

System x iDataPlex dx320
Types 6385 and 6388



Problem Determination and Service Guide

System x iDataPlex dx320
Types 6385 and 6388



Problem Determination and Service Guide

Note: Before using this information and the product it supports, read the information in Appendix B, "Notices," on page 113, and the *IBM Safety Information, IBM Systems Environmental Notices and User's Guide*, and the *Warranty and Support Information* documents on the *IBM Documentation CD*.

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Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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 ασφαλείας (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 pečítajte 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 4, "Parts listing," on page 63 and "Power cords" on page 67.
 - 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:

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

To Disconnect:

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

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.

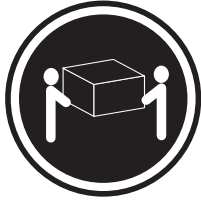


DANGER

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.

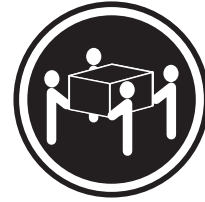
Statement 4:



≥ 18 kg (39.7 lb.)



≥ 32 kg (70.5 lb.)



≥ 55 kg (121.2 lb.)

CAUTION:

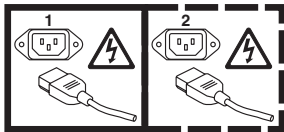
Use safe practices when lifting.

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. Start here

You can solve many problems without outside assistance by following the troubleshooting procedures in this *Problem Determination and Service Guide* and on the IBM® Web site. This document describes the diagnostic tests that you can perform, troubleshooting procedures, and explanations of error messages and error codes. The documentation that comes with your operating system and software also contains troubleshooting information.

Diagnosing a problem

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

1. **Determine what has changed.**

Determine whether any of the following items were added, removed, replaced, or updated before the problem occurred:

- UEFI code (formerly called BIOS code)
- Device drivers
- Firmware
- Hardware components
- Software

If possible, return the server to the condition it was in before the problem occurred.

2. **Collect data.**

Thorough data collection is necessary for diagnosing hardware and software problems.

a. **Document error codes and system-board LEDs.**

- **System-board LEDs:** See “System-board LEDs” on page 12 for information about system-board LEDs.
- **System error codes:** See “Error logs” on page 26 for information about a specific error code.
- **Software or operating-system error codes:** See the documentation for the software or operating system for information about a specific error code. See the manufacturer's Web site for documentation.

b. **Collect system data.**

Run Dynamic System Analysis (DSA) to collect information about the hardware, firmware, software, and operating system. Have this information available when you contact IBM or an approved warranty service provider. See “Diagnostic programs, messages, and error codes” on page 38 for the instructions to run the DSA program.

To download the latest version of DSA, go to <http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=SERV-DSA> or complete the following steps.

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

- 1) Go to <http://www.ibm.com/systems/support/>.
- 2) Under **Product support**, click **System x**.

- 3) Under **Popular links**, click **Software and device drivers**.
- 4) Under **Related downloads**, click **Dynamic System Analysis (DSA)**.

For information about DSA command-line options, go to http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp?topic=/com.ibm.xseries.tools.doc/erep_tools_dsa.html or complete the following steps:

- 1) Go to <http://publib.boulder.ibm.com/infocenter/toolsctr/v1r0/index.jsp>.
 - 2) In the navigation pane, click **IBM System x and BladeCenter Tools Center**.
 - 3) Click **Tools reference > Error reporting and analysis tools > IBM Dynamic System Analysis**.
3. **Follow the problem-resolution procedures.**

The four problem-resolution procedures are presented in the order in which they are most likely to solve your problem. Follow these procedures in the order in which they are presented:

a. **Check for and apply code updates.**

Most problems that appear to be caused by faulty hardware are actually caused by BIOS code, system firmware, device firmware, or device drivers that are not at the latest levels.

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

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

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

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

To display a list of available updates for your server, go to <http://www.ibm.com/systems/support/supportsite.wss/docdisplay?brandind=5000008&Indocid=MIGR-4JTS2T> 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.

- 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 **System x iDataPlex dx320 server** to display the list of downloadable files for the server.

You can install code updates that are packaged as an Update*Xpress* System Pack or Update*Xpress* CD image. An Update*Xpress* System Pack contains an integration-tested bundle of online firmware and device-driver updates for your server.

Be sure to separately install any listed critical updates that have release dates that are later than the release date of the Update*Xpress* System Pack or Update*Xpress* image.

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

b. **Check for and correct an incorrect configuration.**

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

1) **Make sure that all installed hardware and software are supported.**

If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove nonsupported hardware before you contact IBM or an approved warranty service provider for support.

2) **Make sure that the server, operating system, and software are installed and configured correctly.**

Many configuration problems are caused by loose power or signal cables or incorrectly seated adapters. You might be able to solve the problem by turning off the server, reconnecting cables, reseating adapters, and turning the server back on. For information about performing the checkout procedure, see “Checkout procedure” on page 27.

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

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

For problems with operating systems or IBM software or devices, complete the following steps.

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

- a) Go to <http://www.ibm.com/systems/support/>.
- b) Under **Product support**, click **System x**.
- c) From the **Product family** list, select **System x iDataPlex dx320 server**.
- d) Under **Support & downloads**, click **Documentation, Install**, and **Use** to search for related documentation.

c. **Check for troubleshooting procedures and RETAIN tips.**

Troubleshooting procedures and RETAIN tips document known problems and suggested solutions. To search for troubleshooting procedures and RETAIN tips, 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) From the **Product family** list, select **System x iDataPlex dx320 server**.
- 4) Under **Support & downloads**, click **Troubleshoot**.

5) Select the troubleshooting procedure or RETAIN tip that applies to your problem:

- Troubleshooting procedures are under **Diagnostic**.
- RETAIN tips are under **Troubleshoot**.

d. **Check for and replace defective hardware.**

If a hardware component is not operating within specifications, it can cause unpredictable results. Most hardware failures are reported as error codes in a system or operating-system log. For more information, see “Troubleshooting tables” on page 31 and Chapter 5, “Removing and replacing server components,” on page 69. Hardware errors are also indicated by light path diagnostics LEDs.

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

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

Undocumented problems

If you have completed the diagnostic procedure and the problem remains, the problem might not have been previously identified by IBM. After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no light path diagnostics LEDs or log entries indicate a hardware component failure, contact IBM or an approved warranty service provider for assistance. To open an online service request, go to <http://www.ibm.com/support/electronic/>. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Chapter 2. Introduction

This *Problem Determination and Service Guide* contains information to help you solve problems that might occur in your IBM System x™ iDataPlex™ dx320 system-board tray and IBM System x iDataPlex 2U flex 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 *Problem Determination and Service Guide*, the following documentation for the dx320 system-board tray and 2U chassis is provided in Portable Document Format (PDF) on the IBM *Documentation* CD:

- *Warranty and Support Information*

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

- *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.

- *IBM Systems Environmental Notices and User's Guide*

This multilingual document provides translated versions of the IBM environmental notices for your product.

- *User's Guide*

This document contains general information about how to use, upgrade, and configure the 2U chassis and the dx320 system-board tray.

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/systems/scope/idadaplex/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 dx320 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.

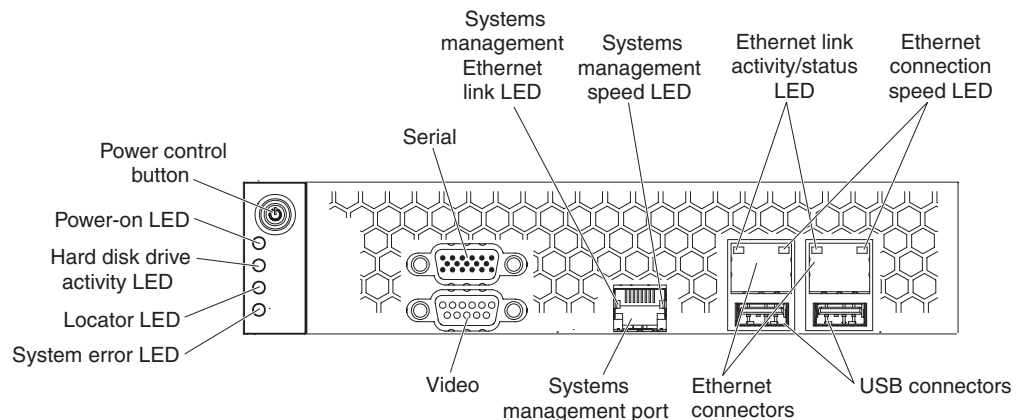
Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or “U.” A 1U-high device is 1.75 inches tall.

Table 1. Features and specifications

| | | |
|--|--|--|
| <p>Microprocessor: Supports two quad-core Intel® Xeon™ microprocessors in each system-board tray.</p> <p>Note: Use the BIOS Setup Utility program to determine the type and speed of the microprocessor.</p> <p>Hard disk drives: The system-board tray supports one 3.5-inch simple-swap SATA hard disk drive.</p> <p>Memory:</p> <ul style="list-style-type: none"> • Six DIMM connectors • Minimum: 8 GB • Maximum: 48 GB • Double-data rate (DDR2) 667 MHz RDIMMs with Error Correcting Code (ECC) • Supports 4 GB and 8 GB DIMMs (as of the date of this publication) with up to 48 GB of total memory in each system-board tray <p>Note: The default memory operating speed is 533 MHz for Web 2.0 power saving optimization. Memory operating speed can be adjusted using the BIOS Setup Utility program.</p> | <p>Integrated functions:</p> <ul style="list-style-type: none"> • Baseboard management controller (BMC) with Intelligent Platform Management Interface (IPMI) 2.0 compliant firmware • ASPEED Technology AST1100 video controller • Dual Broadcom 5722 Gigabit Ethernet controllers with Wake on LAN™ support • I/O controller with five Serial ATA (SATA) ports • Front panel connectors: <ul style="list-style-type: none"> – Two Universal Serial Bus (USB) 2.0 ports – One serial port – VGA video port – Three Ethernet ports (one dedicated to systems management) <p>Size (2U chassis):</p> <ul style="list-style-type: none"> • Height: 86 mm (3.386 inches) • Depth: 473 mm (18.6 inches) • Width: 446 mm (17.56 inches) • Maximum weight: 6.98 kg (15.5 lb.) | <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – 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: 0°C to 60°C (-32°F to 140°F); maximum altitude: 2133 m (7000 ft.) • Humidity: <ul style="list-style-type: none"> – Server on: 10% to 80% – Server off: 8% to 80% <p>Electrical Input:</p> <ul style="list-style-type: none"> • 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 |
|--|--|--|

Operator panel controls, LEDs, connectors, and power

The following illustration shows the controls, LEDs, and connectors on the front of the dx320 system-board tray. The operator panel on the system-board tray is the same for all dx320 server configurations.



Power-control button: Press this button to turn the system-board tray on and off manually.

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

Systems management Ethernet link LED: This LED is on the Systems Management Ethernet connector. When this LED is lit, it indicates that there is an active link connection on the 10BASE-T or 100BASE-TX interface for the Ethernet port.

Systems management Ethernet connection speed LED: This LED is on the Systems Management Ethernet connector. When this LED is lit and is amber, it indicates that the Ethernet network speed is 100 Mbps. When this LED is not lit, it indicates that the Ethernet network speed is 10 Mbps.

Ethernet link activity/status LED: This LED is on each Ethernet connector. When this LED is lit, it indicates that there is an active link connection on the 10BASE-T, 100BASE-TX, or 1000BASE-TX interface for the Ethernet port. When this LED is flashing, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN that is connected to the Ethernet port.

Ethernet connection speed LED: This LED is on the each Ethernet connector. When this LED is lit and is amber, it indicates that the Ethernet network speed is 1 Gbps. When this LED is lit and is green, it indicates that the Ethernet network speed is 100 Mbps. When this LED is not lit, it indicates that the Ethernet network speed is 10 Mbps.

USB connectors: Connect USB 2.0 devices to these connectors.

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

Systems management port: Connect a systems management device to this connector.

Video connector: Connect a monitor to this connector.

Locator LED: This LED can be lit remotely by the system administrator to aid in visually locating the server.

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 Setup Utility program.

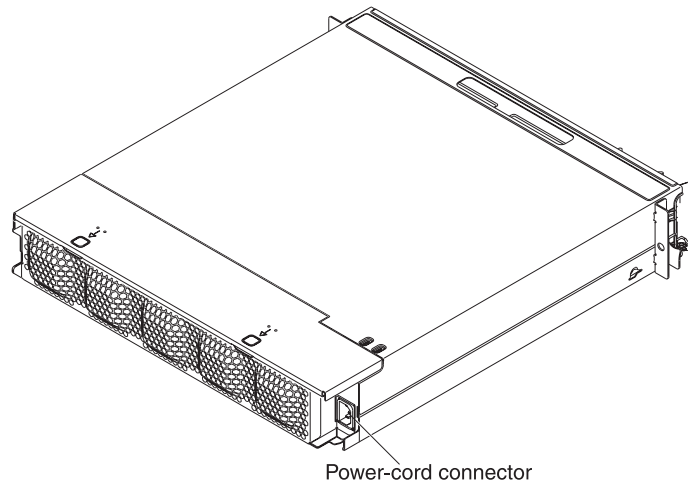
Hard disk drive activity LED: When this LED is flashing, it indicates that an associated hard disk drive is in use.

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 chassis.

Rear connectors

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



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:

- You can press the power-control button on the front of the system-board tray (see “Operator panel controls, LEDs, connectors, and power” on page 8) to start the server.
- You can turn on the system-board tray remotely by using the management appliance.
- If the system-board tray is connected to power, the operating system supports the Wake on LAN feature, and the Wake on LAN feature has not been disabled, the Wake on LAN feature can turn on the system-board tray.
- In an IPMI environment, the system administrator can turn on the system-board tray 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 power through the chassis power supply. The system-board tray still can respond to requests from the service processor, 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, connectors, and power” on page 8). 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.

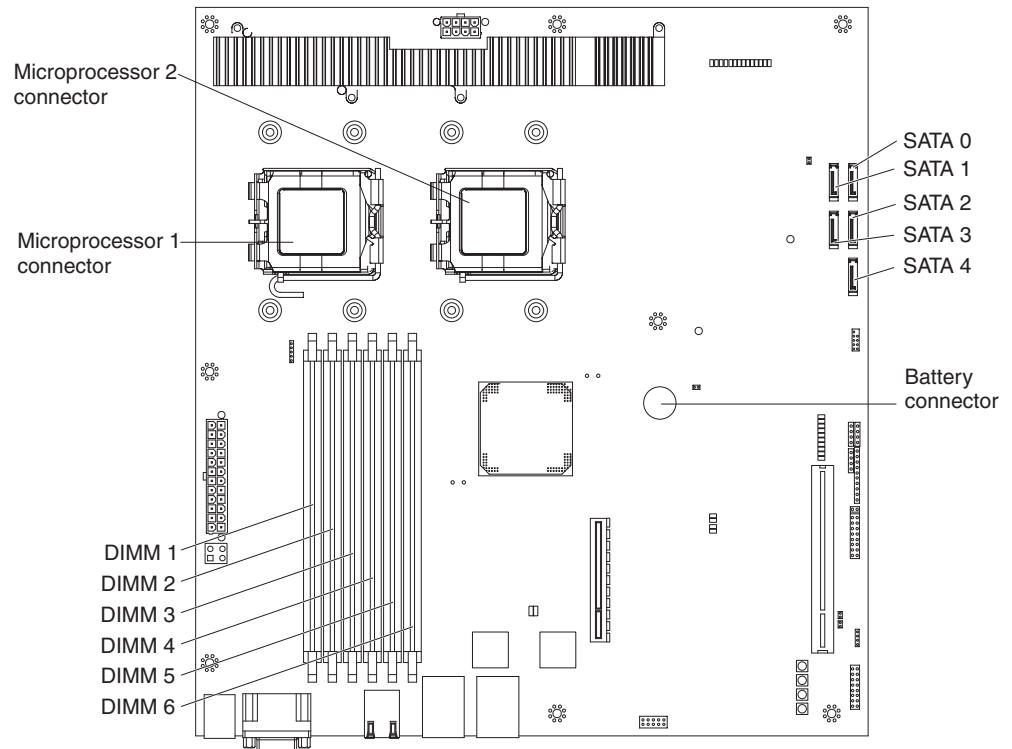
System-board layouts

The following illustrations show the connectors and jumpers on the dx320 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 dx320 system board.



System-board LEDs

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

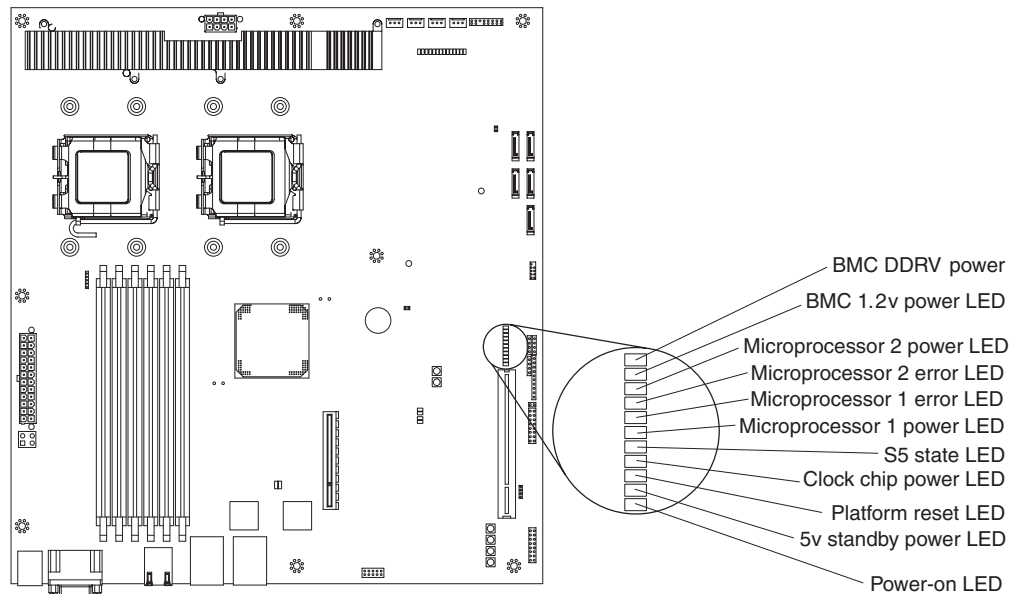


Table 2. System-board LEDs

| LED | Description |
|----------------------------|---|
| BMC DDRV power LED | The BMC is receiving DDR power. (The 2.5 v standby power rail is good; a stable 2.5 v rail is available.) |
| BMC 1.2 v power LED | The baseboard management controller (BMC) is receiving 1.2 v power. (The 1.2 v standby power rail is good; a stable 1.2 v rail is available.) |
| Microprocessor 2 power LED | The socket for microprocessor 2 is receiving power. |
| Microprocessor 2 error LED | An internal error has occurred on microprocessor 2 (CPU1). |
| Microprocessor 1 error LED | An internal error has occurred on microprocessor 1 (CPU0). |
| Microprocessor 1 power LED | The socket for microprocessor 1 is receiving power. |
| S5 state LED | The server is in the S5 state (ac power is present but the server is not turned on). |
| Clock chip power LED | Power good is asserted to the clock chip (the real-time clock has power). |
| Platform reset LED | System board reset is active. |
| 5v standby power LED | Standby power for 5v circuits and devices is present (the 5v standby power rail is active). |
| Power-on LED | The system board is receiving power (the power supply is on and 3.3 volts is active; the system power-on sequence has started or completed). |

System-board switches

The following illustration shows the switches (buttons) on the system board.

Any switches or jumpers on the system board that are not shown in the illustration are reserved.

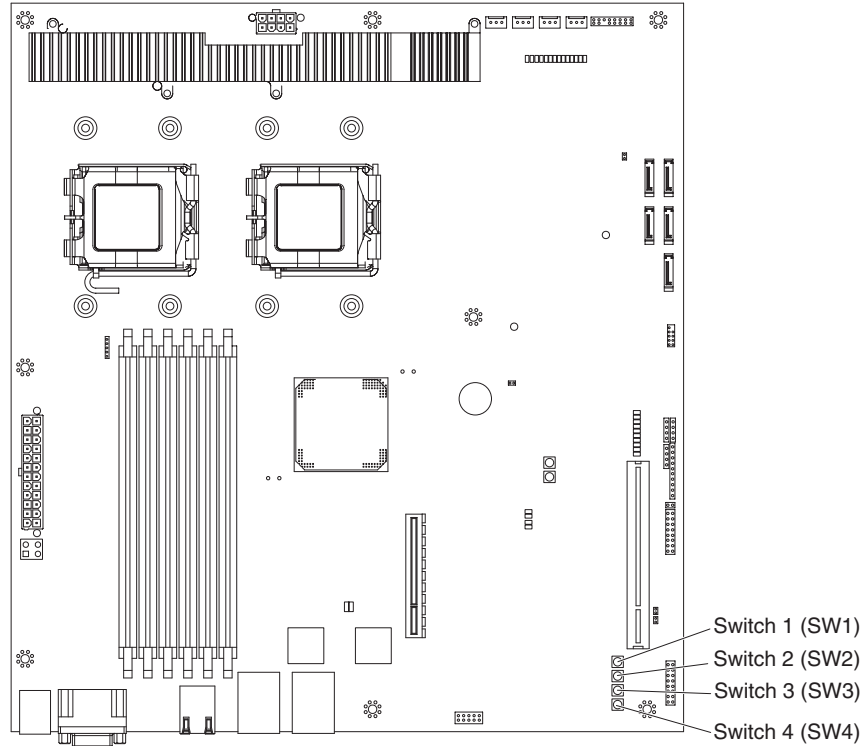


Table 3. System-board switches

| Switch number | Switch (button) description |
|---------------|--|
| 1 | NMI. When this button is pressed, it issues a non-maskable interrupt (NMI) to the server. This button is functional only when power is connected to the server and the server is running. |
| 2 | Clear CMOS. When this button is pressed, it clears the CMOS data, which clears the user password. This button is functional when no power is connected to the system-board tray. |
| 3 | Power-on. This button is not used for the dx320 server. |
| 4 | Reset. This button is not used for the dx320 server. |

Chapter 3. 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 Setup Utility or the Dynamic System Analysis (DSA) Preboot diagnostic programs, you must have the following additional hardware:

- Monitor
- Combination USB keyboard and mouse 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 111 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 successful test completion or the detection of a problem. See “POST” on page 16 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 procedure” on page 27 for more information.

- **Troubleshooting tables**

These tables list problem symptoms and actions to correct the problems. See “Troubleshooting tables” on page 31 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. See “Diagnostic programs, messages, and error codes” on page 38 for more information.

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 supervisor or user passwords are set, you must type the password and press Enter, when you are prompted, for POST to run.

If POST detects a problem, more than one beep might sound, or an error message is displayed. See “Beep code descriptions” and “POST error codes” on page 19 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. To determine the meaning of a beep code, see “Beep code descriptions.”

Beep code descriptions

The following table describes the power-on self test (POST) 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 33 for information about diagnosing microprocessor problems.

Table 4. POST beep codes

| <ul style="list-style-type: none">• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.• See Chapter 4, “Parts listing,” on page 63 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 short beep | The server has successfully completed POST. | None. |
| 3 short beeps | No valid memory modules were found. | <ol style="list-style-type: none">1. Make sure that the memory modules in the server are supported and are installed in the arrangement indicated in “Installing a memory module” on page 84.2. Reseat the memory modules.3. Replace the memory modules.4. (Trained service technician only) Replace the system-board tray. |

Table 4. POST beep codes (continued)

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 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 |
| 1-1-4 | ROM checksum error. | <ol style="list-style-type: none"> 1. Recover the BIOS code (see “Recovering the BIOS code” on page 58). 2. (Trained service technician only) Replace the system-board tray. |
| 1-2-1 | Memory refresh timer failed. | <ol style="list-style-type: none"> 1. Reseat the DIMMs. 2. Replace the following components, one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. DIMMs b. (Trained service technician only) system-board tray |
| 1-3-1 | Base memory read/write test error. A memory failure occurred within the first 64K of memory. | Reseat the DIMMs. |
| 2-2-1 | Processor error. | <ol style="list-style-type: none"> 1. Reseat the following components, one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. (Trained service technician only) microprocessor 2 (if installed) b. (Trained service technician only) microprocessor 1 2. Replace the following components, one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. (Trained service technician only) microprocessor 2 (if installed) b. (Trained service technician only) microprocessor 1 c. (Trained service technician only) system-board tray |

Table 4. POST beep codes (continued)

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 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 |
| 2-2-2 | CMOS checksum error. | <ol style="list-style-type: none"> 1. Run the BIOS Setup Utility program, make sure that the date and time are correct, select Exit → Load Default Settings → Save Changes and Exit. 2. Reseat the battery. 3. Clear CMOS memory. See “Clearing CMOS memory and passwords” on page 56 for information about how to clear CMOS memory. 4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Battery. b. (Trained service technician only) system-board tray. |

POST error codes

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

Table 5. POST error codes

| Error code | Description | Action |
|--|-----------------------------|---|
| <ul style="list-style-type: none"> Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. See Chapter 4, “Parts listing,” on page 63 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. | | |
| 0003 | CMOS battery low. | <ol style="list-style-type: none"> Replace the CMOS lithium battery, if necessary. (Trained service technician only) Replace the system-board tray. |
| 0005 | CMOS checksum error. | <ol style="list-style-type: none"> Run the BIOS Setup Utility program, make sure that the date and time are correct, select Exit → Load Default Settings → Save Changes and Exit. Reseat the battery. Clear CMOS memory. See “Clearing CMOS memory and passwords” on page 56 for information about how to clear CMOS memory. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> Battery (Trained service technician only) system-board tray. |
| 0012 | CMOS date and time not set. | <ol style="list-style-type: none"> Enter the CMOS date and time using the BIOS Setup Utility. Replace the CMOS lithium battery, if necessary. (Trained service technician only) Replace the system-board tray. |
| 0048 | Password check failed. | <ol style="list-style-type: none"> Enter the correct password. Clear the password. See “Clearing CMOS memory and passwords” on page 56 for information about how to clear CMOS memory. Restart the server and enter a new system password using the BIOS Setup Utility program. |

Table 5. POST error codes (continued)

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. | | |
|--|--------------------------------------|--|
| Error code | Description | Action |
| 005D | SMART command failed. | <ol style="list-style-type: none"> 1. Run the hard disk drive diagnostics tests on the drive. 2. Reseat the following components: <ol style="list-style-type: none"> a. Hard disk drive b. Cable from the system board to the drive 3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Hard disk drive b. Cable from the system board to the drive c. (Trained service technician only) system-board tray |
| 005E | Password check failed. | <ol style="list-style-type: none"> 1. Enter the correct password. 2. Clear the password. See “Clearing CMOS memory and passwords” on page 56 for information about how to clear CMOS memory. 3. Restart the server and enter a new system password using the BIOS Setup Utility program. |
| 0120 | CPU1 thermal failure due to PROCHOT# | <ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • There are no fan failure messages in the system event log. If there is a fan failure, replace the fan assembly. • The environmental ambient temperature is not abnormal. • A normal software workload is running. • The microprocessor heat sink is installed correctly. 2. (Trained service technician only) Replace the microprocessor. |
| 0121 | CPU2 thermal failure due to PROCHOT# | <ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • There are no fan failure messages in the system event log. If there is a fan failure, replace the fan assembly. • The environmental ambient temperature is not abnormal. • A normal software workload is running. • The microprocessor heat sink is installed correctly. 2. (Trained service technician only) Replace the microprocessor. |

Table 5. POST error codes (continued)

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. | | |
|--|---------------------------------|--|
| Error code | Description | Action |
| 0150 | CPU1 failed BIST. | <ol style="list-style-type: none"> 1. Make sure that the microprocessor is enabled in the BIOS Setup Utility. 2. (Trained service technician only) Make sure that the microprocessor is installed correctly and that the heat sink is installed correctly. 3. Start the server again to run the test. 4. (Trained service technician only) Swap the microprocessor with one that is known to work. Replace the microprocessor, if necessary. |
| 0151 | CPU2 failed BIST. | <ol style="list-style-type: none"> 1. Make sure that the microprocessor is enabled in the BIOS Setup Utility. 2. (Trained service technician only) Make sure that the microprocessor is installed correctly and that the heat sink is installed correctly. 3. Start the server again to run the test. 4. (Trained service technician only) Swap the microprocessor with one that is known to work. Replace the microprocessor, if necessary. |
| 0160 | Processor 00 missing microcode. | <ol style="list-style-type: none"> 1. Make sure that the correct firmware update package is being applied: <ul style="list-style-type: none"> • Use the BIOS Setup Utility to determine the current BIOS version. • Compare the current BIOS version to the latest version available on the web. 2. Update the server using the latest firmware update package. See “Firmware updates” on page 110 for more information. |
| 0161 | Processor 01 missing microcode. | <ol style="list-style-type: none"> 1. Make sure that the correct firmware update package is being applied: <ul style="list-style-type: none"> • Use the BIOS Setup Utility to determine the current BIOS version. • Compare the current BIOS version to the latest version available on the web. 2. Update the server using the latest firmware update package. See “Firmware updates” on page 110 for more information. |

Table 5. POST error codes (continued)

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. | | |
|--|---------------------------------|---|
| Error code | Description | Action |
| 0162 | Processor 02 missing microcode. | <ol style="list-style-type: none"> 1. Make sure that the correct firmware update package is being applied: <ul style="list-style-type: none"> • Use the BIOS Setup Utility to determine the current BIOS version. • Compare the current BIOS version to the latest version available on the web. 2. Update the server using the latest firmware update package. See “Firmware updates” on page 110 for more information. |
| 0163 | Processor 03 missing microcode. | <ol style="list-style-type: none"> 1. Make sure that the correct firmware update package is being applied: <ul style="list-style-type: none"> • Use the BIOS Setup Utility to determine the current BIOS version. • Compare the current BIOS version to the latest version available on the web. 2. Update the server using the latest firmware update package. See “Firmware updates” on page 110 for more information. |
| 0164 | Processor 04 missing microcode. | <ol style="list-style-type: none"> 1. Make sure that the correct firmware update package is being applied: <ul style="list-style-type: none"> • Use the BIOS Setup Utility to determine the current BIOS version. • Compare the current BIOS version to the latest version available on the web. 2. Update the server using the latest firmware update package. See “Firmware updates” on page 110 for more information. |
| 0165 | Processor 05 missing microcode. | <ol style="list-style-type: none"> 1. Make sure that the correct firmware update package is being applied: <ul style="list-style-type: none"> • Use the BIOS Setup Utility to determine the current BIOS version. • Compare the current BIOS version to the latest version available on the web. 2. Update the server using the latest firmware update package. See “Firmware updates” on page 110 for more information. |

Table 5. POST error codes (continued)

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. | | |
|--|--|---|
| Error code | Description | Action |
| 0166 | Processor 06 missing microcode. | <ol style="list-style-type: none"> 1. Make sure that the correct firmware update package is being applied: <ul style="list-style-type: none"> • Use the BIOS Setup Utility to determine the current BIOS version. • Compare the current BIOS version to the latest version available on the web. 2. Update the server using the latest firmware update package. See “Firmware updates” on page 110 for more information. |
| 0167 | Processor 07 missing microcode. | <ol style="list-style-type: none"> 1. Make sure that the correct firmware update package is being applied: <ul style="list-style-type: none"> • Use the BIOS Setup Utility to determine the current BIOS version. • Compare the current BIOS version to the latest version available on the web. 2. Update the server using the latest firmware update package. See “Firmware updates” on page 110 for more information. |
| 0192 | L2 cache size mismatch | <ol style="list-style-type: none"> 1. Make sure that both of the microprocessors have matching cache sizes (for example: 12 MB last level cache). Both microprocessors must match for proper operation. 2. (Trained service technician only) Replace the microprocessor. |
| 0193 | CPUID, Processor stepping are different. | <ol style="list-style-type: none"> 1. Make sure that both microprocessors have matching microprocessor numbers (for example, Intel Xeon E5472 microprocessor). Both microprocessors must match for proper operation. 2. (Trained service technician only) Replace the microprocessor. |
| 0194 | CPUID, Processor family are different. | <ol style="list-style-type: none"> 1. Make sure that both microprocessors have matching microprocessor numbers (for example, Intel Xeon E5472 microprocessor). Both microprocessors must match for proper operation. 2. (Trained service technician only) Replace the microprocessor. |
| 0195 | Front side bus mismatch. | <ol style="list-style-type: none"> 1. Make sure that both microprocessors have matching front side bus speeds (for example, 1600 MHz, or 1333 MHz). Both microprocessors must match for proper operation. 2. (Trained service technician only) Replace the microprocessor. |

Table 5. POST error codes (continued)

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. | | |
|--|--|---|
| Error code | Description | Action |
| 0196 | CPUID, Processor model are different. | <ol style="list-style-type: none"> 1. Make sure that both microprocessors have matching microprocessor numbers (for example, Intel Xeon E5472 microprocessor). Both microprocessors must match for proper operation. 2. (Trained service technician only) Replace the microprocessor. |
| 0197 | Processor speeds mismatched. | <ol style="list-style-type: none"> 1. Make sure that both microprocessors have matching microprocessor numbers (for example, Intel Xeon E5472 microprocessor). Both microprocessors must match for proper operation. 2. (Trained service technician only) Replace the microprocessor. |
| 7001 | DIMM 01 is disabled Double-Bit error detected. | <ol style="list-style-type: none"> 1. Make sure that the DIMM01 is installed correctly. 2. Make sure that the DIMM01 is enabled in the BIOS Setup Utility. 3. Make sure that the server supports the DIMM type and speed. 4. Replace the DIMM. |
| 7002 | DIMM 02 is disabled Double-Bit error detected. | <ol style="list-style-type: none"> 1. Make sure that the DIMM02 is installed correctly. 2. Make sure that the DIMM02 is enabled in the BIOS Setup Utility. 3. Make sure that the server supports the DIMM type and speed. 4. Replace the DIMM. |
| 7003 | DIMM 03 is disabled Double-Bit error detected. | <ol style="list-style-type: none"> 1. Make sure that the DIMM03 is installed correctly. 2. Make sure that the DIMM03 is enabled in the BIOS Setup Utility. 3. Make sure that the server supports the DIMM type and speed. 4. Replace the DIMM. |
| 7004 | DIMM 04 is disabled Double-Bit error detected. | <ol style="list-style-type: none"> 1. Make sure that the DIMM04 is installed correctly. 2. Make sure that the DIMM04 is enabled in the BIOS Setup Utility. 3. Make sure that the server supports the DIMM type and speed. 4. Replace the DIMM. |

Table 5. POST error codes (continued)

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. | | |
|--|---|--|
| Error code | Description | Action |
| 7005 | DIMM 05 is disabled Double-Bit error detected. | <ol style="list-style-type: none"> 1. Make sure that the DIMM05 is installed correctly. 2. Make sure that the DIMM05 is enabled in the BIOS Setup Utility. 3. Make sure that the server supports the DIMM type and speed. 4. Replace the DIMM. |
| 7006 | DIMM 06 is disabled Double-Bit error detected. | <ol style="list-style-type: none"> 1. Make sure that the DIMM06 is installed correctly. 2. Make sure that the DIMM06 is enabled in the BIOS Setup Utility. 3. Make sure that the server supports the DIMM type and speed. 4. Replace the DIMM. |
| 8601 | BMC fail to detect. Error: BMC not responding. | <ol style="list-style-type: none"> 1. Start the server again. 2. Update the server BIOS, BMC, and FRU/SDR firmware using the latest firmware update package. See “Updating (flash-updating) the BIOS code” on page 57 for more information. 3. (Trained service technician only) Replace the system-board tray. |

Error logs

The event log contains messages that were generated during POST and all system status messages from the service processor. The BMC system event log contains monitored events, such as a threshold that is reached or a device that fails.

The following illustration shows an example of a BMC system event log entry.

```
BMC System Event Log
-----
Get Next Entry
Get Previous Entry
Clear BMC SEL

Entry Number=    00005 / 00011
Record ID=       0005
Record Type=     02
Timestamp=       2005/01/25 16:15:17
Entry Details:   Generator ID= 0020
                  Sensor Type= 04
                  Assertion Event
                  Fan
                  Threshold
                  Lower Non-critical - going high

                  Sensor Number= 40
                  Event Direction/Type= 01

                  Event Data= 52 00 1A
```

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 BMC system event log through the BIOS Setup Utility program (the menu choices are described in “BIOS Setup Utility menu choices” on page 108). When you are troubleshooting an error, be sure to clear the BMC system event log so that you can find current errors more easily.

You can view the contents of the event log and the BMC system event log from the BIOS Setup Utility program.

Viewing error logs from the BIOS Setup Utility program

For complete information about using the BIOS Setup Utility program, see “Using the BIOS Setup Utility program” on page 107.

To view the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt Press F1 for BIOS Setup appears, press F1. If you have set both a user password and a supervisor password, you must type the supervisor password to access the full BIOS Setup Utility menu. If you do not type the supervisor password, a limited BIOS Setup Utility menu is available.
3. Use one of the following procedures:
 - To view the event log, select **Advanced** → **Event Log Configuration** → **View Event Log**.
 - To view the BMC system event log, select **Advanced** → **IPMI configuration** → **View BMC System Event Log**.

Clearing the error logs

For complete information about using the BIOS Setup Utility program, see “Using the BIOS Setup Utility program” on page 107.

To clear the error logs, complete the following steps:

1. Turn on the server.
2. When the prompt Press F1 for BIOS Setup appears, press F1. If you have set both a user password and a supervisor password, you must type the supervisor password to view the error logs.
3. Use one of the following procedures:
 - To clear the event log, select **Advanced** → **Event Log Configuration** → **Clear Event Log**.
 - To clear the BMC system event log, select **Advanced** → **IPMI configuration** → **Clear BMC System Event Log**.

Checkout procedure

The checkout procedure is 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 procedure

Before you perform 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 33 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 codes” on page 19. If the system-board tray is halted and no error message is displayed, see “Troubleshooting tables” on page 31 and “Solving undetermined problems” on page 60.
- For information about power-supply problems, see “Power problems” on page 35.
- For intermittent problems, check the error log; see “Error logs” on page 26 and “Diagnostic programs, messages, and error codes” on page 38.

Performing the basic checkout procedure

To perform the checkout procedure, complete the following steps:

1. Is the system-board tray part of a cluster?
 - **No:** Go to step 2.
 - **Yes:** Shut down all failing system-board trays that are related to the cluster. 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 31.
 - 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 codes” on page 19.
 - 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 following results:
 - Successful completion of POST, indicated by one short beep
 - Successful completion of startup, indicated by a readable display of the operating-system desktop
3. Did one short beep sound and are there readable instructions on the main menu?
 - **No:** Find the failure symptom in “Troubleshooting tables” on page 31; if necessary, see “Solving undetermined problems” on page 60.
 - **Yes:** Run the diagnostic programs (see “Running the diagnostic programs” on page 39).
 - If you receive an error, see “Diagnostic error codes” on page 40.
 - If the diagnostic programs were completed successfully and you still suspect a problem, see “Solving undetermined problems” on page 60.

Important: Clear the BMC system-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 startup. 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. 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 3.
 - **No:** Go to step 4.
3. Remove the system-board tray from the chassis and apply power to the chassis. Is the fan on the power supply working?
 - **Yes:** (Trained service technician only) Replace the system-board tray.
 - **No:** Replace the power supply.
4. Check to see if power is being applied to the system-board tray. Reinstall the system-board tray in the chassis and press the power-control button to turn on the system. Are the chassis fans working?
 - **Yes:** Go to step 6.
 - **No:** Complete the following steps:
 - a. Remove the chassis from the rack.
 - b. Remove the chassis top cover.
 - c. Reseat the fan packs on the power supply.
 - d. Go to step 5.
5. With the system-board tray installed in the chassis and the chassis top cover removed, apply power to the system. 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, replace the system-board tray.
6. Reseat all of the system board components, including the following:
 - Cables
 - DIMMs
 - Optional adapters
 - Video card

Go to step 7.
7. Turn on the system. Does the system start and display output to the monitor?
 - **Yes:** One of the components was loose. The problem is fixed.
 - **No:** Go to step 8.
8. Configure the system to the minimum hardware requirements as listed in “Solving undetermined problems” on page 60; then, turn on the system. Does the system start 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 9.
9. 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 10.
 - **No:** (Trained service technician only) Replace the system-board tray.
 10. Test POST again by completing the following steps:
 - a. Reinstall the DIMMs.
 - b. Clear CMOS by using the procedure listed in “Clearing CMOS memory and passwords” on page 56.
 - c. Turn on the system.
 - d. Does the system start and display output to the monitor?
 - **Yes:** Go to step 11.
 - **No:** See the “Solving undetermined problems” on page 60 to continue troubleshooting.
 11. Recover the system BIOS.
 - a. Use the BIOS recovery procedure listed in “Recovering the BIOS code” on page 58.
 - b. Turn on the system.
 - c. Does the system start and display output to the monitor?
 - **Yes:** The symptom has changed, see “Solving undetermined problems” on page 60 to continue troubleshooting.
 - **No:** Go to step 12.
 12. (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 39 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

| <ul style="list-style-type: none">• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.• See Chapter 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs.• 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

| <ul style="list-style-type: none">• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.• See Chapter 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs.• 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. |

Intermittent problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs.
- 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. | <ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • 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 26). 3. See “Solving undetermined problems” on page 60. |

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 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs.
- 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. | <ol style="list-style-type: none"> 1. Make sure that the combination USB keyboard and mouse cable is securely connected. 2. If you are using a combination USB keyboard and mouse and it is connected to a USB hub, disconnect the device from the hub and connect it 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: <ol style="list-style-type: none"> a. Combination USB keyboard and mouse b. (Trained service technician only) system-board tray |

Memory problems

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs. • 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. | <ol style="list-style-type: none"> 1. Check the system-event log for DIMM error messages: <ol style="list-style-type: none"> a. Reseat the DIMMs, verifying that each pair consists of matched DIMMs (matching speed, size, and technology), and restart the system-board tray. b. Verify that all branches and channels of memory are detected on startup. Use the BIOS Setup Utility to view installed DIMM information. 2. If the DIMM error occurs again: <ol style="list-style-type: none"> a. Run memory diagnostics (see “Running the diagnostic programs” on page 39). b. Replace the DIMMS and restart the system-board tray. |

Microprocessor problems

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs. • 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. | <ol style="list-style-type: none"> 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 39. 3. (Trained service technician only) If the problem remains, replace the microprocessor. |

Optional-device problems

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs. • 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. | <ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • 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 Setup 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. | <ol style="list-style-type: none"> 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 4, “Parts listing,” on page 63 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). | <ol style="list-style-type: none"> 1. Make sure that the operator panel power-control button is working correctly: <ol style="list-style-type: none"> a. Remove the system-board tray from the 2U chassis for 30 seconds. b. Reinstall the system-board tray. c. Press the power-control button. 2. Make sure that external power is good. Verify that: <ol style="list-style-type: none"> a. The ac power cord is correctly connected to the chassis and to a working electrical outlet. b. The power supply fan is working. c. The other system-board tray in the 2U chassis (if installed) powers on. 3. Make sure that the 5 V standby power LED on the system board is lit. See “System-board LEDs” on page 12 for additional information. 4. Replace the following components one at a time, in the order shown, restarting the system each time: <ol style="list-style-type: none"> a. (Trained service technician only) System-board tray, if the other system-board tray in the chassis powers on. b. If both system-board trays in the chassis fail to power on, reseal the fan assembly; then, replace the power supply. |
| The system-board tray does not turn off. | <ol style="list-style-type: none"> 1. Turn off the system-board tray by holding the power-control button for 5 seconds. 2. Restart the system-board tray and listen for POST beep codes. A single short beep indicates the successful completion of POST. 3. If the system-board tray fails POST and the power-control button does not work, remove the 2U chassis from the rack for 20 seconds to disconnect it from ac power; then, reinstall the chassis and restart the system-board tray. 4. (Trained service technician only) If the problem remains, replace the system-board tray. |
| The system-board tray unexpectedly shuts down, and the LEDs on the operator panel are not lit. | See “Solving undetermined problems” on page 60. |

Serial-device problems

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs. • 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. | <ol style="list-style-type: none"> 1. Make sure that each port is assigned a unique address in the BIOS Setup Utility program and no serial ports are disabled. 2. (Trained service technician only) Replace the system-board tray. |
| A serial device does not work. | <ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The device is compatible with the system-board tray. • The serial port is enabled and is assigned a unique address. 2. Reseat the serial cable. 3. Replace the following components one at a time, in the order shown, restarting the system-board tray each time: <ol style="list-style-type: none"> a. Serial cable b. (Trained service technician only) system-board tray |

Software problems

| <ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • See Chapter 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs. • 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. | <ol style="list-style-type: none"> 1. To determine whether the problem is caused by the software, make sure that: <ul style="list-style-type: none"> • 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. <p>Note: If you have just installed an adapter or memory, the system-board tray might have a memory-address conflict.</p> • 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 4, “Parts listing,” on page 63 to determine which components are CRUs and which components are FRUs.
- 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. | <ol style="list-style-type: none">1. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the system-board tray.2. Reseat the USB device.3. Replace the USB device.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. You can download DSA from <http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA>.

Note: You can select to download images of the DSA programs for external USB storage devices, such as a USB memory key or an external USB CD ROM drive.

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 adapters and service processors

The DSA diagnostic programs also can provide diagnostics for the following system components, if they are installed in the system:

- Gigabit Ethernet controller
- Hard disk drives
- PCIe adapters
- Baseboard management controller
- Memory
- Microprocessor

Note: The memory stress test is the only memory test supported on the dx320 server, and it does not provide any DIMM isolation capabilities.

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 39 for more information.

Make sure that you have the latest version of the DSA diagnostic programs. The DSA Portable Edition is available for external USB storage devices such as a USB memory key or an external USB CD ROM drive. To download the latest version of DSA, 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. You also can remove USB CD-ROM drives before you run the DSA diagnostic programs to get accurate optical drive test results.

To run 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, or the USB memory key containing the DSA Preboot diagnostic programs, to a USB connector on the front of the system-board tray.

Note: To run the DSA Preboot diagnostic programs, you might need an external USB CD-RW/DVD drive such as the IBM and Lenovo part number 73P4515 or 73P4516.

3. Turn on all attached devices; then, turn on the system-board tray.
4. Use the BIOS Setup Utility program to select the device containing the DSA Preboot diagnostic programs as the startup device (select **Boot → Boot Device Priority**). See “Using the BIOS Setup Utility program” on page 107.
5. If using a CD/DVD drive, insert the *IBM Dynamic System Analysis Preboot Diagnostic* CD in the CD/DVD drive.
6. Save the settings and exit the BIOS Setup Utility program. The diagnostic programs start.

Note: If the diagnostics programs do not start, leave USB memory key connected or leave the CD in the CD/DVD drive, and restart the server.

7. 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 40 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: 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 33 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 4, “Parts listing,” on page 63 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. | <ol style="list-style-type: none"> 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=psg1MIGR-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. |

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| Message number | Component | Test | State | Description | Action |
|----------------|-----------|-----------------|---------|-------------------------------------|---|
| 089-802-xxx | CPU | CPU Stress Test | Aborted | System resource availability error. | <ol style="list-style-type: none"> 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=psg1MIGR-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. |

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| 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. | <ol style="list-style-type: none"> 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=psg1MIGR-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. | <ol style="list-style-type: none"> 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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| 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. | <ol style="list-style-type: none"> 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 Setup 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=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. |
| 201-803-xxx | Memory | Memory Test | Aborted | Test canceled: could not enable the microprocessor cache. | <ol style="list-style-type: none"> 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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| Message number | Component | Test | State | Description | Action |
|----------------|-----------|-------------|---------|---|---|
| 201-804-xxx | Memory | Memory Test | Aborted | Test canceled: the memory controller buffer request failed. | <ol style="list-style-type: none"> 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. | <ol style="list-style-type: none"> 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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| 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. | <ol style="list-style-type: none"> 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. |
| 201-807-xxx | Memory | Memory Test | Aborted | Test canceled: the memory controller buffer free request failed. | <ol style="list-style-type: none"> 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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| Message number | Component | Test | State | Description | Action |
|----------------|-----------|-------------|---------|--|--|
| 201-808-xxx | Memory | Memory Test | Aborted | Test canceled: memory controller display/alter buffer execute error. | <ol style="list-style-type: none"> 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. |
| 201-809-xxx | Memory | Memory Test | Aborted | Test canceled program error: operation running fast scrub. | <ol style="list-style-type: none"> 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. |

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| Message number | Component | Test | State | Description | Action |
|----------------|-----------|-------------|---------|---|--|
| 201-810-xxx | Memory | Memory Test | Aborted | Test canceled: unknown error code xxx received in COMMONEXIT procedure. | <ol style="list-style-type: none"> 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. |

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| 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. | <ol style="list-style-type: none"> 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. |

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| Message number | Component | Test | State | Description | Action |
|----------------|-----------|--------------------|---------|-------------------------|--|
| 202-801-xxx | Memory | Memory Stress Test | Aborted | Internal program error. | <ol style="list-style-type: none"> 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=psg1MIGR-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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| 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. | <ol style="list-style-type: none"> 1. Turn off and restart the system-board tray. 2. Make sure that all memory is enabled by checking the Memory Configuration under the Advanced option in the BIOS Setup Utility program (press F1 at system startup). 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. | <ol style="list-style-type: none"> 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. |
| 405-901-xxx | Ethernet device | TestControlRegisters | Failed | | <ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For 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. 2. Run the test again. 3. 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 |
|----------------|-----------------|--------------------|--------|-------------|--|
| 405-902-xxx | Ethernet device | TestMIIRegisters | Failed | | <ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For 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. 2. Run the test again. 3. 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. |
| 405-903-xxx | Ethernet device | TestEEPROM | Failed | | <ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For 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. 2. Run the test again. 3. 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. |
| 405-904-xxx | Ethernet device | TestInternalMemory | Failed | | <ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For 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. 2. Run the test again. 3. 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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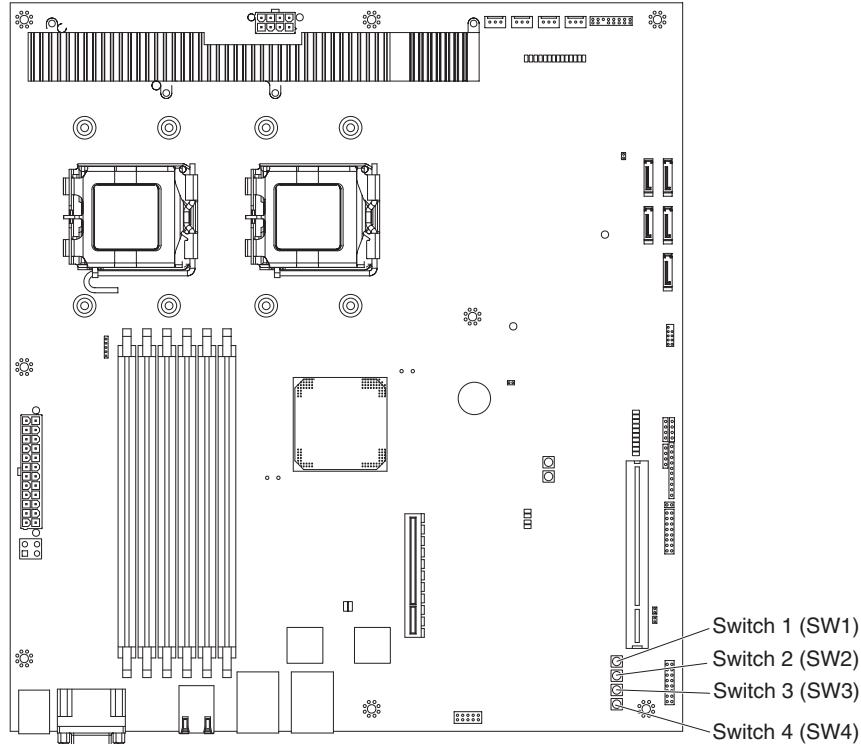
| Message number | Component | Test | State | Description | Action |
|----------------|-----------------|-------------------------|--------|-------------|---|
| 405-905-xxx | Ethernet device | TestInterrupt | Failed | | <ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For 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. 2. Run the test again. 3. Check the interrupt assignments in the PCI Hardware section of the DSA event log. If the Ethernet device is sharing interrupts, if possible, use the BIOS Setup Utility program (press F1 at system startup) to assign a unique interrupt to the device. 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. |
| 405-906-xxx | Ethernet device | TestLoopbackAtMAC-Layer | Failed | | <ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For 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. 2. Run the test again. 3. 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 |
|----------------|-----------------|-----------------------------|--------|-------------|--|
| 405-907-xxx | Ethernet device | TestLoopbackAtPhysicalLayer | Failed | | <ol style="list-style-type: none"> 1. Check the Ethernet cable for damage and make sure that the cable type and connection are correct. 2. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For 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. 3. Run the test again. 4. 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. |
| 405-908-xxx | Ethernet device | TestLEDs | Failed | | <ol style="list-style-type: none"> 1. Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For 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. 2. Run the test again. 3. 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 and passwords

If user or supervisor passwords are set and forgotten, you can press the Clear CMOS switch (button) on the system board to clear CMOS memory and bypass the user or supervisor password check. The Clear CMOS switch is switch 2 (SW2) on the system board. The switch location is shown in the following illustration.



To clear CMOS memory and bypass user and supervisor passwords, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 69
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 71).
3. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
4. Locate the Clear CMOS switch (SW2) on the system board.
5. Press the Clear CMOS switch once.
6. Install the system-board tray cover (see “Installing the system-board tray cover” on page 82).
7. Install the system-board tray in the chassis (see “Installing the system-board tray in a 2U chassis” on page 72).
8. Turn on the server and start the BIOS Setup Utility program. You can now either delete the old password or set a new user or supervisor password. (see “Using the BIOS Setup Utility program” on page 107 for information).
9. Save the configuration before exiting the BIOS Setup Utility.

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 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 dx320 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. Follow the instructions in the readme file that comes with the update file that you downloaded.

Note: Always reset the BIOS Setup Utility program to the default values after you update the BIOS code.

7. Restart the system-board tray.

Recovering the BIOS code

If the BIOS code has become damaged, such as from a power failure during an update, you can recover the BIOS code using the Ctrl+Home keys and a recovery medium that contains a BIOS image, such as a hard disk drive or an external USB storage device.

Notes:

1. You can obtain a BIOS recovery image from one of the following sources:
 - Download the BIOS code update from the World Wide Web and use it to make a recovery medium.
 - Contact your IBM service representative.
2. To create and use a USB BIOS recovery medium, you must add an optional external USB drive to the server.

To download the BIOS code update from the World Wide 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 **Software and device drivers**.
4. Click **System x iDataPlex dx320 server** to display the matrix of downloadable files.
5. Download the latest BIOS code update.
6. Create the BIOS recovery medium, following the instructions that come with the update file that you downloaded. Rename the BIOS file on the recovery medium to `amiboot.rom`.

To recover the BIOS code and restore the server operation to the primary page, complete the following steps:

1. Turn off the system-board tray.
2. Insert the BIOS recovery medium into the external USB storage drive, if applicable.
3. Restart the system-board tray. The power-on self test (POST) starts.
4. Press Ctrl+Home for approximately 2 seconds to begin the recovery process. When the recovery process is finished, the system automatically restarts and sounds a beep code.
5. Remove the BIOS recovery medium from the drive.

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 36.

Damaged data in CMOS memory or damaged BIOS code can cause undetermined problems. To reset the CMOS data, use the Clear CMOS button to override the password and clear the CMOS memory; see “System-board switches” on page 13 and “Clearing CMOS memory and passwords” on page 56 for more information. If you suspect that the BIOS code is damaged, see “Updating (flash-updating) the BIOS code” on page 57 and “Recovering the BIOS code” on page 58 for more 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. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
4. Remove or disconnect the following devices, one at a time, until you find the failure. Reinstall, turn on, and re-configure the system-board tray each time.
 - Any external devices.
 - Each adapter.
 - Each hard disk drive.
 - Memory modules. The minimum configuration requirement is two 4 GB DIMMs on the system board.

The following minimum configuration is required for the system-board tray to start:

- Chassis
 - System-board tray
 - One microprocessor
 - Two 4 GB DIMMs
5. Install and turn on the system-board tray. If the problem remains, suspect the following components in the following order:
 - a. DIMM
 - b. Microprocessor
 - c. System-board tray

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 111 for information about calling IBM for service.

Chapter 4. Parts listing

This section lists the replaceable components that are available for the iDataPlex dx320 system-board tray and the 2U chassis.

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 dx320 server** and click **Go**.

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

Type 6385 2U chassis components

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

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

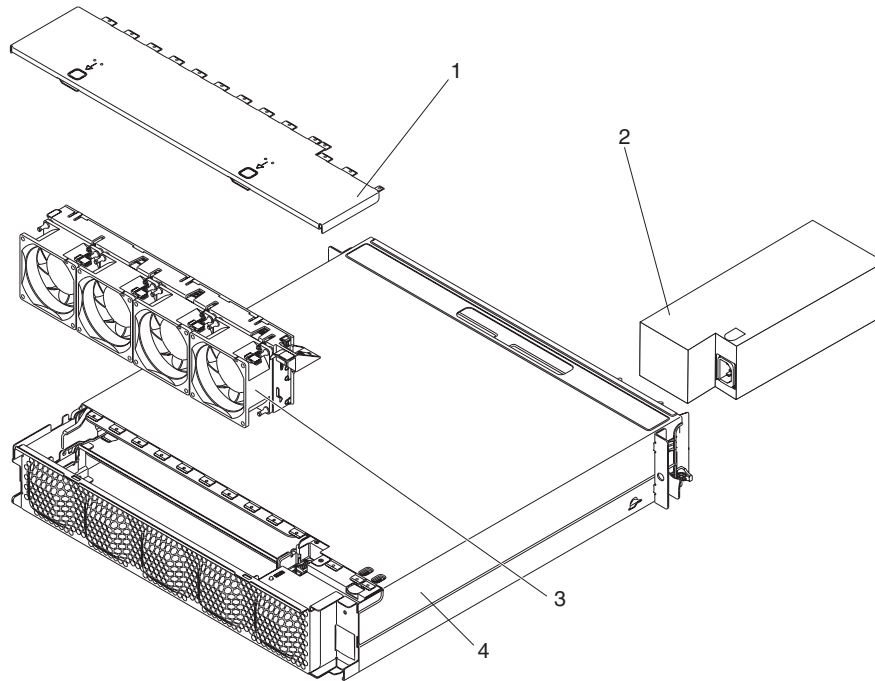


Table 6. CRUs and FRUs, Type 6385 2U chassis

| Index | Description | CRU No. (Tier 1) | CRU No. (Tier 2) | FRU No. |
|-------|--------------------------|---------------------|---------------------|---------|
| 1 | Top cover | 44W4791 | | |
| 2 | 900 W power supply | | 43X3286 | |
| 3 | Fan assembly | 44W4792 | | |
| 4 | 2U chassis | | | 44W4790 |
| | Rail kit | | 44W4793 | |
| | Enterprise rack rail kit | | 44W4794 | |
| | Power cord, jumper | 39M5503 | | |
| | Power cord, Y jumper | 39M5501 | | |
| | Label kit | 44W4849 | | |

dx320 Type 6388 system-board tray components

The following replaceable components are available for the iDataPlex dx320 Type 6388 system-board tray.

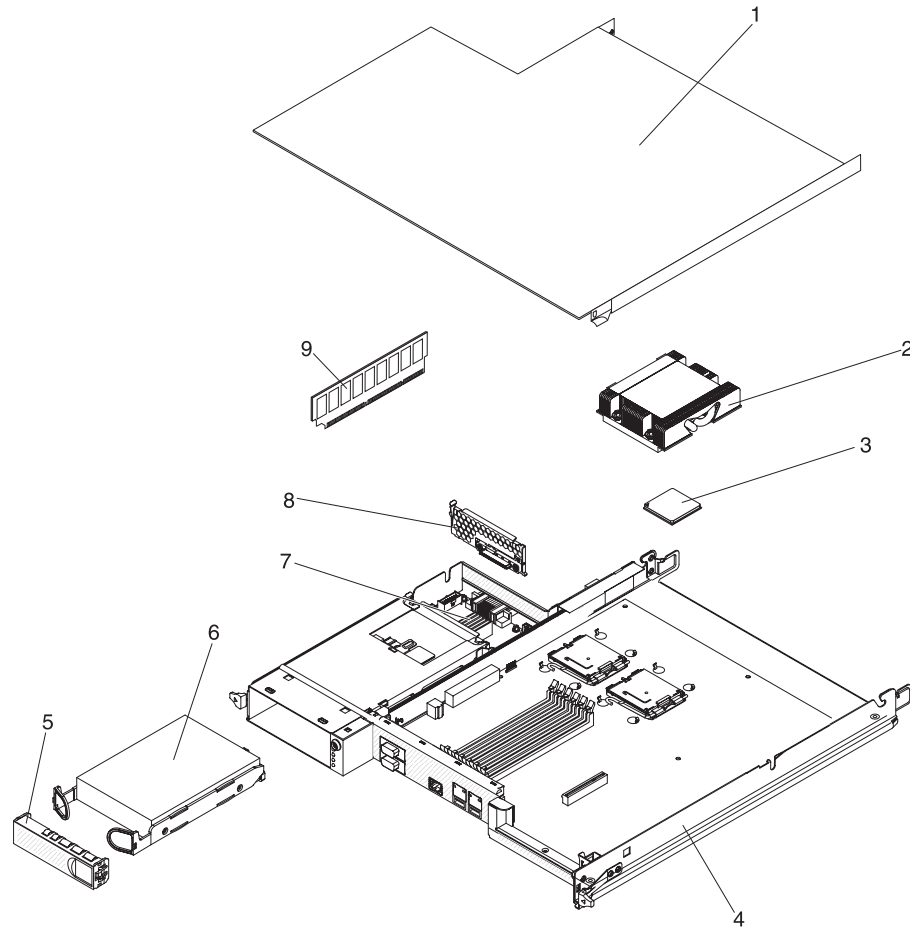


Table 7. CRUs and FRUs, dx320 Type 6388 system-board tray

| Index | Description | CRU No. (Tier 1) | CRU No. (Tier 2) | FRU No. |
|-------|---|---------------------|---------------------|---------|
| 1 | System-board tray cover | | 44W4795 | |
| 2 | Heat sink | | | 44W4759 |
| 3 | Microprocessor, Intel Xeon L5420E 2.5 GHz 1333 MHz quad core 50W | | | 46M3149 |
| 4 | System-board tray with system board | | | 46C6904 |
| 5 | 3.5-inch drive filler panel | 44W4802 | | |
| 6 | Hard disk drive, 3.5-inch 250 GB simple-swap SATA | 39M4511 | | |
| 6 | Hard disk drive, 3.5-inch 500 GB simple-swap SATA | 39M4517 | | |
| 7 | Power supply paddle card domain A | | | 43X3272 |
| 8 | One-bay hard disk drive bracket and cable assembly, 1 PM SATA to 1x | | 46C6896 | |
| 9 | Memory, 4 GB DDR2 667 2Rx4 PC2-5300 555 RDIMM with ECC | | 46C7537 | |
| 9 | Memory, 8 GB DDR2 667 2Rx4 PC2-5300 555 RDIMM with ECC | | 43V7355 | |

Table 7. CRUs and FRUs, dx320 Type 6388 system-board tray (continued)

| Index | Description | CRU No. (Tier 1) | CRU No. (Tier 2) | FRU No. |
|-------|---------------------------|---------------------|---------------------|---------|
| | Microprocessor filler | 44W4807 | | |
| | Thermal grease | | 41Y9292 | |
| | Front-panel assembly | | | 46C6905 |
| | Thermistor two-drop cable | | 46C6873 | |
| | PCI filler bracket | 44W4895 | | |
| | Label kit | 46C6912 | | |
| | Miscellaneous parts kit | | 46C6911 | |

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 8. Consumable parts, dx320 system-board tray

| Description | Part number |
|-------------------|-------------|
| Battery, 3.0 volt | 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.

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 5. 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 4, “Parts listing,” on page 63 to determine whether a component is a Tier 1 CRU, Tier 2 CRU, or FRU.

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 70. 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-plug Universal Serial Bus (USB) devices. However, you must shut down the operating system and turn off the system-board tray before you remove simple-swap drives or 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.
- The system-board tray 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.
- The upper system-board tray is not operating with the bottom system-board tray removed or powered off.
- The system-board tray cover is installed and closed.

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 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 chassis or 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 chassis or 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.

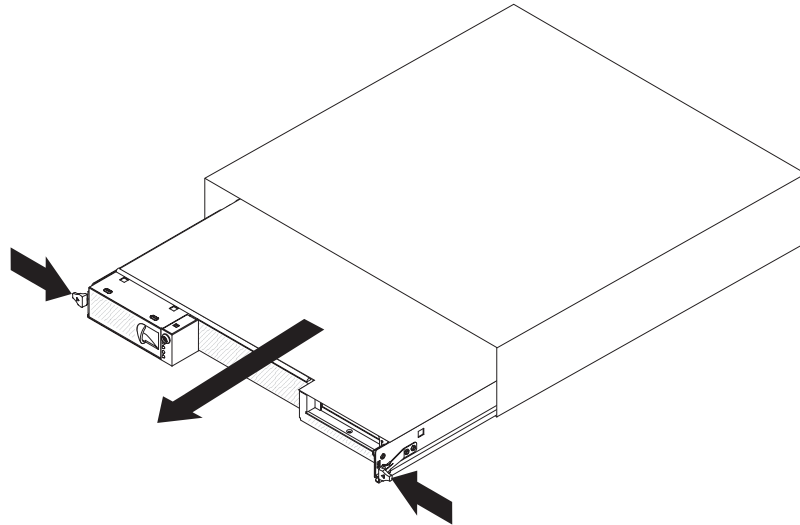
Returning a device or component

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 the system-board tray from a 2U chassis

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

To remove the system-board tray from a 2U chassis, complete the following steps.



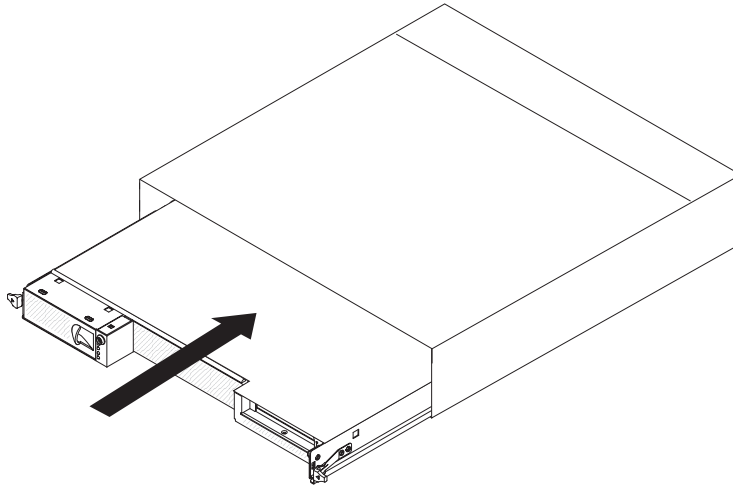
Note: If two system-board trays are installed in the chassis, they can be removed independently of each other.

1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
2. Turn off the system-board tray and all attached devices (see “Turning off the system-board tray” on page 10).
3. If external cables are connected to the front of the system-board tray, note where they are connected; then, remove them.
4. Press in on the two release handles, pull the system-board tray out of the chassis, and set it on a flat, static-protective surface.

Installing the system-board tray in a 2U chassis

Attention: You cannot insert the system-board tray into a chassis until the cover is installed and closed. Do not attempt to override this protection.

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



1. Slide the system-board tray into the chassis until it stops and the release handles click into place.
2. Reconnect the cables to the front of the system-board tray.
3. Turn on the system-board tray (see “Turning on the system-board tray” on page 10).
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 have changed the configuration of the system-board tray or 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 Setup Utility program. See “Using the BIOS Setup Utility program” on page 107 for more information.

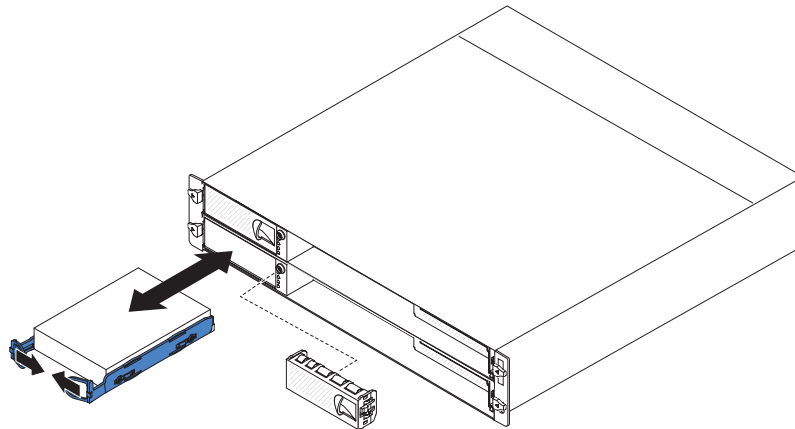
Removing and replacing Tier 1 CRUs

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 a 3.5-inch simple-swap hard disk drive

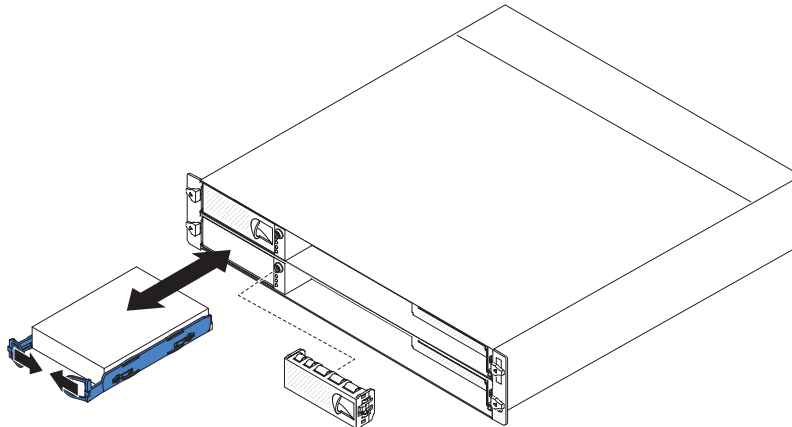
To remove a 3.5-inch simple-swap hard disk drive, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
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 10 for more information).
3. Pull the 3.5-inch filler panel out of the bay for the drive that you want to remove. Save the filler panel for future use.
4. Pull the loops of the drive toward each other; then, pull the drive out of the drive bay.
5. Install a new drive in the bay or reinstall the 3.5-inch filler panel.
6. 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.



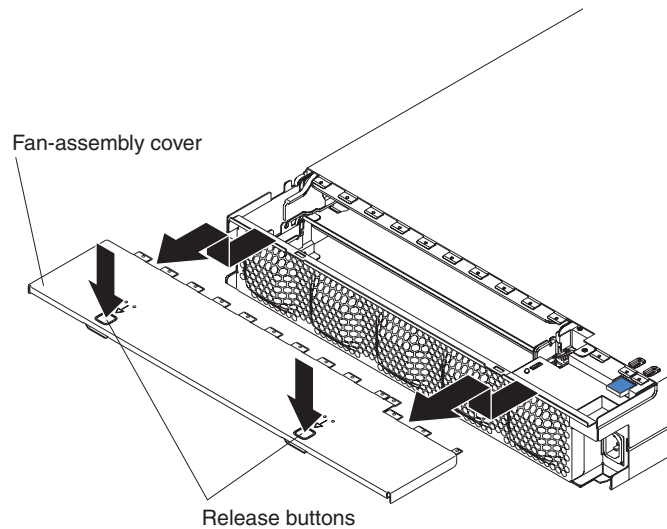
1. Touch the static-protective package that contains the hard disk drive to any unpainted metal surface on the outside of the system-board tray; then, remove the hard disk drive from the package.
Attention: Do not press on the top of the drive. Pressing the top might damage the drive.
2. Align the drive 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 10).

Removing the 2U chassis top cover

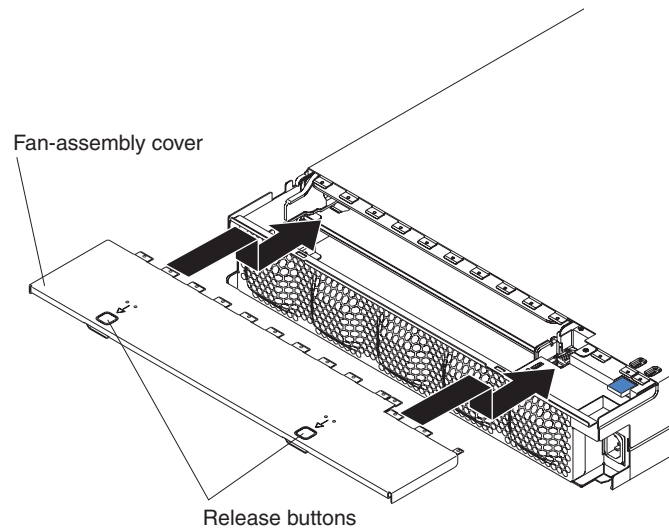
To remove the 2U chassis top cover, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
2. If the chassis is installed in a rack, remove it (see “Removing the 2U chassis from a Type 7825 rack” on page 92).
3. Press the two cover-release buttons and slide the cover toward the rear of the chassis to remove it.
4. Save the top cover for future use.
5. If you are instructed to return the top cover, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the 2U chassis top cover

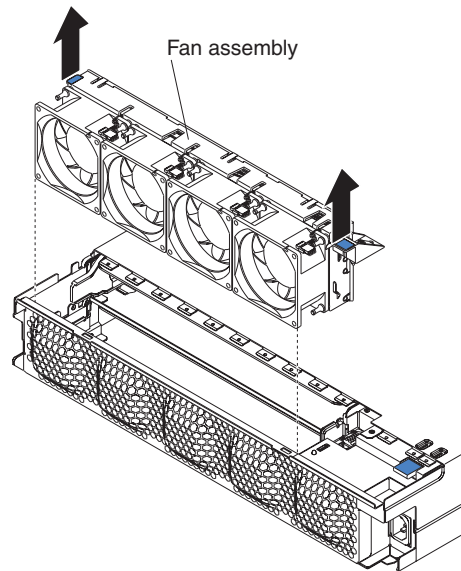
To install the 2U chassis top cover, complete the following steps.



1. Make sure that no wires are protruding that 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 rack (see "Installing the 2U chassis in a Type 7825 rack" on page 93).

Removing the 2U chassis fan assembly

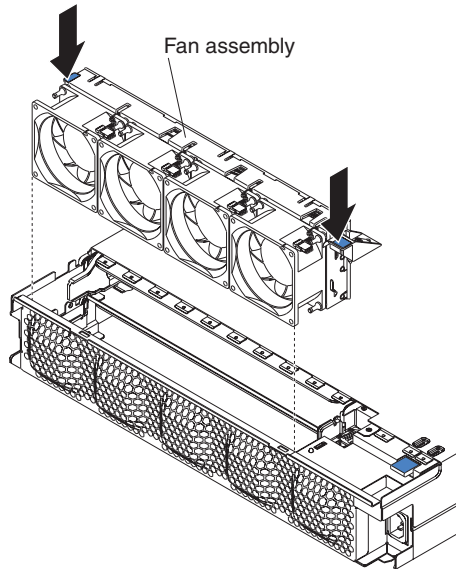
To remove the fan assembly from a 2U chassis, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
2. If the chassis is installed in a rack, remove it (see “Removing the 2U chassis from a Type 7825 rack” on page 92).
3. Remove any installed system-board trays (see “Removing the system-board tray from a 2U chassis” on page 71).
4. Remove the top cover (see “Removing the 2U chassis top cover” on page 75).
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

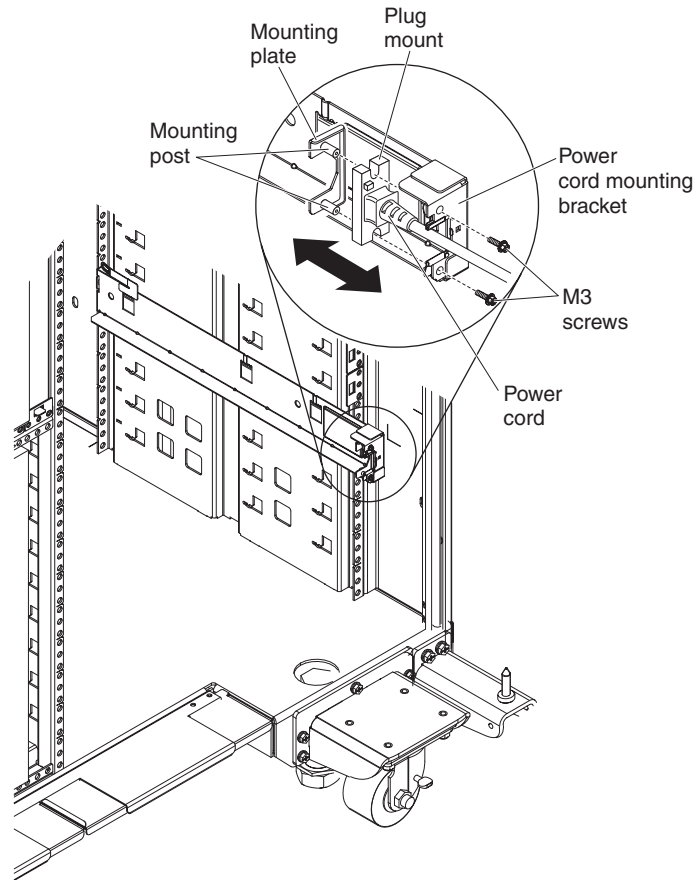
To install the fan assembly in a 2U chassis, complete the following steps.



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 to make sure that it is fully seated.
4. Install the top cover (see “Installing the 2U chassis top cover” on page 76).
5. Install any system-board trays that you removed (see “Installing the system-board tray in a 2U chassis” on page 72).
6. Install the chassis in the iDataPlex rack (see “Installing the 2U chassis in a Type 7825 rack” on page 93).

Removing the power cord

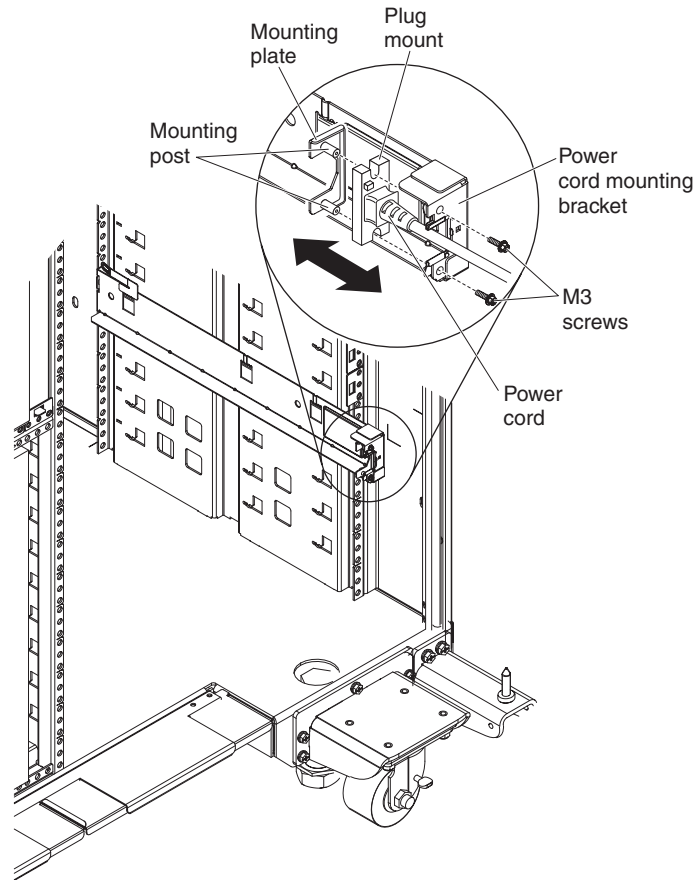
To remove the power cord from the iDataPlex rack, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
2. If the 2U chassis is installed in an iDataPlex rack, remove the chassis from the rack (see “Removing the 2U chassis from a Type 7825 rack” on page 92).
3. Unplug the power cord that you are working on from the power distribution unit.
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 in an iDataPlex rack, 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. Use an M3 hex driver and two M3 screws to secure the power cord and mounting plate.
5. Plug the power cord that you are working on into a power distribution unit.
6. Install the chassis in the rack (see "Installing the 2U chassis in a Type 7825 rack" on page 93).

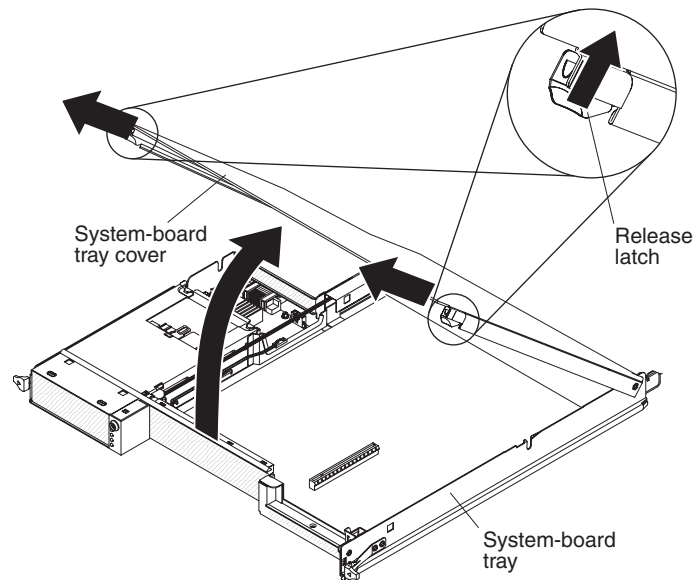
Removing and replacing Tier 2 CRUs

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 system-board tray cover

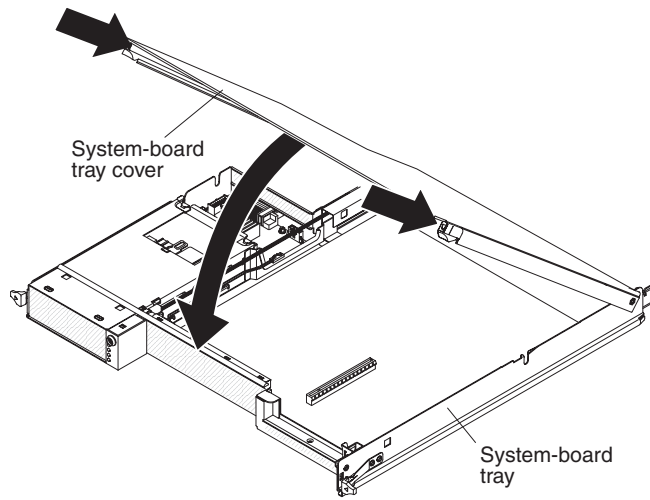
To remove the system-board tray cover, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
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 71).
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. Lift the cover from the system-board tray and store it for future use.
6. 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

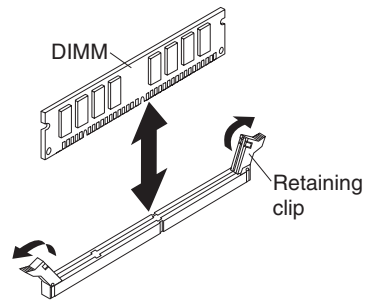
To install the system-board tray cover, complete the following steps.



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 72).

Removing a memory module

To remove a DIMM from the system-board tray, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69
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 71).
3. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
4. Locate the DIMM connectors on the system board (see “System-board connectors” on page 11).
Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, handle the clips gently.
5. Move the DIMM retaining clips on the side of the DIMM connector to the open position by pressing the retaining clips away from the center of the DIMM connector.
6. Using your fingers, 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

When you install memory, you must install a pair of matched DIMMs. Each DIMM in a pair must be the same size, speed, type, and technology to ensure that the server will operate correctly. If you are replacing a faulty DIMM, make sure that the replacement DIMM is the correct type of memory (see the Chapter 4, “Parts listing,” on page 63 for a list of memory that is compatible with the server).

Note: The default memory operating speed is 533 MHz for Web 2.0 power saving optimization. Memory operating speed can be adjusted using the **Chipset** option in the BIOS Setup Utility program.

When you install DIMMs, you must install the DIMMs in the order shown in the following tables, to maintain performance.

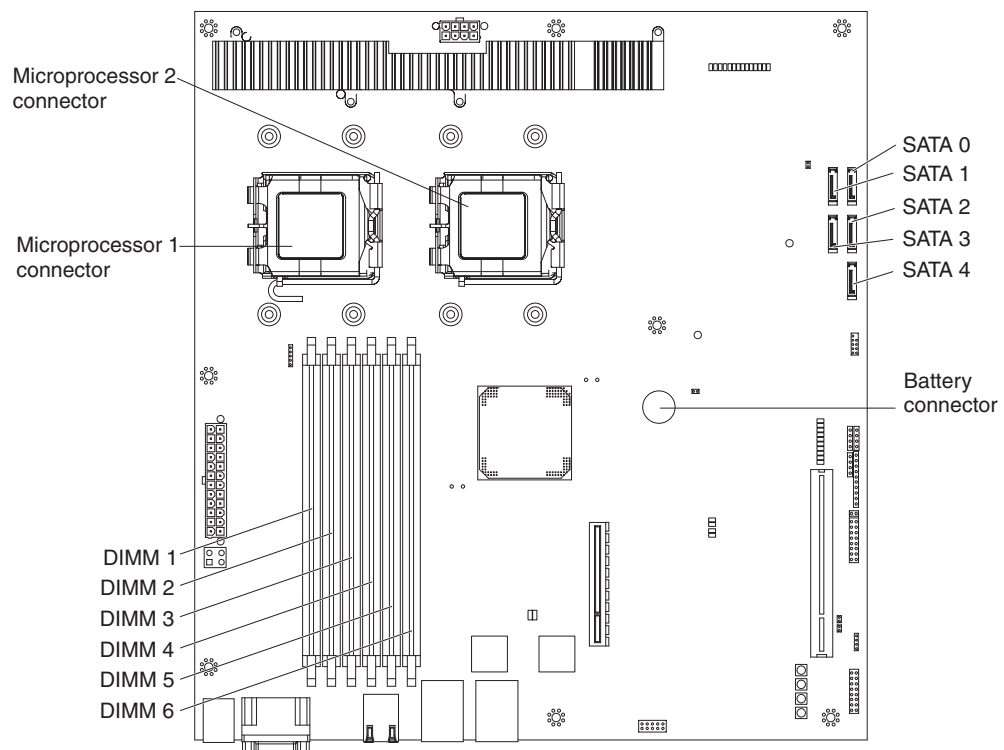
Table 9. DIMM installation sequence, non-interleaved

| DIMM | DIMM connectors |
|------|-----------------|
| 1st | 1 |
| 2nd | 3 |
| 3rd | 5 |

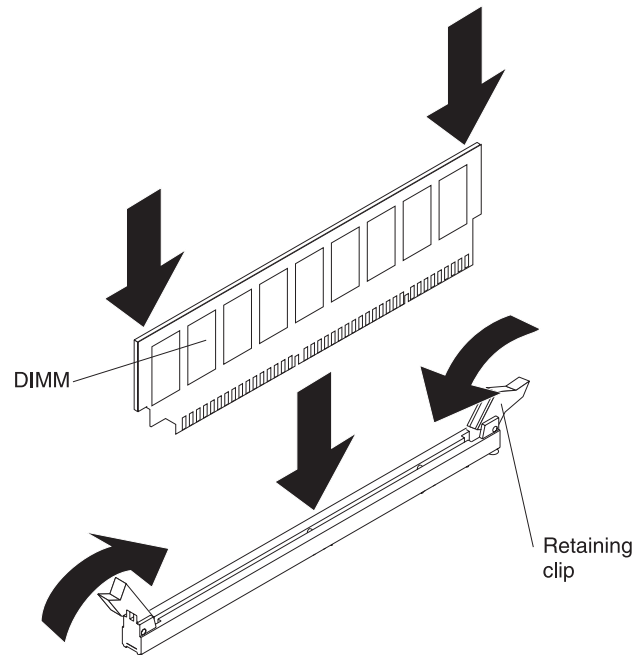
Table 10. DIMM installation sequence, interleaved

| DIMM pair | DIMM connectors |
|-----------|-----------------|
| 1st | 1 and 2 |
| 2nd | 3 and 4 |
| 3rd | 5 and 6 |

The following illustration shows the location of the DIMM slots on the dx320 system board.



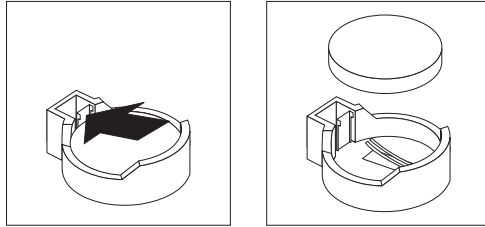
To install a DIMM in the system-board tray, complete the following steps.



1. Read the documentation that comes with the DIMM.
2. Locate the DIMM connectors on the system board (see “System-board connectors” on page 11). Determine the connectors into which you will install the DIMMs.
3. 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.
4. Make sure that both of the connector retaining clips are in the fully open position.
5. Orient the DIMM so that the DIMM keys align correctly with the connector on the system board.
6. Insert the DIMM by applying pressure along the top of the DIMM at both ends simultaneously. 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.
7. Install the system-board tray cover (see “Installing the system-board tray cover” on page 82).
8. Install the system-board tray in the chassis (see “Installing the system-board tray in a 2U chassis” on page 72).

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 69
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 71).
3. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
4. Locate the battery on the system board (see “System-board connectors” on page 11).
5. Use one finger to press the top of the battery clip away from the battery. The battery pops up when it is released.
6. Use your thumb and index finger to lift the battery from the socket.
7. Dispose of the battery as required by local ordinances or regulations (see the *IBM Systems Environmental Notices and User's Guide* on the IBM *Documentation CD* 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.

- When you are replacing the battery, you must replace it with a lithium battery of the same type from the same manufacturer.
- To order replacement batteries, call 1-800-426-7378 within the United States, and 1-800-465-7999 or 1-800-465-6666 within Canada. Outside the U.S. and Canada, call your IBM marketing representative or authorized reseller.
- After you replace the battery, you must re-configure 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:

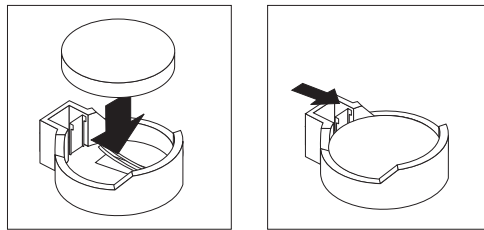
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode 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.

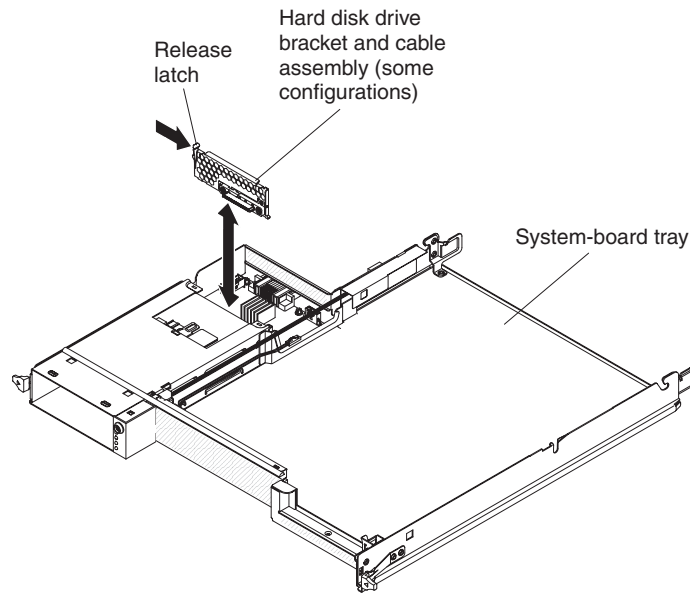
To install the battery, complete the following steps.



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. Install the system-board tray cover (see “Installing the system-board tray cover” on page 82).
5. Install the system-board tray in the chassis (see “Installing the system-board tray in a 2U chassis” on page 72).
6. Turn on the system-board tray and run the BIOS Setup Utility program. Set configuration parameters as needed (see “Using the BIOS Setup Utility program” on page 107 for information).

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

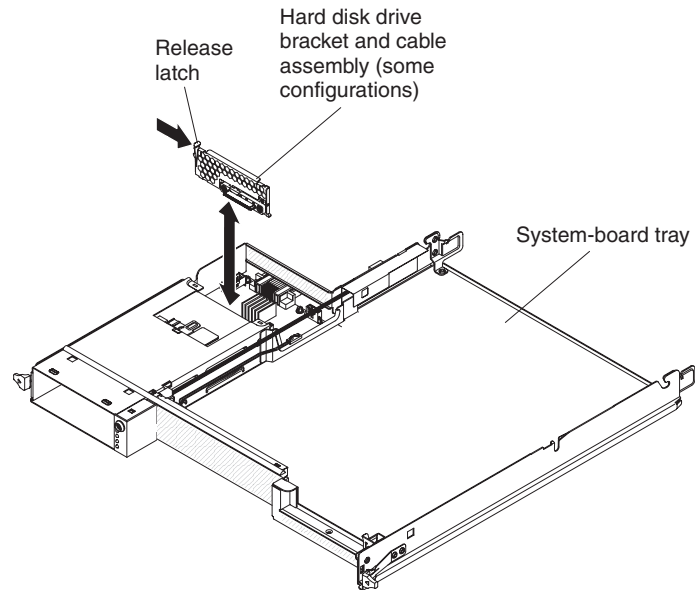
To remove a one-bay hard disk drive bracket and cable assembly from a system-board tray, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
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 71).
3. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
4. 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 73).
5. Make a note of where the hard disk drive bracket and cable assembly cables are attached; then, disconnect them.
6. 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.
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.

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

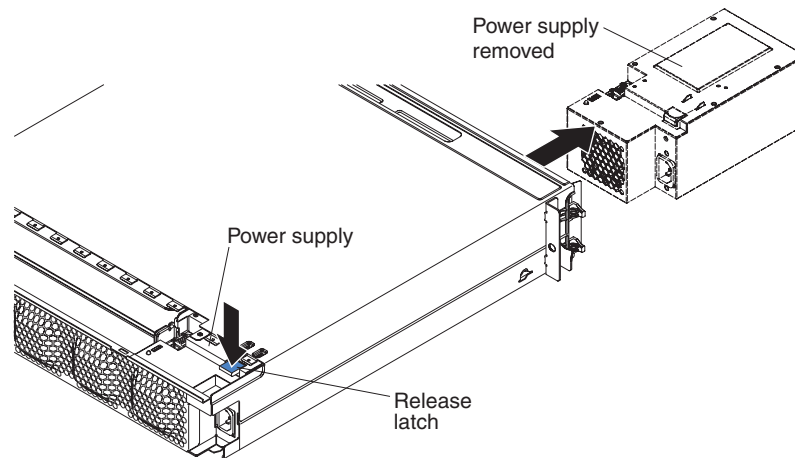
To install a one-bay hard disk drive bracket and cable assembly in a system-board tray, complete the following steps.



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; 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; 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 previously removed one from the system-board tray (see “Installing a 3.5-inch simple-swap hard disk drive” on page 74).
5. Install the system-board tray cover (see “Installing the system-board tray cover” on page 82).
6. Install the system-board tray in the chassis (see “Installing the system-board tray in a 2U chassis” on page 72).
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 the 2U chassis power supply

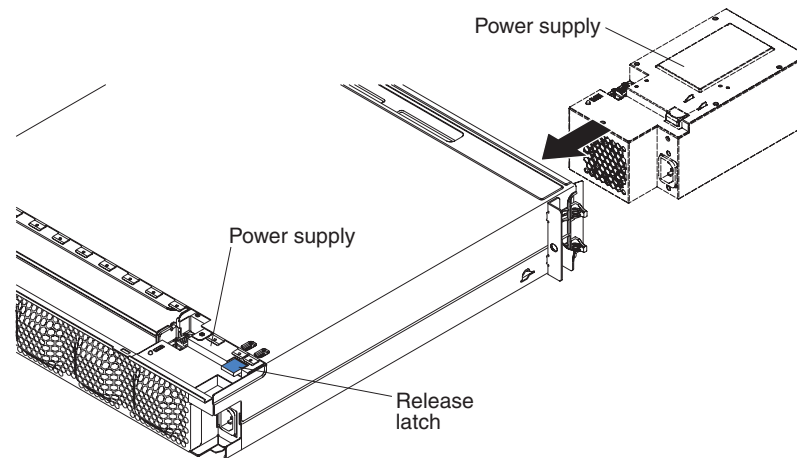
To remove the power supply from a 2U chassis, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
2. If the chassis that contains the power supply is installed in a rack, remove it (see “Removing the 2U chassis from a Type 7825 rack” on page 92).
3. Remove any installed system-board trays (see “Removing the system-board tray from a 2U chassis” on page 71).
4. Remove the top cover (see “Removing the 2U chassis top cover” on page 75).
5. Remove the fan assembly (see “Removing the 2U chassis fan assembly” on page 77).
6. Press the power-supply release latch and push the power supply toward the front of the chassis.
7. Carefully pull the power supply out through the front of the chassis.
8. 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 78).
5. Install the top cover (see “Installing the 2U chassis top cover” on page 76).
6. 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 72).
7. Install the chassis in the rack (see “Installing the 2U chassis in a Type 7825 rack” on page 93).

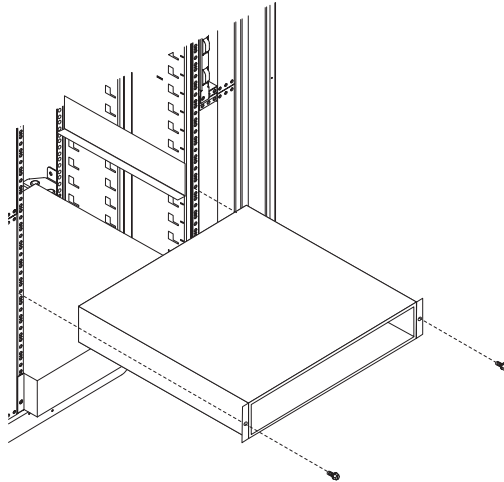
Removing and replacing FRUs

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 rack

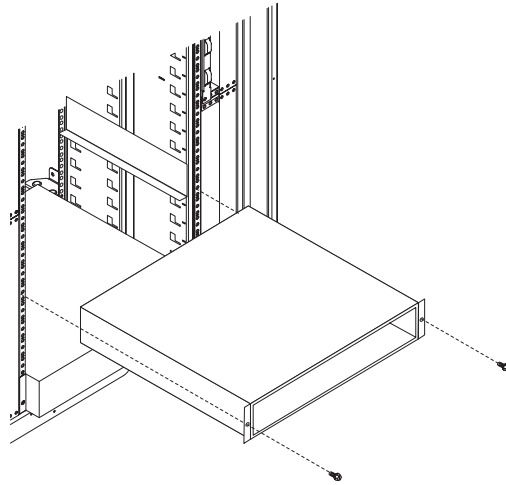
To remove the 2U chassis from a Type 7825 rack, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
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 10 for more information).
3. Remove any installed system-board trays (see “Removing the system-board tray from a 2U chassis” on page 71).
4. Remove the two screws that secure the chassis to the rack; then, pull the chassis forward, lift the chassis out of the 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 77 and “Removing the 2U chassis power supply” on page 90).
6. If you are instructed to return the 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 rack

To install the Type 6385 2U chassis in a Type 7825 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 91 and “Installing the 2U chassis fan assembly” on page 78).
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 72).

Removing a microprocessor and heat sink

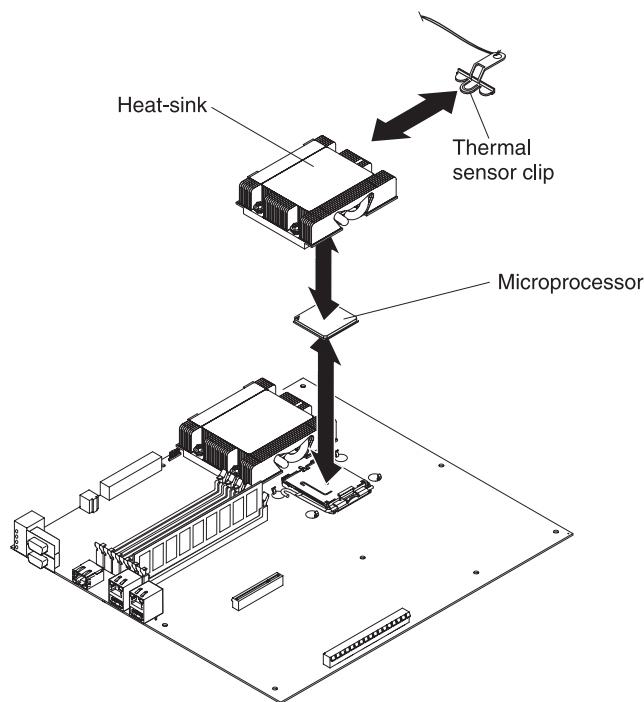
Read the following important guidelines before you remove a microprocessor that is not faulty (for example, when you are replacing the system-board assembly).

If you are not replacing a defective heat sink or microprocessor, the thermal grease 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 grease or otherwise allow it to become contaminated.

Notes:

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



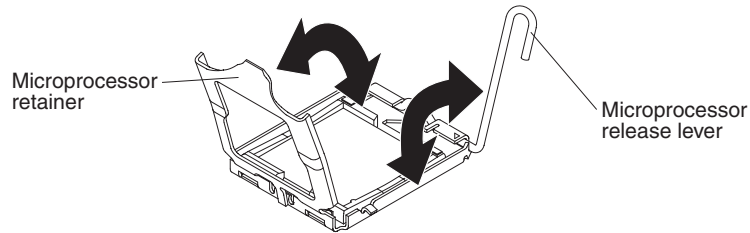
To remove a microprocessor and heat sink, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
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 71).
3. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
4. Remove the heat sink.

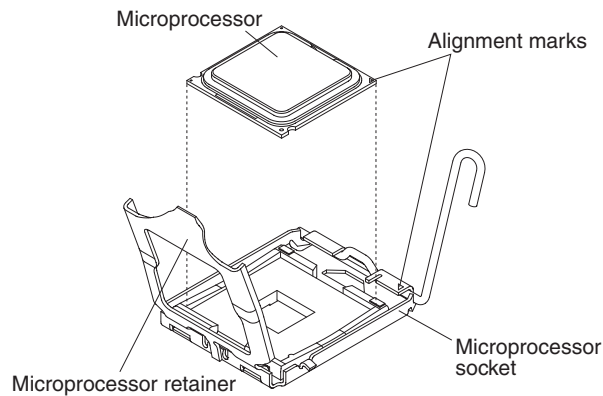
Attention: Do not touch the thermal grease on the bottom of the heat sink. Touching the thermal grease will contaminate it. If the thermal grease on the microprocessor or heat sink becomes contaminated, you must replace it. See “Thermal grease” on page 98 for more information.

- 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.



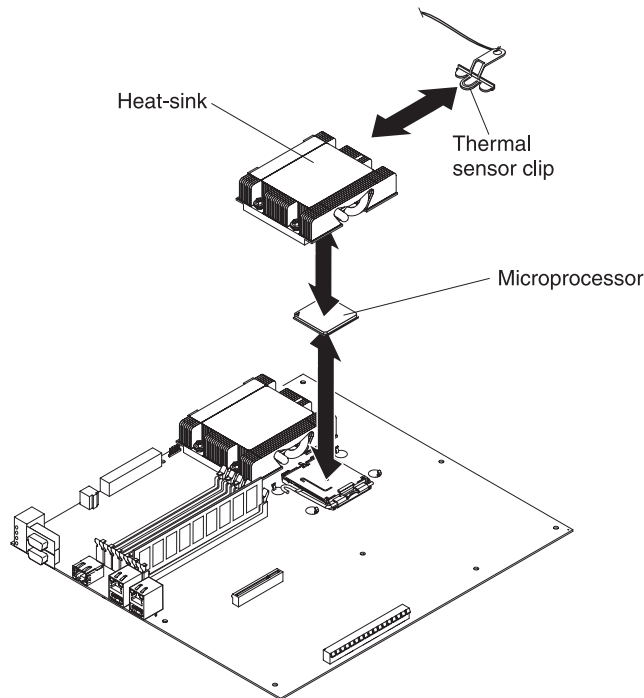
5. Rotate the locking lever on the microprocessor socket from its closed and locked position until it stops in the fully open position (approximately a 135° angle). Lift the microprocessor retainer cover upward.
6. Use your fingers to pull the microprocessor out of the socket.



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.

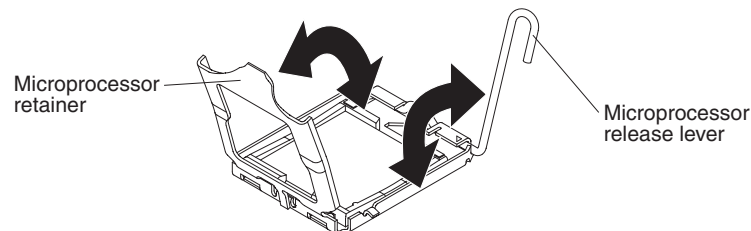
Installing a microprocessor and heat sink

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



1. Install the microprocessor:

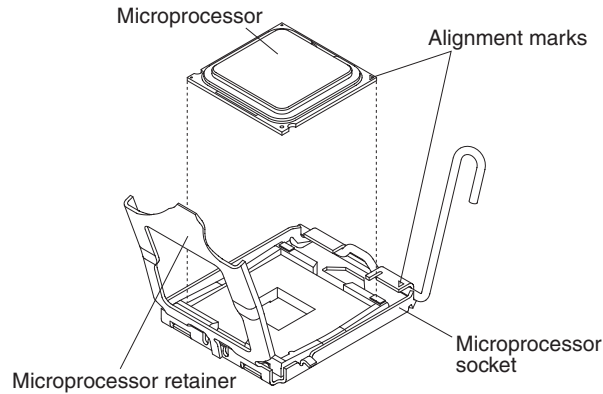
Attention: Do not use any tools or sharp objects to lift the locking lever on the microprocessor socket. Doing so might result in permanent damage to the system board.



- 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; 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:

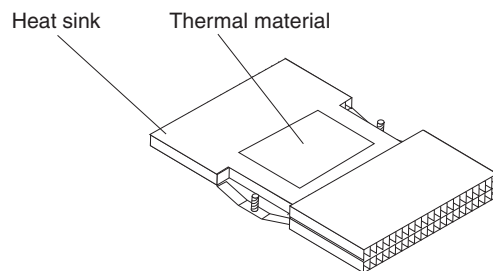
- Do not press the microprocessor into the socket.
- Make sure that the microprocessor is oriented and aligned correctly in the socket before you try to close the microprocessor retainer.

- 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 grease on the bottom of the heat sink. Touching the thermal grease will contaminate it.
- If the thermal grease on the microprocessor or heat sink becomes contaminated, you must replace it. See “Thermal grease” on page 98 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 grease 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 grease 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 system-board tray cover (see “Installing the system-board tray cover” on page 82).
4. Install the system-board tray in the chassis (see “Installing the system-board tray in a 2U chassis” on page 72).

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 the existing thermal grease on the heat sink and microprocessor.

Notes:

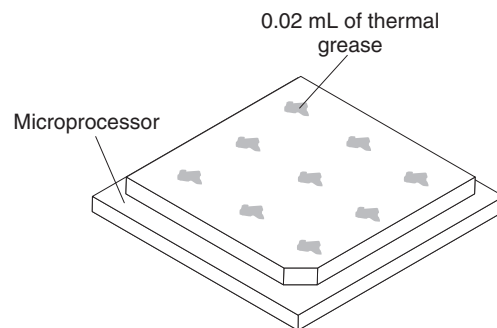
1. Read the safety information that begins on page vii.
2. Read the “Installation guidelines” on page 69.
3. Read “Handling static-sensitive devices” on page 70.

To replace damaged or contaminated thermal grease on the microprocessor and heat sink, complete the following steps:

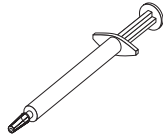
1. Place the heat sink on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the heat sink.

Note: Make sure that all of the thermal grease is removed.

4. Use a clean area of the cleaning pad to wipe the thermal grease from the microprocessor; then, dispose of the cleaning pad after all of the thermal grease is removed.



5. Use the thermal-grease syringe to place 9 uniformly spaced dots of 0.02 mL each on the top of the microprocessor. The outermost dots must be within approximately 5 mm of the edge of the microprocessor, to ensure uniform distribution of the grease.

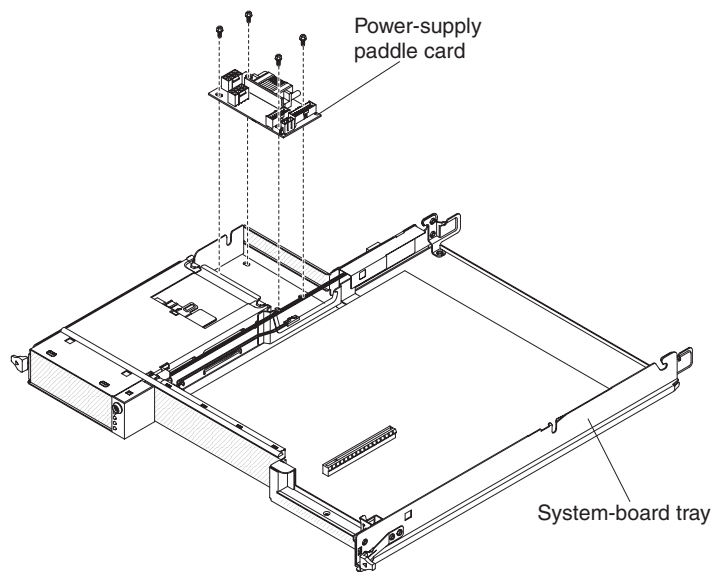


Note: If the grease is properly applied, approximately half of the grease will remain in the syringe.

6. Install the heat sink onto the microprocessor as described in “Installing a microprocessor and heat sink” on page 96.

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.

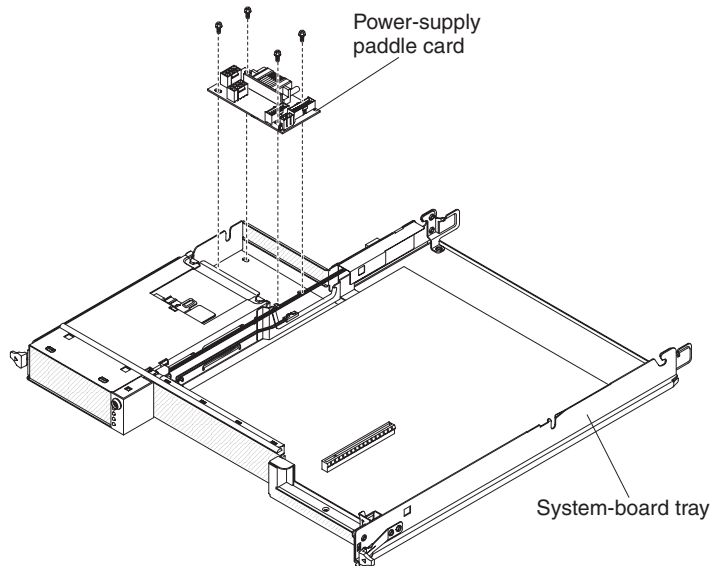


1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
2. If the system-board tray is installed in a chassis, remove it (see “Removing the system-board tray from a 2U chassis” on page 71).
3. Carefully set the system-board tray on a flat, static-protective surface.
4. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
5. If a 3.5-inch simple-swap hard disk drive is installed in the system-board tray, complete the following steps:
 - a. Remove the 3.5-inch hard disk drive (see “Removing a 3.5-inch simple-swap hard disk drive” on page 73).
 - b. Remove the hard disk drive bracket and cable assembly (see “Removing a one-bay hard disk drive bracket and cable assembly” on page 88).
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 system-board tray and save them for future use.
8. Lift the power-supply paddle card out of the system-board tray.

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 the system-board tray

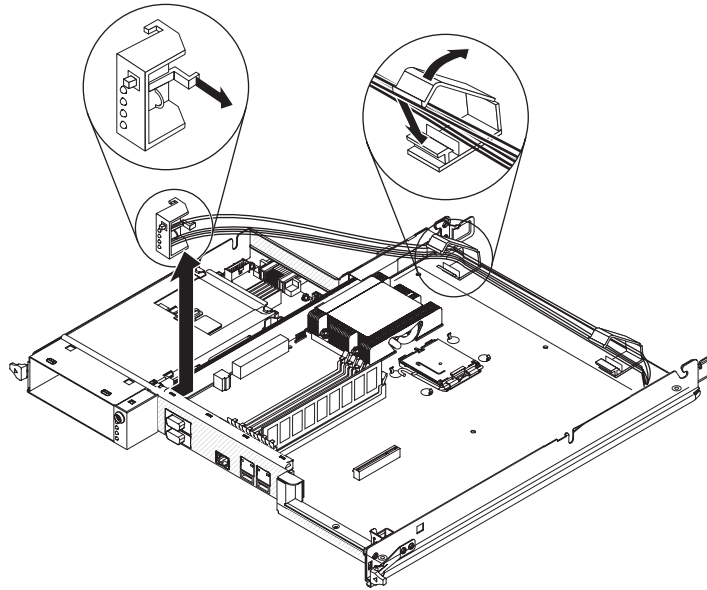
To install a power-supply paddle card in the system-board tray, complete the following steps.



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 retaining screws.
3. Reconnect the power-supply paddle card cables.
4. Install the 3.5-inch simple-swap drive, if you removed one when you removed the power-supply paddle card:
 - a. Install the hard disk drive bracket and cable assembly (see “Installing a one-bay hard disk drive bracket and cable assembly” on page 88).
 - b. Install the 3.5-inch hard disk drive (see “Installing a 3.5-inch simple-swap hard disk drive” on page 74).
5. Install the system-board tray cover (see “Installing the system-board tray cover” on page 82).
6. Install the system-board tray in the chassis (see “Installing the system-board tray in a 2U chassis” on page 72).

Removing a front-panel assembly

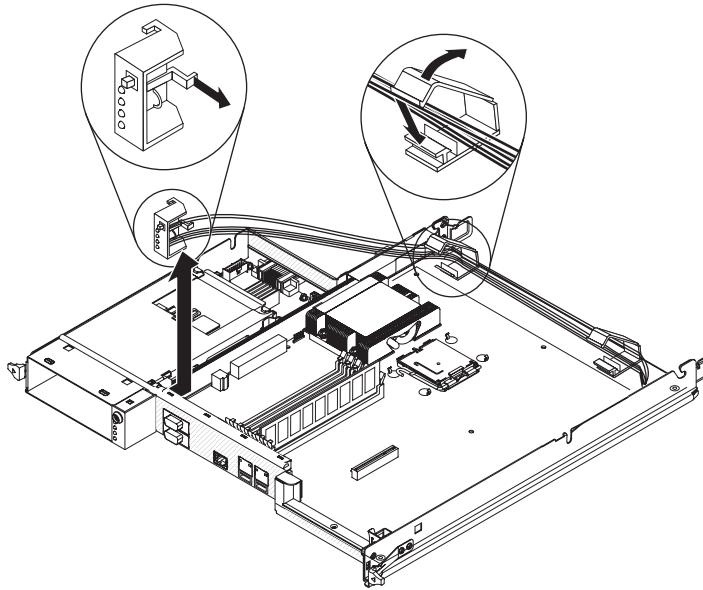
To remove the front-panel assembly, complete the following steps.



1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
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 71).
3. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
4. Press the release tab and slide the front-panel assembly away from the front of the system-board tray.
5. Note the cable routing and disconnect the front-panel assembly cables from the system board and power-supply paddle card.
6. Open the cable retention latches and carefully pull the assembly and cables from the system-board tray.
7. 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.

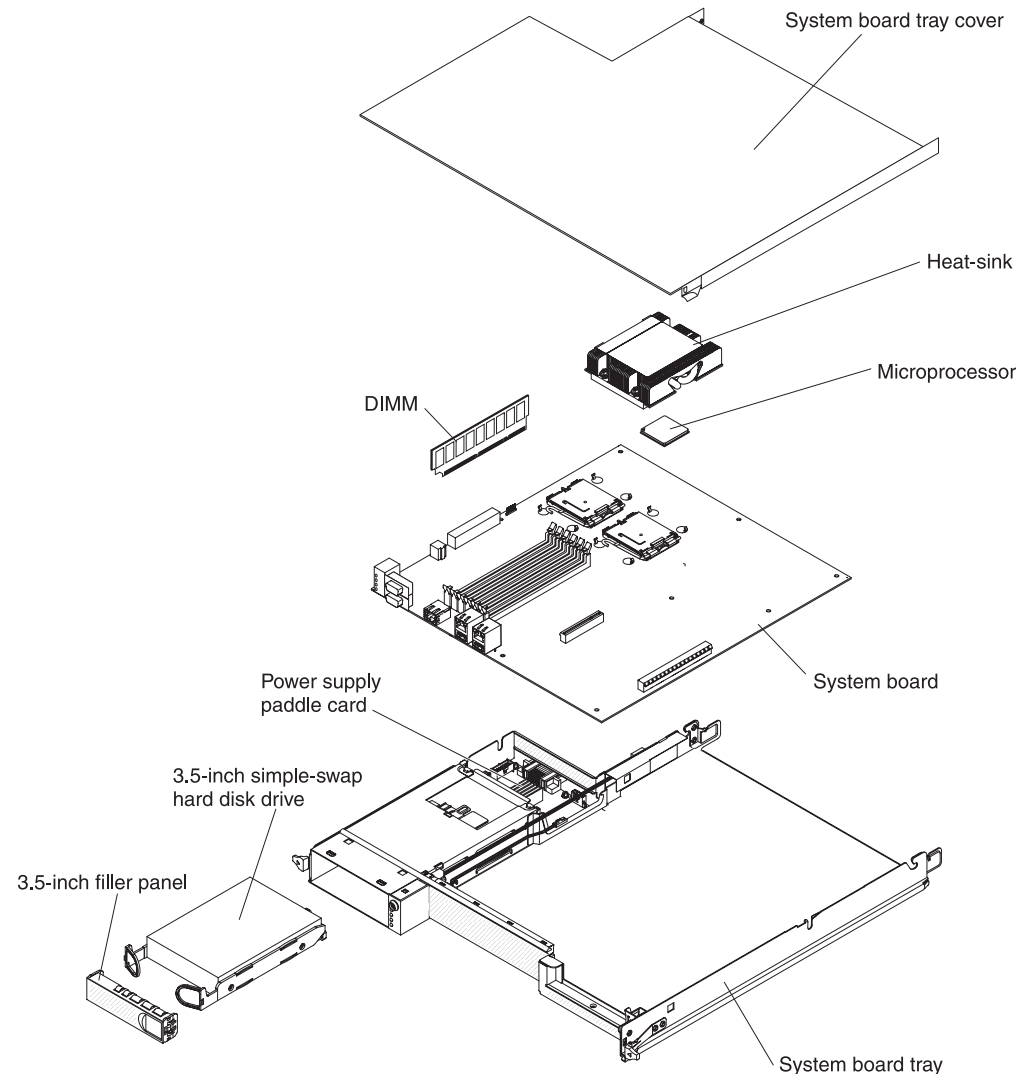
Note: Make sure that all cables are properly routed and that the cables do not protrude from inside the system-board tray.

3. Install the system-board tray cover (see “Installing the system-board tray cover” on page 82).
4. Install the system-board tray in the chassis (see “Installing the system-board tray in a 2U chassis” on page 72).

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 11 for the locations of the connectors on the system board.



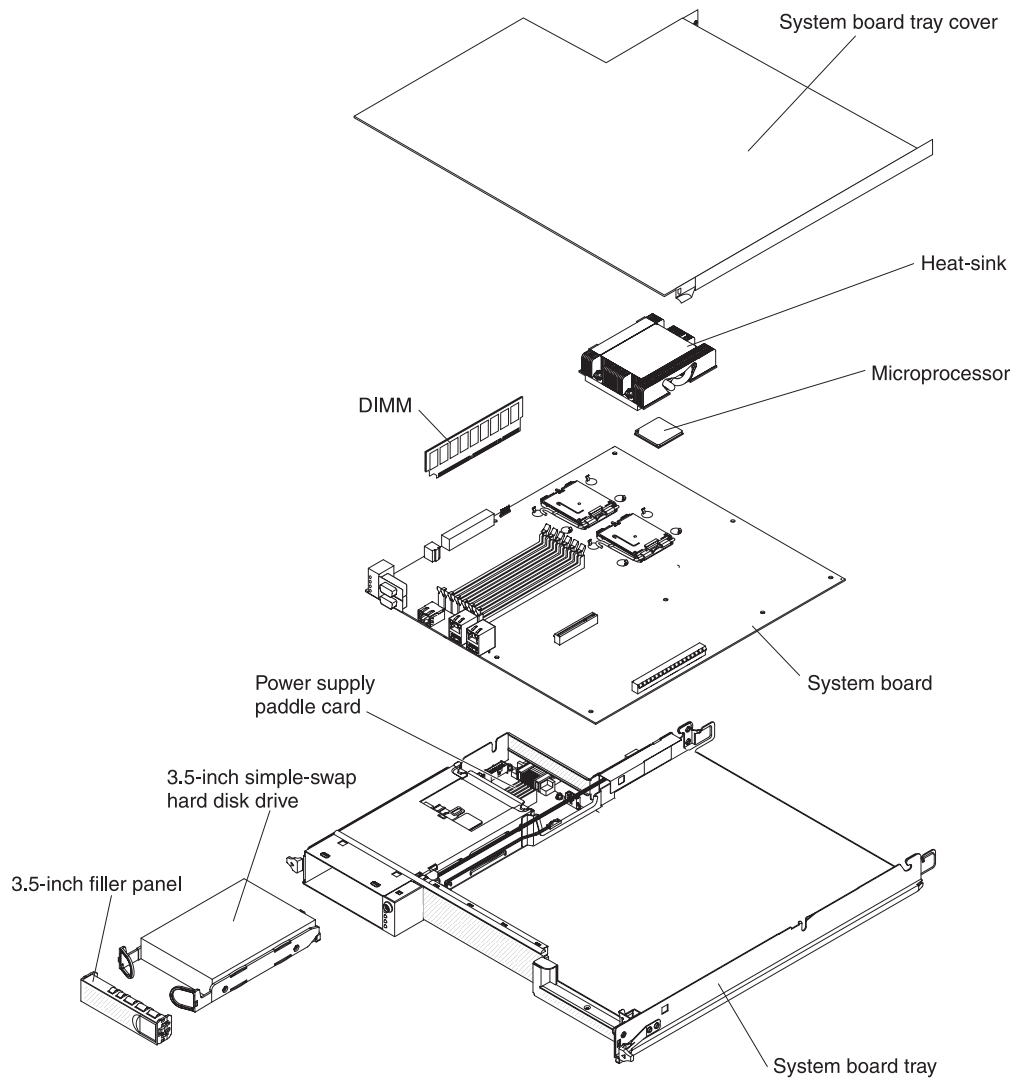
To remove the system-board tray, complete the following steps:

1. Read the safety information that begins on page vii and “Installation guidelines” on page 69.
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 71).
3. Remove the system-board tray cover (see “Removing the system-board tray cover” on page 81).
4. Remove the hard disk drive, if installed (see “Removing a 3.5-inch simple-swap hard disk drive” on page 73).
5. Remove the hard disk drive bracket and cable assembly (see “Removing a one-bay hard disk drive bracket and cable assembly” on page 88).

6. Remove the battery from the system board (see “Removing the battery” on page 86).
7. Remove the DIMMs (see “Removing a memory module” on page 83).
8. Remove the microprocessors and heat sinks (see “Removing a microprocessor and heat sink” on page 94).
9. If you are instructed to return the system-board tray, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the system-board tray

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



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 96).
2. Reinstall the DIMMs (see “Installing a memory module” on page 84).
3. Reinstall the battery (see “Installing the battery” on page 86).

4. Install the hard disk drive bracket and cable assembly (see “Installing a one-bay hard disk drive bracket and cable assembly” on page 88).
5. Reinstall the hard disk drive, if you removed one (See “Installing a 3.5-inch simple-swap hard disk drive” on page 74).
6. Install the system-board tray cover (see “Installing the system-board tray cover” on page 82).
7. Install the system-board tray in the chassis (see “Installing the system-board tray in a 2U chassis” on page 72).
8. 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.
9. 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.
10. Refer to Retain Tip **H193629** for the instructions to program the thermal profile for the new system board.

Chapter 6. Configuration information and instructions

This section provides information about updating the firmware and using the configuration utilities.

To update the firmware, you might have to use an external USB CD-RW/DVD drive. To run the BIOS Setup Utility or the Dynamic System Analysis (DSA) Preboot diagnostic programs, you must have the following additional hardware:

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

The following configuration programs come with the dx320 server:

- **BIOS Setup Utility program**

The BIOS Setup Utility program is part of the basic input/output system (BIOS). Use it to configure serial port assignments, change interrupt request (IRQ) settings, change the startup-device sequence, set the date and time, and set passwords. For information about using this program, see “Using the BIOS Setup Utility program.”

- **Gigabit Ethernet controller configuration**

To configure the integrated Gigabit Ethernet controller, see “Configuring the Gigabit Ethernet controller” on page 109.

- **IBM Dynamic System Analysis (DSA) Preboot Diagnostic Programs**

The IBM Dynamic System Analysis (DSA) Preboot diagnostic programs are the primary method of testing the major components of an IBM System x iDataPlex server. You can use the USB memory key that comes with the iDataPlex rack when you run the DSA Preboot diagnostic programs on an iDataPlex server.

To download the most current USB or ISO image of the DSA Preboot diagnostic programs go to <http://www.ibm.com/support/docview.wss?uid=psg1SERV-DSA>.

For additional information about the DSA diagnostic programs, see “Diagnostic programs, messages, and error codes” on page 38.

Using the BIOS Setup Utility program

Use the BIOS Setup 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 and change the startup characteristics of the server and the order of startup devices (startup-drive sequence)
- Set and change settings for advanced hardware features
- View and clear the error and event logs
- Resolve configuration conflicts

Starting the BIOS Setup Utility program

To start the BIOS Setup Utility program, complete the following steps:

1. Turn on the server.

2. When the prompt Press F1 for BIOS Setup appears, press F1. If you have set both a user password and a supervisor password, you must type the supervisor password to access the full BIOS Setup Utility menu. If you do not type the supervisor password, a limited BIOS Setup Utility menu is available.
3. Select the settings to view or change.

BIOS Setup Utility menu choices

The following choices are on the BIOS Setup Utility main window taskbar. Depending on the version of the BIOS code, some taskbar choices might differ slightly from these descriptions.

- **Main**

Select this choice to view system information, such as the machine type and model, serial number, Universally Unique Identifier (UUID), system board identifier, asset tag number; information about the BIOS, microprocessors, system memory size; and to view or change the system date and time. This is the default page that is displayed when you start the BIOS Setup Utility program.

- **Advanced**

Select this choice to view or configure advanced features for the server hardware and software.

- **CPU configuration**

Configure advanced features for the microprocessors.

- **SATA configuration**

View each recognized SATA device, and configure SATA as disabled, enhanced, or compatible.

- **Super I/O configuration**

Select the base address for the serial port used by the Super I/O chipset.

- **USB configuration**

View the USB configuration and enable or disable USB functions and legacy USB support.

- **ACPI configuration**

View and change the settings in the Advanced Configuration And Power Interface (ACPI), such as whether to enable support for the advanced programmable interrupt controller.

- **APM configuration**

View and change the settings in the advanced power management (APM) configuration, such as whether the server should automatically restart when ac power is restored.

- **Event log configuration**

View the event log, clear the event log, or enable or disable PCI Express advanced error logging.

- **IPMI configuration**

View and change the settings in the Intelligent Platform Management Interface (IPMI) configuration: view the version of IPMI and the version of BMC firmware; view and change the addresses and subnet mask for the LAN configuration; view or clear the BMC system event log; specify whether the BMC resets the server or powers down the server in the event the operating system crashes or fails to respond (enable or disable the BMC watchdog timer action).

- **Remote Access configuration**

Configure the type of remote access and the parameters for remote access, such as the serial port and mode used.

– **Memory settings**

View recognized DIMMs and enable a DIMM after it replaces a failed DIMM.

– **NMI auto reboot**

Configure whether the server automatically restarts when it receives a non-maskable interrupt.

• **PCIPnP**

Select this choice to view or change advanced settings for the PCI bus and plug and play (PnP) interface. You can change the master latency timer value, clear non-volatile RAM, and specify whether BIOS or the operating system should configure all the devices in the server.

• **Boot**

Select this choice to specify the server startup options, including the boot device sequence, type, and priority.

• **Security**

Select this choice to specify the supervisor password and user (power-on) password.

• **Chipset**

Select this choice to specify the advanced options for the memory controller chipset, including default memory operating speed.

• **Exit**

Select this choice to save your changes and exit the BIOS Setup Utility program, to discard your changes and exit, to discard your changes without exiting the program, or to load the default values for all the setup options.

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 port in the server supports 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.

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.

To find the device driver or updated information about configuring the controller, complete the following steps:

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 dx320 server** to display the matrix of downloadable files for the server.

Firmware updates

The firmware for the server is periodically updated and is available for download on 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, and device drivers. 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 server with the latest version of the firmware that is stored in memory on the device or restore the pre-existing firmware.

The following firmware updates are downloadable from the Web at <http://www.ibm.com/systems/support/>. Follow the instructions on how to apply the updates using documentation that is included in the downloaded files:

- BIOS code
- BMC firmware
- FRU/SDR data

Major components contain VPD code. You can select to update the VPD code when you update the BIOS code.

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

To download the firmware for the server:

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 dx320 server** to display the matrix of downloadable files for the server.

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>.

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/idadaplex/index.html>. The address for IBM BladeCenter[®] information is <http://www.ibm.com/systems/bladecenter/>.

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 your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to <http://www.ibm.com/partnerworld/> and click **Find a Business Partner** on the right side of the page. For IBM support telephone numbers, see <http://www.ibm.com/planetwide/>. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

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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Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc., in the United States, other countries, or both.

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Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

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Other company, product, or service names may be trademarks or service marks of others.

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.

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.

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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

聲 明
此為 A 級產品。在生活環境中，該產品可能會造成無線電干擾。在這種情況下，可能需要用戶對其干擾採取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス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。

Korean Class A warning statement

이 기기는 업무용으로 전자파 적합등록을 받은 기기 이오니, 판매자 또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에서 비업무용으로 교환하시기 바랍니다.

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