.
3. Align the ServeRAID M5015 SAS/SATA adapter so that the keys align correctly with the connector on the riser-card assembly.
4. Insert the SAS/SATA adapter into the connector on the riser-card until it is firmly seated.

   **Attention:** Incomplete insertion might cause damage to the server or the adapter.
5. Reinstall the riser-card assembly into the system board.

6. Reconnect cables to the adapter. Be sure to route the signal cables through the SAS cable guide and up and over the rear of the microprocessor air baffle; then, through the loops on the scalability connector cover and then to the adapter (see the following illustration). Use the cable ties (as shown in the illustration) that come with the drive backplane to secure the SAS cables so that they do not get in the way or get damaged.




7. Replace the cover (see "Replacing the server top cover" on page 247).
8. Slide the server in the rack.
9. Reconnect the power cord and any cables that you removed.
10. Turn on the peripheral devices and the server.

## Removing a ServeRAID M5016 SAS/SATA Controller

To remove a ServeRAID M5016 SAS/SATA controller, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Disconnect the signal cables from the adapter.
5. Carefully grasp the riser-card assembly by the blue touch points and pull up until the riser-card assembly disengages from the connector on the system board.
6. Remove the adapter from the riser card.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a ServeRAID M5016 SAS/SATA Controller

You can purchase an optional ServeRAID M5016 SAS/SATA controller. This adapter can be installed only in the PCI slots list in Table 15 on page 258. The ServeRAID M5016 adapter supports RAID levels 0, 1, and 10. With the ServeRAID M5100 Series 1 GB Flash/RAID 5 Upgrade for IBM System x cache card that comes with this adapter, you also get RAID levels 5 and 50 support. For configuration information, see the ServeRAID documentation at http://www.ibm.com/systems/support/.

**Attention:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

**Note:**

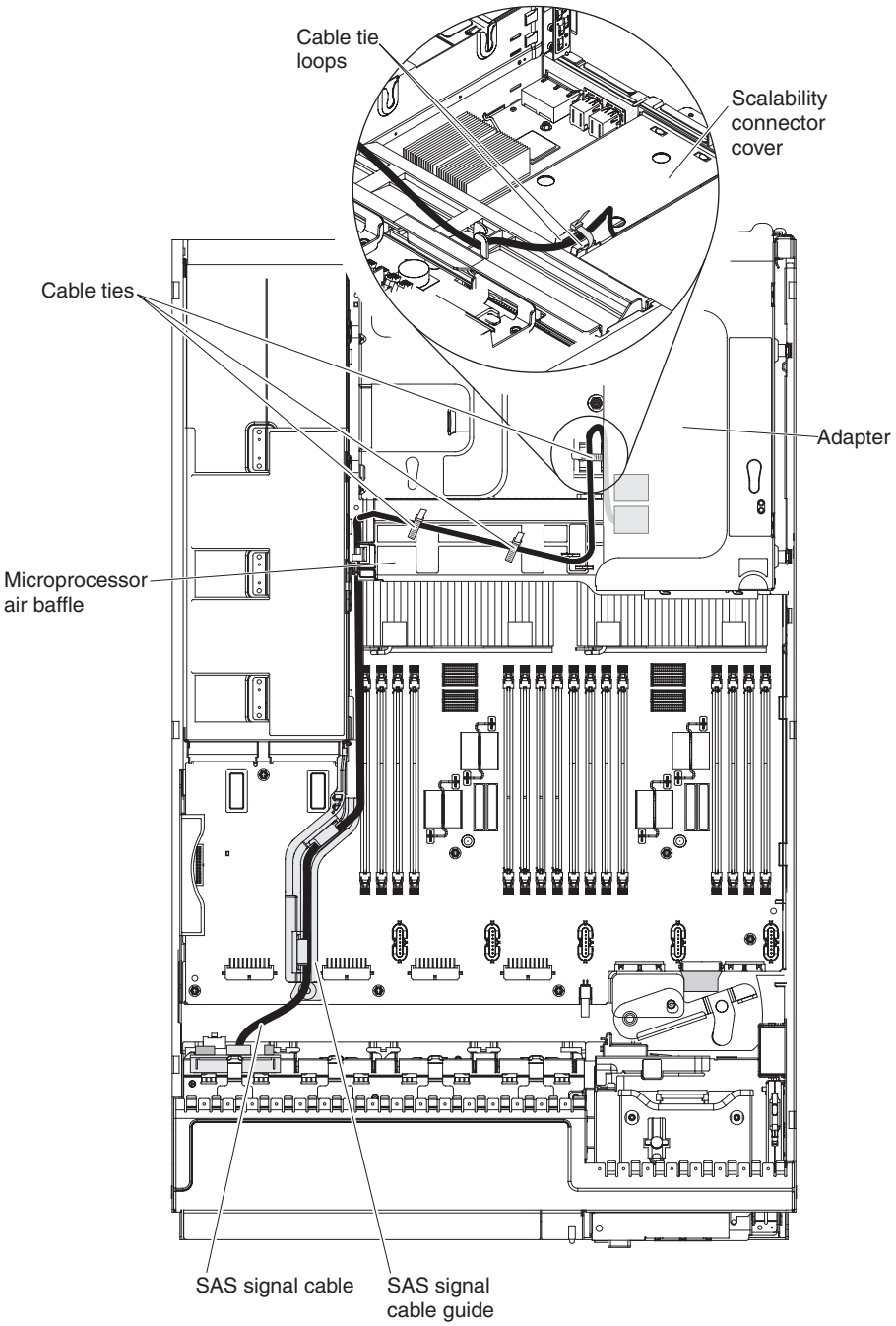
1. When the IBM 4x4 Drive Backplane ServeRAID Expansion adapter is installed in the server, this adapter installs in slot 2 on the two-slot PCI riser card (see "PCI riser card with two slots" on page 26).

To install an IBM ServeRAID M5016 SAS/SATA adapter, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the new ServeRAID M5016 SAS/SATA adapter to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners of the adapter and remove it from the package.
3. Align the ServeRAID M5016 SAS/SATA adapter so that the keys align correctly with the connector on the riser-card assembly.
4. Insert the adapter into the connector on the riser-card until it is firmly seated.

   **Attention:** Incomplete insertion might cause damage to the server or the adapter.
5. Reinstall the riser-card assembly into the system board.
6. Reconnect the cables to the adapter. Be sure to route the signal cables through the SAS cable guide and up and over the rear of the microprocessor air baffle; then, through the loops on the scalability connector cover and then to the adapter (see the following illustration). Use the cable ties (as shown in the

illustration) that comes with the server to secure the SAS cables so that they do not get in the way or get damaged.




7. Replace the cover (see "Replacing the server top cover" on page 247).
8. Slide the server in the rack.
9. Reconnect the power cord and any cables that you removed.
10. Turn on the peripheral devices and the server.

## Removing an IBM ServeRAID B5015 SSD Controller

To remove an IBM ServeRAID B5015 Solid State Drive (SSD) controller, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Disconnect the cables from the existing SSD adapter.
5. Carefully grasp the riser card by the blue touch points and pull it up until the riser-card assembly disengages from the connector on the system board and set it aside.
6. Carefully grasp the SSD adapter and pull it out of the riser-card assembly.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing an IBM ServeRAID B5015 SSD Controller

**Note:**

1. This adapter can only be installed in the PCI slots listed in Table 15 on page 258.
2. This adapter can only be used with the 8x1.8-inch drive backplane.
3. You can only use 1.8-inch hot-swap drives with this adapter.

The IBM ServeRAID B5015 Solid State Drive (SSD) controller supports RAID levels 1 and 5. For configuration information, see the ServeRAID documentation at http://www.ibm.com/systems/support/.

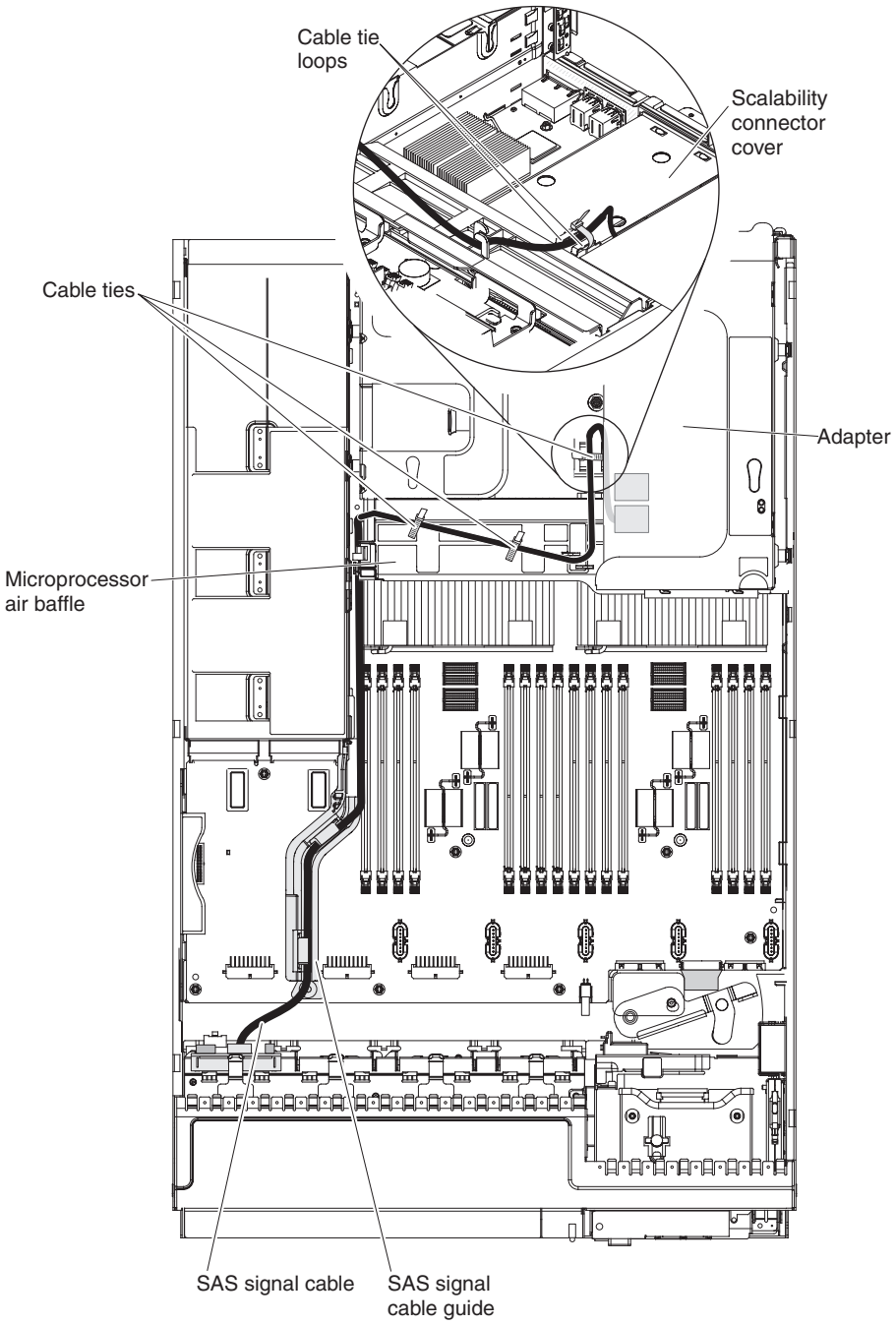
**Attention:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

To install an IBM ServeRAID B5015 SSD adapter, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the new ServeRAID B5015 SSD adapter to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners of the adapter and remove it from the package.
3. Align the ServeRAID B5015 SSD adapter so that the keys align correctly with the connector on the riser-card assembly.
4. Insert the SSD adapter into the connector on the riser-card until it is firmly seated.

   **Attention:** Incomplete insertion might cause damage to the server or the adapter.
5. Reinstall the riser-card assembly onto the system board.
6. Connect the signal cable to the adapter. Be sure to route the signal cables through the SAS cable guide and up and over the rear of the microprocessor air baffle; then, through the loops on the scalability connector cover and then to the adapter (see the following illustration). Use the cable ties (as shown in the illustration) that come with the drive backplane to secure the SAS cables

so that they do not get in the way or get damaged.




7. Replace the cover (see "Replacing the server top cover" on page 247n).
8. Slide the server in the rack.
9. Reconnect the power cord and any cables that you removed.
10. Turn on the peripheral devices and the server.

## Removing the IBM 4x4 Drive Backplane ServeRAID Expansion adapter

To remove 4x4 Drive Backplane ServeRAID Expansion adapter, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Disconnect the cables from the existing ServeRAID Expansion adapter.
5. Carefully grasp the riser card by the blue touch points and pull it up until the riser-card assembly disengages from the connector on the system board and set t aside.
6. Carefully grasp the ServeRAID Expansion adapter and pull it out of the riser-card assembly.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the IBM 4x4 Drive Backplane ServeRAID Expansion adapter

The IBM 4x4 Drive Backplane ServeRAID Expansion Adapter provides additional SAS signal connectors.

**Note:**

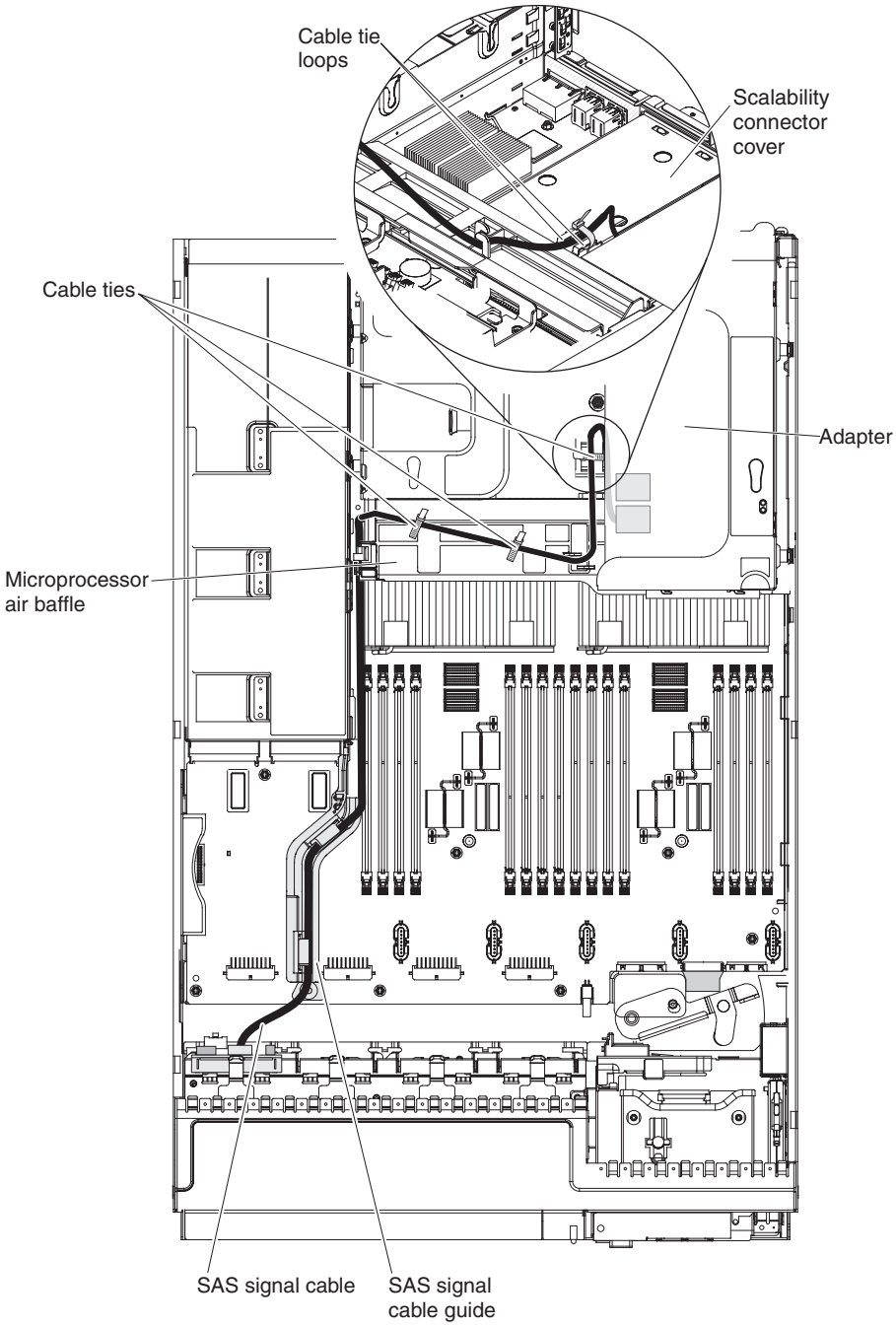
1. You can only use this adapter with the ServeRAID M1015 SAS/SATA adapter and the ServeRAID M5015 SAS/SATA adapter. This adapter must be installed in PCI slot 1 and the ServeRAID M1015 or ServeRAID M5015 adapter (whichever is installed) must be installed in PCI slot 2 on the two-slot PCI riser card (see Table 15 on page 258 for more information).
2. You can only use the 2.5-inch hot-swap drive backplanes with this adapter.

To install an IBM 4x4 Drive Backplane ServeRAID Expansion adapter, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the ServeRAID Expansion adapter to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners of the adapter and remove it from the package.
3. Align the ServeRAID Expansion adapter so that the keys align correctly with the connector on the riser-card assembly.
4. Insert the adapter into the connector on the riser-card until it is firmly seated.

   **Attention:** Incomplete insertion might cause damage to the server or the adapter.
5. Reinstall the riser-card assembly onto the system board.
6. Connect the signal cable to the adapter. Be sure to route the signal cables through the SAS cable guide and up and over the rear of the microprocessor air baffle; then, through the loops on the scalability connector cover and then to the adapter (see the following illustration). Use the cable ties (as shown in the illustration) that come with the drive backplane to secure the SAS cables

so that they do not get in the way or get damaged.




7. Replace the cover (see “Replacing the server top cover” on page 247).
8. Slide the server in the rack.
9. Reconnect the power cord and any cables that you removed.
10. Turn on the peripheral devices and the server.

## Removing the Emulex 10GbE Custom Adapter for IBM System x or the Emulex 10GbE Integrated Virtual Fabric Adapter II for IBM System x

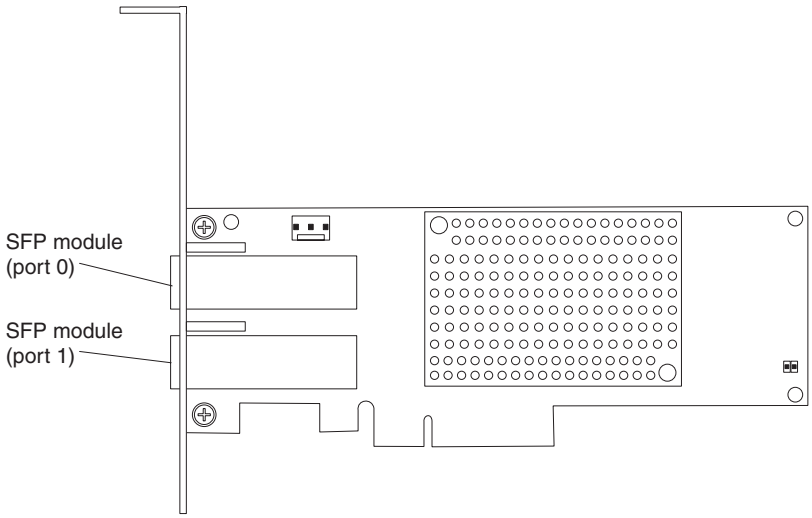
To remove the Emulex 10GbE Custom Adapter for IBM System x or the Emulex 10GbE Integrated Virtual Fabric Adapter II for IBM System x, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. If any adapters are installed in the three-slot PCI riser-card assembly, disconnect any cables that are connected to the adapters.
5. Carefully grasp the riser card and pull it until it disengages from the riser card connector on the system board.
6. Pull the Emulex adapter out of the riser card.
7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the Emulex 10GbE Custom Adapter for IBM System x or the Emulex 10GbE Integrated Virtual Fabric Adapter II for IBM System x

To replace a Emulex 10GbE Custom Adapter for IBM System x or the Emulex 10GbE Integrated Virtual Fabric Adapter II for IBM System x, complete the following steps:

**Note:** The following illustration might differ slightly from your hardware.




1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the new adapter to any unpainted metal surface on the server. Then, remove the adapter from the package.
3. Insert the adapter into the riser-card assembly, aligning the edge connector on the adapter with the connector on the riser-card assembly. Press the edge of

the connector *firmly* into the riser-card assembly. Make sure that the adapter snaps into the riser-card assembly securely.

**Attention:** When you install an adapter, make sure that the adapter is correctly seated in the riser-card assembly and that the riser-card assembly is securely seated in the riser-card connector on the system board before you turn on the server. An incorrectly seated adapter might cause damage to the system board, the riser-card assembly, or the adapter.

4. Reinstall the PCI riser-card assembly in PCI riser-card connector (see "Replacing a PCI riser-card assembly" on page 319.
5. Reconnect any cables that you disconnect earlier.
6. Perform any configuration tasks that are required for the adapter.
7. Replace the cover (see "Replacing the server top cover" on page 247).
8. Slide the server into the rack.
9. Reconnect the power cord and any cables that you removed.
10. Turn on the peripheral devices and the server.

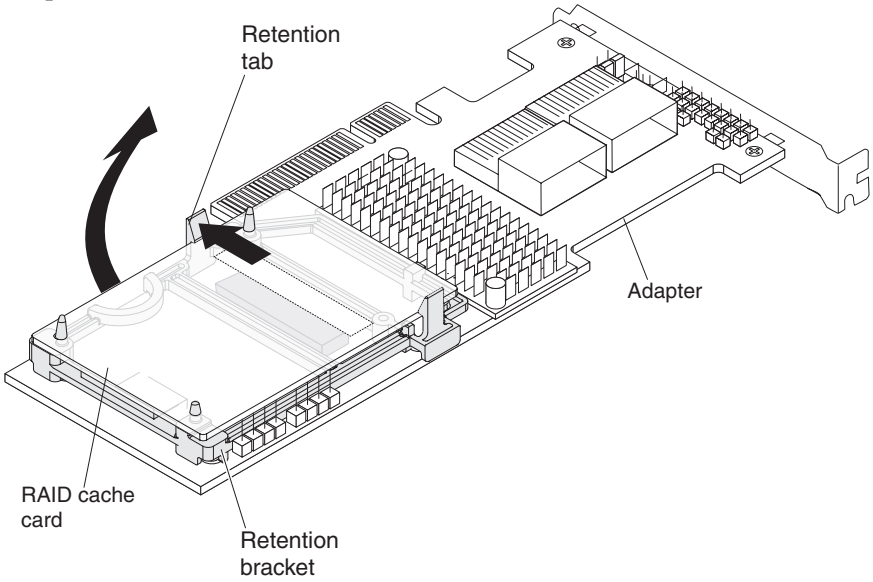
## Removing a RAID cache card

**Note:** For additional information and notes about the adapters, see "Replacing an adapter" on page 257.

To remove a RAID cache card, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Disconnect the signal cables from the adapter.
5. Disconnect the flash power module cable from the cache card.
6. Disconnect the cable from the flash power module in the flash power module tray on top of the memory tray or DIMM air baffle (whichever one is installed).
7. Grasp the riser-card assembly at the blue touch points and pull it up until it disengages from the connector on the system board.
8. Remove the adapter from the riser-card assembly (see "Removing an adapter" on page 256).

9. Press the retention tab away from the cache card and lift the cache card off the adapter and set it aside.



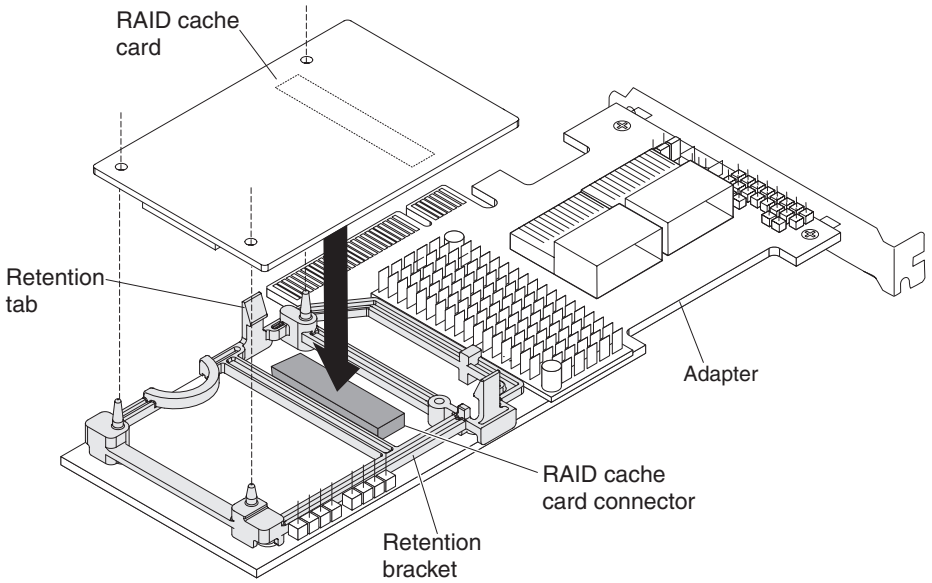

10. If you are instructed to return the cache card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a RAID cache card

**Note:** For additional information and notes about installing adapters, see "Replacing an adapter" on page 257.

To replace an RAID cache card, complete the following steps:

1. Read "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the new RAID cache card to any unpainted surface on the outside of the server; then, grasp the card by the top edge or upper corners of the card and remove it from the package.
3. Align the cache card with the RAID cache card slot on the RAID adapter and lower it onto the connector.



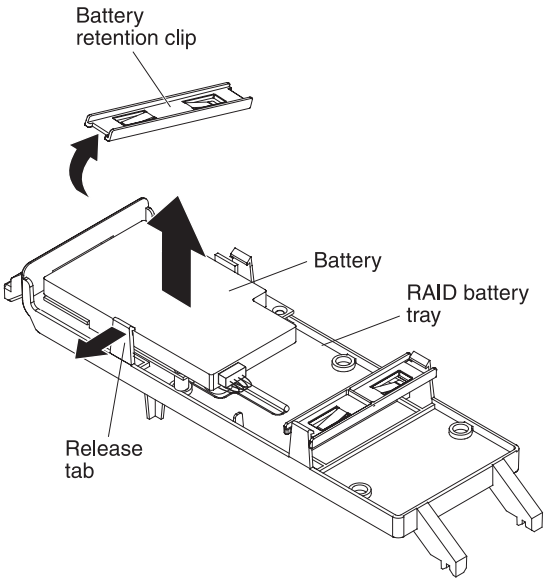
4. Gently press the cache card down until it snaps in place and is securely seated.
5. Align the adapter so that the keys align correctly with the connector on the riser-card assembly.
6. Insert the adapter into the connector on the riser-card until it is firmly seated.

   **Attention:** Incomplete insertion might cause damage to the server or the adapter.
7. Reinstall the riser-card assembly onto the connector on the system board.
8. Reconnect the signal cables to the adapter.
9. Reconnect the flash power module cable to the cache card.
10. Reconnect the cable to the flash power module that is in the flash power module tray on top of the memory tray or DIMM air baffle (whichever one is installed).
11. Replace the cover (see "Replacing the server top cover" on page 247).
12. Reconnect the power cord and any cables that you removed.
13. Slide the server in the rack.
14. Turn on the peripheral devices and the server.

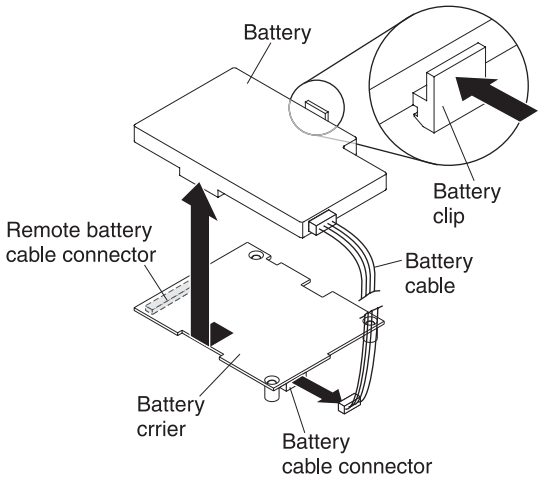
## Removing a remotely installed RAID adapter battery

If a RAID adapter battery is installed remotely on the memory tray or the DIMM air baffle and you need to replace the RAID adapter battery, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. From the top of the memory tray or DIMM air baffle (whichever one is installed in the server), remove the battery retention clip that holds the battery in place on the RAID battery tray. Press the release tab toward the side of the server and remove the battery retention clip.



5. Lift the battery and battery carrier from the RAID battery tray and disconnect the remote battery cable from the remote battery cable connector on the battery carrier.
6. Disconnect the battery cable from the battery cable connector on the battery carrier; then, press the battery clip toward the battery to release it from the battery carrier.

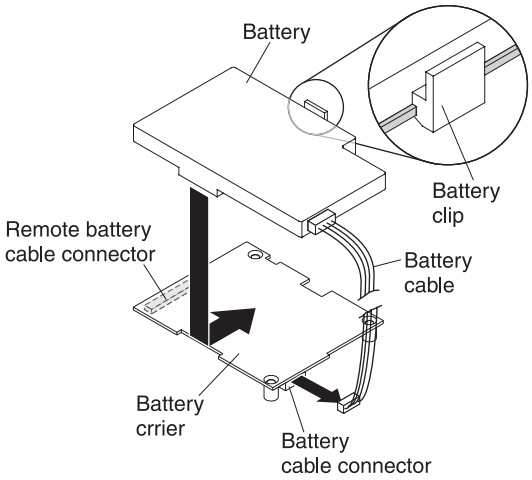



If you are instructed to return the RAID adapter battery, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a RAID adapter battery remotely in the server

When you install any RAID adapter in the server that come with batteries, the RAID batteries must be installed remotely to prevent the batteries from overheating. The batteries must be installed only in the RAID battery tray on top of the memory tray or DIMM air baffle (whichever one is installed in the server). To install the RAID adapter battery in the RAID battery tray, complete the following steps:

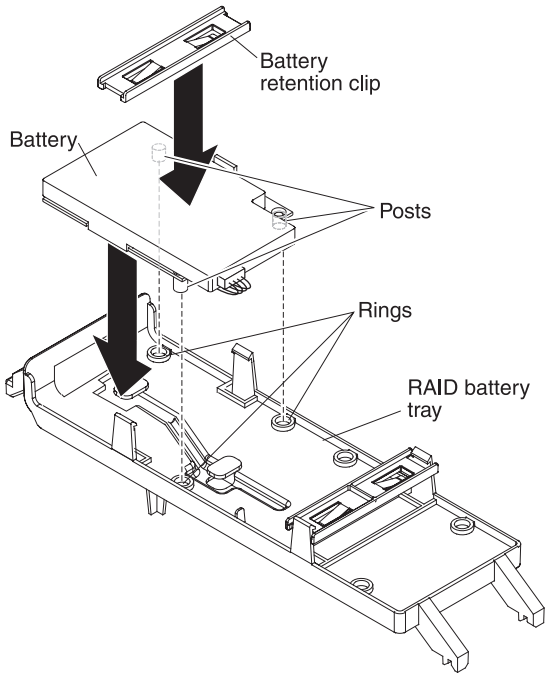
1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Install the RAID adapter on the riser-card and install the riser-card assembly in the server (see "Replacing a PCI riser-card assembly" on page 319).
3. Install the memory tray or DIMM air baffle (whichever is installed in the server). See "Replacing the memory tray" on page 249 and "Replacing the DIMM air baffle" on page 253).
4. Install the battery in the RAID battery tray:
   a. Align the new battery with the slots on the battery carrier and insert the battery under the battery clip; then, press the battery down into the battery carrier until it snaps in place and is firmly seated.




b. Connect the battery cable to the battery cable connector on the battery carrier.

c. Place the battery carrier in the RAID battery tray mounting slot on the RAID battery tray and ensure that battery carrier posts align with the rings on the battery mounting slot so that the battery carrier is secure in the slot.

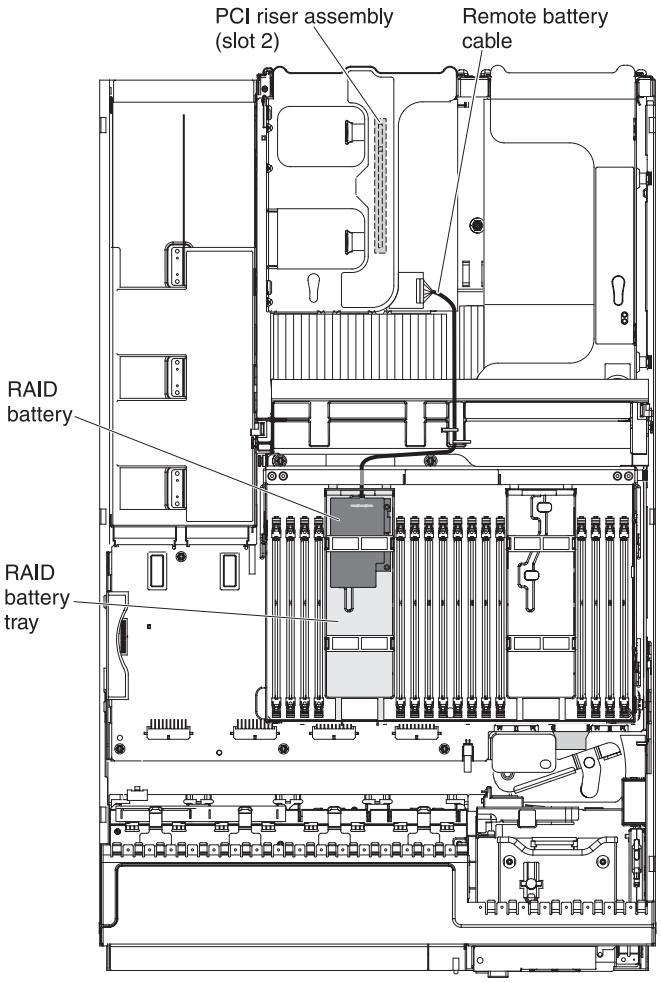
**Note:** The positioning of the remote battery depends on the type of remote battery that you install.




d. Take the battery retention clip and place it underneath the tab while pressing the release tab toward the side of the server; then, press it down until it snaps in place to hold the battery carrier firmly in place.

5. Route the remote battery cable in the server and through the slots on the RAID battery tray as shown in the following illustrations (depending on the PCI slot in which the RAID adapter is installed).

**Attention:** Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.



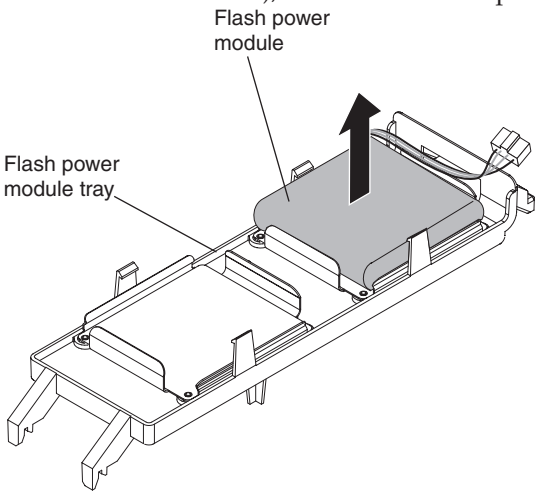

6. Install the cover.
7. Slide the server into the rack.
8. Reconnect the power cords and all external cables, and turn on the server and peripheral devices.

## Removing a RAID flash power module

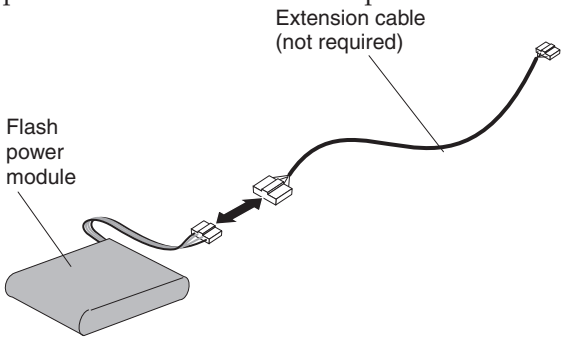
The flash power module that comes with some RAID adapters must be installed remotely in the server. To remove a failed flash power module, complete the following steps:

1. Read the safety information in “Safety” on page vii and “Installation guidelines” on page 243.
2. Turn off the server (see “Turning off the server” on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see “Removing the server top cover” on page 246).

4. From the top of the memory tray or DIMM air baffle (whichever one is installed in the server), remove the flash power module from the tray.




5. Disconnect the extension cable from the flash power module and lift the flash power module from the flash power module tray.



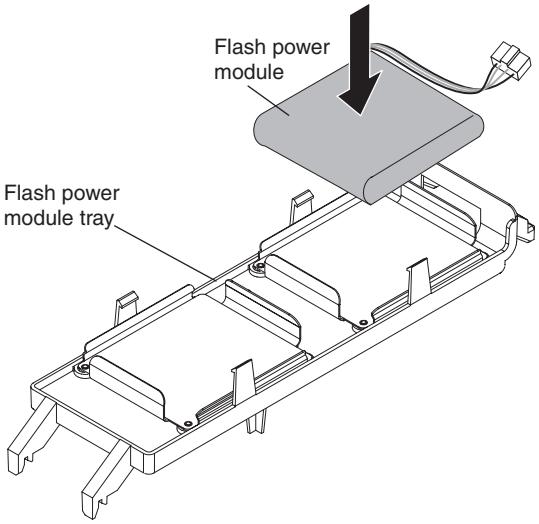

If you are instructed to return the flash power module, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a RAID flash power module

When you install any RAID adapter in the server that comes with a flash power module, the RAID flash power module must be installed remotely in the server to prevent the flash power module from overheating. The flash power module must be installed only in the flash power module tray on top of the memory tray or DIMM air baffle (whichever one is installed in the server). To replace a flash power module, complete the following steps:

1. Read the safety information in "Safety" on page vii and "Installation guidelines" on page 243.
2. Install the RAID adapter on the riser-card and install the riser-card assembly in the server (see "Replacing a PCI riser-card assembly" on page 319).
3. Install the flash power module in the flash power module tray:
   a. Align the new flash power module with the slot on the flash power module tray.
   b. Lower the flash power module onto the slot in the tray; then, press the flash power module down until it snaps into place and is firmly seated in the slot.

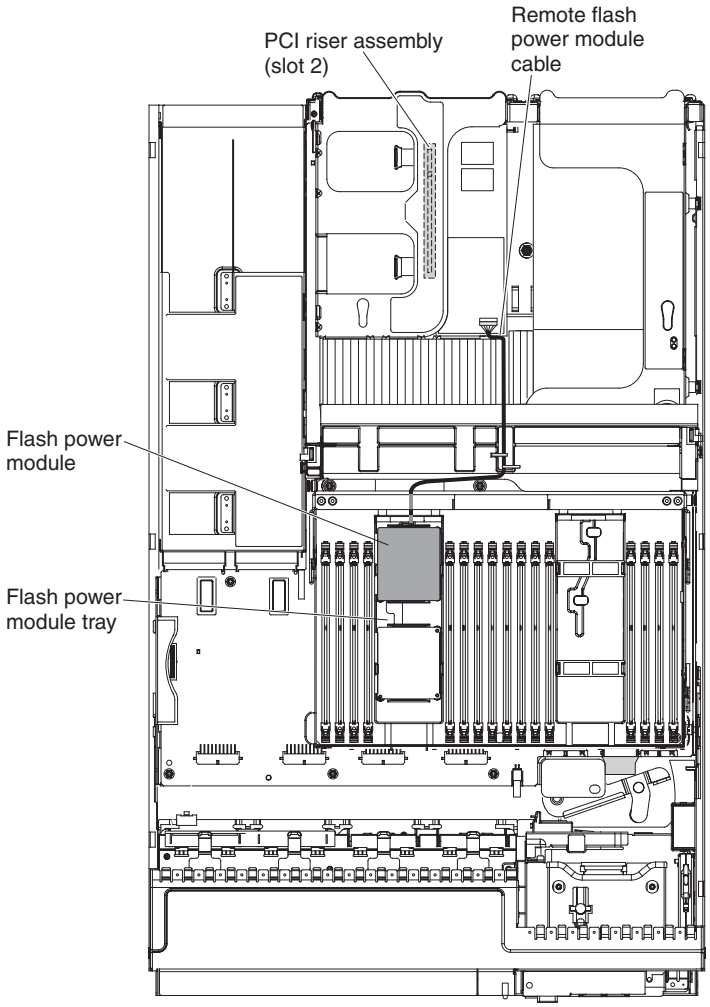
**Note:** The flash power module does not require a retention clip to hold the flash power module in place.




c. Reconnect the extension cable to the flash power module.

4. Ensure that the flash power module cable is routed in the server as shown in the following illustrations (depending on the PCI slot in which the RAID adapter is installed).

   **Attention:** Make sure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board.

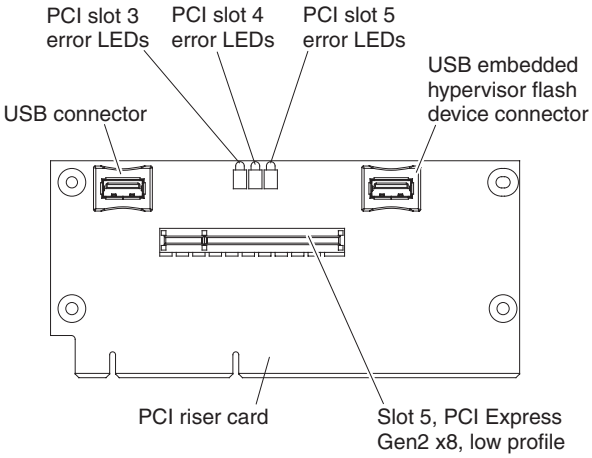



5. Install the cover.
6. Slide the server into the rack.
7. Reconnect the power cords and all external cables, and turn on the server and peripheral devices.

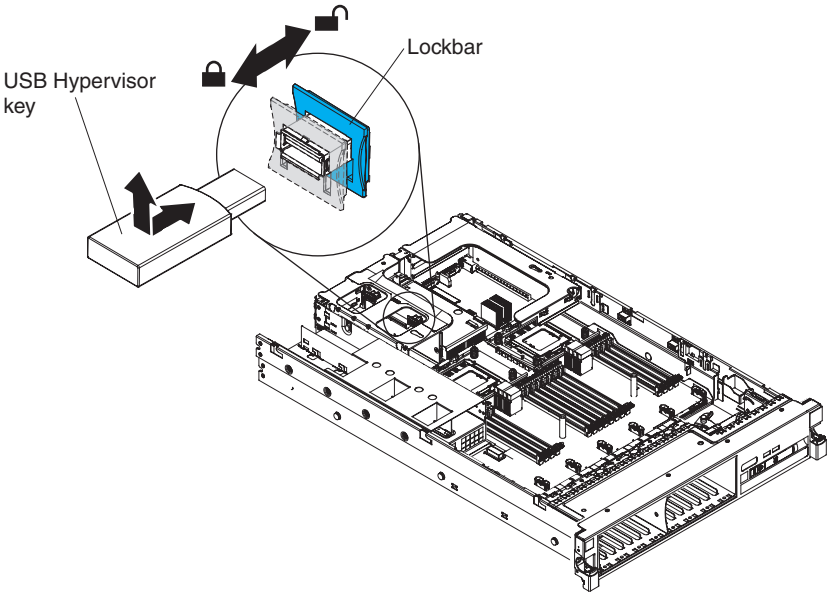
## Removing a USB embedded hypervisor flash device

To remove a hypervisor flash device, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Locate the USB embedded hypervisor flash device connector on the one-slot side of the x8 low-profile riser-card as shown in the following illustration:




5. Slide the lockbar on the flash device connector to the unlocked position and pull the USB flash device out of the connector.

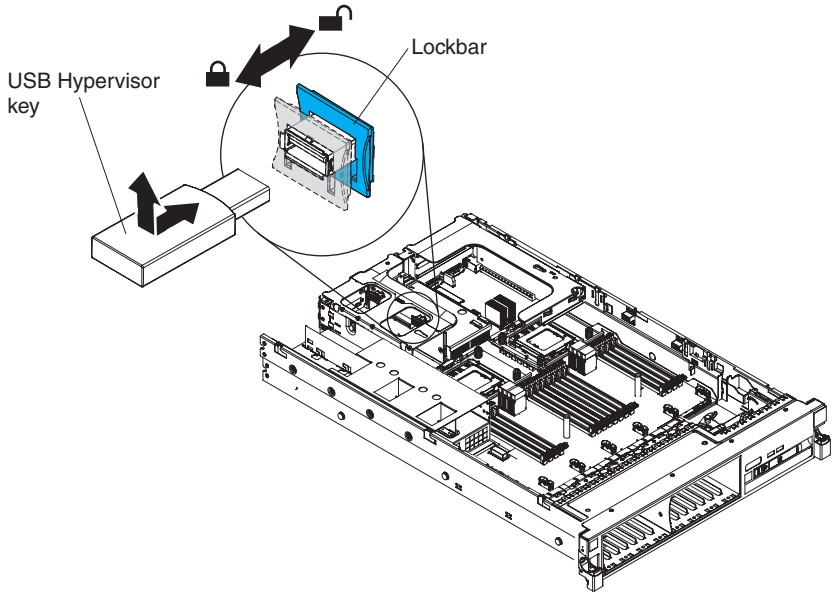



6. If you are instructed to return the flash device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a USB embedded hypervisor flash device

To install a hypervisor flash device, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the USB flash device with the connector on the x8 low-profile riser-card assembly and push it into the connector until it is firmly seated.
3. Slide the lockbar toward the riser-card assembly to the locked position until it is seated firmly.



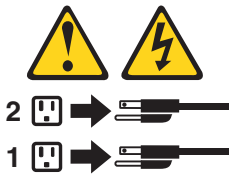

4. Reconnect the power cord and any cables that you removed.
5. Install the cover (see "Replacing the server top cover" on page 247).
6. Slide the server into the rack.
7. Turn on the peripheral devices and the server.

## Removing a hot-swap power supply

When you remove or install a hot-swap power supply, observe the following precautions.

**Statement 5**

**CAUTION:**
**The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**



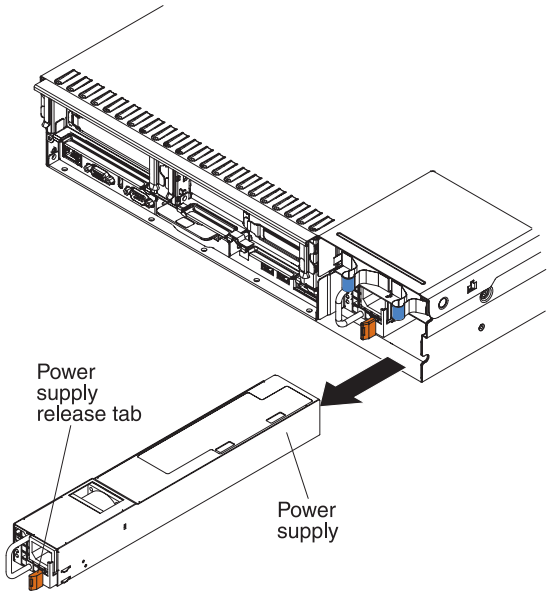

**Statement 8**

**CAUTION:**
**Never remove the cover on a power supply or any part that has the following label attached.**

**Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

To remove a hot-swap power supply, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. If only one power supply is installed, turn off the server and peripheral devices and disconnect all power cords.
3. If the server is in a rack, at the back of the server, pull back the cable management arm to gain access to the rear of the server and the power supply.
4. Press and hold the orange release tab to the left. Grasp the handle and pull the power supply out of the server.




5. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a hot-swap power supply

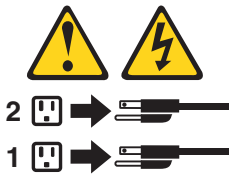
The following notes describe the type of power supply that the server supports and other information that you must consider when you install a power supply:

- The server comes with one 675-watt hot-swap 12-volt output power supply. The input voltage is 110 V ac or 220 V ac auto-sensing.

  **Note:** You cannot mix 110 V ac and 220 V ac power supplies in the server, it is not supported.
- These power supplies are designed for parallel operation. In the event of a power-supply failure, the redundant power supply continues to power the system. The server supports a maximum of four power supplies.
- The server can run fully configured with two power supplies. For redundancy support, you must install the optional IBM Power Interposer for Redundant Power option kit.

### Statement 5

**CAUTION:**
**The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**



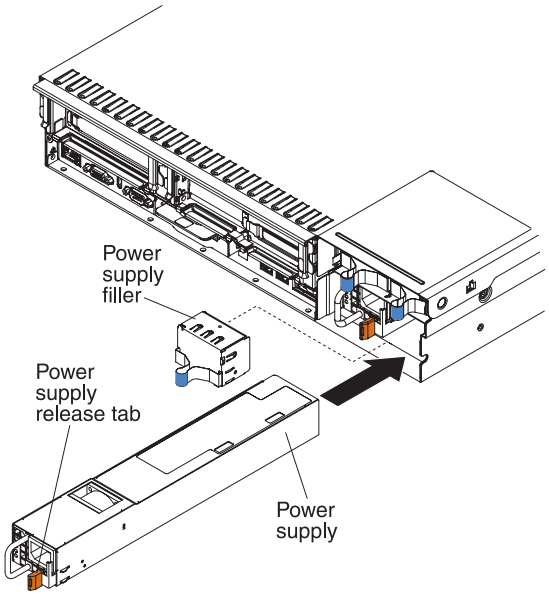

**Statement 8**

**CAUTION:**
**Never remove the cover on a power supply or any part that has the following label attached.**

**Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a with one of these parts, contact a service technician.**

To install a hot-swap power supply, complete the following steps:

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the server; then, remove the power supply from the package and place it on a static-protective surface.
3. If you are installing a hot-swap power supply into an empty bay, remove the power-supply filler panel from the power-supply bay.



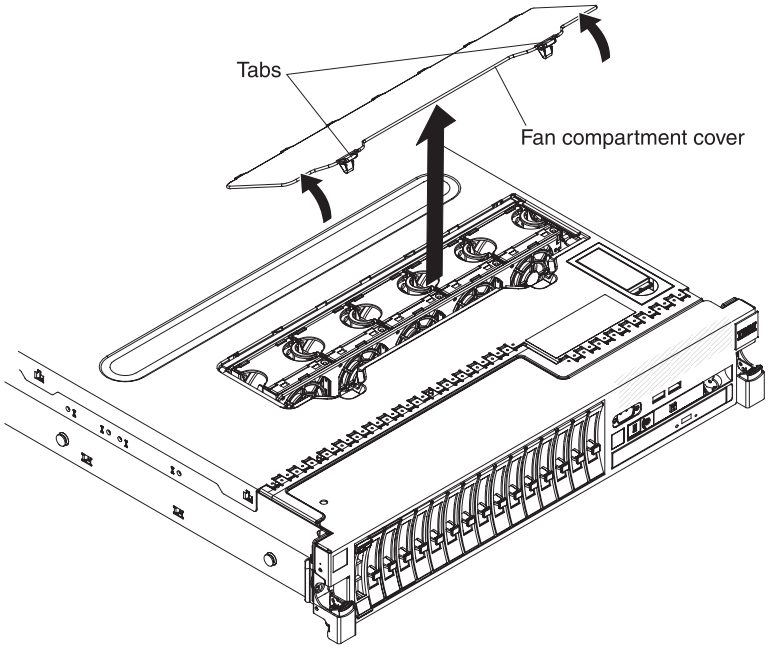

4. Grasp the handle on the rear of the power supply and slide the power supply forward into the power-supply bay until it clicks. Make sure that the power supply connects firmly into the power-supply connector.
5. Route the power cord through the cable retainer clip so that it does not accidentally become disconnected
6. Connect the power cord for the new power supply to the power-cord connector on the power supply.
7. Connect the other end of the power cord to a properly grounded electrical outlet.
8. Make sure that the ac power LED and the dc power LED on the power supply are lit, indicating that the power supply is operating correctly. The two green LEDs are to the right of the power-cord connector.

## Removing a hot-swap fan assembly

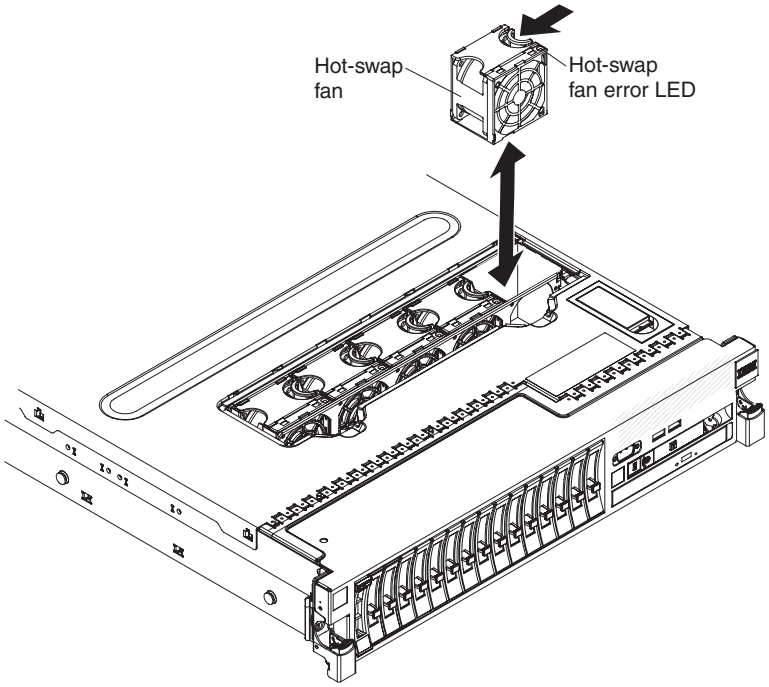
**Attention:** To ensure proper server operation, replace a failed hot-swap fan within 30 seconds.

To remove a hot-swap-fan, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Remove the fan compartment cover. Push in on the fan compartment cover release tabs while also pulling up on the cover; then, lift the compartment cover up and off the server and set it aside.




3. Pull the fan latch to the left to release the fan release tab from the fan cage assembly and pull the fan out of the fan cage assembly.




**Attention:** To ensure proper operation, replace a failed hot-swap fan within 30 seconds.

4. If you are instructed to return the fan, follow all of the packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a hot-swap fan assembly

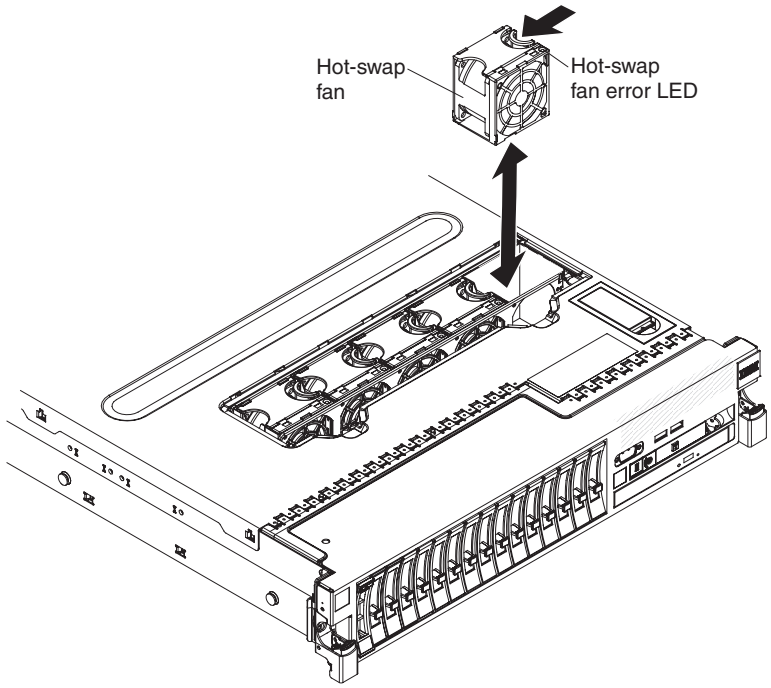
The server comes standard with five speed-controlled hot-swap cooling fans.

**Attention:** To ensure proper operation, replace a failed hot-swap fan within 30 seconds.

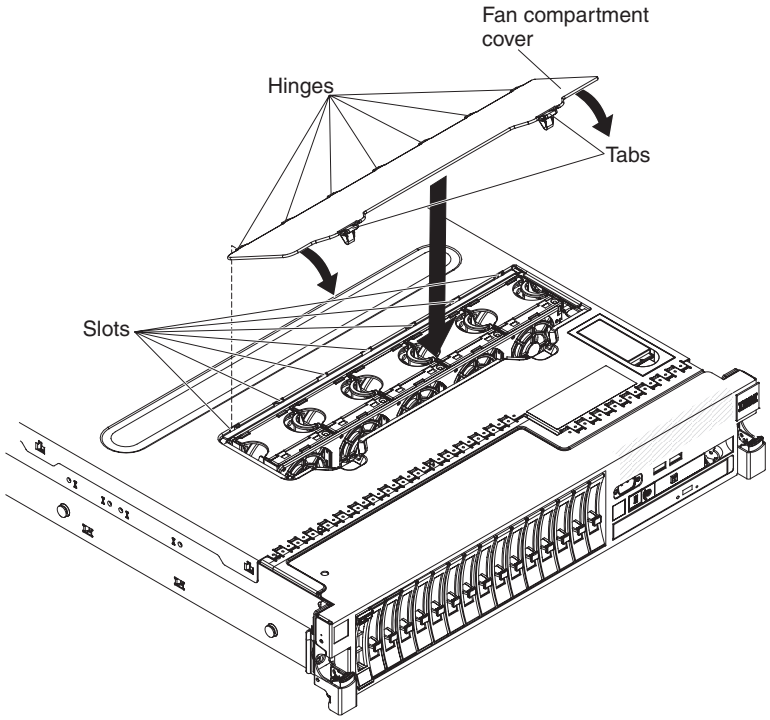
To install or replace a hot-swap fan, complete the following steps:

**Note:** For more information about how the fan event messages are issued and the fan number and the device on which the fan is located, see "System-event log" on page 167 and Table 9 on page 167.

1. Touch the static-protective package that contains the new fan to any unpainted metal surface on the server. Then, remove the new fan from the package.
2. Orient the fan over the fan slot in the fan cage assembly so that the fan connector aligns with the connector on the system board.




3. Insert the fan into the fan slot in the fan cage assembly and ensure that is it seated correctly and the fan release tab is in the slot (hole) on the fan cage assembly.
4. Reinstall the fan compartment cover. Align the hinges on the bottom of the fan compartment cover with the slots on the server cover. Insert the fan compartment cover hinges into the slots on the server cover and rotate the fan compartment cover down and press it firmly to snap it in place.

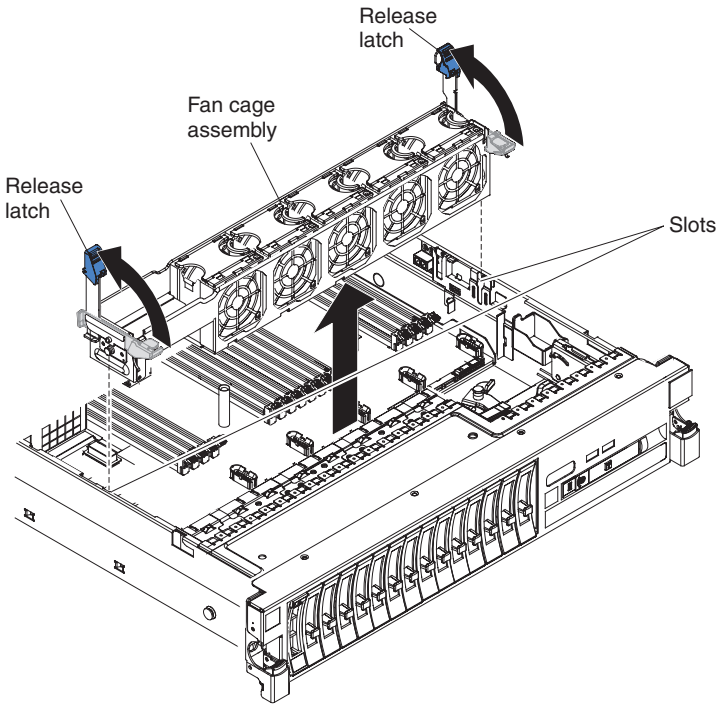



5. Slide the server into the rack.

## Removing the fan cage assembly

To remove the fan cage assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. If the server is in a rack, slide the server out of the rack.
4. Remove the top cover (see "Removing the server top cover" on page 246).
5. Squeeze the tabs on the ends of the fan cage assembly release latches and rotate the release latches up until the assembly disengages from the chassis; then, lift the fan cage assembly out of the server.

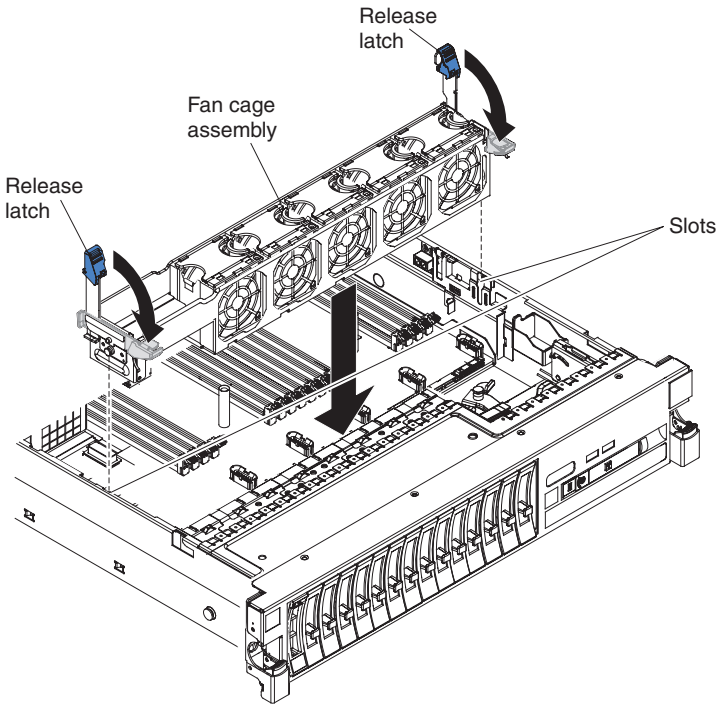



6. If you are instructed to return the fan cage assembly, follow all of the packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the fan cage assembly

To replace the fan cage assembly, complete the following steps:

1. Align the tabs on the fan cage assembly with the slots on both sides of the chassis and lower it into the server.



2. Squeeze the tabs on the ends of the fan cage assembly release latches and hold them while rotating the release latches down until the release latches are in the locked position.

   **Note:** It is easier to rotate the release latches to the locked position in the server when you squeeze the tabs and hold them.
3. Reinstall the cover (see "Replacing the server top cover" on page 247).
4. Slide the server into the rack.
5. Turn on the peripheral devices and the server.

## Removing the system battery

The following notes describe information that you must consider when replacing the battery:

- IBM has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.

  **Note:** In the U. S., call 1-800-IBM-4333 for information about battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call 1-800-IBM-SERV within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your support center or business partner.

  **Note:** After you replace the battery, you must reconfigure the server and reset the system date and time.

  **Statement 2**

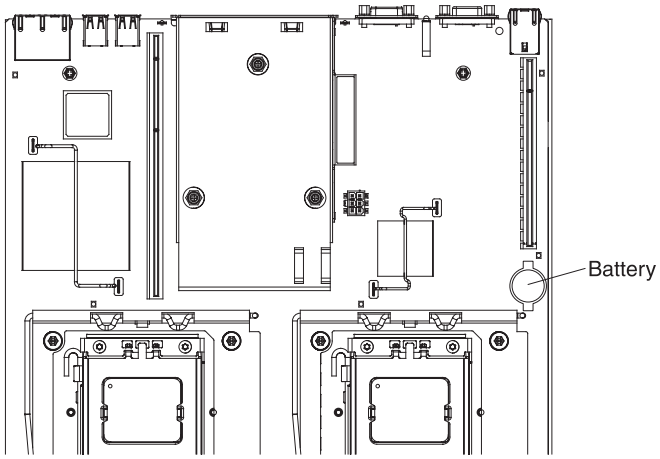
  **CAUTION:**
  **When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.**

  *Do not:*

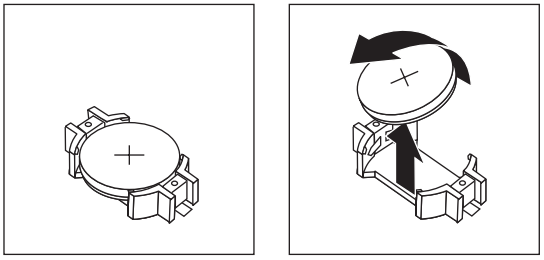
  – **Throw or immerse into water**
  – **Heat to more than 100°C (212°F)**
  – **Repair or disassemble**

  **Dispose of the battery as required by local ordinances or regulations.**

To remove the system-board battery, complete the following steps:




1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Turn off the server (see “Turning off the server” on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see “Removing the server top cover” on page 246).
4. Disconnect the cables from the adapters in the PCI riser-card assembly in slot 1 and remove the PCI riser assembly from the server. (see “Removing a PCI riser-card assembly” on page 318).
5. Remove the system-board battery:
   a. Use one finger to push the battery horizontally out of its housing.



   b. Use your thumb and index finger to lift the battery from the socket.
6. Dispose of the battery as required by local ordinances or regulations. See the *IBM Environmental Notices and User's Guide* on the IBM *Documentation* CD for more information.

## Replacing the system battery

The following notes describe information that you must consider when replacing the system-board battery in the server.

- When replacing the system-board battery, you must replace it with a lithium battery of the same type from the same manufacturer.
- To order replacement batteries, call 1-800-426-7378 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM marketing representative or authorized reseller.
- After you replace the system-board battery, you must reconfigure the server and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

**Statement 2**

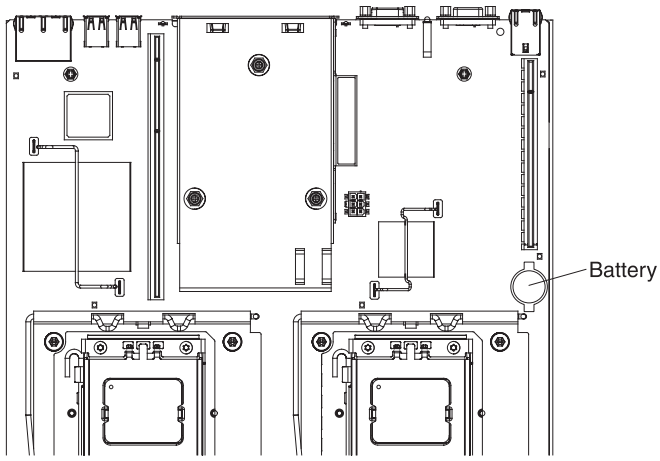
**CAUTION:**
**When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.**

*Do not:*

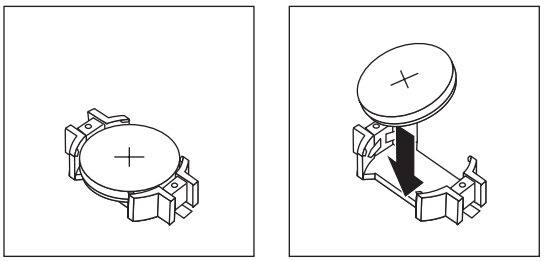
- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

**Dispose of the battery as required by local ordinances or regulations.**

To install the replacement system-board battery, complete the following steps:




1. Follow any special handling and installation instructions that come with the replacement battery.
2. Insert the new battery:
   a. Position the battery so that the positive (+) symbol is facing you.



b. Place the battery into its socket, and press the battery press the battery toward the housing until it clicks into place. Make sure that the battery clip holds the battery securely.

3. Install the cover (see "Replacing the server top cover" on page 247).
4. Slide the server into the rack.
5. Reconnect the external cables; then, reconnect the power cords and turn on the peripheral devices and the server.

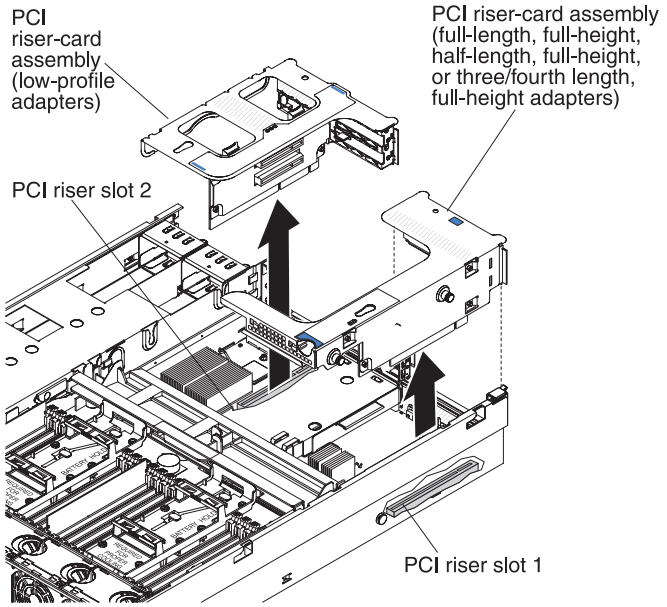
   **Note:** You must wait approximately 1 to 3 minutes after you connect the server to a power source before the power-control button becomes active.
6. Start the Setup utility and reset the configuration.
   - Set the system date and time.
   - Set the power-on password.
   - Reconfigure the server.

   See "Using the Setup utility" on page 384 for details.

## Removing a PCI riser-card assembly

To remove a PCI riser-card assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and the "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. If an adapter is installed in the PCI riser-card assembly, disconnect any cables that are connected to the adapter.
5. Grasp the front and rear of the PCI riser-card assembly at the blue touch-points and lift it out of the PCI riser-card slot on the system board.

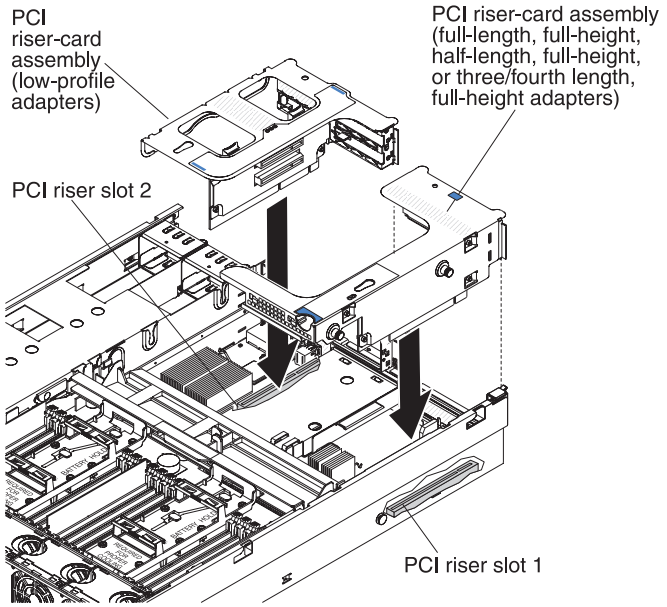



6. Remove the adapter, if necessary, from the PCI riser-card assembly.
7. Set the adapter and PCI riser-card assembly aside.

## Replacing a PCI riser-card assembly

To replace a PCI riser-card assembly, complete the following steps:

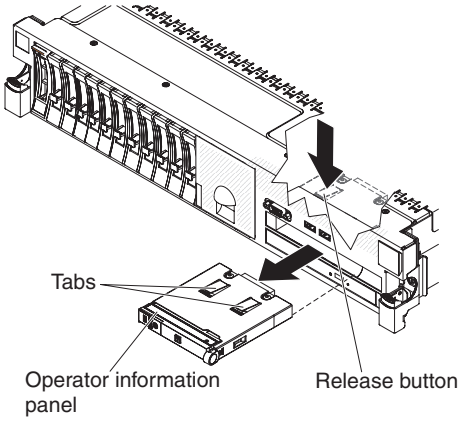
1. Read the safety information that begins on page "Safety" on page vii and the "Installation guidelines" on page 243.
2. Install the adapter in the new PCI riser-card assembly (see "Replacing an adapter" on page 257).
3. Set any jumpers or switches on the adapter as directed by the adapter manufacturer.
4. Align the PCI riser-card assembly with the PCI slot connector on the system board and align the nailheads with the slots on the chassis; then, press down firmly until the PCI riser-card assembly is seated correctly in the connector on the system board.



## Removing the operator information panel assembly

To remove the operator information panel, complete the following steps.

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the server cover (see "Removing the server top cover" on page 246).
4. Disconnect the cable from the back of the operator information panel assembly.
5. Push down on the release tab; hold down the release tab and push the blue push point on the rear of the panel to the front of the server.

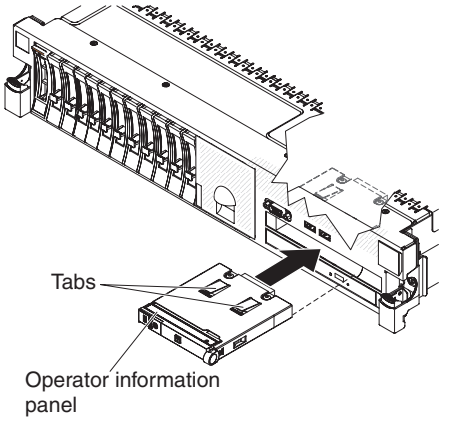



6. From the front of the server, carefully pull the assembly out of the server while you move it slightly from side to side.
7. If you are instructed to return the operator information panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the operator information panel assembly

To install the operator information panel, complete the following steps.

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. From the front of the server, slide the operator information panel into the server until it clicks into place.




3. Inside the server, connect the cable to the rear of the operator information panel assembly.

4. Install the cover (see “Replacing the server top cover” on page 247).
5. Slide the server into the rack.
6. Reconnect the power cords and any cables that you removed.
7. Turn on the peripheral devices and the server.

## Removing and replacing Tier 2 CRUs

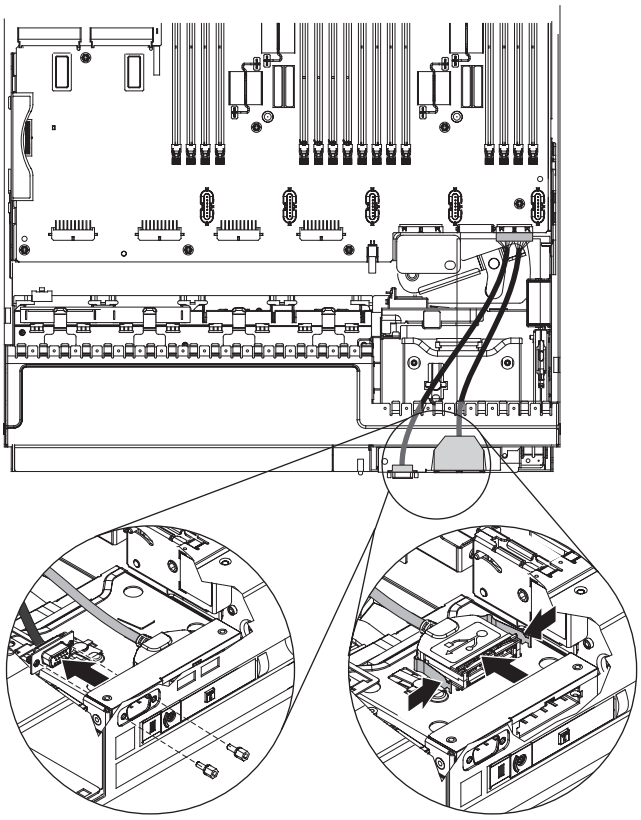
You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.

The illustrations in this document might differ slightly from your hardware.

### Removing the video/USB cable assembly

To remove the video/USB cable assembly, complete the following steps:

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Turn off the server (see “Turning off the server” on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Slide the server out of the rack.
4. Remove the server top cover (see “Removing the server top cover” on page 246).
5. Remove the fan cage assembly (see “Removing the fan cage assembly” on page 313).
6. Disconnect the video/USB cable from the connector on the system board.
7. Remove the two screws from the front of the video connector and pull the video connector out of the slot on the server.

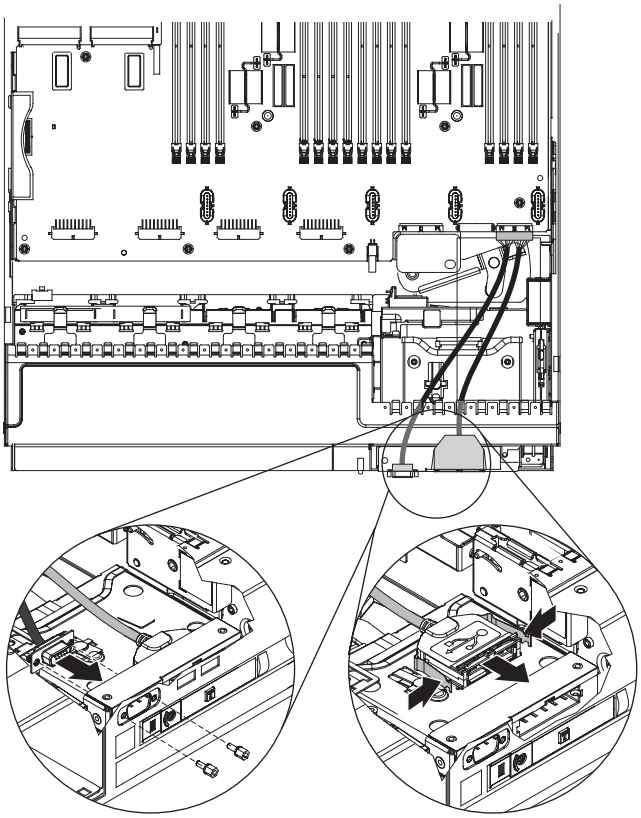


8. From inside the server, squeeze the spring clips on both sides of the USB connector and pull it out of the slot.
9. If you are instructed to return the video/USB cable assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the video/USB cable assembly

To replace the video/USB cable assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. From inside the server, align the USB connect and squeeze the spring clips on both sides of the USB connector and insert it into the slot on the server until it snaps into place and is seated firmly.

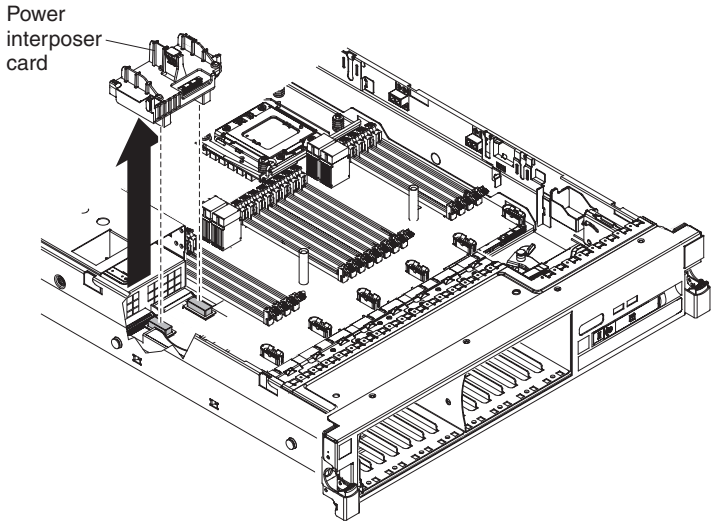


3. Align the video connector with the slot on the server and install the two screws to secure it to the server.
4. Connect the video/USB cable to the connector on the system board.
5. Reinstall the fan cage assembly (see "Replacing the fan cage assembly" on page 314).
6. Replace the cover (see "Replacing the server top cover" on page 247).

## Removing the power interposer card assembly

To remove the power interposer card assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the server cover (see "Removing the server top cover" on page 246).
4. Disconnect the power supplies that are connected to the power interposer card assembly.
5. Disconnect the power interposer card power cable from the power interposer card assembly; then, pull the power interposer card up and out of the connectors on the system board.

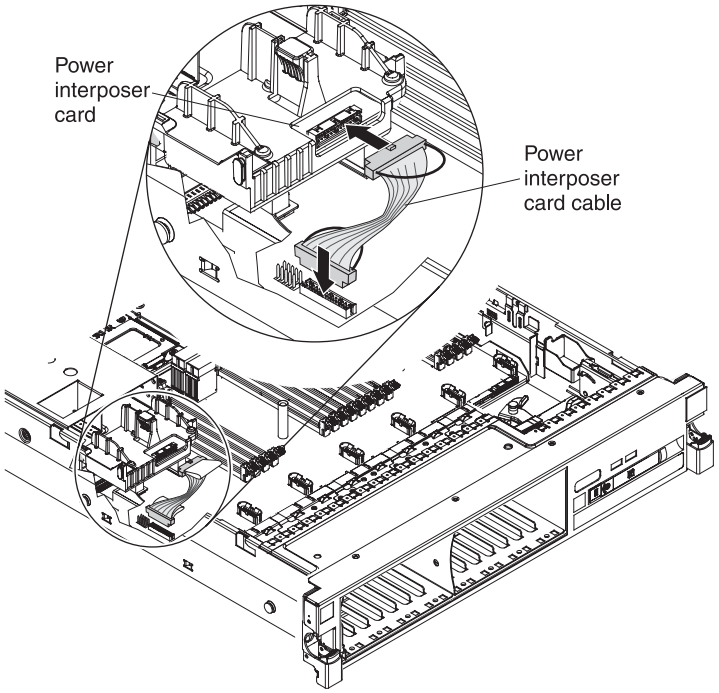



6. If you are instructed to return the power interposer card assembly, follow all of the packaging instructions, and use any packaging materials for shipping that are supplied to you.

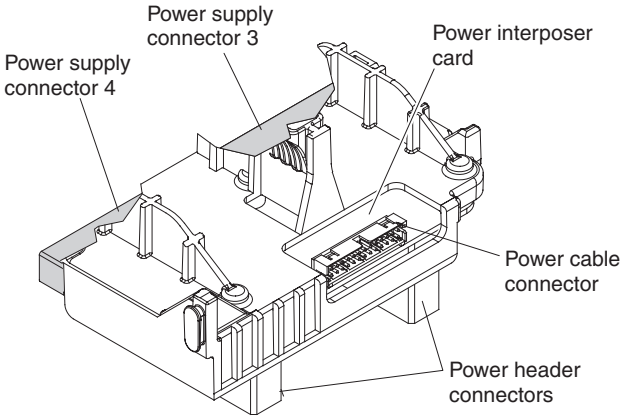
## Replacing a power interposer card assembly

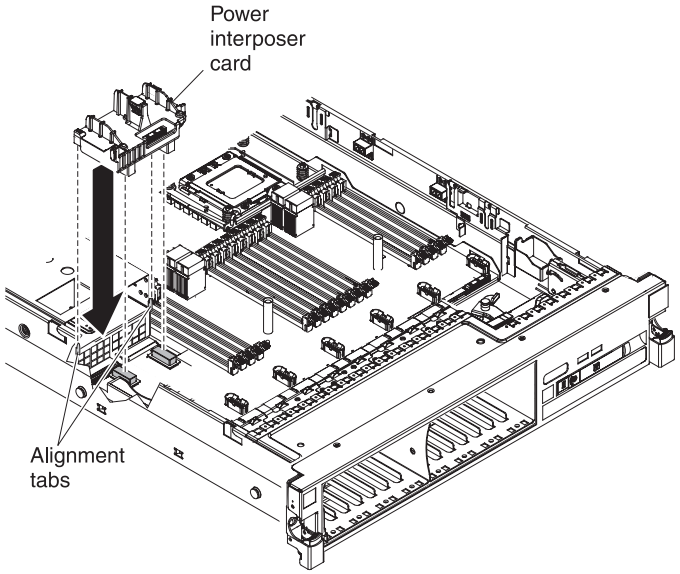
To install the power interposer card assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Reconnect the power interposer card power cable to the power interposer card.




3. Align the connectors on the power interposer card assembly so that they are facing the power supply cage and the power interposer card is also aligned with the power interposer card connectors on the system board; then, press down on the assembly until it is firmly seated in the connectors on the system board.





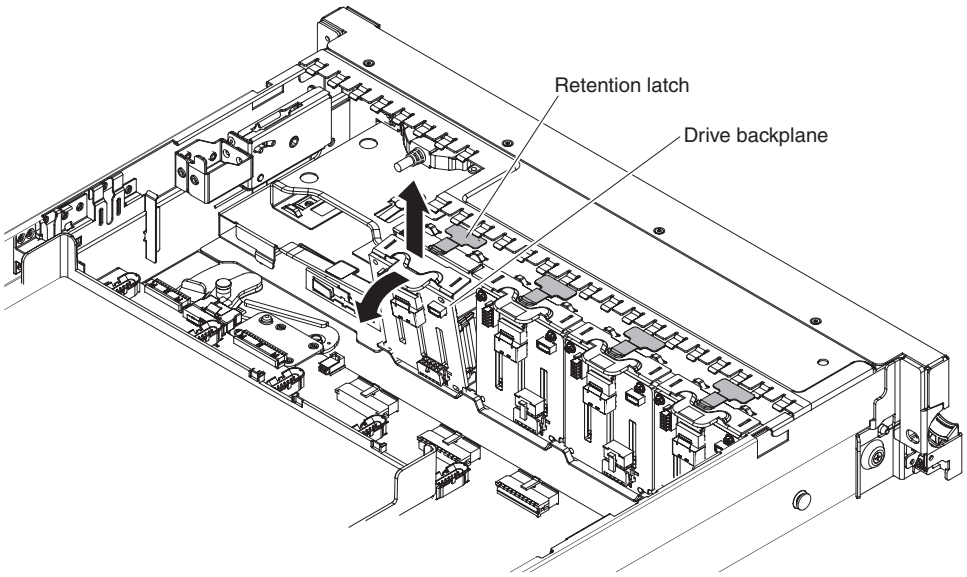

4. Reinstall the power supplies that you removed earlier.
5. Reinstall the cover (see "Replacing the server top cover" on page 247).
6. Slide the server into the rack.
7. Reconnect the power cords and any cables that you removed.
8. Turn on the peripheral devices and the server.

## Removing the hot-swap drive backplane

To remove the 2.5-inch hot-swap drive backplane, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Slide the server out of the rack.
5. Pull the drives and filler panels out of the server slightly to disengage them from the drive backplane.
6. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 313).
7. Disconnect the combination power/configuration cable from the backplane. If a SAS signal cable is attached to the drive backplane, disconnect it.

   **Note:** You can also choose to disconnect the cables after removing the backplane, if that is easier for you.
8. Lift the backplane up slightly and pull it out of the retention latch on top of the backplane bracket; then, rotate it out of the tabs at the bottom of the backplane bracket and remove it from the server.



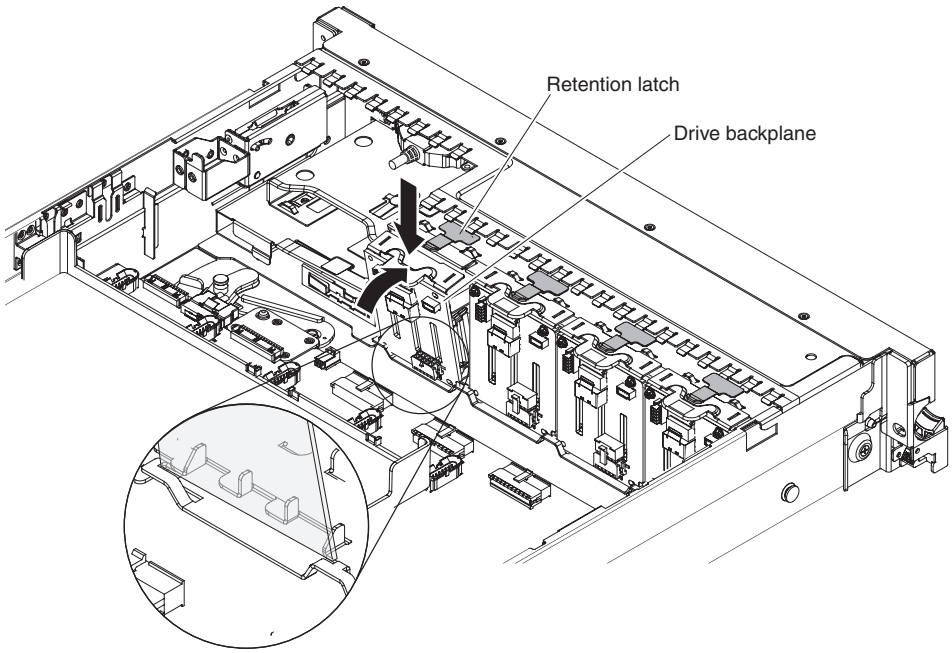

9. If you are instructed to return the drive backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the hot-swap drive backplane

To install the replacement hot-swap drive backplane, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the tabs on the bottom of the drive backplane with the slots on the bottom of the backplane cage.
3. Insert the drive backplane tabs into slots on the bottom of the backplane cage and push the drive backplane forward into the retention latch on top of the backplane bracket until the backplane is locked in place.

   **Note:** You can reconnect the cables to the drive backplane before installing the backplane onto the cage or you can connect the cables after you install the backplane, if that is easier for you.

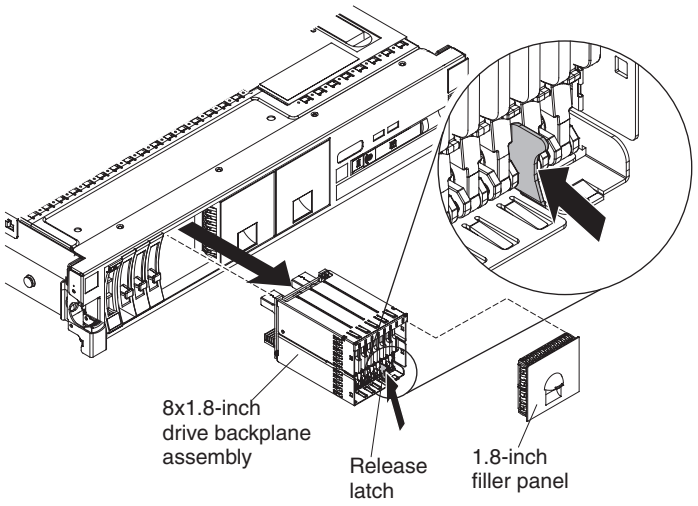



4. Reconnect the cables to the drive backplane and adapter, if it was removed.
5. Reinstall the fan cage assembly (see "Replacing the fan cage assembly" on page 314).
6. Reinstall the drives and filler panels.
7. Install the cover (see "Replacing the server top cover" on page 247).
8. Slide the server into the rack.
9. Reconnect the power cords and any cables that you removed.
10. Turn on the peripheral devices and the server.

## Removing the 8x1.8-inch hot-swap drive backplane assembly

To remove the 8x1.8-inch hot-swap drive backplane assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the top cover (see "Removing the server top cover" on page 246).
4. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 313).
5. Remove the drive filler panel.
6. Remove the drives from the drive backplane assembly (see "Removing 2.5-inch and 1.8-inch hot-swap drives" on page 260) and install them in the new backplane assembly.
7. Disconnect the combination power/configuration cable from the backplane assembly. If a SAS signal cable is attached to the drive backplane, disconnect it.
8. Lift up the spring release latch slightly while pushing the assembly from the back and slide the backplane assembly out the front of the server.

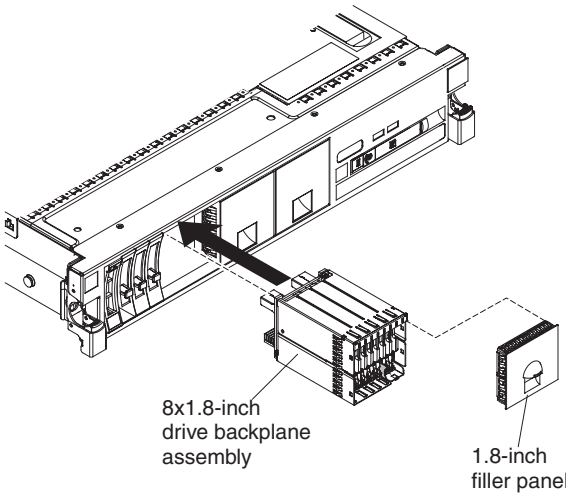



9. If you are instructed to return the drive backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the 8x1.8-inch hot-swap drive backplane assembly

To replace the 8x1.8-inch hot-swap drive backplane assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the drive backplane assembly with the drive-bay slots in which you want to install the assembly.



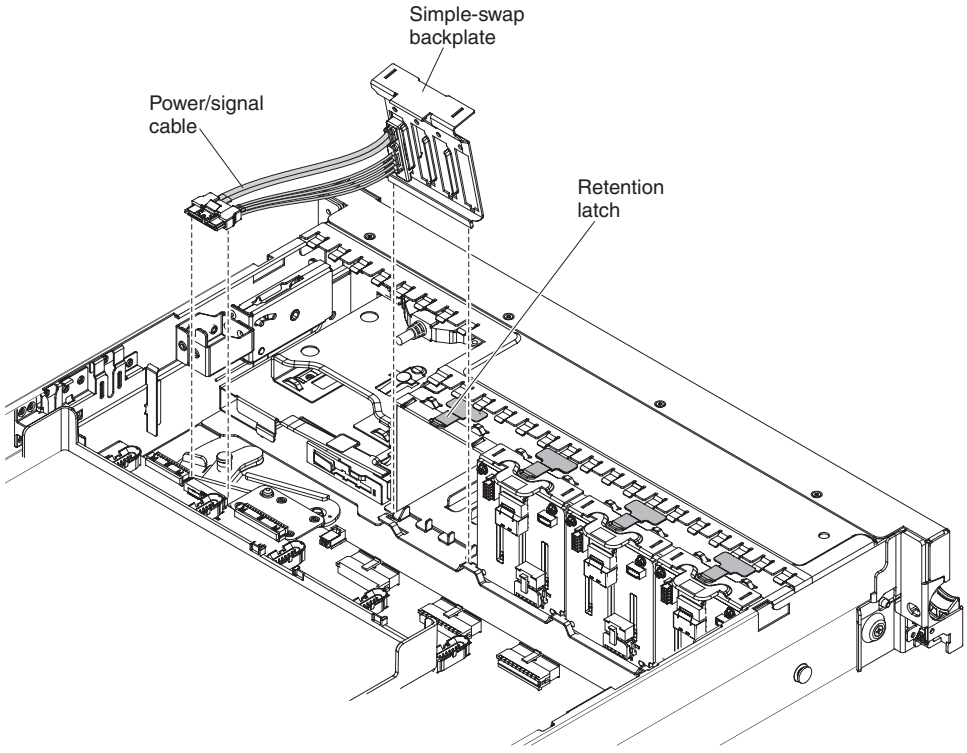

3. Slide the drive backplane assembly into the slot until it clicks into place.
4. Connect the combination power/configuration cable to the connectors on the backplane assembly; then connect the signal cable to the backplane assembly.
5. Reinstall the drives that you removed from the old assembly into the new drive backplane assembly (see "Replacing 2.5-inch and 1.8-inch hot-swap drives" on page 262).
6. Install the drive filler panel.
7. Reinstall the fan cage assembly (see "Replacing the fan cage assembly" on page 314).

8. Install the cover (see “Replacing the server top cover” on page 247).
9. Slide the server into the rack.
10. Reconnect the power cords and any cables that you removed.
11. Turn on the peripheral devices and the server.

## Removing the simple-swap SATA drive and backplate assembly

To remove the simple-swap SATA drive backplate assembly, complete the following steps:

1. Read the safety information that begins on page “Safety” on page vii and “Installation guidelines” on page 243.
2. Turn off the server (see “Turning off the server” on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the server cover (see “Removing the server top cover” on page 246).
4. Pull the drive and filler panels out of the server slightly to disengage them from the drive backplate.
5. Remove the fan cage assembly (see “Removing the fan cage assembly” on page 313).
6. Disconnect the backplate cable from the CD/DVD drive connector on the system board.
7. Lift the backplate assembly up slightly and pull it out of the retention latch on top of the drive backplane cage; then, rotate it backward out of the tabs at the bottom of the backplane cage and remove the assembly from the server.



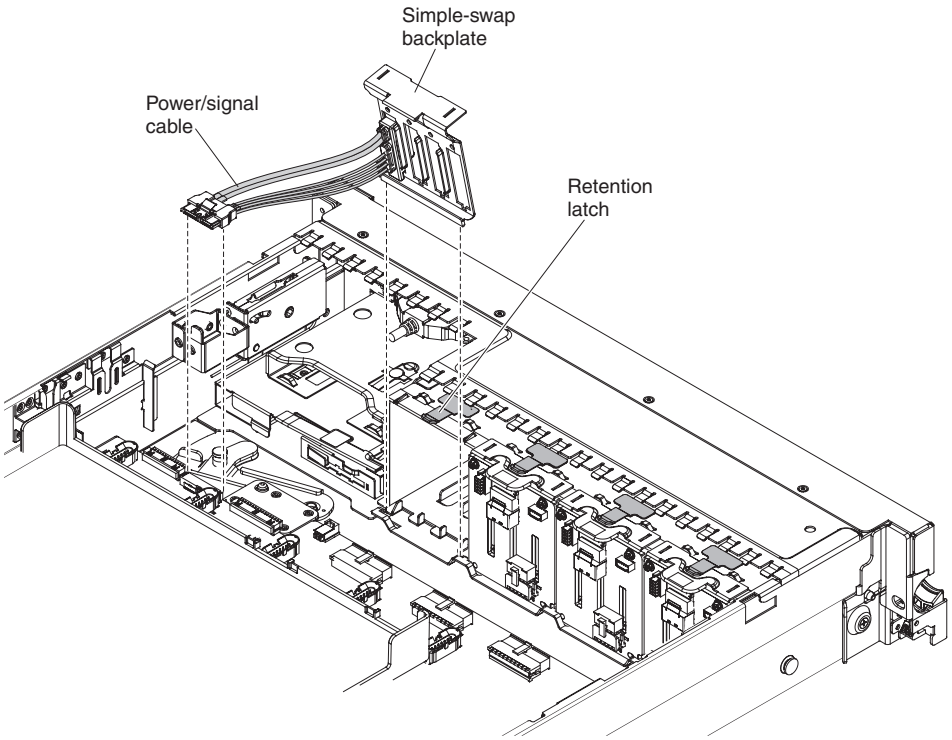

8. If you are instructed to return the drive backplate assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the simple-swap SATA drive backplate assembly

To install the replacement simple-swap SATA drive and backplate assembly, complete the following steps:

**Note:** The simple-swap SATA drive and backplate assembly must be installed in the backplane slot closest to the information panel and the SATA drive must be installed in the drive-bay closest to the information panel. The backplate assembly cable connects to the CD/DVD-ROM drive connector on the system board.

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the tabs on the bottom of the drive backplate with the backplate slots on the bottom of the backplane cage.




3. Insert the drive backplate tabs into the slots on the bottom of the backplate cage and lift up the retention latch on top of the drive cage; then, rotate the drive backplate assembly forward until the backplate is latched.
4. Connect the cable to the CD/DVD connector on the system board.
5. Reinstall the fan cage assembly (see "Replacing the fan cage assembly" on page 314).
6. Reinstall the drive and filler panel and plastic drive-bay spacer.
7. Install the cover (see "Replacing the server top cover" on page 247).
8. Slide the server into the rack.
9. Reconnect the power cords and any cables that you removed.
10. Turn on the peripheral devices and the server.

# Removing and replacing FRUs

FRUs must be replaced or installed only by trained service technicians.

The illustrations in this document might differ slightly from the hardware.

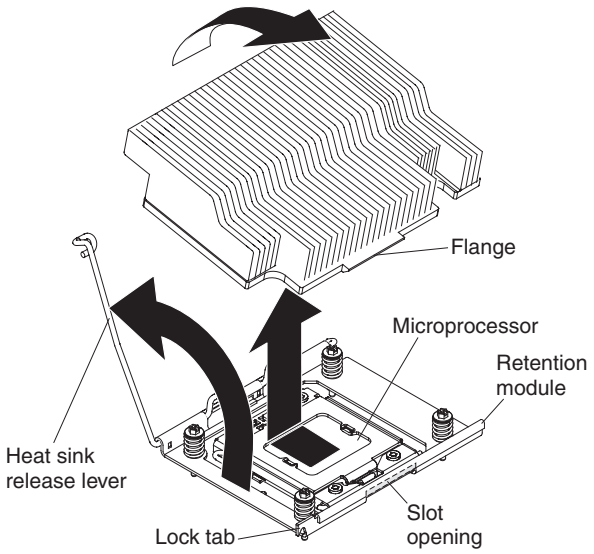
## Removing a microprocessor and heat sink

**Attention:**

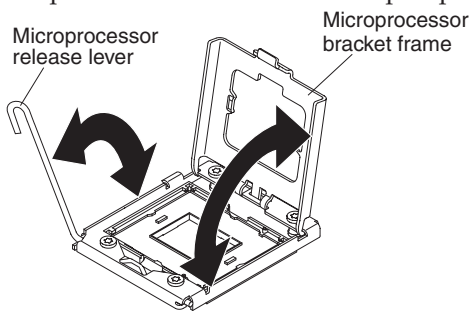
- Be extremely careful, the contacts are very fragile.
- Do not allow the thermal grease on the microprocessor and heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease and the microprocessor socket.
- Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
- Use the microprocessor installation tool that came with the new microprocessor to remove and install the microprocessor.

To remove a microprocessor and heat sink, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the server cover (see "Removing the server top cover" on page 246).
4. Disconnect any cables that impede access to the heat sink and microprocessor.
5. Disconnect any cables from the adapters that are installed in the PCI riser-card in slot 1 on the system board.
6. Remove memory tray, if one is installed (see "Removing the memory tray" on page 248).
7. Remove the DIMM air baffle, if one is installed (see "Removing the DIMM air baffle" on page 252).
8. Remove the riser-card assembly from slot 1 on the system board. Grasp the riser-card assembly by the front and rear and pull it out of the slot on the system board.
9. Remove the microprocessor air baffle (see "Removing the microprocessor air baffle" on page 250).
10. Open the heat sink release lever to the fully open position.
11. Lift the heat sink out of the server. After removal, place the heat sink on its side on a clean, flat surface.

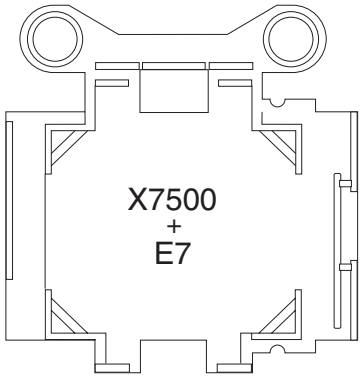



12. Release the microprocessor retention latch by pressing down on the end, moving it to the side, and releasing it to the open (up) position.
13. Open the microprocessor bracket frame by lifting up the tab on the top edge. Keep the bracket frame in the open position.



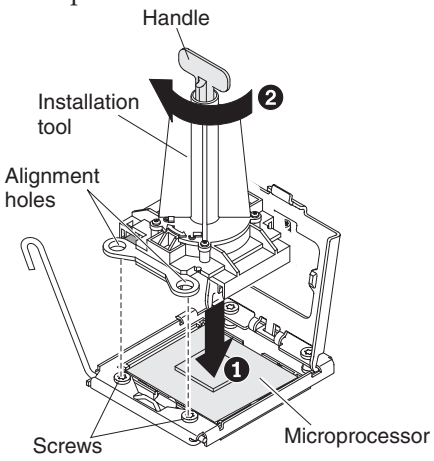

14. Locate the microprocessor installation tool that comes with the new microprocessor.

    **Note:** If you are removing E7 series microprocessors, you must use the microprocessor installation tool with the text "X7500 + E7" on the bottom of the tool (see the following illustration). Tools that do not have this text on the bottom will not work correctly with the E7 series microprocessors.

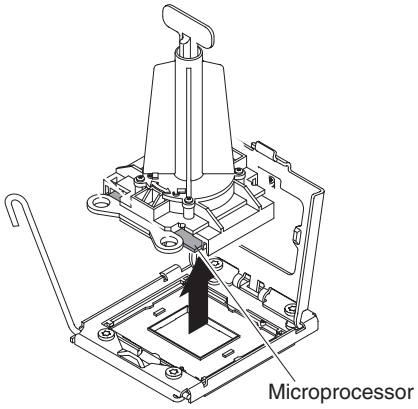



15. Align the holes on the installation tool with the screws on the microprocessor bracket, then place the microprocessor installation tool down over the microprocessor **1** . Twist the handle clockwise **2** to attach the tool to the microprocessor.

**Note:** You can pick up or release the microprocessor by twisting the microprocessor installation tool handle.




16. Carefully lift the microprocessor straight up and out of the socket. Remove the microprocessor from the installation tool by twisting the handle counterclockwise and place the microprocessor on a static-protective surface.




17. If you are instructed to return the microprocessor, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you. Do not return the microprocessor installation tool.

## Replacing a microprocessor and heat sink

The following notes describe the type of microprocessor that the server supports and other information that you must consider when you install a microprocessor and heat sink:

- Use the microprocessor installation tool that came with the new microprocessor to remove the microprocessor from the server.
- Be extremely careful when handling the microprocessor, the contacts are very fragile.
- The server supports up to two Intel Xeon dual-core or quad-core microprocessors. See http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for a list of supported microprocessors.
- Do not mix dual-core and quad-core microprocessors in the same server.
- Do not mix Intel Xeon™ EX versions of the 6000 and 7000 Series and the E7 Series microprocessors in the same server, it is not supported. In addition:
  - Intel Xeon EX versions of the 6000 and 7000 Series microprocessors are supported only on machine types 7148 and 7149.
  - Intel Xeon EX E7 Series microprocessors are supported only on machine types 7147 and 7192.

- The microprocessor options that IBM supports are limited by the capacity and capability of the server. Any microprocessor options that you install must have the same specifications as the microprocessor(s) that came with the server.
- The first microprocessor must always be installed in microprocessor socket 1 on the system board.
- When one microprocessor is installed, a heat sink filler is not required for microprocessor socket 2, however, the microprocessor air baffle, the DIMM air baffle, and the memory tray must be installed to provide proper system cooling.
- Do not remove the first microprocessor from the system board when you install the second microprocessor.
- When you install the second microprocessor, you must also install additional memory. See "Replacing a memory module" on page 278 for details about the installation sequence.
- To ensure proper server operation when you install an additional microprocessor, use microprocessors that have the same QuickPath Interconnect (QPI) link speed, integrated memory controller frequency, core frequency, power segment, internal cache size, and type.
- Mixing microprocessors of different stepping levels within the same server model is supported.
- When mixing microprocessors with different stepping levels within the same server model, you do not have to install the microprocessor with lowest stepping level and features in microprocessor socket 1.
- Both microprocessor voltage regulator modules are integrated on the system board.
- If you have to replace a microprocessor, call for service.
- Read the documentation that comes with the microprocessor, so that you can determine whether you have to update the UEFI firmware. To download the most current level of server firmware, go to http://www.ibm.com/support/fixcentral/systemx/groupView?query.productGroup=ibm%2FSystemx/.

  **Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
- The microprocessor speeds are automatically set for this server; therefore, you do not have to set any microprocessor frequency-selection jumpers or switches.
- If the thermal-grease protective cover (for example, a plastic cap or tape liner) is removed from the heat sink, do not touch the thermal grease on the bottom of the heat sink or set down the heat sink. For more information about applying or working with thermal grease, see "Thermal grease" on page 338.

  **Note:** Removing the heat sink from the microprocessor destroys the even distribution of the thermal grease and requires replacing the thermal grease.
- The following table shows the DIMM connectors on the system board and the memory tray that are associated with each microprocessor:

*Table 23. DIMM connectors associated with each microprocessor*

| Microprocessor | DIMM connectors |
|---|---|
| Microprocessor socket 1 | 1 through 16 |
| Microprocessor socket 2 | 17 through 32 |

**Note:** When the memory tray is not installed in the server, DIMMs 1 through 16 are solely associated with microprocessor 1. Microprocessor 2 has access to

DIMMs 1 through 16, but access is through microprocessor 1. This is important if load balancing is a necessity for your operating system or software load.

To install an additional microprocessor and heat sink, complete the following steps:

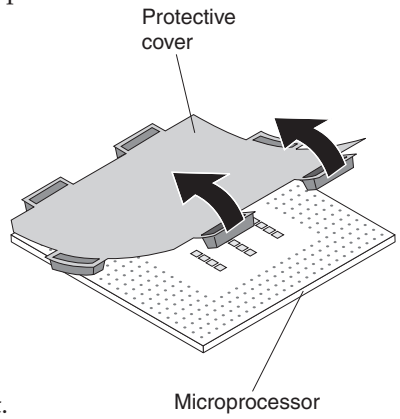
**Attention:** When you handle static-sensitive devices, take precautions to avoid damage from static electricity. For details about handling these devices, see "Handling static-sensitive devices" on page 245.

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Install the microprocessor:
   a. Remove the static-protective bag, and the foam surrounding the bag, from the box.
   b. Touch the static-protective package that contains the new microprocessor to any *unpainted* metal surface on the server; then, remove the microprocessor from the package.

      **Attention:**

      - Do not touch the microprocessor contacts; handle the microprocessor by the edges only. Contaminants on the microprocessor contacts, such as oil from your skin, can cause connection failures between the contacts and the socket.
      - Handle the microprocessor carefully. Dropping the microprocessor during installation or removal can damage the contacts.
      - Do not use excessive force when you press the microprocessor into the socket.
      - Make sure that the microprocessor is oriented and aligned and positioned in the socket before you try to close the lever.

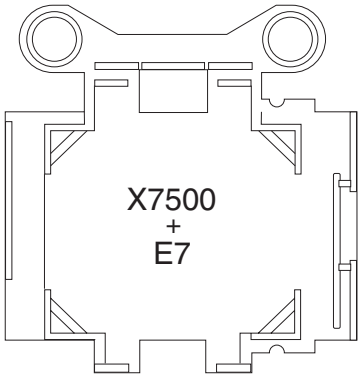
   c. If there is a plastic protective cover on the bottom of the microprocessor, carefully remove it.




   d. Twist the handle of the microprocessor installation tool counterclockwise so that it is in the open position.

      **Note:** If you are installing E7 series microprocessors in your server, you must use the microprocessor installation tool with the text "X7500 + E7" on the bottom of the tool (see the following illustration). Tools that do not have

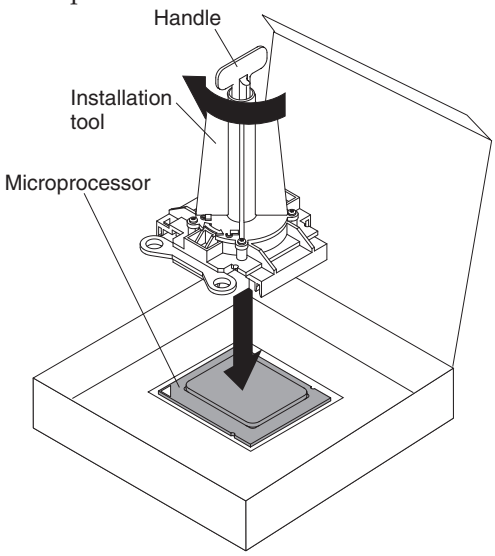
this text on the bottom will not work correctly with the E7 series microprocessors.




e. Align the triangle alignment mark on the microprocessor with the triangle alignment mark on the microprocessor installation tool, then place the microprocessor on the bottom of the tool so that the tool can grasp the microprocessor correctly onto the bottom of the installation tool.

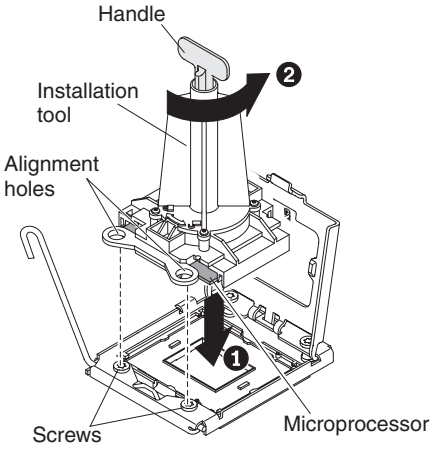
f. Twist the handle of the installation tool clockwise to secure the microprocessor in the tool.

**Note:** You can pick up or release the microprocessor by twisting the microprocessor installation tool handle clockwise.




g. Carefully align the microprocessor installation tool over the microprocessor socket. Twist the handle of the microprocessor tool counterclockwise to insert the microprocessor into the socket.

**Note:** The microprocessor fits only one way on the socket.




h. Close the microprocessor bracket frame.

i. Carefully close the microprocessor release lever to the closed position to secure the microprocessor in the socket.

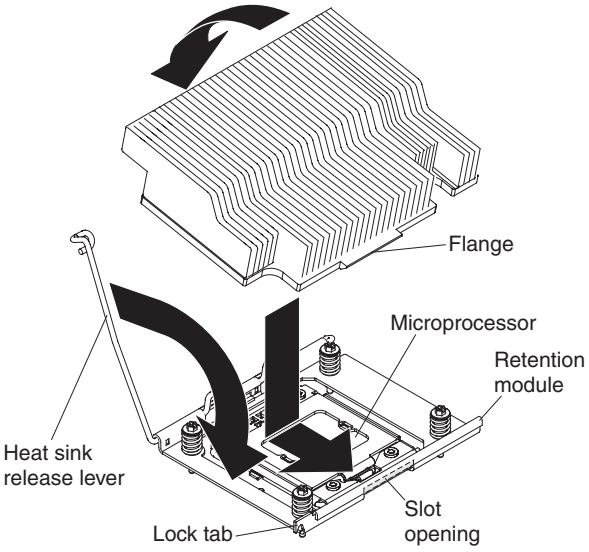
3. Install the heat sink that comes with the microprocessor:

   a. Remove the plastic protective cover from the bottom of the heat sink.

      **Attention:** Do not touch the thermal grease on the bottom of the heat sink after you remove the protective cover. Touching the thermal grease will contaminate it. See "Thermal grease" on page 338 for more information.

   b. Align the heat sink on top of the microprocessor with the thermal grease side down.

   c. Lower the flange of the heat sink into the opening in the retainer bracket and press down firmly on the rear of the heat sink until it is seated securely.




   d. Rotate the heat-sink release lever to the closed position and hook it underneath the lock tab.

4. If you removed the microprocessor air baffle, install it (see "Replacing the microprocessor air baffle" on page 251).

5. Reinstall the riser-card assembly on the system board (see "Replacing a PCI riser-card assembly" on page 319).

6. Reinstall the memory tray, if one was removed (see"Replacing the memory tray" on page 249).

7. Reinstall the DIMM air baffle, if one was removed (see “Replacing the DIMM air baffle” on page 253).
8. Reconnect any cables that your disconnected from the adapters or system board.

**Thermal grease:**
The thermal grease must be replaced whenever the heat sink has been removed from the top of the microprocessor and is going to be reused or when debris is found in the grease.

When you are installing the heat sink on the same microprocessor that is was removed from, make sure that the following requirements are met:

- The thermal grease on the heat sink and microprocessor is not contaminated.
- Additional thermal grease is not added to the existing thermal grease on the heat sink and microprocessor.

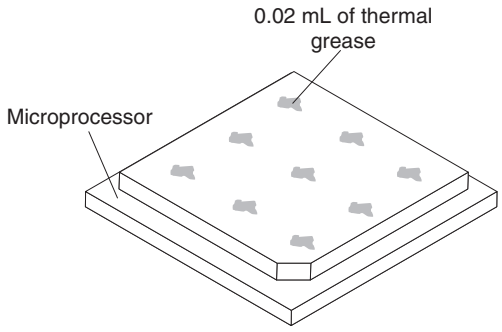
**Note:**

- Read the Safety information on page “Safety” on page vii.
- Read the “Installation guidelines” on page 243.
- Read “Handling static-sensitive devices” on page 245.

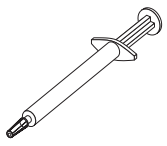
To replace damaged or contaminated thermal grease on the microprocessor and heat sink, complete the following steps:

1. Place the heat sink on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

   **Note:** Make sure that all of the thermal grease is removed.
4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.




5. Use the thermal-grease syringe to place 9 uniformly spaced dots of 0.02 mL each on the top of the microprocessor. The outermost dots must be within approximately 5 mm of the edge of the microprocessor; this is to ensure uniform distribution of the grease.



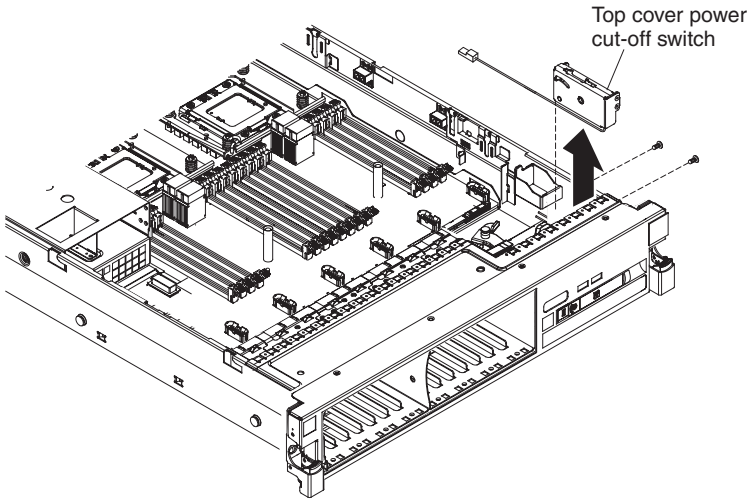
**Note:** If the grease is properly applied, approximately half of the grease will remain in the syringe.

6. Install the heat sink onto the microprocessor as described in "Replacing a microprocessor and heat sink" on page 333.

## Removing the top cover/power cut-off switch assembly

To remove the top-cover/power cut-off switch, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. Remove the server cover (see "Removing the server top cover" on page 246).
4. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 313.
5. Disconnect the cable from the system board and remove the cable from the loops on the side of the drive cage next to the operator information panel.
6. Remove the screws (that holds assembly to the chassis) from the side of the chassis.
7. Grasp the assembly and lift it out of the server.

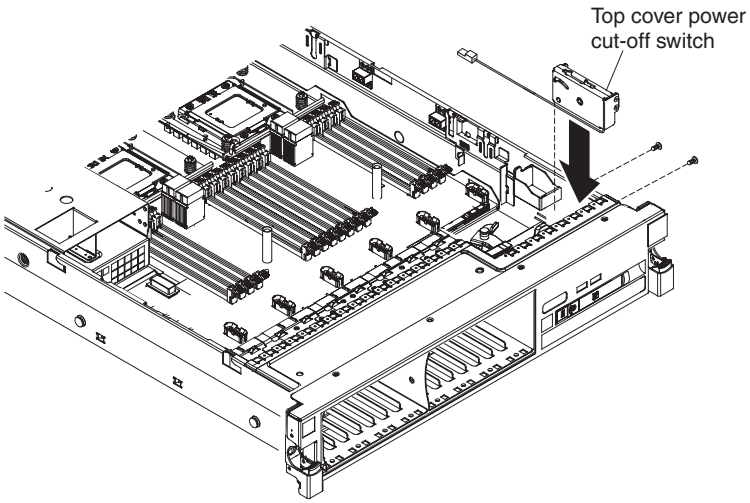



8. If you are instructed to return the top cover/power cut-off switch assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the top cover/power cut-off switch assembly

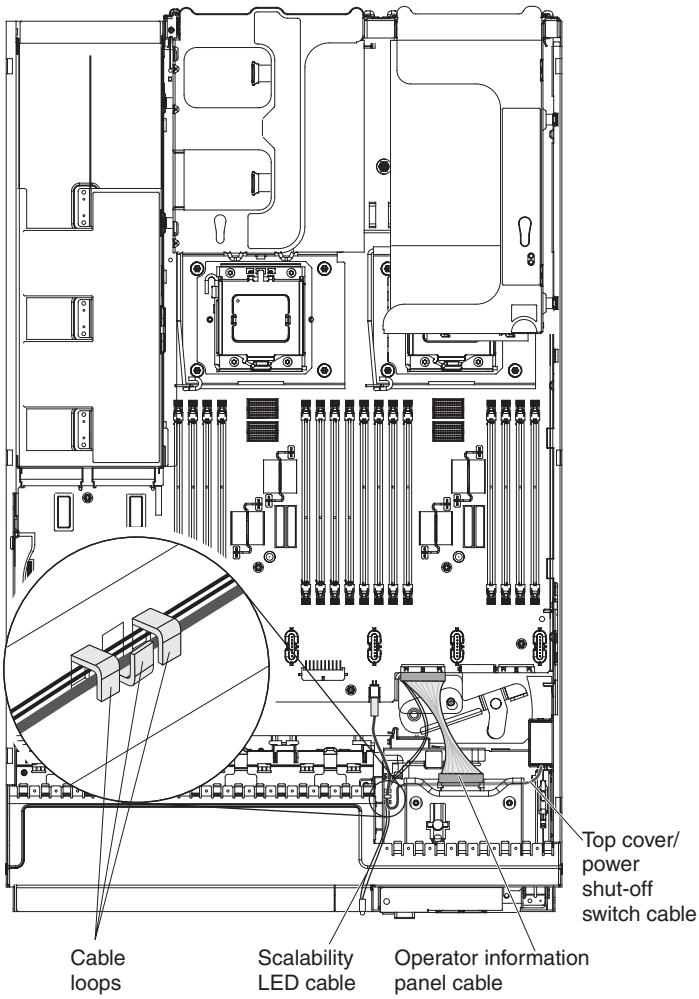
To install the top-cover/power cut-off switch, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the screw holes on the assembly with the holes on the chassis wall and secure the assembly to the chassis with the screws you removed earlier.




3. Run the assembly cable under the front edge of the operator information panel and then through the loops on the side of the drive cage next to operator information panel. Connect the assembly cable to the top cover/power cut-off

switch connector on the system board.




4. Reinstall the fan cage assembly (see "Replacing the fan cage assembly" on page 314).
5. Install the cover (see "Replacing the server top cover" on page 247).
6. Slide the server into the rack.
7. Reconnect the power cords and any cables that you removed.
8. Turn on the peripheral devices and the server.

## Removing the system board

Before you remove the system board from the server, take the following steps to save data, firmware, and configuration data:

- Record all system configuration information, such as IMM IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.
- Using the Advanced Settings Utility (ASU), save the system configuration to external media.
- Save the system-event log to external media.

**Note:**

1. When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed.
2. Before you attach a MAX5 to the server and try to use it, you must update the server firmware with the latest level of firmware or code. If you attach and try to use the MAX5 without updating the server firmware, you might get unexpected system behavior or the server might not power on. For special instructions to follow before you attach the MAX5 to the server, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5085756.

To remove the system board, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables as necessary to replace the device.
3. If the server is in a rack, slide the server out of the rack.
4. Remove the server cover (see "Removing the server top cover" on page 246).
5. Disconnect all cables from the system board. Make a list of each cable as you disconnect it; you can then use this as a checklist when you install the new system board.
6. Disconnect all remote RAID battery cables from the adapters, if any are installed.
7. Remove the fan cage assembly (see "Removing the fan cage assembly" on page 313
8. Remove the DIMM air baffle, if one is installed (see "Removing the DIMM air baffle" on page 252).
9. Remove the memory tray, if one is installed (see "Removing the memory tray" on page 248).
10. Remove the DIMMs from the system board and set them aside on a static-protective surface for reinstallation (see "Removing a memory module" on page 277).

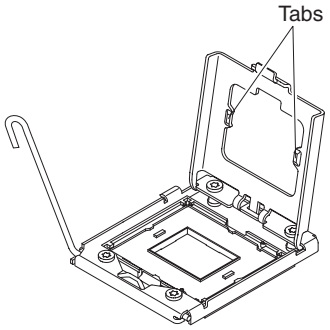
    **Note:** Make a note of the location of each DIMM as you remove it, so that you can later reinstall it in the same connector.
11. Remove all PCI riser-card assemblies with the adapters in them (see "Removing a PCI riser-card assembly" on page 318).
12. Remove the microprocessor air baffle (see "Removing the microprocessor air baffle" on page 250).

13. Remove all heat sinks and microprocessors from the old system board and install them on the new system board using the microprocessor installation tool (see “Removing a microprocessor and heat sink” on page 331).

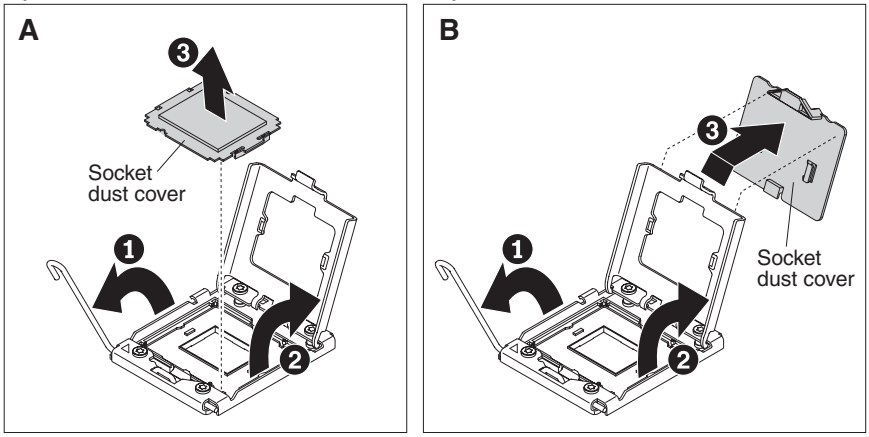
    **Note:**

    a. Be sure to keep the heat sink and microprocessor from each microprocessor socket of the old system board together so that you can install them on the new system board together. For example, when you remove the heat sink and microprocessor from microprocessor socket 1 of the old system board , install them both on the same socket on the new system board.

    b. Use an alcohol wipe to remove any thermal grease from the tabs on the microprocessor bracket frame on the old system board.




14. Remove the socket covers from the microprocessor sockets on the new system board and place them on the microprocessor sockets of the old system board that you are removing. The microprocessor socket might have the socket cover style shown in illustration A or the style shown in illustration B.

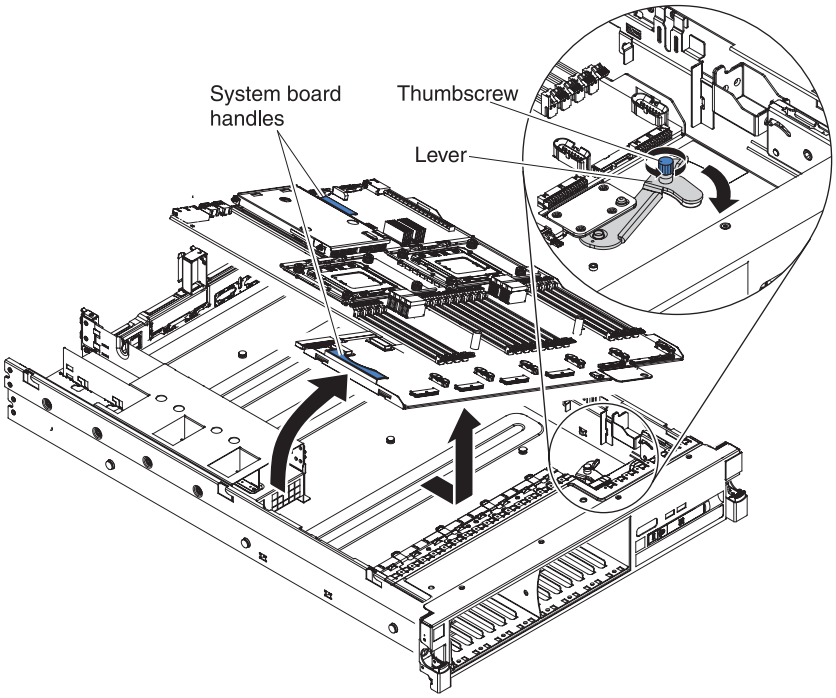



15. Remove the SAS cable guide (see “Removing the SAS cable guide” on page 253).
16. Slide power-supplies 3 and 4 out of the bays slightly (see “Removing a hot-swap power supply” on page 306).
17. Remove the power interposer card assembly, if one is installed (see “Removing the power interposer card assembly” on page 323).
18. Remove the QPI fillers or disconnect the QPI cables from the QPI ports on the rear of the system board (if they are installed) and save them to place on the new system.

**Attention:**

- When you handle the QPI cables, take precautions to avoid damaging the high density interface. Dropping and incorrectly connecting the QPI cables can damage the high density interface. Store the protective covers that come on the end of the QPI cables for reuse when you perform maintenance on the server or when you remove the cables for some reason.
- If the server is connected to one or more MAX5 memory expansion modules (one or more 3U configurations), see the documentation for QPI cabling option kit and the EXA cabling option kit for other important cabling information when disconnecting or connecting QPI or EXA cables.

19. Loosen the thumbscrew and rotate the system-board lever toward the front of the server.




20. Grasp both system-board handles and lift up the left side of the system board slightly and carefully remove it from the chassis, being careful not to damage any surrounding components.
21. If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the system board

**Note:**

1. When you reassemble the components in the server, be sure to route all cables carefully so that they are not exposed to excessive pressure and so that they do not get pinched when you reinstall the system board.
2. When you replace the system board, you must either update the server with the latest firmware or restore the pre-existing firmware that the customer provides on a diskette or CD image. Make sure that you have the latest firmware or a copy of the pre-existing firmware before you proceed. See "Updating the firmware" on page 379, "Updating the Universal Unique Identifier (UUID)" on page 398, and "Updating the DMI/SMBIOS data" on page 400 for more information.
3. Before you attach a MAX5 to the server and try to use it, you must update the server firmware with the latest level of firmware or code. If you attach and try to use the MAX5 without updating the server firmware, you might get unexpected system behavior or the server might not power on. For special instructions to follow before you attach the MAX5 to the server, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-508575.
4. Adhere to the following QPI cabling guidelines when replacing the system board and reconnecting the QPI cables:
   - Make sure that all two cables are properly installed and remain securely fastened while the server is running.
     - The two QPI cables provide the clocking and field-programmable gate array (FPGA) connections and are required for proper operation.
     - The two QPI cables are integral to the combined chassis enclosures and must remain connected for proper operation.
     - During a reboot, a missing or damaged cable will cause the server to halt.
   - Do not disconnect or hot-swap any of the QPI cables while the server is running.
     - The QPI cables are not hot-swappable.
     - Before you remove or install the QPI cables, disconnect the ac power from the server and the MAX5 expansion module. Do not reconnect the ac power to the server or the MAX5 expansion module until all two of the QPI cables are properly installed and securely fastened.
     - If any of the QPI cables are disconnected while the server is running, the server will halt and unpredictable results will occur.

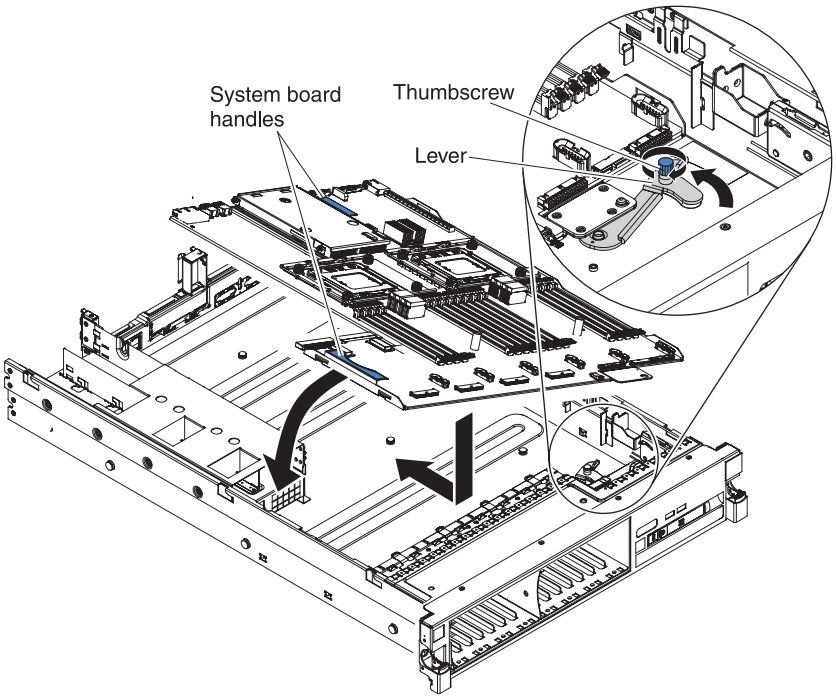
**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code

To install the system board, complete the following steps:

**Note:** When you replace the system board, make sure that you use the correct system board for your server machine type. See the table in "Replaceable server components" on page 231 for information about the correct system board for your machine type.

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.

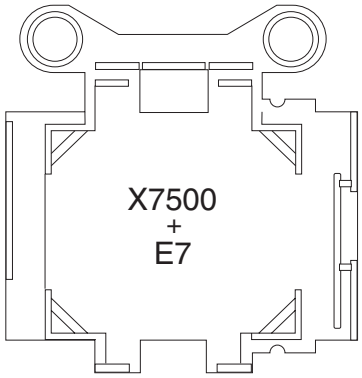
2. Align the system board with the chassis and lower the right side into the chassis first; then, lower the other side of the system board into the chassis.




3. Rotate the system-board lever toward the rear of the server and tighten the thumbscrew to secure the system board to the chassis.
4. Reinstall the fan cage assembly (see "Replacing the fan cage assembly" on page 314).
5. Reinstall the SAS cable guide (see "Replacing the SAS cable guide" on page 254).
6. Reinstall the power interposer card assembly (see "Replacing a power interposer card assembly" on page 323).
7. Reinstall power supplies 3 and 4 (see "Replacing a hot-swap power supply" on page 308).
8. Reinstall the DIMMs onto the system board (see "Replacing a memory module" on page 278).
9. Reinstall the microprocessors and heat sinks (see "Replacing a microprocessor and heat sink" on page 333).

   **Note:** If you are installing E7 series microprocessors in your server, you must use the microprocessor installation tool with the text "X7500 + E7" on the

bottom of the tool (see the following illustration). Tools that do not have this text on the bottom will not work correctly with the E7 series microprocessors.




10. Install the socket covers that you removed from the microprocessor sockets on the new system board and place them on the microprocessor sockets of the old system board, if you have not done so.
11. Reconnect the cables that you disconnected earlier to the system board.
12. Reinstall the microprocessor air baffle (see "Replacing the microprocessor air baffle" on page 251).
13. Reinstall the PCI riser-card assemblies with the adapters, if any were installed (see "Replacing a PCI riser-card assembly" on page 319 and "Replacing an adapter" on page 257).
14. Reinstall the memory tray, if you removed it (see "Replacing the memory tray" on page 249).
15. Reinstall DIMM air baffle, if you removed it (see "Replacing the DIMM air baffle" on page 253).
16. Reconnect the remote RAID battery cables to the adapters and install the RAID battery trays in memory tray or DIMM air baffle, if you removed it earlier.
17. Install the QPI fillers or QPI cables that you removed from the old system board onto the QPI ports on the new system board, if you removed them earlier.

    **Attention:**

    - When you handle the QPI cables, take precautions to avoid damaging the high density interface. Dropping and incorrectly connecting the QPI cables can damage the high density interface. Store the protective covers that come on the end of the QPI cables for reuse when you perform maintenance on the server or when you remove the cables for some reason.
    - If the server is connected to a MAX5 memory expansion modules (one 3U configurations), see the documentation for the QPI cabling option kit for other important cabling information when disconnecting or connecting QPI cables.
18. Reinstall the cover (see "Replacing the server top cover" on page 247).
19. Slide the server into the rack.
20. Reconnect the power cords and any cables that you removed.
21. Turn on the peripheral devices and the server.

**Important:** Perform the following updates:

- Either update the server with the latest RAID firmware or restore the pre-existing firmware from a diskette or CD image.

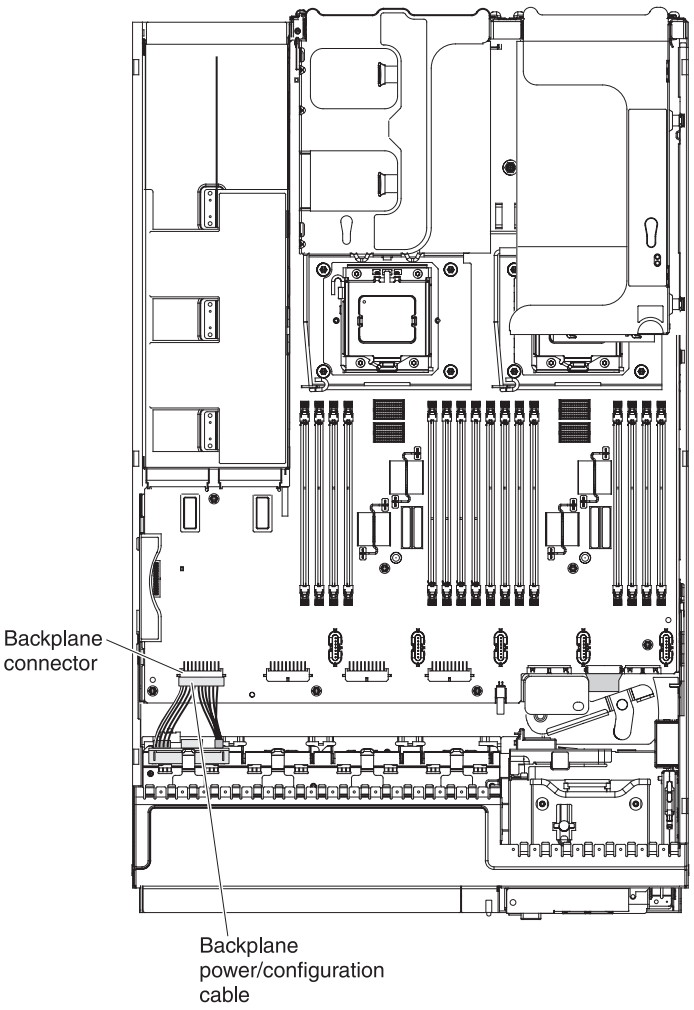
- Update the UUID (see “Updating the Universal Unique Identifier (UUID)” on page 398).
- Update the DMI/SMBIOS (see “Updating the DMI/SMBIOS data” on page 400).

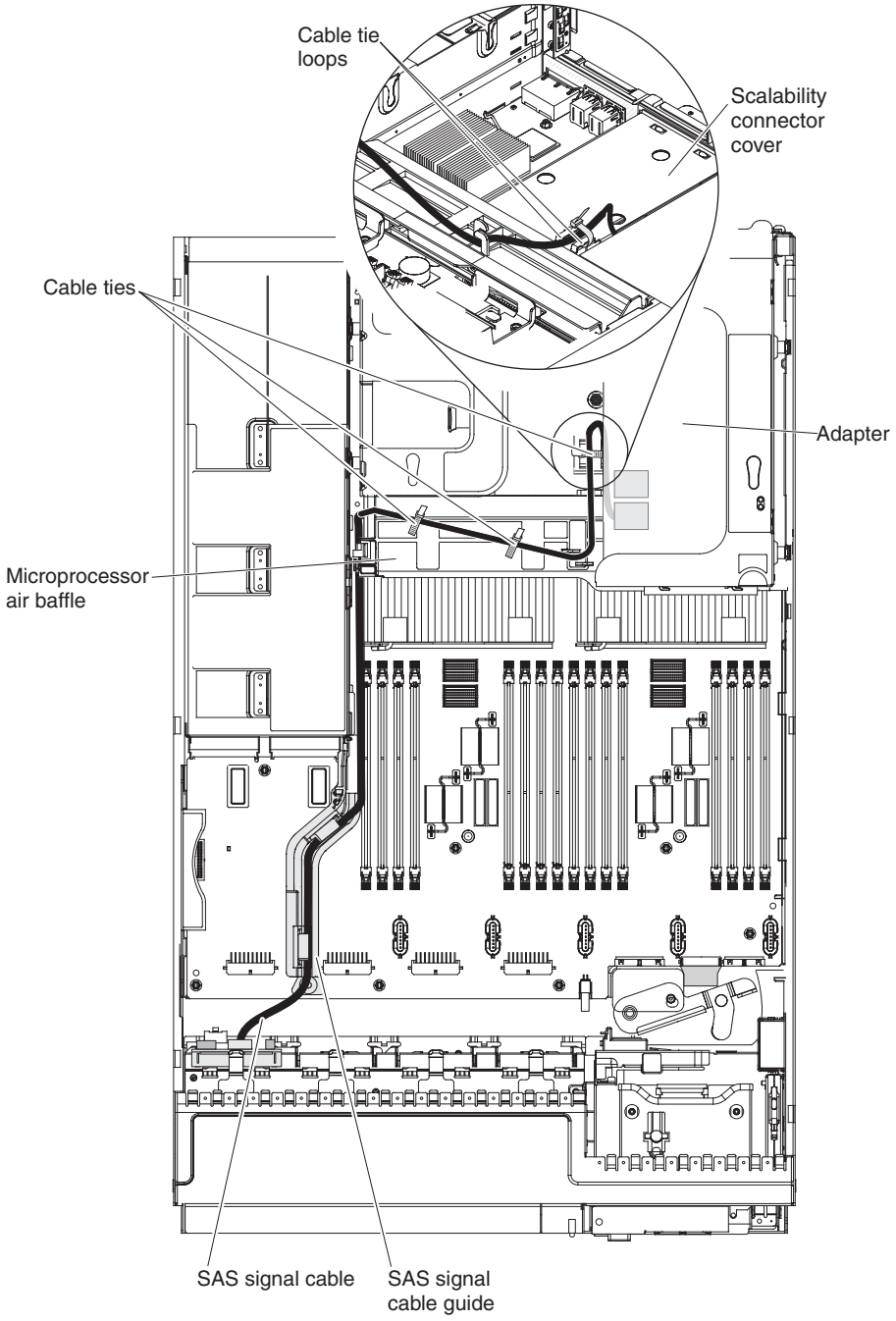
## Internal cable routing

This section provides information about routing the cables when you install some components in the server.

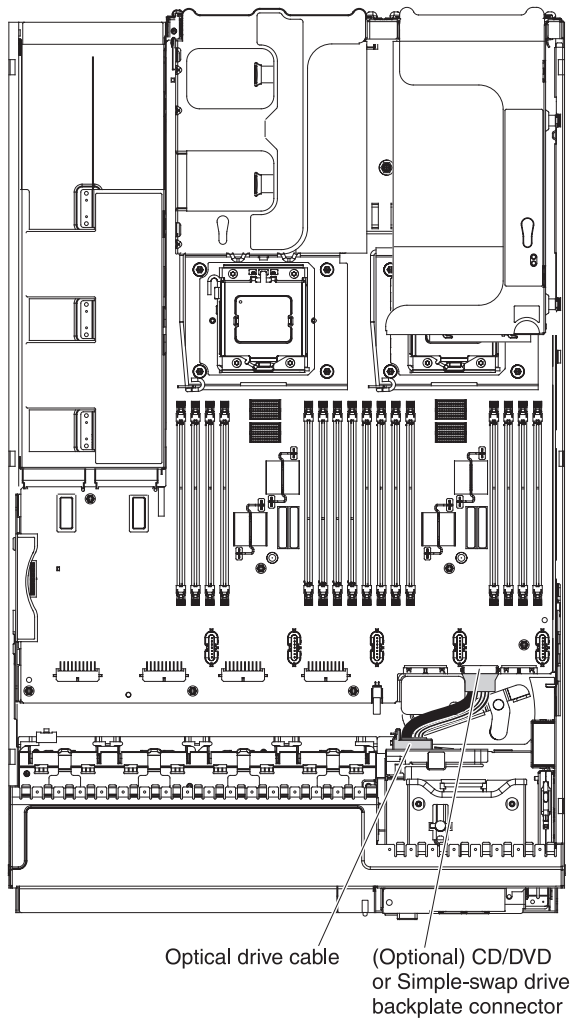
For more information about the requirements for cables and connecting devices, see the documentation that comes with these devices.

The following illustrations show the cabling information for the 4x2.5-inch hot-swap drive backplane and SAS cable:

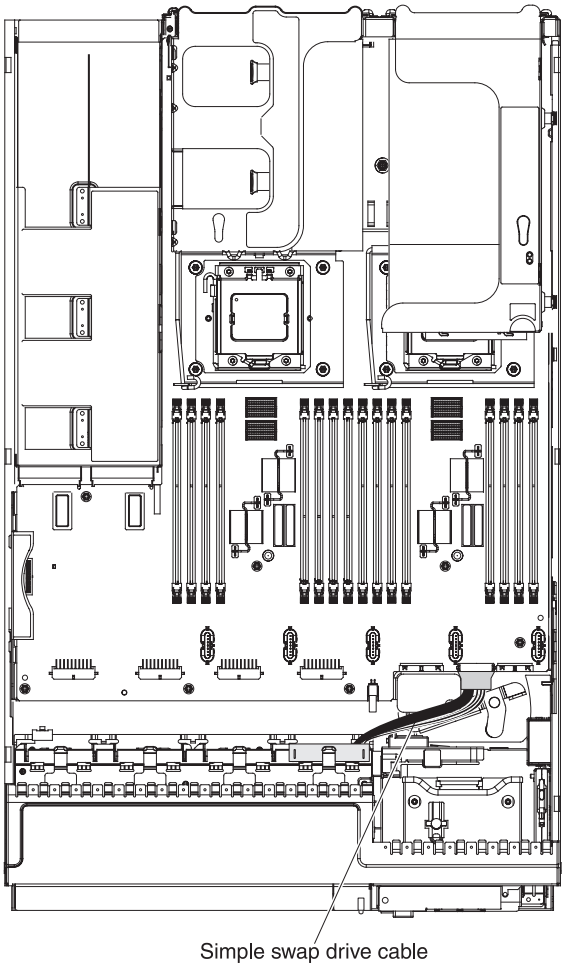




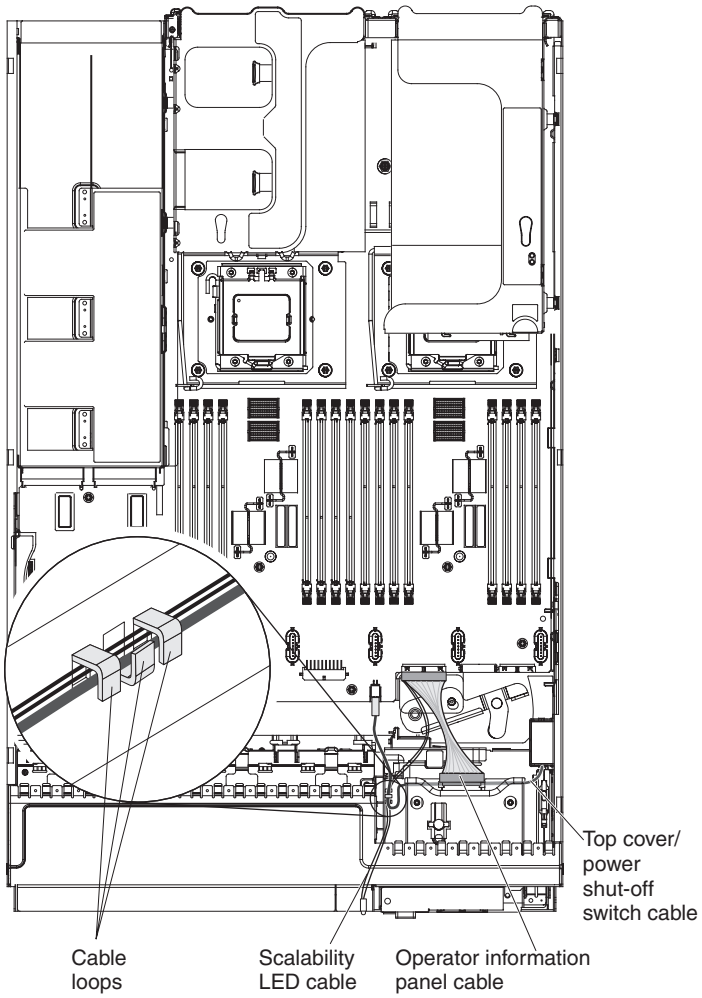

The following illustration shows the cabling information for the optional CD/DVD SATA drive:


Optical drive cable
(Optional) CD/DVD
or Simple-swap drive
backplate connector

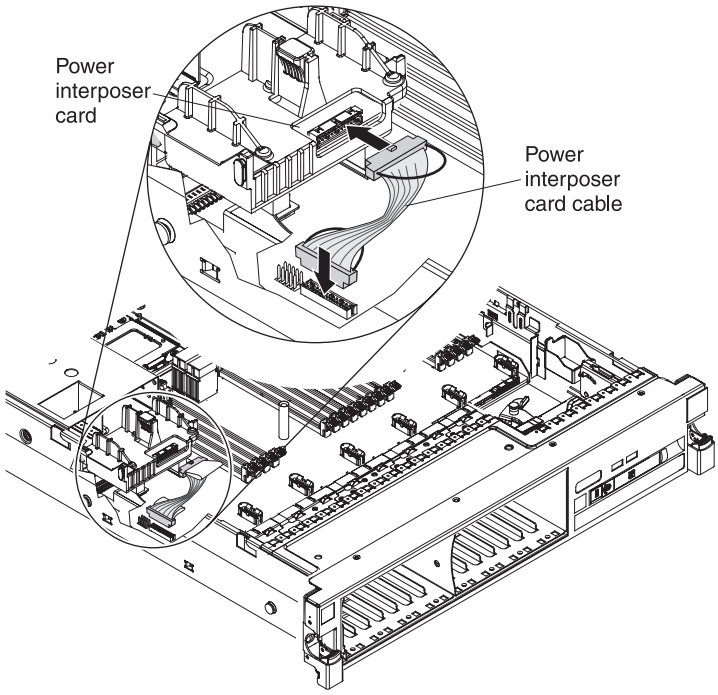
The following illustration shows the cabling information for the simple-swap SATA drive backplate assembly:



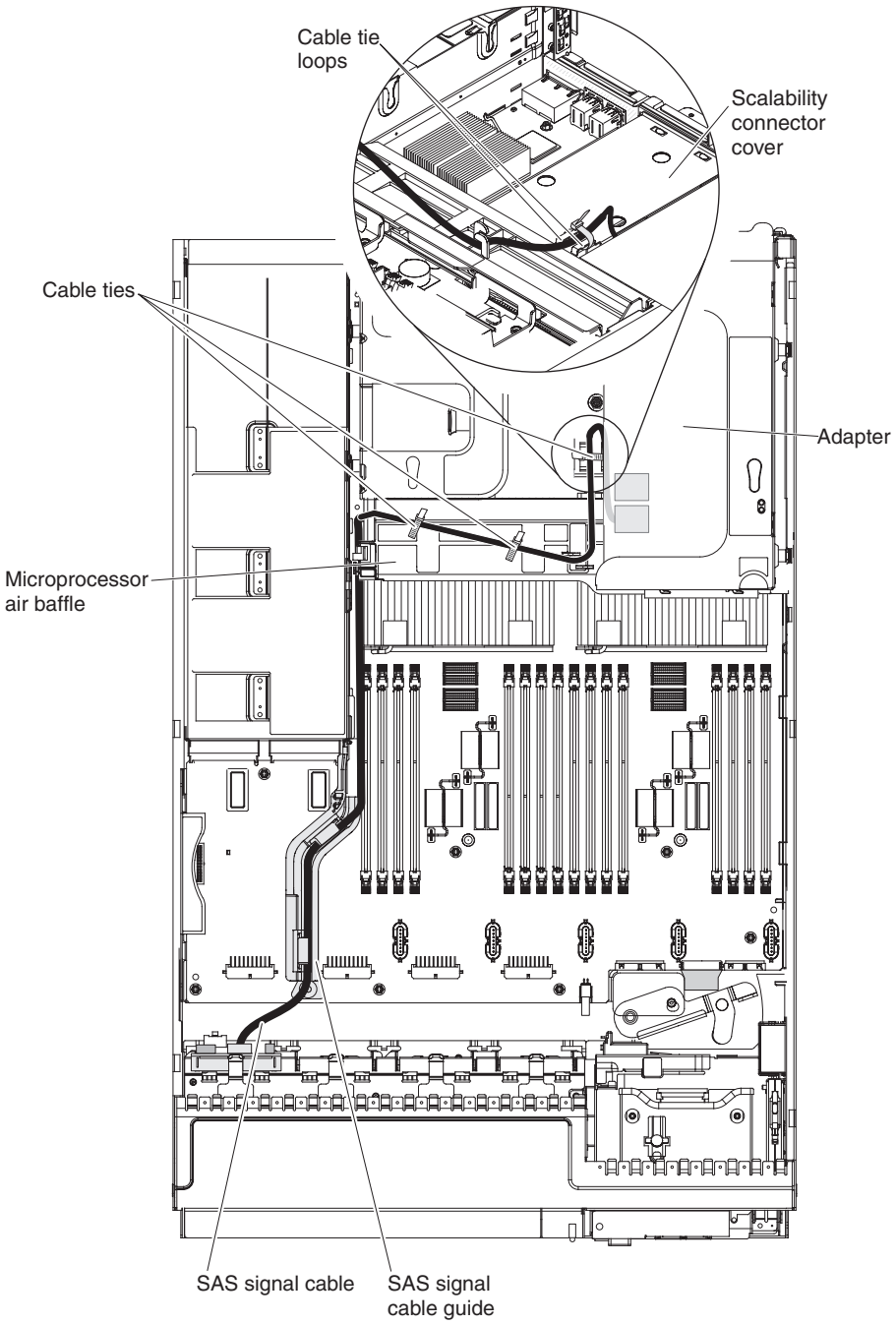
The following illustration shows the cabling information for the scalability LED cable. Make sure that you run the cable through the loops on the side of the drive cage next to operator information panel; then, connect the cable to the scalability LED cable connector on the system board:



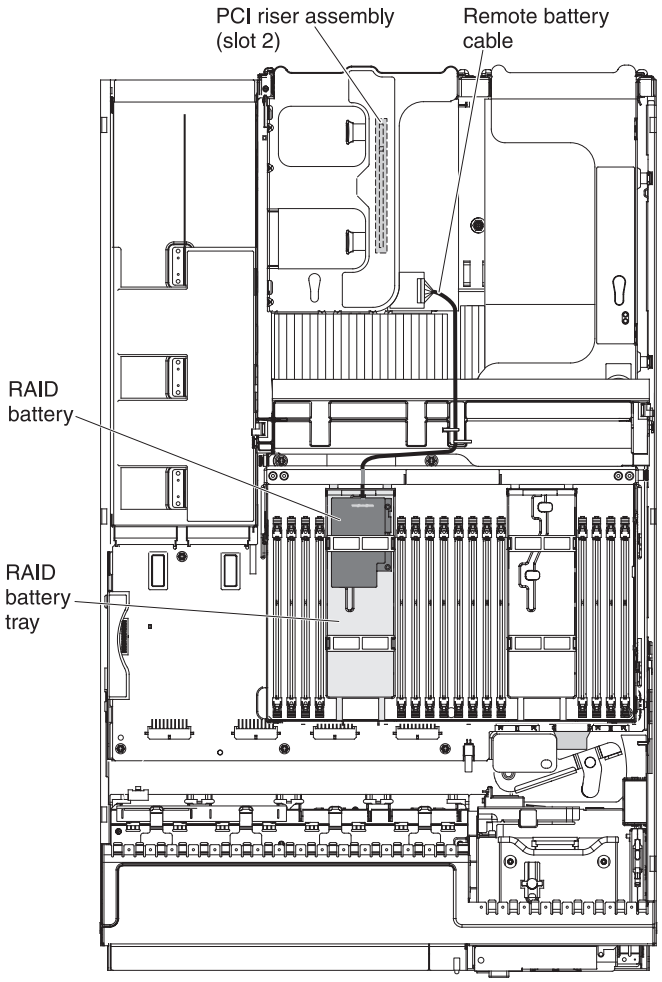
The following illustration shows the cabling information for the power interposer card assembly:



The following illustration shows the cabling information for the SAS cable guide:

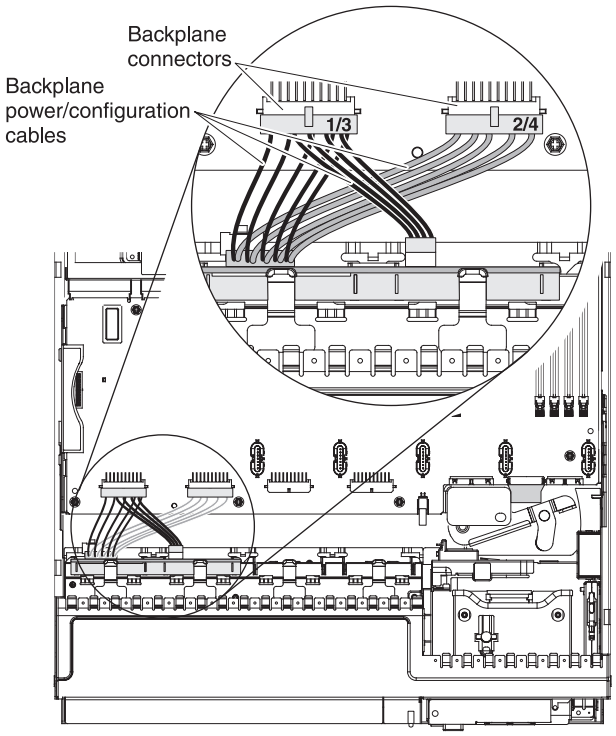


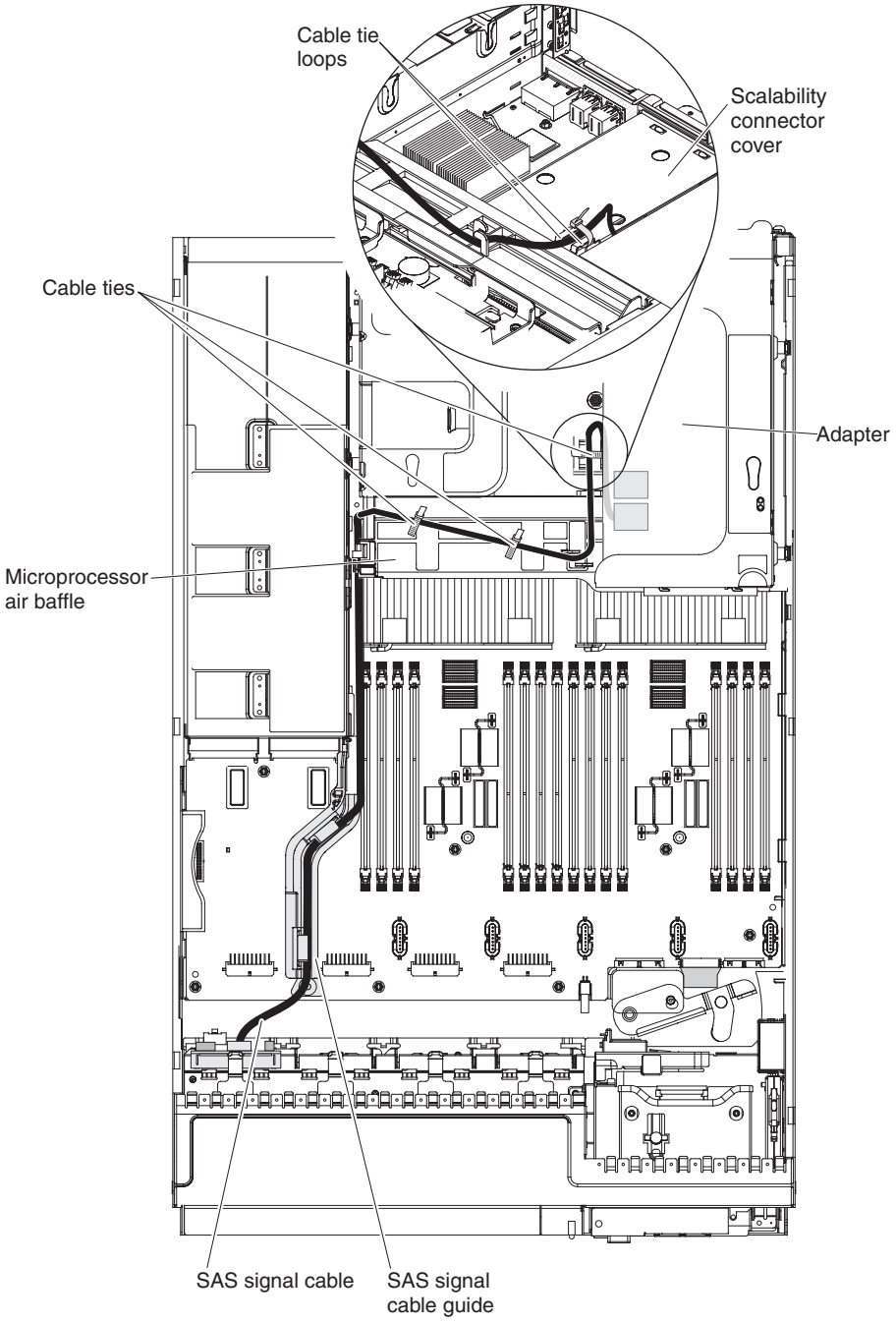
The following illustration shows the cabling information for installing the RAID battery remotely in the server:



The following illustrations shows the cabling information for connecting the 8x2.5-inch drive backplane power/configuration cable and the SAS cables:

**Note:** Connect the combination power/configuration cable end to the power and configuration connectors on the drive backplane. Connect the two power connectors on the other end of the cable to the power backplane connectors on the system board. The power connector on the end of the black cable (which might be labelled 1/3) connects to backplane connectors 1 or 3 on the system board. The power connector on the end of the gray cable (which might be labelled 2/4) connects to backplane connectors 2 or 4 on the system board.






## Removing and replacing the MAX5 components

The following sections provide information about removing and replacing components in the optional IBM MAX5 for System x (MAX5) memory expansion module.

# Removing and replacing MAX5 Tier 1 CRUs

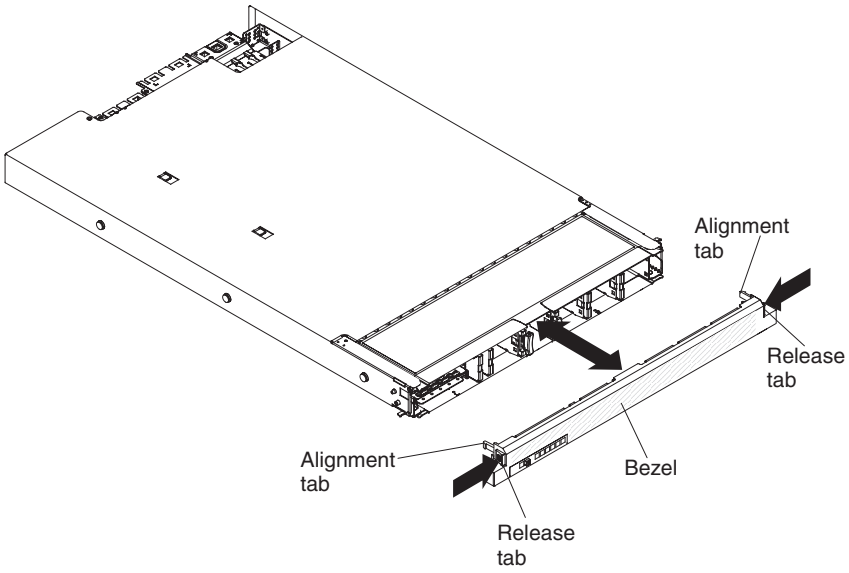
Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

The illustrations in this document might differ slightly from your hardware.

## Removing the MAX5 bezel

To remove the MAX5 bezel, complete the following steps:

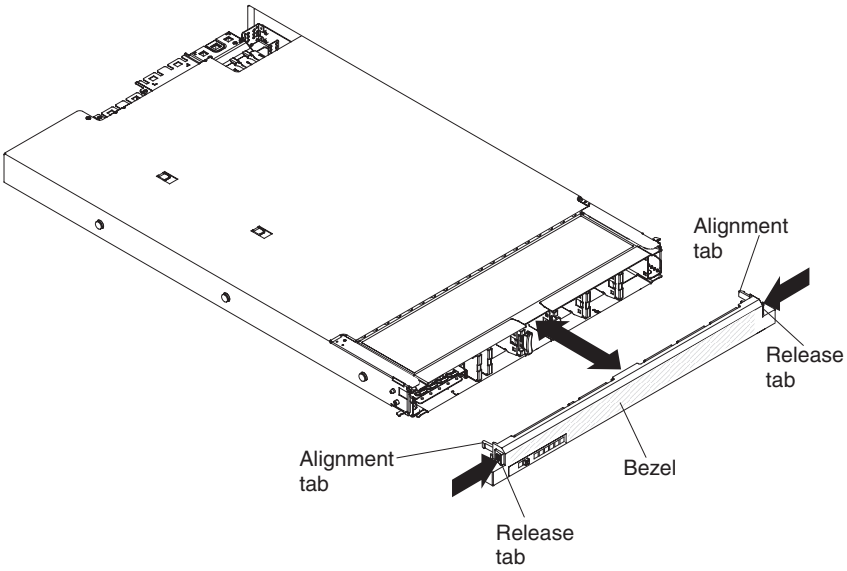
1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Press in on the release tabs on both end of the bezel and pull it off of the chassis.




## Replacing the MAX5 bezel

To replace the MAX5 bezel, complete the following steps:

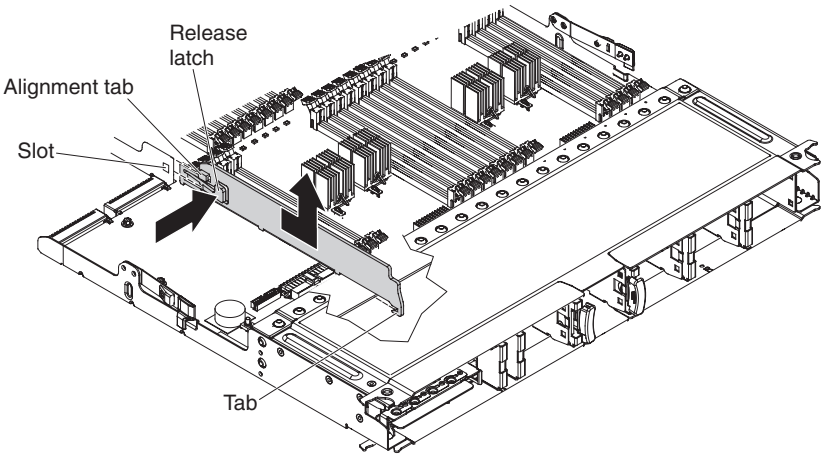
1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the bezel alignment tabs with the chassis and press the bezel onto the chassis until it snaps into place.




## Removing the MAX5 air baffle

To remove the air baffle in the MAX5, complete the following steps:

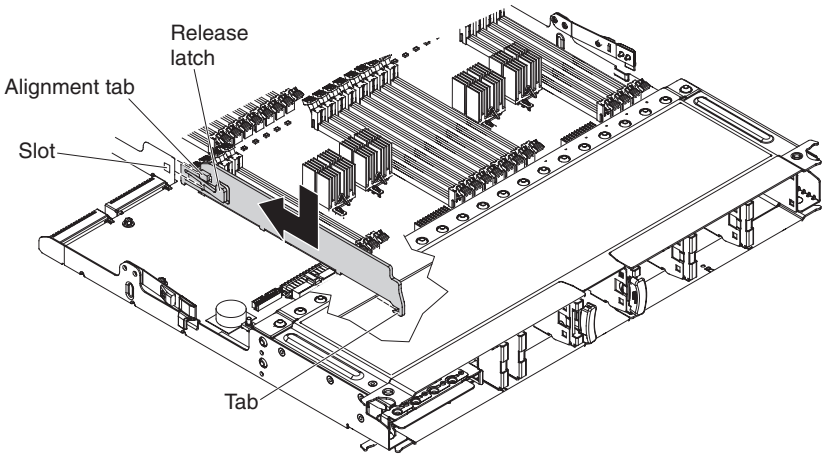
1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the host server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables from the server. Disconnect all power cords from the MAX5; then, disconnect all external cables from the MAX5 as necessary to replace the device.
3. Remove the bezel (see "Removing the MAX5 bezel" on page 358).
4. Remove the system-board tray (see "Removing the MAX5 system-board tray assembly" on page 376).
5. Press the air baffle release tab in and lift the air baffle out of the slot on the system-board tray wall (near the rear of DIMM 1) to release it; then, push the air baffle forward sightly to unhook it from the system board and set it aside.



## Replacing the MAX5 air baffle

To replacing the MAX5 air baffle, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Align the air baffle next to DIMM 1 and hook the hinge on the air baffle underneath the system board; then, insert the tab on the other end of the air baffle into the tab slot on the system-board wall until it is firmly in place.

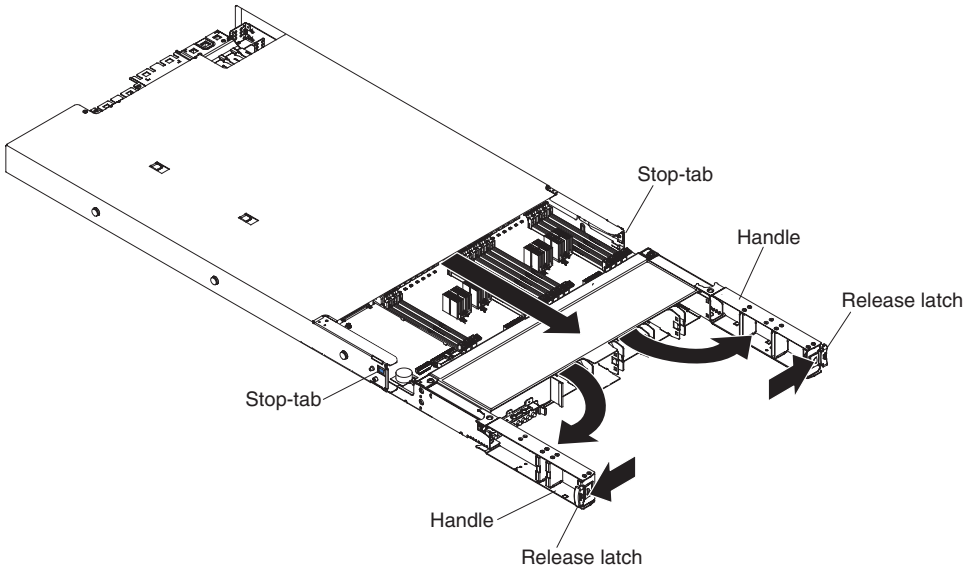



3. Replace the system-board tray (see "Replacing the MAX5 system-board tray assembly" on page 377).
4. Reinstall the bezel (see "Replacing the MAX5 bezel" on page 358).

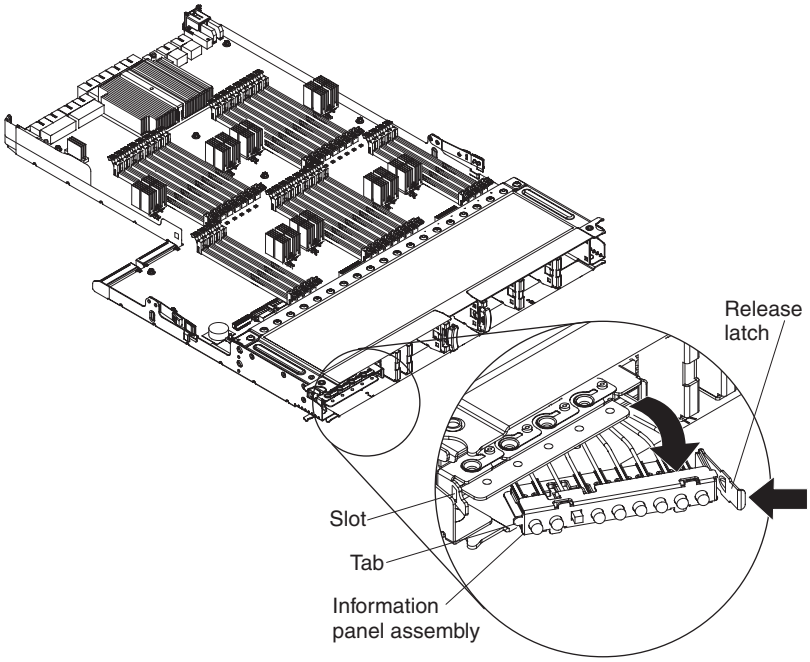
## Removing the MAX5 information panel assembly

To remove the information panel assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the host server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables from the server. Disconnect all power cords from the MAX5; then, disconnect all external cables from the MAX5 as necessary to replace the device.
3. Remove the bezel (see "Removing the MAX5 bezel" on page 358).
4. Grasp the blue release latches on the system-board tray handles and pull the latches in opposite directions; then, rotate the handles to the open position.




5. Grasp the handles and pull the system-board tray out until it stops.
6. Disconnect the information panel assembly cable from the connector on the system-board tray.
7. Press the information panel release latch to the left and hold it while you pull the right side of the information panel assembly out of the slot on the system-board tray.

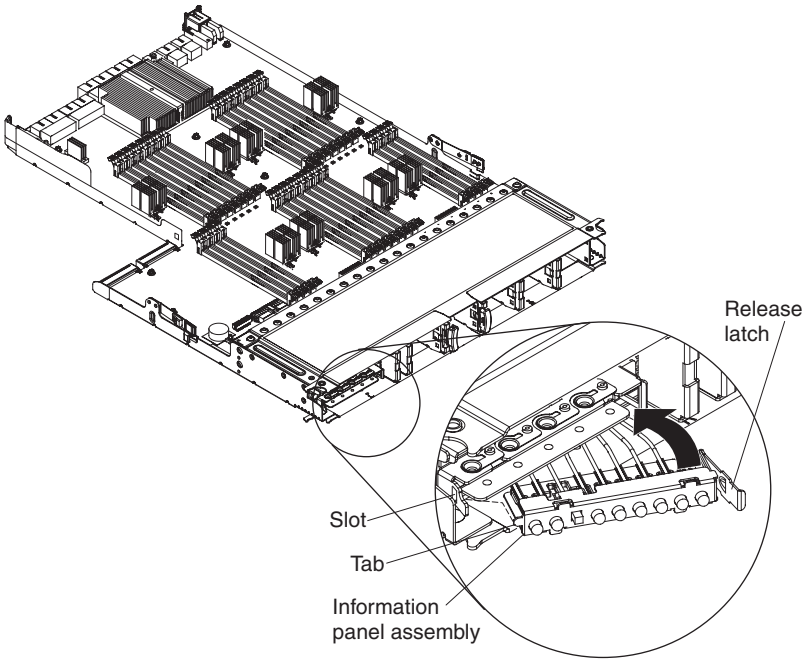



8. Grasp the left side of the information panel assembly and pull the tab out of the hole on the system-board tray and remove the assembly from the tray.
9. If you are instructed to return the information panel, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

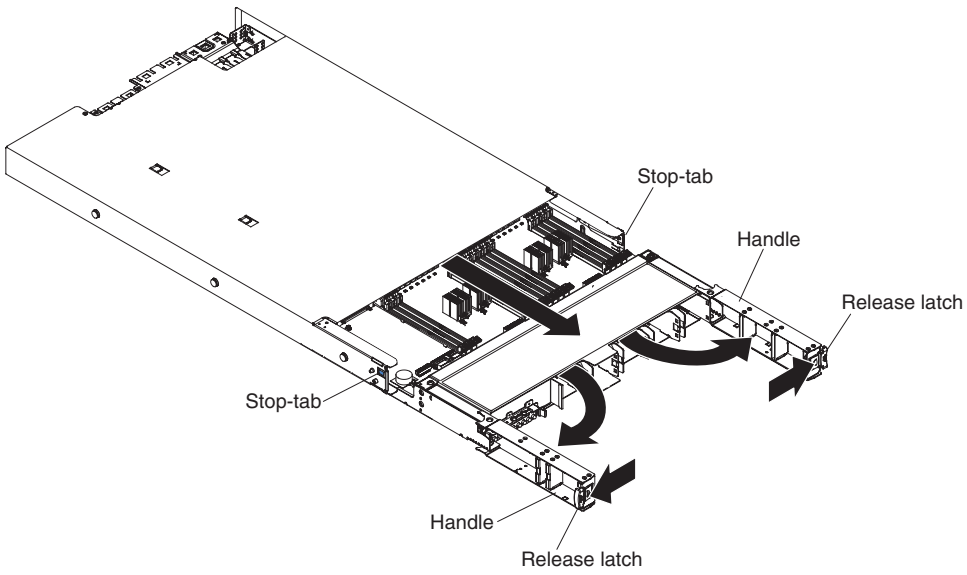
## Replacing the MAX5 information panel assembly

To replace the MAX5 information panel assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. From the front of the MAX5 system-board tray, insert the cable end of the information panel assembly through the information panel slot.
3. Insert the tab on the left side of the information panel assembly into the hole on the system-board tray and hold the information panel assembly release latch while you rotate the right side of the assembly toward the system-board tray.




4. Push the information panel assembly release latch in firmly to snap the release latch into place and secure the information panel assembly.
5. Connect the information panel assembly cable to the connector on the system board.
6. Slide the system-board tray forward until the tabs at the bottom of the handles touch the chassis; then, close the release latches firmly (they will snap into the locked position).

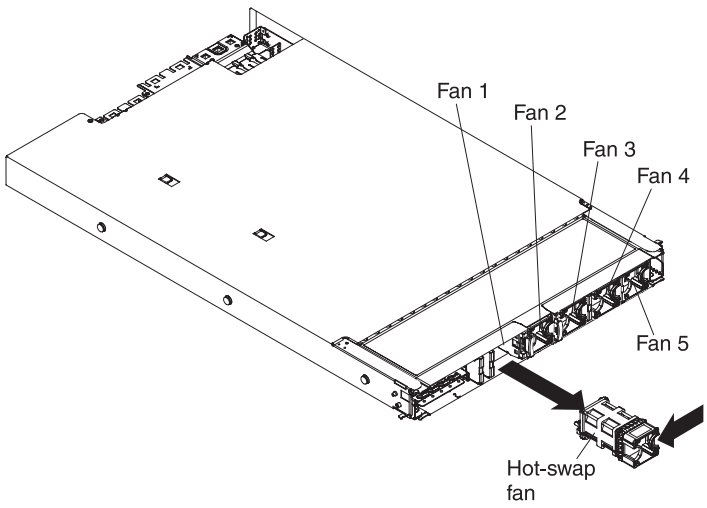



7. Reinstall the bezel (see "Replacing the MAX5 bezel" on page 358).
8. Reconnect the power cords to the MAX5; then, connect all external cables to the MAX5
9. Turn on the peripheral devices and the host server.

## Removing a MAX5 hot-swap fan

To remove a hot-swap fan from the MAX5 memory expansion module, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Remove the bezel (see "Removing the MAX5 bezel" on page 358).
3. Squeeze both fan latches on the fan toward each other and slide the fan out of the slot.



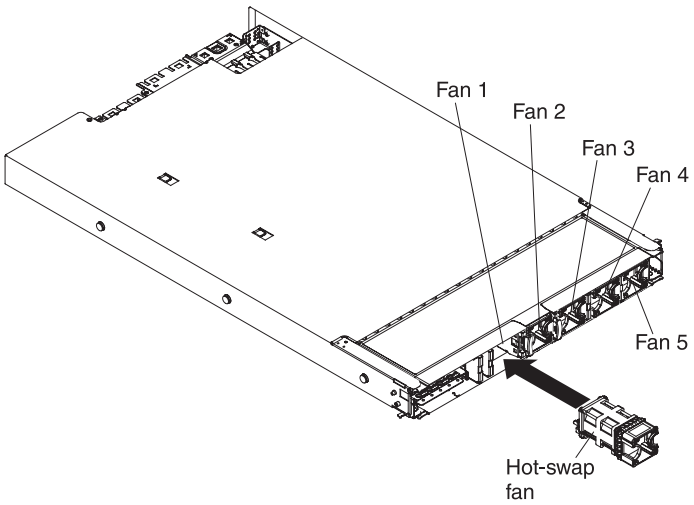

4. If you are instructed to return the fan, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a MAX5 hot-swap fan

To replace a hot-swap fan in the MAX5 expansion module, complete the following steps:

**Note:** For more information about how the fan event messages are issued and the fan number and the device on which the fan is located, see "System-event log" on page 167 and Table 9 on page 167.

1. Align the new fan with the slot in the fan cage.
2. Slide the fan into the fan slot until it snaps into the connector firmly.

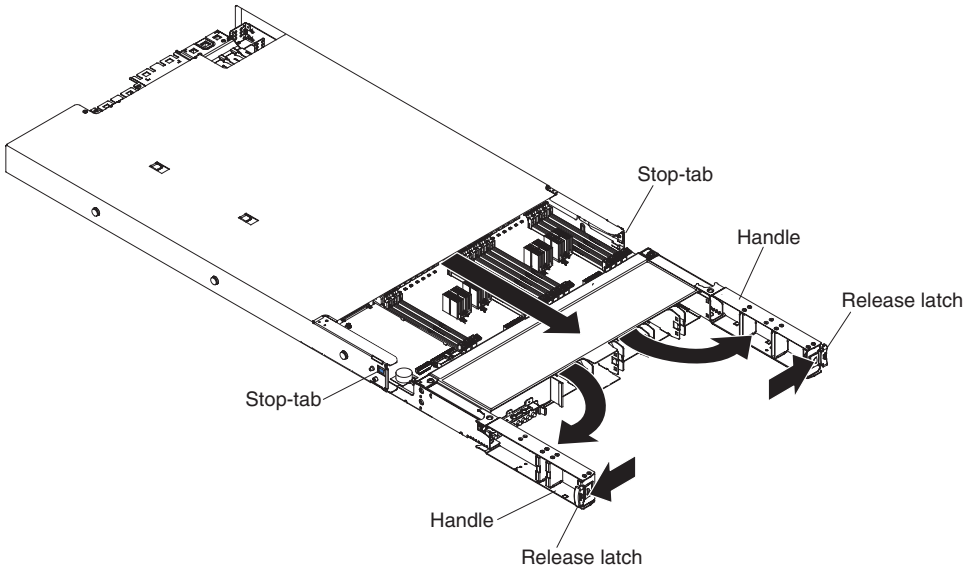



3. Reinstall the bezel (see "Replacing the MAX5 bezel" on page 358).

## Removing a MAX5 memory module

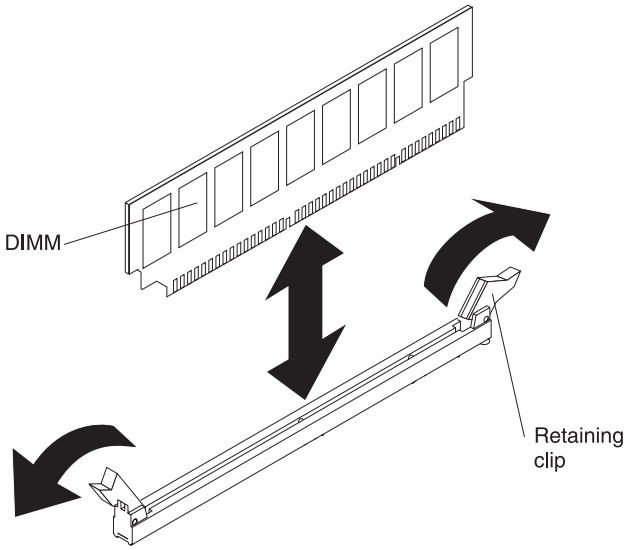
To remove a memory module from the MAX5 memory expansion module, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the host server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables from the server. Disconnect all power cords from the MAX5; then, disconnect all external cables from the MAX5 as necessary to replace the device.
3. Remove the bezel (see "Removing the MAX5 bezel" on page 358).
4. Grasp the blue release tabs on the system-board tray latches and pull the latches in opposite directions to release the tray from the chassis.




5. Pull the system-board tray out until it stops; then, press the blue tabs on both sides of the system-board tray and pull the tray out of the chassis.
6. Carefully open both retaining clips on each end of the DIMM connector and remove the DIMM from the connector.

   **Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.




7. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a MAX5 memory module

The following notes describe the types of DIMMs that the MAX5 memory expansion module supports and other information that you must consider when you install DIMMs:

- The MAX5 supports a maximum of 32 DIMMs (single-rank, dual-rank, or quad-rank).

  **Note:** To determine the type of a DIMM, see the label on the DIMM. The information on the label is in the format xxxxx nRxxx PC3-xxxxx-xx-xx-xxx. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (n=1) or dual-rank (n=2).
- The DIMM options that are available for the MAX5 are 2 GB, 4 GB, 8 GB, 16 GB, and 32 GB (when available and depending on the model).
- If you install 32 GB DIMMs in the MAX5, all of the DIMMs must be 32 GB capacity DIMMs. You cannot mix the 32 GB DIMMs with other capacity DIMMs in the system.
- The MAX5 supports a minimum of 4 GB and a maximum of 1 TB of system memory.
- Some MAX5 models come with the Intel 7500 scalable memory buffer or the Intel 7510 scalable memory buffer. See the parts listing table under "Replaceable MAX5 components" on page 237 for information about the Intel memory buffer that is supported on the MAX5 system board tray.
- The MAX5 supports 1.35-volt (low-voltage) and 1.5-volt DIMMs. In addition, support is dependent on the host server machine type that the MAX5 is connected to as noted below:
  - When connecting the MAX5 to IBM System x3690 X5 Machine Types 7148 and 7149:
    - Install only 1.5-volt DIMMs in the MAX5.
  - When connecting the MAX5 to IBM System x3690 X5 Machine Types 7147 and 7192:
    - The MAX5 supports low-voltage (1.35-volt) DIMMs at capacities of 4 GB, 8 GB, 16 GB or 16 GB LP-RDIMMs, and 32 GB only.
    - If you install 32 GB DIMMs in the MAX5, all of the DIMMs must be 32 GB capacity DIMMs. You cannot mix the 32 GB DIMMs with other capacity DIMMs in the system.
    - When you mix 1.35-volt and 1.5-volt DIMMs in the MAX5, the MAX5 will operate at the 1.5-volt rate.
    - You can enable all DIMMs (1.35-volt and 1.5-volt) to operate at 1.5-volt in the host server Setup utility.
- Double-device data correction support is only available when 16 GB x4 DRAM technology DIMMs are installed in the MAX5 and the MAX5 is connected to a host server.
- The MAX5 does not support memory sparing. However, the host server does support memory sparing. For more information about installing memory on the host server and memory sparing, see "Replacing a memory module" on page 278.
- When you populate DIMMs in the MAX5, populate the larger capacity DIMMs first; then the smaller capacity DIMMs. See Table 26 on page 367 for non-mirroring mode DIMM population sequence and Table 27 on page 368 for memory-mirroring mode DIMM population sequence.
- The MAX5 provides eight memory ports (memory channels) and each memory port supports up to four DIMMs. Do not mix DIMMs with x4 technology

(DIMMs with DRAMs that are organized with 4 data lanes) and x8 technology (DIMMs with DRAMs that are organized with 8 data lanes) in the same memory port. The following table shows the DIMM connectors on the eight memory ports.

*Table 24. DIMM connectors on each memory port*

| Memory ports | DIMM connectors |
|---|---|
| 1 | 1, 2, 7, and 8 |
| 2 | 3, 4, 5, and 6 |
| 3 | 9, 10, 15, and 16 |
| 4 | 11, 12, 13, and 14 |
| 5 | 17, 18, 23, and 24 |
| 6 | 19, 20, 21, and 22 |
| 7 | 25, 26, 31, and 32 |
| 8 | 27, 28, 29, and 30 |
| **Note:** 2 GB, 4 GB, and 8 GB DIMMs are x4 technology DIMMs. 16 GB and 32 GB DIMMs are x8 technology DIMMs. | |

- Do not mix DIMMs with 1 Gb (gigabit) DRAM technology, 2 Gb DRAM technology, or other gigabit DRAM technologies in banks of eight DIMMs on memory ports (memory channels) that are on the same memory controller. This is not supported on the MAX5. The following table lists the DIMM connectors for each bank of eight DIMMs that are on the memory ports within the same memory controller.

*Table 25. DIMM connectors on memory ports within the same memory controller*

| Bank of DIMMs | DIMM connectors |
|---|---|
| 1st bank of DIMMs | 1, 2, 3, 4, 5, 6, 7, and 8 |
| 2nd bank of DIMMs | 9, 10, 11, 12, 13, 14, 15, and 16 |
| 3rd bank of DIMMs | 17, 18, 19, 20, 21, 22, 23, and 24 |
| 4th bank of DIMMs | 25, 26, 27, 28, 29, 30, 31, and 32 |

- DIMMs must be installed in pairs for non-mirroring mode and in sets of four for memory-mirroring.
- A minimum of two DIMMs must be installed in the MAX5 for each microprocessor in the host server.
- The maximum operating speed of the MAX5 is determined by the slowest DIMM installed in the MAX5.
- The MAX5 does not come with any DIMMs installed when you purchase it as a option. When you install DIMMs, install them in the order shown in the following tables to optimize system performance.
- The MAX5 supports non-mirroring mode and memory-mirroring mode through the host server.
  - **Non-mirroring mode**. When you use the non-mirroring mode, install DIMMs as indicated in the following table:

*Table 26. Non-mirroring mode DIMM population sequence for the MAX5 memory expansion module*

| Pairs of DIMMs | DIMM connector population sequence |
|---|---|
| Pair 1 | 28, 29 |

*Table 26. Non-mirroring mode DIMM population sequence for the MAX5 memory expansion module (continued)*

| Pairs of DIMMs | DIMM connector population sequence |
|---|---|
| Pair 2 | 9, 16 |
| Pair 3 | 1, 8 |
| Pair 4 | 20, 21 |
| Pair 5 | 26, 31 |
| Pair 6 | 11, 14 |
| Pair 7 | 3, 6 |
| Pair 8 | 18, 23 |
| Pair 9 | 27, 30 |
| Pair 10 | 10, 15 |
| Pair 11 | 2, 7 |
| Pair 12 | 19, 22 |
| Pair 13 | 25, 32 |
| Pair 14 | 12, 13 |
| Pair 15 | 4, 5 |
| Pair 16 | 17, 24 |

**Note:** When you populate DIMMs in the MAX5, populate the larger capacity DIMMs first; then the smaller capacity DIMMs.

– **Memory-mirroring mode**. When you use the mirroring mode feature, consider the following information:
  - Memory-mirroring mode replicates and stores data on sets of four DIMMs simultaneously. If a failure occurs, the memory controller switches from the primary set of memory DIMMs to the backup set of DIMMs. To enable memory mirroring through the Setup utility, select **System Settings → Memory**. For more information, see "Using the Setup utility" on page 384.
  - DIMMs must be installed in sets of four. The DIMMs in each set must be the same size and type. This is applicable also when the MAX5 expansion module is attached to a host server and the host server has an optional memory tray installed in the server. You must install DIMMs in sets of four DIMMs for memory-mirroring mode in each (server, memory tray, and the MAX5).
  - The maximum available memory is reduced to half of the installed memory when memory mirroring is enabled. For example, if the MAX5 expansion module has 64 GB of memory installed, only 32 GB of addressable memory is available when you use memory mirroring.
  - The following table lists the DIMM installation sequence for memory-mirroring mode:

*Table 27. Memory-mirroring mode DIMM population sequence for the MAX5 memory expansion module*

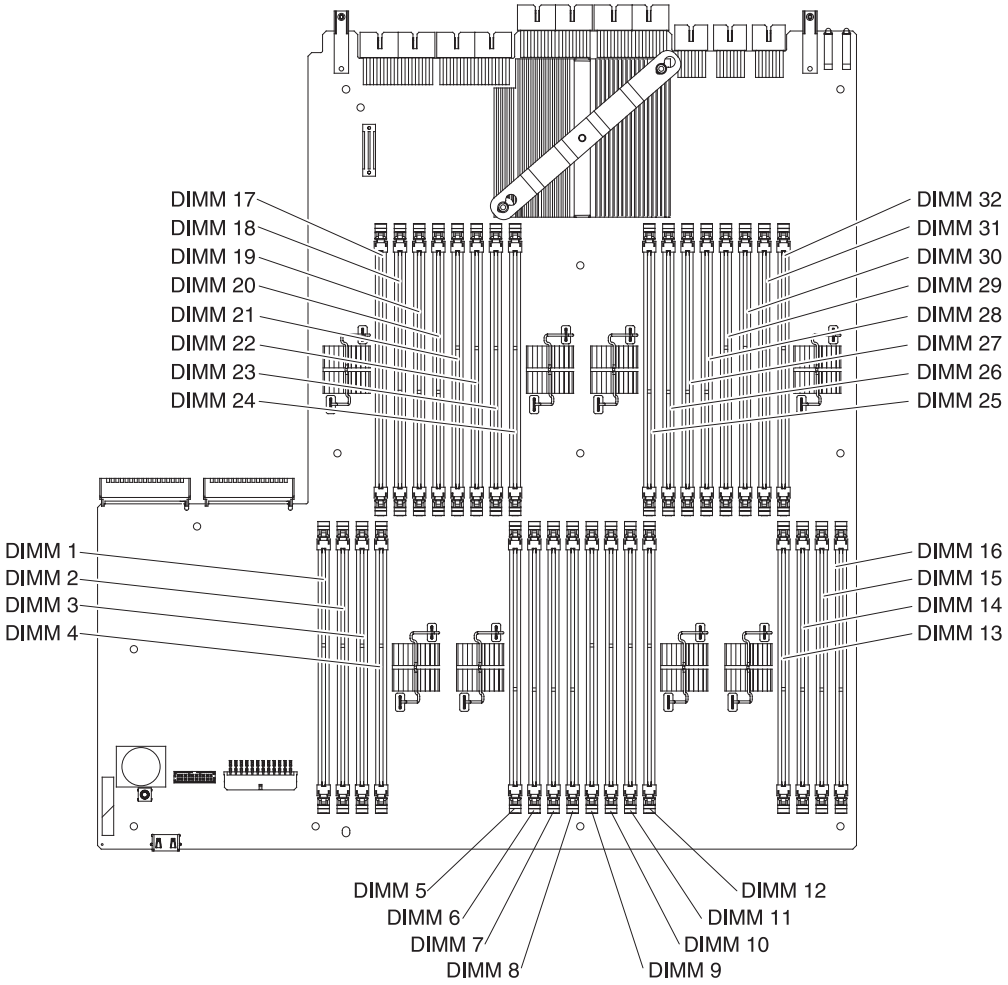
| Sets of 4 DIMMs | DIMM connector population sequence |
|---|---|
| Set 1 | 9, 16, 28, 29 |
| Set 2 | 1, 8, 20, 21 |
| Set 3 | 11, 14, 26, 31 |

*Table 27. Memory-mirroring mode DIMM population sequence for the MAX5 memory expansion module (continued)*

| Sets of 4 DIMMs | DIMM connector population sequence |
|---|---|
| Set 4 | 3, 6, 18, 23 |
| Set 5 | 10, 15, 27, 30 |
| Set 6 | 2, 7, 19, 22 |
| Set 7 | 12, 13, 25, 32 |
| Set 8 | 4, 5, 17, 24 |

**Note:** When you populate DIMMs in the MAX5, populate the larger capacity DIMMs first; then the smaller capacity DIMMs.

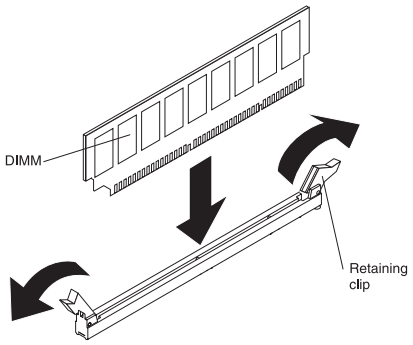
The following illustration shows the location of the DIMMs connectors on the system-board tray:




To install a memory module in the MAX5 expansion module, complete the following steps.

**Note:** The MAX5 might come with DIMM fillers on DIMM connectors that are not populated. Remove them before you install DIMMs in those connectors.

1. Touch the static-protective package that contains the new DIMM to any unpainted metal surface on the outside of the MAX5; then, remove the DIMM from the package.
2. Turn the DIMM so that the DIMM keys align correctly with the connector.
3. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector.




4. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

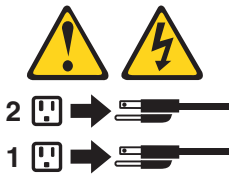
   **Note:** If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.
5. Grasp the system-board tray on both sides (near the stop-tabs) and align the system-board tray with the chassis.
6. Slide the system-board tray forward until the tabs at the bottom of the handles touch the chassis; then, close the handles and press firmly on the release latches to snap them into the locked position.
7. Reinstall the bezel (see “Replacing the MAX5 bezel” on page 358).
8. Reconnect the power cords to the MAX5; then, connect all external cables to the MAX5
9. Turn on the peripheral devices and the host server.

## Removing a MAX5 hot-swap power supply

When you remove or install a hot-swap power supply, observe the following precautions.

**Statement 5**

**CAUTION:**
**The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**


2
1

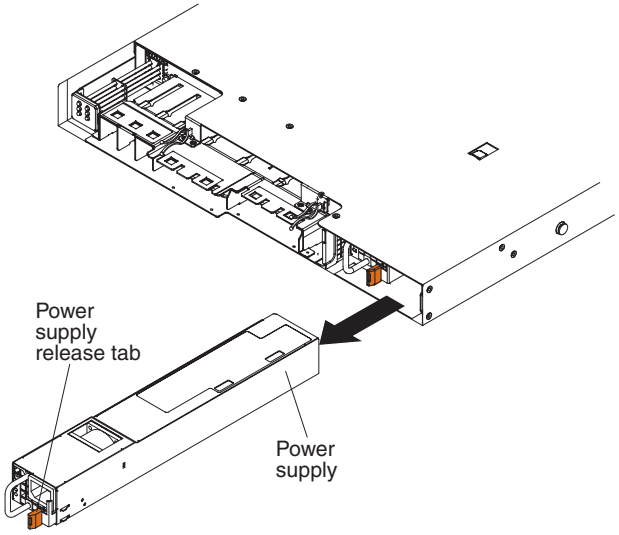
**Statement 8**

**CAUTION:**
**Never remove the cover on a power supply or any part that has the following label attached.**

**Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

To remove a hot-swap power supply from the MAX5 expansion module, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. If only one power supply is installed, turn off the host server and peripheral devices and disconnect the MAX5 power cords.
3. If the MAX5 is in a rack, at the back of the MAX5, pull back the cable management arm to gain access to the rear of the MAX5 and the power supply.
4. Press and hold the orange release tab to the left. Grasp the handle and pull the power supply out of the MAX5.




5. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing a MAX5 hot-swap power supply

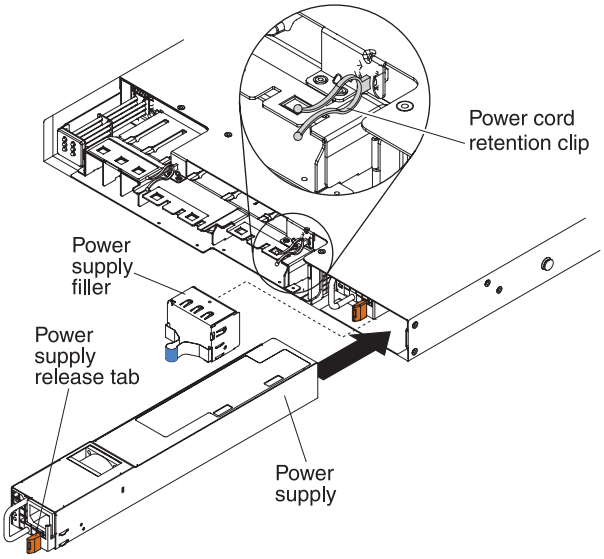
The following notes describe the type of power supply that the MAX5 supports and other information that you must consider when you install a power supply:

- The server comes with one 675-watt hot-swap 12-volt output power supply. The input voltage is 110 V ac or 220 V ac auto-sensing.

  **Note:** You cannot mix 110 V ac and 220 V ac power supplies in the MAX5, it is not supported.
- These power supplies are designed for parallel operation. In the event of a power-supply failure, the redundant power supply continues to power the system. The MAX5 supports a maximum of two power supplies, which is the requirement for redundancy support.

To install a hot-swap power supply in the MAX5, complete the following steps:

1. Read the safety information that begins "Safety" on page vii and "Installation guidelines" on page 243.
2. Touch the static-protective package that contains the hot-swap power supply to any unpainted metal surface on the MAX5; then, remove the power supply from the package and place it on a static-protective surface.
3. If you are installing a hot-swap power supply into an empty bay, remove the power-supply filler panel from the power-supply bay.

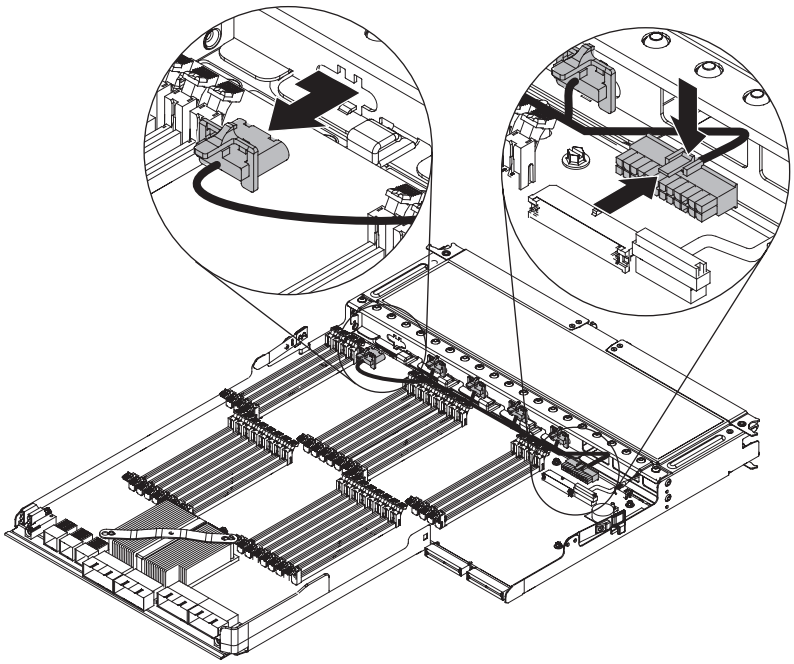



4. Grasp the handle on the rear of the power supply and slide the power supply forward into the power-supply bay until it clicks. Make sure that the power supply connects firmly into the power-supply connector.
5. Route the power cord through the cable retention clip on the rear of the server so that it does not accidentally become disconnected.
6. Connect the power cord for the new power supply to the power-cord connector on the power supply.
7. Connect the other end of the power cord to a properly grounded electrical outlet.
8. Make sure that the ac power LED and the dc power LED on the power supply are lit, indicating that the power supply is operating correctly. The two green LEDs are to the right of the power-cord connector.

## Removing the MAX5 five-drop fan cable assembly

To remove the five-drop fan cable assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the host server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables from the server. Disconnect all power cords from the MAX5; then, disconnect all external cables from the MAX5 as necessary to replace the device.
3. Remove the bezel (see "Removing the MAX5 bezel" on page 358).
4. Remove the system-board tray (see "Removing the MAX5 system-board tray assembly" on page 376).
5. Remove the hot-swap fans (see "Removing a MAX5 hot-swap fan" on page 363).
6. From the inside of the system-board tray, remove the fan cable connectors from the system-board tray, starting with the fan cable connector that is farthest from the information panel.
7. Grasp the fan cable connector tab on the system-board tray and push the connector to the right to release the fan connector from the system-board tray; then, remove the cable for that fan from the clamp. Repeat this for each fan connector until you have removed all five fan connectors from the fan connectors on fan cage.

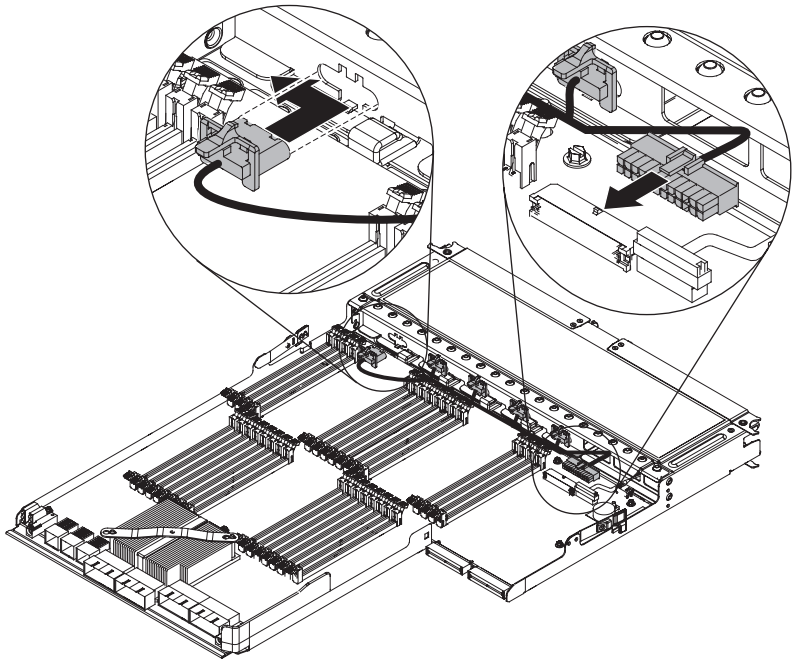


8. Disconnect the five-drop fan cable from the system-board.
9. Lift the five-drop fan cable from the system-board tray.
10. If you are instructed to return the fan cable, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Replacing the MAX5 five-drop fan cable assembly

To install the five-drop fan cable assembly, complete the following steps:

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Connect the five-drop fan cable connectors to the system-board tray, starting with the fan cable connector that is farthest from the information panel.
3. Insert the fan cable connector into the connector on the system-board tray and push it to the left to lock it in place; then route that fan cable through the cable clamp next to that fan. Repeat this for each fan connector until you have connected all five fan connectors to the fan connectors on the fan cage and the cable is routed through the clamps.



4. Connect the five-drop fan cable to the connector on the system board.
5. Reinstall the hot-swap fans (see "Replacing a MAX5 hot-swap fan" on page 364).
6. Replace the system-board tray (see"Replacing the MAX5 system-board tray assembly" on page 377).
7. Replace the bezel (see "Replacing the MAX5 bezel" on page 358).
8. Reconnect the power cords to the MAX5; then, connect all external cables to the MAX5
9. Turn on the peripheral devices and the host server.

# Removing and replacing MAX5 Tier 2 CRUs

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your MAX5.

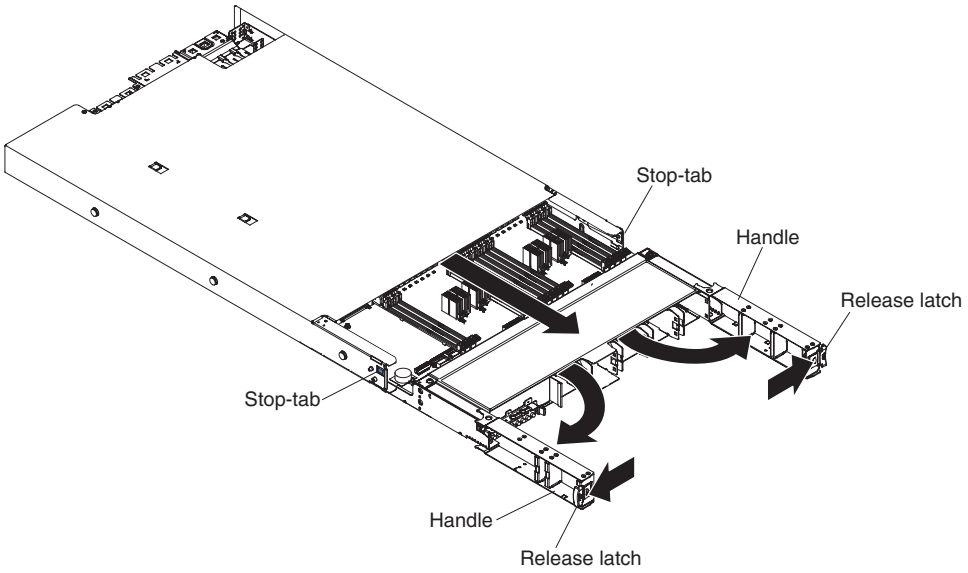
## Removing the MAX5 system-board tray assembly

To remove the system-board tray, complete the following steps:

**Note:**

1. When you replace the system-board tray, make sure that the host server firmware is at the latest level.
2. Before you attach a MAX5 to the server and try to use it, you must update the server firmware with the latest level of firmware or code. If you attach and try to use the MAX5 without updating the server firmware, you might get unexpected system behavior or the server might not power on. For special instructions to follow before you attach the MAX5 to the server, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5085756.

1. Read the safety information that begins on page "Safety" on page vii and "Installation guidelines" on page 243.
2. Turn off the host server (see "Turning off the server" on page 17) and all attached peripheral devices. Disconnect all power cords; then, disconnect all external cables from the server. Disconnect all power cords from the MAX5; then, disconnect all external cables from the MAX5 as necessary to replace the device.
3. Remove the bezel (see "Removing the MAX5 bezel" on page 358).
4. Grasp the blue release latches on the system-board tray handles and press release latches in opposite directions and rotate the handles to the fully open position.




5. Grasp the handles and pull the system-board tray out until it stops; then, press inward on the stop-tabs on both sides of the system-board tray and pull the tray out of the chassis.
6. Remove the air baffle (see "Replacing the MAX5 air baffle" on page 360).
7. Remove the DIMMs (see "Removing a MAX5 memory module" on page 364).

8. Remove all hot-swap fans (see “Removing a MAX5 hot-swap fan” on page 363).
9. If you are instructed to return the system-board tray, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

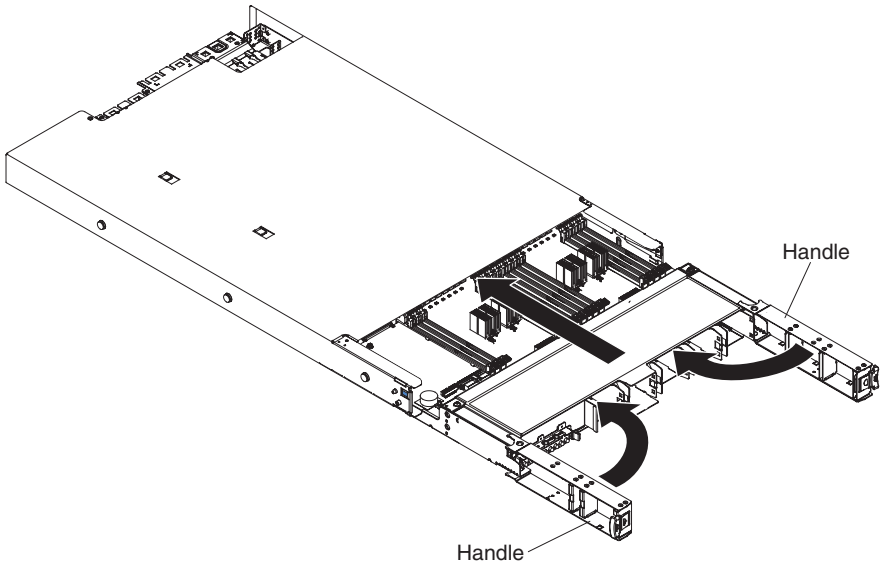
## Replacing the MAX5 system-board tray assembly

To replace the system-board tray, complete the following steps:

**Note:**

1. When you reassemble the components in the MAX5, be sure to route all cables carefully so that they are not exposed to excessive pressure.
2. When you replace the system-board tray, make sure that host server firmware is at the latest level (See “Updating the firmware” on page 379).
3. Before you attach a MAX5 to the server and try to use it, you must update the server firmware with the latest level of firmware or code. If you attach and try to use the MAX5 without updating the server firmware, you might get unexpected system behavior or the server might not power on. For special instructions to follow before you attach the MAX5 to the server, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5085756.

1. Reinstall the DIMMs (see “Replacing a MAX5 memory module” on page 366).
2. Reinstall the air baffle (see “Replacing the MAX5 air baffle” on page 360).
3. Reinstall the hot-swap fans (see “Replacing a MAX5 hot-swap fan” on page 364).
4. Grasp the system-board tray on both sides (near the stop-tabs) and align the system-board tray with the chassis.




**Note:** When you replace the system-board tray in the MAX5, be sure to order the correct system-board tray for your model. A label comes on models of the MAX5 that contains the Intel 7510 scalable memory buffer. The label in located on top of the system-board tray. A note on the label states “This MAX5 contains Intel 7510 scalable memory buffer”. In addition, models of the MAX5 that contains the Intel 7510 scalable memory buffer will have a label attached inside of the MAX5 chassis. To locate the label, remove the front bezel. The label is

attached to the left side of the chassis with the text “7510 SMB”. See the parts listing table in “Replaceable MAX5 components” on page 237 for more information about the correct system-board tray for your model.

5. Slide the system-board tray forward until the tabs at the bottom of the handles touch the chassis; then, close the handles and press firmly on the release latches to snap them into the locked position.
6. Reinstall the bezel (see “Replacing the MAX5 bezel” on page 358).
7. Reconnect the power cords to the MAX5; then, connect all external cables to the MAX5
8. Turn on the peripheral devices and the host server.

# Chapter 6. Configuration information and instructions

This chapter provides information about updating the firmware and using the configuration utilities.

## Updating the firmware

**Important::** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Before you attach a MAX5 to the server and try to use it, you must update the server firmware with the latest level of firmware or code. If you attach and try to use the MAX5 without updating the server firmware, you might get unexpected system behavior or the server might not power on. For special instructions to follow before you attach the MAX5 to the server, go to http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5085756.

You can install code updates that are packaged as an Update*Xpress* System Pack or Update*Xpress* CD image. An Update*Xpress* System Pack contains an integration-tested bundle of online firmware and device-driver updates for your server. Use Update*Xpress* System Pack Installer to acquire and apply Update*Xpress* System Packs and individual firmware and device-driver updates. For additional information and to download the Update*Xpress* System Pack Installer, go to the ToolsCenter for System x and BladeCenter at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp9.42.212.195/ and click **UpdateXpress System Pack Installer**.

When you click an update, an information page is displayed, including a list of the problems that the update fixes. Review this list for your specific problem; however, even if your problem is not listed, installing the update might solve the problem.

Be sure to separately install any listed critical updates that have release dates that are later than the release date of the Update*Xpress* System Pack or Update*Xpress* image.

The firmware for the server is periodically updated and is available for download on the IBM Web site. To check for the latest level of firmware, such as the UEFI firmware, vital product data (VPD) code, device drivers, and integrated management module (IMM) firmware, go to http://www.ibm.com/support/fixcentral/.

**Note:** Before you update the firmware, be sure to back up any data that is stored in the Trusted Platform Module (TPM), in case any of the TPM characteristics are changed by the new firmware. For instructions, see your encryption software documentation.

Download the latest firmware for the server; then, install the firmware, using the instructions that are included with the downloaded files.

When you replace a device in the server, you might have to either update the firmware that is stored in memory on the device or restore the pre-existing firmware from a diskette or CD image.

The following list indicates where the firmware is stored:

- UEFI firmware is stored in ROM on the system board.
- IMM firmware is stored in ROM on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller.
- ServeRAID firmware is stored in ROM on the ServeRAID adapter.
- SAS/SATA firmware is stored in ROM on the SAS/SATA controller on the system board.

## Configuring the server

The *ServerGuide* program provides software-setup tools and installation tools that are designed for the server. Use this CD during the installation of the server to configure basic hardware features, such as an integrated SAS/SATA controller with RAID capabilities, and to simplify the installation of your operating system. For information about using this CD, see "Using the ServerGuide Setup and Installation CD" on page 381.

In addition to the *ServerGuide Setup and Installation* CD, you can use the following configuration programs to customize the server hardware:

- **Setup utility**

  The Setup utility is part of the basic input/output system firmware. Use it to change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see "Using the Setup utility" on page 384.
- **Boot Manager program**

  The Boot Manager program is part of the server firmware. Use it to override the startup sequence that is set in the Setup utility and temporarily assign a device to be first in the startup sequence. For more information about using this program, see "Using the Boot Manager program" on page 390.
- **Integrated Management Module**

  Use the integrated management module (IMM) for configuration, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network. For information about using these programs, see "Using the integrated management module" on page 391.
- **VMware ESXi embedded hypervisor**

  The VMware ESXi embedded hypervisor software is available on the optional IBM USB flash device with embedded hypervisor. The USB flash device can be installed in the USB connector on the SAS/SATA RAID riser card (see the following illustration). Hypervisor is virtualization software that enables multiple operating systems to run on a host system at the same time. The USB flash device is required to activate the hypervisor functions. For more information about using the embedded hypervisor, see "Using the embedded hypervisor" on page 392.
- **Remote presence and blue-screen capture features**

  The remote presence and blue-screen capture features are integrated functions of the Integrated Management Module (IMM). The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture feature to assist in determining the cause of the hang condition.

- **Ethernet controller configuration**

  For information about configuring the Ethernet controller, see "Configuring the Gigabit Ethernet controller" on page 395.
- **Configuring RAID arrays**

  For information about configuring RAID arrays, see"Configuring RAID arrays" on page 396.
- **IBM Advanced Settings Utility (ASU) program**

  Use this program as an alternative to the Setup utility for modifying UEFI settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the server to access the Setup utility. For more information about using this program, see "IBM Advanced Settings Utility program" on page 396.

## Using the ServerGuide Setup and Installation CD

The *ServerGuide Setup and Installation* CD provides software setup tools and installation tools that are designed for your server. The ServerGuide program detects the server model and optional hardware devices that are installed and uses that information during setup to configure the hardware. The ServerGuide program simplifies operating-system installations by providing updated device drivers and, in some cases, installing them automatically.

You can download a free image of the *ServerGuide Setup and Installation CD* or purchase the CD from the ServerGuide fulfillment Web site at http://www.ibm.com/systems/management/serverguide/sub.html. To download the free image. click **IBM Service and Support Site**.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD drive. In addition to the *ServerGuide Setup and Installation* CD, you must have your operating-system CD to install the operating system.

The ServerGuide program has the following features:

- An easy-to-use interface
- Diskette-free setup, and configuration programs that are based on detected hardware
- ServeRAID Manager program, which configures your ServeRAID adapter
- Device drivers that are provided for your server model and detected hardware

- Operating-system partition size and file-system type that are selectable during setup

## ServerGuide features

Features and functions can vary slightly with different versions of the ServerGuide program. To learn more about the version that you have, start the *ServerGuide Setup and Installation* CD and view the online overview. Not all features are supported on all server models.

The ServerGuide program requires a supported IBM server with an enabled startable (bootable) CD drive. In addition to the *ServerGuide Setup and Installation* CD, you must have your operating-system CD to install the operating system.

The ServerGuide program performs the following tasks:

- Sets system date and time
- Detects the RAID adapter or controller and runs the SAS/SATA RAID configuration program
- Checks the microcode (firmware) levels of a ServeRAID adapter and determines whether a later level is available from the CD
- Detects installed hardware options and provides updated device drivers for most adapters and devices
- Provides diskette-free installation for supported Windows operating systems
- Includes an online readme file with links to tips for your hardware and operating-system installation

## Setup and configuration overview

When you use the *ServerGuide Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program provides a list of tasks that are required to set up your server model. On a server with a ServeRAID adapter or SAS/SATA controller with RAID capabilities, you can run the SAS RAID configuration program to create logical drives.

**Note:** Features and functions can vary slightly with different versions of the ServerGuide program.

When you start the *ServerGuide Setup and Installation* CD, the program prompts you to complete the following tasks:

- Select your language.
- Select your keyboard layout and country.
- View the overview to learn about ServerGuide features.
- View the readme file to review installation tips for your operating system and adapter.
- Start the operating-system installation. You will need your operating-system CD.

## Typical operating-system installation

The ServerGuide program can reduce the time it takes to install an operating system. It provides the device drivers that are required for your hardware and for the operating system that you are installing. This section describes a typical ServerGuide operating-system installation.

**Note:** Features and functions can vary slightly with different versions of the ServerGuide program.

1. After you have completed the setup process, the operating-system installation program starts. (You will need your operating-system CD to complete the installation.)
2. The ServerGuide program stores information about the server model, service processor, hard disk drive controllers, and network adapters. Then, the program checks the CD for newer device drivers. This information is stored and then passed to the operating-system installation program.
3. The ServerGuide program presents operating-system partition options that are based on your operating-system selection and the installed hard disk drives.
4. The ServerGuide program prompts you to insert your operating-system CD and restart the server. At this point, the installation program for the operating system takes control to complete the installation.

## Installing your operating system without using ServerGuide

If you have already configured the server hardware and you are not using the ServerGuide program to install your operating system, complete the following steps to download the latest operating-system installation instructions from the IBM Web site.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. From the menu on the left side of the page, click **System x support search**.
4. From the **Task** menu, select **Install**.
5. From the **Product family** menu, select **System x3690 X5**.
6. From the **Operating system** menu, select your operating system, and then click **Search** to display the available installation documents.

# Using the Setup utility

Use the Unified Extensible Firmware Interface (UEFI) Setup utility to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords
- Set the startup characteristics of the server and the order of startup devices
- Set and change settings for advanced hardware features
- View, set, and change settings for power-management features
- View and clear error logs
- Change interrupt request (IRQ) settings
- Resolve configuration conflicts

For more information about UEFI-compliant firmware, go to http://www-947.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=MIGR-5083207&brandind=5000008.

## Starting the Setup utility

To start the Setup utility, complete the following steps:

1. Turn on the server.

   **Note:** Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When the prompt `<F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup utility menu. If you do not type the administrator password, a limited Setup utility menu is available.
3. Select **System Settings** to view or change the server component settings.

## Setup utility menu choices

The following choices are on the Setup utility main menu for the UEFI. Depending on the version of the IBM System x Server Firmware (server firmware), some menu choices might differ slightly from these descriptions.

- **System Information**

  Select this choice to view information about the server. When you make changes through other choices in the Setup utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information. This choice is on the full Setup utility menu only.

  – **System Summary**

    Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessors, machine type and model of the server, the serial number, the system UUID, and the amount of installed memory. When you make configuration changes through other options in the Setup utility, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

  – **Product Data**

    Select this choice to view the system-board identifier, the revision level or issue date of the firmware, the integrated management module and diagnostics code, and the version and date.

  This choice is on the full Setup utility menu only.

- **System Settings**

  Select this choice to view or change the server component settings.

  – **Adapters and UEFI Drivers**

    Select this choice to view information about the UEFI 1.10 and UEFI 2.0 compliant adapters and device drivers installed in the server.

  – **Network Configuration**

    Select this choice if you want to use the driver's own configuration capability to configure the device.

  – **Processors**

    Select this choice to view or change the processor settings.

  – **Memory**

    Select this choice to view or change the memory settings. To configure memory mirroring, select **System Settings → Memory → Memory Mirroring Mode → Mirrored**.

  – **Devices and I/O Ports**

    Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the serial ports, configure remote console redirection, enable or disable integrated Ethernet controllers, the SAS/SATA controller, SATA optical drive channels, PCI slots, and view the system Ethernet MAC addresses. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

  – **Power**

    Select this choice to view or change power capping to control consumption, processors, and performance states.

    - **Active Energy Manager**

      Select this choice to enable or disable power capping. If you enable power capping, the Active Energy Manager program will limit the maximum power that is consumed by the server.

    - **Power Restore Policy**

      Select this choice to determine the mode of operation to which the server will be restored after a power outage occurs. You can select **Always Off**, **Restore**, or **Always On** to restore the server the state that it was set to at the time of the power outage.

  – **Operating Modes**

    Select this choice to view or change the operating profile (performance and power utilization). This choice specify a preset operating mode to configure the server for maximum power savings, maximum efficiency, or maximum performance.

    - **Efficiency mode**

      Select this choice to maintain the optimal balance between performance and power consumption. The server generally produces the best performance per watt while it is in this mode.

    - **Acoustic mode**

      Select this choice to configure the server to draw the minimum amount of power and generate the least noise. Server performance might be degraded depending on the application that you are running.

    - **Performance mode**

Select this choice to achieve the highest absolute performance for most server applications. The power consumption in this mode is often higher than in the Efficiency or the Acoustics mode.

- **Custom mode**

  Select this choice only if you understand the functions of the low-level IMM settings. This is the only choice that enables you to change the low-level IMM settings that affect the performance and power consumption of the server.

– **Integrated Management Module**

Select this choice to view or change the settings for the integrated management module.

- **POST Watchdog Timer**

  Select this choice to view or enable the POST watchdog timer.

- **POST Watchdog Timer Value**

  Select this choice to view or set the POST loader watchdog timer value.

- **Reboot System on NMI**

  Enable or disable restarting the server whenever a nonmaskable interrupt (NMI) occurs. **Disabled** is the default.

- **Commands on USB Interface Preference**

  Select this choice to enable or disable the Ethernet over USB interface on IMM.

- **Network Configuration**

  Select this choice to view the system management network interface port, the IMM MAC address, the current IMM IP address, and host name; define the static IMM IP address, subnet mask, and gateway address, specify whether to use the static IP address or have DHCP assign the IMM IP address, save the network changes, and reset the IMM.

- **Reset IMM to Defaults**

  Select this choice to view or reset IMM to the default settings.

- **Reset IMM**

  Select this choice to reset the IMM settings.

– **Legacy Support**

Select this choice to view or set legacy support.

- **Force Legacy Video on Boot**

  Select this choice to force INT video support, if the operating system does not support UEFI video output standards.

- **Rehook INT**

  Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.

- **Legacy Thunk Support**

  Select this choice to enable or disable UEFI to interact with PCI mass storage devices that are non-UEFI compliant.

– **System Security**

Select this choice to view or configure Trusted Platform Module (TPM) support.

– **iSCSI Configuration**

Select this choice to configure the iSCSI parameters.

– **Network Device List**

Select this choice to view or configure the network device options, such as iSCSI, PXE, and network devices. There might be additional configuration choices for optional network devices that are compliant with UEFI 2.1 and later.

- **Date and Time**

  Select this choice to set the date and time in the server, in 24-hour format (*hour*:*minute*:*second*).

  This choice is on the full Setup utility menu only.

- **Start Options**

  Select this choice to view or change the start options, including the startup sequence, keyboard NumLock state, PXE boot option, and PCI device boot priority. Changes in the startup options take effect when you start the server.

  The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. For example, you can define a startup sequence that checks for a disc in the CD-RW/DVD drive, then checks the hard disk drive, and then checks a network adapter.

  This choice is on the full Setup utility menu only.

- **Boot Manager**

  Select this choice to view, add, delete, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting.

- **System Event Logs**

  Select this choice to enter the System Event Manager, where you can view the POST event log and the system-event log. You can use the arrow keys to move between pages in the error log.

  The POST event log contains the three most recent error codes and messages that were generated during POST.

  The system-event log contains POST and system management interrupt (SMI) events and all events that are generated by the baseboard management controller that is embedded in the integrated management module (IMM).

  **Important:** If the system-error LED on the front of the server is lit but there are no other error indications, clear the system-event log. Also, after you complete a repair or correct an error, clear the system-event log to turn off the system-error LED on the front of the server.

  – **POST Event Viewer**

    Select this choice to enter the POST event viewer to view the POST error messages.

  – **System Event Log**

    Select this choice to view the IMM system event log.

  – **Clear System Event Log**

    Select this choice to clear the IMM system event log.

- **User Security**

  Select this choice to set, change, or clear passwords. See “Passwords” on page 388 for more information.

  This choice is on the full and limited Setup utility menu.

  – **Power-on Password**

    Select this choice to set or change a power-on password. See “Power-on password” on page 389 for more information.

  - **Administrator Password**

    Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If an administrator password is set, the full Setup utility menu is available only if you type the administrator password at the password prompt. For more information, see "Administrator password" on page 390.

- **Save Settings**

  Select this choice to save the changes that you have made in the settings.

- **Restore Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

  Select this choice to exit from the Setup utility. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

## Passwords

From the **User Security** menu choice, you can set, change, and delete a power-on password and an administrator password. The **User Security** choice is on the full Setup utility menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup and to have access to the full Setup utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Setup utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Setup utility menu.

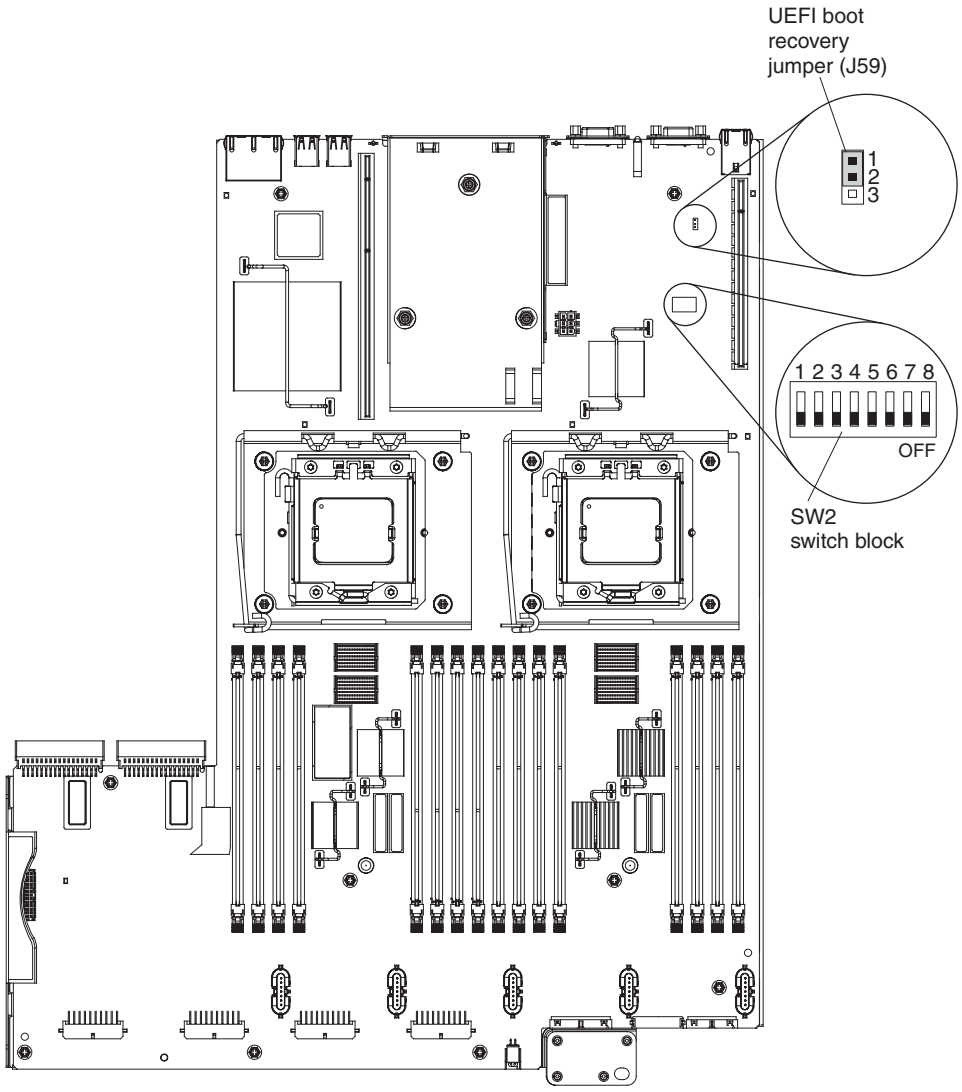
If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Setup utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Setup utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

**Power-on password:**
If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of 6 to 20 printable ASCII characters for the password.

When a power-on password is set, you can enable the Unattended Start mode, in which the keyboard and mouse remain locked but the operating system can start. You can unlock the keyboard and mouse by typing the power-on password.

If you forget the power-on password, you can regain access to the server in any of the following ways:

- If an administrator password is set, type the administrator password at the password prompt. Start the Setup utility and reset the power-on password.
- Remove the battery from the server and then reinstall it. See "Removing the system battery" on page 315 for instructions on removing the battery.
- Change the position of the power-on password switch (enable switch 3 of the system board switch block (SW2) to bypass the power-on password check (see Table 3 on page 22 for more information).



**Attention:** Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. See the safety information that begins on page "Safety" on page vii. Do not change settings or move jumpers on any system-board switch or jumper blocks that are not shown in this document.

The default for all of the switches on switch block (SW2) is Off.

While the server is turned off, move switch 3 of the switch block (SW2) to the On position to enable the power-on password override. You can then start the Setup utility and reset the power-on password. You do not have to return the switch to the previous position.

The power-on password override switch does not affect the administrator password.

**Administrator password:**
If an administrator password is set, you must type the administrator password for access to the full Setup utility menu. You can use any combination of 6 to 20 printable ASCII characters for the password.

**Attention:** If you set an administrator password and then forget it, there is no way to change, override, or remove it. You must replace the system board.

## Using the Boot Manager program

The Boot Manager program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the Setup utility.

To use the Boot Manager program, complete the following steps:

1. Turn off the server.
2. Restart the server.
3. When the prompt `<F12> Select Boot Device` is displayed, press F12. If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.
4. Use the Up arrow and Down arrow keys to select an item from the **Boot Selection Menu** and press Enter.

The next time the server starts, it returns to the startup sequence that is set in the Setup utility.

## Starting the backup server firmware

The system board contains a backup copy area for the server firmware. This is a secondary copy of the server firmware that you update only during the process of updating the server firmware. If the primary copy of the server firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, place the J59 jumper in the backup position (pins 2 and 3).

Use the backup copy of the server firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, move the J59 jumper back to the primary position (pins 1 and 2).

## Using the integrated management module

The integrated management module (IMM) is a second generation of the functions that were formerly provided by the baseboard management controller hardware. It combines service processor functions, video controller, and remote presence function in a single chip.

The IMM supports the following basic system management features:

- Active Energy Manager.
- Alerts (in-band and out-of-band alerting, PET traps - IPMI style, SNMP, e-mail).
- Auto Boot Failure Recovery (ABR).
- Automatic microprocessor disable on failure and restart in a two-microprocessor configuration when one microprocessor signals an internal error.
- Automatic Server Restart (ASR) when POST is not complete or the operating system hangs and the operating system watchdog timer times-out. The IMM might be configured to watch for the operating system watchdog timer and reboot the system after a timeout, if the ASR feature is enabled. Otherwise, the IMM allows the administrator to generate a nonmaskable interrupt (NMI) by pressing an NMI button on the light path diagnostics panel for an operating-system memory dump. ASR is supported by IPMI.
- A virtual media key, which enables remote presence support (remote video, remote keyboard/mouse, and remote storage).
- Boot sequence manipulation.
- Command-line interface.
- Configuration save and restore.
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) disables a failing DIMM that is detected during POST, and the IMM lights the associated system error LED and the failing DIMM error LED.
- Environmental monitor with fan speed control for temperature, voltages, fan failure, power supply failure, and power backplane failure.
- Intelligent Platform Management Interface (IPMI) Specification V2.0 and Intelligent Platform Management Bus (IPMB) support.
- Invalid system configuration (CNFG) LED support.
- Light path diagnostics LEDs indicators to report errors that occur with fans, power supplies, microprocessor, hard disk drives, and system errors.
- Nonmaskable interrupt (NMI) detection and reporting.
- Operating-system failure blue screen capture.
- PCI configuration data.

- PECI 2 support.
- Power/reset control (power-on, hard and soft shutdown, hard and soft reset, schedule power control).
- Query power-supply input power.
- ROM-based IMM firmware flash updates.
- Serial over LAN (SOL).
- Serial port redirection over telnet or ssh.
- SMI handling.
- System event log (SEL).

The IMM also provides the following remote server management capabilities through the OSA SMBridge management utility program:

- **Command-line interface (IPMI Shell)**

  The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.
- **Serial over LAN**

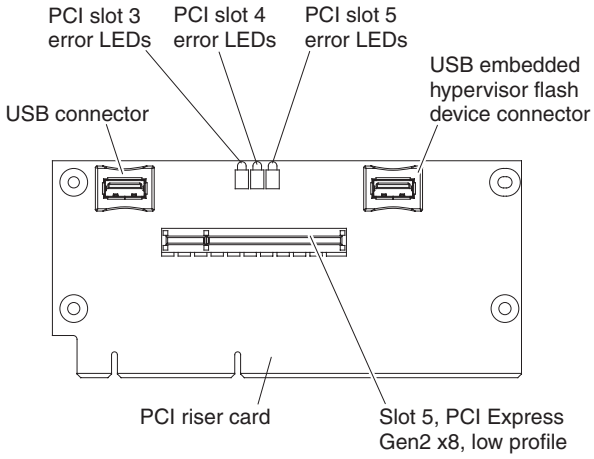
  Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the UEFI settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

  For more information about IMM, see the *Integrated Management Module User's Guide* at http://www.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=MIGR-5079770&brandind=5000008.

## Using the embedded hypervisor

An optional USB flash device with VMware ESXi embedded hypervisor software is available for purchase. Hypervisor is virtualization software that enables multiple operating systems to run on a host system at the same time. The USB embedded hypervisor flash device installs in USB connector on the low-profile, SAS/SATA riser card in PCI riser slot 2 on the system board (see the following illustration). The USB flash device is required to activate the hypervisor functions.

**Note:** When you add an optional MAX5 to your server configuration and you plan to use the optional USB flash device with VMware ESXi embedded hypervisor software, see the documentation that comes with the USB flash device and the operating system installation instructions for installing VMware ESXi (or ESX, depending on your environment) on your server at IBM website at http://www.ibm.com/systems/support/. The documentation provides additional installation and configuration information that you need to follow before you use the MAX5.




To start using the embedded hypervisor functions, you must add the USB flash device to the boot order in the Setup utility.

To add the USB flash device to the boot order, complete the following steps:

1. Turn on the server.

   **Note:** Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When the prompt `<F1> Setup` is displayed, press F1.
3. From the Setup utility main menu, select **Boot Manager**.
4. Select **Add Boot Option**; then, select **USB Storage**. Press Enter, and then select Esc.
5. Select **Change Boot Order** and then select **Commit Changes**; then, press Enter.
6. Select **Save Settings** and then select **Exit Setup**.

If the embedded hypervisor flash device image becomes corrupt, you can use the *VMware Recovery* CD that comes with the system to recover the flash device image. To recover the flash device image, complete the following steps:

1. Turn on the server.

   **Note:** Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. Insert the VMware Recovery CD into the CD or DVD drive.
3. Follow the instructions on the screen.

For additional information and instructions, see the *VMware ESXi Server 3.1 Embedded Setup Guide* at http://www.vmware.com/pdf/vi3_35/esx_3i_e/r35/vi3_35_25_3i_setup.pdf

## Using the remote presence and blue-screen capture features

The remote presence and blue-screen capture features are integrated functions of the integrated management module (IMM). The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

### Obtaining the IP address for the IMM

To access the Web interface to use the remote presence feature, you need the IP address of the IMM. You can obtain the IMM IP address through the Setup utility. The server comes with a default IP address for the IMM of 192.168.70.125. To locate the IP address, complete the following steps:

1. Turn on the server.

   **Note:** Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When the prompt `<F1> Setup` is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.
3. From the Setup utility main menu, select **System Settings**.
4. On the next screen, select **Integrated Management Module**.
5. On the next screen, select **Network Configuration**.
6. Find the IP address and write it down.
7. Exit from the Setup utility.

### Logging on to the Web interface

To log onto the IMM Web interface, complete the following steps:

1. Open a Web browser on a computer that connects to the server and in the **Address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

   **Note:** If you are logging on to the IMM for the first time after installation, the IMM defaults to DHCP. If a DHCP host is not available, the IMM assigns a static IP address of 192.168.70.125. The MAC address tag provides the default hostname of the IMM and does not require you to start the server.
2. On the Login page, type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the event log.

   **Note:** The IMM is set initially with a user name of USERID and password of PASSW0RD (passw0rd with a zero, not a the letter O). You have read/write access. You must change the default password the first time you log on.
3. On the Welcome page, type a timeout value (in minutes) in the field that is provided. The IMM will log you off the Web interface if your browser is inactive for the number of minutes that you entered for the timeout value.
4. Click **Continue** to start the session. The System Health page provides a quick view of the system status.

## Enabling the Broadcom Gigabit Ethernet Utility program

The Broadcom Gigabit Ethernet Utility program is part of the server firmware. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence. Enable and disable the Broadcom Gigabit Ethernet Utility program from the Setup utility.

## Configuring the Gigabit Ethernet controller

The Ethernet controllers are integrated on the system board. They provide an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server support auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operate at that rate and mode.

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the *Broadcom NetXtreme II Gigabit Ethernet Software* CD that comes with the server. To find updated information about configuring the controllers, complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. Under **Popular links**, click **Software and device drivers**.
4. From the **Product family** menu, select **System x3690 X5** and click **Go**.

## Configuring RAID arrays

Through the Setup utility, you can access utilities to configure RAID arrays. The specific procedure for configuring arrays depends on the RAID controller that you are using. For details, see the documentation for your RAID controller. To access the utility for your RAID controller, complete the following steps:

1. Turn on the server.

   **Note:** Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.
2. When prompted, `<F1> Setup` is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup utility menu. If you do not type the administrator password, a limited Setup utility menu is available.
3. Select **System Settings → Adapters and UEFI drivers**.
4. Press Enter to refresh the list of device drivers.
5. Select the device driver for your RAID controller and press Enter.
6. Follow the instructions in the documentation for your RAID controller.

## IBM Advanced Settings Utility program

The IBM Advanced Settings Utility (ASU) program is an alternative to the Setup utility for modifying UEFI settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the system to access the Setup utility.

You can also use the ASU program to configure the optional remote presence features or other IMM settings. The remote presence features provide enhanced systems-management capabilities.

In addition, the ASU program provides limited settings for configuring the IPMI function in the IMM through the command-line interface.

Use the command-line interface to issue setup commands. You can save any of the settings as a file and run the file as a script. The ASU program supports scripting environments through a batch-processing mode.

For more information and to download the ASU program, go to http://www.ibm.com/systems/support/supportsite.wss/docdisplay?lndocid=TOOL-ASU&brandind=5000008 or complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **System x**.
3. On the left side of the page, click **Systems Management software**.
4. Under **Configuration**, click **Advanced Settings Utility**.

## Updating IBM Systems Director

If you plan to use IBM Systems Director to manage the server, you must check for the latest applicable IBM Systems Director updates and interim fixes.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

To locate and install a newer version of IBM Systems Director, complete the following steps:

1. Check for the latest version of IBM Systems Director:
   a. Go to http://www.ibm.com/systems/management/director/downloads.html.
   b. If a newer version of IBM Systems Director than what comes with the server is shown in the drop-down list, follow the instructions on the Web page to download the latest version.
2. Install the IBM Systems Director program.

If your management server is connected to the Internet, to locate and install updates and interim fixes, complete the following steps:

1. Make sure that you have run the Discovery and Inventory collection tasks.
2. On the Welcome page of the IBM Systems Director Web interface, click **View updates**.
3. Click **Check for updates**. The available updates are displayed in a table.
4. Select the updates that you want to install, and click **Install** to start the installation wizard.

If your management server is not connected to the Internet, to locate and install updates and interim fixes, complete the following steps:

1. Make sure that you have run the Discovery and Inventory collection tasks.
2. On a system that is connected to the Internet, go to http://www.ibm.com/eserver/support/fixes/fixcentral/.
3. From the **Product family** list, select **IBM Systems Director**.
4. From the **Product** list, select **IBM Systems Director**.
5. From the **Installed version** list, select the latest version, and click **Continue**.
6. Download the available updates.
7. Copy the downloaded files to the management server.
8. On the management server, on the Welcome page of the IBM Systems Director Web interface, click the **Manage** tab, and click **Update Manager**.
9. Click **Import updates** and specify the location of the downloaded files that you copied to the management server.
10. Return to the Welcome page of the Web interface, and click **View updates**.
11. Select the updates that you want to install, and click **Install** to start the installation wizard.

## Updating the Universal Unique Identifier (UUID)

The Universal Unique Identifier (UUID) must be updated when the system board is replaced. Use the Advanced Settings Utility to update the UUID in the UEFI-based server. The ASU is an online tool that supports several operating systems. Make sure that you download the version for your operating system. You can download the ASU from the IBM Web site. To download the ASU and update the UUID, complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Download the Advanced Settings Utility (ASU):
   a. Go to http://www.ibm.com/systems/support/.
   b. Under Product support, select **System x**.
   c. Under Popular links, select **Tools and utilities**.
   d. In the left pane, click **System x and BladeCenter Tools Center**.
   e. Scroll down and click **Tools reference**.
   f. Scroll down and click the plus-sign (+) for Configuration tools to expand the list; then, select **Advanced Settings Utility (ASU)**.
   g. In the next window under Related Information, click the **Advanced Settings Utility** link and download the ASU version for your operating system.
2. ASU sets the UUID in the Integrated Management Module (IMM). Select one of the following methods to access the Integrated Management Module (IMM) to set the UUID:
   - Online from the target system (LAN or keyboard console style (KCS) access)
   - Remote access to the target system (LAN based)
   - Bootable media containing ASU (LAN or KCS, depending upon the bootable media)

     **Note:** IBM provides a method for building a bootable media. You can create a bootable media using the Bootable Media Creator (BoMC) application from the Tools Center Web site. In addition, the Windows and Linux based tool kits are also available to build a bootable media. These tool kits provide an alternate method to creating a Windows Professional Edition or Master Control Program (MCP) based bootable media, which will include the ASU application.
3. Copy and unpack the ASU package, which also includes other required files, to the server. Make sure that you unpack the ASU and the required files to the same directory. In addition to the application executable (asu or asu64), the following files are required:
   - For Windows based operating systems:
     – ibm_rndis_server_os.inf
     – device.cat
   - For Linux based operating systems:
     – cdc_interface.sh
4. After you install ASU, use the following command syntax to set the UUID:

   ```
   asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]
   ```

   Where:

   *<uuid_value>*
   Up to 16-byte hexadecimal value assigned by you.

*[access_method]*
The access method that you selected to use from the following methods:

- Online authenticated LAN access, type the command:

  ```
  [host <imm_internal_ip>] [user <imm_user_id>][password <imm_password>]
  ```

  Where:

  *imm_internal_ip*
  The IMM internal LAN/USB IP address. The default value is 169.254.95.118.

  *imm_user_id*
  The IMM account (1 of 12 accounts). The default value is USERID.

  *imm_password*
  The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

  **Note:** If you do not specify any of these parameters, ASU will use the default values. When the default values are used and ASU is unable to access the IMM using the online authenticated LAN access method, ASU will automatically use the unauthenticated KCS access method.

  The following commands are examples of using the userid and password default values and not using the default values:

  Example that does not use the userid and password default values:
  ```
  asu set SYSTEM_PROD_DATA.SYsInfoUUID <uuid_value> --user <user_id>
  --password <password>
  ```

  Example that does use the userid and password default values:
  ```
  asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
  ```

- Online KCS access (unauthenticated and user restricted):

  You do not need to specify a value for *access_method* when you use this access method.

  Example:
  ```
  asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
  ```

  The KCS access method uses the IPMI/KCS interface. This method requires that the IPMI driver be installed. Some operating systems have the IPMI driver installed by default. ASU provides the corresponding mapping layer. See the *Advanced Settings Utility Users Guide* for more details. You can access the ASU Users Guide from the IBM Web site.

  **Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

  a. Go to http://www.ibm.com/systems/support/.
  b. Under Product support, select **System x**.
  c. Under Popular links, select **Tools and utilities**.
  d. In the left pane, click **System x and BladeCenter Tools Center**.
  e. Scroll down and click **Tools reference**.
  f. Scroll down and click the plus-sign (+) for Configuration tools to expand the list; then, select **Advanced Settings Utility (ASU)**.
  g. In the next window under Related Information, click the **Advanced Settings Utility** link.

- Remote LAN access, type the command:

  **Note:** When using the remote LAN access method to access IMM using the LAN from a client, the *host* and the *imm_external_ip* address are required parameters.

  ```
  host <imm_external_ip> [user <imm_user_id>][password <imm_password>]
  ```

  Where:

  *imm_external_ip*
  The external IMM LAN IP address. There is no default value. This parameter is required.

  *imm_user_id*
  The IMM `account` (1 of 12 accounts). The default value is USERID.

  *imm_password*
  The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

  The following commands are examples of using the userid and password default values and not using the default values:

  Example that does not use the userid and password default values:
  ```
  asu set SYSTEM_PROD_DATA.SYsInfoUUID <uuid_value> --host <imm_ip>
  --user <user_id> --password <password>
  ```

  Example that does use the userid and password default values:
  ```
  asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> --host <imm_ip>
  ```

- Bootable media:

  You can also build a bootable media using the applications available through the Tools Center Web site at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp. From the left pane, click **IBM System x and BladeCenter Tools Center**, then click **Tool reference** for the available tools.

5. Restart the server.

## Updating the DMI/SMBIOS data

The Desktop Management Interface (DMI) must be updated when the system board is replaced. Use the Advanced Settings Utility to update the DMI in the UEFI-based server. The ASU is an online tool that supports several operating systems. Make sure that you download the version for your operating system. You can download the ASU from the IBM Web site. To download the ASU and update the DMI, complete the following steps.

**Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

1. Download the Advanced Settings Utility (ASU):
   a. Go to http://www.ibm.com/systems/support/.
   b. Under Product support, select **System x**.
   c. Under Popular links, select **Tools and utilities**.
   d. In the left pane, click **System x and BladeCenter Tools Center**.
   e. Scroll down and click **Tools reference**.
   f. Scroll down and click the plus-sign (+) for Configuration tools to expand the list; then, select **Advanced Settings Utility (ASU)**.

g. In the next window under Related Information, click the **Advanced Settings Utility** link and download the ASU version for your operating system.

2. ASU sets the DMI in the Integrated Management Module (IMM). Select one of the following methods to access the Integrated Management Module (IMM) to set the DMI:
   - Online from the target system (LAN or keyboard console style (KCS) access)
   - Remote access to the target system (LAN based)
   - Bootable media containing ASU (LAN or KCS, depending upon the bootable media)

     **Note:** IBM provides a method for building a bootable media. You can create a bootable media using the Bootable Media Creator (BoMC) application from the Tools Center Web site. In addition, the Windows and Linux based tool kits are also available to build a bootable media. These tool kits provide an alternate method to creating a Windows Professional Edition or Master Control Program (MCP) based bootable media, which will include the ASU application.
3. Copy and unpack the ASU package, which also includes other required files, to the server. Make sure that you unpack the ASU and the required files to the same directory. In addition to the application executable (asu or asu64), the following files are required:
   - For Windows based operating systems:
     - ibm_rndis_server_os.inf
     - device.cat
   - For Linux based operating systems:
     - cdc_interface.sh
4. After you install ASU, Type the following commands to set the DMI:

   ```
   asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
   asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
   asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
   ```

   Where:

   *<m/t_model>*
   The server machine type and model number. Type `mtm xxxxyyy`, where *xxxx* is the machine type and *yyy* is the server model number.

   *<s/n>* The serial number on the server. Type `sn zzzzzzz`, where *zzzzzzz* is the serial number.

   *<asset_method>*
   The server asset tag number. Type `asset aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where *aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa* is the asset tag number.

   *[access_method]*
   The access method that you select to use from the following methods:

   - Online authenticated LAN access, type the command:

     ```
     [host <imm_internal_ip>] [user <imm_user_id>][password <imm_password>]
     ```

     Where:

     *imm_internal_ip*
     The IMM internal LAN/USB IP address. The default value is 169.254.95.118.

*imm_user_id*
The IMM account (1 of 12 accounts). The default value is USERID.

*imm_password*
The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

**Note:** If you do not specify any of these parameters, ASU will use the default values. When the default values are used and ASU is unable to access the IMM using the online authenticated LAN access method, ASU will automatically use the following unauthenticated KCS access method.

The following commands are examples of using the userid and password default values and not using the default values:

Examples that do not use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SYsInfoProdName <m/t_model>
--user <imm_user_id> --password <imm_password>
asu set SYSTEM_PROD_DATA.SYsInfoSerialNum <s/n> --user <imm_user_id>
--password <imm_password>
asu set SYSTEM_PROD_DATA.SYsEncloseAssetTag <asset_tag>
--user <imm_user_id> --password <imm_password>
```

Examples that do use the userid and password default values:
```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
```

- Online KCS access (unauthenticated and user restricted):

  You do not need to specify a value for *access_method* when you use this access method.

  The KCS access method uses the IPMI/KCS interface. This method requires that the IPMI driver be installed. Some operating systems have the IPMI driver installed by default. ASU provides the corresponding mapping layer. You can download the ASU from the IBM Web site. To download the *Advanced Settings Utility Users Guide*, complete the following steps.

  **Note:** Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.

  a. Go to http://www.ibm.com/systems/support/.
  b. Under Product support, select **System x**.
  c. Under Popular links, select **Tools and utilities**.
  d. In the left pane, click **System x and BladeCenter Tools Center**.
  e. Scroll down and click **Tools reference**.
  f. Scroll down and click the plus-sign (+) for Configuration tools to expand the list; then, select **Advanced Settings Utility (ASU)**.
  g. In the next window under Related Information, click the **Advanced Settings Utility** link and download the ASU version for your operating system.

  The following commands are examples of using the userid and password default values and not using the default values:

  Examples that do not use the userid and password default values:
  ```
  asu set SYSTEM_PROD_DATA.SYsInfoProdName <m/t_model>
  ```

```
asu set SYSTEM_PROD_DATA.SYsInfoSerialNum <s/n>
asu set SYSTEM_PROD_DATA.SYsEncloseAssetTag <asset_tag>
```

- Remote LAN access, type the command:

  **Note:** When using the remote LAN access method to access IMM using the LAN from a client, the *host* and the *imm_external_ip* address are required parameters.

  ```
  host <imm_external_ip> [user <imm_user_id>][password <imm_password>]
  ```

  Where:

  *imm_external_ip*
  The external IMM LAN IP address. There is no default value. This parameter is required.

  *imm_user_id*
  The IMM account (1 of 12 accounts). The default value is USERID.

  *imm_password*
  The IMM account password (1 of 12 accounts). The default value is PASSW0RD (with a zero 0 not an O).

  The following commands are examples of using the userid and password default values and not using the default values:

  Examples that do not use the userid and password default values:

  ```
  asu set SYSTEM_PROD_DATA.SYsInfoProdName <m/t_model> --host <imm_ip>
  --user <imm_user_id> --password <imm_password>
  asu set SYSTEM_PROD_DATA.SYsInfoSerialNum <s/n> --host <imm_ip>
  --user <imm_user_id> --password <imm_password>
  asu set SYSTEM_PROD_DATA.SYsEncloseAssetTag <asset_tag>
  --host <imm_ip> --user <imm_user_id> --password <imm_password>
  ```

  Examples that do use the userid and password default values:

  ```
  asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --host <imm_ip>
  asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --host <imm_ip>
  asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
  --host <imm_ip>
  ```

- Bootable media:

  You can also build a bootable media using the applications available through the Tools Center Web site at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp. From the left pane, click **IBM System x and BladeCenter Tools Center**, then click **Tool reference** for the available tools.

5. Restart the server.

# Appendix. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you.

Use this information to obtain additional information about IBM and IBM products, determine what to do if you experience a problem with your IBM system or optional device, and determine whom to call for service, if it is necessary.

## Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself.

If you believe that you require IBM to perform warranty service on your IBM product, the IBM service technicians will be able to assist you more efficiently if you prepare before you call.

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated firmware and operating-system device drivers for your IBM product. The IBM Warranty terms and conditions state that you, the owner of the IBM product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your IBM service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to make sure that the hardware and software is supported by your IBM product.
- Go to http://www.ibm.com/supportportal/ to check for information to help you solve the problem.
- Gather the following information to provide to IBM Support. This data will help IBM Support quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  - Hardware and Software Maintenance agreement contract numbers, if applicable
  - Machine type number (IBM 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI and firmware levels
  - Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/electronic/portal/ to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to IBM Support quickly and efficiently. IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

## Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files.

See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/supportportal/ .

## Getting help and information from the World Wide Web

Up-to-date information about IBM products and support is available on the World Wide Web.

On the World Wide Web, up-to-date information about IBM systems, optional devices, services, and support is available at http://www.ibm.com/supportportal/ . IBM System x information is at http://www.ibm.com/systems/x/ . IBM BladeCenter information is at http://www.ibm.com/systems/bladecenter/ . IBM IntelliStation information is at http://www.ibm.com/systems/intellistation/ .

## Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your IBM products.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/ or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

## Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services.

To locate a reseller authorized by IBM to provide warranty service, go to http://www.ibm.com/partnerworld/ and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see http://www.ibm.com/planetwide/ . In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

## IBM Taiwan product service

Use this information to contact IBM Taiwan product service.

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:

IBM Taiwan Corporation
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Taipei, Taiwan
Telephone: 0800-016-888

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## Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1,048,576 bytes, and GB stands for 1,073,741,824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1,000,000 bytes, and GB stands for 1,000,000,000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

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Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

## Particulate contamination

**Attention:** Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the device, IBM may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

*Table 28. Limits for particulates and gases*

| Contaminant | Limits |
|---|---|
| Particulate | • The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1].<br>• Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282.<br>• The deliquescent relative humidity of the particulate contamination must be more than 60%[2].<br>• The room must be free of conductive contamination such as zinc whiskers. |
| Gaseous | • Copper: Class G1 as per ANSI/ISA 71.04-1985[3]<br>• Silver: Corrosion rate of less than 300 Å in 30 days |

1. ASHRAE 52.2-2008 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
2. The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.
3. ANSI/ISA-71.04-1985. Environmental conditions for process measurement and control systems: Airborne contaminants. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

## Germany Class A statement

**Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit**

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

### Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

### Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

**Generelle Informationen:**

**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**

## Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

*Information Development*
*IBM Corporation*
*205/A015*
*3039 E. Cornwallis Road*
*P.O. Box 12195*
*Research Triangle Park, North Carolina 27709-2195*
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In the request, be sure to include the publication part number and title.

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## Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

### Federal Communications Commission (FCC) statement

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

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

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

## Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

## Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## Australia and New Zealand Class A statement

**Attention:** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

**Attention:** This is an EN 55022 Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Responsible manufacturer:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:

IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

## Germany Class A statement

**Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit**

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

### Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

### Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH
Technical Regulations, Abteilung M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

**Generelle Informationen:**

**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**

## Japan VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

## Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

Japan Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guidelines (products less than or equal to 20 A per phase)

## Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

## Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

## People's Republic of China Class A electronic emission statement

中华人民共和国“A类”警告声明

声 明

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

## Taiwan Class A compliance statement

警告使用者:
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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