System x iDataPlex dx340
Types 6385, 6386, 6389, 7831, 7832, and 7834

IBM

Problem Determination and Service Guide

System x iDataPlex dx340
Types 6385, 6386, 6389, 7831, 7832, and 7834

Problem Determination and Service Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 167, and the *Warranty and Support Information* document on the IBM *Documentation* CD.

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 on which you are working. 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 optional devices 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 Chapter 3, "Parts listing," on page 59 and "Power cords" on page 69.
   - Make sure that the insulation is not frayed or worn.
4. Remove the 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 you service electrical equipment:
- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, 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 current.
- 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 work 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 your 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.**

Statement 4:
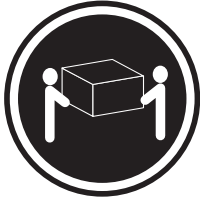
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)

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.
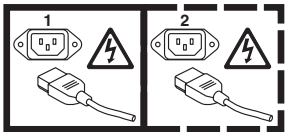
Statement 8:

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 10:

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

Chapter 1. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur in your IBM® System x™ iDataPlex™ dx340 system-board tray, System x iDataPlex 2U Flex Chassis, or System x iDataPlex 3U Chassis. It describes the diagnostic tools that are available, error codes and suggested actions, and instructions for replacing failing 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.

For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document on the IBM *Documentation* CD.

Related documentation

In addition to the printed *Important Notices* document and this document, the following documentation for the dx340 system-board tray, 2U chassis, and 3U chassis is provided in Portable Document Format (PDF) on the IBM *Documentation* CD:

- *User's Guide*

  This document contains general information about how to use, upgrade, and configure the dx340 system-board tray, the 2U chassis, the 3U chassis, the System x iDataPlex I/O enclosure, and the System x iDataPlex Storage enclosure.

- *Safety Information*

  This document 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.

- *Warranty and Support Information*

  This document contains information about the terms of the warranty and getting service and assistance.

Depending on the hardware configuration, additional documentation might be included on the IBM *Documentation* CD.

The iDataPlex documentation might be updated occasionally, or technical updates might be available to provide additional information that is not included in the documentation. These updates are available from the IBM Systems Information Center. To check for updated iDataPlex information and technical updates, go to http://publib.boulder.ibm.com/infocenter/idataplx/documentation/index.jsp.

The updated iDataPlex documentation also is available from the IBM Support 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 x iDataPlex dx340 server** and click **Go**.

Notices and statements in this document

The caution and danger statements 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 your language 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.

Features and specifications

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

Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or "U." A 1U-high device is 1.75 inches tall.

Microprocessor: One or two quad-core Intel® Xeon™ microprocessors in each system-board tray
Note: Use the BIOS configuration utility program to determine the type and speed of the microprocessor.

Memory:

- Up to four DIMM channels: 8 DIMM connectors
- Type: Fully buffered, double-data rate 2 (DDR2), ECC, PC2-5300 FB-DIMMs with advanced memory buffering
- Supports 1 GB, 2 GB, and 4 GB (as of the date of this publication) for a total memory of up to 32 GB

Hard disk drives: The system-board tray supports one 3.5-inch simple-swap SAS, one 3.5-inch simple-swap SATA, or two 2.5-inch hot-swap SAS hard disk drives (with optional SAS controller). The system-board tray with an enclosure attached can support the following drive configurations:

- Up to four 3.5-inch simple-swap SAS hard disk drives with the storage enclosure and optional SAS controller
- Up to five 3.5-inch simple-swap SATA hard disk drives with the storage enclosure
- Up to eight 2.5-inch hot-swap SAS hard disk drives with the I/O enclosure and optional SAS controller
- Up to twelve 3.5-inch hot-swap SAS or SATA hard disk drives in a 3U chassis and optional SAS controller

Integrated functions:

- Dual-port Gigabit Ethernet controller
- One or two PCIe expansion connectors (depending on server configuration)
- Baseboard management controller (BMC) with Intelligent Platform Management Interface (IPMI) firmware
- ATI RN50 ES1000 video controller
- Six-port Serial ATA (SATA) controller
- Serial over LAN (SOL)
- Front connectors for USB 2.0 (2 ports), serial, video, and RJ-45 LAN (2 ports)

Predictive Failure Analysis (PFA) alerts:

- Memory
- Hard disk drives

Power Supply:

- Support for one 100 - 240 V ac power supply
- 375 W (2U chassis only)
- 900 W (2U chassis or 3U chassis)

Electrical Input:

- Input voltage low range: 100 V ac (minimum) to 127 V ac (maximum), 50 to 60 Hz, sine-wave input
- Input voltage high range: 200 V ac (minimum) to 240 V ac (maximum), 50 to 60 Hz, sine-wave input

Environment:

- Air temperature:
  - Server on: 10°C to 35°C (50°F to 95°F); altitude: 0 to 914.4 m (0 to 3000 ft). Derate maximum temperature by 1°C for every 304.8 m (1000 ft) increase in elevation to a maximum of 3,048.0 m (10000 ft) at an ambient temperature of 28°C
  - Server off: 10°C to 43°C (59°F to 109.4°F); maximum altitude: 2133 m (7000 ft)
- Humidity:
  - Server on: 10% to 80%
  - Server off: 8% to 80%

Size:

- Height:
  - 2U chassis: 8.6 cm (3.39 inches)
  - 3U chassis: 13.0 cm (5.1 inches)
- Depth: 47.3 cm (18.6 inches)
- Width: 44.6 cm (17.6 inches)
- Weight:
  - 2U chassis:
    - Fully loaded: 22.7 kg (46.1 lb)
    - Without system-board trays: 7.1 kg (15.6 lb)
  - 3U chassis:
    - Fully loaded: 28.1 kg (62.0 lb)
    - Without hard disk drives: 15.4 kg (34.0 lb)

Operator panel controls, LEDs, and connectors

The following illustration shows the controls, LEDs, and connectors on the front of the server. The operator panel on the system-board tray is the same for all server configurations.
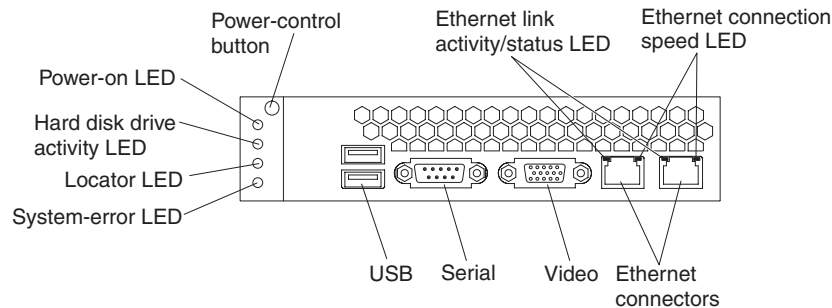
Power-control button: Press this button to turn the system-board tray on and off manually. Note that the power-control button is recessed to prevent the system-board tray from being turned on or off accidentally.

Note: The power-control button cover can be removed for easier access to the power-control button.

Ethernet link activity/status LED: This LED is on each Ethernet connector. When this LED is lit, it indicates that there is an active connection on the Ethernet port. When this LED is flashing, it indicates that there is activity between the server and the network.

Ethernet connection speed LED: This LED is on each Ethernet connector. The status of this LED indicates the connection speed, in megabits-per-second (Mbps), between the server and the network as follows:
*   LED off: 10 Mbps connection
*   LED lit amber: 100 Mbps connection
*   LED lit green: 1000 Mbps connection

Ethernet connectors: Use these connectors to connect the server to a network.

Video connector: Connect a monitor to this connector.

Serial connector: Connect a 9-pin serial device to this connector.

USB connectors: Connect USB 2.0 devices to these connectors.

System-error LED: When this LED is lit, it indicates that a system error has occurred. The source of the error is logged in the BMC system-event log that is accessed in the BIOS configuration utility program.

Locator LED: This LED can be lit remotely by the system administrator to aid in visually locating the system-board tray. In an IPMI environment, the system administrator can light the LED by using the BMC IPMI **Chassis Identify** command.

Hard disk drive activity LED: When this LED is on or flashing, it indicates that an associated hard disk drive is in use.

Power-on LED: When this LED is lit, it indicates that the system-board tray is turned on.

Note: If this LED is off, it does not mean that no electrical power is present. The LED might be burned out. To remove all electrical power, you must disconnect the power cord from the power supply or remove the system-board tray from the chassis.

Hot-swap hard disk drive activity LED: In some configurations, each hot-swap hard disk drive has an activity LED. When this LED is flashing, it indicates that the drive is in use.

Hot-swap hard disk drive status LED: In some configurations, each hot-swap hard disk drive has a status LED. When this LED is lit, it indicates that the drive has failed.

Rear connectors

Power-cord connector: Connect the power cord to this connector. When the chassis is installed in an iDataPlex rack, it is automatically connected to power through a power cord that is mounted to the rack rail.

Power-cord connector
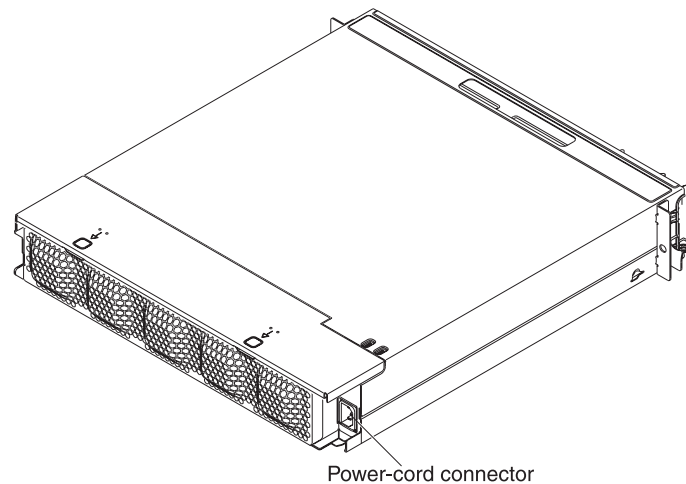
Turning on the system-board tray

After you install the system-board tray in a chassis, the system-board tray can start in any of the following ways:

Important: To avoid potential problems during startup, disconnect any USB keys from the system that contain the Smart Launch Utility before you turn on the system-board tray.

- You can press the power-control button on the front of the system-board tray (see "Operator panel controls, LEDs, and connectors" on page 4) to start the system-board tray.
- In an IPMI environment, the system administrator can turn on the system-board tray by using the BMC IPMI **Chassis Control** command.
- If a power failure occurs, the system-board tray can start automatically when power is restored, if it is configured to do so.

Turning off the system-board tray

When you turn off the system-board tray, it is still connected to ac power through the chassis power supply. The system-board tray still can respond to requests from the BMC, such as a remote request to turn on the system-board tray. To remove all power from the system-board tray, you must remove the tray from the chassis.

Shut down the operating system before you turn off the system-board tray. See the operating-system documentation for information about shutting down the operating system.

The system-board tray can be turned off in any of the following ways:

- You can press the power-control button on the front of the system-board tray (see "Operator panel controls, LEDs, and connectors" on page 4). This starts an orderly shutdown of the operating system, if this feature is supported by the operating system.
- You can turn off the system-board tray from the operating system, if the operating system supports this feature. After an orderly shutdown of the operating system, the system-board tray will be turned off automatically.
- In an IPMI environment, the system administrator can turn off the system-board tray by using the BMC IPMI **Chassis Control** command.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the system-board tray.
- You might be able to turn off the system-board tray by using an optional management appliance.
  - If the system is not operating correctly, the management appliance might automatically turn off the system-board tray.
  - Through the management appliance control interface, you might also be able to configure the management appliance to turn off the system-board tray. For additional information, see the documentation for your management appliance.

System-board layouts

The following illustrations show the connectors, jumpers, and LEDs on the system board.

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

System-board connectors

The following illustration shows the connectors on the system board.
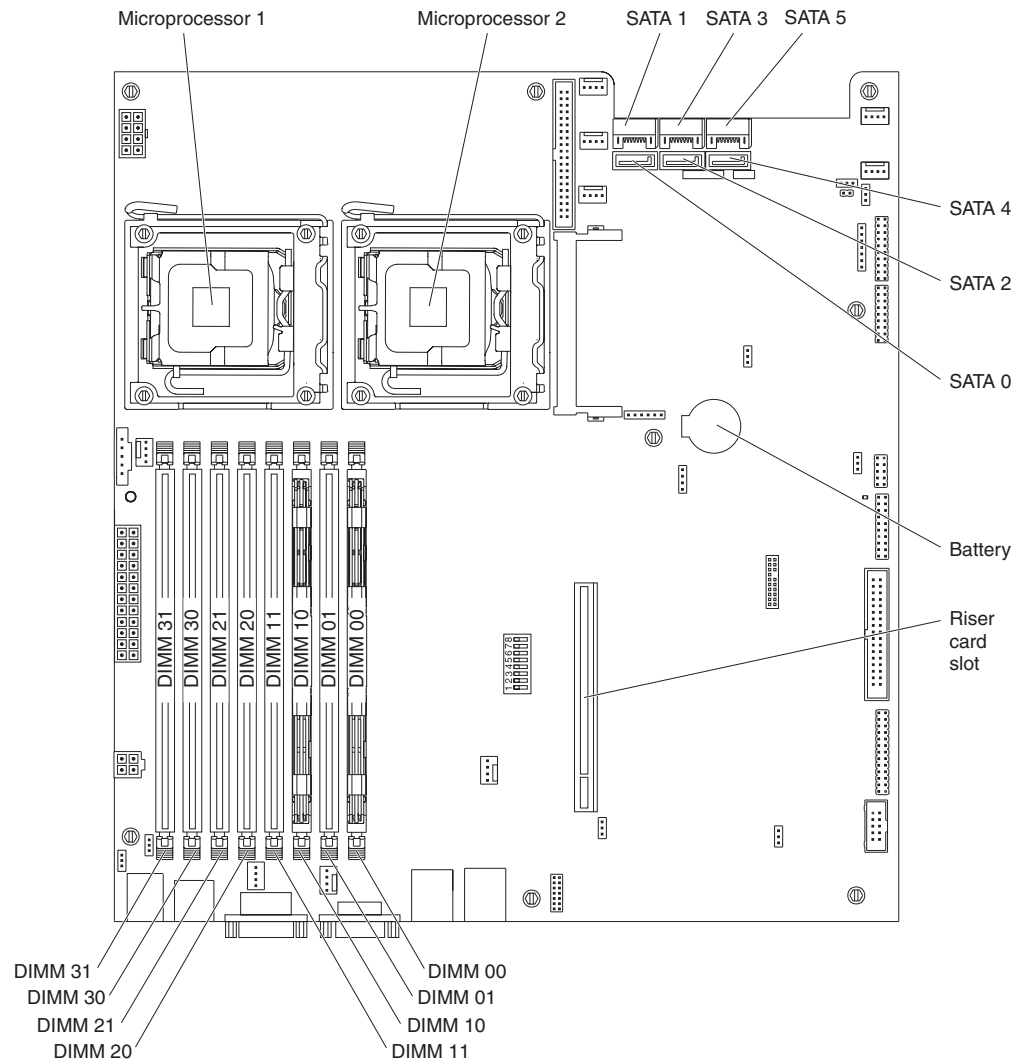
System-board jumpers

The following illustration shows the locations of the jumpers on the system board.

BIOS recovery (RECOVERY1)

Clear RTC RAM (CLRTC1)

3 2 1
Normal

VGA controller (VGA_EN1)

3
2
1
Normal

DIMM 31　DIMM 30　DIMM 21　DIMM 20　DIMM 11　DIMM 10　DIMM 01　DIMM 00
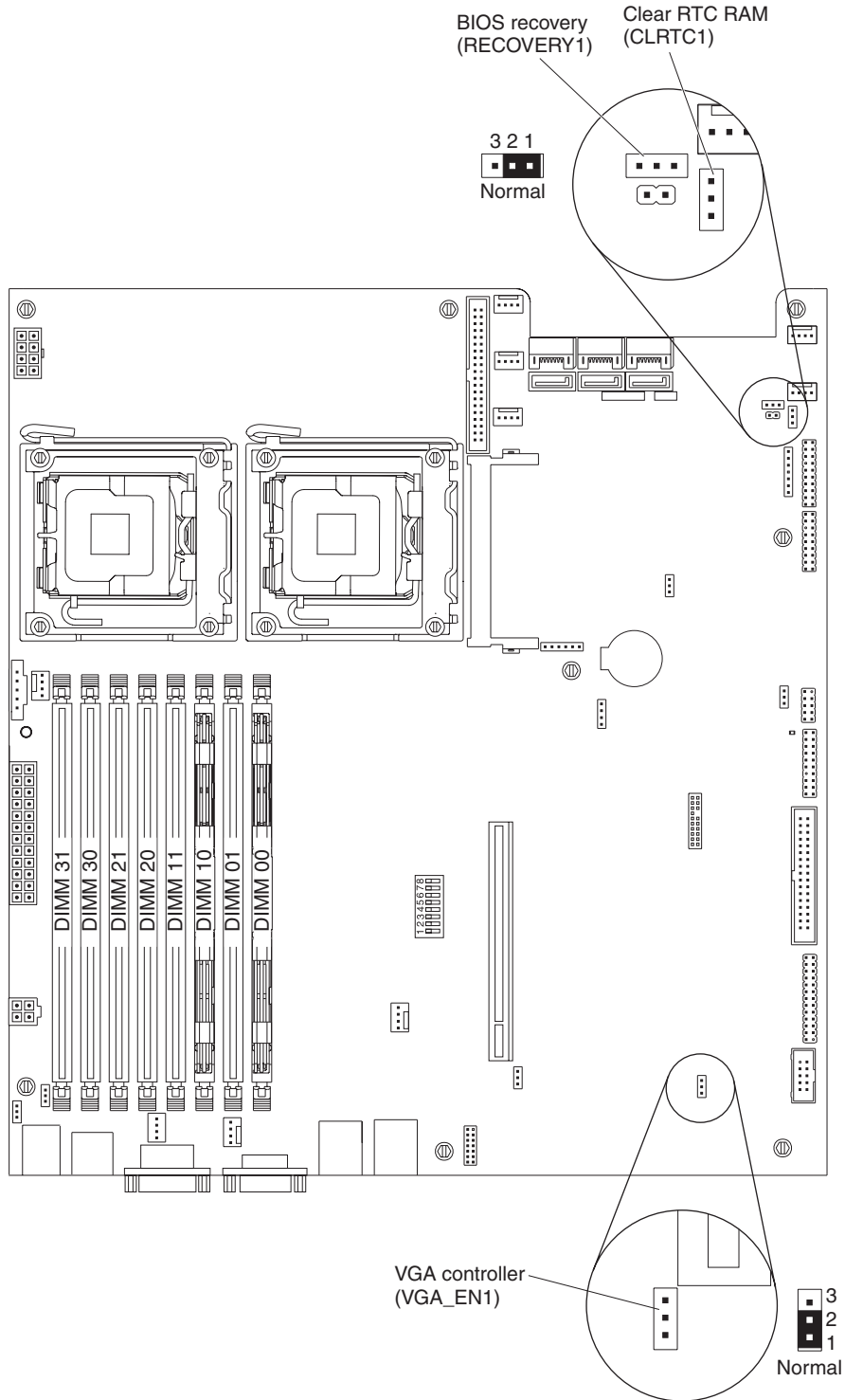
The following table defines the function of each jumper on the system board.

Jumper	Description
Clear RTC RAM (CLRTC1)	• Pins 1 and 2: Normal (default) • Pins 2 and 3: Clear the CMOS data
Force BIOS recovery setting (RECOVERY1)	• Pins 1 and 2: Normal (default) • Pins 2 and 3: Recover the BIOS
VGA controller setting (VGA_EN1)	• Pins 1 and 2: Enable the video controller (default) • Pins 2 and 3: Disable the video controller **Note:** The disable video controller setting can be used as an energy saving feature in lights out environments.

System-board LEDs

The following illustration shows the locations of the LEDs on the system board.
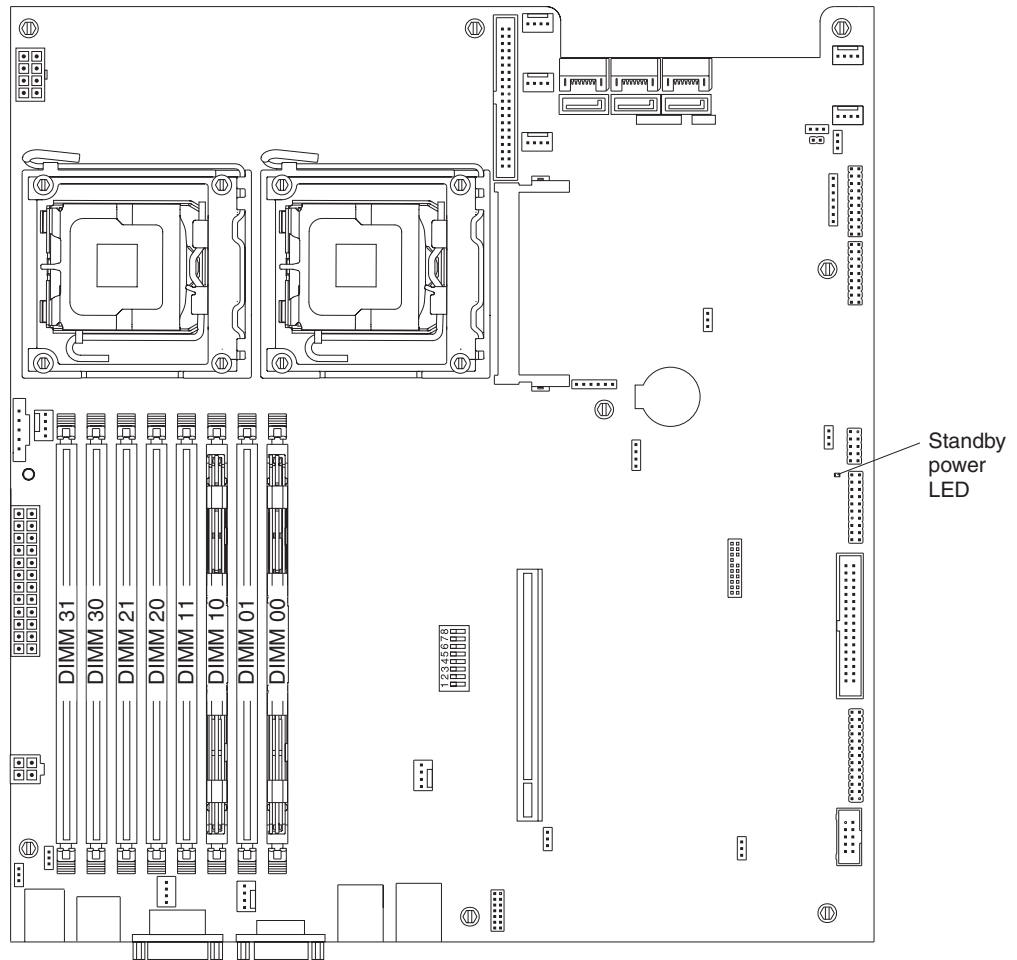
Note: When the LED is lit, the Standby power LED is visible through the air vents on the front of the system-board tray.

Chapter 2. Diagnostics

This section describes the diagnostic tools that are available to help you solve problems that might occur in the system-board tray and chassis.

To update the firmware, you might have to use an external USB CD-RW/DVD drive. To run the BIOS configuration utility or the Dynamic System Analysis (DSA) Preboot diagnostic programs, you must have the following additional hardware:
- Monitor
- Combination USB keyboard and pointing device such as IBM part number 40K5372
- External USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516

If you cannot diagnose and correct a problem by using the information in this section, see Appendix A, "Getting help and technical assistance," on page 165 for more information.

Diagnostic tools

The following tools are available to help you diagnose and solve hardware-related problems:
- **POST beep codes, error messages, and error logs**

  The power-on self-test (POST) generates beep codes and messages to indicate the detection of a problem. See "POST" on page 12 for more information.
- **Checkout procedures**

  Checkout procedures are available to help you diagnose server problems. The basic checkout procedure is designed for anyone to use. The advanced checkout procedure is intended for trained service technicians only. See "Checkout procedures" on page 19 for more information.
- **Troubleshooting tables**

  These tables list problem symptoms and actions to correct the problems. See "Troubleshooting tables" on page 23 for more information.
- **Dynamic System Analysis (DSA) Preboot diagnostic programs**

  The DSA Preboot diagnostic programs collect and analyze system information to aid in diagnosing problems. The diagnostic programs collect the following information:
  – System configuration
  – Network interfaces and settings
  – Installed hardware
  – Service processor status and configuration
  – Vital product data, firmware, and BIOS configuration
  – Hard disk drive health
  – RAID controller configuration
  – Event logs for RAID controllers and the BMC

  The diagnostic programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to IBM service and support. Additionally, you can view the server information locally through a generated text report file. You can also copy the log to removable media and view the log from a Web browser.

POST

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

If the system-board tray is configured to require entry of a password to complete the system startup, you can type either the supervisor password or user password to complete the system startup, if either password is set.

If POST detects a problem, one or more beeps might sound, or an error message is displayed. See "POST beep codes" and "POST error messages" on page 15 for more information.

POST beep codes

A beep code is a combination of short or long beeps or a series of short beeps that are separated by pauses. For example, a "1-2-3" beep code is one short beep, a pause, two short beeps, a pause, and three short beeps. The following table describes the beep codes and suggested actions to correct the detected problems.

A single problem might cause more than one error message. When this occurs, correct the cause of the first error message. The other error messages usually will not occur the next time POST runs.

Exception: If multiple error codes indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See "Microprocessor problems" on page 27 for information about diagnosing 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 3, "Parts listing," on page 59 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.**

Beep code	Description	Action
Continuous beep	DIMM missing or is improperly installed	1. Reseat the DIMMs. 2. Replace the DIMMs.
2 short beeps	PCI resource assignment error	1. Make sure that no devices have been disabled in the BIOS configuration utility program. 2. Make sure that the settings for the adapter and all other adapters in the BIOS configuration utility program are correct. If the adapter memory resource settings are not correct, change them. 3. If all memory resources are being used, remove an adapter to make memory available to the adapter. Disabling the BIOS on the adapter should correct the error. See the documentation that comes with the adapter.
1 long and 2 short beeps	Video configuration failure	Check the video configuration.

- **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," on page 59 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.**

Beep code	Description	Action
1-2-2-3	BIOS ROM checksum	1. Use the recover system BIOS procedure. For instructions, see "Recovering from a BIOS update failure" on page 48. 2. (Trained service technician only) Replace the system-board tray.

1-3-1-1	Test DRAM refresh	1. Reseat the following components:
		  a. DIMM
		  b. System-board tray
		2. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
		  a. DIMM
		  b. (Trained service technician only) System-board tray

1-3-1-3	Test 8742 keyboard controller	Replace the keyboard.

1-3-4-1	RAM failure on address line *xxxx*
	
	where *xxxx* is the failing address line or bits.
		1. Reseat the following components:
		  a. DIMM
		  b. System-board tray
		2. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
		  a. DIMM
		  b. (Trained service technician only) System-board tray

1-3-4-3	RAM failure on data bits xxxx of low byte of memory bus
	
	where *xxxx* is the failing address line or bits.
		1. Reseat the following components:
		  a. DIMM
		  b. System-board tray
		2. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
		  a. DIMM
		  b. (Trained service technician only) System-board tray

1-4-1-1	RAM failure on data bits *xxxx* of high byte of memory bus
	
	where *xxxx* is the failing address line or bits.
		1. Reseat the following components:
		  a. DIMM
		  b. System-board tray
		2. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
		  a. DIMM
		  b. (Trained service technician only) System-board tray

- **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," on page 59 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.**

Beep code	Description	Action
2-1-2-3	Check ROM copyright notice	1. Reseat the chassis. 2. (Trained service technician only) Replace the system-board tray.

2-2-3-1	Test for unexpected interrupts	1. Reseat the following components:
		  a. DIMM
		  b. System-board tray
		2. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
		  a. DIMM
		  b. (Trained service technician only) System-board tray

POST error messages

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

- **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," on page 59 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 message	Action

Failure fixed disk	1. Reseat the following components, depending on the hardware configuration:
	  • Hot-swap drive configurations:
	    a. Hard disk drive *x*
	    b. SAS/SATA PCIe adapter
	  • Simple-swap drive configurations:
	    a. Hard disk drive *x*
	    b. Hard disk drive *x* cable
	2. Replace the following components one at a time, depending on the hardware configuration, in the order shown, restarting the system-board tray each time:
	  • Hot-swap drive configurations:
	    a. Hard disk drive *x*
	    b. 2x2 2.5-inch hot-swap SAS backplane or 2.5-inch hot-swap drive cage
	    c. SAS/SATA PCIe adapter
	  • Simple-swap drive configurations:
	    a. Hard disk drive *x*
	    b. Hard disk drive *x* cable
	3. (Trained service technician only) Replace the system-board tray.

Stuck key	Make sure that all keyboard keys operate freely.
Keyboard error	1. Reseat the keyboard. 2. Replace the keyboard. 3. (Trained service technician) Replace the system-board tray.
Keyboard controller error	1. Reseat the keyboard. 2. Replace the keyboard. 3. (Trained service technician) Replace the system-board tray.

- **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," on page 59 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 message	Action

System CMOS checksum bad	1. Run the BIOS configuration utility program, select **Load setup defaults**, and save the settings.
	2. Reseat the following components:
	  a. Battery
	  b. Failing device (if the device is a FRU, the device must be reseated by a trained service technician only)
	3. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
	  a. Battery
	  b. Failing device (if the device is a FRU, the device must be replaced by a trained service technician only)
	  c. (Trained service technician only) System-board tray

Real time clock error	1. Reseat the battery.
	2. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
	  a. Battery
	  b. (Trained service technician only) System-board tray

Previous boot incomplete - default configuration used	Information only.
BMC hardware not found or unresponsive	(Trained service technician) Replace the system-board tray.
BMC system error log (SEL) full	Use the BIOS configuration utility to clear the BMC log.
System RAM failed at offset	1. Make sure that no devices have been disabled in the BIOS configuration utility program. 2. Make sure that the settings for all adapters are correct in the BIOS configuration utility program . If the memory resource settings are not correct, change them. 3. If all memory resources are being used, remove an adapter to make memory available to the adapter. Disabling the BIOS on the adapter should correct the error. See the documentation that comes with the adapter.
Shadow RAM failed at offset	1. Make sure that no devices have been disabled in the BIOS configuration utility program. 2. Make sure that the settings for all adapters are correct in the BIOS configuration utility program . If the memory resource settings are not correct, change them. 3. If all memory resources are being used, remove an adapter to make memory available to the adapter. Disabling the BIOS on the adapter should correct the error. See the documentation that comes with the adapter.

- **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," on page 59 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 message	Action
Extended RAM failed at address	1. Make sure that no devices have been disabled in the BIOS configuration utility program.
	2. Make sure that the settings for all adapters are correct in the BIOS configuration utility program . If the memory resource settings are not correct, change them.
	3. If all memory resources are being used, remove an adapter to make memory available to the adapter. Disabling the BIOS on the adapter should correct the error. See the documentation that comes with the adapter.

Error logs

The system-board tray generates two error logs:

- **DMI event log**

  This log contains the three most recent error codes and messages that were generated during POST.

- **BMC system event log**

  This log contains messages that were generated by the BMC controller.

The BMC system event log is limited in size. When the log is full, new entries will not overwrite existing entries; therefore, you must periodically clear the log through the BIOS configuration utility program (the menu choices are described in Chapter 5, "Configuration information and instructions," on page 155). When you are troubleshooting an error, be sure to clear both the DMI event log and the BMC system event log so that you can find current errors more easily.

Important: After you complete a repair or correct an error, clear the BMC system event log to turn off the system-error LED on the front of the system-board tray.

Entries that are written to the BMC system event log during the early phase of POST show an incorrect date and time as the default time stamp; however, the date and time are corrected as POST continues.

Each log entry is displayed on its own page. To move from one entry to the next, use the Up Arrow (↑) and Down Arrow (↓) keys.

For complete information about using the BIOS configuration utility program, see "Using the BIOS configuration utility program" on page 156.

To view the error logs from the BIOS configuration utility program, complete the following steps:

1. Turn on the system-board tray.
2. When the prompt `Press F1 for BIOS Setup` is displayed, press F1. If the system-board tray is configured to require entry of a password to complete the system startup, you can type either the supervisor password or user password to complete the system startup.
3. Use one of the following procedures:
    - To view the DMI event log, select **Server** → **DMI Event Logging** → **View DMI Event Log**.
    - To view the BMC system event log, select **Server** → **IPMI** → **System Event Log**.

Checkout procedures

The checkout procedures are the sequence of tasks that you should follow to diagnose a problem. The basic checkout procedure is designed for anyone to use. The advanced checkout procedure is intended for trained service technicians only.

About the checkout procedures

Before you perform either the basic checkout procedure or the advanced checkout procedure for diagnosing hardware problems, review the following information:

- Read the safety information that begins on page vii.
- The diagnostic programs provide the primary methods of testing the major components. 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 the diagnostic programs, 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 the diagnostic programs.

  Exception: If multiple error codes indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See "Microprocessor problems" on page 27 for information about diagnosing microprocessor problems.

- Before you run the diagnostic programs, you must determine whether the failing system-board tray is part of a shared hard disk drive cluster (two or more system-board trays that share 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 system-board tray might be part of a cluster if any of the following conditions is true:
  - You have identified the failing system-board tray as part of a cluster (two or more system-board trays that share external storage devices).
  - One or more external storage units are attached to the failing system-board tray and at least one of the attached storage units is also attached to another server or unidentifiable device.

  Important: If the system-board tray 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 system-board tray is halted and a POST error code is displayed, see "POST error messages" on page 15. If the system-board tray is halted and no error message is displayed, see "Troubleshooting tables" on page 23 and "Solving undetermined problems" on page 57.
- For information about power-supply problems, see "Power problems" on page 28.
- For intermittent problems, check the error log; see "Error logs" on page 18 and "Diagnostic programs, messages, and error codes" on page 31.

Performing the basic checkout procedure

To perform the basic checkout procedure, complete the following steps:

1. Is the system-board tray part of a cluster?

   - **Yes:** Shut down all failing system-board trays that are related to the cluster. Go to step 2.

   - **No:** Go to step 2.

2. Complete the following steps:

   a. If the system-board tray is running, turn off the system-board tray.

   b. Check all installed devices for compatibility.

   c. Turn on the system-board tray. If the system-board tray does not start, see "Troubleshooting tables" on page 23.

   d. Record any POST beep codes that sound or POST error messages that are displayed on the monitor. If an error is displayed, look up the first error in "POST error messages" on page 15.

   e. Check the system-error LED on the system-board tray operator panel. If it is lit, check the BMC system-event log.

      Important: If the system-error LED on the front of the system-board tray is lit but there are no error indications, clear the BMC system-event log. This log does not clear itself, and if it begins to fill up, the system-error LED will be lit. Also, after you complete a repair or correct an error, clear the BMC system-event log to turn off the system-error LED.

   f. Check for the successful completion of startup, indicated by a readable display of the operating-system desktop.

3. Are there readable instructions on the main menu?

   - **Yes:** Run the diagnostic programs (see "Running the diagnostic programs" on page 32).

      – If you receive an error, see "Diagnostic error codes" on page 34.

      – If the diagnostic programs were completed successfully and you still suspect a problem, see "Solving undetermined problems" on page 57.

   - **No:** Find the failure symptom in "Troubleshooting tables" on page 23; if necessary, see "Solving undetermined problems" on page 57.

   Important: Clear the BMC system event log and the DMI event log after you correct all conditions. This will turn off the system-error LED, if all conditions are corrected.

Performing the advanced checkout procedure

This section contains information for trained service technicians.

The no POST no video environment occurs when the server does not complete POST and there is no output to the monitor during boot. To perform the no POST no video troubleshooting procedure, complete the following steps:

1. Search the Retain tips for a known solution that will correct the problem. Did a Retain tip correct the issue?
   - **Yes:** The problem is solved.
   - **No:** Go to step 2.
2. Check the standby power. Are any system LEDs lit or flashing?
   - **Yes:** See "System-board LEDs" on page 10 to locate the system LEDs and to continue troubleshooting.
   - **No:** Go to step 3.
3. Verify that the power supply is receiving power. Is the power properly turned on and are the power-supply fans working?
   - **Yes:** Go to step 4.
   - **No:** Go to step 5.
4. Remove the system-board tray from the chassis and apply power to the system. Is the fan on the power supply working?
   - **Yes:** (Trained service technician only) Replace the system-board tray.
   - **No:** Replace the power supply.
5. Check if power is being applied to the system-board tray. Press the power-control button to turn on the system. Are the system fans working?
   - **Yes:** Go to step 8.
   - **No:** Complete the following tasks:
     a. Remove the chassis.
     b. Remove the chassis top cover.
     c. Reseat the fan packs on the power supply.
     d. Reseat the chassis in the rack.
     e. Go to step 6.
6. Is the amber LED on the power supply lit?
   - **Yes:** Replace the power supply.
   - **No:** (Trained service technician only) If the amber LED on the power supply is not lit, reseat the system-board tray.
7. Check the VGA controller jumper. See "System-board jumpers" on page 8 for more information.
8. Reseat all of the system board components, including the following:
   - Cables
   - DIMMs
   - Optional adapters
   - Video card

   Go to step 9.
9. Turn the system on. Does the system boot and display output to the monitor?
   - **Yes:** One of the components was loose. The problem is fixed.
   - **No:** Go to step 10 on page 22.

10. Configure the system to the minimum hardware requirements as listed in "Solving undetermined problems" on page 57; then, turn the system on. Does the system boot and display output to the monitor?
    - **Yes:** The problem was caused by one or more of the components that were removed. Reinstall each device one at a time to isolate the failing component; then, replace the component.
    - **No:** Go to step 11.
11. Verify that the BIOS code is running at startup.
    a. Remove all DIMMs from the system.
    b. Turn on the system. Did a memory-error beep code occur?
        - **Yes:** Go to step 12.
        - **No:** (Trained service technician only) Replace the system-board tray.
12. Test POST again by completing the following steps:
    a. Reinstall the DIMMs.
    b. Clear CMOS by using the procedure listed in "Clearing CMOS memory" on page 47.
    c. Turn on the system.
    d. Does the system boot and display output to the monitor?
        - **Yes:** Go to step 13.
        - **No:** See the "Solving undetermined problems" on page 57 to continue troubleshooting.
13. Recover the system BIOS.
    a. Use the BIOS recovery procedure listed in "Recovering from a BIOS update failure" on page 48.
    b. Turn on the system.
    c. Does the system boot and display output to the monitor?
        - **Yes:** The symptom has changed, see "Solving undetermined problems" on page 57 to continue troubleshooting.
        - **No:** Go to step 14.
14. (Trained service technician only) Replace the system-board tray.

Troubleshooting tables

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

If you cannot find a problem in these tables, see "Running the diagnostic programs" on page 32 for information about testing the system-board tray.

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

1. Remove the software or device that you just added.
2. Run the diagnostic tests to determine whether the system-board tray is running correctly.
3. Reinstall the new software or new device.

General problems

• 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," on page 59 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 cover lock 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.

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 3, "Parts listing," on page 59 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 hard disk drive diagnostic test.	Remove the drive that is indicated by the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The system-board tray stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the system-board tray stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.
A hard disk drive passes the hard disk drive diagnostic test, but the problem remains.	Run the hard disk drive diagnostic test again. If the drive continues to pass the test but continues to have a problem, replace the drive with a new one.
A hard disk drive was not detected by the controller.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.

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 3, "Parts listing," on page 59 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:
	  • All cables are connected securely to the front of the system-board tray and the power cord is connected securely to the rear of the chassis.
	  • When the system-board tray is turned on, air is flowing from the rear of the chassis. If there is no airflow, the fan assembly is not working. This causes the system-board tray to overheat and shut down.
	2. Check the BMC system event log (see "Error logs" on page 18).
	3. See "Solving undetermined problems" on page 57.

Keyboard or mouse problems

- **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," on page 59 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 keyboard and mouse problems.	1. Make sure that the keyboard and mouse cables are securely connected. 2. If you are using a USB keyboard and mouse and they are connected to a USB hub, disconnect the devices from the hub and connect them directly to the system-board tray. 3. Replace the following components one at a time, in the order shown, restarting the system-board tray each time: a. Keyboard or mouse b. (Trained service technician only) System-board tray

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 3, "Parts listing," on page 59 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.	1. Make sure that:
	   - Memory mirroring does not account for the discrepancy.
	   - The memory modules are seated correctly.
	   - You have installed the correct type of memory.
	   - If you changed the memory, you updated the memory configuration in the BIOS configuration utility program.
	   - All banks of memory are enabled. The software might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
	2. Check the DMI event log for a memory error message.
	   - If a DIMM was disabled by a system-management interrupt (SMI), replace the DIMM.
	   - If a DIMM was disabled by the user or by POST, run the BIOS configuration utility program and enable the DIMM.
	3. Run memory diagnostics (see "Running the diagnostic programs" on page 32).
	4. Make sure that there is no memory mismatch when the system-board tray is at the minimum memory configuration (see "Solving undetermined problems" on page 57 for information about the minimum required configuration).
	5. Add one pair of DIMMs at a time, making sure that the DIMMs in each pair match.
	6. Reseat the DIMMs.
	7. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
	   a. DIMMs
	   b. (Trained service technician only) System-board tray

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 3, "Parts listing," on page 59 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
Multiple error codes indicate a microprocessor error.	1. (Trained service technician only) Reseat the microprocessor and restart the system-board tray. 2. Run the Dynamic System Analysis (DSA) Preboot diagnostic programs. See "Running the diagnostic programs" on page 32. 3. (Trained service technician only) If the problem remains, replace the microprocessor.

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 3, "Parts listing," on page 59 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: 　• The device is designed for the system-board tray. 　• You followed the installation instructions that came with the device and the device is installed correctly. 　• You have not loosened any other installed devices or cables. 　• You updated the configuration information in the BIOS configuration utility program. Whenever memory or any other device is changed, you must update the configuration. 2. If the device comes with its own test instructions, use those instructions to test the device. 3. Reseat the device that you just installed. 4. Replace the device that you just installed.
An IBM optional device that used to work does not work now.	1. Make sure that all of the cable connections for the device are secure. 2. If the device comes with test instructions, use those instructions to test the device. 3. Reseat the failing device. 4. 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 3, "Parts listing," on page 59 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 (the system-board tray does not start).	1. Make sure that the operator panel power-control button is working correctly:
	  a. Disconnect the chassis power cord.
	  b. Reconnect the power cord.
	  c. Press the power-control button.
	2. Make sure that:
	  • The power cord is fully seated in the power supply inlet and connected to a working electrical outlet and that the power supply fan is working.
	  • The system-board tray contains the correct type of DIMMs.
	  • The DIMMs are correctly seated.
	  • The microprocessor is correctly installed.
	3. Reseat the following components:
	  a. DIMMs
	  b. Power-supply cables to all internal components
	  c. Power supply
	4. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
	  a. DIMMs
	  b. Power supply
	5. If you just installed an optional device, remove it, and restart the system-board tray. If the system-board tray now starts, you might have installed more devices than the power supply supports.
	6. See "Solving undetermined problems" on page 57.

The system-board tray 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:
	  a. Press Ctrl+Alt+Delete.
	  b. Turn off the system-board tray by holding the power-control button for 5 seconds.
	  c. Restart the system-board tray.
	  d. If the system-board tray 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 system-board tray.
	2. (Trained service technician only) If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

The system-board tray unexpectedly shuts down, and the LEDs on the operator panel are not lit.	See "Solving undetermined problems" on page 57.

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 3, "Parts listing," on page 59 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 each port is assigned a unique address in the BIOS configuration utility program and none of the serial ports is disabled. **Note:** One external serial port is available. A second port (COM2) is reserved for the BMC serial over LAN (SOL) function. 2. Reseat the serial port adapter, if one is installed. 3. Replace the serial port adapter, if one is installed.

A serial device does not work.	1. Make sure that:
	  • The device is compatible with the system-board tray.
	  • The serial port is enabled and is assigned a unique address.
	  • The device is connected to the correct connector (see "Operator panel controls, LEDs, and connectors" on page 4).
	2. Reseat the following components:
	  a. Failing serial device
	  b. Serial cable
	3. Replace the following components one at a time, in the order shown, restarting the system-board tray each time:
	  a. Failing serial device
	  b. Serial cable
	  c. (Trained service technician only) System-board tray

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 3, "Parts listing," on page 59 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:
	  • The system-board tray has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.
	  Note: If you have just installed an adapter or memory, the system-board tray might have a memory-address conflict.
	  • The software is designed to operate on the system-board tray.
	  • Other software works on the system-board tray.
	  • The software works on another system-board tray.
	2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
	3. Contact your place of purchase of the software.

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 3, "Parts listing," on page 59 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.	**Important:** To avoid potential problems during startup, disconnect any USB keys from the system that contain the Smart Launch Utility before you turn on the system-board tray.
	
	 1. Make sure that:
	     • The operating system supports USB devices.
	     • The correct USB device driver is installed.
	
	 2. Make sure that the USB configuration options are set correctly in the BIOS configuration utility program.
	
	 3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the system-board tray.
	
	 4. (Trained service technician only) Replace the system-board tray.

Diagnostic programs, messages, and error codes

The IBM Dynamic System Analysis (DSA) Preboot diagnostic programs are the primary method of testing the major components of the system-board tray. DSA is a system information collection and analysis tool that you can use to provide information to IBM service and support to aid in the diagnosis of the system problems. DSA comes on the *IBM Dynamic System Analysis Preboot Diagnostic* CD. You can download the CD from http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA.

Note: You can also select to download images of the DSA program for other external USB storage devices, such as a USB memory key.

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 indicates what action you should take as a result of the text message.

The DSA diagnostic programs collect information about the following aspects of the system:
- System configuration
- Network interfaces and settings
- Hardware inventory, including PCIe and USB information
- Service processor status and configuration
- Vital product data, firmware, and basic input/output system (BIOS)
- Drive health information
- LSI RAID and adapter configuration
- Event logs for RAID controllers and service processors

The DSA diagnostic programs can also provide diagnostics for the following system components, if they are installed in the system:
- Hard disk drives
- Memory
- Microprocessor

The diagnostic programs create a merged log called the DSA error log, which includes events from all collected logs. You can output all of the collected information as a compressed XML file that you can send to IBM service and support, view the information locally through a generated text report file, or copy the log to a removable media and view the log from a Web browser. See "Running the diagnostic programs" on page 32 for more information.

Make sure that you have the latest version of DSA. To download the latest version, 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. Click **Dynamic System Analysis (DSA)**.

For additional information about tools for updating, managing, and deploying firmware, see the System x and xSeries Tools Center at http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp.

Running the diagnostic programs

Important: The DSA diagnostic programs do not support USB CD-ROM drives. If you run the DSA diagnostic programs while any USB CD-ROM drives are attached, ignore any optical drive test results that are returned for USB CD-ROM drives.

To run the BIOS configuration utility or the Dynamic System Analysis (DSA) Preboot diagnostic programs, you must have the following additional hardware:

- Monitor
- Combination USB keyboard and pointing device such as IBM part number 40K5372
- External USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516

To run the CD version of the DSA Preboot diagnostic programs, complete the following steps:

1. If the system-board tray is running, turn off the system-board tray and all attached devices.
2. Connect a USB CD or DVD drive to a USB connector on the front of the system-board tray.
3. Turn on all attached devices; then, turn on the system-board tray.
4. When the prompt `Press F1 For BIOS Setup` is displayed, press F1.
5. From the BIOS configuration utility menu, select **Boot**.
6. From the **Boot** menu, select **Boot Device Priority**.
7. Note the device that is selected as the first startup device. Later, you must restore this setting.
8. Select **CD/DVD-ROM** as the first startup device.
9. Press Esc two times to return to the BIOS configuration utility menu.
10. Insert the *IBM Dynamic System Analysis Preboot Diagnostic* CD into the CD or DVD drive.
11. Select **Save Changes and Exit** and follow the prompts. The diagnostic programs start.
12. From the diagnostic programs screen, select the test that you want to run, and follow the instructions on the screen.

Follow the actions in the "Diagnostic error codes" on page 34 to solve the problem.

If the diagnostic programs do not detect any hardware errors but the problem remains during normal operations, a software error might be the cause. If you suspect a software problem, see the information that comes with your software.

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 the diagnostic programs.

Exception: Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again. See "Microprocessor problems" on page 27 for information about diagnosing microprocessor problems.

If the system-board tray stops during testing and you cannot continue, restart the system-board tray and try running the diagnostic programs again. If the problem remains, replace the component that was being tested when the system-board tray 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.

Viewing the test log

You can use one of the following methods to access the test log when the tests are completed:

- From the DSA command line, issue the DSA CLI **view** command or select **Diagnostic Event Log** from the DSA graphical user interface (GUI).
- From the DSA interactive menu, select **getextendedresults**.
- From the DSA interactive menu, select **view** to view all of the collected results and error log data.
- In the DSA GUI, select **DSA Error Log** from the System Information page.

You can send the DSA error log file to IBM service and support to aid in diagnosing the server problems or you can use the DSA CLI **copy** command to copy the log to an external USB device.

Diagnostic error codes

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 action column.

Important: The DSA diagnostic programs do not support USB CD-ROM drives. If you run the DSA diagnostic programs while any USB CD-ROM drives are attached, ignore any optical drive test results that are returned for USB CD-ROM drives.

- **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," on page 59 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.**

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-board tray. 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. 3. Run the test again. 4. Make sure that the 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. 5. Run the test again. 6. If the system-board tray has stopped responding, turn it off and restart it. 7. Run the test again. 8. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

- **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," on page 59 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.**

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-board tray. 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. 3. Run the test again. 4. Make sure that the 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. 5. Run the test again. 6. If the system has stopped responding, turn off and restart the system-board tray. 7. Run the test again. 8. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

- **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," on page 59 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.**

Message number	Component	Test	State	Description	Action
089-803-xxx	CPU	CPU Stress Test	Aborted	Memory size insufficient to run the test. At least 1 GB is required.	1. Turn off and restart the system-board tray. 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. 3. Run the test again. 4. Make sure that the 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. 5. Run the test again. 6. If the system-board tray has stopped responding, turn off and restart the system-board tray. 7. Run the test again. 8. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.
201-801-xxx	Memory	Memory Test	Aborted	Test canceled: the system BIOS programmed the memory controller with an invalid CBAR address.	1. Turn off and restart the system-board tray. 2. Run the test again. 3. Make sure that the BIOS code 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. 4. Run the test again. 5. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

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- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Message number	Component	Test	State	Description	Action
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-board tray. 2. Run the test again. 3. Make sure that all DIMMs are enabled in the BIOS configuration utility program (press F1 at system startup). 4. Make sure that the BIOS code 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. 5. Run the test again. 6. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.
201-803-xxx	Memory	Memory Test	Aborted	Test canceled: could not enable the processor cache.	1. Turn off and restart the system-board tray. 2. Run the test again. 3. Make sure that the BIOS code 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. 4. Run the test again. 5. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

- **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," on page 59 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
201-804-xxx	Memory	Memory Test	Aborted	Test canceled: the memory controller buffer request failed.	1. Turn off and restart the system-board tray. 2. Run the test again. 3. Make sure that the BIOS code 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=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 4. Run the test again. 5. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.
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-board tray. 2. Run the test again. 3. Make sure that the BIOS code 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=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 4. Run the test again. 5. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

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- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Message number	Component	Test	State	Description	Action
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-board tray. 2. Run the test again. 3. Make sure that the BIOS code 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. 4. Run the test again. 5. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.
201-807-xxx	Memory	Memory Test	Aborted	Test canceled: the memory controller buffer free request failed.	1. Turn off and restart the system-board tray. 2. Run the test again. 3. Make sure that the BIOS code 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. 4. Run the test again. 5. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

- **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," on page 59 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.**

Message number	Component	Test	State	Description	Action
201-808-xxx	Memory	Memory Test	Aborted	Test canceled: memory controller display/alter buffer execute error.	1. Turn off and restart the system-board tray. 2. Run the test again. 3. Make sure that the BIOS code 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. 4. Run the test again. 5. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.
201-809-xxx	Memory	Memory Test	Aborted	Test canceled program error: operation running fast scrub.	1. Turn off and restart the system-board tray. 2. Run the test again. 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. 4. Make sure that the BIOS code 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. 5. Run the test again. 6. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

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- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Message number	Component	Test	State	Description	Action
201-810-xxx	Memory	Memory Test	Aborted	Test canceled: unknown error code xxx received in COMMONEXIT procedure.	1. Turn off and restart the system-board tray. 2. Run the test again. 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. 4. Make sure that the BIOS code 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=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 5. Run the test again. 6. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

- **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," on page 59 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.**

Message number	Component	Test	State	Description	Action
201-901-xxx	Memory	Memory Test	Failed	Test failure: single-bit error, failing bank x, failing DIMM z.	1. Turn off the system-board tray and disconnect the chassis from the power source. 2. Reseat DIMM z. 3. Reconnect the chassis to the power source and turn on the system-board tray. 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. 5. Make sure that the BIOS code 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=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 6. Run the test again. 7. Replace the failing DIMMs. 8. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

- **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," on page 59 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.**

Message number	Component	Test	State	Description	Action
201-902-xxx	Memory	Memory Test	Failed	Test failure: single-bit and multi-bit error, failing bank x, failing DIMM z	1. Turn off the system-board tray and disconnect the chassis from the power source. 2. Reseat DIMM z. 3. Reconnect the chassis to the power source and turn on the system-board tray. 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. 5. Make sure that the BIOS code 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. 6. Run the test again. 7. Replace the failing DIMMs. 8. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

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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-board tray. 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. 3. Make sure that the BIOS code 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. 4. Run the test again. 5. Turn off and restart the system-board tray if necessary to recover from a hung state. 6. Run the memory diagnostics to identify the specific failing DIMM. 7. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

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- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Message number	Component	Test	State	Description	Action
202-802-xxx	Memory	Memory Stress Test	Aborted	Memory size is insufficient to run the test. At least 1 GB is required.	1. Turn off and restart the system-board tray. 2. Make sure that all memory is enabled by checking the Available System Memory in the Resource Utilization section of the DSA event log. 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. 4. Make sure that the BIOS code 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=psg1MIGR-4JTS2T and select your system to display a matrix of available firmware. 5. Run the test again. 6. Turn off and restart the system-board tray if necessary to recover from a hung state. 7. Run the memory diagnostics to identify the specific failing DIMM. 8. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

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Message number	Component	Test	State	Description	Action
202-901-xxx	Memory	Memory Stress Test	Failed	Test failure.	1. Run the standard DSA memory diagnostic to validate all memory. 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. 3. Turn off the system-board tray and disconnect the chassis from power. 4. Reseat the DIMMs. 5. Reconnect the system to power and turn on the system. 6. Run the test again. 7. Run the standard DSA memory diagnostic to validate all memory. 8. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.
202-902-xxx	Memory	Memory Stress Test	Failed	General error: memory size is insufficient to run the test.	1. Turn off and restart the system-board tray. 2. Make sure that all memory is enabled by checking the Available System Memory in the Resource Utilization section of the DSA event log. 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. 4. Run the test again. 5. Turn off and restart the system-board tray if necessary to recover from a hung state. 6. Run the standard DSA memory diagnostic to validate all memory. 7. If the problem remains, collect the data from the DSA event log and send it to IBM Service. For information about contacting and sending data to IBM Service, see http://www.ibm.com/support/docview.wss?uid=psg1SERV-CALL.

Clearing CMOS memory

To clear the CMOS memory, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. Turn off the system-board tray and all attached devices; then, disconnect the chassis power cord and external cables.
3. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
4. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).
5. Remove the battery (see "Removing the battery" on page 86).
6. Locate the Clear RTC RAM jumper (CLRTC1) (see "System-board jumpers" on page 8).
7. Move the jumper from pins 1 and 2 to pins 2 and 3.
8. Wait approximately 10 seconds; then, move the jumper back to pins 1 and 2.
9. Install the battery (see "Installing the battery" on page 86).
10. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).
11. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).
12. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the system-board tray.
13. Run the BIOS configuration utility program and set configuration parameters as necessary (see "Using the BIOS configuration utility program" on page 156 for information).

Updating (flash-updating) the BIOS code

Periodically, IBM makes new levels of BIOS code available on the Web. Always check http://www.ibm.com/systems/support/ for the latest level of BIOS code, device drivers, documentation, and hints and tips. You can use one of the following methods to update (flash-update) the BIOS code on the system-board tray:

- Download the BIOS code update file directly to the hard disk drive.
- Download the BIOS code update file to a diskette (you must attach an optional external USB portable diskette drive to the system-board tray); then, update the BIOS code on the system-board tray.
- Download the BIOS code update file to a CD or DVD (you must attach an optional external USB portable CD or DVD drive to the system-board tray); then, start the system-board tray with the CD or DVD in the CD or DVD drive to update the BIOS code.

One file type is available for each of these methods. The description next to each file indicates the type of medium to which you can download the file. A readme file is also available with instructions for installing the BIOS code update.

To download the BIOS (flash) update files, 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. Click **System x iDataPlex dx340 server** to display the matrix of downloadable files.
5. Select the applicable file for your operating system and the file type for the medium that you want to use; then, download the flash BIOS update.
6. Update the BIOS code and follow the instructions in the readme file that comes with the update file.

   Note: Always reset the BIOS configuration utility program to the default values after you update the BIOS code.
7. Restart the system-board tray.

Recovering from a BIOS update failure

If power to the system-board tray is interrupted while the BIOS code is being updated, the system-board tray might not restart correctly or might not display video. If this happens, use the procedure in this section to recover the BIOS code. This procedure can also be used to recover from a BIOS ROM corruption or checksum failure.

To complete the recovery procedure, you must make the following preparations:

- Download the crisis recovery (CR) image to create the POST/BIOS recovery diskette from http://www.ibm.com/systems/support/.
- To create and use a diskette, you must attach an external USB diskette drive to the system-board tray.

To recover the BIOS code, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. Turn off the system-board tray and all attached devices; then, disconnect the chassis power cord and external cables.
3. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
4. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).
5. Locate the BIOS recovery jumper (RECOVERY1) on the system board.

BIOS recovery
(RECOVERY1)

3 2 1
Normal

DIMM 31
DIMM 30
DIMM 21
DIMM 20
DIMM 11
DIMM 10
DIMM 01
DIMM 00

1 2 3 4 5 6 7 8
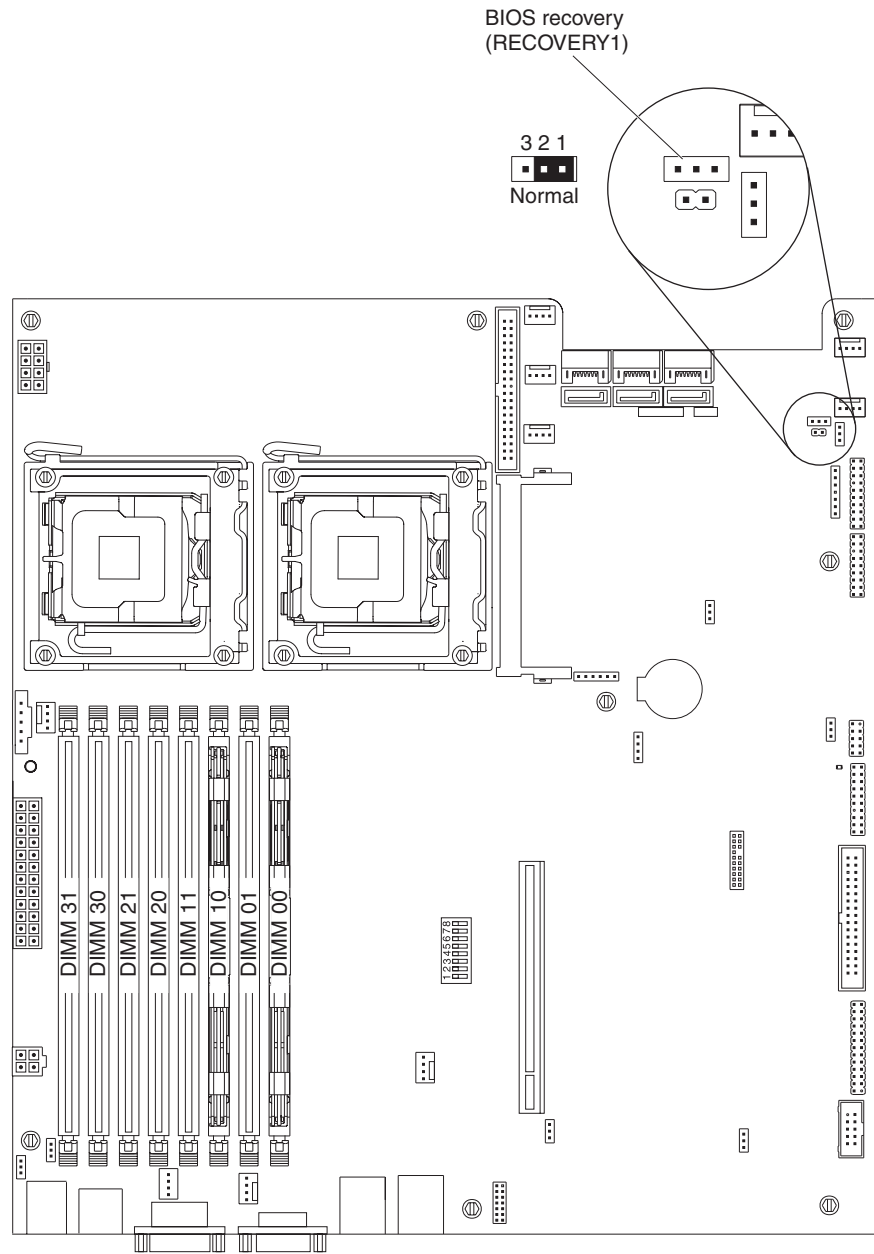
6. Move the BIOS recovery jumper to pins 2 and 3.

7. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).

8. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

9. Reconnect all external cables and power cords.

10. Insert the update diskette into the drive.

11. Turn on the system-board tray and the monitor.

After the update is complete, remove the diskette from the drive and turn off the system-board tray.

12. Disconnect all power cords and external cables.

13. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).

14. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).

15. Return the BIOS recovery jumper to pins 1 and 2.

16. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).

17. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

18. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the system-board tray.

BMC system event log messages

The following tools are available to view the BMC system event log:

- Dynamic System Analysis (DSA) Preboot diagnostic programs. See "Running the diagnostic programs" on page 32.
- BIOS configuration utility program. See "Using the BIOS configuration utility program" on page 156.
- Industry-standard Intelligent Platform Management Interface (IPMI) management tools.

Domain A system-error log messages or sensor numbers refer to system-board trays in the lower position in a 2U chassis. Domain B system-error log messages or sensor numbers refer to system-board trays in the upper position.

The following table describes the possible system event log messages and suggested actions to correct the detected problems.

- **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," on page 59 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.**

System event log message	Sensor number (Hex)	Action
DIMM_00 Amb. Temperature	20	No action required.
DIMM_01 Amb. Temperature	21	No action required.
DIMM_10 Amb. Temperature	24	No action required.
DIMM_11 Amb. Temperature	25	No action required.
DIMM_20 Amb. Temperature	28	No action required.
DIMM_21 Amb. Temperature	29	No action required.
DIMM_30 Amb. Temperature	2C	No action required.

- **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," on page 59 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.**

System event log message	Sensor number (Hex)	Action
DIMM_31 Amb. Temperature	2D	No action required.
CPU1 temperature	31	No action is required for lower temperature alerts (for example, Lower Critical). For upper temperature alerts, complete the following steps: 1. Check all fans and the server for proper cooling. 2. (Trained service technician only) Check the heat sink for proper installation. 3. (Trained service technician only) Reseat the microprocessor and heat sink.
CPU2 temperature	32	No action is required for lower temperature alerts (for example, Lower Critical). For upper temperature alerts, complete the following steps: 1. Check all fans and the server for proper cooling. 2. (Trained service technician only) Check the heat sink for proper installation. 3. (Trained service technician only) Reseat the microprocessor and heat sink.
MB temperature 1	33	No action required.
MB temperature 2	CA	No action required.
Vcore1	34	1. (Trained service technician only) Reseat the microprocessor and check to see if the error remains. 2. (Trained service technician only) Replace the system-board tray. 3. (Trained service technician only) Replace the microprocessor.
Vcore2	35	1. (Trained service technician only) Reseat the microprocessor and check to see if the error remains. 2. (Trained service technician only) Replace the system-board tray. 3. (Trained service technician only) Replace the microprocessor.
3,3 Volts	36	1. Remove all PCI adapters and check to see if the error remains. 2. (Trained service technician only) Replace the system-board tray. 3. (Trained service technician only) Replace the power-supply paddle card.
5 Volts	37	1. (Trained service technician only) Replace the system-board tray. 2. (Trained service technician only) Replace the power-supply paddle card. 3. Check all hard disk drive backplanes.

- **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," on page 59 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.**

System event log message	Sensor number (Hex)	Action
12 Volts	38	Check the BMC log of the lower server for a power supply failure (Sensor94h). **Important:** Sensor 94h will also report a loss of ac power which is not commonly associated with a power supply failure. If a power supply failure is logged, replace the power supply. If no power supply failure is logged, disconnect all hard disk drives backplanes to help isolate the failure. With the hard disk drive backplanes disconnected, clear the BMC log. If the problem remains, replace the following components in the order that they are listed: 1. (Trained service technician only) System-board tray 2. (Trained service technician only) Power-supply paddle card 3. Power supply
5 Volts Standby5 Volts	3B	1. Replace the power supply. 2. (Trained service technician only) Replace the system-board tray. 3. (Trained service technician only) Replace the power-supply paddle card.
CMOS Battery	3C	1. Replace the 3 V battery. 2. (Trained service technician only) Replace the system-board tray.
1,8 Volts	3D	1. Check the BMC log for a 5 V failure (Sensor 37h) and follow the instructions for that error message. 2. (Trained service technician only) Replace the system-board tray.
1.5/1.25 Volts	3E	1. Check the BMC log for a 5 V failure (Sensor 37h) and follow the instructions for that error message. 2. (Trained service technician only) Replace the system-board tray.
HD Driver 1	68	1. Check the hard disk drive fault LED. 2. Check all cables and reseat the hard disk drives. 3. Replace the failing hard disk drive. 4. (Trained service technician only) If the problem remains, replace the hard disk drive backplane.
HdDriver 2	69	1. Check the hard disk drive fault LED. 2. Check all cables and reseat the hard disk drives. 3. Replace the failing hard disk drive. 4. (Trained service technician only) If the problem remains, replace the hard disk drive backplane.

- **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," on page 59 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.**

System event log message	Sensor number (Hex)	Action
Fan 1 Fault	90	1. Check the connection to the fan assembly. 2. Reseat the fan. 3. Replace the fan.
Fan 2 Fault	91	1. Check the connection to the fan assembly. 2. Reseat the fan. 3. Replace the fan.
Fan 3 Fault	92	1. Check the connection to the fan assembly. 2. Reseat the fan. 3. Replace the fan.
Fan 4 Fault	93	1. Check the connection to the fan assembly. 2. Reseat the fan. 3. Replace the fan.
PSU Status	94	This power supply sensor can report a loss of ac power or a power supply failure. 1. If a power supply failure is reported, replace the power supply. 2. If ac loss is reported, check that the system may have been unpluged or lost ac input.
PSU Over Spec	95	This sensor reports that the power supply output load has been exceeded and usually occurs if there is a short circuit in the system. 1. Unplug the hard disk drives to isolate a short circuit to the system-board tray. 2. (Trained service technician only) Check under the system board for a short circuit to the chassis ground. 3. (Trained service technician only) Replace the system-board tray. 4. (Trained service technician only) Replace the power-supply paddle card.
PSU Over Temp	96	1. Check the operation of the power-supply fan. 2. Check the server for proper cooling. 3. Make sure that the server is not in an environment that exceeds ambient air specifications.
SEL Fullness	B6	Clear the BMC log (see "Using the BIOS configuration utility program" on page 156).
VTT	E1	1. Check BMC log for a 5 V failure (Sensor 37h) and follow the suggested actions. 2. (Trained service technician only) If the problem remains, 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 3, "Parts listing," on page 59 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.**

System event log message	Sensor number (Hex)	Action
Domain A Front Panel Temp	F0	No action is required for lower temperature alerts (for example, Lower Critical). For upper temperature alerts, complete the following steps: 1. Check all fans and the server for proper cooling. 2. Be sure that the server is not in an environment that exceeds ambient air specifications. 3. Reseat the thermistor connector located on the power-supply paddle card and make sure that the sensor is properly mounted.
Domain A Therm 1	F1	No action is required for lower temperature alerts (for example, Lower Critical). For upper temperature alerts, complete the following steps: 1. Check all fans and the server for proper cooling. 2. Reseat the thermistor connector located on the power-supply paddle card and make sure that the sensor is properly mounted.
Domain A Therm 2	F2	No action is required for lower temperature alerts (for example, Lower Critical). For upper temperature alerts, complete the following steps: 1. Check all fans and the server for proper cooling. 2. Reseat the thermistor connector located on the power-supply paddle card and make sure that the sensor is properly mounted.
Domain B Front Panel Temp	F3	No action is required for lower temperature alerts (for example, Lower Critical). For upper temperature alerts, complete the following steps: 1. Check all fans and the server for proper cooling. 2. Be sure that the server is not in an environment that exceeds ambient air specifications. 3. Reseat the thermistor connector located on the power-supply paddle card and make sure that the sensor is properly mounted.
Domain B Therm 1	F4	No action is required for lower temperature alerts (for example, Lower Critical). For upper temperature alerts, complete the following steps: 1. Check all fans and the server for proper cooling. 2. Reseat the thermistor connector located on the power-supply paddle card and make sure that the sensor is properly mounted.

- **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," on page 59 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.**

System event log message	Sensor number (Hex)	Action
Domain B Therm 2	F5	No action is required for lower temperature alerts (for example, Lower Critical). For upper temperature alerts, complete the following steps: 1. Check all fans and the server for proper cooling. 2. Reseat the thermistor connector located on the power-supply paddle card and make sure that the sensor is properly mounted.
PSU Fan1	F6	1. Check the connections to the system fans. 2. Reseat the fan. 3. Replace the fan.
PSU Fan2	F7	1. Check the connections to the system fans. 2. Reseat the fan. 3. Replace the fan.
PSU Fan3	F8	1. Check the connections to the system fans. 2. Reseat the fan. 3. Replace the fan.
PSU Fan4	F9	1. Check the connections to the system fans. 2. Reseat the fan. 3. Replace the fan.

Solving SAS hard disk drive problems

For any SAS error message, one or more of the following devices might be causing the problem:

- A failing SAS adapter or drive
- An incorrectly installed cable
- A defective cable
- SAS backplane

For any SAS error message, follow these suggested actions in the order in which they are listed until the problem is solved:

1. Make sure that external SAS devices are turned on before you turn on the server.
2. Make sure that the cables for all external SAS devices are connected correctly.
3. Make sure that the SAS devices are configured correctly.

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 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 system-board trays (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 system-board tray operator panel. 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 light is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Check the LAN activity LEDs on the system-board tray operator panel. The LAN activity LEDs are lit when data is active on the Ethernet network. If the LAN activity LEDs are 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 the diagnostic tests did not diagnose the failure or if the system-board tray 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 29.

Damaged data in CMOS memory or damaged BIOS code can cause undetermined problems. To reset the CMOS memory, use the clear CMOS jumper to override the power-on password and clear the CMOS memory; see "System-board jumpers" on page 8 and "Clearing CMOS memory" on page 47 for further information. If you suspect that the BIOS code is damaged, see "Updating (flash-updating) the BIOS code" on page 47 and "Recovering from a BIOS update failure" on page 48 for further information.

Make sure that the power supply is working correctly. If the power supply is working correctly and reseating the system-board tray in the chassis does not correct the problem, complete the following steps:
1. Turn off the system-board tray.
2. Remove the system-board tray from the chassis.
3. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).
4. Remove or disconnect the following devices, one at a time, until you find the failure. Reinstall, turn on, and reconfigure the system-board tray each time.
   - Any external devices.
   - Each adapter.
   - Each hard disk drive.
   - Memory modules. The minimum configuration requirement is one 1 GB DIMM in slot 00.

   The following minimum configuration is required for the system-board tray to start:
   - One chassis
   - One microprocessor
   - One DIMM in slot 00
   - One system-board tray
   - One power supply
   - One fan assembly
5. Install and turn on the system-board tray. If the problem remains, suspect the following components in the following order:
   a. DIMM
   b. System-board tray
   c. Microprocessor

If the problem is solved when you remove an adapter 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 system-board tray.

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

Problem determination tips

Because of the variety of hardware and software combinations that you can encounter, have as much of the following information available as possible when you request assistance from IBM:

- Machine type and model
- Microprocessor and hard disk drive upgrades
- Failure symptoms
  - Does the system-board tray fail the diagnostic programs? If so, what are the error codes?
  - What occurs? When? Where?
  - Does the failure occur on a single system-board tray or on multiple trays?
  - Is the failure repeatable?
  - Has the current configuration ever worked?
  - What changes, if any, were made before it failed?
  - Is this the original reported failure, or has this failure been reported before?
- Diagnostic program type and version level
- Hardware configuration (print screen of the system summary)
- BIOS code level
- Operating-system type and version level

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

- Machine type and hardware configuration
- BIOS level
- Adapters and attachments, in the same locations
- Address jumpers, terminators, and cabling
- Software versions and levels
- Diagnostic program type and version level
- Configuration option settings
- Operating-system control-file setup

See Appendix A, "Getting help and technical assistance," on page 165 for information about calling IBM for service.

Chapter 3. Parts listing

This section lists the replaceable components that are available for the 2U chassis, the dx340 system-board tray, the 3U chassis, the storage enclosure, and the I/O enclosure.

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.

For an updated parts listing on the Web, 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 **Parts documents**.
4. From the **Product family** menu, select **System x iDataPlex dx340 server** and click **Go**.

For information about the terms of the warranty and getting service and assistance, see the *Warranty and Support Information* document.

2U chassis components

The following replaceable components are available for the Type 6385 and Type 7831 2U chassis.

Note: The illustrations in this document might differ slightly from your hardware.
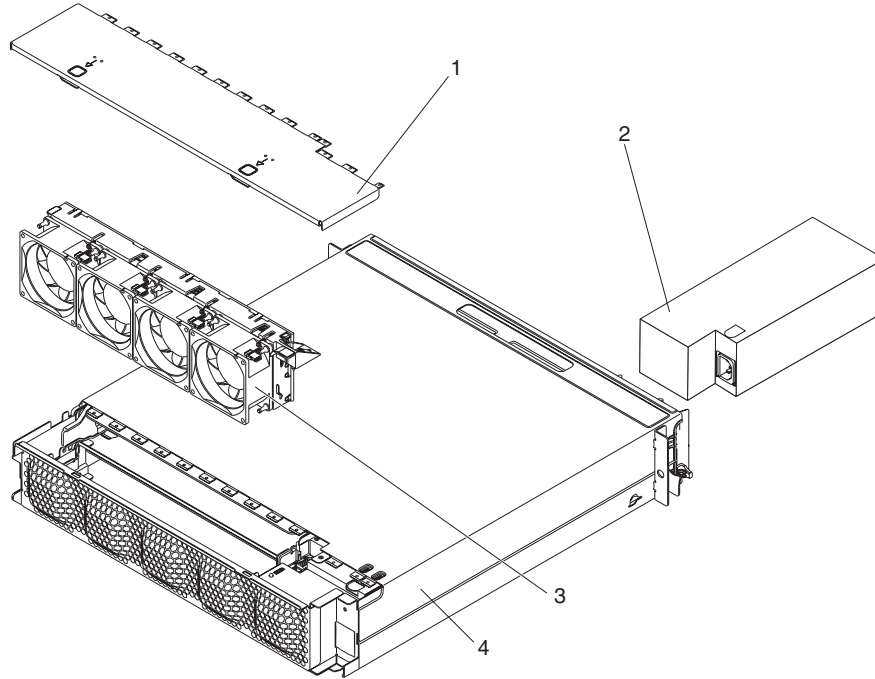
Table 1. CRUs and FRUs, 2U chassis

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Top cover	44W4791		
2	375 W power supply		39Y7318	
2	900 W power supply		39Y7316	
3	Fan assembly	44W4792		
4	2U chassis			44W4790
	Rail kit		44W4793	
	Enterprise rack rail kit		44W4794	
	Label kit	44W4849		

dx340 system-board tray components

The following replaceable components are available for the dx340 Type 6389 and Type 7832 system-board tray.
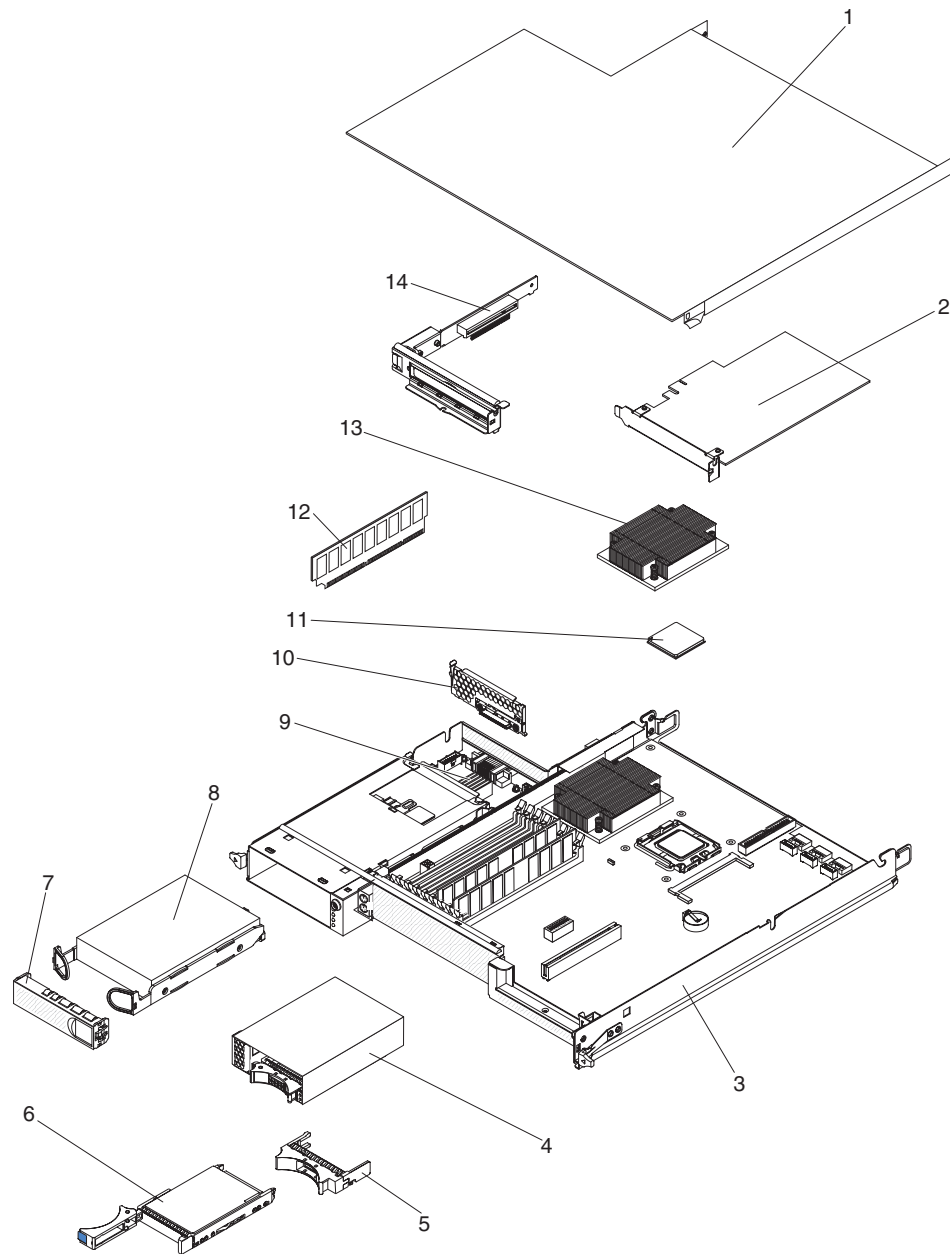
Table 2. CRUs and FRUs, dx340 system-board tray

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	System-board tray cover		44W4795	
2	Qlogic single-port Fibre Channel PCIe adapter		39R6526	
2	Qlogic double-port Fibre Channel PCIe adapter		39R6528	
2	Qlogic single-port iSCSI host bus PCIe adapter		39Y6148	
2	Intel Pro1000 Ethernet adapter		42C1752	

Table 2. CRUs and FRUs, dx340 system-board tray (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
2	Qlogic double-port iSCSI host bus adapter		42C1772	
2	ServeRAID-10i adapter		43W4297	
2	ServeRAID-10i battery pack		43W4301	
2	Single-port Fibre Channel 4 GB host bus adapter		43W7510	
2	Double-port Fibre Channel 4 GB host bus adapter		43W7512	
2	SAS host bus adapter		44E8690	
3	System-board tray (includes BMC controller)			44W4796
4	2.5-inch hot-swap drive cage with backplane		44W4800	
5	2.5-inch drive filler panel	26K8680		
6	Hard disk drive, 3.5-inch 146 GB simple-swap SAS (15000 RPM)	39R7362		
6	Hard disk drive, 3.5-inch 146 GB simple-swap SAS (10000 RPM)	43X0825		
6	Hard disk drive, 3.5-inch 300 GB simple-swap SAS	43X0817		
7	3.5-inch drive filler panel	44W4802		
8	Hard disk drive, 3.5-inch 160 GB simple-swap SATA	39M4507		
8	Hard disk drive, 3.5-inch 250 GB simple-swap SATA	39M4511		
8	Hard disk drive, 3.5-inch 500 GB simple-swap SATA	39M4517		
8	Hard disk drive, 3.5-inch 750 GB simple-swap SATA	43W7575		
8	Hard disk drive, 3.5-inch 1 TB simple-swap SATA	43W7625		
8	Hard disk drive, 3.5-inch 1 TB hot-swap SATA	43W7629		
9	Power-supply paddle card domain A			39Y7309
10	One-bay hard disk drive bracket and cable assembly, SATA 1x		44T0647	
10	One-bay hard disk drive bracket and cable assembly, SAS 1x		44T0676	
11	Microprocessor, 2.0 GHz quad core			44R5644
11	Microprocessor, 2.33 GHz quad core			44R5645
11	Microprocessor, 2.86 GHz quad core			44R5648
11	Microprocessor, 2.33 GHz LV quad core			44W1953
11	Microprocessor, 2.50 GHz LV quad core			44W1986
11	Microprocessor, 2.50 GHz/1333 MHz quad core			44E5144
11	Microprocessor, 2.6 GHz/1333 MHz quad core			44R5647
11	Microprocessor, 3.0 GHz/1333 MHz quad core			44R5649
11	Microprocessor, 3.0 GHz/1333 MHz dual core			46M3069
11	Microprocessor, 3.3 GHz/1333 MHz dual core			44E5160
12	Memory, 1.0 GB PC2-5300 ECC		39M5784	
12	Memory, 2.0 GB PC2-5300 ECC		39M5790	
12	Memory, 4.0 GB PC2-5300 ECC		41Y2845	
12	Memory, 1.0 GB PC2-5300 ECC (low power)		46C7421	
12	Memory, 2.0 GB PC2-5300 ECC (low power)		46C7422	
12	Memory, 4.0 GB PC2-5300 ECC (low power)		46C7423	

Table 2. CRUs and FRUs, dx340 system-board tray (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
13	Heat sink			44W4759
14	One-slot PCIe riser-card assembly (1 x 8)		44W4803	
	Microprocessor filler	44W4807		
	Thermal grease	41Y9292		
	Label kit	44W4850		
	Miscellaneous parts kit		44W4847	
	Front-panel assembly			44T0642
	1 PM SATA 1x cable		44T0647	
	4 PM SATA 4 1x cable		44T0672	
	4 PM SAS 4 1x cable		44T0673	
	4 PM SATA to 4x cable		44T0674	
	4 PM SAS to 4x cable		44T0675	
	1 PM SAS to 1x cable		44T0676	
	1 PM SATA to 4x cable		44T0677	
	2 PM SATA to 4x cable		44T0678	
	1 PM SAS to 4x cable		44T0679	
	2 PM SAS to 4x cable		44T0680	
	Mini SAS - 580 cable		44T0681	
	Hard disk drive 2-drop cable		44T0683	
	Thermal 2 drop F cable		44W4805	
	Hard disk drive 4-pin F power cable		44W4820	
	14-pin power cable		44W4821	
	16-pin 4 D power cable		44W4822	
	Hard disk drive signal mini S cable		44W4824	
	I2C cable		44W4829	
	I2C to multiple cable		44W4831	
	2 PM SATA to 2 1x cable		44W4840	

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 3. Consumable parts, dx340 system-board tray

Description	Part number
Battery, 3.0 V	33F8354

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.

3U chassis components

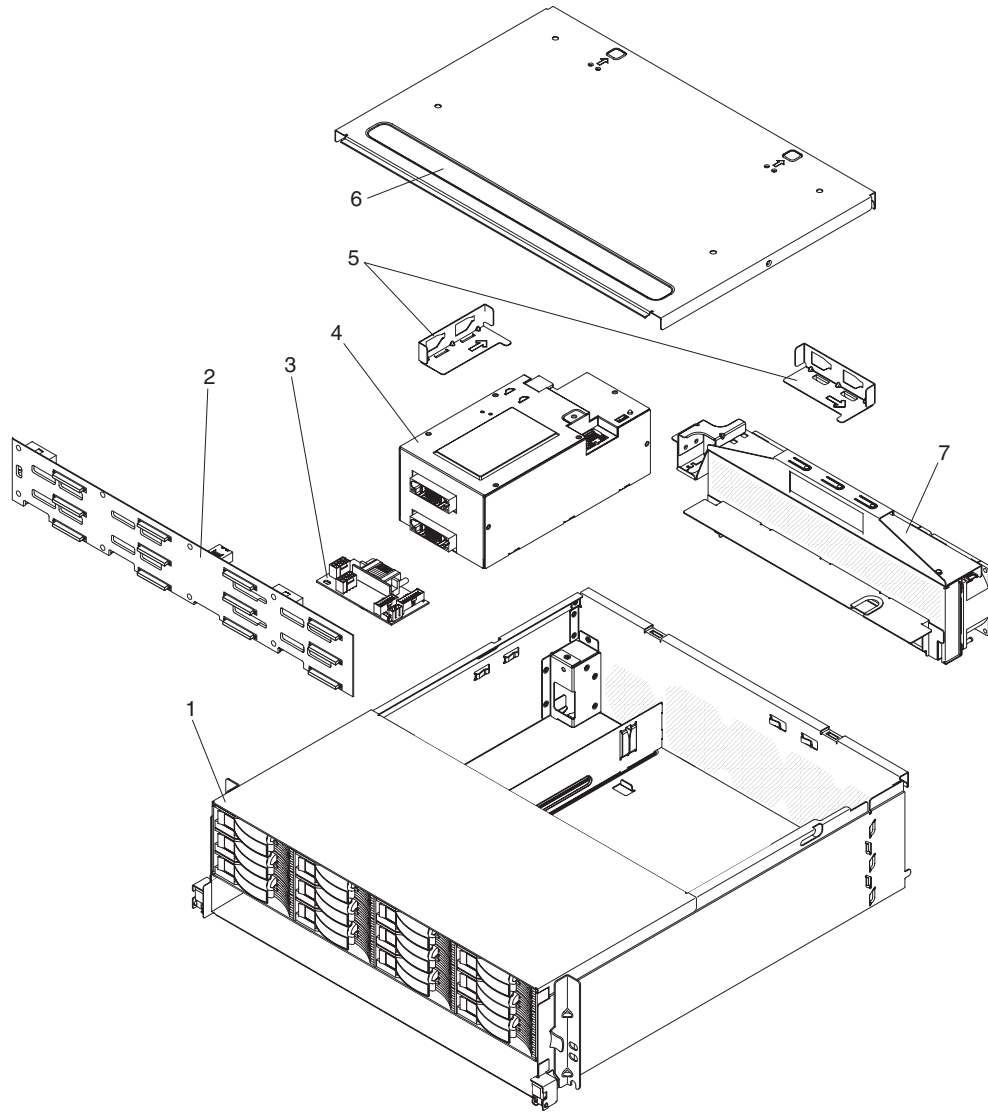The following replaceable components are available for the Type 6386 and Type 7834 3U chassis.

Table 4. CRUs and FRUs, 3U chassis

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	3U chassis			46C6285
2	Hard disk drive backplane			44E8766
3	Power-supply paddle card domain B		39Y7311	
4	900 W power supply			39Y7316
5	Retention bracket (included in miscellaneous hardware kit)		46C6288	
6	Top cover	46C6286		

Table 4. CRUs and FRUs, 3U chassis (continued)

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
7	Fan assembly		46C6287	
	Label kit	46C6305		
	Backplane power Y cable and paddle card		44W4553	
	Two-drop power cable		44W4552	
	Y jumper cable		39M5501	
	Jumper cable		39M5503	
	Hard disk drive signal cable assembly			46C6304
	3U chassis I2C power cable (Type 7832)		46C6284	
	3U chassis I2C power cable (Type 7835)		46C6275	
	Miscellaneous hardware kit		46C6288	
	Rail kit		44W4793	
	Enterprise rack rail kit		44W4794	
	3.5-inch SAS drive filler panel	39M4375		

I/O enclosure components

This section lists replaceable components that are available for the I/O enclosure.

I/O enclosures configured with 2.5-inch hot-swap hard disk drives

The following replaceable components are available for I/O enclosures that are configured with 2.5-inch hot-swap hard disk drives.
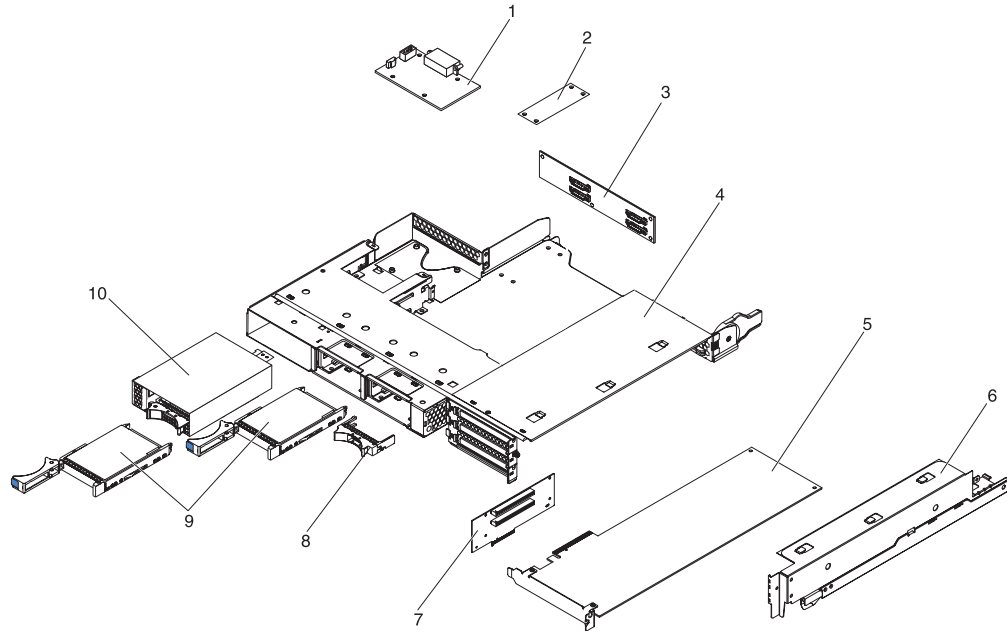

Table 5. CRUs and FRUs, I/O enclosures configured with 2.5-inch hot-swap hard disk drives

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Power-supply paddle card domain B		39Y7311	
2	I²C multiplexer card		44W4832	
3	2x2 2.5-inch hot-swap SAS backplane			44E8765
4	I/O enclosure			44W4799
5	PCIe adapter			
6	PCIe adapter bay cover		44W4859	
7	Two-slot PCIe riser-card assembly (2x4 with 2x16 connectors)			44X0449
8	2.5-inch drive filler panel	26K8680		
9	SAS hard disk drive (see Table 2 on page 61 for the supported drives)			
10	2.5-inch hot-swap drive cage with backplane		44W4800	

I/O enclosures configured with 3.5-inch simple-swap hard disk drives

The following replaceable components are available for I/O enclosures that are configured with 3.5-inch simple-swap hard disk drives.
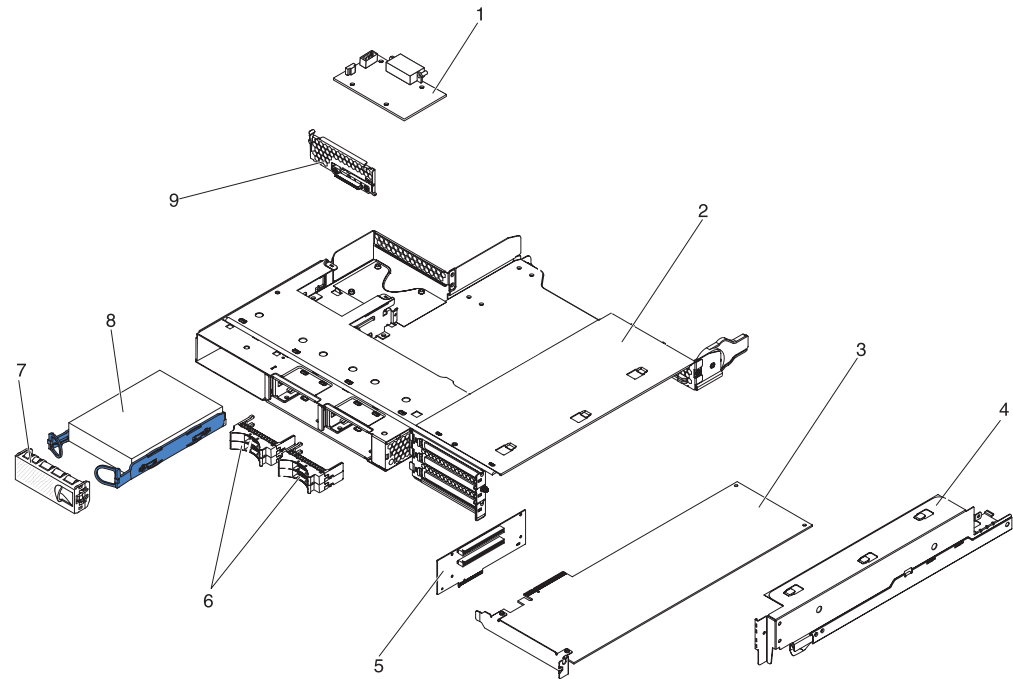

Table 6. CRUs and FRUs, I/O enclosures configured with 3.5-inch simple-swap hard disk drives

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Power-supply paddle card domain B		39Y7311	
2	I/O enclosure			44W4799
3	PCIe adapter			
4	PCIe adapter bay cover		44W4859	
5	Two-slot PCIe riser-card assembly (2x4 with 2x16 connectors)			44X0449
6	2x2 2.5-inch drive filler panel	44W4801		
7	3.5-inch drive filler panel	44W4802		
8	SATA hard disk drive (see Table 2 on page 61 for the supported drives)			
9	SAS hard disk drive (see Table 2 on page 61 for the supported drives)			
10	One-bay hard disk drive bracket and cable assembly, SATA 1x		44T0647	
11	One-bay hard disk drive bracket and cable assembly, SAS 1x		44T0676	

Storage enclosure components

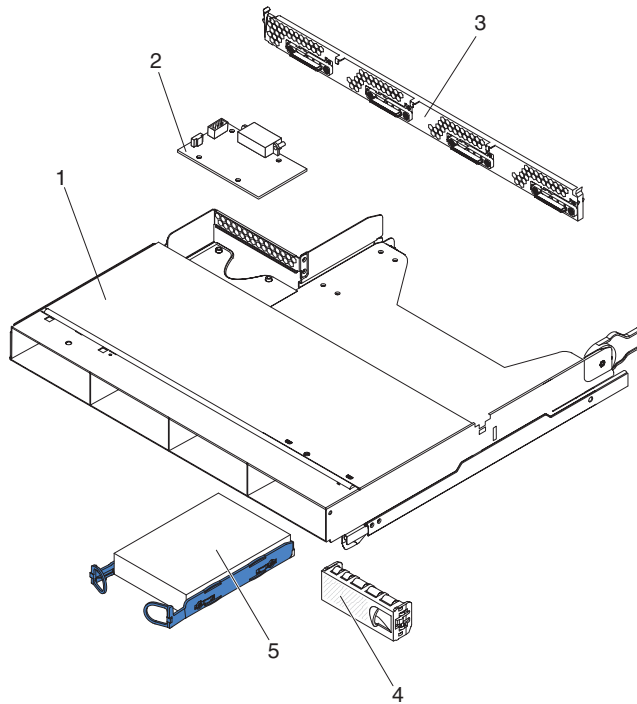The following replaceable components are available for the storage enclosure.

Table 7. CRUs and FRUs, storage enclosure

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number
1	Storage enclosure		44W4798	
2	Power-supply paddle card domain B		39Y7311	
3	Four-bay hard disk drive bracket and cable assembly, SATA 4 to 1x		44T0672	
3	Four-bay hard disk drive bracket and cable assembly, SATA 4 to 4x		44T0674	
3	Four-bay hard disk drive bracket and cable assembly, SAS 4 to 1x		44T0673	
3	Four-bay hard disk drive bracket and cable assembly, SAS 4 to 4x		44T0675	
4	3.5-inch simple-swap drive filler panel	44W4802		
5	SATA hard disk drive (see Table 2 on page 61 for the supported drives)			
5	SAS hard disk drive (see Table 2 on page 61 for the supported drives)			

Power cords

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

IBM 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.

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

IBM 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

IBM 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 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
39M5081	110 - 120 V 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
39M5068	Argentina, Paraguay, Uruguay
39M5226	India
39M5233	Brazil

Chapter 4. Removing and replacing server 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 3, "Parts listing," on page 59 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 and Support Information* document.

Installation guidelines

Before you remove or replace a component, read the following information:

- Read the safety information that begins on page vii and the guidelines in "Handling static-sensitive devices" on page 72. This information will help you work safely.
- 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 can 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.
- Back up all important data before you make changes to disk drives.
- Have a small Phillips screwdriver available.
- You do not have to turn off the system-board tray to install or replace hot-swap drives or hot-plug Universal Serial Bus (USB) devices. However, you must shut down the operating system of the system-board tray before you remove the system-board tray from a chassis.
- Blue on a component indicates touch points, where you can grip the component to remove it or install it, 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 system-board tray and operating system support hot-swap capability, you can remove or install the component while the system-board tray 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.

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.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a hot-swap drive within 2 minutes of removal.
- The server battery is operational. If the battery becomes defective, replace it immediately.
- You have replaced one or both system-board trays within 2 minutes of removal.

Handling static-sensitive devices

Attention: Static electricity can damage 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.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available.
- 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 surface on the outside of the rack, chassis, or system-board tray for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from the package and install it directly into the system-board tray without setting down the device. If it is necessary to set down the device, put it back into the static-protective package. Do not place the device on the system-board tray cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.
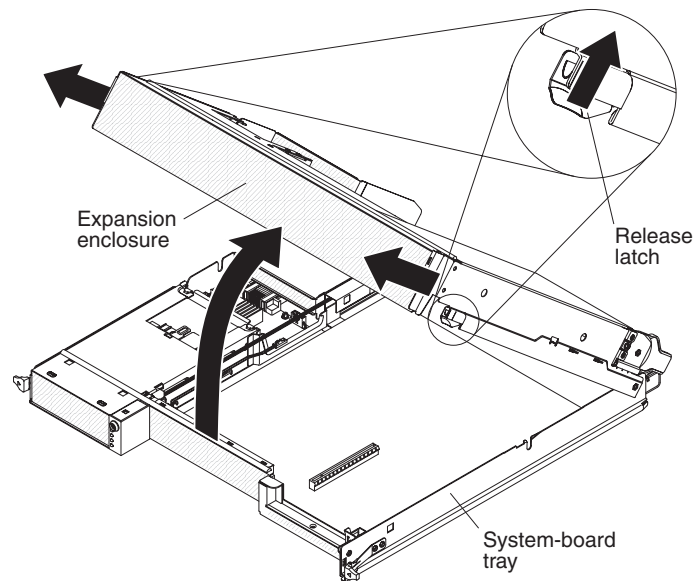
Returning a device or component

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 an expansion enclosure from a system-board tray

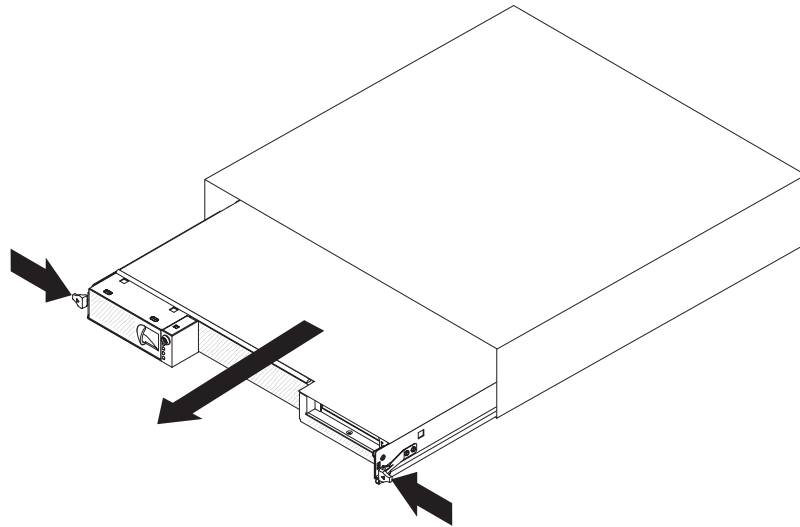To remove an expansion enclosure from a system-board tray, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
3. Carefully set the system-board tray on a flat, static-protective surface.
4. Pull the release latch on each side of the expansion enclosure outward; then, rotate the expansion enclosure approximately 30 degrees to a partially open position.
5. Make a note of where the cables are attached; then, if necessary, disconnect them.
6. Lift the expansion enclosure from the system-board tray and set the expansion enclosure on a flat, static-protective surface.

Installing an expansion enclosure on a system-board tray

To install an expansion enclosure on a system-board tray, complete the following steps.
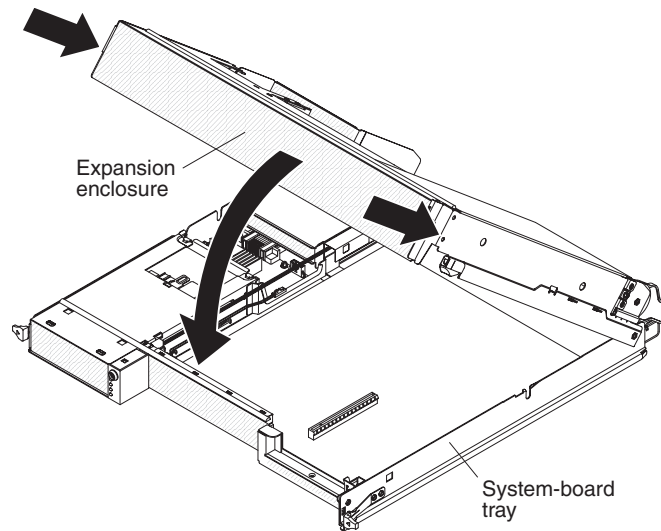
1. Orient the expansion enclosure above the system-board tray.
2. Lower the expansion enclosure so that the pins at the rear of the enclosure slide down into the slots at the rear of the system-board tray.
3. If you disconnected cables when you removed the expansion enclosure, reconnect them.
4. Pivot the expansion enclosure onto the system-board tray until it clicks into place.
5. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

Removing the system-board tray from a 2U chassis

To remove the system-board tray from a 2U chassis, complete the following steps. If the server contains an expansion enclosure, you remove the expansion enclosure and the system-board tray from the chassis as one assembly.

Attention: When two system-board trays are installed in the chassis, do not operate the upper system-board tray with the lower system-board tray removed or powered off, except for servicing. When the lower system-board tray is removed or powered-off, chassis-level system-management information is not available. For example, chassis fan speeds and temperatures may be returned as zero values. In this situation, the chassis will continue to operate normally, since the power supply and fans are designed to operate independently.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is operating, shut down the operating system; then, press the power-control button to turn off the system-board tray (see "Turning off the system-board tray" on page 6 for more information).
3. If external cables are connected to the front of the system-board tray or expansion enclosure, if one is attached, note where they are connected; then, remove them.
4. Press in the two release latches and pull the system-board tray and expansion enclosure out of the chassis.

Installing the system-board tray in a 2U chassis

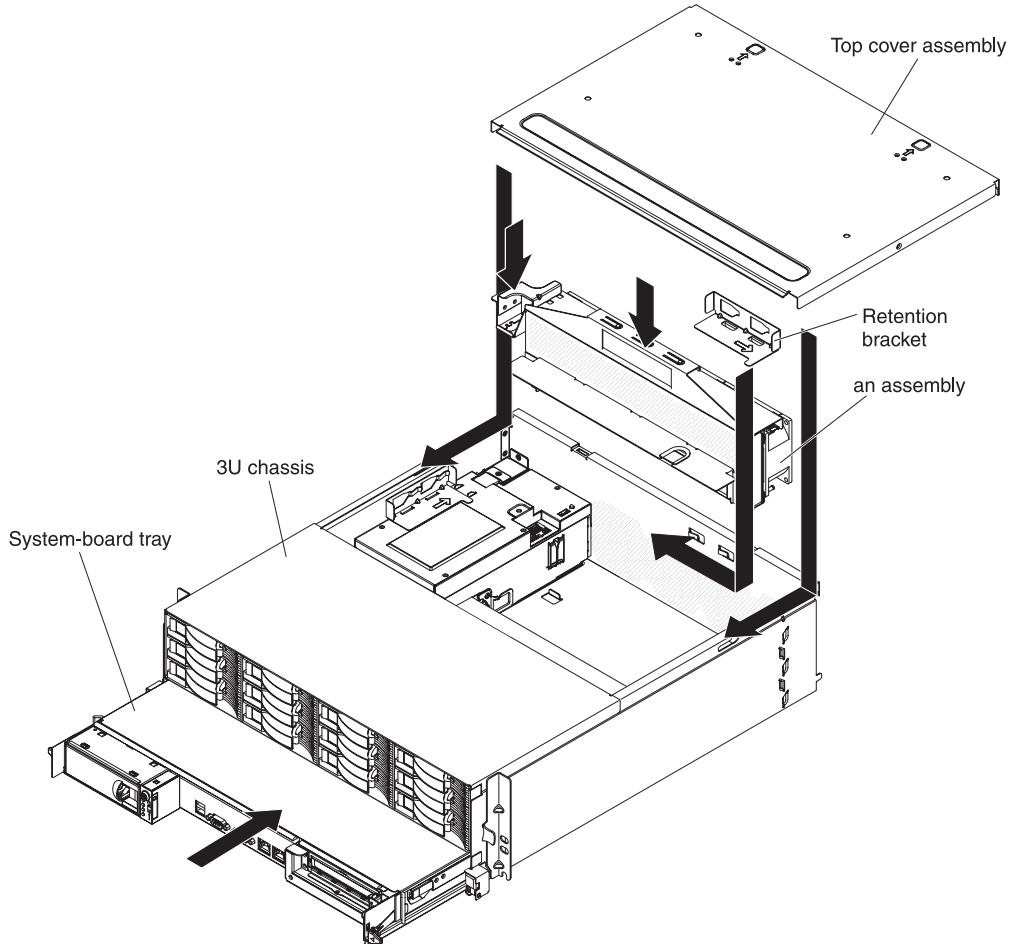To install the system-board tray in a 2U chassis, complete the following steps.
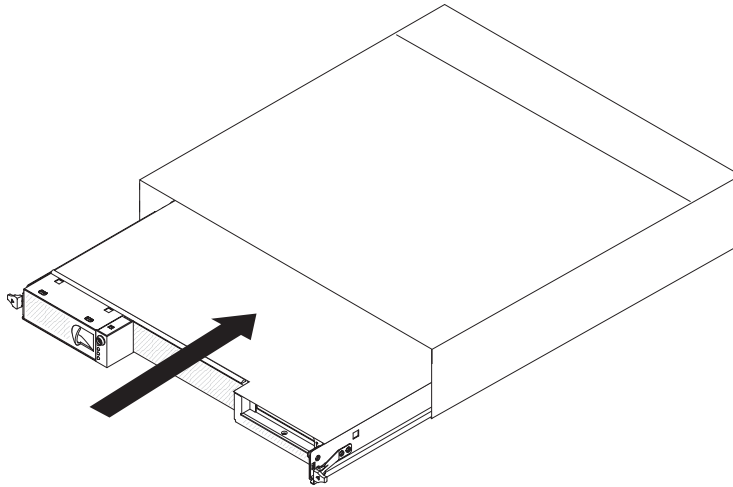
1. Slide the system-board tray into the chassis until it stops and the release latches click into place.
2. Reconnect the cables to the front of the system-board tray or expansion enclosure.
3. Turn on the system-board tray (see "Turning on the system-board tray" on page 5).
4. Make sure that the power-on LED on the system-board tray operator panel is lit continuously, indicating that the system-board tray is receiving power and is turned on.

If you are installing a different system-board tray from the one that you removed, you might have to configure the system-board tray, using the BIOS configuration utility program. See "Using the BIOS configuration utility program" on page 156 for more information.

Removing the system-board tray from a 3U chassis

To remove the system-board tray from a 3U chassis, complete the following steps.
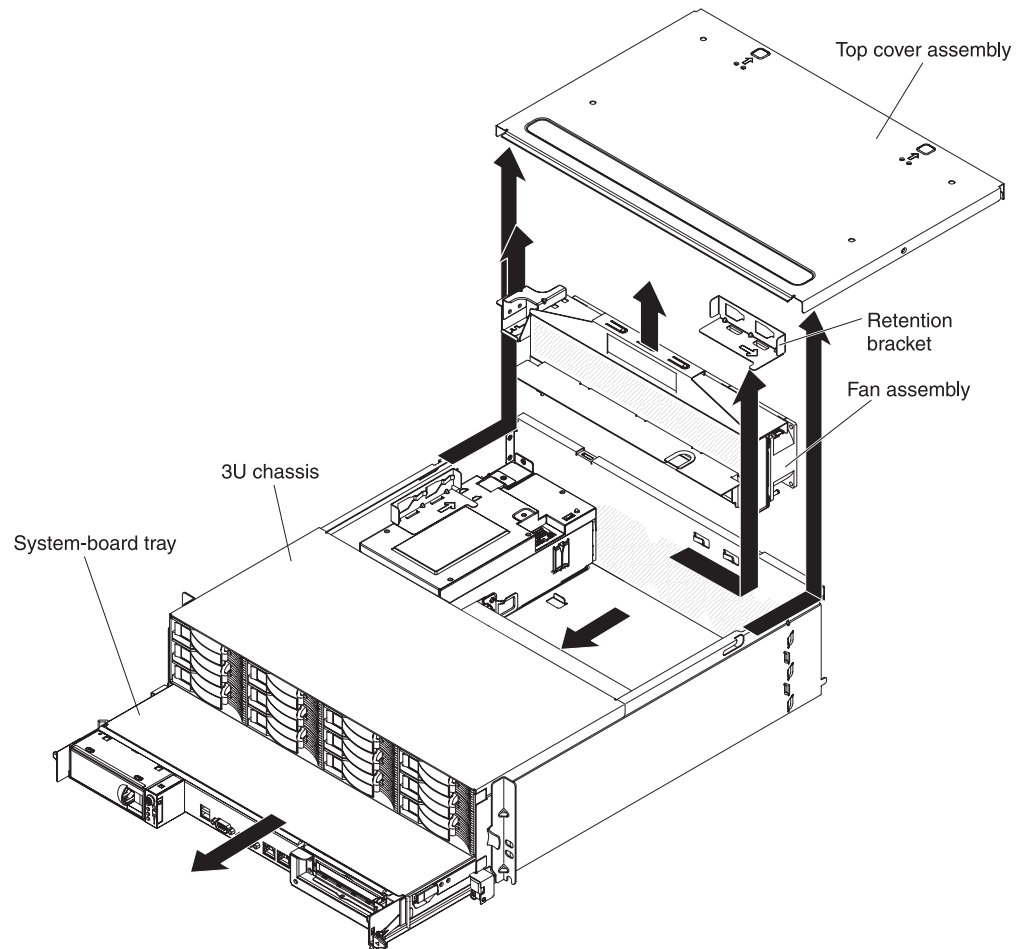
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is operating, shut down the operating system; then, press the power-control button to turn off the system-board tray (see "Turning off the system-board tray" on page 6 for more information).
3. If external cables are connected to the front of the system-board tray, note where they are connected; then, remove them.
4. Remove the 3U chassis from the iDataPlex rack (see "Removing a 3U chassis from a Type 7825 iDataPlex rack" on page 129).
5. Press on the two release latches at the top-rear edge of the top-cover assembly; then, slide the top-cover assembly toward the rear of the 3U chassis and remove it.
6. Slide the retention bracket to release it from the chassis and remove the bracket from the chassis.
7. Lift up on the fan-assembly handle and remove the fans from the 3U chassis.
8. Note the cable routing and connection locations; then, disconnect the cables that connect the system-board tray to the 3U chassis.
9. Push on the back edge of the system-board tray from inside the 3U chassis and slide the system-board tray forward.

10. Pull the system-board tray out of the 3U chassis and set it on a flat, static-protective surface.

Installing the system-board tray in a 3U chassis

To install the system-board tray in a 3U chassis, complete the following steps.

Note: You must remove the 3U chassis from the iDataPlex rack before you install the system-board tray (see "Removing a 3U chassis from a Type 7825 iDataPlex rack" on page 129).

1. Slide the system-board tray into the 3U chassis until it stops.

2. Reconnect the cables that connect the system-board tray and optional adapter to the 3U chassis.

3. Turn the fan assembly so that the connector aligns correctly with the connector in the power supply.

4. Insert the fan assembly into the 3U chassis. Firmly press the fan assembly straight down into the chassis by applying pressure on both ends of the fan assembly simultaneously.

5. Reinstall the retention bracket.

6. Align the top-cover assembly with the rear of the 3U chassis; then, slide it forward until it clicks into place.

7. Reinstall the 3U chassis in the iDataPlex rack (see "Installing a 3U chassis in a Type 7825 iDataPlex rack" on page 130).

8. Install the hard disk drives (see "Removing and installing a hard disk drive" on page 88).

9. Reconnect the cables on the front of the system-board tray.

10. Turn on the system-board tray (see "Turning on the system-board tray" on page 5).

11. Make sure that the power-on LED on the system-board tray operator panel is lit continuously, indicating that the system-board tray is receiving power and is turned on.

If you are installing a different system-board tray from the one that you removed, you might have to configure the system-board tray, using the BIOS configuration utility program. See "Using the BIOS configuration utility program" on page 156 for more information.

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.

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

Removing the 2U chassis fan assembly

To remove the 2U chassis fan assembly, complete the following steps.
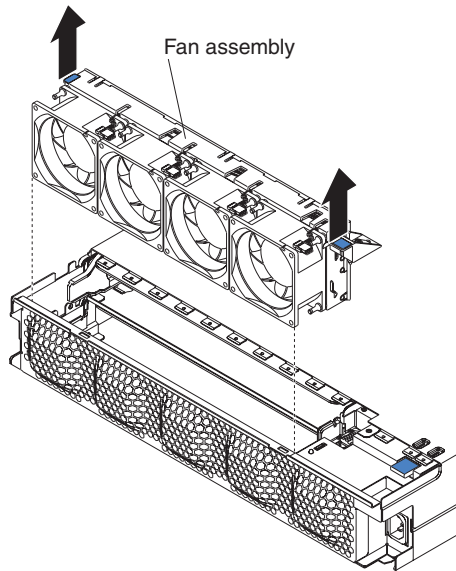
Fan assembly

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the chassis that contains the fan assembly is installed in an iDataPlex rack, remove it (see "Removing the 2U chassis from a Type 7825 iDataPlex rack" on page 123).
3. Remove any installed system-board trays (see "Removing the system-board tray from a 2U chassis" on page 75).
4. Remove the top cover (see "Removing the 2U chassis top cover" on page 82).
5. Grasp the tab at each end of the fan assembly and lift it out of the chassis.
6. If you are instructed to return the fan assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Installing the 2U chassis fan assembly

To install the 2U chassis fan assembly, complete the following steps.
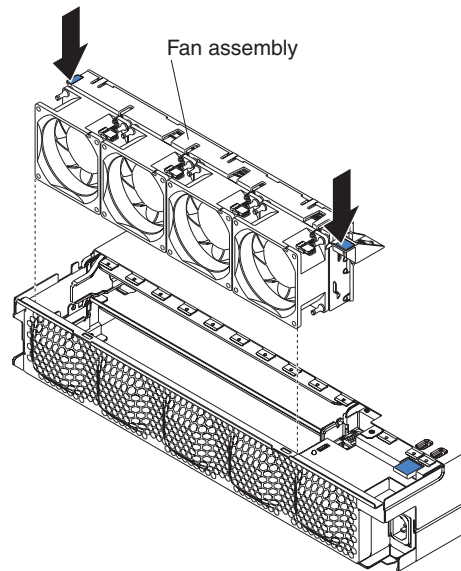
Fan assembly

1. Touch the static-protective package that contains the fan assembly to any *unpainted* metal surface on the outside of the chassis; then, remove the fan assembly from the package.
2. Orient the fan assembly over the opening in the chassis. Make sure that the power connector on the fan assembly aligns with the connector on the power supply.
3. Lower the fan assembly into the chassis and press down on the tab above the power connector to make sure that it is fully seated.
4. Install the top cover (see "Installing the 2U chassis top cover" on page 83).
5. Install the chassis in the iDataPlex rack (see "Installing the 2U chassis in a Type 7825 iDataPlex rack" on page 124).
6. Install any system-board trays that you removed (see "Installing the system-board tray in a 2U chassis" on page 76).

Removing the 2U chassis top cover

To remove the 2U chassis top cover, complete the following steps.
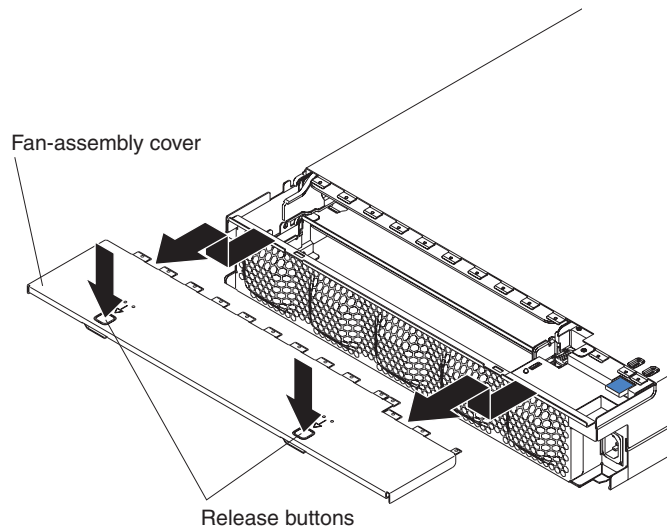
Fan-assembly cover

Release buttons

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the chassis is installed in an iDataPlex rack, remove it (see "Removing the 2U chassis from a Type 7825 iDataPlex rack" on page 123).
3. Press the two cover-release buttons and slide the cover toward the rear of the chassis to remove it.
4. If you are instructed to return the 2U chassis top cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the 2U chassis top cover

To install the 2U chassis top cover, complete the following steps.
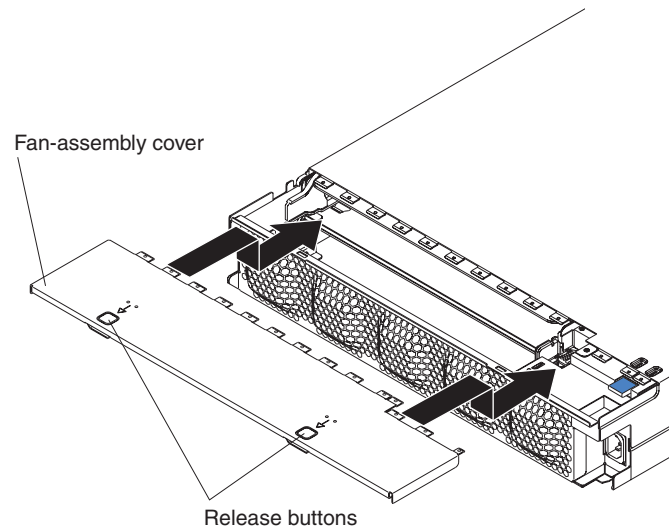
Fan-assembly cover

Release buttons

1. Make sure that no wires are protruding and might interfere with the cover.
2. Orient the cover over the rear of the chassis so that the retention tabs on the cover align with the tabs in the chassis.
3. Slide the cover onto the chassis until the cover-release buttons click into place.
4. Install the chassis in the iDataPlex rack (see "Installing the 2U chassis in a Type 7825 iDataPlex rack" on page 124).

Removing the 3U chassis top cover

To remove the 3U chassis top cover, complete the following steps.
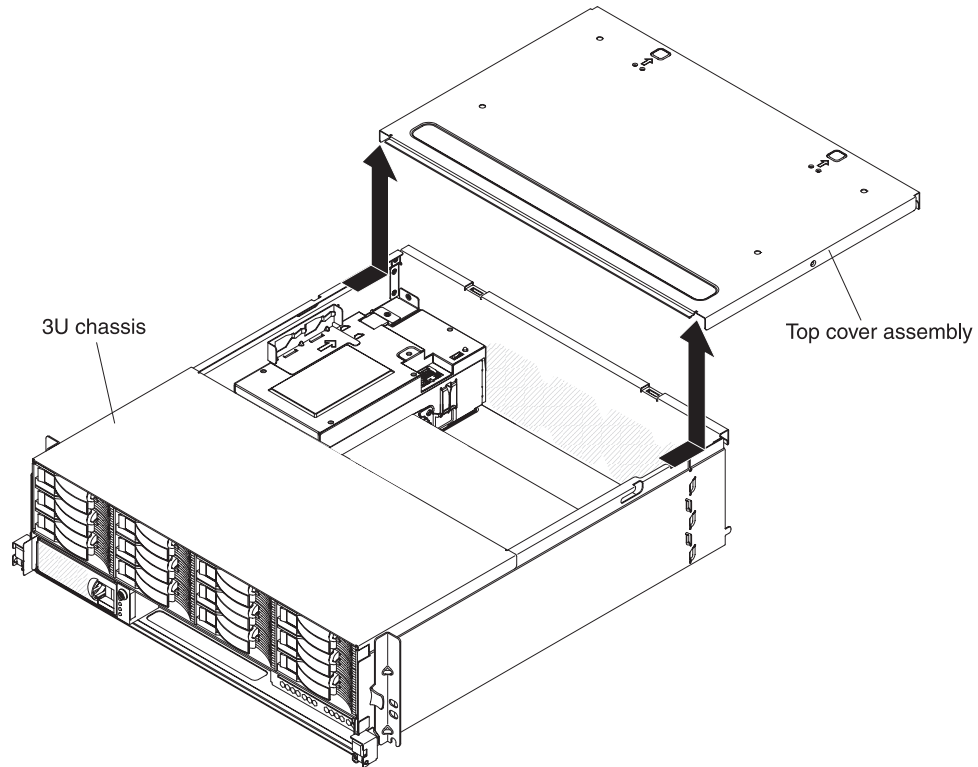
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the chassis is installed in an iDataPlex rack, remove it (see "Removing a 3U chassis from a Type 7825 iDataPlex rack" on page 129).
3. Press the two cover-release buttons and slide the cover toward the rear of the chassis to remove it.
4. If you are instructed to return the 3U chassis top cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the 3U chassis top cover

To install the 3U chassis top cover, complete the following steps.
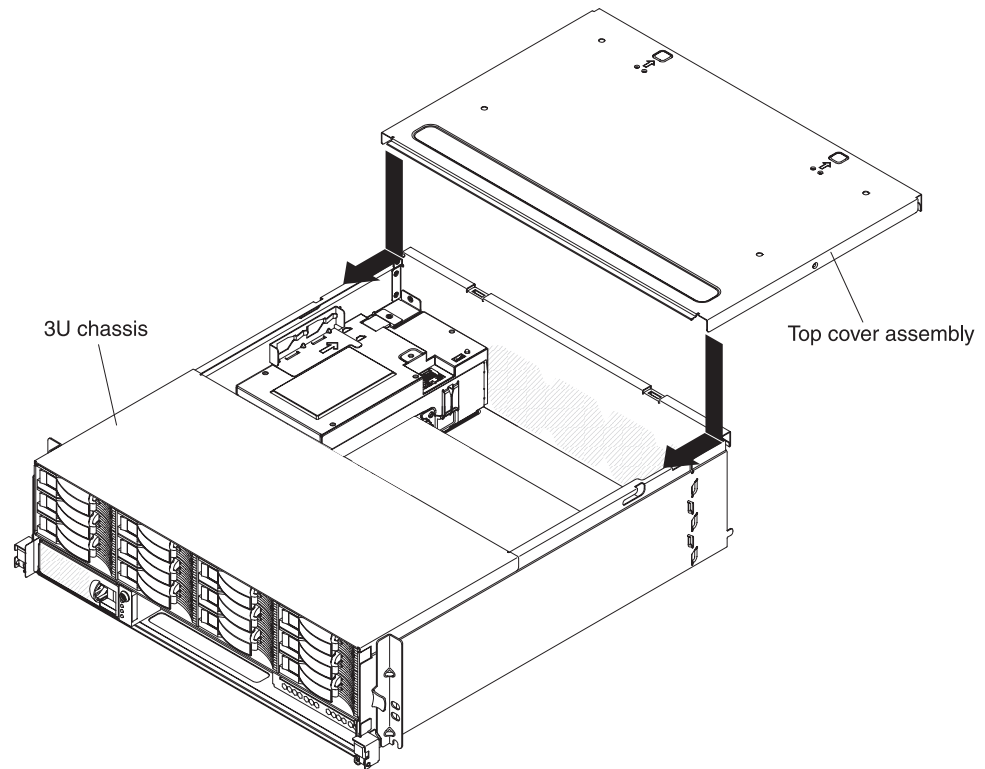
1. Make sure that no wires are protruding and might interfere with the cover.
2. Orient the cover over the rear of the chassis so that the retention tabs on the cover align with the tabs in the chassis.
3. Slide the cover onto the chassis until the cover-release buttons click into place.
4. Install the chassis in the iDataPlex rack (see "Installing a 3U chassis in a Type 7825 iDataPlex rack" on page 130).

Removing the battery

To remove the battery, complete the following steps.
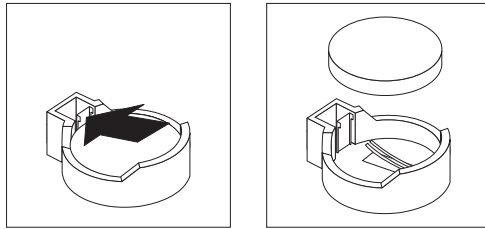
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71

2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).

3. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).

4. Remove the PCIe riser-card assembly, if one is installed (see "Removing a PCIe riser-card assembly from the system-board tray" on page 115).

5. Locate the battery on the system board (see "System-board connectors" on page 7).

6. Use one finger to press the top of the battery clip away from the battery. The battery pops up when it is released.

7. Use your thumb and index finger to lift the battery from the socket.

8. Dispose of the battery as required by local ordinances or regulations (see "Battery return program" on page 170 for information about disposing of the battery).

Installing the battery

The following notes describe information that you must consider when you are replacing the battery in the system-board tray.

- You must replace the battery 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 battery, you must reconfigure the system-board tray 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 battery, complete the following steps.
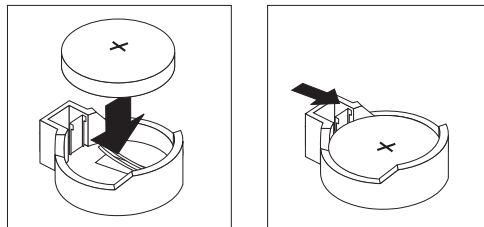
1. Follow any special handling and installation instructions that come with the battery.
2. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.
3. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.
4. If you removed the PCIe riser-card assembly, install it (see "Installing a PCIe riser-card assembly in the system-board tray" on page 116).
5. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).
6. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).
7. Turn on the system-board tray and run the BIOS configuration utility program. Set configuration parameters as needed (see "Using the BIOS configuration utility program" on page 156 for information).

Removing and installing a hard disk drive

The following section describes how to remove and replace 2.5-inch hot-swap hard disk drives and 3.5-inch simple-swap hard disk drives.

Removing a 2.5-inch hot-swap hard disk drive

To remove a 2.5-inch hot-swap hard disk drive, complete the following steps.
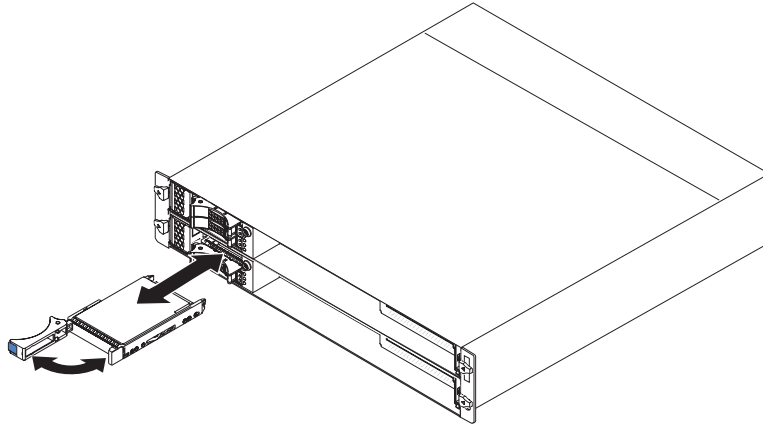

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. Rotate the drive tray handle of the drive that is to be removed to the open position.
3. Grasp the drive handle and pull the drive out of the bay.
4. If you are instructed to return the hard disk drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a 2.5-inch hot-swap hard disk drive

To install a 2.5-inch hot-swap hard disk drive, complete the following steps.
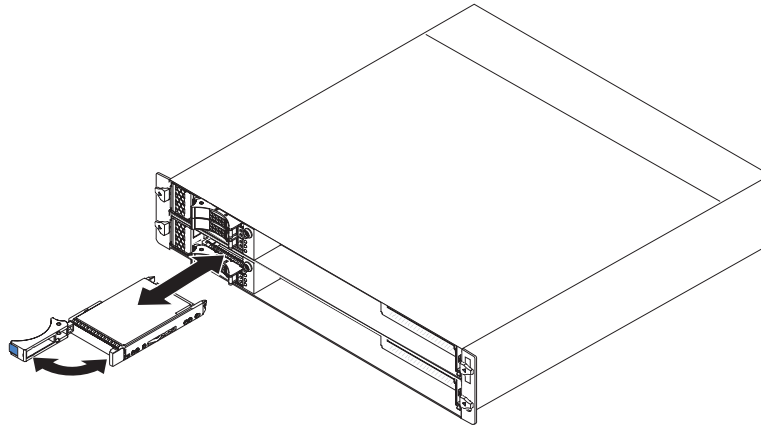
1. Touch the static-protective package that contains the hard disk drive to any *unpainted* metal surface on the outside of the chassis or rack; then, remove the hard disk drive from the package.

   Attention: Do not press on the top of the drive. Pressing the top might damage the drive.

2. Make sure that the drive tray handle is in the open position.

3. Align the drive with the guide rails in the drive bay; then, carefully slide the drive into the bay until the drive stops.

4. Rotate the drive tray handle to the closed position.

Removing a 3.5-inch simple-swap hard disk drive

To remove a 3.5-inch simple-swap hard disk drive, complete the following steps.
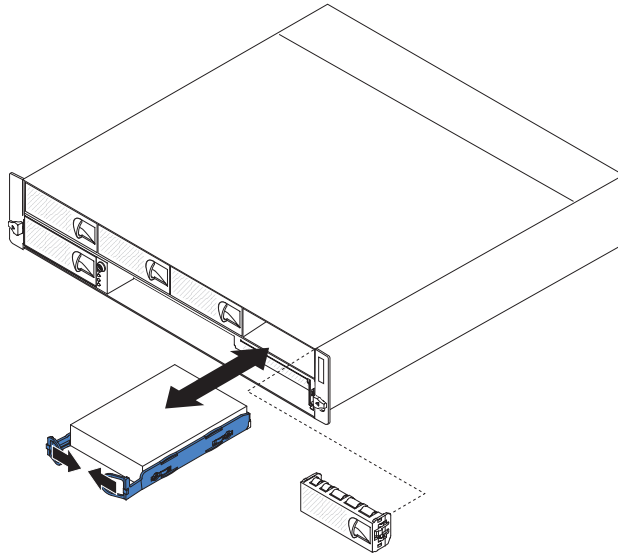
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is operating, shut down the operating system; then, press the power-control button to turn off the system-board tray (see "Turning off the system-board tray" on page 6 for more information).
3. Remove the filler panel from the drive bay.
4. Pull the loops of the drive toward each other; then, pull the drive out of the drive bay.
5. If you are instructed to return the hard disk drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a 3.5-inch simple-swap hard disk drive

To install a 3.5-inch simple-swap hard disk drive, complete the following steps.
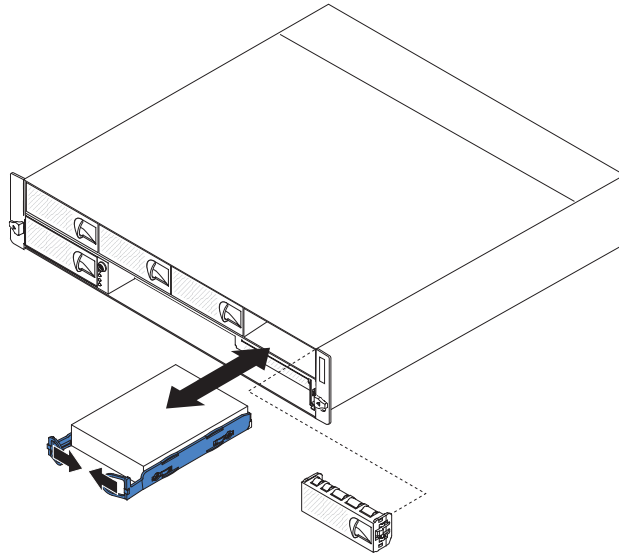
1. Touch the static-protective package that contains the hard disk drive to any *unpainted* metal surface on the outside of the chassis or rack; then, remove the hard disk drive from the package.

   **Attention:** Do not press on the top of the drive. Pressing the top might damage the drive.

2. Align the drive with the guide rails in the drive bay.

3. Pull the loops of the drive toward each other; then, carefully slide the drive into the bay until it stops, and release the loops.

   Note: Do not release the loops on the drive until it is completely seated.

4. Install the filler panel in the drive bay.

5. Turn on the system-board tray (see "Turning on the system-board tray" on page 5).

Removing the power cord

To remove the power cord, complete the following steps.
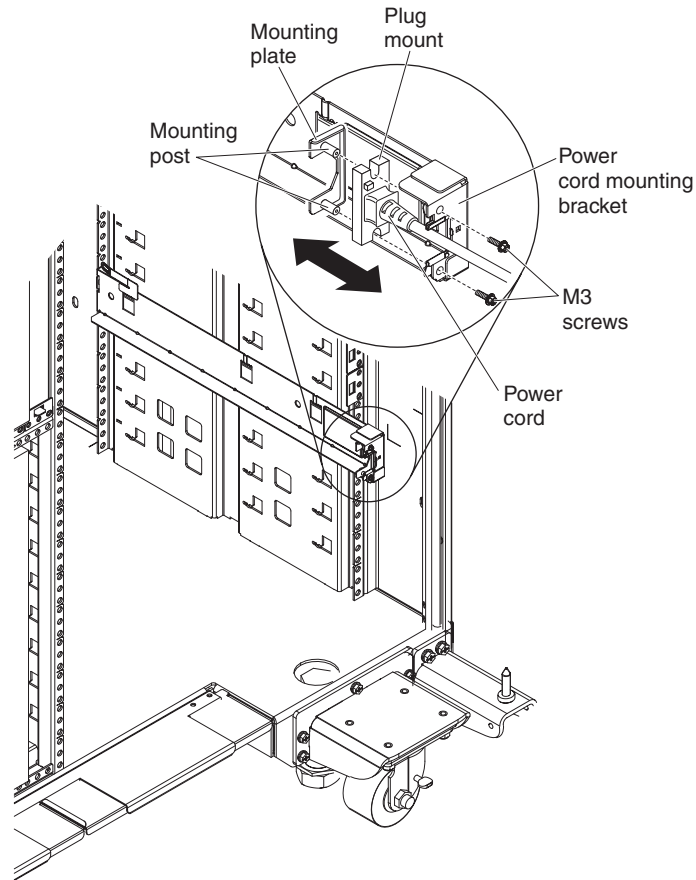
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the 2U chassis or 3U chassis is installed in an iDataPlex rack, remove the chassis from the rack (see "Removing the 2U chassis from a Type 7825 iDataPlex rack" on page 123) or (see "Removing a 3U chassis from a Type 7825 iDataPlex rack" on page 129).
3. Unplug the power cord that you are working on from the PDU.
4. Use an M3 hex driver to remove the two screws from the rail and set them aside.
5. Pull the mounting plate and power cord toward the front of the rack cabinet.
6. Separate the power cord from the mounting plate; then, set the mounting plate aside.
7. If you are instructed to return the power cord, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the power cord

To install the power cord, complete the following steps.
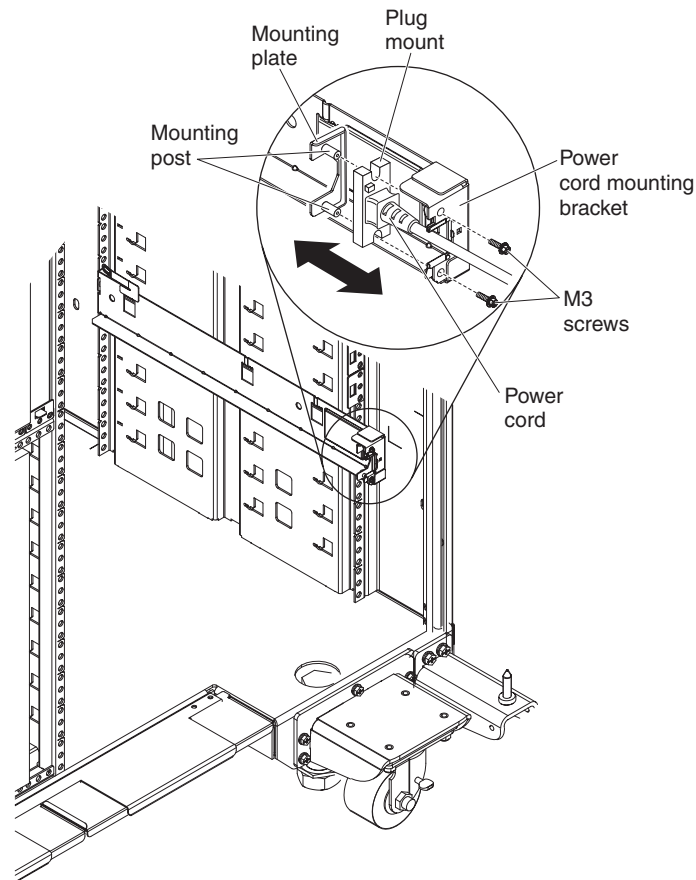
1. Grasp the end of the power cord with the plug mount molded onto it in your right hand. Notice the shape of the plug and how it matches the cutout in the mounting plate.
2. Align the mounting posts on the mounting plate with the slots in the plug mount and install the power cord onto the mounting plate.
3. Position the entire assembly inside the left rail and align the mounting posts with the holes in the back of the mounting bracket on the rail.
4. Install the power cord and mounting plate.
5. Plug the power cord that you are working on into a PDU.
6. Install the chassis in the iDataPlex rack (see "Installing the 2U chassis in a Type 7825 iDataPlex rack" on page 124) or ("Installing a 3U chassis in a Type 7825 iDataPlex rack" on page 130).

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.

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

Removing the 2U chassis power supply

To remove the power supply from a 2U chassis, complete the following steps.
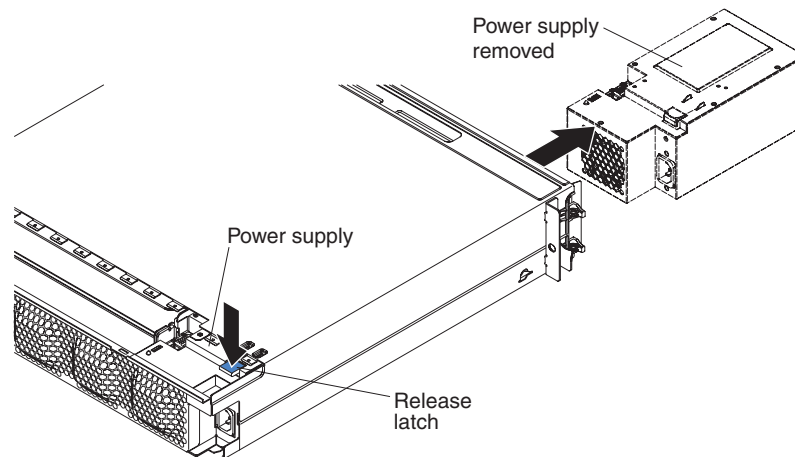
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the chassis that contains the power supply is installed in an iDataPlex rack, remove it (see "Removing the 2U chassis from a Type 7825 iDataPlex rack" on page 123).
3. Remove the top cover (see "Removing the 2U chassis top cover" on page 82).
4. Remove the fan assembly (see "Removing the 2U chassis fan assembly" on page 80).
5. Press the power-supply release latch and push the power supply toward the front of the chassis.
6. Carefully pull the power supply out through the front of the chassis.
7. 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.

Installing the 2U chassis power supply

To install the power supply in a 2U chassis, complete the following steps.
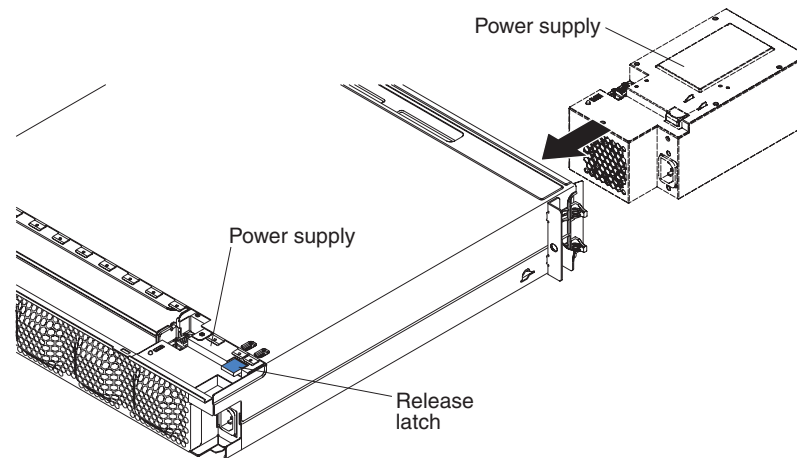
1. Touch the static-protective package that contains the power supply to any *unpainted* metal surface on the outside of the chassis; then, remove the power supply from the package.
2. Insert the power supply into the front of the chassis.
3. Carefully guide the power supply into the guides at the left-rear corner of the chassis until the release latch clicks into place.
4. Install the fan assembly (see "Installing the 2U chassis fan assembly" on page 81).
5. Install the top cover (see "Installing the 2U chassis top cover" on page 83).
6. Install the chassis in the iDataPlex rack (see "Installing the 2U chassis in a Type 7825 iDataPlex rack" on page 124).

Removing a 2.5-inch hot-swap drive cage

To remove a 2.5-inch hot-swap drive cage, complete the following steps.
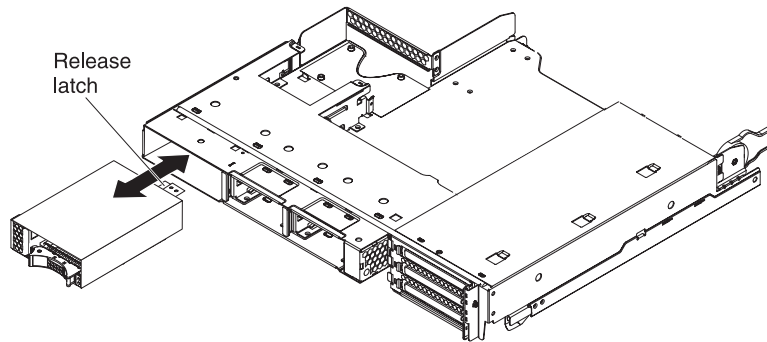
Release latch

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If hard disk drives are installed in the 2.5-inch hot-swap drive cage that you plan to remove, make a note of where the drives are installed; then, remove them (see "Removing a 2.5-inch hot-swap hard disk drive" on page 88).
3. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75).
4. If the 2.5-inch hot-swap drive cage is installed in an expansion enclosure drive bay, complete the following steps:
   a. Make a note of where the cables are attached; then, remove them.
   b. Pull up on the release lever at the top of the drive bay; then, grasp the 2.5-inch hot-swap drive cage and pull it out of the front of the drive bay.
5. If the 2.5-inch hot-swap drive cage is installed in the system-board tray drive bay, complete the following steps:
   a. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).
   b. Make a note of where the cables are attached; then, remove them.
   c. Pull up on the release lever at the top of the drive bay; then, grasp the 2.5-inch hot-swap drive cage and pull it out of the front of the drive bay.
6. If you are instructed to return the 2.5-inch hot-swap drive cage, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a 2.5-inch hot-swap drive cage

To install a 2.5-inch hot-swap drive cage, complete the following steps.

Release
latch
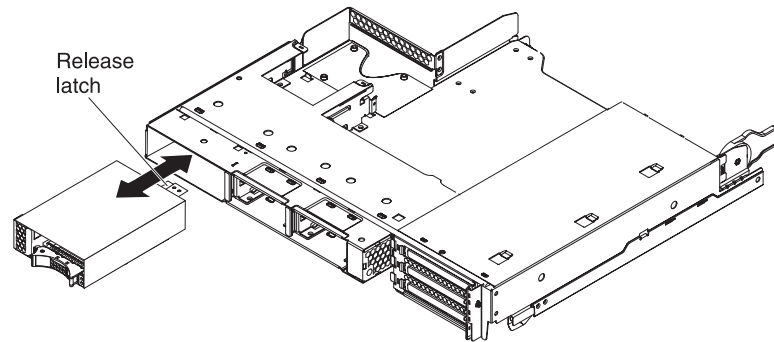
1. Touch the static-protective package that contains the 2.5-inch hot-swap drive cage to any *unpainted* metal surface on the outside of the system-board tray; then, remove the 2.5-inch hot-swap drive cage from the package.
2. Align the 2.5-inch hot-swap drive cage with the drive bay; then, carefully slide the cage into the bay until it stops and the release lever locks into place.
3. Connect the power and signal cables to the backplane on the 2.5-inch hot-swap drive cage.
4. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).
5. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).
6. Install the hard disk drives, if you removed any (see "Installing a 2.5-inch hot-swap hard disk drive" on page 89).

# Removing the 3U chassis fan assembly

To remove the 3U chassis fan assembly, complete the following steps.
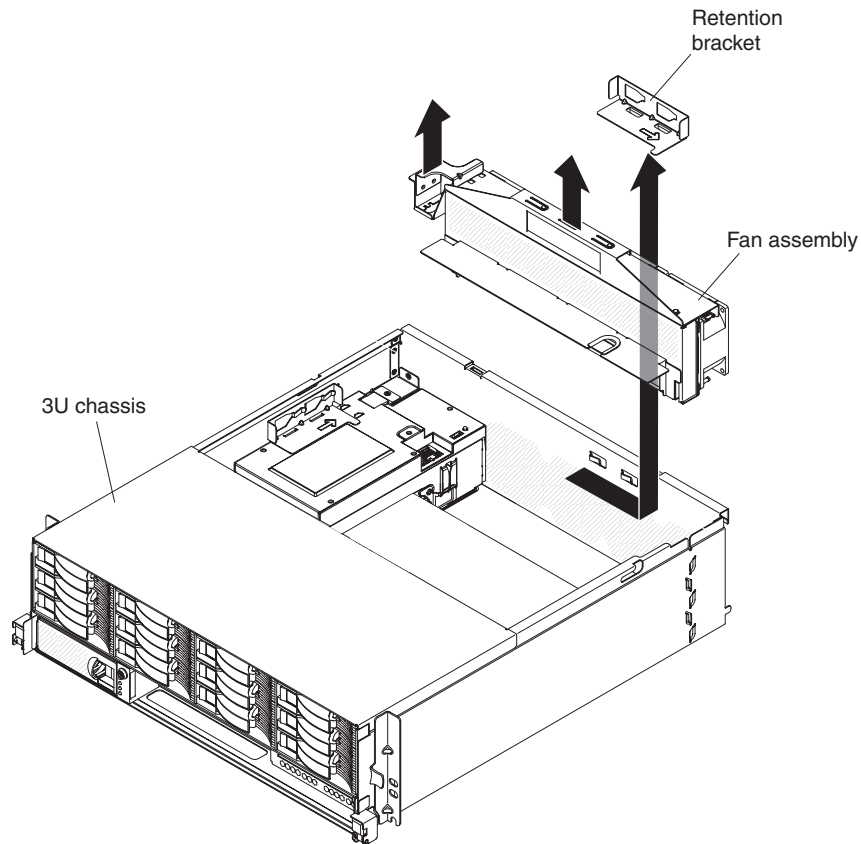
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the 3U chassis is installed in an iDataPlex rack, remove it (see "Removing a 3U chassis from a Type 7825 iDataPlex rack" on page 129).
3. Remove the top cover (see "Removing the 2U chassis fan assembly" on page 80).
4. Slide the retention bracket to release it and remove the bracket from the chassis.
5. Grasp the tab at each end of the fan assembly and lift it out of the chassis.
6. If you are instructed to return the fan assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the 3U chassis fan assembly

To install the 3U chassis fan assembly, complete the following steps.
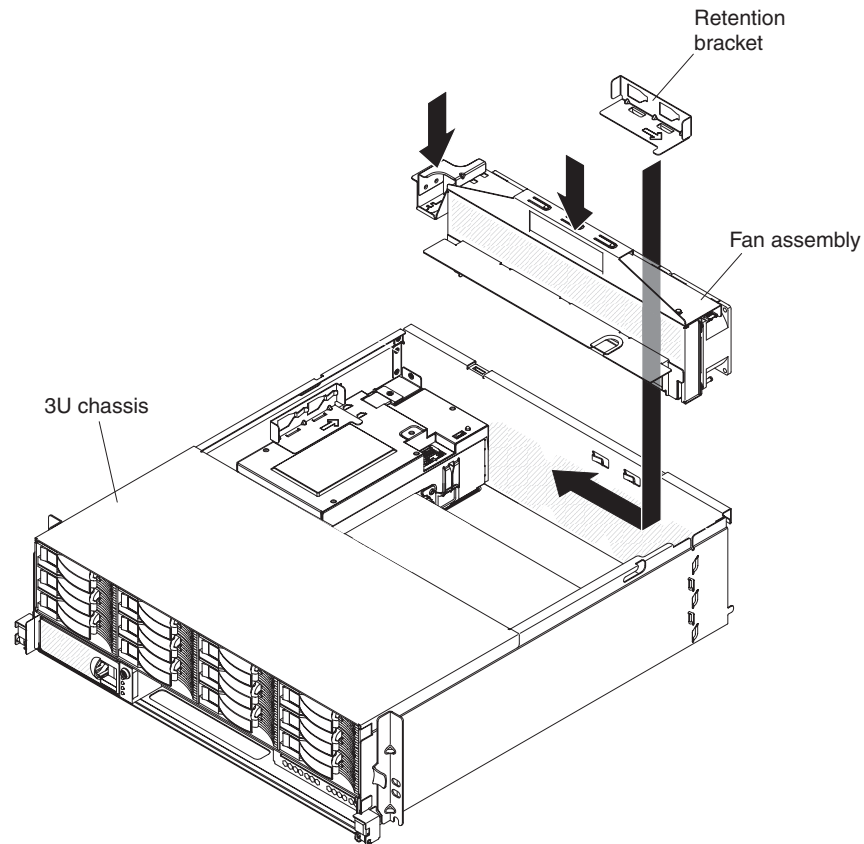
1. Touch the static-protective package that contains the fan assembly to any *unpainted* metal surface on the outside of the chassis; then, remove the fan assembly from the package.
2. Orient the fan assembly over the opening in the chassis. Make sure that the power connector on the fan assembly aligns with the connector on the power supply.
3. Lower the fan assembly into the chassis and press down on the tab above the power connector and make sure that it is fully seated.
4. Install the retention bracket.
5. Install the top cover (see "Installing the 2U chassis top cover" on page 83).
6. Install the 3U chassis in the iDataPlex rack (see "Installing the 3U chassis top cover" on page 85).

Removing and installing an adapter

The following section describes how to remove and replace PCIe adapters.

Important: The maximum power consumption from all supply voltages for a single PCIe slot is the same as specified in PCI Local Bus Specification Revision 2.3 for conventional slots (25 W).

Removing an adapter from the system-board tray

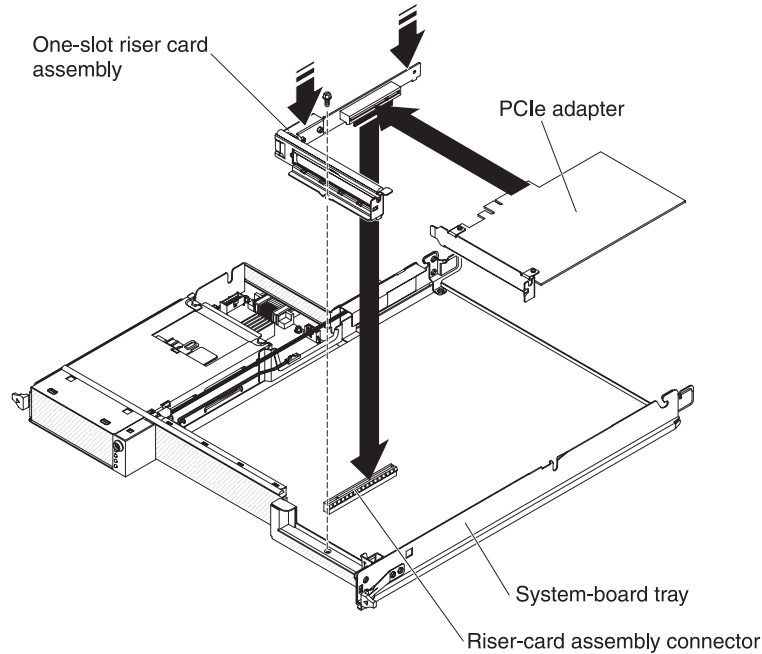To remove a PCIe adapter from the system-board tray, complete the following steps.
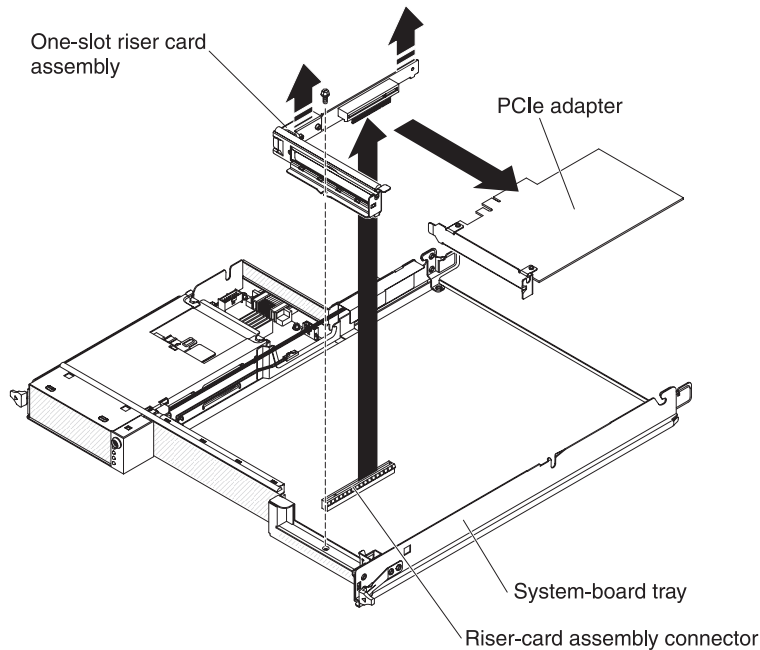
One-slot riser card assembly

PCIe adapter

System-board tray

Riser-card assembly connector

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
3. If a storage enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).
4. Make a note of where cables are attached to the adapter; then, disconnect the cables.
5. Remove the screw that secures the PCIe riser-card assembly to the system-board tray and save it for future use.
6. Pinch the two sides of the PCIe riser-card assembly as indicated in above graphic and pull the PCIe riser-card assembly out of the slot, evenly with both hands, on the system board.
7. Pull the adapter out of the connector on the PCIe riser-card assembly.

   Note: Make sure that the adapter is pulled out carefully. Improper remove of an adapter might damage the PCIe riser-card assembly or the adapter.
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.

Installing an adapter in the system-board tray

To install a PCIe adapter in the system-board tray, complete the following steps.

1. Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the outside of the system-board tray; then, remove the adapter from the package. Avoid touching the components and gold-edge connectors on the adapter.

2. See the documentation that comes with the adapter to determine whether you must set any jumpers or switches.

3. Align the adapter with the PCIe slot on the riser-card assembly; then, press the adapter into the slot.

   Notes:

   a. Ensure that the tab on the riser-card bracket is properly aligned with the slot on the adapter bracket.

   b. Make sure that the adapter is inserted carefully. Improper installation of an adapter might damage the PCIe riser-card assembly or the adapter.

4. Pinch the two sides of the PCIe riser-card assembly as indicated in above graphic and insert the PCIe riser-card assembly with the adapter into the riser-card slot, evenly with both hands, on the system board. Then, install the retaining screw.

5. If you disconnected cables when you removed the adapter, reconnect the cables.

6. Install the storage enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).

7. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

   Note: To complete the installation of the PCIe adapter, see the documentation that comes with the adapter for device-driver and configuration information.

Removing an adapter from the I/O enclosure

To remove a PCIe adapter from the I/O enclosure, complete the following steps.
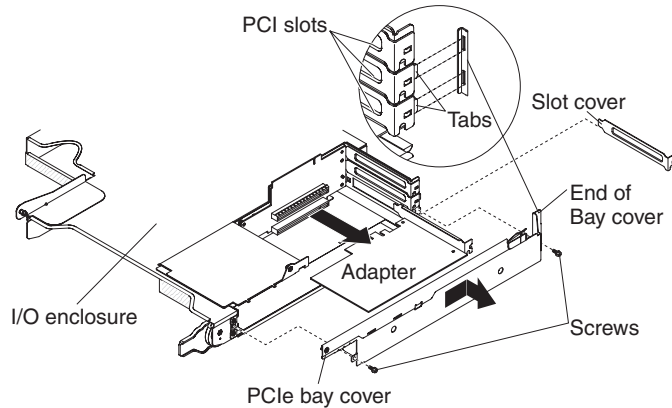
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
3. Remove the I/O enclosure (see "Removing an expansion enclosure from a system-board tray" on page 73).
4. Carefully set the I/O enclosure on a flat, static-protective surface.
5. Remove the PCIe adapter bay cover from the I/O enclosure and save it for future use (see "Removing the PCIe adapter bay cover" on page 113).
6. Make a note of where cables are attached to the adapter; then, disconnect the cables.
7. Pull the adapter out of the connector on the PCIe riser-card assembly.
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.

Installing an adapter in the I/O enclosure

To install a PCIe adapter in the I/O enclosure, complete the following steps.
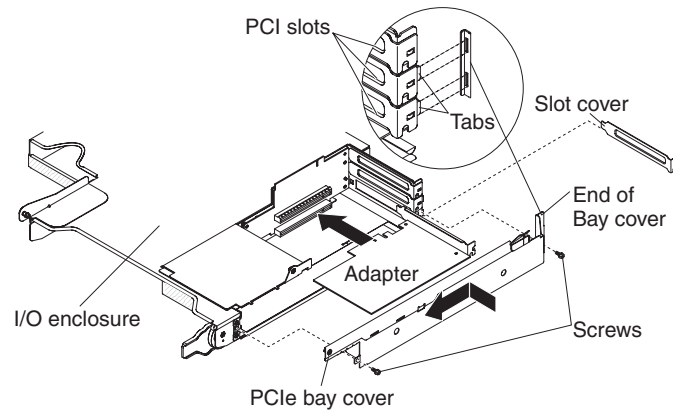

1. Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the outside of the system-board tray; then, remove the adapter from the package. Avoid touching the components and gold-edge connectors on the adapter.
2. See the documentation that comes with the adapter to determine whether you must set any jumpers or switches.
3. Align the adapter with the PCIe slot on the riser-card assembly; then, press the adapter into the slot.
4. If you disconnected cables when you removed the adapter, reconnect the cables.
5. Install the PCIe adapter bay cover on the I/O enclosure (see "Installing the PCIe adapter bay cover" on page 114).
6. Install the I/O enclosure on the system-board tray (see "Installing an expansion enclosure on a system-board tray" on page 74).
7. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

    Note: To complete the installation of the PCIe adapter, see the documentation that comes with the adapter for device-driver and configuration information.

Removing an I^{2}C multiplexer card

To remove a multiplexer card from the I/O enclosure, complete the following steps.
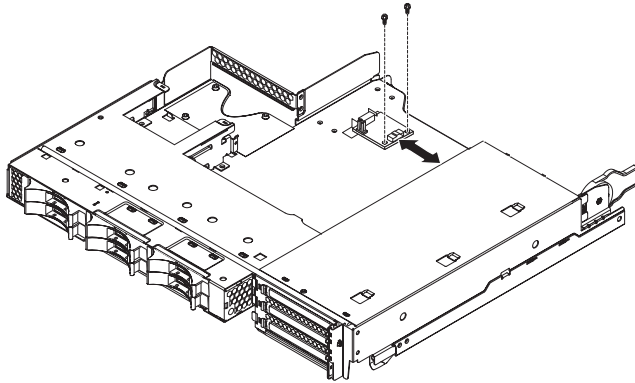

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75).
3. Remove the I/O enclosure from the system-board tray (see "Removing an expansion enclosure from a system-board tray" on page 73).
4. Carefully set the I/O enclosure on a flat, static-protective surface.
5. Make a note of where the cables are attached to the I^{2}C multiplexer card; then, disconnect them.
6. Remove the screws that secure the I^{2}C multiplexer card to the I/O enclosure and save them for future use.
7. Pull the I^{2}C multiplexer card from the mounting clips and remove the card from the I/O enclosure.
8. If you are instructed to return the I^{2}C multiplexer card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an I^{2}C multiplexer card

To install an I^{2}C multiplexer card in the I/O enclosure, complete the following steps.
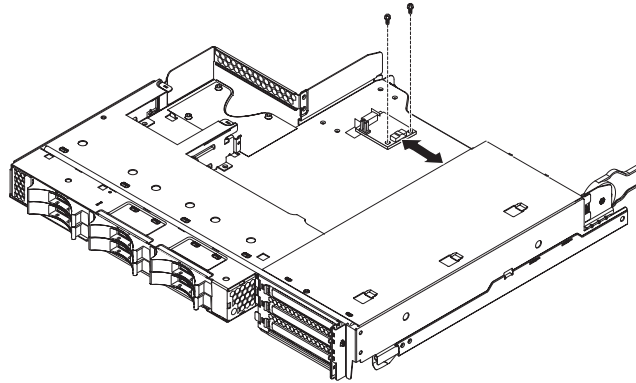
1. Touch the static-protective package that contains the I^{2}C multiplexer card to any *unpainted* metal surface on the outside of the I/O enclosure; then, remove the I^{2}C multiplexer card from the package.
2. Slide the I^{2}C multiplexer card under the mounting clips.
3. Install the retaining screws.
4. Reconnect the cables to the I^{2}C multiplexer card.
5. Install the I/O enclosure (see "Installing an expansion enclosure on a system-board tray" on page 74).
6. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).

Removing a memory module

To remove a DIMM, complete the following steps.
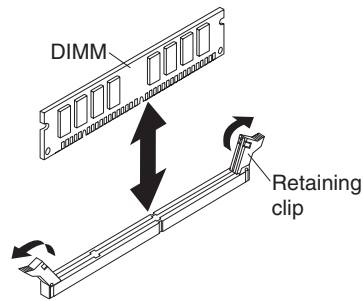
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
3. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).
4. Locate the DIMM connectors (see "System-board connectors" on page 7).
   Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
5. Press the DIMM retaining clips to the open position.
6. Lift the DIMM out of the DIMM connector.
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.

Installing a memory module

If you are replacing a DIMM, read the following information:

- Only DIMM replacement is supported. Installation of additional DIMMs is not supported.
- Install the replacement DIMM in the same slot from which you remove the defective DIMM.
- Make sure that the replacement DIMM is the correct type of memory (see Chapter 3, "Parts listing," on page 59 for a list of DIMMs that are compatible with the server).

To install a DIMM, complete the following steps.
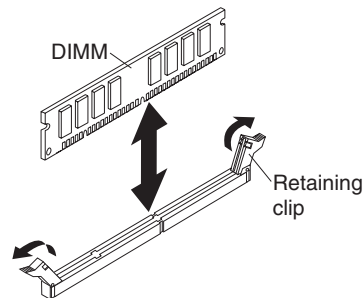
1. Read the documentation that comes with the DIMM.
2. Touch the static-protective package that contains the DIMM to any *unpainted* metal surface on the outside of the system-board tray; then, remove the DIMM from the package.

   Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.
3. Make sure that both of the retaining clips are in the fully open position.
4. Orient the DIMM so that the DIMM keys align correctly with the connector on the system board.
5. Insert the DIMM by pressing the DIMM along the guides into the connector. Make sure that the retaining clips snap into the closed positions.

   Attention: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly installed. In this case, open the retaining clips and remove the DIMM; then, reinsert the DIMM.
6. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).
7. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly

The following section describes how to remove and install a one-bay hard disk drive bracket and cable assembly and a four-bay hard disk drive bracket and cable assembly in a system-board tray and expansion enclosures.

### Removing a one-bay hard disk drive bracket and cable assembly

To remove a one-bay hard disk drive bracket and cable assembly from a system-board tray or I/O enclosure, complete the following steps.
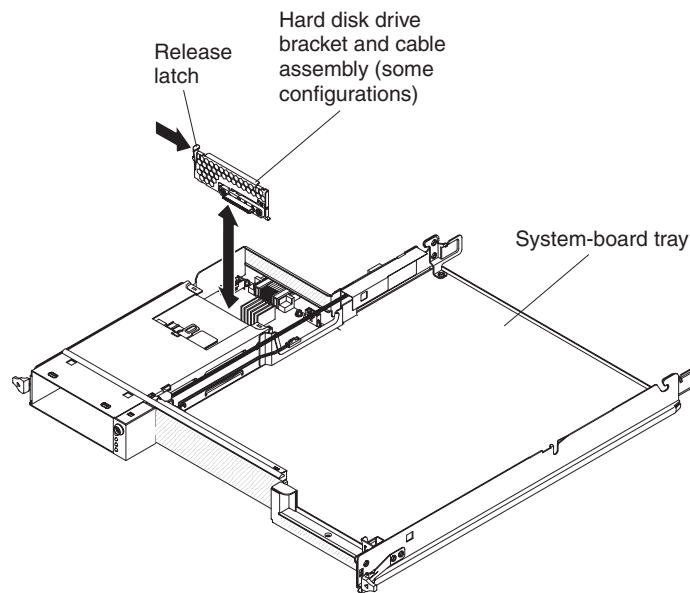
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75).
3. If you are removing the hard disk drive bracket and cable assembly from a system-board tray, complete the following steps:

   a. If the system-board tray has an expansion enclosure attached, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).

   b. If a 3.5-inch hard disk drive is installed in the system-board tray, remove it (see "Removing a 3.5-inch simple-swap hard disk drive" on page 90).

   c. Make a note of where the hard disk drive bracket and cable assembly cables are attached; then, disconnect them.

   d. Press inward on the hard disk drive bracket and cable assembly release latch; then, lift the assembly off the mounting tabs and out of the system-board tray.

4. If you are removing the hard disk drive bracket and cable assembly from an I/O enclosure, complete the following steps:

   a. Remove the I/O enclosure from the system-board tray and set it on a flat, static-protective surface (see "Removing an expansion enclosure from a system-board tray" on page 73).

b. If a hard disk drive is installed in the I/O enclosure, remove it (see "Removing a 3.5-inch simple-swap hard disk drive" on page 90).

   c. Make a note of where the hard disk drive bracket and cable assembly cables are attached; then, disconnect them.

   d. Press inward on the hard disk drive bracket and cable assembly release latch; then, lift the assembly off the mounting tabs and out of the I/O enclosure.

5. If you are instructed to return the hard disk drive bracket and cable assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a one-bay hard disk drive bracket and cable assembly

To install a one-bay hard disk drive bracket and cable assembly in a system-board tray or I/O enclosure, complete the following steps.
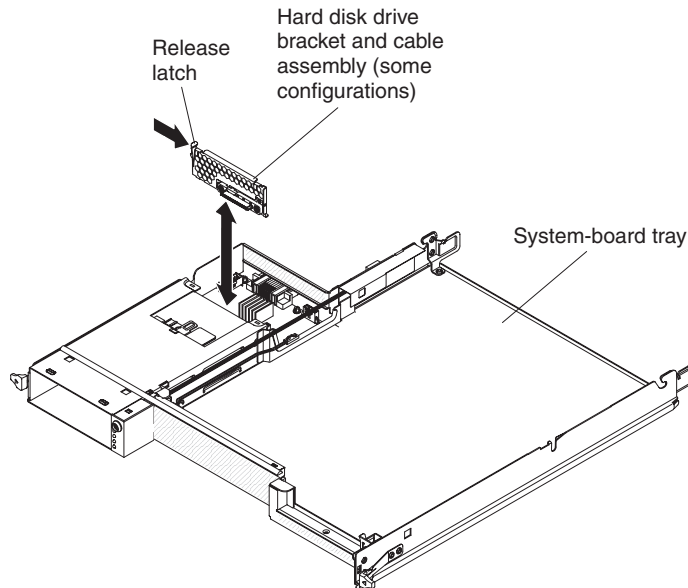
1. Touch the static-protective package that contains the hard disk drive bracket and cable assembly to any *unpainted* metal surface on the outside of the system-board tray or I/O enclosure; then, remove the hard disk drive bracket and cable assembly from the package.

2. Place the hard disk drive bracket and cable assembly on the mounting tabs inside the system-board tray or I/O enclosure; then, press down on the hard disk drive bracket and cable assembly until the release latch clicks into place.

3. Reconnect the hard disk drive bracket and cable assembly cables.

4. Install the hard disk drive, if you removed one from the system-board tray or I/O enclosure (see "Installing a 3.5-inch simple-swap hard disk drive" on page 91).

5. If you are installing the hard disk drive bracket and cable assembly in a system-board tray, complete the following steps:

   a. Install the expansion enclosure, if you removed one from the system-board tray (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).

   b. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).

6. If you are installing the hard disk drive bracket and cable assembly in an I/O enclosure, complete the following steps:

   a. Install the I/O enclosure on the system-board tray (see "Installing an expansion enclosure on a system-board tray" on page 74).

   b. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).

7. If you are instructed to return the hard disk drive bracket and cable assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

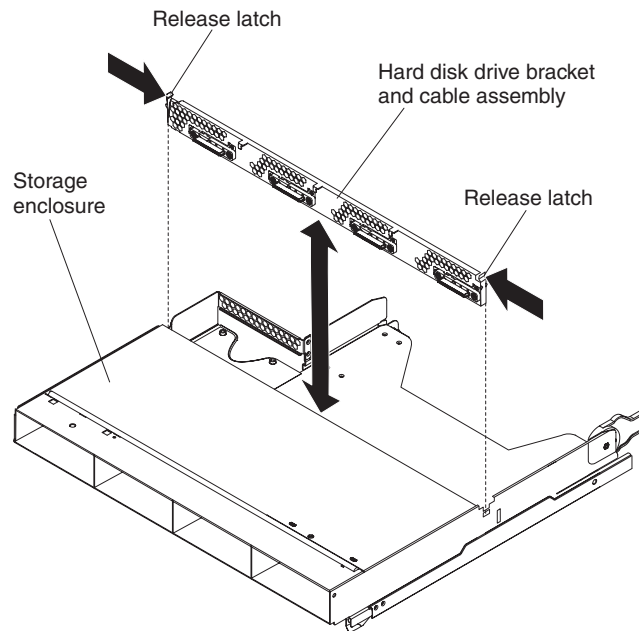## Removing a four-bay hard disk drive bracket and cable assembly

To remove a four-bay hard disk drive bracket and cable assembly from the storage enclosure, complete the following steps.
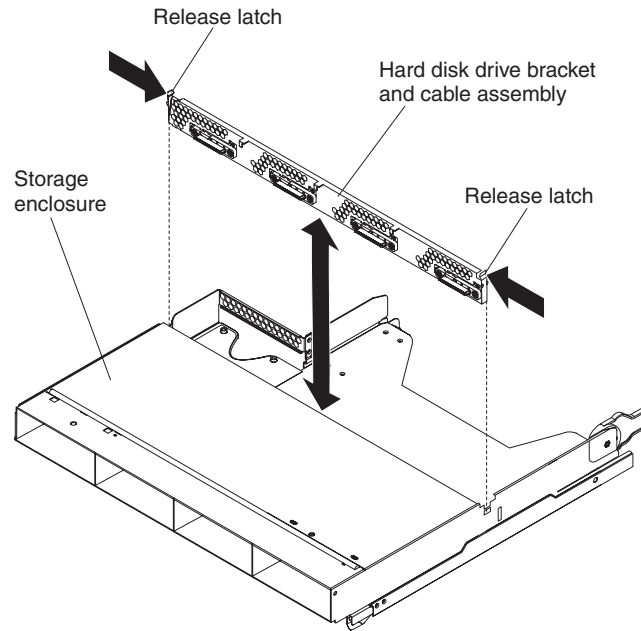
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.

2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75).

3. Remove the storage enclosure from the system-board tray (see "Removing an expansion enclosure from a system-board tray" on page 73).

4. Carefully set the storage enclosure on a flat, static-protective surface.

5. If hard disk drives are installed in the storage enclosure, make note of where the drives are installed; then, remove them (see "Removing a 3.5-inch simple-swap hard disk drive" on page 90).

6. Make a note of where the hard disk drive bracket and cable assembly cables are attached; then, disconnect them.

7. Press inward on the hard disk drive bracket and cable assembly release latches; then, lift the hard disk drive bracket and cable assembly off the mounting tabs and out of the storage enclosure.

8. If you are instructed to return the hard disk drive bracket and cable assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a four-bay hard disk drive bracket and cable assembly

To install a four-bay hard disk drive bracket and cable assembly in the storage enclosure, complete the following steps.


1. Touch the static-protective package that contains the hard disk drive bracket and cable assembly to any *unpainted* metal surface on the outside of the storage enclosure; then, remove the hard disk drive bracket and cable assembly from the package.
2. Place the hard disk drive bracket and cable assembly on the mounting tabs inside the storage enclosure; then, press down on the hard disk drive bracket and cable assembly until the release latches click into place.
3. Reconnect the hard disk drive bracket and cable assembly cables.
4. Install the hard disk drives, if you removed any from the storage enclosure (see "Installing a 3.5-inch simple-swap hard disk drive" on page 91).
5. Install the storage enclosure (see "Installing an expansion enclosure on a system-board tray" on page 74).
6. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).
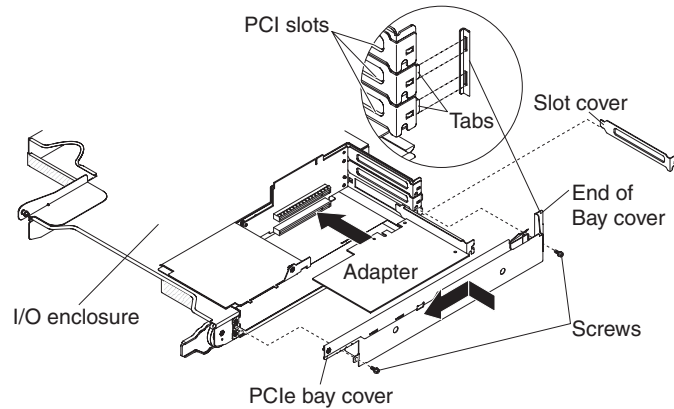
Removing the PCIe adapter bay cover

To remove the adapter bay cover from the I/O enclosure, complete the following steps.
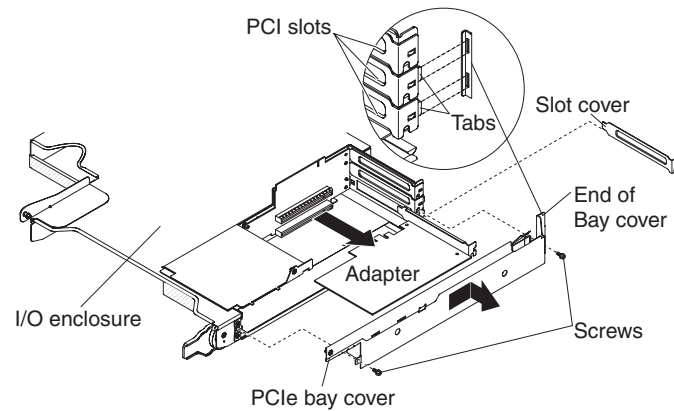
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
3. Remove the I/O enclosure (see "Removing an expansion enclosure from a system-board tray" on page 73).
4. Carefully set the I/O enclosure on a flat, static-protective surface.
5. Remove the two screws that secure the PCIe adapter bay cover to the I/O enclosure and save the screws for future use.
6. Slide the PCIe adapter bay cover out of the mounting tabs and remove it from the I/O enclosure.
7. If you are instructed to return the PCIe adapter bay cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
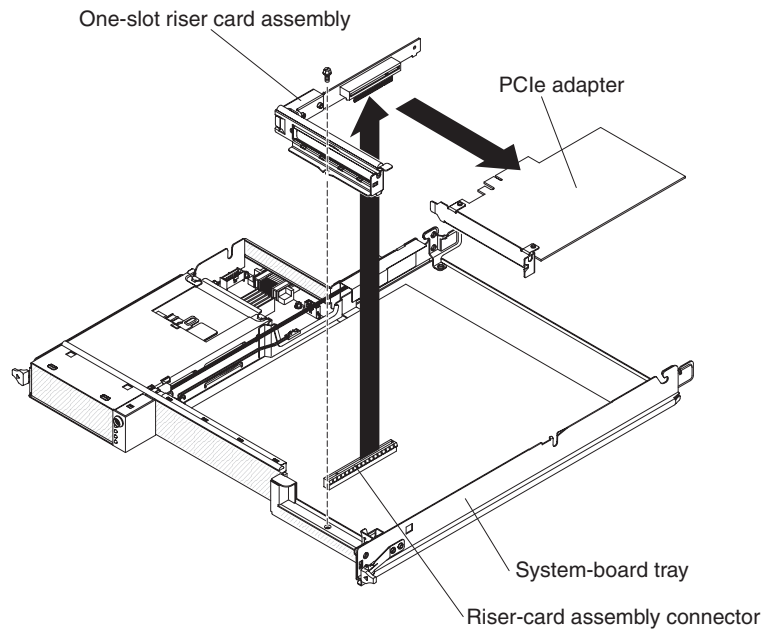
Installing the PCIe adapter bay cover

To install the PCIe adapter bay cover on the I/O enclosure, complete the following steps.

PCI slots

Slot cover

Tabs

End of
Bay cover

Adapter

I/O enclosure

Screws

PCIe bay cover

1. Make sure that no wires are protruding and might interfere with the cover.
2. Orient the PCIe adapter bay cover so that the retention tabs in the cover align with the tab slots in the enclosure.
3. Slide the PCIe adapter bay cover into the tab slots in the I/O enclosure.
4. Install the two retaining screws.
5. Install the I/O enclosure on the system-board tray (see "Installing an expansion enclosure on a system-board tray" on page 74).
6. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

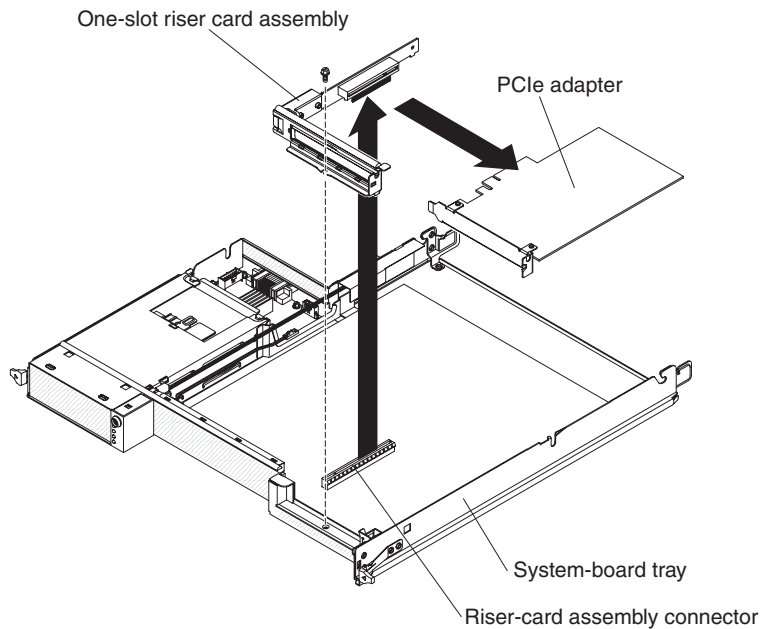# Removing a PCIe riser-card assembly from the system-board tray

To remove a PCIe riser-card assembly from the system-board tray, complete the following steps.

One-slot riser card assembly

PCIe adapter

System-board tray

Riser-card assembly connector

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
3. If a storage enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).
4. Remove the screw that secures the PCIe riser-card assembly to the system-board tray and save it for future use.
5. Pull the PCIe riser-card assembly out of the riser-card slot on the system board.
6. If an adapter is installed on the PCIe riser-card assembly, remove it (see "Removing an adapter from the system-board tray" on page 100).
7. If you are instructed to return the PCIe riser-card assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a PCIe riser-card assembly in the system-board tray

To install a PCIe riser-card assembly in the system-board tray, complete the following steps.

One-slot riser card assembly

PCIe adapter

System-board tray

Riser-card assembly connector

1. Touch the static-protective package that contains the PCIe riser-card assembly to any *unpainted* metal surface on the outside of the system-board tray; then, remove the PCIe riser-card assembly from the package.

2. Install the PCIe adapter, if you removed one (see "Installing an adapter in the system-board tray" on page 101).

3. Press the PCIe riser-card assembly into the riser-card slot on the system board.

4. Install the retaining screw.

5. Install the storage enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).

6. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

Removing a power-supply paddle card from an expansion enclosure

Note: The following information describes how to remove a power-supply paddle card from an I/O enclosure. Removing the power-supply paddle card from another type of expansion enclosure is similar. A power-supply paddle card is rarely used in an expansion enclosure.

To remove a power-supply paddle card from an expansion enclosure, complete the following steps.
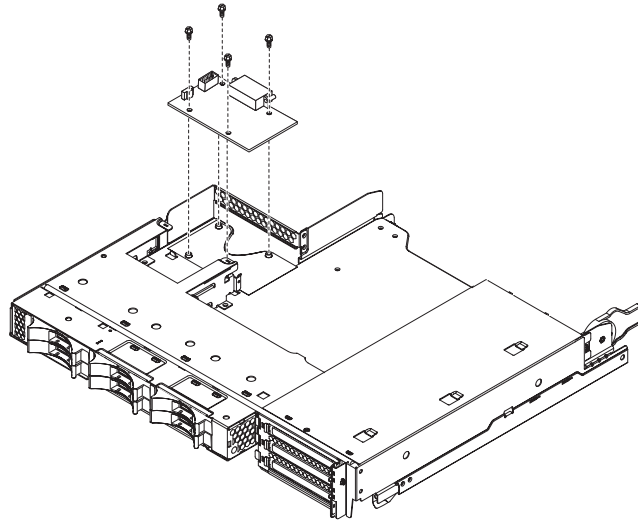
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75).
3. Carefully set the system-board tray on a flat, static-protective surface.
4. Remove the expansion enclosure and set it on a flat, static-protective surface (see "Removing an expansion enclosure from a system-board tray" on page 73).
5. If any 3.5-inch simple-swap drives are installed in the expansion enclosure, complete the following steps:
   a. Remove the 3.5-inch drives (see "Removing a 3.5-inch simple-swap hard disk drive" on page 90).
   b. Note the cable routing of the hard disk drive bracket and cable assembly cables; then, disconnect the cables.
   c. Remove the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).
6. Make a note of where cables are attached to the power-supply paddle card; then, disconnect them.
7. Remove the four screws that secure the power-supply paddle card to the expansion enclosure and save them for future use.
8. Lift the power-supply paddle card out of the expansion enclosure.
9. If you are instructed to return the power-supply paddle card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a power-supply paddle card in an expansion enclosure

Note: The following information describes how to install a power-supply paddle card in an I/O enclosure. Installing the power-supply paddle card in another type of expansion enclosure is similar.

To install a power-supply paddle card in an expansion enclosure, complete the following steps.
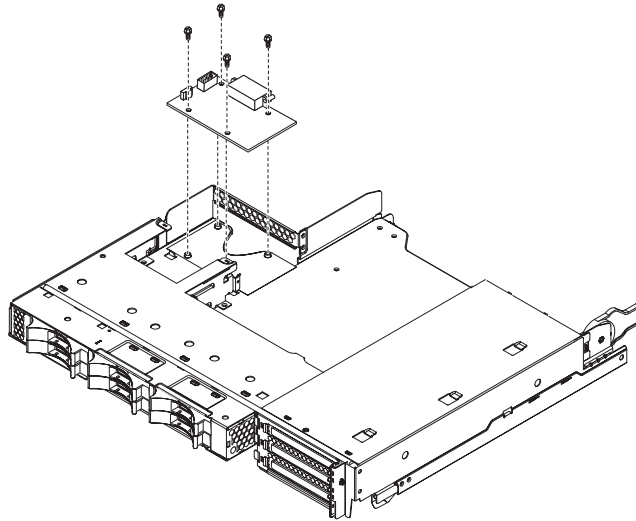
1. Touch the static-protective package that contains the power-supply paddle card to any *unpainted* metal surface on the outside of the expansion enclosure; then, remove the power-supply paddle card from the package.
2. Place the power-supply paddle card on the mounting studs in the expansion enclosure and install the four retaining screws.
3. Reconnect the power-supply paddle card cables.
4. Install the 3.5-inch simple-swap drives, if you removed any when you removed the power-supply paddle card. Complete the following steps:
   a. Install the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).
   b. Reconnect the hard disk drive bracket and cable assembly cables.
   c. Install the 3.5-inch hard disk drive (see "Installing a 3.5-inch simple-swap hard disk drive" on page 91).
5. Install the expansion enclosure (see "Installing an expansion enclosure on a system-board tray" on page 74).
6. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).
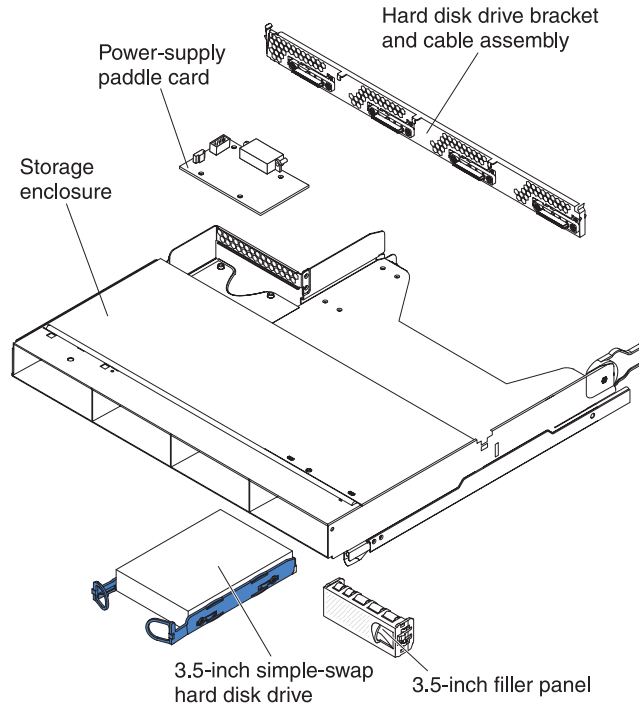
Removing a storage enclosure

To remove a storage enclosure, complete the following steps.
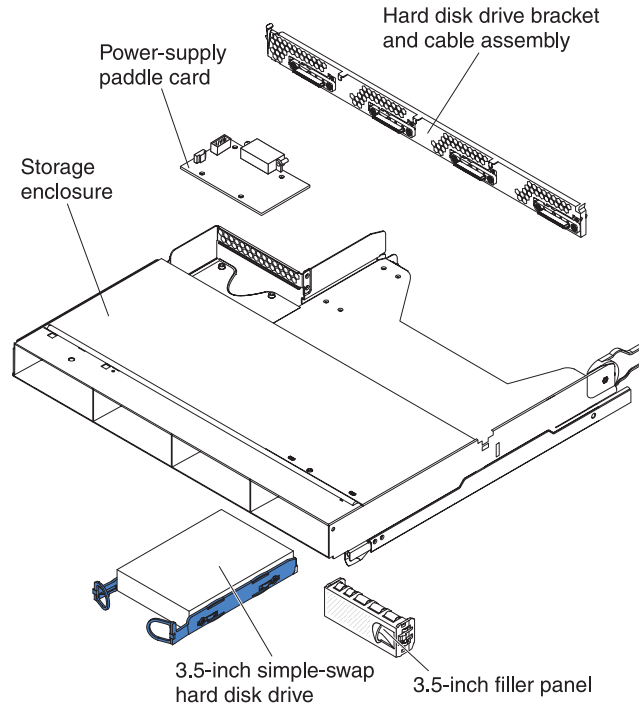
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the storage enclosure is installed on a system-board tray, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73).
3. Carefully set the storage enclosure on a flat, static-protective surface.
4. Make a note of where the hard disk drives are installed; then, remove them. Place them on a static-protective surface or install them in the new storage enclosure (see "Removing and installing a hard disk drive" on page 88).
5. Note the cable routing; then, remove the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).
6. If you are instructed to return the storage enclosure, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a storage enclosure

To install a storage enclosure, complete the following steps.

Hard disk drive bracket
and cable assembly

Power-supply
paddle card

Storage
enclosure

3.5-inch simple-swap
hard disk drive

3.5-inch filler panel

1. Carefully set the storage enclosure on a flat, static-protective surface.
2. Install the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).
3. Install the hard disk drives in the storage enclosure (see "Removing and installing a hard disk drive" on page 88).
4. Install the storage enclosure on the system-board tray (see "Installing an expansion enclosure on a system-board tray" on page 74).

Removing the system-board tray cover

To remove the system-board tray cover, complete the following steps.
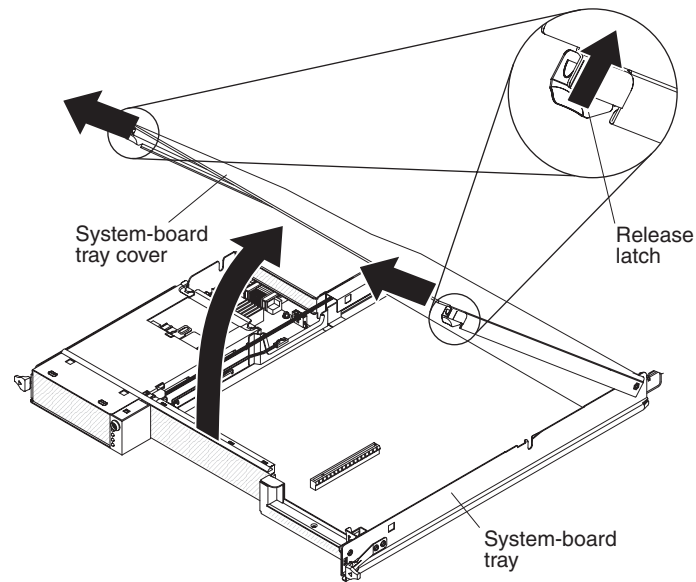
System-board
tray cover

Release
latch

System-board
tray

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).
3. Carefully set the system-board tray on a flat, static-protective surface, with the cover side up.
4. Pull the cover release latch on each side of the system-board tray outward and lift the cover open.
5. If you are instructed to return the system-board tray cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the system-board tray cover

To install the system-board tray cover, complete the following steps.

Attention: You cannot insert the system-board tray into a chassis until the cover is installed and closed or an expansion enclosure is installed. Do not attempt to override this protection.
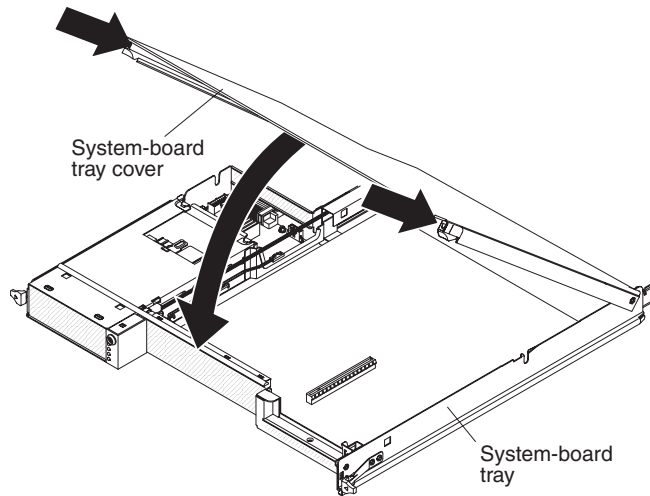
1. Lower the cover so that the pins at the rear of the cover slide down into the slots at the rear of the system-board tray. Before you close the cover, make sure that all components are installed and seated correctly, all internal cables are correctly routed, and you have not left loose tools or parts inside the system-board tray.
2. Pivot the cover to the closed position until it clicks into place.
3. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

Removing and replacing FRUs

FRUs must be installed only by trained service technicians.

Note: The illustrations in this document might differ slightly from your hardware.
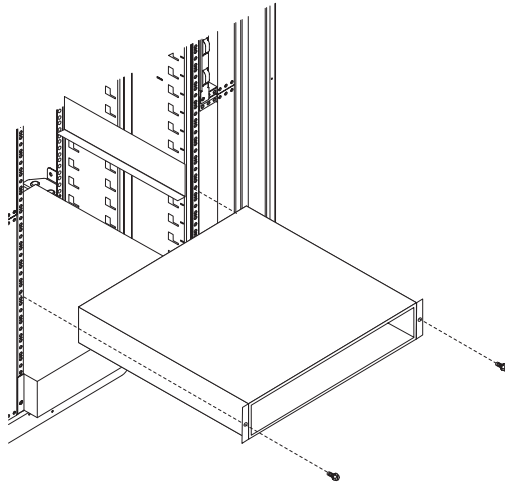
Removing the 2U chassis from a Type 7825 iDataPlex rack

To remove the 2U chassis from a Type 7825 iDataPlex rack, complete the following steps.
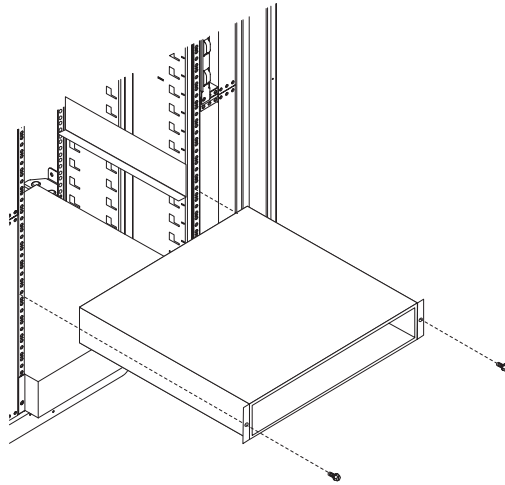
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the chassis contains a system-board tray that is operating, shut down the operating system; then, press the power-control button to turn off the system-board tray (see "Turning off the system-board tray" on page 6 for more information).
3. Remove any installed system-board trays (see "Removing the system-board tray from a 2U chassis" on page 75).
4. Remove the two screws that secure the chassis to the rack; then, pull the chassis forward, lift the chassis out of the iDataPlex rack, and set it on a flat, static-protective surface.
5. If you are replacing a damaged chassis, remove the fan assembly and power supply from the chassis, and place them on a static-protective surface or install them in the new chassis (see "Removing the 2U chassis fan assembly" on page 80 and "Removing the 2U chassis power supply" on page 94).
6. If you are instructed to return the 2U chassis, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

# Installing the 2U chassis in a Type 7825 iDataPlex rack

To install the 2U chassis in a Type 7825 iDataPlex rack, complete the following steps.

1. If you are installing a new chassis, install the power supply and fan assembly that were removed from the old chassis (see "Installing the 2U chassis power supply" on page 95 and "Installing the 2U chassis fan assembly" on page 81).
2. Install the chassis on the rails; then, install the two screws to secure the chassis to the rack.
3. Install any system-board trays that you removed when you removed the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).

Removing a 2x2 2.5-inch hot-swap SAS backplane

To remove a 2x2 2.5-inch hot-swap SAS backplane from the I/O enclosure, complete the following steps.
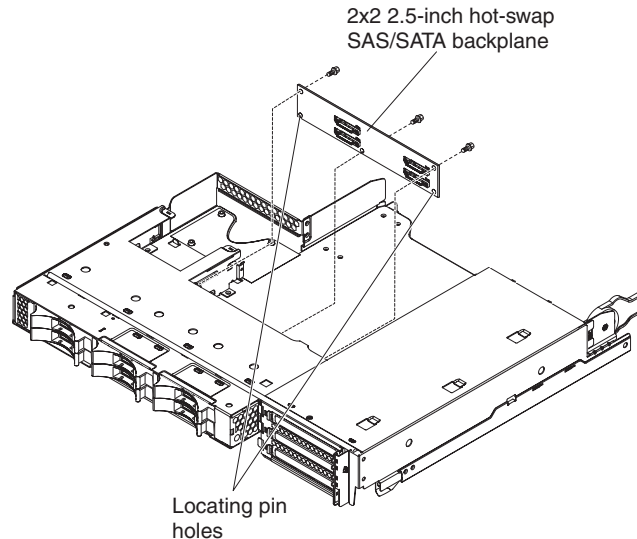
2x2 2.5-inch hot-swap
SAS/SATA backplane

Locating pin
holes

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75).
3. Remove the I/O enclosure from the system-board tray (see "Removing an expansion enclosure from a system-board tray" on page 73).
4. Carefully set the I/O enclosure on a flat, static-protective surface.
5. Make note of where the drives are installed; then, remove them (see "Removing a 2.5-inch hot-swap hard disk drive" on page 88).

   Attention: If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.
6. Make note of where the cables are attached to the backplane; then, disconnect them.
7. Remove the screws that secure the 2x2 2.5-inch hot-swap SAS backplane to the I/O enclosure and save them for future use.
8. Pull the 2x2 2.5-inch hot-swap SAS backplane off the locating pins and out of the I/O enclosure.
9. If you are instructed to return the 2x2 2.5-inch hot-swap SAS backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

# Installing a 2x2 2.5-inch hot-swap SAS backplane

To install a 2x2 2.5-inch hot-swap SAS backplane in the I/O enclosure, complete the following steps.
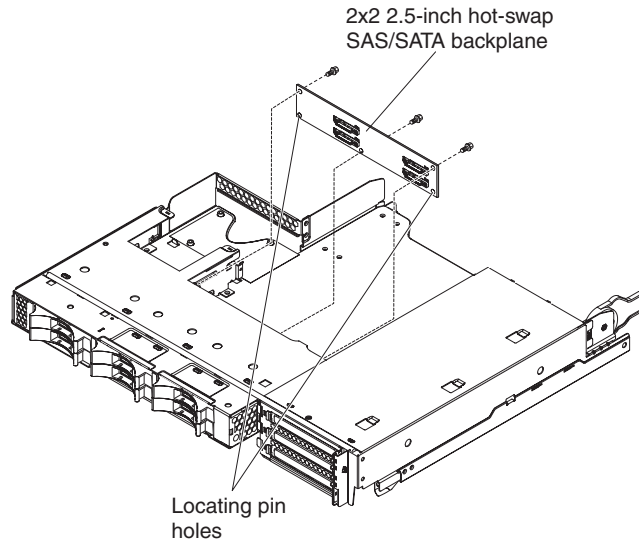
1. Touch the static-protective package that contains the 2x2 2.5-inch hot-swap SAS backplane to any *unpainted* metal surface on the outside of the I/O enclosure; then, remove the 2x2 2.5-inch hot-swap SAS backplane from the package.
2. Place the 2x2 2.5-inch hot-swap SAS backplane on the locating pins inside the I/O enclosure.
3. Install the retaining screws.
4. Reconnect the cables to the 2x2 2.5-inch hot-swap SAS backplane.
5. Install the 2.5-inch hot-swap hard disk drives, if you removed any from the I/O enclosure (see "Installing a 2.5-inch hot-swap hard disk drive" on page 89).
6. Install the I/O enclosure (see "Installing an expansion enclosure on a system-board tray" on page 74).
7. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).

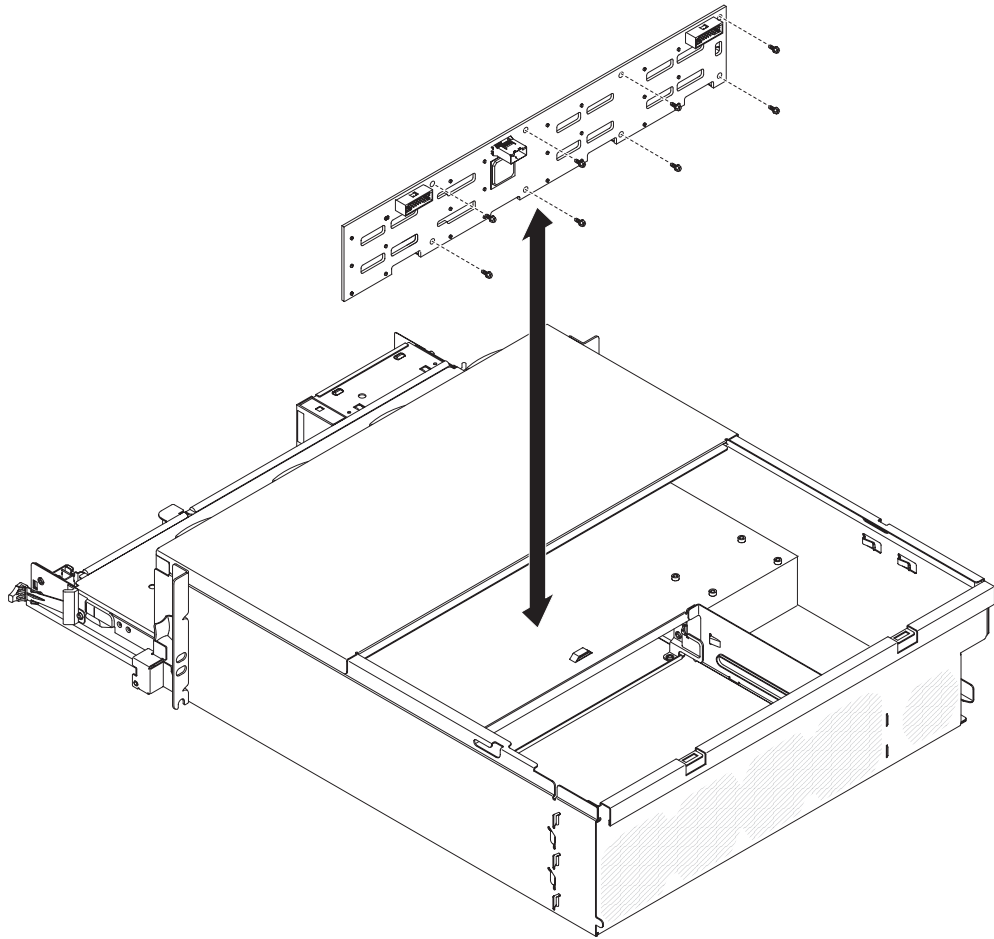# Removing the 3U chassis hard disk drive backplane

To remove the 3U chassis hard disk drive backplane, complete the following steps.
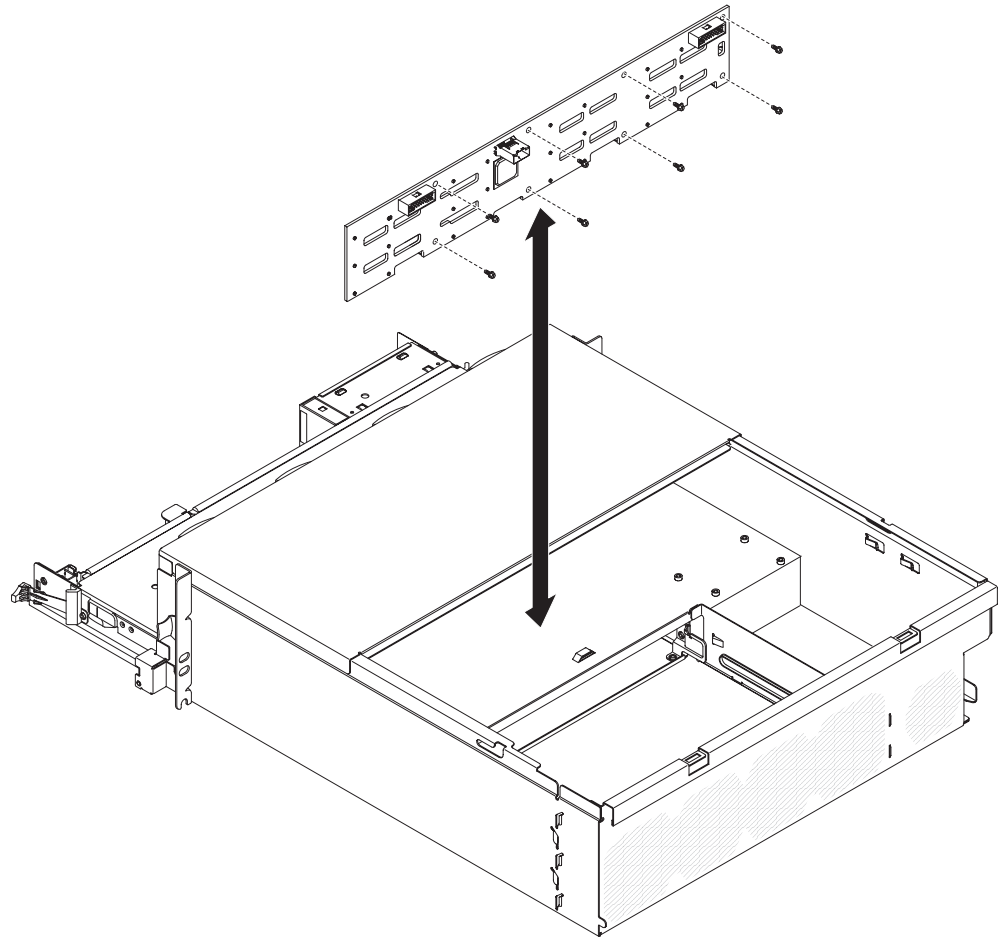
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the 3U chassis is installed in an iDataPlex rack, remove it (see "Removing a 3U chassis from a Type 7825 iDataPlex rack" on page 129).
3. Remove the top cover (see "Removing the 3U chassis top cover" on page 84).
4. Remove the fan assembly (see "Removing the 3U chassis fan assembly" on page 98).
5. Partially remove the system-board tray to disengage the power-supply connector at the rear of the system-board tray (see "Removing the system-board tray from a 3U chassis" on page 77).
6. Pull the hard disk drives out of the server slightly to disengage them from the hard disk drive backplane (see "Removing and installing a hard disk drive" on page 88).
7. Remove the power-supply paddle card and the power supply (see "Removing the 3U chassis power supply and power-supply paddle card" on page 131).
8. Disconnect the cables from the hard disk drive backplane, remove the ten screws, and remove the hard disk drive backplane from the 3U chassis.
9. If you are instructed to return the hard disk drive backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the 3U chassis hard disk drive backplane

To install the 3U chassis hard disk drive backplane, complete the following steps.


1. Touch the static-protective package that contains the hard disk drive backplane to any *unpainted* metal surface on the outside of the 3U chassis; then, remove the hard disk drive backplane from the package.
2. Position the hard disk drive backplane in the 3U chassis and secure it with ten screws.
3. Install the power-supply paddle card and power supply (see "Installing the 3U chassis power supply and power-supply paddle card" on page 133).
4. Install the system-board tray in the 3U chassis (see "Installing the system-board tray in a 3U chassis" on page 78).
5. Install the fan assembly (see "Installing the 3U chassis fan assembly" on page 99).
6. Install the top cover (see"Installing the 3U chassis top cover" on page 85).
7. Install the 3U chassis in the iDataPlex rack (see "Installing a 3U chassis in a Type 7825 iDataPlex rack" on page 130).
8. Install the hard disk drives (see "Removing and installing a hard disk drive" on page 88).

Removing a 3U chassis from a Type 7825 iDataPlex rack

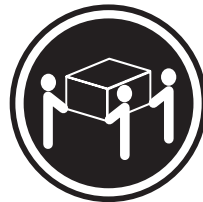To remove the 3U chassis from a Type 7825 iDataPlex rack, complete the following steps.
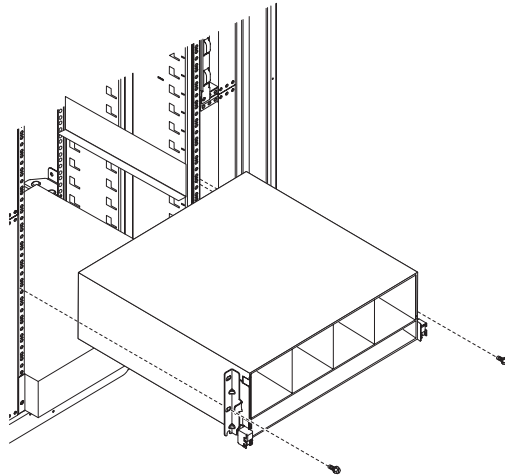
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. Turn off the server and all attached devices (see "Turning off the system-board tray" on page 6).
3. If external cables are connected to the front of the system-board tray, note where they are connected; then, remove them.
4. Note where the hard disk drives are installed; then, remove them (see "Removing and installing a hard disk drive" on page 88).

   Statement 4:
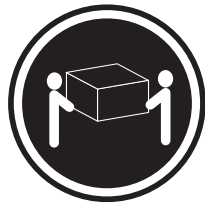
   | ≥ 18 kg (39.7 lb) | ≥ 32 kg (70.5 lb) | ≥ 55 kg (121.2 lb) |

   CAUTION:
   Use safe practices when lifting.

5. Remove the screws and slide the 3U chassis from the iDataPlex rack.
6. Set the 3U chassis on a flat, static-protective surface.
7. If you are instructed to return the 3U chassis, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a 3U chassis in a Type 7825 iDataPlex rack

To install the 3U chassis in a Type 7825 iDataPlex rack, complete the following steps.
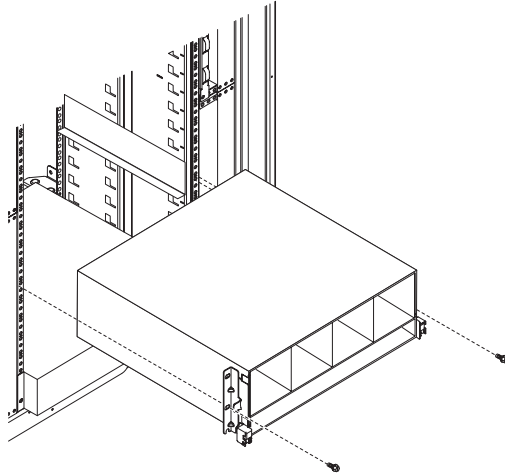
1. Align the 3U chassis with the rails on the iDataPlex rack; then, slide the 3U chassis into the rack until it is fully seated.
2. Install the M6 screws that secure the chassis to the rack.
3. Install the hard disk drives (see "Removing and installing a hard disk drive" on page 88).
4. Reconnect the cables on the front of the system-board tray.
5. Turn on the system-board tray (see "Turning on the system-board tray" on page 5).
6. Make sure that the power-on LED on the system-board tray operator panel is lit continuously, indicating that the system-board tray is receiving power and is turned on.

If you have changed the configuration of the system-board tray, you might have to update the server configuration through the BIOS configuration utility program (see "Using the BIOS configuration utility program" on page 156).
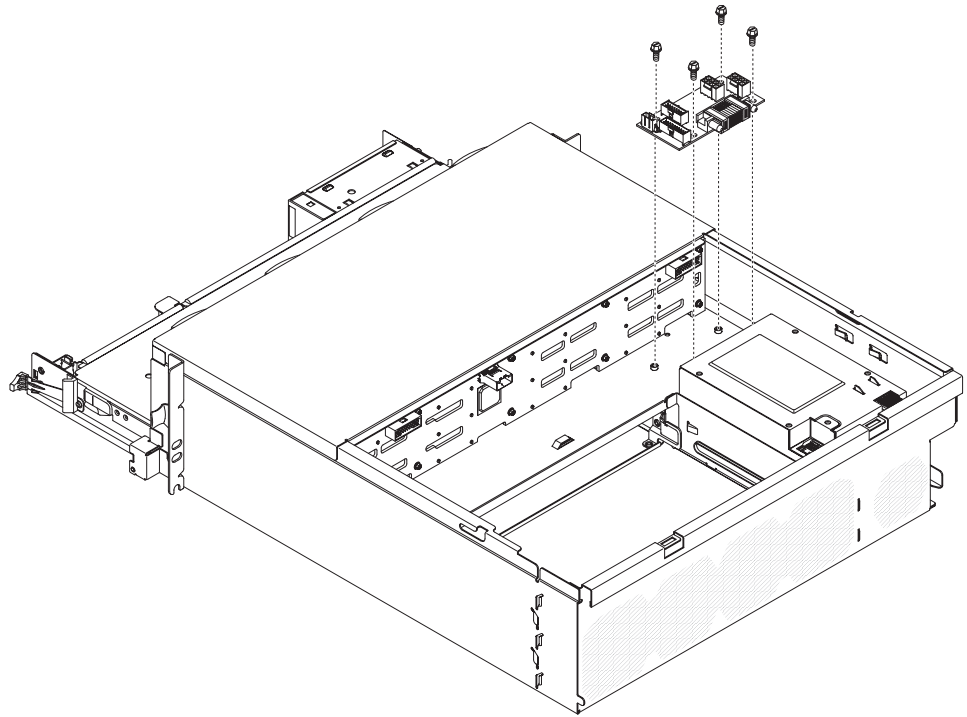
Removing the 3U chassis power supply and power-supply paddle card

To remove the 3U chassis power supply and power-supply paddle card, complete the following steps:

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.

2. If the 3U chassis is installed in an iDataPlex rack, remove it (see "Removing a 3U chassis from a Type 7825 iDataPlex rack" on page 129).

3. Remove the top cover (see "Removing the 3U chassis top cover" on page 84).

4. Remove the fan assembly (see "Removing the 3U chassis fan assembly" on page 98).

5. Partially remove the system-board tray to disengage the power connector at the rear of the system-board tray (see "Removing the system-board tray from a 3U chassis" on page 77).

6. Press the release button on the power supply and simultaneously slide the retention bracket toward the rear of the 3U chassis and remove the retention bracket.

Tabs Release button
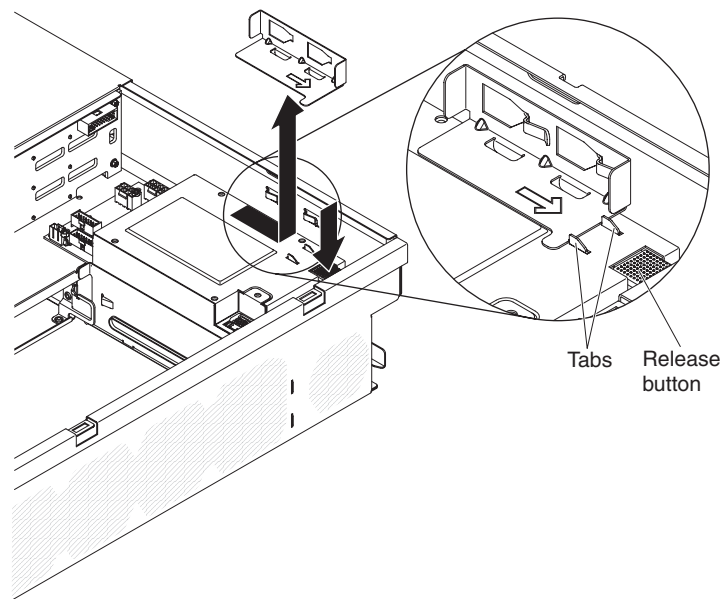
7. Disconnect the cables from the power-supply paddle card, remove the four screws, and remove the power-supply paddle card from the system-board tray.

8. Lift the power supply from the 3U chassis.
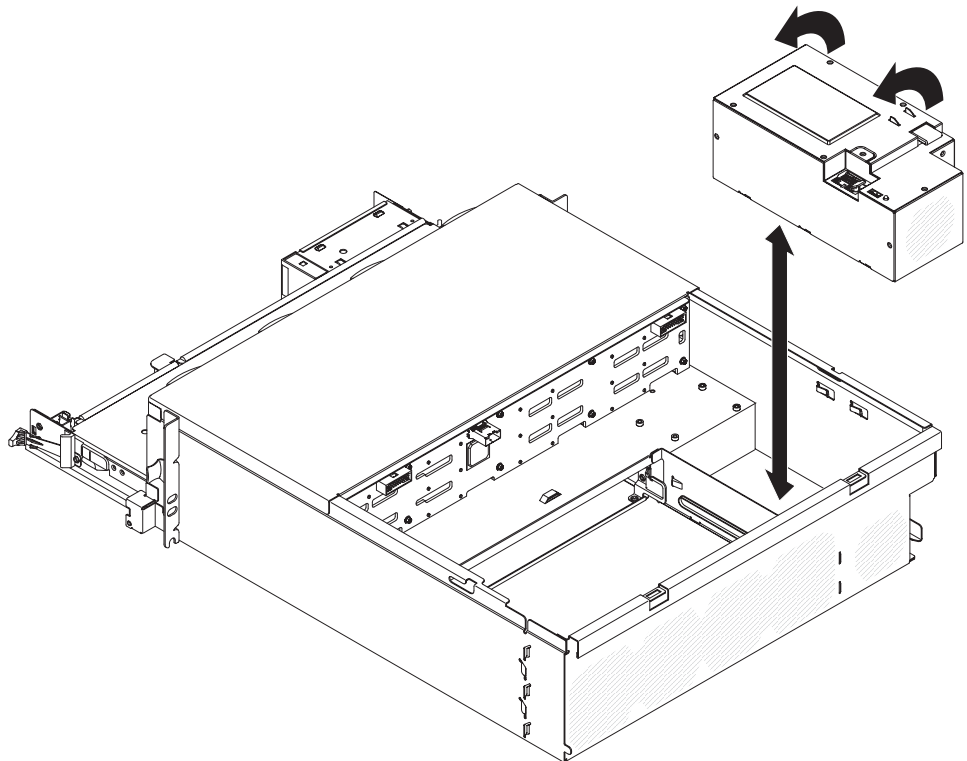
9. If you are instructed to return the power supply or the power-supply paddle card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

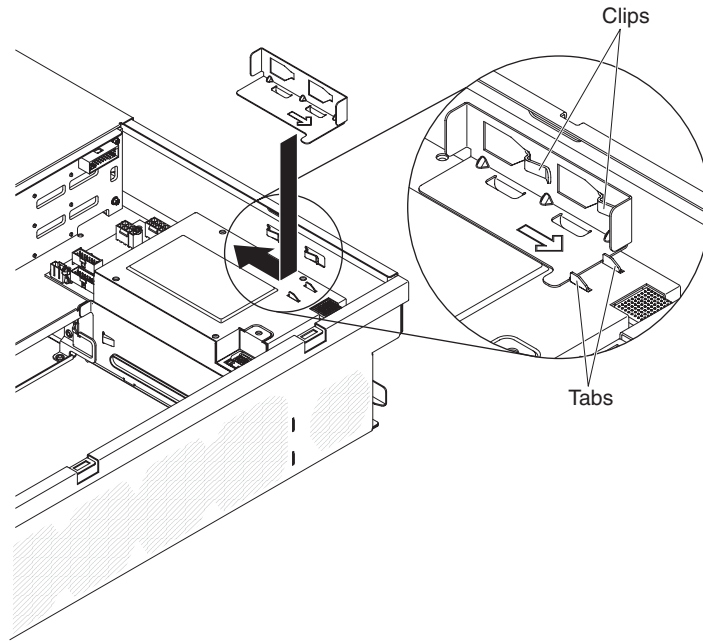# Installing the 3U chassis power supply and power-supply paddle card

To install the 3U chassis power supply and power-supply paddle card, complete the following steps:

1. Touch the static-protective package that contains the power supply to any *unpainted* metal surface on the outside of the 3U chassis; then, remove the power supply from the package.

2. Lower the power supply into the 3U chassis.
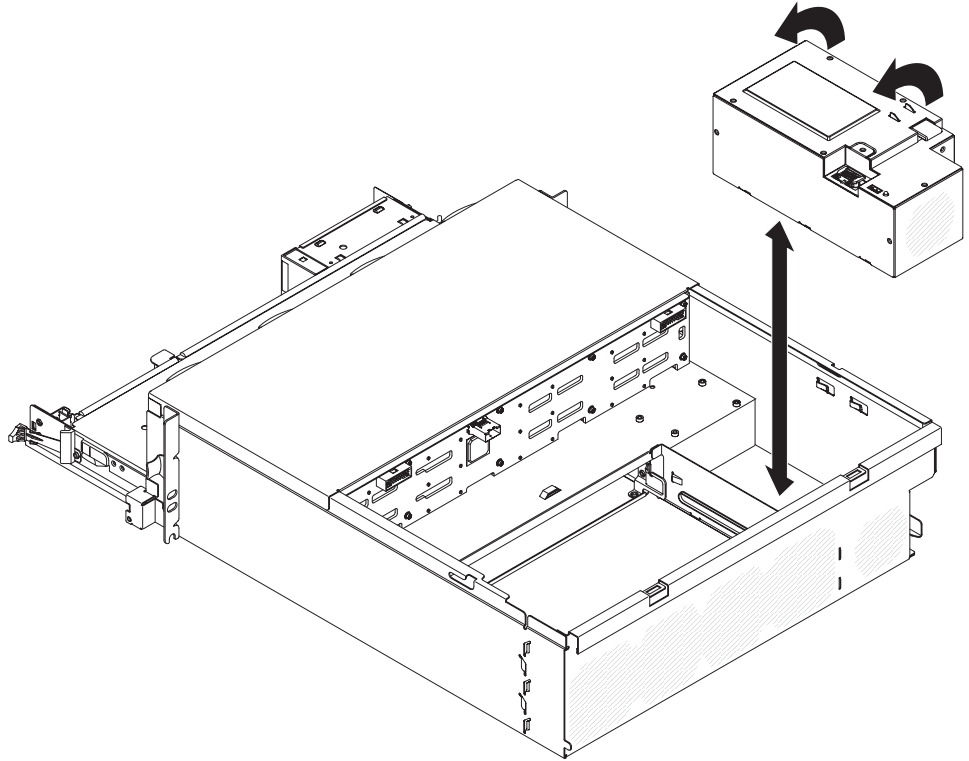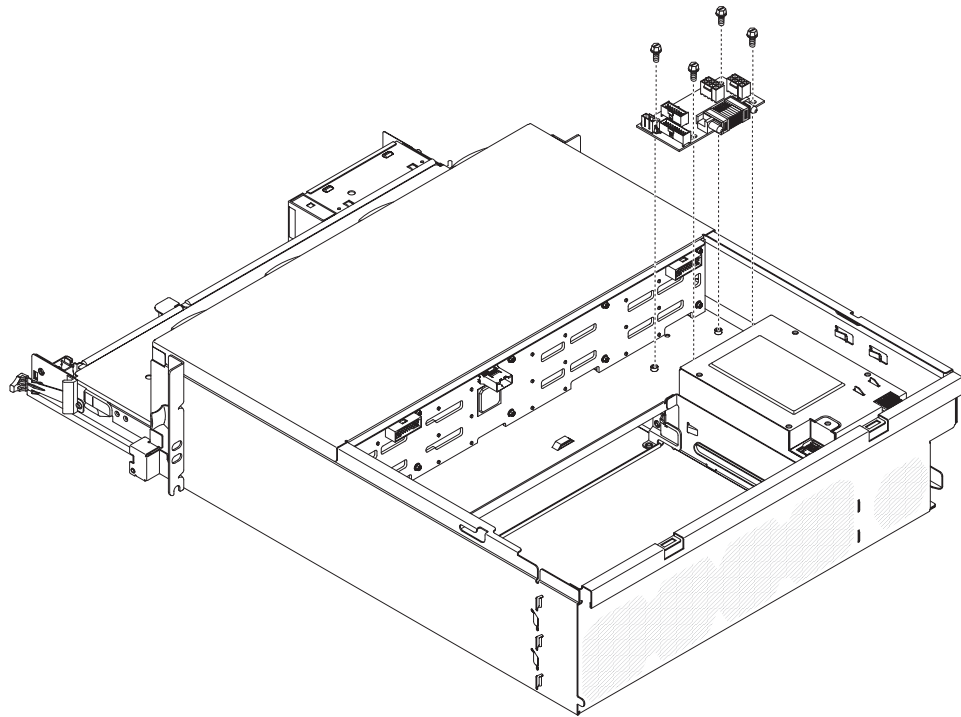

3. Install the retention bracket.

   Note: Make sure that the clips on the side of the chassis secure the retention bracket and that the bracket presses firmly against the tabs on the power supply.

Clips

Tabs

4. Secure the power-supply paddle card with four screws and connect the cables.

5. Install the system-board tray in the 3U chassis (see "Installing the system-board tray in a 3U chassis" on page 78).
6. Install the fan assembly (see "Installing the 3U chassis fan assembly" on page 99).
7. Install the top cover (see"Installing the 3U chassis top cover" on page 85).
8. Install the 3U chassis in the iDataPlex rack (see "Installing a 3U chassis in a Type 7825 iDataPlex rack" on page 130).
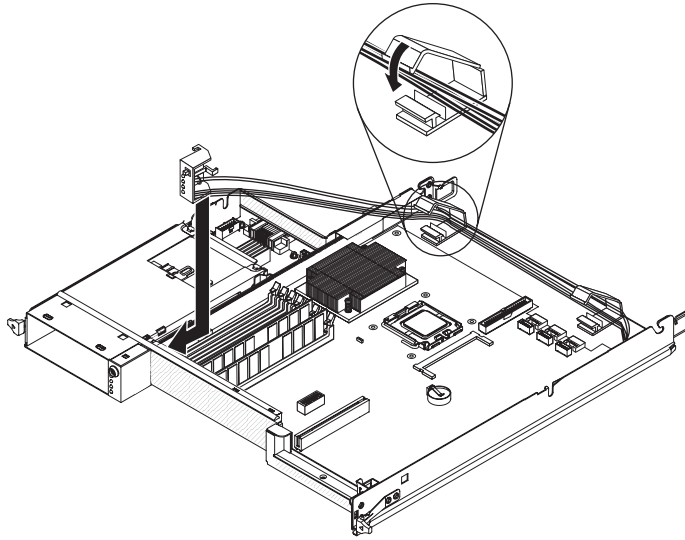
Removing a front-panel assembly

To remove the front-panel assembly, complete the following steps.
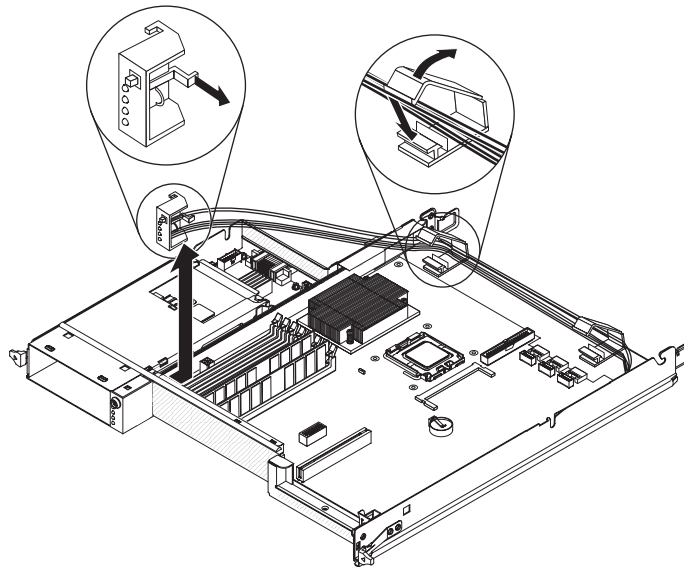
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.

2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).

3. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).

4. If DIMMs are installed in DIMM slot 30 or slot 31, remove the DIMMs (see "Removing a memory module" on page 106). To identify the DIMM connectors, see "System-board connectors" on page 7.

5. Note the cable routing and where each cable is connected and disconnect the cables located around the front-panel assembly to improve accessibility.

6. Press the release tab and slide the front-panel assembly away from the front of the system-board tray.

7. Note the cable routing and disconnect the front-panel assembly cables from the system board and power-supply paddle card.

8. Open the cable retention latches and carefully pull the assembly and cables from the system-board tray.

9. If you are instructed to return the front-panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a front-panel assembly

To install a front-panel assembly, complete the following steps.

1. Press the front-panel assembly into the front of the system-board tray and make sure that it is secure.
2. Connect the front-panel assembly cables to the system board and power-supply paddle card and close the cable retention latches. Carefully route the cables as you connect the cables.
3. Connect the other cables to the system-board tray.

   Note: Make sure that all cables are properly routed and that the cables do not protrude from inside the system-board tray.

4. Install the DIMMs, if you removed any (see "Installing a memory module" on page 107).
5. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).
6. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

Removing an I/O enclosure configured with 2.5-inch hot-swap hard disk drives

To remove an I/O enclosure that is configured with 2.5-inch hot-swap hard disk drives, complete the following steps.
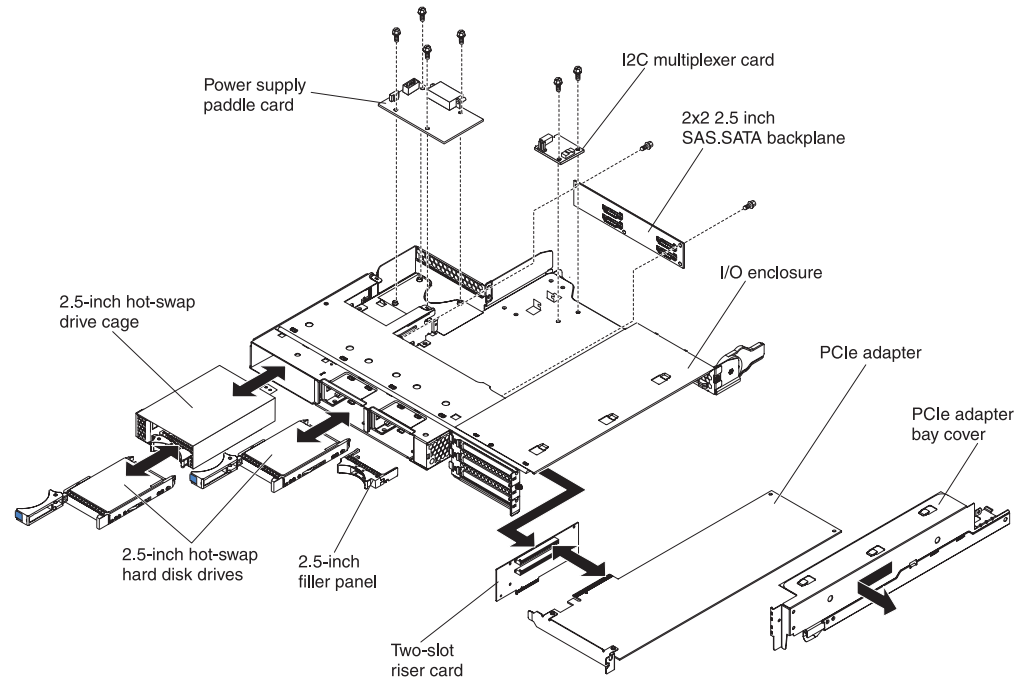
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the I/O enclosure is installed on a system-board tray, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73).
3. Carefully set the I/O enclosure on a flat, static-protective surface.
4. Remove the 2.5-inch simple-swap hard disk drives, if any are installed (see "Removing and installing a hard disk drive" on page 88).
5. Remove the 2.5-inch hot-swap drive cage (see "Removing a 2.5-inch hot-swap drive cage" on page 96).
6. Remove the I^{2}C multiplexer card (see "Removing an I^{2}C multiplexer card" on page 104).
7. Remove the 2x2 2.5-inch hot-swap SAS backplane (see "Removing a 2x2 2.5-inch hot-swap SAS backplane" on page 125).
8. Remove the power-supply paddle card, if one is installed (see "Removing a power-supply paddle card from an expansion enclosure" on page 117).
9. Remove the PCIe adapters, if any are installed (see "Removing an adapter from the I/O enclosure" on page 102).
10. Remove the PCIe riser-card assembly (see "Removing a PCIe riser-card assembly from the I/O enclosure" on page 147).
11. If you are instructed to return the I/O enclosure, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an I/O enclosure configured with 2.5-inch hot-swap hard disk drives

To install an I/O enclosure that is configured with 2.5-inch hot-swap hard disk drives, complete the following steps.
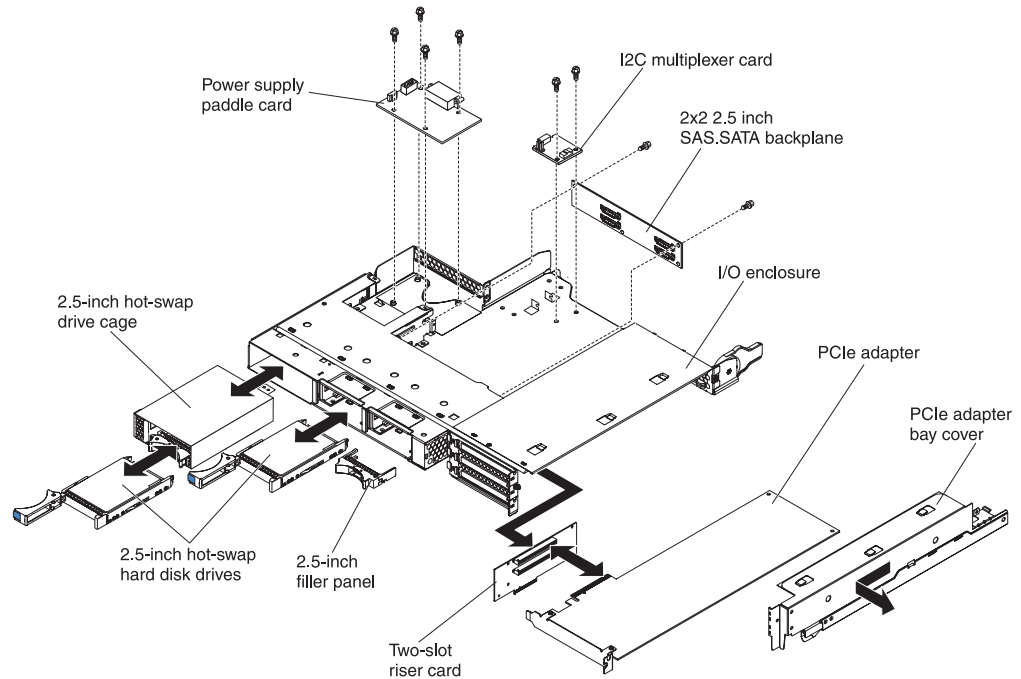
1. Install the PCIe riser-card assembly (see "Installing a PCIe riser-card assembly in the I/O enclosure" on page 148).
2. Install the PCIe adapters, if you removed any (see "Installing an adapter in the I/O enclosure" on page 103).
3. Install the I^2C multiplexer card (see "Installing an I^2C multiplexer card" on page 105).
4. Install the 2x2 2.5-inch hot-swap SAS backplane (see "Installing a 2x2 2.5-inch hot-swap SAS backplane" on page 126).
5. Install the 2.5-inch hot-swap drive cage (see "Installing a 2.5-inch hot-swap drive cage" on page 97).
6. Install the power-supply paddle card, if you removed one (see "Installing a power-supply paddle card in an expansion enclosure" on page 118).
7. Install the hard disk drives, if you removed any (see "Removing and installing a hard disk drive" on page 88).
8. Install the I/O enclosure on the system-board tray (see "Installing an expansion enclosure on a system-board tray" on page 74).

Removing an I/O enclosure configured with 3.5-inch simple-swap hard disk drives

To remove an I/O enclosure that is configured with 3.5-inch simple-swap hard disk drives, complete the following steps.
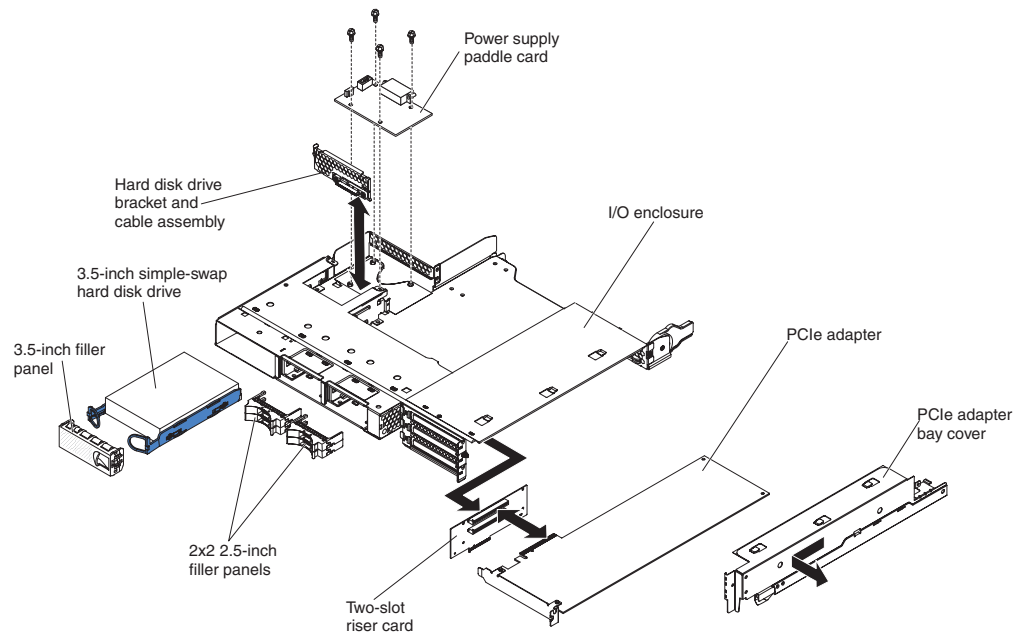
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the I/O enclosure is installed on a system-board tray, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73).
3. Carefully set the I/O enclosure on a flat, static-protective surface.
4. Remove the 3.5-inch simple-swap hard disk drive, if one is installed (see "Removing and installing a hard disk drive" on page 88).
5. Note the cable routing for the hard disk drive bracket and cable assembly cables; then, disconnect the cables.
6. Remove the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).
7. Remove the power-supply paddle card, if one is installed (see "Removing a power-supply paddle card from an expansion enclosure" on page 117).
8. Remove the PCIe adapters, if any are installed (see "Removing an adapter from the I/O enclosure" on page 102).
9. Remove the PCIe riser-card assembly (see "Removing a PCIe riser-card assembly from the I/O enclosure" on page 147).
10. If you are instructed to return the I/O enclosure, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an I/O enclosure configured with 3.5-inch hot-swap hard disk drives

To install an I/O enclosure that is configured with 3.5-inch hot-swap hard disk drives, complete the following steps.
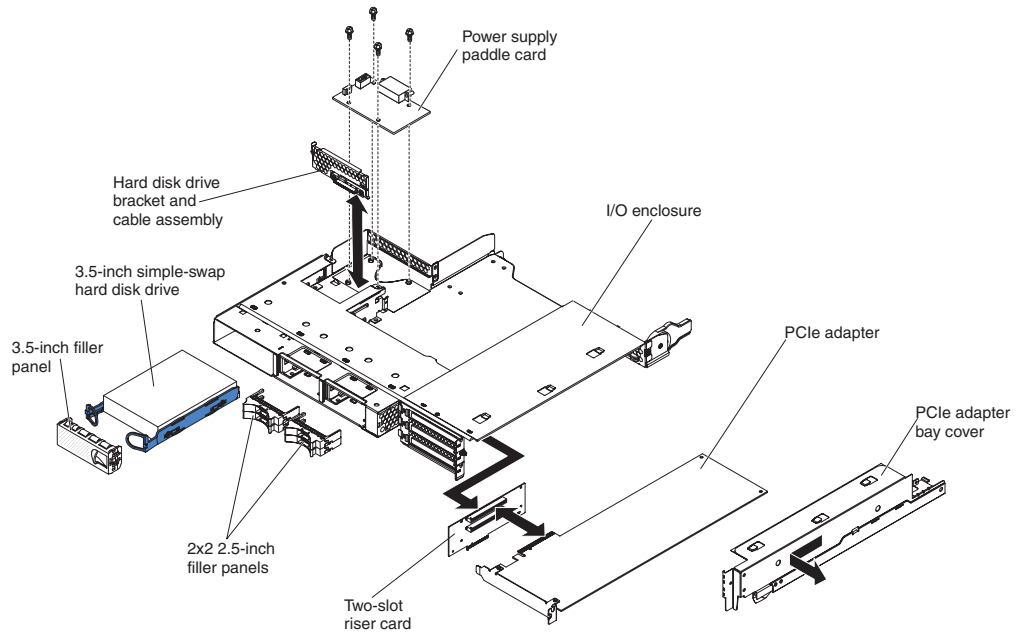
1. Install the PCIe riser-card assembly (see "Installing a PCIe riser-card assembly in the I/O enclosure" on page 148).
2. Install the PCIe adapters, if you removed any (see "Installing an adapter in the I/O enclosure" on page 103).
3. Install the power-supply paddle card, if you removed one (see "Installing a power-supply paddle card in an expansion enclosure" on page 118).
4. Install the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).
5. Install the hard disk drive, if you removed one (see "Removing and installing a hard disk drive" on page 88).
6. Install the I/O enclosure on the system-board tray (see "Installing an expansion enclosure on a system-board tray" on page 74).

Removing a microprocessor and heat sink

Read the following important guidelines before you remove a microprocessor that is not faulty (for example, when you are replacing the system-board assembly).

If you are not replacing a defective heat sink or microprocessor, the thermal material on the heat sink and microprocessor will remain effective if you observe the following precautions:

- Carefully handle the heat sink and microprocessor when you remove or install these components.
- Do not touch the thermal material or otherwise allow it to become contaminated.

Notes:

- The heat-sink FRU is packaged with the thermal material applied to the underside.
- You must replace the thermal material if it becomes contaminated or has come in contact with another object other than its paired microprocessor.
- The heat sink and the thermal material are available as separate FRUs.

To remove a microprocessor and heat sink, complete the following steps.
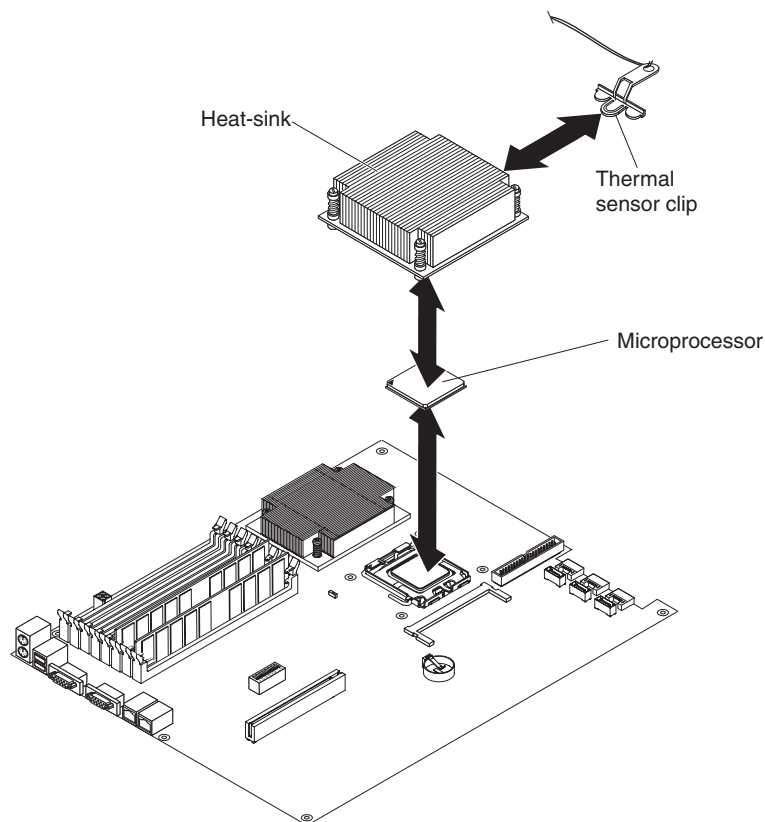
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).

3. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).

4. Remove the heat sink.

   Attention: Do not touch the thermal material on the bottom of the heat sink. Touching the thermal material will contaminate it. If the thermal material on the microprocessor or heat sink becomes contaminated, you must replace it.

   a. Loosen the screw on one side of the heat sink to break the seal with the microprocessor.

   b. Press firmly on the captive screws and loosen them with a screwdriver.

   c. Use your fingers to gently pull the heat sink off the microprocessor.

   d. Pull the thermal sensor clip off the heat sink; then, place the heat sink upside down on a clean, flat surface.

   Attention: Do not use any tools or sharp objects to lift the release lever on the microprocessor socket. Doing so might result in permanent damage to the system board.
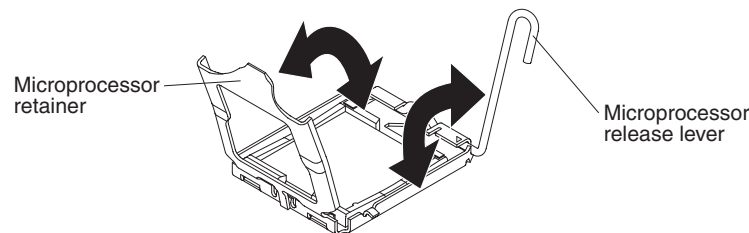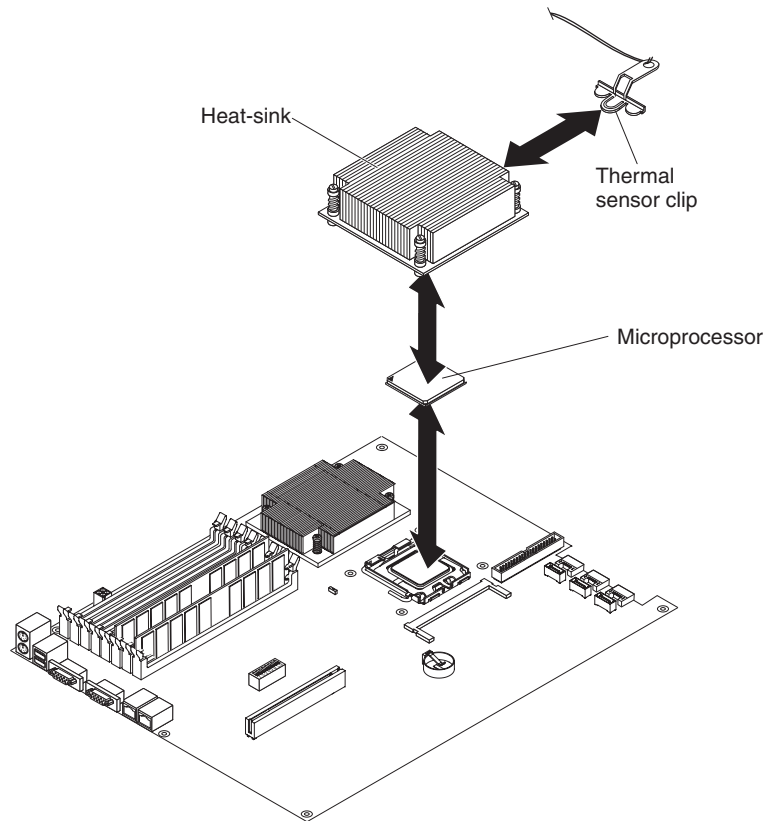

5. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops in the fully open position (approximately a 135° angle). Lift the microprocessor retainer cover upward.

6. Use your fingers to pull the microprocessor out of the socket.
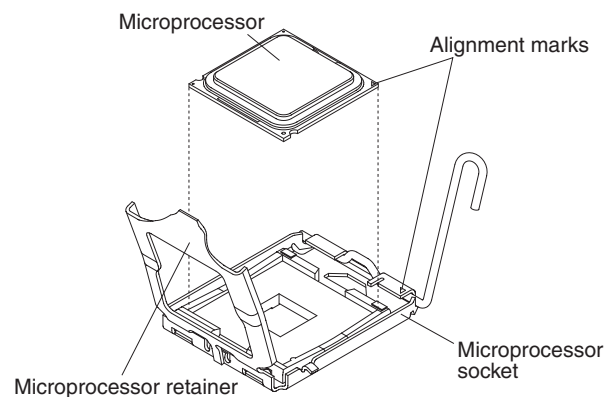
7. If you are instructed to return the microprocessor and heat sink, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
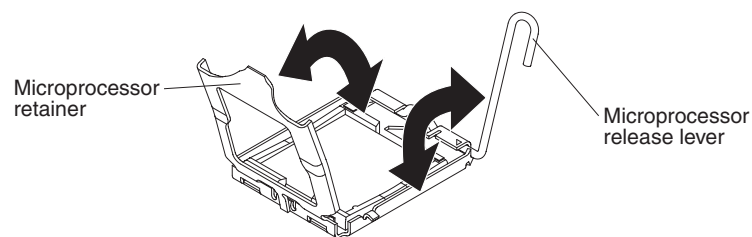
Installing a microprocessor and heat sink

To install a microprocessor and heat sink, complete the following steps.
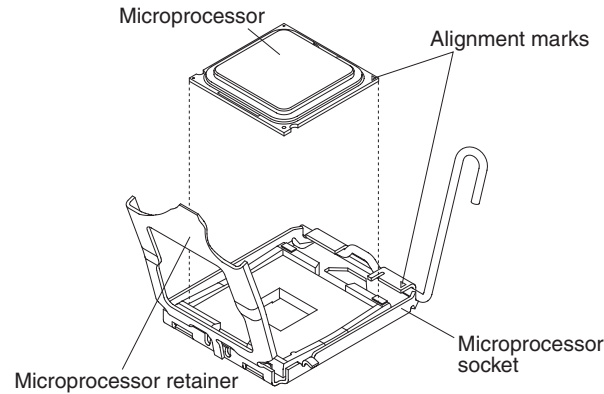

1. Install the microprocessor:

   Attention: Do not use any tools or sharp objects to lift the locking lever on the microprocessor socket. Doing so might result in permanent damage to the system board.

   a. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops in the fully open position (approximately a 135° angle), as shown.

   b. Rotate the microprocessor retainer on the microprocessor socket from its closed position until it stops in the fully open position (approximately a 135° angle), as shown.

   c. Touch the static-protective package that contains the microprocessor to any *unpainted* metal surface on the system-board tray or any *unpainted* metal surface on any other grounded rack component; then, remove the microprocessor from the package.

Attention: Handle the microprocessor only by its edges. Do not touch the contacts on the bottom of the microprocessor or in the microprocessor socket. Touching these contacts might result in permanent damage to the system board.

d. Remove the cover from the bottom of the microprocessor.

e. Center the microprocessor over the microprocessor socket. Align the triangle on the corner of the microprocessor with the triangle on the corner of the socket and carefully place the microprocessor into the socket.

Attention:
- Do not press the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned correctly in the socket before you try to close the microprocessor retainer.

f. Carefully close the microprocessor retainer.

g. Rotate the locking lever on the microprocessor socket to the closed and locked position. Make sure that the lever is secured in the locked position by the tab on the microprocessor socket.

2. Install a heat sink on the microprocessor.

Attention:
- Do not set down the heat sink after you remove the plastic cover.
- Do not touch the thermal material on the bottom of the heat sink. Touching the thermal material will contaminate it.
- If the thermal material on the microprocessor or heat sink becomes contaminated, you must replace it. See "Thermal grease" on page 145 for instructions.
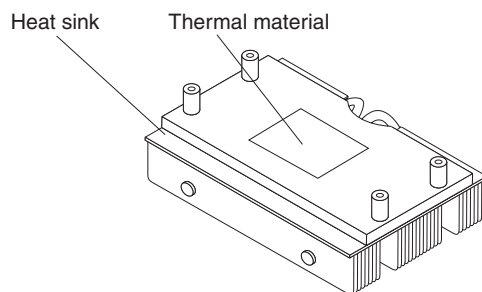
a. If you are installing a new heat sink, remove the plastic protective cover from the bottom of the heat sink.

b. Install the thermal sensor clip on the back of the heat sink.

c. Make sure that the thermal material is still on the bottom of the heat sink; then, align and place the heat sink on top of the microprocessor in the retention bracket, thermal material side down. Press firmly on the heat sink.

d. Align the four screws on the heat sink with the holes on the system-board tray.

e. Press firmly on the captive screws and tighten them with a screwdriver, alternating among the screws until they are tight. If possible, each screw should be rotated two full rotations at a time. Repeat until the screws are tight. Do not overtighten the screws by using excessive force. If you are using a torque wrench, tighten the screws to 8.5 to 13 Newton-meters (Nm) (6.3 to 9.6 inch-pounds).

3. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).

4. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

Thermal grease

You must replace the thermal grease whenever the heat sink has been removed from the top of the microprocessor and is going to be reused on another microprocessor or when debris is found in the grease.

When you are installing the heat sink on the same microprocessor that you removed it from, make sure that the thermal grease on the heat sink and microprocessor is not contaminated. Never add thermal grease to the existing thermal grease on the heat sink and microprocessor.

Note:
- Read the safety information that begins on page vii.
- Read the "Installation guidelines" on page 71.
- Read "Handling static-sensitive devices" on page 72.

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.

0.02 mL of thermal
grease
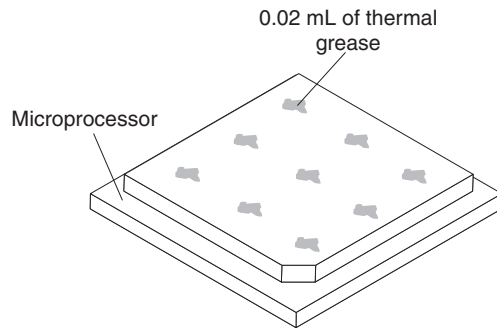
Microprocessor

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, to ensure uniform distribution of the grease.
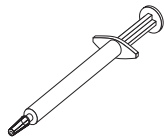
Note: If the grease is properly applied, approximately half of the grease will remain in the syringe.

6. Install the heat sink onto the microprocessor as described in "Installing a microprocessor and heat sink" on page 143.

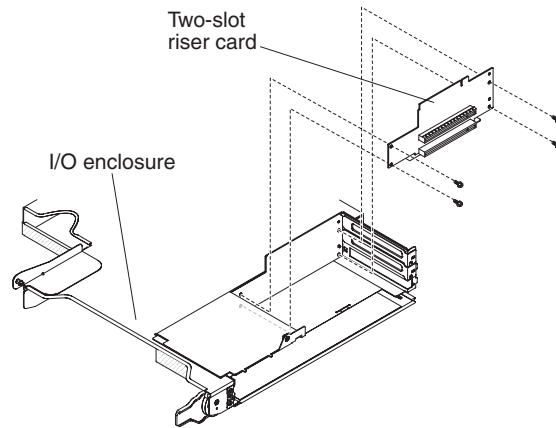# Removing a PCIe riser-card assembly from the I/O enclosure

To remove a PCIe riser-card assembly from the I/O enclosure, complete the following steps.
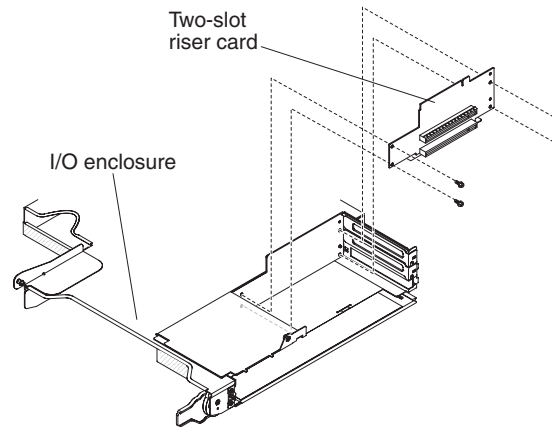
Two-slot
riser card

I/O enclosure

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75).
3. Remove the I/O enclosure from the system-board tray (see "Removing an expansion enclosure from a system-board tray" on page 73).
4. Carefully set the I/O enclosure on a flat, static-protective surface.
5. Remove the PCIe adapter bay cover from the I/O enclosure and save it for future use (see "Removing the PCIe adapter bay cover" on page 113).
6. Remove the PCIe adapter, if one is installed, and save it for future use (see "Removing an adapter from the I/O enclosure" on page 102).
7. Remove the four screws that secure the PCIe riser-card assembly to the I/O enclosure and save them for future use.
8. Pull the PCIe riser-card assembly off the mounting studs and out of the I/O enclosure.
9. If you are instructed to return the PCIe riser-card assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

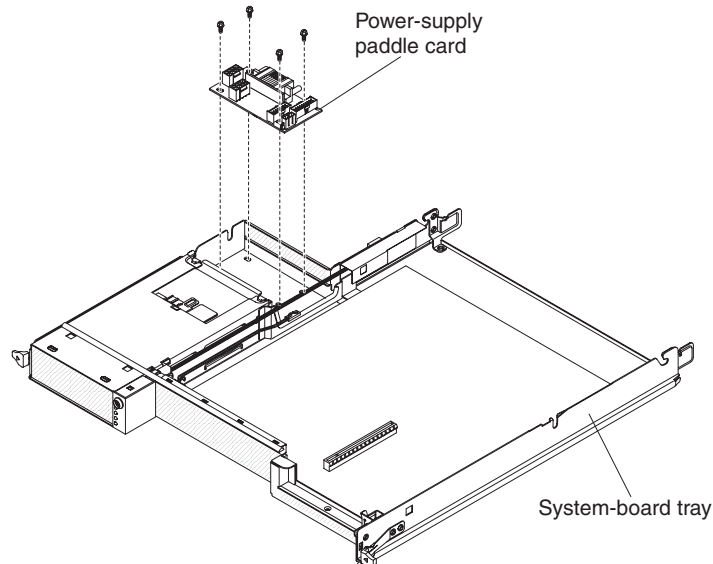# Installing a PCIe riser-card assembly in the I/O enclosure

To install a PCIe riser-card assembly in the I/O enclosure, complete the following steps.

1. Touch the static-protective package that contains the PCIe riser-card assembly to any *unpainted* metal surface on the outside of the I/O enclosure; then, remove the PCIe riser-card assembly from the package.
2. Place the PCIe riser-card assembly on the mounting studs inside the I/O enclosure.
3. Install the four retaining screws.
4. Install and cable the PCIe adapter, if you removed one from the PCIe riser-card assembly (see "Installing an adapter in the I/O enclosure" on page 103).
5. Install the PCIe adapter bay cover on the I/O enclosure (see "Installing the PCIe adapter bay cover" on page 114).
6. Install the I/O enclosure on the system-board tray (see "Installing an expansion enclosure on a system-board tray" on page 74).
7. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76).

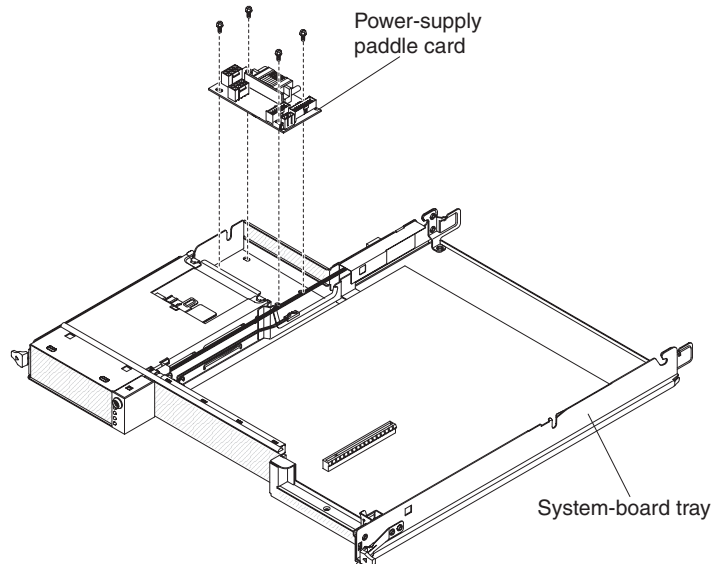# Removing a power-supply paddle card from the system-board tray

To remove a power-supply paddle card from the system-board tray, complete the following steps.

1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.

2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).

3. Carefully set the system-board tray on a flat, static-protective surface.

4. Remove the expansion enclosure, if one is installed, and set it on a flat, static-protective surface (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).

5. If DIMMs are installed in DIMM slot 30 or slot 31, remove the DIMMs (see "Removing a memory module" on page 106). For the locations of the DIMM connectors, see "System-board connectors" on page 7.

6. If any 3.5-inch simple-swap drives are installed in the system-board tray, complete the following steps:

   a. Remove the 3.5-inch drives (see "Removing a 3.5-inch simple-swap hard disk drive" on page 90).

   b. Note the cable routing of the hard disk drive bracket and cable assembly cables; then, disconnect the cables.

   c. Remove the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).

7. Make a note of where cables are attached to the power-supply paddle card; then, disconnect them.

8. Remove the four screws that secure the power-supply paddle card to the system-board tray and save them for future use.

9. Lift the power-supply paddle card out of the system-board tray.

10. If you are instructed to return the power-supply paddle card, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a power-supply paddle card in the system-board tray

To install a power-supply paddle card in the system-board tray, complete the following steps.

1. Touch the static-protective package that contains the power-supply paddle card to any *unpainted* metal surface on the outside of the system-board tray; then, remove the power-supply paddle card from the package.

2. Place the power-supply paddle card on the mounting studs in the system-board tray and install the four screws.

3. Reconnect the power-supply paddle card cables.

4. Install the 3.5-inch simple-swap drives, if you removed any. Complete the following steps:

   a. Install the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).

   b. Reconnect the hard disk drive bracket and cable assembly cables.

   c. Install the 3.5-inch hard disk drive (see "Installing a 3.5-inch simple-swap hard disk drive" on page 91).

5. Install the DIMMs, if you removed any (see "Installing a memory module" on page 107).

6. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).

7. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

Removing the system-board tray

After replacement, you must either update the system-board tray with the latest firmware or restore the pre-existing firmware from a diskette or CD image.

Note: See "System-board layouts" on page 7 for the locations of the connectors on the system board.

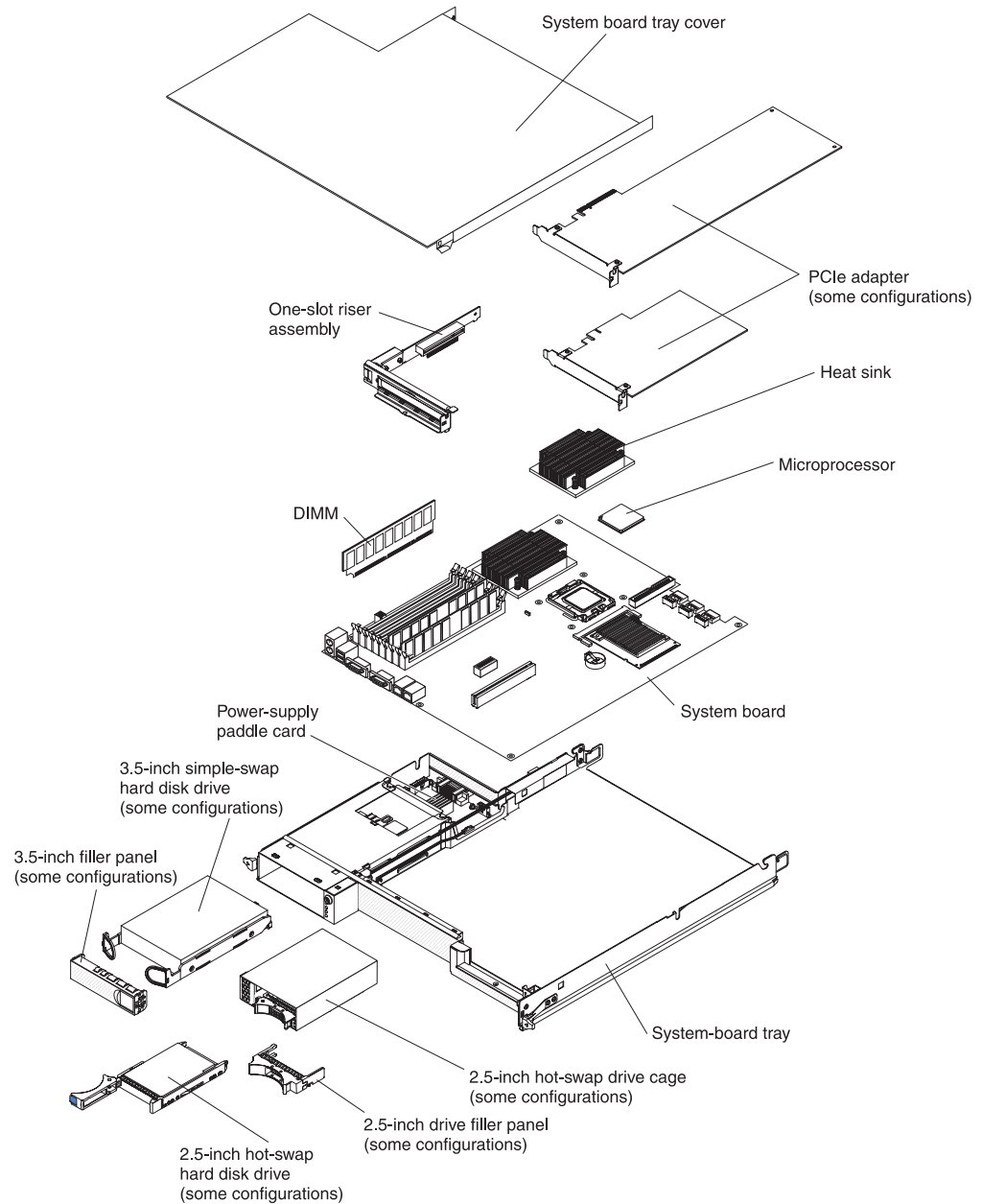To remove the system-board tray, complete the following steps.
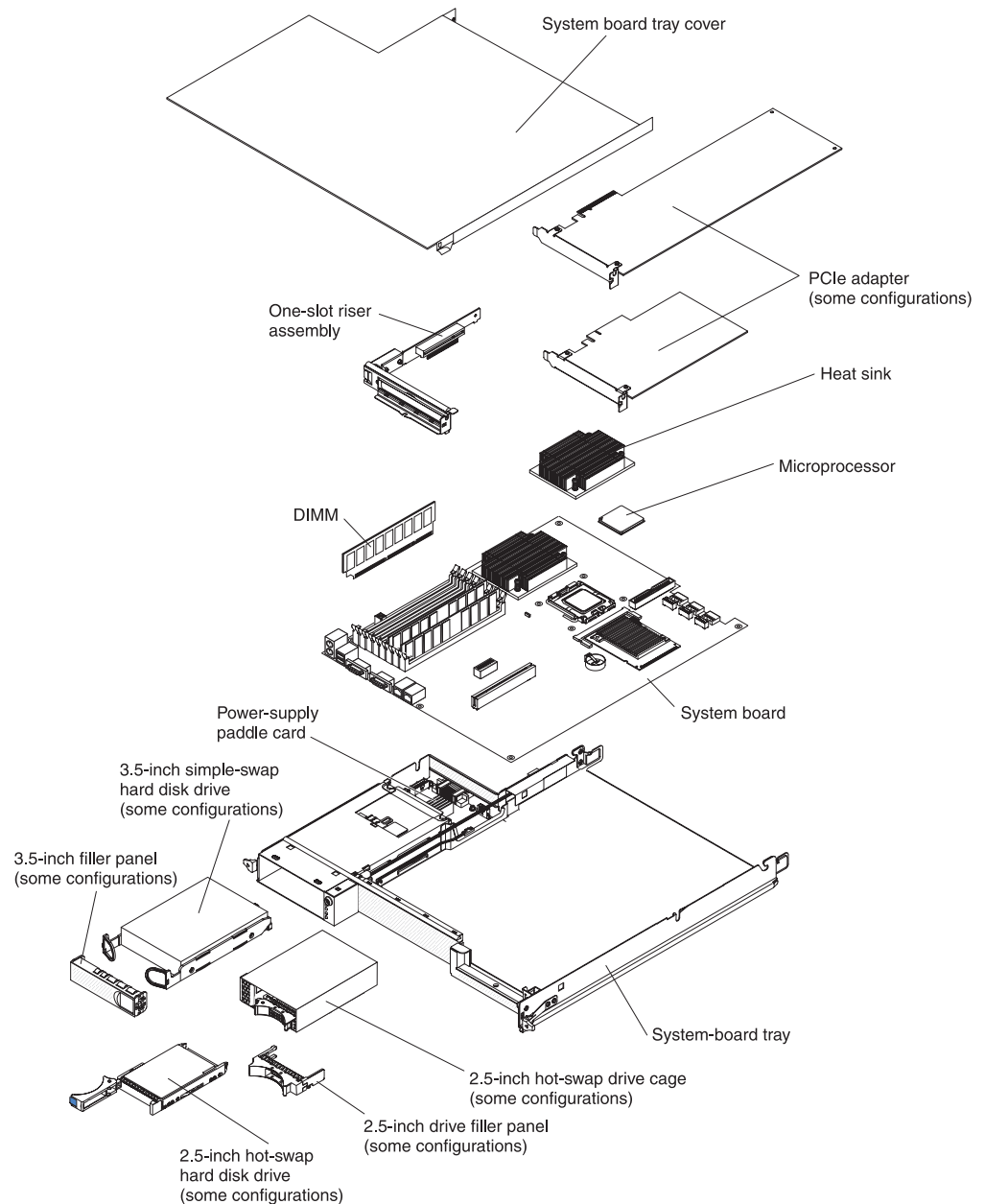
1. Read the safety information that begins on page vii and "Installation guidelines" on page 71.
2. If the system-board tray is installed in a chassis, remove it (see "Removing the system-board tray from a 2U chassis" on page 75 or "Removing the system-board tray from a 3U chassis" on page 77).

3. If an expansion enclosure is installed, remove it (see "Removing an expansion enclosure from a system-board tray" on page 73); otherwise, remove the system-board tray cover (see "Removing the system-board tray cover" on page 121).

4. Remove the hard disk drives, if any are installed (see "Removing and installing a hard disk drive" on page 88).

5. Remove the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).

6. Remove the 2.5-inch hot-swap drive cage, if one is installed (see "Removing a 2.5-inch hot-swap drive cage" on page 96).

7. Remove the PCIe adapters, if any are installed (see "Removing an adapter from the system-board tray" on page 100).

8. Remove the riser card (see "Removing a PCIe riser-card assembly from the system-board tray" on page 115).

9. Remove the battery from the system board (see "Removing the battery" on page 86).

10. Remove the DIMMs (see "Removing a memory module" on page 106).

11. Remove the microprocessors and heat sinks (see "Removing a microprocessor and heat sink" on page 141).

12. 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.

Installing the system-board tray

To install a system-board tray, complete the following steps.

System board tray cover

PCIe adapter
(some configurations)

One-slot riser
assembly

Heat sink

Microprocessor

DIMM

System board

Power-supply
paddle card

3.5-inch simple-swap
hard disk drive
(some configurations)

3.5-inch filler panel
(some configurations)

System-board tray

2.5-inch hot-swap drive cage
(some configurations)

2.5-inch drive filler panel
(some configurations)

2.5-inch hot-swap
hard disk drive
(some configurations)

Note: You might have to remove component fillers or covers before you can install
some components.

1. Reinstall the microprocessors and heat sinks (see "Installing a microprocessor
   and heat sink" on page 143).

2. Reinstall the DIMMs (see "Installing a memory module" on page 107).

3. Reinstall the battery (see "Installing the battery" on page 86).

4. Reinstall the riser card (see "Installing a PCIe riser-card assembly in the
   system-board tray" on page 116).

5. Reinstall the PCIe adapters, if you removed any (see "Installing an adapter in
   the system-board tray" on page 101).

6. Install the hard disk drive bracket and cable assembly (see "Removing and installing a one-bay or four-bay hard disk drive bracket and cable assembly" on page 108).

7. Reinstall the 2.5-inch hot-swap drive cage, if you removed one (see "Installing a 2.5-inch hot-swap drive cage" on page 97).

8. Reinstall the hard disk drives, if you removed any (See "Removing and installing a hard disk drive" on page 88).

9. Install the expansion enclosure, if you removed one (see "Installing an expansion enclosure on a system-board tray" on page 74); otherwise, install the system-board tray cover (see "Installing the system-board tray cover" on page 122).

10. Install the system-board tray in the chassis (see "Installing the system-board tray in a 2U chassis" on page 76 or "Installing the system-board tray in a 3U chassis" on page 78).

Note: After you replace the system-board tray, you must program the thermal profile that is used to regulate cooling within the chassis.

To program the thermal profile for the new system-board tray, complete the following steps:

1. Locate the two-digit, alphanumeric thermal-profile code. The two-digit code is printed on the thermal-profile label that is affixed to the top of the original system-board tray.

2. Locate the replacement identification (RID) tag that is affixed to the top of the new system-board tray and record the machine type (MT), serial number (SN), and thermal-profile code on the tag.

3. (Trained service technician only) Refer to Retain Tip **H193629** for the instructions to program the thermal profile for the new system board.

Chapter 5. Configuration information and instructions

This chapter provides information about updating the firmware and using the configuration utility programs.

To update the firmware, you might have to use an external USB CD-RW/DVD drive. To run the BIOS configuration utility, you must have the following additional hardware:
- Monitor
- Combination USB keyboard and pointing device such as IBM part number 40K5372
- External USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516

Firmware updates

The firmware for the server is periodically updated and is available for download from the Web. Go to http://www.ibm.com/systems/support/ to check for the latest level of firmware, such as BIOS code, vital product data (VPD) code, device drivers, and service processor firmware. 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.

Note: To avoid problems and to maintain proper system performance, always make sure that the BIOS code, and service processor (BMC) and other firmware levels are consistent for all iDataPlex servers.

To update the firmware, you might need to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. To use an external USB CD-RW/DVD drive to update the firmware, complete the following steps:

1. If the system-board tray is running, turn off the system-board tray and all attached devices.
2. Connect a USB CD or DVD drive to a USB connector on the front of the system-board tray.
3. Turn on all attached devices; then, turn on the system-board tray.
4. When the prompt `Press F1 For BIOS Setup` is displayed, press F1.
5. From the BIOS configuration utility menu, select **Boot**.
6. From the **Boot** menu, select **Boot Device Priority**.
7. Note the device that is selected as the first startup device. Later, you must restore this setting.
8. Select **CD/DVD-ROM** as the first startup device.
9. Press Esc two times to return to the BIOS configuration utility menu.
10. Insert the CD or DVD containing the firmware update into the CD or DVD drive.
11. Select **Save Changes and Exit** and follow the prompts.

Using the BIOS configuration utility program

Use the BIOS configuration utility program 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 and the order of startup devices
- Set and change settings for advanced hardware features
- View and clear event logs
- Change interrupt request (IRQ) settings
- Configure memory features

Starting the BIOS configuration utility program

To start the BIOS configuration utility program, complete the following steps:

1. Turn on the server.
2. When the prompt `Press F1 for BIOS Setup` is displayed, press F1. If you have set both a supervisor password and a user password, you must type the supervisor password to access all editable fields in the BIOS configuration utility program. If the system-board tray is configured to require entry of a password to complete the system startup, you can type either password to complete the system startup.
3. Follow the instructions on the screen.

BIOS configuration utility menu choices

Note: Some options in the BIOS configuration utility menus might not be supported in all server configurations.

The following choices are on the BIOS configuration utility menu at the top of the screen. Depending on the version of the BIOS code, some menu choices might differ slightly from these descriptions. Depending on how passwords are configured, certain BIOS configuration utility fields might not be editable by all users. See "Passwords" on page 158 for additional information.

- **Main**

  Select this choice to perform the following tasks:

  – View and set the system date.
  – View and set the system time in 24-hour format (*hour*:*minute*:*second*).
  – Configure hard disk drive support.
  – View information about the system. When you make changes through other choices in the BIOS configuration utility program, some of those changes are reflected in the system information; you cannot change settings directly in the system information. Information includes the model of the system-board tray, the revision level or issue date of the BIOS code that is stored in electrically erasable programmable ROM (EEPROM), and the type, speed, and cache sizes of the microprocessors and the amount of installed memory.

- **Advanced**

  Important: The server might malfunction if these settings are incorrectly configured. Follow the instructions on the screen carefully.

Select this choice to perform the following tasks:

– Configure advanced microprocessor features, such as virtualization and thermal management

– Configure memory features, such as interleaving

– Configure PCI and USB devices and I/O ports

– Configure system-board tray power-on features

- **Server**

Select this choice to set options for console redirection, event logging, and IPMI communications.

You can view the system-event log that contains all the system-error, warning, and informational messages that have been generated. To get more information about error codes that occur, run the diagnostics program. For instructions, see "Running the diagnostic programs" on page 32. To clear the event log, select **Clear all DMI event logs**.

In the IPMI section, you can view the BMC system event log, which contains system error and warning messages that were generated by the BMC controller. The IP address of the BMC is set in the **IP Address** field. Users can then use this IP address for remote management of the BMC, using IBM® Director or an IPMI 2.0 compliant management tool.

- **Security**

Select this choice to set passwords and other security options. The server supports two password levels:

– **User Password**

Select this choice to set or change a user password. For more information, see "User password" on page 158.

– **Supervisor Password**

Select this choice to set or change a supervisor password. A supervisor password is intended to be used by a system administrator; it limits access to some BIOS configuration utility fields. If a supervisor password is set, all BIOS configuration utility fields that can be modified are available for edit only if you type the supervisor password at the password prompt. For more information, see "Supervisor password" on page 158.

For more information about passwords, see "Passwords" on page 158.

- **Boot**

Select this choice to view or change the start options and boot device priority. Changes take effect when you restart 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.

- **Exit**

Select this choice to exit from the BIOS configuration utility program. You can perform the following tasks:

– Save changes and exit

– Discard changes and exit

– Discard changes

– Load setup defaults

Passwords

From the **Security** choice, you can set, change, and delete a supervisor password and a user password. Depending on how passwords are configured, certain BIOS configuration utility fields might not be editable by all users, and you might have to type a password to complete system startup.

Supervisor password

If you set only a supervisor password, you must type the supervisor password to access all editable fields in the BIOS configuration utility program. You can also configure the system to require entry of this password to complete the system startup. If a supervisor password is set, you can also set a user password. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the supervisor password.

If you forget the supervisor password, you can clear CMOS memory to remove the supervisor password. See "Clearing CMOS memory" on page 47 for instructions.

User password

If you set a supervisor password for a system administrator and a user password for a user, a system administrator who types the supervisor password has access to change all editable BIOS configuration utility fields. A user who types the user password can view all BIOS configuration utility fields but can change values in a subset of those fields that are editable by the system administrator. If the system is configured to require entry of a password to complete the system startup, you can type either password to complete the system startup. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

If you forget the user password, you can regain access to the server in any of the following ways:

- If a supervisor password is set, type the supervisor password at the password prompt. Start the BIOS configuration utility program and reset the user password.
- Clear the password by clearing CMOS memory (see "Clearing CMOS memory" on page 47 for instructions).

IBM Advanced Settings Utility program

Use the Advanced Settings Utility (ASU) program to modify firmware settings from the command line without the need to restart the system to access the BIOS configuration utility program. You can also use the ASU program to issue selected baseboard management controller setup commands. 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/.

Using the PXE boot agent utility program

Use the Preboot Execution Environment (PXE) boot agent utility program to enable or disable operating-system wake-up support.

Note: The server does not support changing the network boot protocol or specifying the startup order of devices through the PXE boot agent utility program.

Starting the PXE boot agent utility program

To start the PXE boot agent utility program, complete the following steps:

1. Turn on the server.
2. When the initializing prompt, `Initializing Intel (R) Boot Agent Version X.X.XX PXE 2.0 Build XXX (WfM 2.0)`, is displayed, press Ctrl+S. You have 2 seconds (by default) to press Ctrl+S after the prompt is displayed.
3. To select a choice from the menu, use the arrow keys and press Enter.
4. To change the setting of the selected item, follow the instructions on the screen.

PXE boot agent utility menu choices

The following choices are on the PXE boot agent utility menu:

- **Network Boot Protocol**

  PXE is the default setting. Do not change this setting; the server does not support any other network boot protocols.

- **Boot Order**

  The server does not support this choice. Use the **Start Options** choice in the BIOS configuration utility program to specify the startup sequence.

- **Show setup prompt**

  Select this choice to enable or disable the PXE setup prompt. When the prompt is enabled, the prompt `Press Ctrl+S to enter the setup menu` is displayed under the initializing prompt. **Disable** is the default setting.

- **Setup time wait menu**

  Select this choice to specify the amount of time (in seconds) that the server will wait for you press Ctrl+S after the prompt is displayed. You can select 2 (default), 3, 5, or 8 seconds.

Using the LSI Logic Configuration Utility program

Note: The LSI Logic Configuration Utility program is available only if an optional RAID adapter is installed in the server.

Use the LSI Logic Configuration Utility program to configure and manage redundant array of independent disks (RAID) arrays. Be sure to use the program as described in this document. Use the LSI Logic Configuration Utility program to perform the following tasks:

- Perform a low-level format of a SCSI hard disk drive
- View or change SCSI IDs for attached devices
- Set a SCSI device scan order
- Set SCSI protocol parameters on SCSI hard disk drives
- Configure arrays
- View your RAID configuration and associated devices
- Monitor operation of your RAID controllers
- Create a mirrored pair of SCSI hard disk drives with or without a hot-spare drive

The integrated SCSI controller with RAID capabilities supports redundant array of independent disks (RAID) arrays. You can use the LSI Logic Configuration Utility program to configure RAID level-1 for a single pair of attached devices. If you install a different type of RAID adapter, follow the instructions in the documentation that comes with the adapter to view or change SCSI settings for attached devices.

You can download an LSI command-line configuration program (CFG1030) from http://www.ibm.com/systems/support/. For more information about the RAID controller, go to http://www-304.ibm.com/jct01004c/systems/support/supportsite.wss/docdisplay?Indocid=MIGR-65723&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 **Hardware upgrades**.
3. Under **Product family**, click **RAID**.
4. Under **Type**, click on the type of RAID controller that is installed in your server.

When you use the LSI Logic Configuration Utility program to configure and manage arrays, review the following information:

- The integrated SCSI controller with RAID capabilities in the server supports only RAID level-1 with a hot-spare drive installed. Installing an optional ServeRAID controller provides additional RAID levels.
- You cannot use the *ServerGuide Setup and Installation* CD to configure the integrated SCSI controller with RAID capabilities.
- When you create a RAID level-1 (mirrored) pair, all drives must be on the same channel.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.

- You can set up a mirror after the operating system is installed on the primary drive only if you are using an integrated SCSI controller with RAID capabilities. You must make sure that the primary drive has the lower SCSI ID (for example, 0).

  Important: If you use an integrated SCSI controller with RAID capabilities to configure a RAID level-1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.

- To update the firmware and BIOS code for an optional ServeRAID controller, you must use the IBM *ServeRAID Support* CD that comes with the controller.

  Note: To update the firmware and BIOS code for an optional ServeRAID controller, you might need to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. For more information, see "Firmware updates" on page 155.

- If you install a different type of RAID controller, follow the instructions in the documentation that comes with the controller to view or change SCSI settings for attached devices.

The following sections provide instructions for starting the LSI Logic Configuration Utility program and performing selected functions.

Starting the LSI Logic Configuration Utility program

To start the LSI Logic Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt `<<< Press <CTRL><C> to start LSI Logic Configuration Utility >>>` is displayed, press Ctrl+C. If you have set an administrator password, you are prompted to type the password.
3. To select a controller (channel) from the list of adapters, use the arrow keys and press Enter.
4. To change the settings of the selected items, follow the instructions on the screen. If you select **Device Properties** or **Mirroring Properties**, additional screens are displayed.

When you have finished changing settings, press Esc to exit from the program; select **Save** to save the settings that you have changed.

Formatting a SCSI hard disk drive

Low-level formatting removes all data from the hard disk. If there is data on the disk that you want to save, back up the hard disk before you perform this procedure.

Note: Before you format a SCSI hard disk, make sure that the disk is not part of a mirrored pair. From the list of adapters, select the controller (channel) for the drive that you want to format. Select **Mirroring Properties** and make sure that the mirroring value for the drive is **None**.

To format a drive, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drive that you want to format.
2. Select **Device Properties**.

3. To highlight the drive that you want to format, use the Up Arrow and Down Arrow keys. To scroll left and right, use the Left Arrow and Right Arrow keys or the End key.

4. To start the low-level formatting operation, select **Format** and press Enter .

Creating a mirrored pair of SCSI hard disk drives

To create a mirrored pair of SCSI hard disk drives, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drives that you want to mirror.

2. Select **Mirroring Properties**.

3. Use the arrow keys to highlight the first drive in the pair; then, press the Minus key to change the mirroring value to **Primary**.

4. Use the arrow keys to highlight the second drive in the pair; then, press the Minus key to change the mirroring value to **Secondary**.

5. To establish a third drive that will take over the function of either mirrored drive in the event of a failure, use the arrow keys to highlight the drive that you want to use for that purpose; then, press the Minus key to change the mirroring value to **Hot Spare**.

Configuring the Gigabit Ethernet controller

The Ethernet controller is integrated on the system board. It provides an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provides 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 controller detects the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operates at that rate and mode.

You do not have to set any jumpers or configure the controller. However, you must install a device driver to enable the operating system to address the controller. For device drivers and information about configuring the Ethernet controller, see the *Intel Ethernet Software CD* that comes with the server. To find updated information about configuring the controller, complete the following steps.

Notes:

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

2. To install the device driver for the Ethernet controller, you might need to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. For more information, see "Firmware updates" on page 155.

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 x iDataPlex dx340 server** and click **Go**.

Updating IBM Director

If you plan to use IBM Director to manage the server, you must check for the latest applicable IBM Director updates and interim fixes.

To install the IBM Director updates and any other applicable updates and interim fixes, complete the following steps.

Notes:

1. Changes are made periodically to the IBM Web site. The actual procedure might vary slightly from what is described in this document.
2. To update IBM Director software, you might need to use an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516. For more information, see "Firmware updates" on page 155.

1. Check for the latest version of IBM Director:
    a. Go to http://www.ibm.com/systems/management/downloads.html.
    b. If a newer version of IBM 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 Director program.
3. Download and install any applicable updates or interim fixes for the server:
    a. Go to http://www.ibm.com/systems/support/.
    b. Under **Product support**, click **System x**.
    c. Under **Popular links**, click **Software and device drivers**.
    d. Click **IBM Director downloads**.
    e. Select any applicable update or interim fix that you want to download.
    f. Click the file link for the executable file to download the file, and follow the instructions in the readme file to install the update or interim fix.
    g. Repeat steps 3e and 3f for any additional updates or interim fixes that you want to install.

Appendix A. 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. This appendix contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your product or optional device, and 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:

- 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.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support Web site at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

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 software.

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/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x® and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM iDataPlex information is http://www.ibm.com/systems/x/hardware/idataplex/index.html. The address for IBM BladeCenter® information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

You can find service information for IBM systems and optional devices at http://www.ibm.com/systems/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with System x and xSeries servers, BladeCenter products, IntelliStation workstations, and appliances. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/sl/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 IBM Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. See http://www.ibm.com/planetwide/ for support telephone numbers, or 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

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
    3F, No 7, Song Ren Rd.
    Taipei, Taiwan
    Telephone: 0800-016-888

Appendix B. Notices

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AIX	Netfinity	Wake on LAN
Alert on LAN	PowerExecutive	XA-32
BladeCenter	Predictive Failure Analysis	XA-64
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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.

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet sites at http://www.ibm.com/ibm/recycle/us/index.shtml and http://www.ibm.com/ibm/environment/products/index.shtml.

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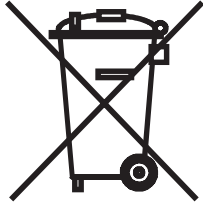
Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/index.shtml or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride,

and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.

For the European Union:
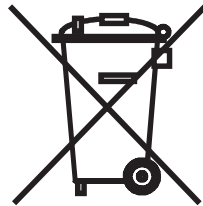
Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

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In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer

participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

This notice is provided in accordance with Royal Decree 106/2008 of Spain: The retail price of batteries, accumulators, and power cells includes the cost of the environmental management of their waste.

For California:

Perchlorate material – special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

German Ordinance for Work gloss statement

The product is not suitable for use with visual display work place devices according to clause 2 of the German Ordinance for Work with Visual Display Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

Electronic emission notices

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 may 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.

United Kingdom telecommunications safety requirement

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.

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.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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 Community contact:
    IBM Technical Regulations
    Pascalstr. 100, Stuttgart, Germany 70569
    Telephone: 0049 (0)711 785 1176
    Fax: 0049 (0)711 785 1283
    E-mail: tjahn@de.ibm.com

Taiwanese Class A warning 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。

Chinese Class A warning statement

<div align="center">

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。

</div>

Japanese Voluntary Control Council for Interference (VCCI) 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

Korean Class A warning statement

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이오니, 판매자 또는 사용자는 이점을 주의하시기
바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에
서 비업무용으로 교환하시기 바랍니다.

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