

lenovo

Hardware Maintenance Manual



ThinkThink**ThinkServer**Think

ThinkServer TS200

Machine Types: 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530

ThinkServer TS200 Types 6522, 6523, 6524, 6525,
6526, 6528, 6529, and 6530



Hardware Maintenance Manual

Note:

Note: Before using this information and the product it supports, read the general information in “Notices,” on page 267 and the *Warranty and Support Information*.

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Chapter 1. About this manual

This *Hardware Maintenance Manual* contains information to help you solve problems that might occur in your server. It describes the diagnostic tools that come with the server, error codes and suggested actions, and instructions for replacing failing components.

Replaceable components are of three types:

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

The most recent version of this document is available at <http://www.lenovo.com/support>.

Before servicing a Lenovo product, be sure to read the Safety Information. See "Important Safety Information."

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

Important Safety Information

Be sure to read all caution and danger statements in this book before performing any of the instructions.

Veillez lire toutes les consignes de type DANGER et ATTENTION du présent document avant d'exécuter les instructions.

Lesen Sie unbedingt alle Hinweise vom Typ "ACHTUNG" oder "VORSICHT" in dieser Dokumentation, bevor Sie irgendwelche Vorgänge durchführen

Leggere le istruzioni introdotte da ATTENZIONE e PERICOLO presenti nel manuale prima di eseguire una qualsiasi delle istruzioni

Certifique-se de ler todas as instruções de cuidado e perigo neste manual antes de executar qualquer uma das instruções

Es importante que lea todas las declaraciones de precaución y de peligro de este manual antes de seguir las instrucciones.

تأكد من قراءة كل التحذيرات الموجودة في هذا الكتاب قبل اتباع هذه التعليمات .

执行任何说明之前，请确保已阅读本书中的所有警告和危险声明。

執行任何指示前，請確實閱讀本書中的所有警告及危險聲明。

דאן שקראתם את כל הודעות האזהרה והסכנה במסמך זה לפני שתבצעו פעולה כלשהי.

본 사용 설명서에 기재된 내용을 실행하기 전에 모든 주의사항 및 위험사항을 숙지하십시오.

Safety statements

Important:

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

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

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

Attention: Use No. 26 AWG or larger UL-listed or CSA certified telecommunication line cord.

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

Do not:

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

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

Statement 3:



CAUTION:

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

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



DANGER

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

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



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

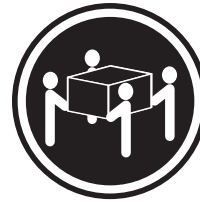
Statement 4:



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

CAUTION:

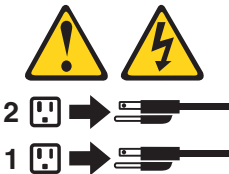
Use safe practices when lifting.

Statement 5:



CAUTION:

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



Statement 8:



CAUTION:

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



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

Statement 26:



CAUTION:

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



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

Important: This product is not suitable for use with visual display workplace devices according to Clause 2 of the German Ordinance for Work with Visual Display Units.

Important information about replacing RoHS compliant FRUs

RoHS, The Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive (2002/95/EC) is a European Union legal requirement affecting the global electronics industry. RoHS requirements must be implemented on Lenovo products placed on the market and sold in the European Union after June 2006. Products on the market before June 2006 are not required to have RoHS compliant parts. If the parts are not compliant originally, replacement parts can also be noncompliant, but in all cases, if the parts are compliant, the replacement parts must also be compliant.

Note: RoHS and non-RoHS FRU part numbers with the same fit and function are identified with unique FRU part numbers.

Lenovo plans to transition to RoHS compliance well before the implementation date and expects its suppliers to be ready to support Lenovo's requirements and schedule in the EU. Products sold in 2005 will contain some RoHS compliant FRUs. The following statement pertains to these products and any product Lenovo produces containing RoHS compliant parts.

RoHS compliant ThinkServer TS200 parts have unique FRU part numbers. Before or after June 2006, failed RoHS compliant parts must always be replaced using RoHS compliant FRUs, so only the FRUs identified as compliant in the system Hardware Maintenance Manual or direct substitutions for those FRUs can be used.

Products marketed before June 2006		Products marketed after June 2006	
Current or original part	Replacement FRU	Current or original part	Replacement FRU
Non-RoHS	Can be Non-RoHS	Must be RoHS	Must be RoHS
Non-RoHS	Can be RoHS		
Non-RoHS	Can sub to RoHS		
RoHS	Must be RoHS		

Note: A direct substitution is a part with a different FRU part number that is automatically shipped by the distribution center at the time of order.

Turkish statement of compliance

The Lenovo product meets the requirements of the Republic of Turkey Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (EEE).

Türkiye EEE Yönetmeliğine Uygunluk Beyanı

Bu Lenovo ürünü, T.C. Çevre ve Orman Bakanlığı'nın "Elektrik ve Elektronik Eşyalarda Bazı Zararlı Maddelerin Kullanımının Sınırlanmasına Dair Yönetmelik (EEE)" direktiflerine uygundur.

EEE Yönetmeliğine Uygundur.

Chapter 2. General information

This chapter provides general information that applies to all machine types supported by this publication.

Features and technologies

The TS200 server offers the following features and technologies:

- **UEFI-compliant server firmware**

The server firmware offers several features, including Unified Extensible Firmware Interface (UEFI) 2.1 compliance, enhanced RAS capabilities, and BIOS compatibility support. UEFI replaces the basic input/output system (BIOS) and defines a standard interface between the operating system, platform firmware, and external devices. UEFI-compliant servers are capable of starting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

Note: The server does not support DOS (Disk Operating System).

- **Systems-management capabilities**

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

- Intelligent Platform Management Interface (IPMI) version 2.0
- Simple Network Management Protocol (SNMP) version 3
- Common Information Model (CIM)
- Web browser

- **Remote presence capability and blue-screen capture**

The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1600 x 1200 at 85 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

- **Preboot diagnostics programs**

The preboot diagnostics programs are stored on the integrated USB memory. It collects and analyzes system information to aid in diagnosing server problems. The diagnostics programs collect the following information about the server:

- System configuration
- Network interfaces and settings
- Installed hardware
- Service processor status and configuration

- Vital product data, firmware, and UEFI (formerly BIOS) configuration
- Hard disk drive health
- RAID controller configuration
- Event logs for service processors

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

For additional information about preboot diagnostics, see the *Hardware Maintenance Manual*.

- **EasyStartup DVD**

The ThinkServer EasyStartup program guides you through the configuration of the hardware, the RAID controller, and the installation of the operating system and device drivers.

- **EasyManage DVD**

The ThinkServer EasyManage program helps you manage and administer your servers and clients through remote problem notification as well as monitoring and alerting.

- **Integrated network support**

The server comes with an integrated dual-port Intel® 82574L Gigabit Ethernet controller, which supports connection to a 10 Mbps, 100 Mbps, or 1000 Mbps network. For more information, see “Configuring the Gigabit Ethernet controllers” on page 265.

- **Intelligent Platform Management Interface (IPMI) 2.0**

The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Large data-storage capacity and hot-swap capability**

Some hot-swap server models support four 3.5-inch hot-swap hard disk drives. With the hot-swap feature, you can add, remove, or replace hard disk drives without turning off the server.

- **Large system-memory capacity**

The server supports up to 24 GB of system memory when registered DIMMs are installed. The server supports up to 8 GB of memory when unbuffered DIMMs are installed. The memory controller supports error correcting code (ECC) and non-error correcting code for up to 6 industry-standard PC3-8500, or PC3-10600R-999 (single-rank or dual-rank), 1066 and 1333 MHz, DDR3 (third-generation double-data-rate), registered, and unbuffered synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- **Redundant connection**

The addition of an optional network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the redundant NIC. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **High-performance graphics controller**

The server comes with an onboard high-performance graphics controller that supports high resolutions and includes many performance-enhancing features for the operating-system environment.

- **Redundant connection**

The addition of an optional network interface card (NIC) provides a failover capability to a redundant Ethernet connection. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the redundant NIC. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Dual-core or quad-core processing**

The server supports one Intel Xeon® dual-core or quad-core microprocessor.

- **RAID support**

The server supports an internal RAID SAS Controller, which is required for you to use the hot-swap hard disk drives and to create redundant array of independent disks (RAID) configurations.

- **TCP/IP offload engine (TOE) support**

The Ethernet controllers in the server support TOE, which is a technology that offloads the TCP/IP flow from the microprocessors and I/O subsystem to increase the speed of the TCP/IP flow. When an operating system that supports TOE is running on the server and TOE is enabled, the server supports TOE operation. See the operating-system documentation for information about enabling TOE.

Note: As of the date of this document, the Linux® operating system does not support TOE.

Specifications

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

Table 1. Features and specifications

<p>Microprocessor:</p> <ul style="list-style-type: none"> • Supports one Intel Xeon 3400 series quad-core microprocessor • Designed for LGA 1156 socket • Scalable up to four cores • 32 KB instruction cache, 32 KB data cache, and up to 8 MB cache that is shared among the cores • Support for Intel Extended Memory 64 Technology (EM64T) <p>Note:</p> <ul style="list-style-type: none"> • Use the Setup Utility to determine the type and speed of the microprocessor. • For a list of supported microprocessors, see http://www.lenovo.com/thinkserver/ and click the Options tab. <p>Memory:</p> <ul style="list-style-type: none"> • Minimum: 1 GB • Maximum: 32 GB <ul style="list-style-type: none"> – 16 GB using unbuffered DIMMs (UDIMMs) – 32 GB using registered DIMMs (RDIMMs) • Types: PC3-8500 or PC3-10600R-999 (single-rank or double-rank), 1066, and 1333 MHz, ECC, DDR3 registered or unbuffered SDRAM DIMMs only • Connectors: Six dual inline memory module (DIMM) connectors, two-way interleaved • Supports: <ul style="list-style-type: none"> – 1 GB, 2 GB, and 4 GB (when available) unbuffered DIMMs – 1 GB, 2 GB, 4 GB, and 8 GB (when available) registered DIMMs 	<p>SATA optical drives:</p> <ul style="list-style-type: none"> • UltraSlim DVD-ROM combo (optional) • Multi-burner (optional) <p>Hard disk drive expansion bays (depending on the model):</p> <p>One of the following configurations:</p> <ul style="list-style-type: none"> • Two 3.5-inch hot-swap SAS or hot-swap SATA hard disk drive bays • Two 3.5-inch simple-swap SAS hard disk drive bays <p>PCI expansion slots:</p> <p>Supports two PCI riser slots on the riser card that connects to slots 1 and 2 on the system board:</p> <ul style="list-style-type: none"> • Slot 1 supports low-profile cards (PCI Express Gen2 x8) • Slot 2 supports 3/4-length, full-height cards (PCI Express Gen2 x8 or PCI-X 1.0a 64-bit/133 MHz) <p>Power supply:</p> <p>One 351-watt power supply or one 351-watt high efficiency power supply with Active Energy Manager depending on your model.</p> <p>Fans: The server comes standard with five speed-controlled fans.</p>	<p>Integrated functions:</p> <ul style="list-style-type: none"> • Integrated management module (IMM), which provides service processor control and monitoring functions, video controller, and (when the optional virtual media key is installed) remote keyboard, video, mouse, and remote hard disk drive capabilities • Intel 82574L Gb Ethernet controller with TCP/IP Offload Engine (TOE) and Wake on LAN® support • Seven Universal Serial Bus (USB) 2.0 ports (two front, four rear, and one internal for the optional USB Hypervisor key) • Two Ethernet ports • Four-port integrated SATA controller • Integrated Trusted Platform Module (TPM) support • One serial port • One VGA port
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Table 1. Features and specifications (continued)

<p>RAID controllers:</p> <ul style="list-style-type: none"> • IBM ServeRAID-BR10i v2 SAS/SATA Controller • IBM ServeRAID-MR10i SAS/SATA Controller • IBM ServeRAID-MR10is VAULT SAS/SATA Controller • IBM ServeRAID-M1015 SAS/SATA controller • IBM ServeRAID-M5015 SAS/SATA controller <p>Acoustical noise emissions:</p> <ul style="list-style-type: none"> • Sound power, idling: 6.5 bels maximum • Sound power, operating: 6.5 bels maximum <p>Environment:</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Server on: 10°C to 35°C (50.0°F to 95.0°F); altitude: 0 to 914.4 m (3000 ft) – Server on: 10°C to 32°C (50.0°F to 89.6°F); altitude: 914.4 m (3000 ft) to 2133.6 m (7000.0 ft) – Server off: 10°C to 43°C (50°F to 109.4°F); maximum altitude: 2133.6 m (7000.0 ft) – Shipping: -40°C to 60°C (-104°F to 140°F) • Humidity: <ul style="list-style-type: none"> – Server on: 8% to 80% – Server off: 8% to 80% • Particulate contamination: 	<p>Video controller (integrated into IMM):</p> <ul style="list-style-type: none"> • Matrox G200 • SVGA compatible video controller • DDR2 128 MB SDRAM video memory • Avocent Digital Video Compression • Video memory is not expandable <p>Note: The maximum video resolution is 1280 x 1024</p> <p>Size:</p> <ul style="list-style-type: none"> • Height: 43 mm (1.69 inches, 1U) • Depth: 560.1 mm (22 inches) • Width: 430 mm (17.3 inches) • Maximum weight: 11.4 kg (25.1 lb) when fully configured <p>Heat output:</p> <p>Approximate heat output:</p> <ul style="list-style-type: none"> • Minimum configuration: 171 BTU per hour (50 watts) • Maximum configuration: 1024 BTU per hour (300 watts) <p>Electrical input:</p> <ul style="list-style-type: none"> • Sine-wave input (50 / 60 Hz) required • Input voltage low range: <ul style="list-style-type: none"> – Minimum: 100 V ac – Maximum: 127 V ac • Input voltage high range: <ul style="list-style-type: none"> – Minimum: 200 V ac – Maximum: 240 V ac • Input kilovolt-amperes (kVA), approximately: <ul style="list-style-type: none"> – Minimum: 0.102 kVA – Maximum: 0.55 kVA 	<p>Notes:</p> <ol style="list-style-type: none"> 1. Power consumption and heat output vary depending on the number and type of optional features installed and the power-management optional features in use. 2. The sound levels were measured in controlled acoustical environments according to the procedures specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average values stated because of room reflections and other nearby noise sources. The noise emission level stated in the declared (upper limit) sound-power level, in bels, for a random sample of system. 3. There is no keyboard connector or mouse connector on the server. You can connect a USB keyboard and USB mouse to the server by using the USB connectors.
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Software

Lenovo provides software to help get your server up and running.

EasyStartup

The ThinkServer EasyStartup program simplifies the process of your RAID controller and installing supported Microsoft® Windows® and Linux operating systems and device drivers on your server. The EasyStartup program is provided with your server on DVD. The DVD is self starting (bootable). The user guide for the EasyStartup program is on the DVD and can be accessed directly from the program interface. For additional information, see “Using the *EasyStartup* DVD” on page 255.

EasyManage

The ThinkServer EasyManage Core Server provides centralized hardware and software inventory management and secure automated system management through a centralized console. The ThinkServer EasyManage Agent enables other clients on the network to be managed by the centralized console. The ThinkServer EasyManage Core Server is supported on Microsoft Windows Server 2003 and Microsoft Windows Server 2008 (32-bit) products. The ThinkServer EasyManage Agent is supported on 32-bit and 64-bit Windows, Red Hat, and SUSE operating systems.

Chapter 3. General Checkout

You can solve many problems without outside assistance by following the troubleshooting procedures in this *Hardware Maintenance Manual* and on the Lenovo 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.

Checkout procedure

This section contains a checkout procedure that you should follow to solve hardware problems in the server.

About the checkout procedure

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

- Read the safety information that begins on page 1.
- The diagnostic programs provide the primary methods of testing the major components of the server, such as the I/O board, Ethernet controller, keyboard, mouse (pointing device), serial ports, and hard disk drives. You can also use them to test some external devices. If you are not sure whether a problem is caused by the hardware or by the software, you can use the diagnostic programs to confirm that the hardware is working correctly.
- When you run 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 or light path diagnostics LEDs indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See “Microprocessor problems” on page 55 for information about diagnosing microprocessor problems.

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

Important: If the server is part of a shared hard disk drive cluster, run one test at a time. Do not run any suite of tests, such as “quick” or “normal” tests, because this might enable the hard disk drive diagnostic tests.

- If the server is halted and a POST error code is displayed, see “POST error codes” on page 21. If the server is halted and no error message is displayed, see “System-board switches and jumpers” on page 120 and “Solving undetermined problems” on page 110.
- For information about power supply problems, see “Solving power problems” on page 108 and “power supply LEDs” on page 64.
- For intermittent problems, check the error log; see “Event logs” on page 19 and “Diagnostic messages” on page 68.

Performing the checkout procedure

To perform the checkout procedure, complete the following steps:

1. Is the server part of a cluster?
 - **No:** Go to step 2.
 - **Yes:** Shut down all failing servers that are related to the cluster. Go to step 2.
2. Complete the following steps:
 - a. Turn off the server and all external devices.
 - b. Check all cables and power cords.
 - c. Set all display controls to the middle positions.
 - d. Turn on all external devices.
 - e. Turn on the server. If the server does not start, see “Troubleshooting tables” on page 49.
 - f. Check the system-error LED on the control panel. If it is lit, check the LEDs on the system board (see “Error LEDs” on page 62).
 - g. Check for the following results:
 - Successful completion of POST, which is indicated by a single beep
 - Successful completion of startup, which is indicated by a readable display of the operating-system desktop
3. Did a single beep sound and are there readable instructions on the main menu, or was a POST error code displayed?
 - **Yes:** Find the “POST error codes” on page 21; if necessary, see “Solving undetermined problems” on page 110.
 - **No:** Find the failure symptom in “Troubleshooting tables” on page 49; if necessary, run the diagnostic programs (see “Running the diagnostic programs” on page 67).
 - If you receive an error, see “Diagnostic messages” on page 68.
 - If the diagnostic programs were completed successfully and you still suspect a problem, see “Solving undetermined problems” on page 110.

Diagnosing a problem

Before you contact Lenovo 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:

- 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 error codes:** See “POST error codes” on page 21 for information about a specific error code.
- See “System-board LEDs” on page 121 for the location of the system-board LEDs.
- **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 the Dynamic System Analysis (DSA) diagnostics program to collect information about the hardware, firmware, software, and operating system. Have this information available when you contact Lenovo or an approved warranty service provider. See “Running the diagnostic programs” on page 67 for the instructions to run the DSA program.

If you need to download the latest version of DSA, go to <http://www.lenovo.com/support>.

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 the server firmware (formerly BIOS firmware), device firmware, or device drivers that are not at the latest levels.

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.

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

To display a list of available updates for your server, go to <http://www.lenovo.com/support>.

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.

See <http://www.lenovo.com/support> to verify that the server supports the installed operating system, optional devices, and software levels. If any hardware or software component is not supported, uninstall it to determine whether it is causing the problem. You must remove unsupported hardware before you contact Lenovo 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. See “Checkout procedure” on page 13 for the instructions to perform the checkout procedures.

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 Lenovo software or devices, complete the following steps.

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

- a) Go to <http://www.lenovo.com/support>.
- b) From the **Select your product** list, select **Servers and Storage**.
- c) In the **Browse by product** window **Family:** list, select **ThinkServer TS200**.
- d) Click **Downloads and drivers** .
- e) Click **User's guides and manuals** to look for related documentation.

c. **Check for service bulletins.**

Lenovo service bulletins document known problems and suggested solutions. To search for service bulletins, complete the following steps.

- 1) Go to <http://www.lenovo.com/support>.
- 2) From the **Select your product** list, select **Servers and Storage**.
- 3) In the **Browse by product** window **Family:** list, select **ThinkServer TS200**.
- 4) Click **Downloads and drivers** to look for service information.

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

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. See "Troubleshooting tables" on page 49 and Chapter 6, "Replacing FRUs," on page 127 for more information.

Troubleshooting procedures are also provided on the Lenovo Web site. A single problem might cause multiple symptoms. Follow the diagnostic procedure for the most obvious symptom. If that procedure does not diagnose the problem, use the procedure for another symptom, if possible. To locate troubleshooting procedures for your server, complete the following steps.

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

- 1) Go to: <http://www.lenovo.com/support>.
- 2) From the **Select your product** list, select **Servers and Storage**.
- 3) In the **Browse by product** window **Family:** list, select **ThinkServer TS200**.
- 4) Under **Support & downloads**, click **Troubleshoot**.
- 5) Under **Diagnostic**, select the troubleshooting procedure for the symptom that you are observing.

For more troubleshooting information, see Chapter 4, "Diagnostics," on page 17.

If the problem remains, contact Lenovo or an approved warranty service provider for assistance with additional problem determination and possible hardware replacement. 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 Lenovo. After you have verified that all code is at the latest level, all hardware and software configurations are valid, and no LEDs or log entries indicate a hardware component failure, contact Lenovo or an approved warranty service provider for assistance. Be prepared to provide information about any error codes and collected data and the problem determination procedures that you have used.

Chapter 4. Diagnostics

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

Diagnostic tools

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

- **POST error messages and event logs**

The power-on self-test (POST) generates messages to indicate successful test completion or the detection of a problem. See “POST” on page 18, “Event logs” on page 19, and “POST error codes” on page 21 for more information.

- **System-event log**

The system-event log contains all IMM, POST, and system management interrupt (SMI) events. See “Event logs” on page 19 and “System event log” on page 28 for more information.

- **Troubleshooting tables**

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

- **Dynamic System Analysis (DSA) Preboot diagnostic programs**

The DSA Preboot diagnostic programs provide problem isolation, configuration analysis, and event log collection. The diagnostic programs are the primary method of testing the major components of the server and are stored in integrated USB memory. The diagnostic programs collect the following information about the server:

- System configuration
- Network interfaces and settings
- Installed hardware
- Service processor status and configuration
- Vital product data, firmware, and UEFI configuration
- Hard disk drive health
- RAID controller configuration
- Controller event logs, including the following information:
 - System event logs
 - Temperature, voltage, and fan speed information
 - Self-monitoring Analysis, and Reporting Technology (SMART) data
 - Machine check registers
 - USB information
 - Monitor configuration information
 - PCI slot information

The diagnostic programs create a merged log that includes events from all collected logs. The information is collected into a file that you can send to Lenovo service and support. Additionally, you can view the server information locally through a generated text report file. You can also copy the log to removable media and view the log from a Web browser. See “Running the diagnostic programs” on page 67 and “Diagnostic messages” on page 68 for more information.

- **Server LEDs**

Use the LEDs on the server to diagnose system errors quickly. See “Error LEDs” on page 62 for more information.

POST

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

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

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

If POST detects a problem, an error message is displayed. See “POST error codes” on page 21 for more information.

Event logs

Error codes and messages are displayed in the following types of event logs. Some of the error codes and messages in the logs are abbreviated. When you are troubleshooting PCI-X slots, note that the event logs report the PCI-X buses numerically. The numerical assignments vary depending on the configuration. You can check the assignments by running the Setup utility (see “Using the Setup Utility” on page 246 for more information).

- **POST event log:** This log contains the three most recent error codes and messages that were generated during POST. You can view the contents of the POST event log from the Setup utility (see “Using the Setup Utility” on page 246).
- **System-event log:** This log contains messages that were generated during POST and all system status messages from the service processor. You can view the contents of the system-event log from the Setup utility (see “Viewing event logs from the Setup utility” for more information).

The system-event log is limited in size. When it is full, new entries will not overwrite existing entries; therefore, you must periodically clear the system-event log through the Setup utility (when the IMM logs an event that indicates that the log is more than 75% full). When you are troubleshooting an error, be sure to clear the system-event log so that you can find current errors more easily.

Each system-event log entry is displayed on its own page. Messages are listed on the left side of the screen, and details about the selected message are displayed on the right side of the screen. To move from one entry to the next, use the Up Arrow (↑) and Down Arrow (↓) keys.

The system-event log indicates an assertion event when an event has occurred. It indicates a deassertion event when the event is no longer occurring.

- **Integrated management module (IMM) event log:** This log contains a superset of IMM, POST, and system management interrupt (SMI) information that is in the system-event log. You can only access the event log through the IMM Web interface. For more information, see “Event logs.”
- **DSA log:** This log is generated by the Dynamic System Analysis (DSA) Preboot program, and it contains merged contents of the system-event log and the IMM system event log. You can view the DSA log from the DSA Preboot program.

Viewing event logs from the Setup utility

To view the event logs, complete the following steps:

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

Viewing event logs without restarting the server

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

You can use DSA Preboot to view these logs, although you must restart the server to use DSA Preboot. To install DSA Preboot or to download a DSA Preboot CD image, go to <http://www.lenovo.com/support> and complete the following steps.

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

1. Go to <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

If IPMItool is installed in the server, you can use it to view the system-event log. Most recent versions of the Linux operating system come with a current version of IPMItool.

You can view the IMM event log through the **Event Log** link in the integrated management module (IMM) Web interface.

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

Table 2. Methods for viewing event logs

Condition	Action
The server is not hung and is connected to a network.	Use any of the following methods: <ul style="list-style-type: none"> Type the IP address of the IMM and go to the Event Log page. Use IPMItool to view the system-event log.
The server is not hung and is not connected to a network.	Use IPMItool locally to view the system-event log.
The server is hung.	<ul style="list-style-type: none"> If DSA Preboot is installed, restart the server and press F2 to start DSA Preboot and view the event logs. If DSA Preboot is not installed, insert the DSA Preboot CD and restart the server to start DSA Preboot and view the event logs. Alternatively, you can restart the server and press F1 to start the Setup Utility and view the POST event log or system-event log. For more information, see “Viewing event logs without restarting the server” on page 19.

Clearing the event logs

To clear the event logs, complete the following steps.

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

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

POST error codes

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

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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 		
0010002	Microprocessor not supported.	<ol style="list-style-type: none"> 1. (Trained service technician only) Reseat the microprocessor and restart the server. 2. (Trained service technician only) Remove the microprocessor and install a new microprocessor. Restart the server. If the error is corrected, the old microprocessor is bad and must be replaced. 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. (Trained service technician only) Microprocessor b. (Trained service technician only) System board
0011000	Invalid microprocessor type.	<ol style="list-style-type: none"> 1. Update the server firmware to the latest level (see "Updating the firmware" on page 258). 2. (Trained service technician only) Remove and replace the affected microprocessor (error LED is lit) with a supported type (see "Replacing the microprocessor and fan sink" on page 182).
0011004	Microprocessor failed BIST.	<ol style="list-style-type: none"> 1. Update the server firmware to the latest level (see "Updating the firmware" on page 258). 2. (Trained service technician only) Reseat microprocessor. 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. (Trained service technician only) Microprocessor b. (Trained service technician only) System board
001100A	Microcode updated failed.	<ol style="list-style-type: none"> 1. Update the server firmware to the latest level (see "Updating the firmware" on page 258). 2. (Trained service technician only) Replace the microprocessor.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Error code	Description	Action
0050001	DIMM disabled.	<ol style="list-style-type: none"> 1. If the server fails the POST memory test, reseal the DIMMs. 2. Remove and replace any DIMM for which the associated error LED is lit (see “Replacing a memory module” on page 134). 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA Preboot memory test (see “Running the diagnostic programs” on page 67).
0051003	Uncorrectable DIMM error	<ol style="list-style-type: none"> 1. If the server failed the POST memory test, reseal the DIMMs. 2. Remove and replace any DIMM for which the associated error LED is lit see “Replacing a memory module” on page 134). 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA Preboot memory test (see “Running the diagnostic programs” on page 67).
0051006	DIMM mismatch detected	Make sure that the DIMMs match and are installed in the correct sequence (see “Replacing a memory module” on page 134).
0051009	No memory detected.	<ol style="list-style-type: none"> 1. Make sure that the server contains DIMMs. 2. Reseat the DIMMs. 3. Install DIMMs in the correct sequence (see “Replacing a memory module” on page 134).
005100A	No usable memory detected.	<ol style="list-style-type: none"> 1. Make sure that the server contains DIMMs. 2. Reseat the DIMMs. 3. Install DIMMs in the correct sequence (see “Replacing a memory module” on page 134). 4. Clear CMOS memory to re-enable all the memory connectors (see “System-board switches and jumpers” on page 120).
0058001	PFA threshold exceeded	<ol style="list-style-type: none"> 1. Update the server firmware to the latest level (see “Updating the firmware” on page 258). 2. Reseat the DIMMs and run the memory test (see “Running the diagnostic programs” on page 67). 3. Replace the failing DIMM, which is indicated by a lit LED on the system board.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Error code	Description	Action
0058007	DIMM population is unsupported.	<ol style="list-style-type: none"> 1. Reseat the DIMMs, and then restart the server. 2. Remove the lowest-numbered DIMM pair of those that are identified and replace it with an identical pair of known good DIMMs, then restart the server. 3. Return the removed DIMMs, one pair at a time, to their original connectors, restarting the server after each pair, until a pair fails. Replace the DIMMs in the failed pair with identical known good DIMMs, restarting the server after each DIMM is installed. Replace the failed DIMM. Repeat this step until you have tested all removed DIMMs. 4. (Trained service technician only) Replace the system board.
0058008	DIMM failed memory test.	<ol style="list-style-type: none"> 1. Reseat the DIMMs, and then restart the server. 2. Replace the following components one at a time, in the order shown, then restart the server after each: <ol style="list-style-type: none"> a. DIMM b. (Trained service technician only) System board
00580A4	Memory population changed.	Information only. Memory has been added, moved, or changed.
0068002	CMOS battery cleared.	<ol style="list-style-type: none"> 1. Reseat the battery. 2. Clear the CMOS memory (see “System-board switches and jumpers” on page 120). 3. Replace the following components one at a time, in the following order, restarting the server after each one: <ol style="list-style-type: none"> a. Battery b. (Trained service technician only) System board
2011001	PCI-X PERR	<ol style="list-style-type: none"> 1. Reseat all affected adapters. 2. Update the PCI adapter firmware. 3. Remove the adapter. 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. Adapter b. (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Error code	Description	Action
2018001	PCI Express uncorrected or uncorrected error	<ol style="list-style-type: none"> 1. Reseat all affected adapters. 2. Update the PCI adapter firmware. 3. Remove the adapter. 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. Adapter b. (Trained service technician only) System board
2018002	Option ROM resource allocation failure	<p>Informational message that some devices might not be initialized.</p> <ol style="list-style-type: none"> 1. If possible, rearrange the order of the adapters in the PCI slots to change the load order of the optional-device ROM code. 2. Run the Setup utility, select Startup Options, and change the boot priority to change the load order of the optional-device ROM code. 3. Run the Setup utility and disable some other resources, if their functions are not being used, to make more space available. <ol style="list-style-type: none"> a. Select Startup Options -> Planar Ethernet (PXE/DHCP) to disable the integrated Ethernet controller ROM. b. Select Advanced Functions -> PCI Bus Control -> PCI ROM Control Execution to disable the ROM of the adapter in the PCI slots. c. Select Devices and I/O Ports to disable any of the integrated devices. 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. Each adapter b. (Trained service technician only) System board
3xx0007 (xx can be 00 - 19)	Firmware fault detected, system halted	<ol style="list-style-type: none"> 1. Recover the server firmware to the latest level (see “Updating the firmware” on page 258). 2. Undo any recent configuration changes, or clear CMOS memory to restore the settings to the default values (see “System-board switches and jumpers” on page 120). 3. Remove any recently installed hardware.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Error code	Description	Action
3038003	Firmware corrupted	<ol style="list-style-type: none"> 1. Run the Setup utility, select Load Default Settings, and save the settings to recover the server firmware. 2. (Trained service technician only) Replace the system board.
3048005	Booted secondary (backup) UEFI Image	Information only. The backup switch was used to boot the secondary bank.
3048006	Booted secondary (backup) UEFI image because of ABR	<ol style="list-style-type: none"> 1. Run the Setup utility, select Load Default Settings, and save the settings to recover the primary UEFI settings. 2. Turn off the server and remove it from the power source. 3. Reconnect the server to the power source, then turn on the server.
305000A	RTC date/time is incorrect	<ol style="list-style-type: none"> 1. Adjust the date and time settings in the Setup utility, and then restart the server. 2. Reseat the battery. 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. Battery b. (Trained service technician only) System board
3058001	System configuration invalid	<ol style="list-style-type: none"> 1. Run the Setup utility, and select Save Settings. 2. Run the Setup utility, select Load Default Settings, and save the settings. 3. Reseat 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. Failing device (if the device is a FRU, it must be reseated by a trained service technician only) c. (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Error code	Description	Action
3058004	Three boot failure	<ol style="list-style-type: none"> 1. Undo any recent system changes, such as new settings or newly installed devices. 2. Make sure that the server is attached to a reliable power source. 3. Remove all hardware that is not supported (see http://www.lenovo.com/support.) 4. Make sure that the operating system is not corrupted. 5. Run the Setup utility, save the configuration, and then restart the server.
3108007	System configuration restored to default settings	Information only. This is message is usually associated with the CMOS battery clear event.
3138002	Boot configuration error	<ol style="list-style-type: none"> 1. Remove any recent configuration changes made to the Setup utility. 2. Run the Setup utility, select Load Default Settings, and save the settings.
3808000	IMM communication failure	<ol style="list-style-type: none"> 1. Remove power from the server for 30 seconds, and then reconnect the server to power and restart it. 2. Update the IMM firmware to the latest level (see “Updating the firmware” on page 258). 3. Make sure that the virtual media key is seated and not damaged. 4. (Trained service technician only) Replace the system board.
3808002	Error updating system configuration to IMM	<ol style="list-style-type: none"> 1. Remove power from the server, and then reconnect the server to power and restart it. 2. Run the Setup utility and select Save Settings. 3. Update the IMM firmware to the latest level (see “Updating the firmware” on page 258).
3808003	Error retrieving system configuration from IMM	<ol style="list-style-type: none"> 1. Remove power from the server, and then reconnect the server to power and restart it. 2. Run the Setup utility and select Save Settings. 3. Update the IMM firmware to the latest level (see “Updating the firmware” on page 258).

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Error code	Description	Action
3808004	IMM system event log full	<ul style="list-style-type: none"> • When using out-of-band, use the IMM Web interface or IPMItool to clear the logs from the operating system. • When using the local console: <ol style="list-style-type: none"> 1. Run the Setup utility. 2. Select System Event Log. 3. Select Clear System Event Log. 4. Restart the server.
3818001	Core Root of Trust Measurement (CRTM) update failed	<ol style="list-style-type: none"> 1. Run the Setup utility, select Load Default Settings, and save the settings. 2. (Trained service technician only) Replace the system board.
3818002	Core Root of Trust Measurement (CRTM) update aborted	<ol style="list-style-type: none"> 1. Run the Setup utility, select Load Default Settings, and save the settings. 2. (Trained service technician only) Replace the system board.
3818003	Core Root of Trust Measurement (CRTM) flash lock failed	<ol style="list-style-type: none"> 1. Run the Setup utility, select Load Default Settings, and save the settings. 2. (Trained service technician only) Replace the system board.
3818004	Core Root of Trust Measurement (CRTM) system error	<ol style="list-style-type: none"> 1. Run the Setup utility, select Load Default Settings, and save the settings. 2. (Trained service technician only) Replace the system board.
3818005	Current Bank Core Root of Trust Measurement (CRTM) capsule signature invalid	<ol style="list-style-type: none"> 1. Run the Setup utility, select Load Default Settings, and save the settings. 2. (Trained service technician only) Replace the system board.
3818006	Opposite bank CRTM capsule signature invalid	<ol style="list-style-type: none"> 1. Switch the server firmware bank to the backup bank (see “Starting the backup server firmware” on page 259). 2. Run the Setup utility, select Load Default Settings, and save the settings. 3. Switch the bank back to the primary bank. 4. (Trained service technician only) Replace the system board.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Error code	Description	Action
3818007	CRTM update capsule signature invalid	<ol style="list-style-type: none"> 1. Run the Setup utility, select Load Default Settings, and save the settings. 2. (Trained service technician only) Replace the system board.
3828004	AEM power capping disabled	<ol style="list-style-type: none"> 1. Check the settings and the event logs. 2. Make sure that the Active Energy Manager feature is enabled in the Setup utility. Select System Settings -> Power -> Active Energy -> Capping Enabled. 3. Update the server firmware to the latest level (see “Updating the firmware” on page 258). 4. Update the IMM firmware to the latest level (see “Updating the firmware” on page 258).

System event log

The system event log contains messages of three types:

Information

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

Warning

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

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

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

Integrated management module (IMM) error messages

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

Message	Severity	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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 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. 			
Numeric sensor Ambient Temp going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	Reduce the ambient temperature.
Numeric sensor Ambient Temp going high (upper non-recoverable) has asserted.	Error	An upper nonrecoverable sensor going high has asserted.	Reduce the ambient temperature.
Numeric sensor Planar 3.3V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	(Trained service technician only) Replace the system board.
Numeric sensor Planar 3.3V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	(Trained service technician only) Replace the system board.
Numeric sensor Planar 5V going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	(Trained service technician only) Replace the system board.
Numeric sensor Planar 5V going high (upper critical) has asserted.	Error	An upper critical sensor going high has asserted.	(Trained service technician only) Replace the system board.
Numeric sensor Planar VBAT going low (lower critical) has asserted.	Error	A lower critical sensor going low has asserted.	Replace the 3 V battery.
Numeric sensor Fan <i>n</i> Tach going low (lower critical) has asserted. (<i>n</i> = fan number)	Error	A lower critical sensor going low has asserted.	<ol style="list-style-type: none"> Reseat the failing fan <i>n</i>, which is indicated by a lit LED on the fan. Replace the failing fan. (<i>n</i> = fan number)

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
<p>The Processor CPU <i>n</i>Status has Failed with IERR. (<i>n</i> = microprocessor number)</p>	Error	A processor failed - IERR condition has occurred.	<ol style="list-style-type: none"> 1. Make sure that the latest levels of firmware and device drivers are installed for all adapters and standard devices, such as Ethernet, SCSI, and SAS. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Run the DSA program for the hard disk drives and other I/O devices. 3. (Trained service technician only) Replace microprocessor <i>n</i>. <p>(<i>n</i> = microprocessor number)</p>
<p>An Over-Temperature Condition has been detected on the Processor CPU <i>n</i>Status. (<i>n</i> = microprocessor number)</p>	Error	An overtemperature condition has occurred for microprocessor <i>n</i> . (<i>n</i> = microprocessor number)	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor <i>n</i> is installed correctly. 3. (Trained service technician only) Replace microprocessor <i>n</i>. <p>(<i>n</i> = microprocessor number)</p>

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
The Processor CPU <i>n</i> Status has Failed with FRB1/BIST condition. (<i>n</i> = microprocessor number)	Error	A processor failed - FRB1/BIST condition has occurred.	<ol style="list-style-type: none"> 1. Check for a server firmware update. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. (Trained service technician only) Reseat microprocessor <i>n</i>. 3. (Trained service technician only) Replace microprocessor <i>n</i>. (<i>n</i> = microprocessor number)
The Processor CPU <i>n</i> Status has a Configuration Mismatch. (<i>n</i> = microprocessor number)	Error	A processor configuration mismatch has occurred.	<ol style="list-style-type: none"> 1. Make sure that the installed microprocessor is compatible (see “Specifications” on page 11 for information about microprocessor requirements). 2. (Trained service technician only) Replace the incompatible microprocessor.
An SM BIOS Uncorrectable CPU complex error for Processor CPU <i>n</i> Status has asserted. (<i>n</i> = microprocessor number)	Error	An SMBIOS uncorrectable CPU complex error has asserted.	<ol style="list-style-type: none"> 1. Check for a server firmware update. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. Make sure that the installed microprocessor is compatible (see “Specifications” on page 11 for information about microprocessor requirements). 3. (Trained service technician only) Reseat microprocessor <i>n</i>. 4. (Trained service technician only) Replace microprocessor <i>n</i>. (<i>n</i> = microprocessor number)

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Sensor CPU <i>n</i> OverTemp has transitioned to critical from a less severe state. (<i>n</i> = microprocessor number)	Error	A sensor has changed to Critical state from a less severe state.	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor <i>n</i> is installed correctly. 3. (Trained service technician only) Replace microprocessor <i>n</i>. (<i>n</i> = microprocessor number)
Sensor CPU <i>n</i> OverTemp has transitioned to non-recoverable from a less severe state. (<i>n</i> = microprocessor number)	Error	A sensor has changed to Nonrecoverable state from a less severe state.	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor <i>n</i> is installed correctly. 3. (Trained service technician only) Replace microprocessor <i>n</i>. (<i>n</i> = microprocessor number)
Sensor CPU <i>n</i> OverTemp has transitioned to critical from a non-recoverable state. (<i>n</i> = microprocessor number)	Error	A sensor has changed to Critical state from Nonrecoverable state.	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor <i>n</i> is installed correctly. 3. (Trained service technician only) Replace microprocessor <i>n</i>. (<i>n</i> = microprocessor number)

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Sensor CPU <i>n</i> OverTemp has transitioned to non-recoverable. (<i>n</i> = microprocessor number)	Error	A sensor has changed to Nonrecoverable state.	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffle is in place and correctly installed, and that the server cover is installed and completely closed. 2. Make sure that the heat sink for microprocessor <i>n</i> is installed correctly. 3. (Trained service technician only) Replace microprocessor <i>n</i>. (<i>n</i> = microprocessor number)
A bus timeout has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)	Error	A bus timeout has occurred.	<ol style="list-style-type: none"> 1. Remove the adapter from the PCI slot that is indicated by a lit LED. 2. Replace the extender card. 3. Remove all PCI adapters. 4. (Trained service technicians only) Replace the system board.
The System %1 encountered a POST Error. (%1 = CIM_ComputerSystem.ElementName)	Error	A POST error has occurred. (Sensor = ABR Status)	<ol style="list-style-type: none"> 1. Recover the server firmware from the backup page (see “Recovering the server firmware” on page 105). 2. Update the server firmware to the latest level. 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.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
The System %1 encountered a POST Error. (%1 = CIM_ComputerSystem.ElementName)	Error	A POST error has occurred. (Sensor = Firmware Error)	<ol style="list-style-type: none"> 1. Update the server firmware on the primary page. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 2. (Trained service technician only) Replace the system board.
A Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)	Error	A bus uncorrectable error has occurred. (Sensor = Critical Int PCI)	<ol style="list-style-type: none"> 1. Check the system-event log. 2. Check the PCI error LEDs. 3. Remove the adapter from the indicated PCI slot. 4. Check for a server firmware update. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained service technician only) Replace the system board.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
<p>A Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)</p>	<p>Error</p>	<p>A bus uncorrectable error has occurred. (Sensor = Critical Int CPU)</p>	<ol style="list-style-type: none"> 1. Check the system-event log. 2. Check the microprocessor error LEDs. 3. (Trained service technician only) Replace microprocessor. 4. Check for a server firmware update. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained service technician only) Replace the system board.
<p>A Uncorrectable Bus Error has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)</p>	<p>Error</p>	<p>A bus uncorrectable error has occurred. (Sensor = Critical Int DIM)</p>	<ol style="list-style-type: none"> 1. Check the system-event log. 2. Check the DIMM error LEDs. 3. Remove the failing DIMM from the system board. 4. Check for a server firmware update. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. Make sure that the installed DIMMs are supported and configured correctly. 6. (Trained service technician only) Replace the system board.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Sensor Sys Board Fault has transitioned to critical from a less severe state.	Error	A sensor has changed to Critical state from a less severe state.	<ol style="list-style-type: none"> 1. Check the system-event log. 2. Check for an error LED on the system board. 3. Replace any failing device. 4. Check for a server firmware update. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code. 5. (Trained service technician only) Replace the system board.
Sensor RAID Error has transitioned to critical from a less severe state.	Error	A sensor has changed to Critical state from a less severe state.	<ol style="list-style-type: none"> 1. Check the hard disk drive LEDs. 2. Reseat the hard disk drive for which the status LED is lit. 3. Replace the defective hard disk drive.
The Drive <i>n</i> Status has been removed from unit Drive 0 Status. (<i>n</i> = hard disk drive number)	Error	A drive has been removed.	Reseat hard disk drive <i>n</i> . (<i>n</i> = hard disk drive number)
The Drive <i>n</i> Status has been disabled due to a detected fault. (<i>n</i> = hard disk drive number)	Error	A drive has been disabled because of a fault.	<ol style="list-style-type: none"> 1. Run the hard disk drive diagnostic test on drive <i>n</i>. 2. Reseat the following components: <ol style="list-style-type: none"> a. Hard disk drive b. Cable from the system board to the backplane 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 backplane c. Hard disk drive backplane (<i>n</i> = hard disk drive number)

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Array %1 is in critical condition. (%1 = CIM_ComputerSystem. ElementName)	Error	An array is in Critical state. (Sensor = Drive <i>n</i> Status) (<i>n</i> = hard disk drive number)	Replace the hard disk drive that is indicated by a lit status LED.
Array %1 has failed. (%1 = CIM_ComputerSystem. ElementName)	Error	An array is in Failed state. (Sensor = Drive <i>n</i> Status) (<i>n</i> = hard disk drive number)	Replace the hard disk drive that is indicated by a lit status LED.
Memory uncorrectable error detected for DIMM All DIMMs on Memory Subsystem All DIMMs.	Error	A memory uncorrectable error has occurred.	<ol style="list-style-type: none"> 1. If the server failed the POST memory test, reseal the DIMMs. 2. Replace any DIMM that is indicated by a lit error LED. Note: You do not have to replace DIMMs by pairs. 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA memory test.
Memory Logging Limit Reached for DIMM All DIMMs on Memory Subsystem All DIMMs.	Error	The memory logging limit has been reached.	<ol style="list-style-type: none"> 1. Update the server firmware to the latest level. 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. 2. Reseat the DIMMs and run the DSA memory test. 3. Replace any DIMM that is indicated by a lit error LED.
Memory DIMM Configuration Error for All DIMMs on Memory Subsystem All DIMMs.	Error	A DIMM configuration error has occurred.	Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology.
Memory uncorrectable error detected for DIMM One of the DIMMs on Memory Subsystem One of the DIMMs.	Error	A memory uncorrectable error has occurred.	<ol style="list-style-type: none"> 1. If the server failed the POST memory test, reseal the DIMMs. 2. Replace any DIMM that is indicated by a lit error LED. Note: You do not have to replace DIMMs by pairs. 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA memory test.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Memory Logging Limit Reached for DIMM One of the DIMMs on Memory Subsystem One of the DIMMs.	Error	The memory logging limit has been reached.	<ol style="list-style-type: none"> 1. Update the UEFI to the latest level. 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. 2. Reseat the DIMMs and run the DSA memory test. 3. Replace any DIMM that is indicated by a lit error LED.
Memory DIMM Configuration Error for One of the DIMMs on Memory Subsystem One of the DIMMs.	Error	A DIMM configuration error has occurred.	Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology.
Memory uncorrectable error detected for DIMM <i>n</i> Status on Memory Subsystem DIMM <i>n</i> Status. (<i>n</i> = DIMM number)	Error	A memory uncorrectable error has occurred.	<ol style="list-style-type: none"> 1. If the server failed the POST memory test, reseat the DIMMs. 2. Replace any DIMM that is indicated by a lit error LED. Note: You do not have to replace DIMMs by pairs. 3. Run the Setup utility to enable all the DIMMs. 4. Run the DSA memory test. 5. (Trained service technician only) Replace the system board.
Memory Logging Limit Reached for DIMM <i>n</i> Status on Memory Subsystem DIMM <i>n</i> Status. (<i>n</i> = DIMM number)	Error	The memory logging limit has been reached.	<ol style="list-style-type: none"> 1. Update the UEFI to the latest level. 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. 2. Reseat the DIMMs and run the DSA memory test. 3. Replace any DIMM that is indicated by a lit error LED.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Memory DIMM Configuration Error for DIMM <i>n</i> Status on Memory Subsystem DIMM <i>n</i> Status. (<i>n</i> = DIMM number)	Error	A DIMM configuration error has occurred.	Make sure that DIMMs are installed in the correct sequence and have the same size, type, speed, and technology.
Sensor DIMM <i>n</i> Temp has transitioned to critical from a less severe state. (<i>n</i> = DIMM number)	Error	A sensor has changed to Critical state from a less severe state.	<ol style="list-style-type: none"> 1. Make sure that the fans are operating, that there are no obstructions to the airflow, that the air baffles are in place and correctly installed, and that the server cover is installed and completely closed. 2. If a fan has failed, complete the action for a fan failure. 3. Replace DIMM <i>n</i>. (<i>n</i> = DIMM number)
A PCI PERR has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)	Error	A PCI PERR has occurred. (Sensor = PCI Slot <i>n</i> ; <i>n</i> = PCI slot number)	<ol style="list-style-type: none"> 1. Check the extender-card LEDs. 2. Reseat the affected adapters and extender card. 3. Update the server and adapter firmware (UEFI and IMM). 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. 4. Remove the adapter from slot <i>n</i>. 5. Replace the PCIe adapter. 6. Replace extender card <i>n</i>. (<i>n</i> = PCI slot number)

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
<p>A PCI SERR has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)</p>	<p>Error</p>	<p>A PCI SERR has occurred. (Sensor = PCI Slot <i>n</i>; <i>n</i> = PCI slot number)</p>	<ol style="list-style-type: none"> 1. Check the extender-card LEDs. 2. Reseat the affected adapters and extender card. 3. Update the server and adapter firmware (UEFI and IMM). 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. 4. Remove the adapter from slot <i>n</i>. 5. Replace the PCIe adapter. 6. Replace extender card <i>n</i>. <p>(<i>n</i> = PCI slot number)</p>
<p>A PCI PERR has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)</p>	<p>Error</p>	<p>A PCI PERR has occurred. (Sensor = One of PCI Err)</p>	<ol style="list-style-type: none"> 1. Check the extender-card LEDs. 2. Reseat the affected adapters and riser card. 3. Update the server and adapter firmware (UEFI and IMM). 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. 4. Remove both adapters. 5. Replace the PCIe adapter. 6. Replace the extender card. 7. (Trained service technician only) Replace the system board.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
<p>A PCI SERR has occurred on system %1. (%1 = CIM_ComputerSystem.ElementName)</p>	<p>Error</p>	<p>A PCI SERR has occurred. (Sensor = One of PCI Err)</p>	<ol style="list-style-type: none"> 1. Check the extender-card LEDs. 2. Reseat the affected adapters and extender card. 3. Update the server and adapter firmware (UEFI and IMM). 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. 4. Remove both adapters. 5. Replace the PCIe adapter. 6. Replace the extender card. 7. (Trained service technician only) Replace the system board.
<p>Fault in slot System board on system %1. (%1 = CIM_ComputerSystem.ElementName)</p>	<p>Error</p>		<ol style="list-style-type: none"> 1. Check the extender-card LEDs. 2. Reseat the affected adapters and extender card. 3. Update the server and adapter firmware (UEFI and IMM). 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. 4. Remove both adapters. 5. Replace the PCIe adapter. 6. Replace the extender card. 7. (Trained service technician only) Replace the system board.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Redundancy Bckup Mem Status has been reduced.	Error	Redundancy has been lost and is insufficient to continue operation.	<ol style="list-style-type: none"> 1. Check the system-event log for DIMM failure events (uncorrectable or PFA) and correct the failures. 2. Re-enable mirroring in the Setup utility.
IMM Network Initialization Complete.	Info	An IMM network has completed initialization.	No action; information only.
Certificate Authority %1 has detected a %2 Certificate Error. (%1 = IBM_CertificateAuthority.CADistinguishedName; %2 = CIM_PublicKeyCertificate.ElementName)	Error	A problem has occurred with the SSL Server, SSL Client, or SSL Trusted CA certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated by the Generate a New Key and Certificate Signing Request link.	<ol style="list-style-type: none"> 1. Make sure that the certificate that you are importing is correct. 2. Try importing the certificate again.
Ethernet Data Rate modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort.Speed; %2 = CIM_EthernetPort.Speed; %3 = user ID)	Info	A user has modified the Ethernet port data rate.	No action; information only.
Ethernet Duplex setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort.FullDuplex; %2 = CIM_EthernetPort.FullDuplex; %3 = user ID)	Info	A user has modified the Ethernet port duplex setting.	No action; information only.
Ethernet MTU setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort.ActiveMaximumTransmissionUnit; %2 = CIM_EthernetPort.ActiveMaximumTransmissionUnit; %3 = user ID)	Info	A user has modified the Ethernet port MTU setting.	No action; information only.
Ethernet Duplex setting modified from %1 to %2 by user %3. (%1 = CIM_EthernetPort.NetworkAddresses; %2 = CIM_EthernetPort.NetworkAddresses; %3 = user ID)	Info	A user has modified the Ethernet port MAC address setting.	No action; information only.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Ethernet interface %1 by user %2. (%1 = CIM_EthernetPort.EnabledState; %2 = user ID)	Info	A user has enabled or disabled the Ethernet interface.	No action; information only.
Hostname set to %1 by user %2. (%1 = CIM_DNSProtocolEndpoint. Hostname; %2 = user ID)	Info	A user has modified the host name of the IMM.	No action; information only.
IP address of network interface modified from %1 to %2 by user %3. (%1 = CIM_IPProtocolEndpoint. IPv4Address; %2 = CIM_StaticIPAssignmentSettingData. IPAddress; %3 = user ID)	Info	A user has modified the IP address of the IMM.	No action; information only.
IP subnet mask of network interface modified from %1 to %2 by user %3s. (%1 = CIM_IPProtocolEndpoint. SubnetMask; %2 = CIM_StaticIPAssignmentSettingData. SubnetMask; %3 = user ID)	Info	A user has modified the IP subnet mask of the IMM.	No action; information only.
IP address of default gateway modified from %1 to %2 by user %3s. (%1 = CIM_IPProtocolEndpoint. GatewayIPv4Address; %2 = CIM_StaticIPAssignmentSettingData. DefaultGatewayAddress; %3 = user ID)	Info	A user has modified the default gateway IP address of the IMM.	No action; information only.
OS Watchdog response %1 by %2. (%1 = Enabled or Disabled; %2 = user ID)	Info	A user has enabled or disabled an OS Watchdog.	No action; information only.
DHCP[%1] failure, no IP address assigned. (%1 = IP address, xxx.xxx.xxx.xxx)	Info	A DHCP server has failed to assign an IP address to the IMM.	<ol style="list-style-type: none"> 1. Make sure that the network cable is connected. 2. Make sure that there is a DHCP server on the network that can assign an IP address to the IMM.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Remote Login Successful. Login ID: %1 from %2 at IP address %3. (%1 = user ID; %2 = ValueMap(CIM_ProtocolEndpoint.ProtocolIFType; %3 = IP address, xxx.xxx.xxx.xxx)	Info	A user has successfully logged in to the IMM.	No action; information only.
Attempting to %1 server %2 by user %3. (%1 = Power Up, Power Down, Power Cycle, or Reset; %2 = IBM_ComputerSystem.ElementName; %3 = user ID)	Info	A user has used the IMM to perform a power function on the server.	No action; information only.
Security: Userid: '%1' had %2 login failures from WEB client at IP address %3. (%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, xxx.xxx.xxx.xxx)	Error	A user has exceeded the maximum number of unsuccessful login attempts from a Web browser and has been prevented from logging in for the lockout period.	<ol style="list-style-type: none"> 1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
Security: Login ID: '%1' had %2 login failures from CLI at %3. (%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, xxx.xxx.xxx.xxx)	Error	A user has exceeded the maximum number of unsuccessful login attempts from the command-line interface and has been prevented from logging in for the lockout period.	<ol style="list-style-type: none"> 1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
Remote access attempt failed. Invalid userid or password received. Userid is '%1' from WEB browser at IP address %2. (%1 = user ID; %2 = IP address, xxx.xxx.xxx.xxx)	Error	A user has attempted to log in from a Web browser by using an invalid login ID or password.	<ol style="list-style-type: none"> 1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
Remote access attempt failed. Invalid userid or password received. Userid is '%1' from TELNET client at IP address %2. (%1 = user ID; %2 = IP address, xxx.xxx.xxx.xxx)	Error	A user has attempted to log in from a Telnet session by using an invalid login ID or password.	<ol style="list-style-type: none"> 1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
The Chassis Event Log (CEL) on system %1 cleared by user %2. (%1 = CIM_ComputerSystem.ElementName; %2 = user ID)	Info	A user has cleared the IMM event log.	No action; information only.
IMM reset was initiated by user %1. (%1 = user ID)	Info	A user has initiated a reset of the IMM.	No action; information only.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
ENET[0] DHCP-HSTN=%1, DN=%2, IP@=%3, SN=%4, GW@=%5, DNS1@=%6. (%1 = CIM_DNSProtocolEndpoint. Hostname; %2 = CIM_DNSProtocolEndpoint. DomainName; %3 = CIM_IPProtocolEndpoint. IPv4Address; %4 = CIM_IPProtocolEndpoint. SubnetMask; %5 = IP address, xxx.xxx.xxx.xxx; %6 = IP address, xxx.xxx.xxx.xxx)	Info	The DHCP server has assigned an IMM IP address and configuration.	No action; information only.
ENET[0] IP-Cfg:HstName=%1, IP@%2, NetMsk=%3, GW@=%4. (%1 = CIM_DNSProtocolEndpoint. Hostname; %2 = CIM_StaticIPSettingData. IPv4Address; %3 = CIM_StaticIPSettingData. SubnetMask; %4 = CIM_StaticIPSettingData. DefaultGatewayAddress)	Info	An IMM IP address and configuration have been assigned using client data.	No action; information only.
LAN: Ethernet[0] interface is no longer active.	Info	The IMM Ethernet interface has been disabled.	No action; information only.
LAN: Ethernet[0] interface is now active.	Info	The IMM Ethernet interface has been enabled.	No action; information only.
DHCP setting changed to by user %1. (%1 = user ID)	Info	A user has changed the DHCP mode.	No action; information only.
IMM: Configuration %1 restored from a configuration file by user %2. (%1 = CIM_ConfigurationData. ConfigurationName; %2 = user ID)	Info	A user has restored the IMM configuration by importing a configuration file.	No action; information only.
Watchdog %1 Screen Capture Occurred. (%1 = OS Watchdog or Loader Watchdog)	Error	An operating-system error has occurred, and the screen capture was successful.	<ol style="list-style-type: none"> 1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
Watchdog %1 Failed to Capture Screen. (%1 = OS Watchdog or Loader Watchdog)	Error	An operating-system error has occurred, and the screen capture failed.	<ol style="list-style-type: none"> 1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system. 6. Update the IMM firmware. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
Running the backup IMM main application.	Error	The IMM has resorted to running the backup main application.	Update the IMM firmware. Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.
Please ensure that the IMM is flashed with the correct firmware. The IMM is unable to match its firmware to the server.	Error	The server does not support the installed IMM firmware version.	Update the IMM firmware to a version that the server supports. 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.
IMM reset was caused by restoring default values.	Info	The IMM has been reset because a user has restored the configuration to its default settings.	No action; information only.
IMM clock has been set from NTP server %1. (%1 = IBM_NTPTService.ElementName)	Info	The IMM clock has been set to the date and time that is provided by the Network Time Protocol server.	No action; information only.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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. 			
SSL data in the IMM configuration data is invalid. Clearing configuration data region and disabling SSL+H25.	Error	There is a problem with the certificate that has been imported into the IMM. The imported certificate must contain a public key that corresponds to the key pair that was previously generated through the Generate a New Key and Certificate Signing Request link.	<ol style="list-style-type: none"> 1. Make sure that the certificate that you are importing is correct. 2. Try to import the certificate again.
Flash of %1 from %2 succeeded for user %3. (%1 = CIM_ManagedElement.ElementName; %2 = Web or LegacyCLI; %3 = user ID)	Info	A user has successfully updated one of the following firmware components: <ul style="list-style-type: none"> • IMM main application • IMM boot ROM • Server firmware • Diagnostics • Integrated service processor 	No action; information only.
Flash of %1 from %2 failed for user %3. (%1 = CIM_ManagedElement.ElementName; %2 = Web or LegacyCLI; %3 = user ID)	Info	An attempt to update a firmware component from the interface and IP address has failed.	Try to update the firmware again.
The Chassis Event Log (CEL) on system %1 is 75% full. (%1 = CIM_ComputerSystem.ElementName)	Info	The IMM event log is 75% full. When the log is full, older log entries are replaced by newer ones.	To avoid losing older log entries, save the log as a text file and clear the log.
The Chassis Event Log (CEL) on system %1 is 100% full. (%1 = CIM_ComputerSystem.ElementName)	Info	The IMM event log is full. When the log is full, older log entries are replaced by newer ones.	To avoid losing older log entries, save the log as a text file and clear the log.
%1 Platform Watchdog Timer expired for %2. (%1 = OS Watchdog or Loader Watchdog; %2 = OS Watchdog or Loader Watchdog)	Error	A Platform Watchdog Timer Expired event has occurred.	<ol style="list-style-type: none"> 1. Reconfigure the watchdog timer to a higher value. 2. Make sure that the IMM Ethernet over USB interface is enabled. 3. Reinstall the RNDIS or cdc_ether device driver for the operating system. 4. Disable the watchdog. 5. Check the integrity of the installed operating system.
IMM Test Alert Generated by %1. (%1 = user ID)	Info	A user has generated a test alert from the IMM.	No action; information only.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 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.

Security: Userid: '%1' had %2 login failures from an SSH client at IP address %3. (%1 = user ID; %2 = MaximumSuccessiveLoginFailures (currently set to 5 in the firmware); %3 = IP address, xxx.xxx.xxx.xxx)	Error	A user has exceeded the maximum number of unsuccessful login attempts from SSH and has been prevented from logging in for the lockout period.	<ol style="list-style-type: none"> 1. Make sure that the correct login ID and password are being used. 2. Have the system administrator reset the login ID or password.
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Troubleshooting tables

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

If you cannot find the problem in these tables, see “Running the diagnostic programs” on page 67 for information about testing the server.

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

1. Check the LEDs on the control panel or the system board (see “Error LEDs” on page 62).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

EasyStartup problems

Table 3. EasyStartup DVD

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.• Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information.	
Symptom	Action
The <i>EasyStartup</i> DVD will not start.	<ul style="list-style-type: none">• Make sure the server supports the EasyStartup program and has a startable (bootable) DVD drive.• If the startup (boot) sequence settings have been changed, make sure the DVD drive is first in the startup sequence.• If more than one DVD drive is installed, make sure that only one drive is set as the primary drive. Start the EasyStartup DVD from the primary DVD drive.
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The EasyStartup program will not start the operating-system media.	Make sure that the operating-system media is supported by the EasyStartup program. See the EasyStartup User Guide for a list of supported operating-system versions. The EasyStartup User Guide and compatibility notes are available through the EasyStartup program.

DVD 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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
The DVD-ROM drive is not recognized.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The SATA channel to which the DVD drive is attached (primary or secondary) is enabled in the Setup utility program. • All cables and jumpers are installed correctly. • The correct device driver is installed for the DVD drive. 2. Run the DVD drive diagnostic programs. 3. Reseat the DVD drive cable. 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. DVD drive cable b. DVD drive c. (Trained service technician only) System board
A CD or DVD is not working correctly.	<ol style="list-style-type: none"> 1. Clean the CD or DVD. 2. Run the DVD drive diagnostic programs. 3. Reseat the DVD drive cable. 4. Reseat the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. DVD drive cable b. DVD drive c. (Trained service technician only) System board 5. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> a. Replace the DVD drive cable b. Replace the DVD drive
The DVD drive tray is not working.	<ol style="list-style-type: none"> 1. Make sure that the server is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Reseat the DVD drive cable. 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. DVD drive cable b. DVD drive

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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test (the Fixed Disk 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 server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server 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 diagnostic Fixed Disk Test or SCSI Attached Disk Test, but the problem remains.	Run the diagnostic SCSI Attached Disk Test (see “Running the diagnostic programs” on page 67). Note: This test is supported on server models with RAID arrays that use the ServeRAID-BR10iL, ServeRAID-MR10i, or ServeRAID-MR10is controllers or servers with SATA hard disk drives that use the onboard SATA/SAS controller to create RAID arrays. Use the Fixed Disk Test for SATA hard disk drives or servers that have RAID arrays.

Intermittent 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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.• Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information.	
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 and cords are connected securely to the rear of the server and attached devices.• When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down.2. Check the system-error log or IMM system event log (see “Event logs” on page 19).

Keyboard, mouse, or pointing-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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.• Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information.	
Symptom	Action
All or some keys on the keyboard do not work.	<ol style="list-style-type: none">1. Make sure that:<ul style="list-style-type: none">• The keyboard cable is securely connected.• The server and the monitor are turned on.2. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.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. Keyboardb. (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Symptom	Action
The mouse or pointing device does not work.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The mouse or pointing-device cable is securely connected to the server. • The mouse or pointing-device drivers are installed correctly. • The server and the monitor are turned on. • The mouse option is enabled in the Setup utility program. 2. If you are using a USB mouse or pointing device and it is connected to a USB hub, disconnect the mouse or pointing device from the hub and connect it directly to the server. 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. Mouse or pointing device b. (Trained service technician only) System board

Memory problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

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. Make sure that: <ul style="list-style-type: none"> • No error LEDs are lit on the control-panel assembly or on the system board. • Memory mirroring does not account for the discrepancy. • The memory modules are seated correctly. • You have installed the correct type of memory. • All DIMMs are enabled. The server might have automatically disabled a DIMM when it detected a problem. 2. Check the POST error log for error message 289: <ul style="list-style-type: none"> • If a DIMM was disabled by a system-management interrupt (SMI), replace the DIMM. 3. Run memory diagnostics (see “Running the diagnostic programs” on page 67). 4. Make sure that there is no memory mismatch when the server is over the minimum memory configuration (one 1 GB DIMM) and that you have installed the correct number of DIMMs. 5. Reseat the DIMMs. 6. 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
Multiple rows of DIMMs in a branch are identified as failing.	<ol style="list-style-type: none"> 1. Reseat the DIMMs; then, restart the server. 2. Replace the lowest-numbered DIMM pair of those that are identified; then, restart the server. Repeat as necessary. 3. (Trained service technician only) Replace the system board.

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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
A microprocessor LED is lit during POST, indicating that the startup (boot) microprocessor is not working correctly.	<ol style="list-style-type: none"> 1. Make sure that the server supports the microprocessor. 2. (Trained service technician only) Make sure that the microprocessor is seated correctly. 3. (Trained service technician only) Reseat the Microprocessor. 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. (Trained service technician only) Microprocessor b. (Trained service technician only) System board

Monitor or video problems

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

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
Testing the monitor	<ol style="list-style-type: none"> 1. Make sure that the monitor cables are firmly connected. 2. Try using a different monitor on the server, or try using the monitor that is being tested on a different server. 3. Run the diagnostic programs. If the monitor passes the diagnostic programs, the problem might be a video device driver. 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. (Trained service technician only) System board

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Symptom	Action
The screen is blank.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The server is turned on. If there is no power to the server, see “Power problems” on page 58. • The monitor cables are connected correctly. • The monitor is turned on and the brightness and contrast controls are adjusted correctly. 2. Make sure that the correct server is controlling the monitor, if applicable. 3. Make sure that damaged server firmware is not affecting the video; see “Recovering the server firmware” on page 105. 4. See “Solving undetermined problems” on page 110.
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	<ol style="list-style-type: none"> 1. Make sure that: <ul style="list-style-type: none"> • The application program is not setting a display mode that is higher than the capability of the monitor. • You installed the necessary device drivers for the application. 2. Run video diagnostics (see “Running the diagnostic programs” on page 67). <ul style="list-style-type: none"> • If the server passes the video diagnostics, the video is good; see “Solving undetermined problems” on page 110. • (Trained service technician only) If the server fails the video diagnostics, replace the system board.
The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.	<ol style="list-style-type: none"> 1. If the monitor self-tests show the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. <p>Attention: Moving a color monitor while it is turned on might cause screen discoloration.</p> <p>Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.</p> <p>Notes:</p> <ol style="list-style-type: none"> a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.). b. Non-Lenovo monitor cables might cause unpredictable problems. 2. Reseat the following components: <ol style="list-style-type: none"> a. Monitor cable 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. Monitor b. (Trained service technician only) System board

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
Wrong characters appear on the screen.	<ol style="list-style-type: none"> 1. If the wrong language is displayed, update the server firmware with the correct language (see “Updating the firmware” on page 258). 2. Reseat the monitor cable. 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. Monitor b. (Trained service technician only) System board

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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
A Lenovo 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 server. • 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 Setup utility program. Whenever memory or any other device is changed, you must update the configuration. 2. Reseat the device that you just installed. 3. Replace the device that you just installed.
A Lenovo optional device that used to work does not work now.	<ol style="list-style-type: none"> 1. Make sure that all of the hardware and 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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Symptom	Action
<p>The power-control button does not work (the server does not start).</p> <p>Note: The power-control button will not function until 1 to 3 minutes after the server has been connected to ac power.</p>	<ol style="list-style-type: none"> 1. Make sure that the control-panel assembly power-control button is working correctly: <ol style="list-style-type: none"> a. Disconnect the server power cords. b. Reconnect the power cords. c. Press the power-control button. If the server does not start, check the power-control button for damage. 2. Make sure that: <ul style="list-style-type: none"> • The power cords are correctly connected to the server and to a working electrical outlet. • The power LEDs (AC, DC) are lit correctly. • The server power-on LED on the front information panel is flashing after AC power cord is connected and that it stays on after the power-button is pressed. • The server contains the correct type of DIMMs. • The DIMMs are correctly seated. • A POST beep code did not sound, indicating a memory initialization error. • The LEDs on the power supply do not indicate a problem. • The microprocessor is correctly installed. 3. Reseat the following components: <ol style="list-style-type: none"> a. DIMMs b. power supply cables to all internal components 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. DIMMs b. (Trained service technician only) Power supply 5. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports. 6. See “Solving undetermined problems” on page 110.
<p>The server does not turn off.</p>	<ol style="list-style-type: none"> 1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps: <ol style="list-style-type: none"> a. Press Ctrl+Alt+Delete. b. Turn off the server by holding the power-control button for 5 seconds. c. Restart the server. d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server. 2. (Trained service technician only) If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

<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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
The server unexpectedly shuts down, and the LEDs on the control-panel assembly are not lit.	See “Solving undetermined problems” on page 110.

Serial port 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 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
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: <ul style="list-style-type: none"> • Each port is assigned a unique address in the Setup utility program and none of the serial ports is disabled. • The serial port adapter (if one is present) is seated correctly. 2. Reseat the serial port adapter. 3. Replace the serial port adapter.
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 server. • The serial port is enabled and is assigned a unique address. • The device is connected to the correct connector (see “System-board external connectors” on page 119). 2. Reseat the following components: <ol style="list-style-type: none"> a. Failing serial device b. Serial cable 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. Failing serial device b. Serial cable c. (Trained service technician only) System board

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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
You suspect a software problem.	<ol style="list-style-type: none"> To determine whether the problem is caused by the software, make sure that: <ul style="list-style-type: none"> The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict. The software is designed to operate on the server. Other software works on the server. The software works on another server. If you receive any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem. Contact your place of purchase of the software.

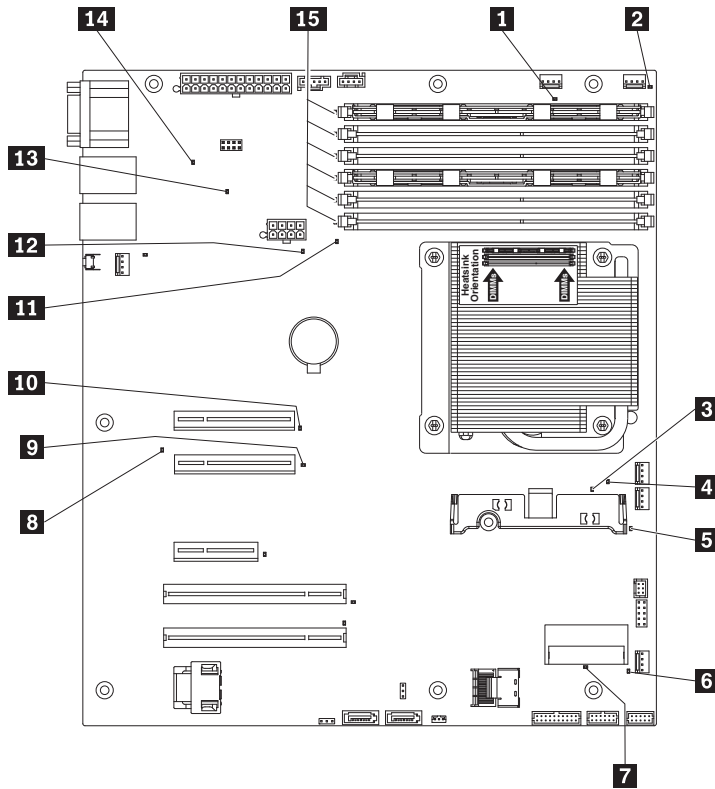
Universal Serial Bus (USB) port problems

<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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 	
Symptom	Action
A USB device does not work.	<ol style="list-style-type: none"> Run USB diagnostics (see "Running the diagnostic programs" on page 67). Make sure that: <ul style="list-style-type: none"> The correct USB device driver is installed. The operating system supports USB devices. Make sure that the USB configuration options are set correctly in the Setup utility program. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Error LEDs

The illustration shows the system-board LEDs. The system board has error LEDs that will help to locate the source of the error. Run the diagnostic programs to find out the cause of the error (see “Running the diagnostic programs” on page 67).



- | | | | |
|----------|-------------------------|-----------|------------------------------|
| 1 | Fan 5 error LED | 9 | PCI Express slot 2 error LED |
| 2 | Fan 4 error LED | 10 | PCI Express slot 1 error LED |
| 3 | H8 Heartbeat LED | 11 | Microprocessor error LED |
| 4 | Fan 3 error LED | 12 | Battery error LED |
| 5 | Fan 2 error LED | 13 | Standby power LED |
| 6 | Fan 1 error LED | 14 | System board error LED |
| 7 | SAS/SATA Controller LED | 15 | DIMM 1-6 error LEDs |
| 8 | IMM heart beat LED | | |

The server is designed so that LEDs remain lit when the server is connected to an ac power source but is not turned on, provided that the power supply is operating correctly. This feature helps you to isolate the problem when the operating system is shut down.

Note: When you disconnect the power source from the server, you lose the ability to view the LEDs because the LEDs are not lit when the power source is removed. Before you disconnect the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel and LEDs inside the server on the system board.

Many errors are first indicated by a lit system-error LED on the control-panel assembly of the server. If this LED is lit, one or more LEDs elsewhere in the server might also be lit and can direct you to the source of the error.

Before you work inside the server to view the LEDs, read “Important Safety Information” on page 1 and “Handling static-sensitive devices” on page 129.

If an error occurs, view the server LEDs in the following order:

1. Check the control-panel assembly on the front of the server. If the system-error LED is lit, it indicates that an error has occurred.
2. Check the front and rear of the server to determine whether any component LEDs are lit.
3. Remove the server cover and look inside the server for lit LEDs. Certain components inside the server have LEDs that will be lit to indicate the location of a problem. For example, a DIMM error will light the LED next to the failing DIMM on the system board.

Look at the system service label inside the side cover of the server, which gives an overview of internal components. This information can often provide enough information to correct the error.

The following table describes the LEDs on the system board and PCI extender cards and suggested actions to correct the detected 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. • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 		
Component LED	Description	Action
DIMM error LEDs	A memory DIMM has failed or is incorrectly installed.	<ol style="list-style-type: none"> 1. Remove the DIMM that has the lit error LED. 2. Reseat the DIMM. 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. DIMM b. (Trained service technician only) System board
Fan error LEDs	A fan has failed, is operating too slowly, or has been removed.	<ol style="list-style-type: none"> 1. Reseat the failing fan, which is indicated by a lit LED near the fan connector on the system board. 2. Replace the failing fan.
Microprocessor error LED	Microprocessor has failed, is missing, or has been incorrectly installed. Note: (Trained service technician only) Make sure that the microprocessor is installed correctly; see “Replacing the microprocessor and fan sink” on page 182.	<ol style="list-style-type: none"> 1. Check the system-event log to determine the reason for the lit LED. 2. (Trained service technician) Reseat the failing microprocessor 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. (Trained service technician only) Failing microprocessor b. (Trained service technician only) System board
System-board error LED	System-board microprocessor VRD and/or power voltage regulators have failed.	(Trained service technician only) Replace the system board.
Battery failure LED	Battery low.	<ol style="list-style-type: none"> 1. Replace the CMOS lithium battery, if necessary. 2. (Trained service technician only) Replace the system board.

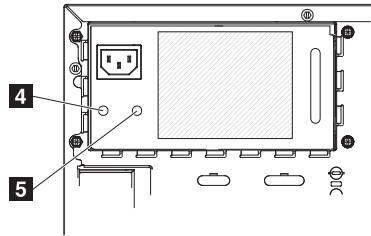
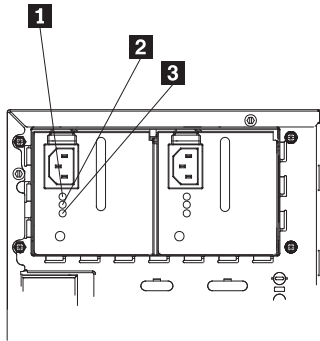
<ul style="list-style-type: none"> • Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved. • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 		
Component LED	Description	Action
IMM heartbeat LED	<p>Indicates the status of the boot process of the IMM.</p> <p>When the server is connected to power this LED flashes quickly to indicate that the IMM code is loading. When the loading is complete, the LED stops flashing briefly and then flashes slowly to indicate that the IMM is fully operational and you can press the power-control button to start the server.</p>	<p>If the LED does not begin flashing within 30 seconds of when the server is connected to power, complete the following steps:</p> <ol style="list-style-type: none"> 1. (Trained service technician only) Rerecover the firmware (see “Recovering the UEFI firmware” on page 259). 2. (Trained service technician only) Replace the system board.
PCI slots error LEDs	<p>An error has occurred on a PCI bus or on the system board. An additional LED is lit next to a failing PCI slot.</p>	<ol style="list-style-type: none"> 1. Check the system-event log for information about the error. 2. If you cannot isolate the failing PCI card through the LEDs and the information in the system-event log, remove one PCI card at a time, and restart the server after each PCI card is removed. 3. If the failure remains, go to http://www.lenovo.com/support for additional troubleshooting information.
H8 heartbeat LED	<p>power-on and power-off sequencing.</p>	<ol style="list-style-type: none"> 1. If the LED flashes at 1Hz, it is functioning properly and no action is necessary. 2. If the LED is not flashing, (trained service technician only) replace the system board.

power supply LEDs

The following minimum configuration is required for the server to start:

- One microprocessor
- One 1 GB DIMM
- Power supply
- Power cord
- ServeRAID SAS/SATA adapter
- System board assembly

The following illustration shows the location of the power supply LEDs:



- 1** AC power LED
- 2** DC power LED
- 3** Fault LED
- 4** Fault LED
- 5** Power LED

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

Table 4. power supply LEDs

power supply LEDs			Description	Action	Notes
AC	DC	Error			
Off	Off	Off	No ac power to the server or a problem with the ac power source	<ol style="list-style-type: none"> 1. Check the ac power to the server. 2. Make sure that the power cord is connected to a functioning power source. 3. Turn the server off and then turn the server back on. 4. If the problem remains, replace the power supply. 	This is a normal condition when no ac power is present.
Off	Off	On	No ac power to the server or a problem with the ac power source and the power supply had detected an internal problem	<ol style="list-style-type: none"> 1. Replace the power supply. 2. Make sure that the power cord is connected to a functioning power source. 	This happens only when a second power supply is providing power to the server.
Off	On	Off	Faulty power supply	Replace the power supply.	
Off	On	On	Faulty power supply	Replace the power supply.	
On	Off	Off	Power supply not fully seated, faulty system board, or faulty power supply	<ol style="list-style-type: none"> 1. Reseat the power supply. 2. If the system board error (fault) LED is not lit, replace the power supply. 3. If the system board error (fault) LED is lit, (Trained service technician only) replace the system board. 	Typically indicates that a power supply is not fully seated.
On	Off or Flashing	On	Faulty power supply	Replace the power supply.	
On	On	Off	Normal operation		
On	On	On	Power supply is faulty but still operational	Replace the power supply.	

Diagnostic programs and messages

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

Make sure that the server has the latest version of the diagnostic programs. To download the latest version, complete the following steps.

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

1. Go to <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.

Utilities are available to reset and update the diagnostics code on the integrated USB flash device, if the diagnostic partition becomes damaged and does not start the diagnostic programs. For more information and to download the utilities, go to <http://www.lenovo.com/thinkserver>.

The DSA diagnostic programs collect information about the following aspects of the system:

- System configuration
- Network interfaces and settings
- Hardware inventory, including PCI and USB information
- Drive health information
- SAS/SATA RAID and controller configuration
- Event logs for ServeRAID controllers and service processors

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

- BroadCom Dual Gigabit Ethernet
- Optical drives
- Hard disk drives
- SAS/SATA RAID controller
- Integrated management module (IMM)
- Trusted Platform Module chip
- Memory
- Microprocessor

Running the diagnostic programs

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

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

Note: The DSA Preboot diagnostic program might appear to be unresponsive for an unusual length of time when you start the program. This is normal operation while the program loads.

4. Optionally, select **Quit to DSA** to exit from the stand-alone memory diagnostic program.

Note: After you exit from the stand-alone memory diagnostic environment, you must restart the server to access the stand-alone memory diagnostic environment again.

5. Select **gui** to display the graphical user interface, or select **cmd** to display the DSA interactive menu.
6. Follow the instructions on the screen to select the diagnostic test to run.

If the diagnostic programs do not detect any hardware errors but the problem remains during normal server 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 or LEDs indicate a microprocessor error, the error might be in a microprocessor or in a microprocessor socket. See “Microprocessor problems” on page 55 for information about diagnosing microprocessor problems.

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

For a list of diagnostic messages, see Chapter 4, “Diagnostics,” on page 17.

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

To view the test log when the tests are completed, type the **view** command in the DSA interactive menu, or select **Diagnostic Event Log** in the graphical user interface. To transfer DSA Preboot collections to an external USB device, type the **copy** command in the DSA interactive menu.

Diagnostic messages

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.

Table 5. DSA Preboot messages

Message number	Component	Test	State	Description	Action
089-801-xxx	CPU	CPU Stress Test	Aborted	Internal program error.	<ul style="list-style-type: none"> 1. Turn off and restart the system. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 3. Run the test again. 4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 5. Run the test again. 6. Turn off and restart the system if necessary to recover from a hung state. 7. Run the test again. 8. Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved: <ul style="list-style-type: none"> a. (Trained service technician only) Microprocessor board b. (Trained service technician only) Microprocessor 9. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
089-802-xxx	CPU	CPU Stress Test	Aborted	System resource availability error.	<ol style="list-style-type: none"> Turn off and restart the system. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. Run the test again. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For the latest level of firmware, go to http://www.lenovo.com/support and select your system to find available firmware. Run the test again. Turn off and restart the system if necessary to recover from a hung state. Run the test again. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again.
089-802-xxx	CPU	CPU Stress Test	Aborted	System resource availability error.	<ol style="list-style-type: none"> Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved: <ol style="list-style-type: none"> (Trained service technician only) Microprocessor board (Trained service technician only) Microprocessor If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
089-901-xxx	CPU	CPU Stress Test	Failed	Test failure.	<ul style="list-style-type: none"> 1. Turn off and restart the system if necessary to recover from a hung state. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 3. Run the test again. 4. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 5. Run the test again. 6. Turn off and restart the system if necessary to recover from a hung state. 7. Run the test again. 8. Replace the following components one at a time, in the order shown, and run this test again to determine whether the problem has been solved: <ul style="list-style-type: none"> a. (Trained service technician only) Microprocessor board b. (Trained service technician only) Microprocessor 9. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Message number	Component	Test	State	Description	Action
166-801-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the IMM returned an incorrect response length.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-802-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the test cannot be completed for an unknown reason.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-803-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the node is busy; try later.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-804-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: invalid command.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
Message number	Component	Test	State	Description	Action
166-805-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: invalid command for the given LUN.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-806-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: timeout while processing the command.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-807-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: out of space.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-808-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: reservation canceled or invalid reservation ID.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-809-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: request data was truncated.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-810-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: request data length is invalid.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-811-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: request data field length limit is exceeded.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-812-xxx	IMM	IMM I2C Test	Aborted	IMM I2C Test stopped a parameter is out of range.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-813-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: cannot return the number of requested data bytes.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-814-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: requested sensor, data, or record is not present.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-815-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: invalid data field in the request.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-816-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the command is illegal for the specified sensor or record type.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Message number	Component	Test	State	Description	Action
166-817-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: a command response could not be provided.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-818-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: cannot execute a duplicated request.	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-819-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: a command response could not be provided; the SDR repository is in update mode.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-820-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: a command response could not be provided; the device is in firmware update mode.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code and IMM firmware are at the latest level. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
166-821-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: a command response could not be provided; IMM initialization is in progress.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-822-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: the destination is unavailable.	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-823-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: cannot execute the command; insufficient privilege level.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
166-824-xxx	IMM	IMM I2C Test	Aborted	IMM I2C test stopped: cannot execute the command.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-901-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the H8 bus (Bus 0)	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. Remove power from the system. 8. (Trained service technician only) Replace the system board. 9. Reconnect the system to power and turn on the system. 10. Run the test again. 11. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
166-902-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the SAS backplane 1 (Bus 1).	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. Turn off the system and disconnect it from the power source. Reseat the SAS backplane. Reconnect the system to the power source and turn on the system. Run the test again. Turn off the system and disconnect it from the power source. (Trained service technician only) Replace the system board. Reconnect the system to the power source and turn on the system. Run the test again.
166-902-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the memory bus.	<ol style="list-style-type: none"> If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-903-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the DIMM bus (Bus 2).	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. Disconnect the system from the power source. 8. Replace the DIMMs one at a time, and run the test again after replacing each DIMM. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. Turn off the system and disconnect it from the power source. 12. Reseat all of the DIMMs. 13. Reconnect the system to the power source and turn on the system. 14. Run the test again. 15. Turn off the system and disconnect it from the power source. 16. (Trained service technician only) Replace the system board. 17. Reconnect the system to the power source and turn on the system. 18. Run the test again. 19. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
166-904-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the power supply bus (Bus 3).	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. Reseat the power supply. 8. Run the test again. 9. Turn off the system and disconnect it from the power source. 10. Trained service technician only) Replace the system board. 11. Reconnect the system to the power source and turn on the system. 12. Run the test again. 13. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Message number	Component	Test	State	Description	Action
166-905-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the SAS backplane 2 & sensor bus (Bus 4).	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. 2. After 45 seconds, reconnect the system to the power source and turn on the system. 3. Run the test again. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 6. Run the test again. 7. Turn off the system and disconnect it from the power source. 8. Reseat the hard disk drive backplane. 9. Reconnect the system to the power source and turn on the system. 10. Run the test again. 11. Turn off the system and disconnect it from the power source. 12. (Trained service technician only) Replace the system board. 13. Reconnect the system to the power source and turn on the system. 14. Run the test again. 15. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
166-906-xxx	IMM	IMM I2C Test	Failed	The IMM indicates a failure in the PCI bus (Bus 5).	<ol style="list-style-type: none"> Turn off the system and disconnect it from the power source. You must disconnect the system from ac power to reset the IMM. After 45 seconds, reconnect the system to the power source and turn on the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. Make sure that the IMM firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. Turn off the system and disconnect it from the power source. Trained service technician only) Replace the system board. Reconnect the system to the power source and turn on the system. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
201-801-xxx	Memory	Memory Test	Aborted	Test canceled: the system UEFI programmed the memory controller with an invalid CBAR address	<ol style="list-style-type: none"> Turn off and restart the system. Run the test again. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Message number	Component	Test	State	Description	Action
201-802-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. 2. Run the test again. 3. Make sure that all DIMMs are enabled in the Setup utility. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 5. Run the test again. 6. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
201-803-xxx	Memory	Memory Test	Aborted	Test canceled: could not enable the processor cache.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 4. Run the test again. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
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. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 4. Run the test again. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
201-805-xxx	Memory	Memory Test	Aborted	Test canceled: the memory controller display/alter write operation was not completed.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 4. Run the test again. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
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. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 4. Run the test again. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
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. 2. Run the test again. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 4. Run the test again. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
Message number	Component	Test	State	Description	Action
201-808-xxx	Memory	Memory Test	Aborted	Test canceled: memory controller display/alter buffer execute error.	<ol style="list-style-type: none"> Turn off and restart the system. Run the test again. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
201-809-xxx	Memory	Memory Test	Aborted	Test canceled program error: operation running fast scrub.	<ol style="list-style-type: none"> Turn off and restart the system. Run the test again. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
201-810-xxx	Memory	Memory Test	Aborted	Test stopped: unknown error code xxx received in COMMONEXIT procedure.	<ul style="list-style-type: none"> 1. Turn off and restart the system. 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.lenovo.com/support. 4. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 5. Run the test again. 6. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
201-901-xxx	Memory	Memory Test	Failed	Test failure: single-bit error, failing DIMM z.	<ul style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. 2. Reseat DIMM z. 3. Reconnect the system to power and turn on the system. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 6. Run the test again. 7. Replace the failing DIMMs. 8. Re-enable all memory in the Setup utility (see "Using the Setup Utility" on page 246). 9. Run the test again. 10. Replace the failing DIMM. 11. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, “Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530,” on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Message number	Component	Test	State	Description	Action
201-902-xxx	Memory	Memory Test	Failed	Test failure: single-bit and multi-bit error, failing DIMM z	<ol style="list-style-type: none"> 1. Turn off the system and disconnect it from the power source. 2. Reseat DIMM z. 3. Reconnect the system to power and turn on the system. 4. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 5. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 6. Run the test again. 7. Replace the failing DIMMs. 8. Re-enable all memory in the Setup utility see “Using the Setup Utility” on page 246). 9. Run the test again. 10. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
202-801-xxx	Memory	Memory Stress Test	Aborted	Internal program error.	<ol style="list-style-type: none"> 1. Turn off and restart the system. 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 3. Make sure that the server firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see “Updating the firmware” on page 258. 4. Run the test again. 5. Turn off and restart the system if necessary to recover from a hung state. 6. Run the memory diagnostics to identify the specific failing DIMM. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
202-802-xxx	Memory	Memory Stress Test	Failed	General error: memory size is insufficient to run the test.	<ol style="list-style-type: none"> 1. Make sure that all memory is enabled by checking the Available System Memory in the Resource Utilization section of the DSA event log. If necessary, enable all memory in the Setup utility (see "Using the Setup Utility" on page 246). 2. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 3. Run the test again. 4. Run the standard memory test to validate all memory. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
202-901-xxx	Memory	Memory Stress Test	Failed	Test failure.	<ol style="list-style-type: none"> 1. Run the standard memory test 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.lenovo.com/support. 3. Turn off the system and disconnect it from power. 4. Reseat the DIMMs. 5. Reconnect the system to power and turn on the system. 6. Run the test again. 7. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Message number	Component	Test	State	Description	Action
215-801-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/ Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Aborted	Unable to communicate with the device driver.	<ol style="list-style-type: none"> 1. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.lenovo.com/support. 6. Run the test again. 7. Make sure that the system firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. 8. Run the test again. 9. Replace the CD/DVD drive. 10. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
215-802-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/ Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Aborted	The media tray is open.	<ol style="list-style-type: none"> 1. Close the media tray and wait 15 seconds. 2. Run the test again. 3. Insert a new CD/DVD into the drive and wait for 15 seconds for the media to be recognized. 4. Run the test again. 5. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 6. Run the test again. 7. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 8. Run the test again. 9. For additional troubleshooting information, go to http://www.lenovo.com/support. 10. Run the test again. 11. Replace the CD/DVD drive. 12. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
215-803-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/ Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Failed	The disc might be in use by the system.	<ol style="list-style-type: none"> 1. Wait for the system activity to stop. 2. Run the test again 3. Turn off and restart the system. 4. Run the test again. 5. Replace the CD/DVD drive. 6. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). • If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. • Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
Message number	Component	Test	State	Description	Action
215-901-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/ Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Aborted	Drive media is not detected.	<ol style="list-style-type: none"> 1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.lenovo.com/support. 6. Run the test again. 7. Replace the CD/DVD drive. 8. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
215-902-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/ Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Failed	Read miscompare.	<ol style="list-style-type: none"> 1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.lenovo.com/support. 6. Run the test again. 7. Replace the CD/DVD drive. 8. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
215-903-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/ Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Aborted	Could not access the drive.	<ol style="list-style-type: none"> 1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. Make sure that the DSA code is at the latest level. For the latest level of DSA code, go to http://www.lenovo.com/support. 6. Run the test again. 7. For additional troubleshooting information, go to http://www.lenovo.com/support. 8. Run the test again. 9. Replace the CD/DVD drive. 10. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
215-904-xxx	Optical Drive	<ul style="list-style-type: none"> • Verify Media Installed • Read/ Write Test • Self-Test <p>Messages and actions apply to all three tests.</p>	Failed	A read error occurred.	<ol style="list-style-type: none"> 1. Insert a CD/DVD into the drive or try a new media, and wait for 15 seconds. 2. Run the test again. 3. Check the drive cabling at both ends for loose or broken connections or damage to the cable. Replace the cable if it is damaged. 4. Run the test again. 5. For additional troubleshooting information, go to http://www.lenovo.com/support. 6. Run the test again. 7. Replace the CD/DVD drive. 8. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (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 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU). If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician. Go to the Lenovo support Web site at http://www.lenovo.com/support to check for technical information, hints, tips, and new device drivers or to submit a request for information. 					
Message number	Component	Test	State	Description	Action
217-901-xxx	SAS/SATA Hard Drive	Disk Drive Test	Failed		<ol style="list-style-type: none"> Reseat all hard disk drive backplane connections at both ends. Reseat the all drives. Run the test again. Make sure that the firmware is at the latest level. Run the test again. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
405-901-xxx	Intel Ethernet Device	Test Control Registers	Failed		<ol style="list-style-type: none"> Make sure that the component firmware is at the latest level. The installed firmware level is shown in the DSA event log in the Firmware/VPD section for this component. For more information, see "Updating the firmware" on page 258. Run the test again. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
405-901-xxx	Intel Ethernet Device	Test MII Registers	Failed		<ul 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 more information, see "Updating the firmware" on page 258. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 4. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
405-902-xxx	Intel Ethernet Device	Test EEPROM	Failed		<ul 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 more information, see "Updating the firmware" on page 258. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 4. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Message number	Component	Test	State	Description	Action
405-903-xxx	Intel Ethernet Device	Test Internal Memory	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 more information, see "Updating the firmware" on page 258. 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 Setup utility see "Using the Setup Utility" on page 246) to assign a unique interrupt to the device. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
405-904-xxx	Intel Ethernet Device	Test Interrupt	Failed		<ul 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 more information, see "Updating the firmware" on page 258. 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 Setup utility see "Using the Setup Utility" on page 246) to assign a unique interrupt to the device. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See Chapter 7, "Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530," on page 201 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by "(Trained service technician only)," that step must be performed only by a Trained service technician.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
405-906-xxx	Intel Ethernet Device	Test Loop back at Physical Layer	Failed		<ul 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 more information, see "Updating the firmware" on page 258. 3. Run the test again. 4. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 5. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.
405-907-xxx	Intel Ethernet Device	Test Loop back at MAC-Layer	Failed		<ul 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 more information, see "Updating the firmware" on page 258. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 4. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Table 5. DSA Preboot messages (continued)

Message number	Component	Test	State	Description	Action
405-908-xxx	Intel Ethernet Device	Test LEDs	Failed		<ul 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 more information, see "Updating the firmware" on page 258. 2. Run the test again. 3. Replace the component that is causing the error. If the error is caused by an adapter, replace the adapter. Check the PCI Information and Network Settings information in the DSA event log to determine the physical location of the failing component. 4. If the failure remains, go to the Lenovo Web site for more troubleshooting information at http://www.lenovo.com/support.

Recovering the server firmware

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

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

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

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

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

To download the server firmware update package from the World Wide Web, go to <http://www.lenovo.com/support>.

The flash memory of the server consists of a primary bank and a backup bank. It is essential that you maintain the backup bank with a bootable firmware image. If the primary bank becomes corrupted, you can either manually boot the backup bank with the boot block jumper, or in the case of image corruption, this will occur automatically with the Automated Boot Recovery function.

In-band manual recovery method

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

1. Read the safety information (see “Important Safety Information” on page 1).
2. Turn off the server, and disconnect all power cords and external cables.
3. Unlock and remove the server cover (see “Removing the side cover” on page 130).
4. Locate the UEFI boot recovery jumper (JP6) on the system board (see “System-board switches and jumpers” on page 120.)
5. Move the jumper from pins 1 and 2 to pins 2 and 3 to enable the UEFI recovery mode.
6. Reinstall the server cover (see “Reinstalling the side cover” on page 193); then, reconnect all power cords.
7. Restart the server. The power-on self-test (POST) starts.
8. Boot the server to an operating system that is supported by the firmware update package that you downloaded.
9. Perform the firmware update by following the instructions that are in the firmware update package readme file.
10. Copy the downloaded firmware update package into a directory.
11. From a command line, type *filename-s*, where *filename* is the name of the executable file that you downloaded with the firmware update package.
12. Turn off the server and disconnect all power cords and external cables, and then remove the server cover.
13. Move the UEFI boot recovery jumper back to the primary position (pins 1 and 2).
14. Reinstall the server cover, and then reconnect all the power cables.
15. Restart the server.

See “System-board switches and jumpers” on page 120 for a description of the jumpers and switches.

In-band automated boot recovery method

Note: Use this method if the System board error LED is lit and there is a log entry or Booting Backup Image is displayed on the firmware splash screen; otherwise, use the in-band manual recovery method.

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

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

Automated boot recovery (ABR)

If the server is booting up and the IMM detects problems with the server firmware in the primary bank, it will automatically switch to the backup firmware bank and give you the opportunity to recover the primary bank. To recover to the server firmware primary bank, complete the following steps:

1. Restart the server.
2. When the prompt press F3 to restore to primary is displayed, press F3 to recover the primary bank. Pressing F3 will restart the server.

Three boot failure

Configuration changes, such as added devices or adapter firmware updates can cause the server to fail POST (power-on self-test). If this occurs on three consecutive boot attempts, the server will temporarily use the default configuration values and automatically goes to F1 Setup. To solve the problem, complete the following steps:

1. Undo any configuration changes that you made recently and restart the server.
2. Remove any devices that you added recently and restart the server.
3. If the problem remains, go to the Setup utility and select **Load Default Settings**, and then click **Save** to restore the server factory settings.

Solving SCSI problems

Note: This information also applies to Serial Attached SCSI (SAS) problems.

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

- A failing SCSI device (adapter, drive, or controller)
- An incorrect SCSI termination jumper setting
- A missing or incorrectly installed SCSI terminator
- A defective SCSI terminator
- An incorrectly installed cable
- A defective cable

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

1. Make sure that external SCSI devices are turned on before you turn on the server.
2. Make sure that the cables for all external SCSI devices are connected correctly.
3. If an external SCSI device is attached, make sure that the external SCSI termination is set to automatic.
4. Make sure that the last device in each SCSI chain is terminated correctly.
5. Make sure that the SCSI devices are configured correctly.

Solving power problems

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

1. Turn off the server and disconnect all ac power cords.
2. Check for loose cables in the power subsystem. Also check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.
3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimum configuration that is required for the server to start (see “Solving undetermined problems” on page 110 for the minimum configuration).
4. Reconnect all ac power cords and turn on the server. If the server starts successfully, replace the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimum configuration, replace the components in the minimum configuration one at a time until the problem is isolated.

Solving Ethernet controller problems

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

Try the following procedures:

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

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

Solving undetermined problems

If the diagnostic tests did not diagnose the failure or if the server is inoperative, use the information in this section.

If you suspect that a software problem is causing failures (continuous or intermittent), see “Software problems” on page 60.

Damaged data in CMOS memory or damaged server firmware can cause undetermined problems. To reset the CMOS data, use the clear CMOS jumper to clear the CMOS memory. If you suspect that the server firmware is damaged, see “Recovering the server firmware” on page 105.

Check the LEDs on all the power supplies. If the LEDs indicate that the power supplies are working correctly, complete the following steps:

1. Turn off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices, one at a time, until you find the failure. Turn on the server and reconfigure it each time.
 - Any external devices.
 - Surge-suppressor device (on the server).
 - Modem, printer, mouse, and non-Lenovo devices.
 - Each adapter.
 - Hard disk drives.
 - Memory modules. The minimum configuration requirement is two 1 GB DIMM on the system board.

The following minimum configuration is required for the server to start:

- One microprocessor
 - One 1 GB DIMM on the system board
 - One power supply
 - Power cord
 - ServeRAID SAS/SATA adapter
 - System board
4. Turn on the server. If the problem remains, suspect the following components in the following order:
 - a. Memory module
 - b. Microprocessor
 - c. System board

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

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

Problem determination tips

Because of the variety of hardware and software combinations that you can encounter, use the following information to assist you in problem determination. If possible, have this information available when you request assistance from Lenovo.

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

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

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

Chapter 5. Locating Server Controls and connectors

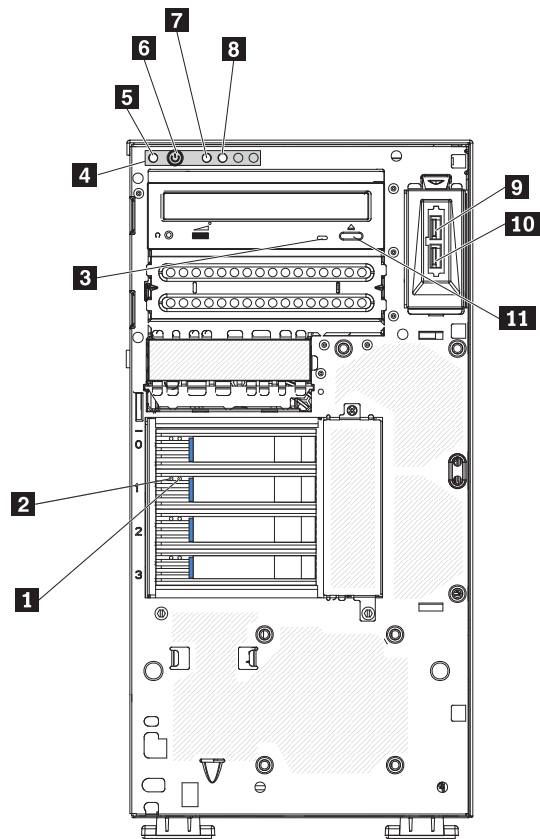
This section describes the controls, light-emitting diodes (LEDs), and connectors on the front and rear of the server, and how to turn the server on and off. For the location of the LEDs on the system board, see “System-board LEDs” on page 121.

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

Front view

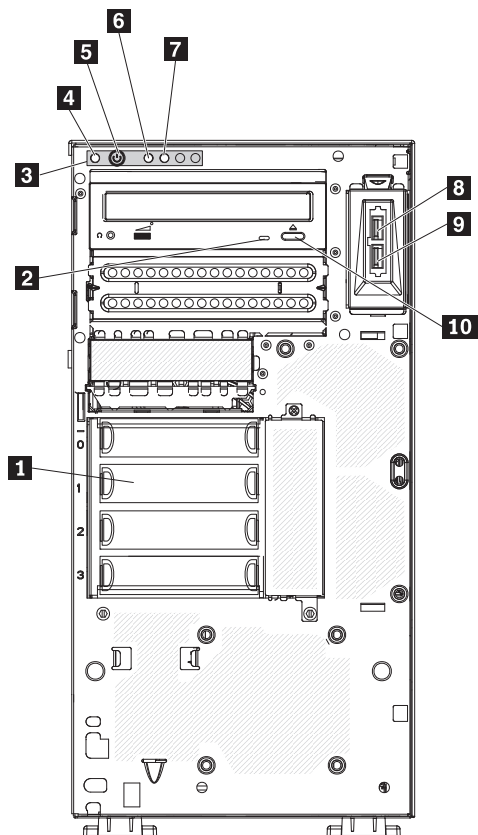
The following illustrations show the controls, LEDs, and connectors on the front of the server models.

The following is an illustration of the 3.5-inch SAS/SATA hot-swap hard disk drive model:



- | | | | |
|----------|--------------------------------------|-----------|------------------------------|
| 1 | Hard disk drive activity LED (green) | 7 | Hard disk drive activity LED |
| 2 | Hard disk drive status LED (amber) | 8 | System error LED |
| 3 | DVD drive activity LED (green) | 9 | USB 2 |
| 4 | Front information panel | 10 | USB 1 |
| 5 | Power-on LED | 11 | DVD-eject button |
| 6 | Power-control button | | |

The following is an illustration of the 3.5-inch SATA simple-swap hard disk drive model:



1	Simple-swap hard disk drive	6	Hard disk drive activity LED
2	DVD drive activity LED (green)	7	System error LED
3	Front information panel	8	USB 2
4	Power-on LED	9	USB 1
5	Power-control button	10	DVD-eject button

DVD drive activity LED: When this LED is lit, it indicates that the DVD drive is in use.

System-power LED: When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed. A system-power LED is also on the rear of the server.

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

- **Off:** AC power is not present, or the power supply or the LED itself has failed.
- **Flashing rapidly (4 times per second):** The server is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 1 to 3 minutes.
- **Flashing slowly (once per second):** The server is turned off and is ready to be turned on. You can press the power-control button to turn on the server.
- **Lit:** The server is turned on.
- **Fading on and off:** The server is in a reduced-power state. To wake the server, press the power-control button or use the IMM Web interface. See “Logging on to the Web interface” on page 265 for information on logging on to the IMM Web interface.

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

System-locator LED: Use this LED to visually locate the server among other servers.

System-information LED: When this LED is lit, it indicates that a noncritical event has occurred.

System-error LED: When this LED is lit, it indicates that a system error has occurred.

USB 1 and 2 connectors: Connect USB devices to these connectors.

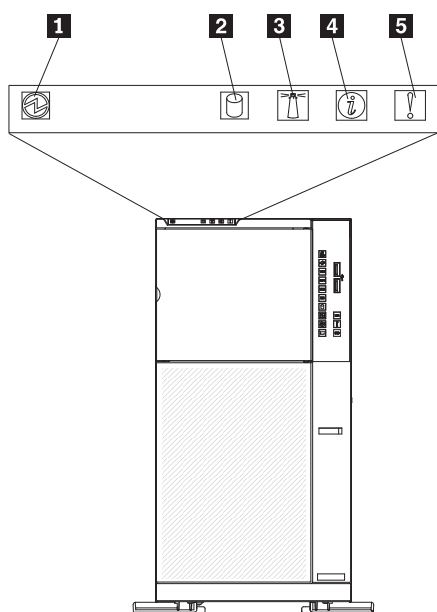
DVD-eject button: Press this button to release a CD or DVD from the DVD drive.

Hard-disk drive status LED: On some server models, each hot-swap hard disk drive has a status LED. When this LED is lit, it indicates that the drive has failed. If an optional RAID controller is installed in the server, when this LED is flashing slowly (one flash per second), it indicates that the drive is being rebuilt. When the LED is flashing rapidly (three flashes per second), it indicates that the controller is identifying the drive.

Hard-disk drive activity LED: When this LED is flashing, it indicates that the drive is in use.

Operator information panel

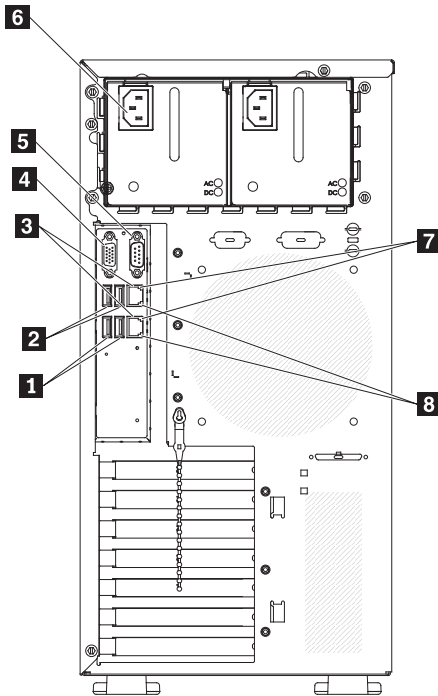
The following illustration shows the LEDs on the operator information panel on the front of the server.



- 1** System power on LED
- 2** Hard disk drive activity LED
- 3** System locator LED
- 4** System information LED
- 5** System error LED

Rear view

The following illustration shows the connectors and LEDs on the rear of the server.



- | | | | |
|----------|---------------------|----------|--|
| 1 | USB 3 and 4 | 5 | Serial (Com1) |
| 2 | USB 1 and 2 | 6 | Power cord connector |
| 3 | Ethernet connectors | 7 | Ethernet transmit/receive activity LED (amber) |
| 4 | Video connector | 8 | Ethernet link status LED (green) |

USB 1-4 connectors: Connect a USB device, such as USB mouse or keyboard, to any of these connectors.

Ethernet 10/100/1000 connector: Use these connectors to connect the server to a network.

Power-cord connector: Connect the power cord to this connector.

Power-error LED: When the power-error LED is lit, it indicates that the power supply has failed.

dc-power LED: Each hot-swap power supply has a dc-power LED and an ac-power LED. When the dc-power LED is lit, it indicates that the power supply is supplying adequate dc power to the system. During typical operation, both the ac and dc-power LEDs are lit. For any other combination of LEDs, see “power supply LEDs” on page 64.

ac-power LED: Each hot-swap power supply has an ac-power LED and a dc-power LED. When the ac-power LED is lit, it indicates that sufficient power is coming into the power supply through the power cord. During typical operation, both the ac and dc-power LEDs are lit. For any other combination of LEDs, see “power supply LEDs” on page 64.

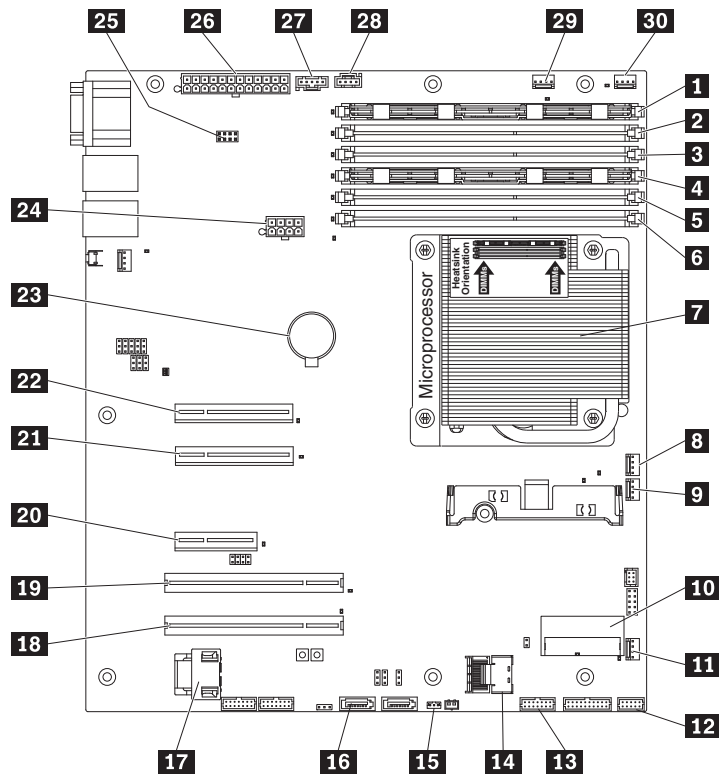
Video connector: Connect a monitor to this connector.

Serial 1 connector (COMM 1): Connect a 9-pin serial device to this connector. The serial port is shared with the integrated management module (IMM). The IMM can take control of the shared serial port to perform text console redirection and to redirect serial traffic, using Serial over LAN (SOL).

Ethernet connectors: Use either of these connectors to connect the server to a network. When you use the Ethernet 1 connector, the network can be shared with the IMM through a single network cable.

System-board internal connectors

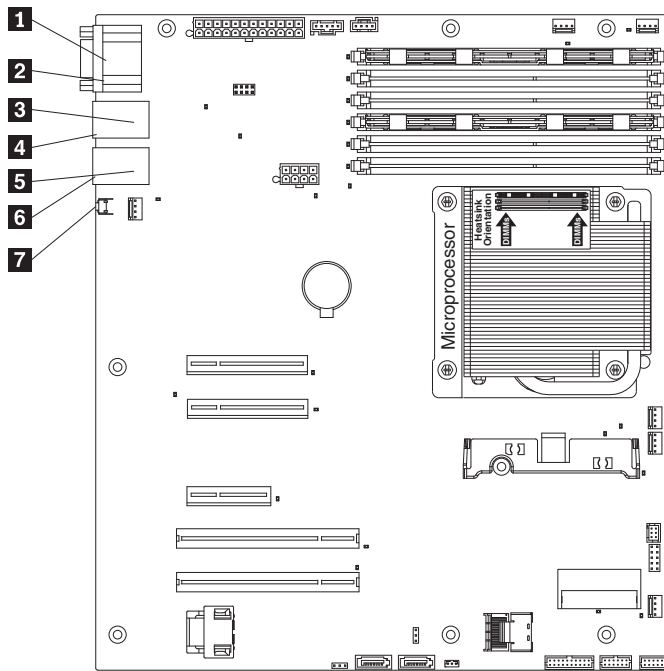
The following illustrations show the internal connectors and switches on the system board.



- | | | |
|-------------------------------------|---|---------------------------------------|
| 1 DIMM 1 | 11 Fan 1 connector | 21 Slot 2: PCIe2 x8, 25w |
| 2 DIMM 2 | 12 Hard disk backplane configuration connector | 22 Slot 1: PCIe2 x8, 25w |
| 3 DIMM 3 | 13 Operator information panel connector | 23 Battery |
| 4 DIMM 4 | 14 Simple-swap HDD backplane signal connector | 24 Power 2 connector |
| 5 DIMM 5 | 15 Wake-on-LAN connector | 25 Virtual media key connector |
| 6 DIMM 6 | 16 Optical drive connector | 26 Power 1 connector |
| 7 Microprocessor | 17 Hypervisor flash device connector | 27 Power 3 connector |
| 8 Fan 3 connector | 18 Slot 5: PCI 32-bit, 33 MHz | 28 Power 4 connector |
| 9 Fan 2 connector | 19 Slot 4: PCI 32-bit, 33 MHz | 29 Not used |
| 10 RAID controller connector | 20 Slot 3: PCIe2 x1, 10w | 30 Not used |

System-board external connectors

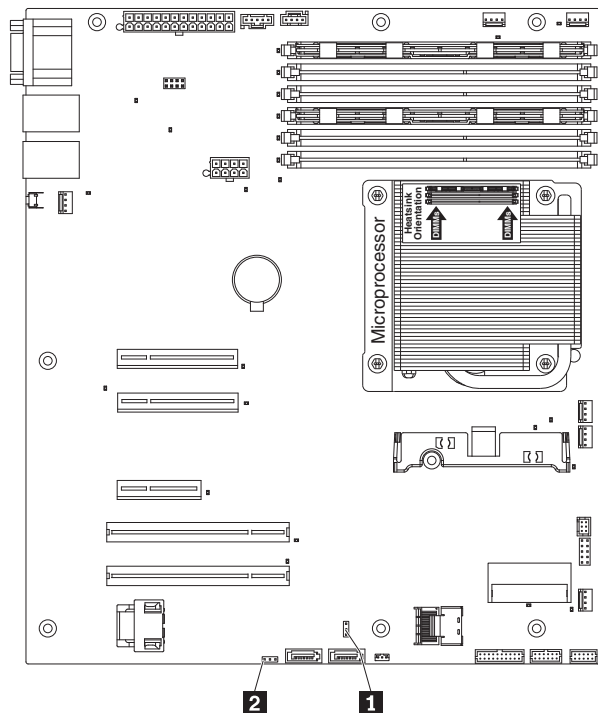
The following illustration shows the external input/output connectors and the NMI button on the system board.



- | | | | |
|----------|--------------------------|----------|------------------------|
| 1 | Serial (com 1) connector | 5 | Ethernet connector 2 |
| 2 | Video connector | 6 | USB connectors 3 and 4 |
| 3 | Ethernet connector 1 | 7 | SW1 (NMI button) |
| 4 | USB connectors 1 and 2 | | |

System-board switches and jumpers

The following illustration shows the switches and jumpers on the system board.



The following table describes the jumpers on the system board.

Table 6. System board jumpers

Jumper number	Jumper name	Jumper setting
JP1	Clear CMOS jumper 1	<ul style="list-style-type: none"> • Pins 1 and 2: Keep CMOS data (default). • Pins 2 and 3: Clear CMOS data (including power-on password and administrator password)
JP6	Boot block jumper 2	<ul style="list-style-type: none"> • Pins 1 and 2: Boot from primary BIOS page (default) . • Pins 2 and 3: Boot from backup BIOS page.

Notes:

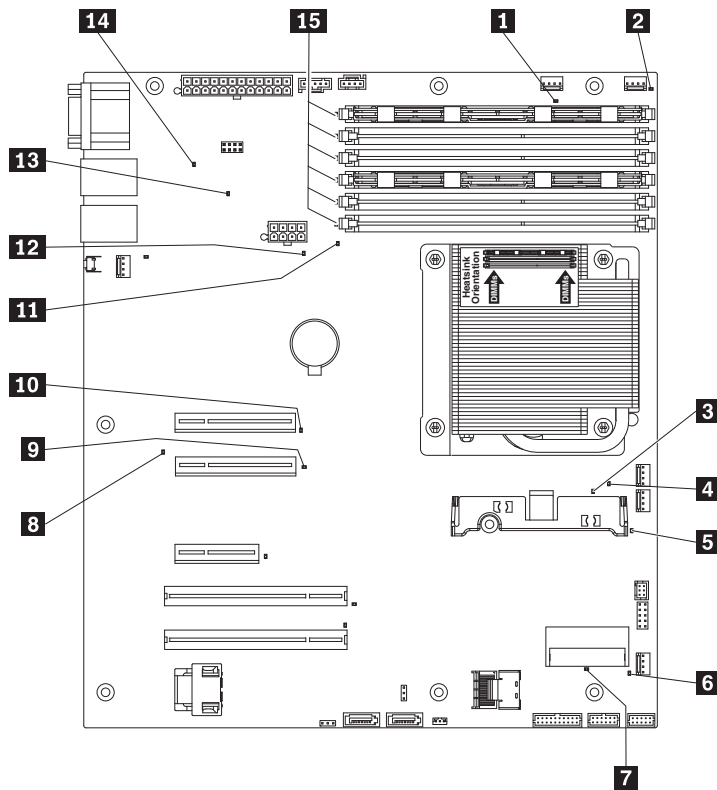
1. If no jumper is present, the server responds as if the pins are set to 1 and 2.
2. Changing the position of the UEFI boot recovery jumper from pins 1 and 2 to pins 2 and 3 before the server is turned on alters which flash ROM page is loaded. Do not change the jumper pin position after the server is turned on. This can cause an unpredictable problem.

Important:

1. Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the information in “Handling static-sensitive devices” on page 129 and “Turning off the server” on page 125.
2. Any system-board switch or jumper blocks that are not shown in the illustrations in this document are reserved.

System-board LEDs

The following illustration shows the LEDs on the system board.



- | | | | |
|----------|-------------------------|-----------|------------------------------|
| 1 | Fan 5 error LED | 9 | PCI Express slot 2 error LED |
| 2 | Fan 4 error LED | 10 | PCI Express slot 1 error LED |
| 3 | H8 Heartbeat LED | 11 | Microprocessor error LED |
| 4 | Fan 3 error LED | 12 | Battery error LED |
| 5 | Fan 2 error LED | 13 | Standby power LED |
| 6 | Fan 1 error LED | 14 | System board error LED |
| 7 | SAS/SATA Controller LED | 15 | DIMM 1-6 error LEDs |
| 8 | IMM heart beat LED | | |

Table 7. System-board LEDs

LED	Description
Error LEDs	When one of these LEDs is lit, it indicates that the associated component has failed.
Baseboard management controller heartbeat LED	This LED flashes to indicate that the IMM is functioning normally.
Standby power LED	When this LED is lit, it indicates that the server is connected to ac power.

The following table describes the LEDs on the system board and extender card and suggested actions to correct the detected problems.

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

System error or information LED lit	Description	Action
DIMM 1 to DIMM 16 error LEDs	A DIMM has failed or is incorrectly installed.	<ol style="list-style-type: none"> 1. Remove the DIMM that is indicated by a lit error LED. 2. Reseat the DIMM. 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. DIMM b. (Trained service technician only) System board
CPU 1 error LED	<p>Microprocessor 1 has failed, is missing, or has been incorrectly installed.</p> <p>Note: (Trained service technician only) Make sure that the microprocessors are installed in the correct sequence; see the procedures for removing and installing a microprocessor in the <i>Hardware Maintenance Manual</i>.</p>	<ol style="list-style-type: none"> 1. Check the system-event log to determine the reason for the lit LED. 2. (Trained service technician) Reseat the failing microprocessor. 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. (Trained service technician only) Failing microprocessor b. (Trained service technician only) System board
CPU 2 error LED	<p>Microprocessor 2 has failed, is missing, or has been incorrectly installed.</p> <p>Note: (Trained service technician only) Make sure that the microprocessors are installed in the correct sequence; see the procedures for removing and installing a microprocessor in the <i>Hardware Maintenance Manual</i>.</p>	<ol style="list-style-type: none"> 1. Check the system-event log to determine the reason for the lit LED. 2. Find the failing, missing, or mismatched microprocessor by checking the LEDs on the system board. 3. (Trained service technician) Reseat the failing microprocessor. 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. (Trained service technician only) Failing microprocessor b. (Trained service technician only) System board
CPU mismatch LED	<p>A mismatched microprocessor has been installed.</p> <p>Note: All microprocessors must have the same speed and cache size.</p>	<ol style="list-style-type: none"> 1. Run the Setup Utility and view the microprocessor information to compare the installed microprocessor specifications. 2. (Trained service technician only) Remove and replace one of the microprocessors so that they both match.

<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 the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRUs) and which components are field replaceable units (FRUs). • If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician. 		
System error or information LED lit	Description	Action
VRM failure LED	Microprocessor 2 VRM has failed or is incorrectly installed.	<ol style="list-style-type: none"> 1. Reseat the VRM 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. VRM b. (Trained service technician only) System board 3. Replace the VRM
System-board error LED	System-board CPU VRD, power voltage regulators, or both have failed.	(Trained service technician only) Replace the system board.
Battery failure LED	Battery low.	<ol style="list-style-type: none"> 1. Replace the CMOS lithium battery, if necessary. 2. (Trained service technician only) Replace the system board.
IMM heartbeat LED	<p>Indicates the status of the boot process of the IMM.</p> <p>When the server is connected to power this LED flashes quickly to indicate that the IMM code is loading. When the loading is complete, the LED stops flashing briefly and then flashes slowly to indicate that the IMM is fully operational and you can press the power-control button to start the server.</p>	<p>If the LED does not begin flashing within 30 seconds of when the server is connected to power, do the following:</p> <ol style="list-style-type: none"> 1. (Trained service technician only) Use the IMM recovery switch to recover the firmware (see “System-board switches and jumpers” on page 120). 2. (Trained service technician only) Replace the system board.
PCI slot 1 to PCI slot 8 error LEDs	An error has occurred on a PCI bus or on the system board. An additional LED is lit next to a failing PCI slot.	<ol style="list-style-type: none"> 1. Check the system-event log for information about the error. 2. If you cannot isolate the failing adapter through the LEDs and the information in the system-event log, remove one adapter at a time, and restart the server after each adapter is removed. 3. If the failure remains, call Lenovo Service and Support for additional troubleshooting information.
H8 heartbeat LED	Indicates the status of power-on and power-off sequencing.	<ol style="list-style-type: none"> 1. If the H8 heartbeat LED is blinking at a 1 Hz rate, no action is necessary. 2. (Trained service technician only) If the H8 heartbeat LED is not blinking, replace the system board.

Server power features

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

Turning on the server

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

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

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

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

Turning off the server

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

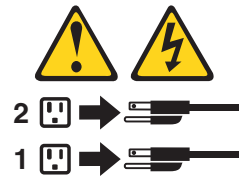
Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

Statement 5:



CAUTION:

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



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

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

Chapter 6. Replacing FRUs

This chapter provides detailed instructions for replacing FRUs in the server.

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 a Lenovo product that you are working on. Each Lenovo 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-Lenovo alterations or attachment of non-Lenovo features or options that are not addressed in this section. If you identify an unsafe condition, you must determine how serious the hazard is and whether you must correct the problem before you work on the product.

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

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

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

1. Make sure that the power is off and the power cord is disconnected.
2. Make sure that the exterior cover is not damaged, loose, or broken, and observe any sharp edges.
3. Check the power cord:
 - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
 - Make sure that the power cord is the correct type.
 - Make sure that the insulation is not frayed or worn.
4. Remove the cover.
5. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
6. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Guidelines for servicing electrical equipment

Observe the following guidelines when servicing electrical equipment:

- Check the area for electrical hazards such as moist floors, nongrounded power extension cords, power surges, and missing safety grounds.
- Use only approved tools and test equipment. Some hand tools have handles that are covered with a soft material that does not provide insulation from live electrical currents.

- Regularly inspect and maintain your electrical hand tools for safe operational condition. Do not use worn or broken tools or testers.
- Do not touch the reflective surface of a dental mirror to a live electrical circuit. The surface is conductive and can cause personal injury or equipment damage if it touches a live electrical circuit.
- Some rubber floor mats contain small conductive fibers to decrease electrostatic discharge. Do not use this type of mat to protect yourself from electrical shock.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Locate the emergency power-off (EPO) switch, disconnecting switch, or electrical outlet so that you can turn off the power quickly in the event of an electrical accident.
- Disconnect all power before you perform a mechanical inspection, work near power supplies, or remove or install main units.
- Before you work on the equipment, disconnect the power cord. If you cannot disconnect the power cord, have the customer power-off the wall box that supplies power to the equipment and lock the wall box in the off position.
- Never assume that power has been disconnected from a circuit. Check it to make sure that it has been disconnected.
- If you have to work on equipment that has exposed electrical circuits, observe the following precautions:
 - Make sure that another person who is familiar with the power-off controls is near you and is available to turn off the power if necessary.
 - When you are working with powered-on electrical equipment, use only one hand. Keep the other hand in your pocket or behind your back to avoid creating a complete circuit that could cause an electrical shock.
 - When you use a tester, set the controls correctly and use the approved probe leads and accessories for that tester.
 - Stand on a suitable rubber mat to insulate you from grounds such as metal floor strips and equipment frames.
- Use extreme care when you measure high voltages.
- To ensure proper grounding of components such as power supplies, pumps, blowers, fans, and motor generators, do not service these components outside of their normal operating locations.
- If an electrical accident occurs, use caution, turn off the power, and send another person to get medical aid.

Working inside the server with the power on

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

You might have to have the server turned on while the cover is off, to look at LEDs or replace hot swap components. Follow these guidelines when you work inside a server that is turned on:

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before you work inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.
- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that might fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

Handling static-sensitive devices

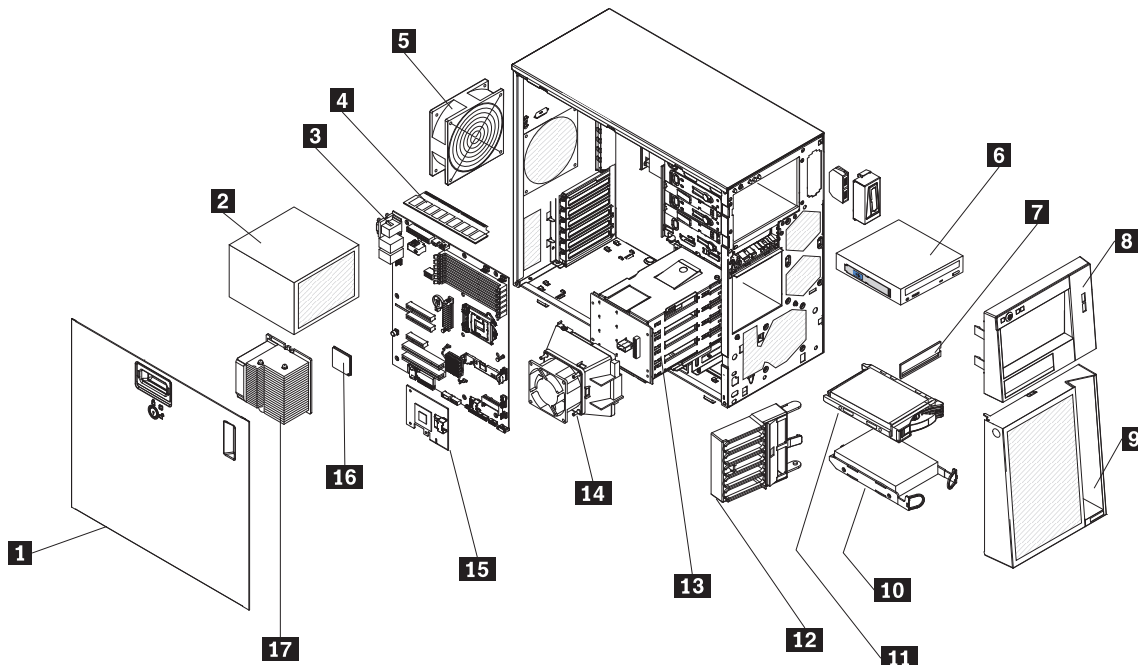
Attention: Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Server components

The following illustration shows the major components in the server.



- 1** Cover
- 2** Non-hot-swap power supply
- 3** System board
- 4** DIMM
- 5** Rear system fan
- 6** Optical drive

- 10** SATA hard disk drive (some models)
- 11** Hot-swap hard disk drive (some models)
- 12** Front adapter-support bracket
- 13** Drive cage
- 14** Hard disk drive fan assembly
- 15** SAS/SATA connector

- 7** Filler panels
- 8** Upper bezel
- 9** Lower bezel

- 16** Microprocessor
- 17** Heat sink

Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

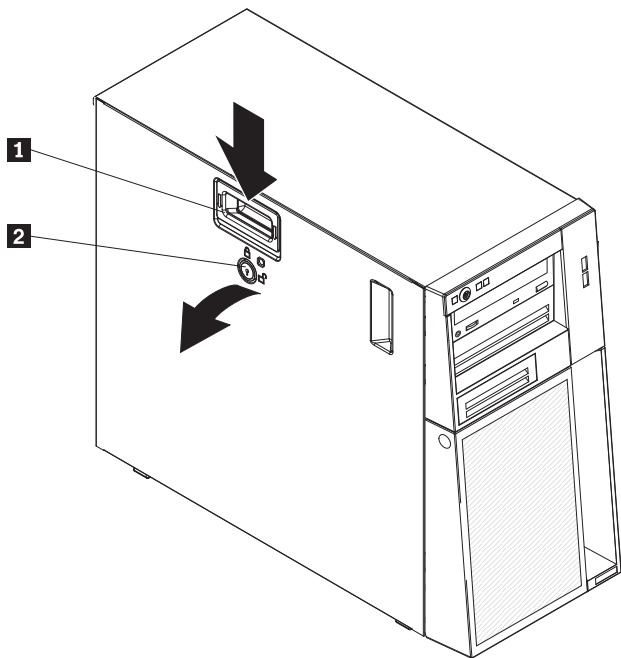
Removing the side cover

Important: Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed. If the server is not working correctly, see the *Hardware Maintenance Manual* for diagnostic information.

To remove the server side cover, complete the following steps.

Attention: Operating the server for more than 30 minutes with the side cover removed might damage server components. For proper cooling and airflow, replace the side cover before turning on the server.

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices (see “Turning off the server” on page 125); then, disconnect all power cords and external cables.
3. Unlock the side cover **2**; then, press the cover-release latch down **1**; then, remove the cover and set it aside.



To replace the side cover, see “Installing the side cover” on page 131.

Attention: For proper cooling and airflow, replace the cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover removed might damage server components.

Installing the side cover

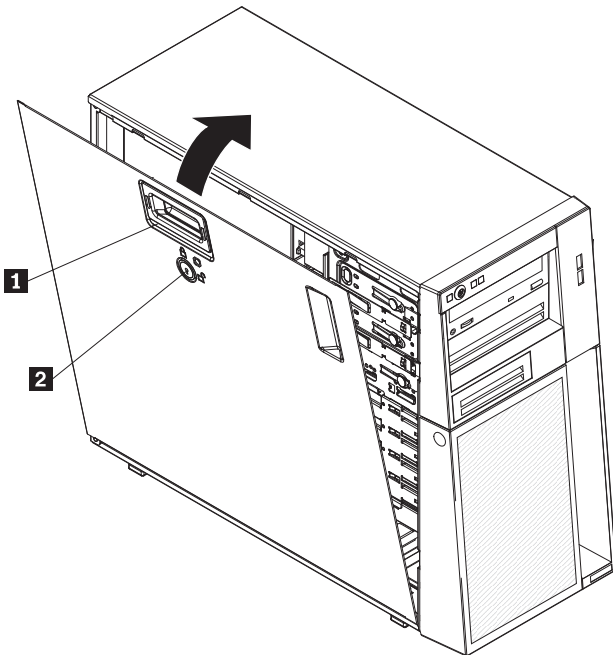
Attention: For proper cooling and airflow, replace the side cover before turning on the server. Operating the server for extended periods of time (more than 30 minutes) with the side cover removed might damage server components.

To install the side cover, complete the following steps:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.
2. If you removed the upper and lower bezels, reinstall them before you replace the side cover (see “Installing the upper bezel” on page 134 and “Installing the lower bezel” on page 133).

Important: The cover lock must be in the unlocked (opened) position before you install the side cover.

3. Position the lip on the bottom edge of the side cover on the ledge on the bottom of the chassis; then, rotate the cover up to the chassis. Press down on the cover release latch and push the cover completely closed until it latches securely into place.



4. Lock the side cover.
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing the two-piece bezel

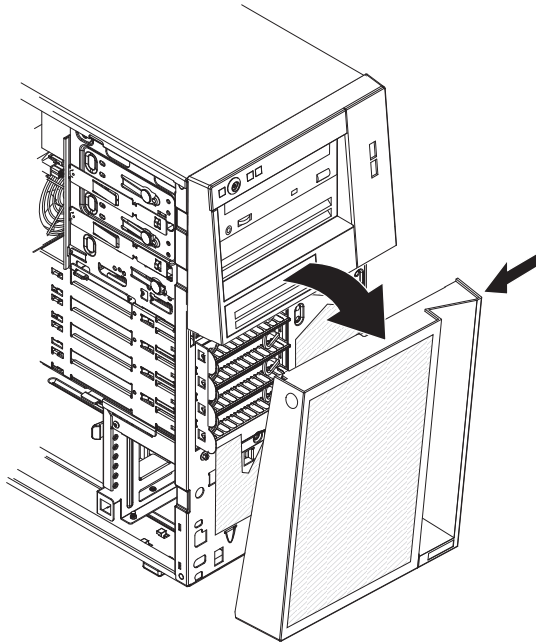
When you work with some devices, such as drives in bays 1 through 7 (see page 140), you must first remove the two-piece bezel to access the devices.

Note:

- Before you remove the upper bezel, you must unlock and remove the side cover and remove the lower bezel.
- If you are removing only the lower bezel, you do not have to remove the side cover. However, the side cover must be unlocked.

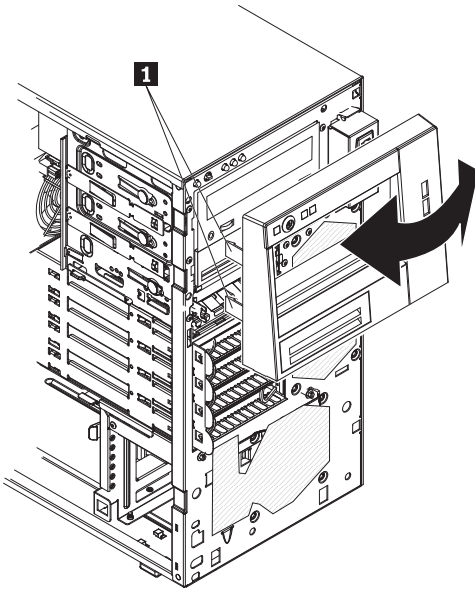
To remove the two-piece bezel, complete the following steps:

1. Read the safety information that begins on page 1.
2. Unlock the side cover.
3. Remove the side cover (see “Removing the side cover” on page 130).
4. Press the round blue release button on the right side of the lower bezel and tilt the lower bezel forward to disengage it from the chassis.



5. Lift the lower bezel to disengage the two bottom tabs from the chassis. Set the lower bezel aside.

6. Carefully pull the two bezel clips **1** on the left side of the upper bezel away from the chassis; then, rotate the upper bezel to the right side of the server to disengage the two right-side tabs from the chassis. Set the upper bezel aside.

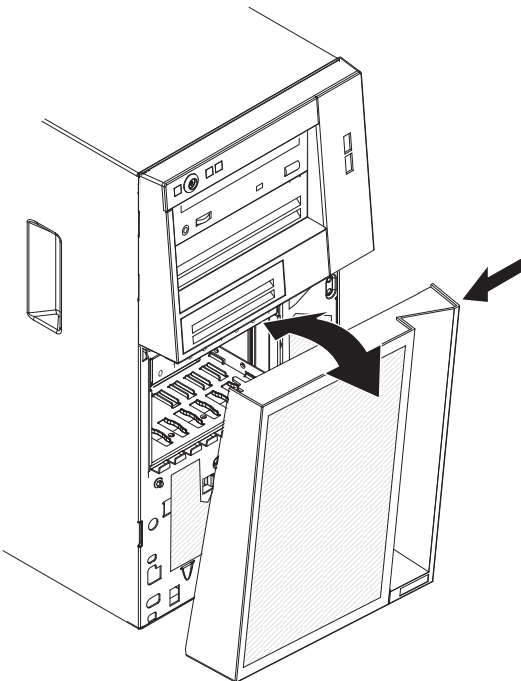


For instructions for replacing the two-piece bezel, see “Installing the lower bezel” and “Installing the upper bezel” on page 134.

Installing the lower bezel

To install the lower bezel, complete the following steps:

1. Insert the two bottom tabs on the lower bezel into the corresponding holes in the front of the chassis.



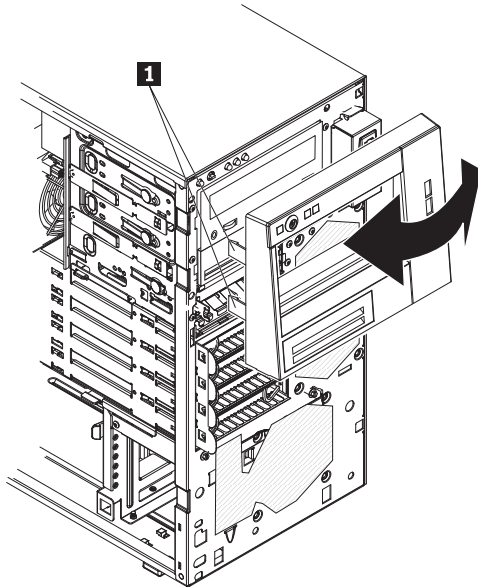
2. Rotate the top of the lower bezel up to the chassis; then, press the blue release tab on the right side of the lower bezel and completely close the lower bezel until it locks securely into place.

3. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Installing the upper bezel

To install the upper bezel, complete the following steps:

1. Insert the two tabs on the right-side of the upper bezel into the corresponding holes on the right side of the chassis.



2. Rotate the upper bezel to the left side of the chassis until the bezel clips are aligned with the corresponding indentations on the left side of the chassis and it snaps into place.
3. Install the lower bezel (see “Installing the lower bezel” on page 133).
4. Install the side cover (see “Installing the side cover” on page 131).
5. Lock the side cover.
6. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Replacing a memory module

Use the following procedures to replace a memory module.

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when you install DIMMs (see “System-board internal connectors” on page 118 for the location of the DIMM connectors):

- The server supports industry-standard, 1066 or 1333 MHz, PC3-10600R-999 (single-rank or dual-rank) double-data-rate 3 (DDR3), registered, synchronous dynamic random-access memory (SDRAM) dual inline memory modules (DIMMs) with error correcting code (ECC). See <http://www.lenovo.com/thinkserver> and click the **Options** tab for a list of supported memory modules for the server.
- The maximum amount of memory that the server supports is dependent on the type of memory that you install in the server. See “Unbuffered DIMMs (UDIMMs)” on page 135 and “Registered DIMMs (RDIMMs)” on page 136 for more information.
- The amount of usable memory is reduced, depending on the system configuration. A certain amount of memory must be reserved for system resources. To view the total amount of installed memory and the amount of configured memory, run the Setup utility. For additional information, see “Using the Setup Utility” on page 246.

- The maximum operating speed of the server is determined by the slowest DIMM in the server.
- If you install a pair of DIMMs in DIMM connectors 2 and 5, the size and speed of the DIMMs that you install in DIMM connectors 2 and 5 must match each other. However, they do not have to be the same size and speed as the DIMMs that are installed in DIMM connectors 1 and 4.
- You can use compatible DIMMs from various manufacturers in the same pair.
- When you install or remove DIMMs, the server configuration information changes. When you restart the server, the system displays a message that indicates that the memory configuration has changed.
- The specifications of a DDR3 DIMM are on a label on the DIMM, in the following format.

ggg eRxff-PC3-wwwwwm-aa-bb-cc

where:

ggg is the total capacity of the DIMM (for example, 1GB, 2GB, or 4GB)

e is the number of ranks

1 = single-rank

2 = dual-rank

4 = quad-rank

ff is the device organization (bit width)

4 = x4 organization (4 DQ lines per SDRAM)

8 = x8 organization

16 = x16 organization

wwwww is the DIMM bandwidth, in MBps

8500 = 8.53 GBps (PC3-1066 SDRAMs, 8-byte primary data bus)

10600 = 10.66 GBps (PC3-1333 SDRAMs, 8-byte primary data bus)

m is the DIMM type

E = Unbuffered DIMM (UDIMM) with ECC (x72-bit module data bus)

R = Registered DIMM (RDIMM)

U = Unbuffered DIMM with no ECC (x64-bit primary data bus)

aa is the CAS latency, in clocks at maximum operating frequency

bb is the JEDEC SPD Revision Encoding and Additions level

cc is the reference design file for the design of the DIMM

d is the revision number of the reference design of the DIMM

Note: To determine the type of a DIMM, see the label on the DIMM. The information on the label is in the format *xxxxx nRxxx PC3-xxxxx-xx-xx-xxx*. The numeral in the sixth numerical position indicates whether the DIMM is single-rank (*n*=1) or dual-rank (*n*=2).

The following sections provide additional information specific to unbuffered and registered DIMMs that you must consider.

Unbuffered DIMMs (UDIMMs)

The following notes provide information that you must configure when you install UDIMMs:

- The memory channels run at the fastest common frequency of the installed DIMMs.
- Do not use both UDIMMs and RDIMMs in the same server.
- Using ECC and non-ECC UDIMMs in the server will cause the server to run in non-ECC mode.
- The UDIMM options that are available for the server are 1 GB, 2 GB, and 4 GB (when available) memory DIMMs.
- You can install a maximum of 16 GB of memory in some server models when you use UDIMMs.
- The server supports up to two single-rank or dual-rank UDIMMs per channel.

- DIMM slots 3 and 6 are not supported when you install UDIMMs in the server. Do not install DIMMs in these connectors.
- The following table lists the supported UDIMM population.

Table 8. Supported UDIMM population per channel

DIMMs slots per channel	DIMMs installed in each channel	DIMM type	DIMM speed	Ranks per DIMM (any combination)
2	1	Unbuffered DDR3 ECC	1066, 1333	single-rank, dual-rank
2	2	Unbuffered DDR3 ECC	1066, 1333	single-rank, dual-rank

- The following table lists the maximum DIMM population using ranked UDIMM.

Table 9. Maximum memory population using ranked UDIMMs (depending on your model)

Number of UDIMMs	DIMM type	DIMM size	Total memory
4	single-rank UDIMMs	1 GB	4 GB
4	single-rank UDIMMs	2 GB	8 GB
4	dual-rank UDIMMs	2 GB	8 GB
4	dual-rank UDIMMs	4 GB (when available)	16 GB

- The following table lists the UDIMM memory population rule to optimize the system performance.

Table 10. UDIMMs population rule for dual-channel symmetric mode

DIMMs connector 1	DIMMs connector 2	DIMMs connector 3	DIMMs connector 4	DIMMs connector 5	DIMMs connector 6
populated	empty	empty	empty	empty	empty
populated	empty	empty	populated	empty	empty
populated	populated	empty	populated	populated	empty

Registered DIMMs (RDIMMs)

The following notes provide information that you must consider when you install RDIMMs (see “System-board internal connectors” on page 118 for the location of the DIMM connectors):

- The memory channels run at the fastest common frequency of the installed DIMMs.
- Do not use both RDIMMs and UDIMMs in the same server.
- The server supports up to three single-rank, dual-rank, or quad-rank RDIMMs per channel.
- The RDIMM options that are available for the server are 1 GB, 2 GB, 4 GB, and 8 GB (when available) memory DIMMs.
- You can install a maximum of 32 GB of memory in the server when you use RDIMMs.
- The following table lists the supported RDIMM population.

Table 11. Supported RDIMM population per channel

DIMMs slots per channel	DIMMs installed in each channel	DIMM type	DIMM speed	Ranks per DIMM (any combination)
3	1	Registered DDR3 ECC	1066, 1333	single-rank, dual-rank
3	2	Registered DDR3 ECC	1066, 1333	single-rank, dual-rank

Table 11. Supported RDIMM population per channel (continued)

DIMMs slots per channel	DIMMs installed in each channel	DIMM type	DIMM speed	Ranks per DIMM (any combination)
3	3	Registered DDR3 ECC	800	single-rank, dual-rank
3	1	Registered DDR3 ECC	1066	quad-rank
3	2	Registered DDR3 ECC	800	quad-rank

- The following table lists the maximum DIMM population using ranked RDIMM.

Table 12. Maximum memory population using ranked RDIMMs (depending on your model)

Number of RDIMMs	DIMM type	DIMM size	Total memory
6	single-rank RDIMMs	1 GB	6 GB
6	single-rank RDIMMs	2 GB	12 GB
6	dual-rank RDIMMs	2 GB	12 GB
4	dual-rank RDIMMs	4 GB	16 GB
4	quad-rank RDIMMs	4 GB	16 GB
6	dual-rank RDIMMs	4 GB	24 GB
4	quad-rank RDIMMs	8 GB (when available)	32 GB

- The following table lists the RDIMM memory population rule to optimize the system performance.

Table 13. RDIMMs population rule for dual-channel symmetric mode

DIMMs connector 1	DIMMs connector 2	DIMMs connector 3	DIMMs connector 4	DIMMs connector 5	DIMMs connector 6
populated	empty	empty	empty	empty	empty
populated	empty	empty	populated	empty	empty
populated	populated	empty	populated	populated	empty
populated	populated	populated	populated	populated	populated

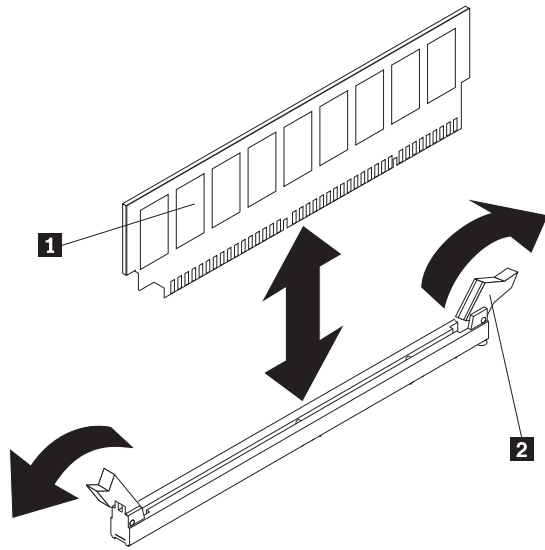
Removing a memory module

To remove a dual inline memory module (DIMM), complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Locate the DIMM connector that contains the DIMM that is to be replaced (see “System-board internal connectors” on page 118 for DIMM slot locations).

Attention: To avoid breaking the DIMM retaining clips or damaging the DIMM connectors, open and close the clips gently.

5. Carefully open the retaining clips on each end **2** of the DIMM connector and remove the DIMM **1**.



6. If you are instructed to return the DIMM, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a memory module

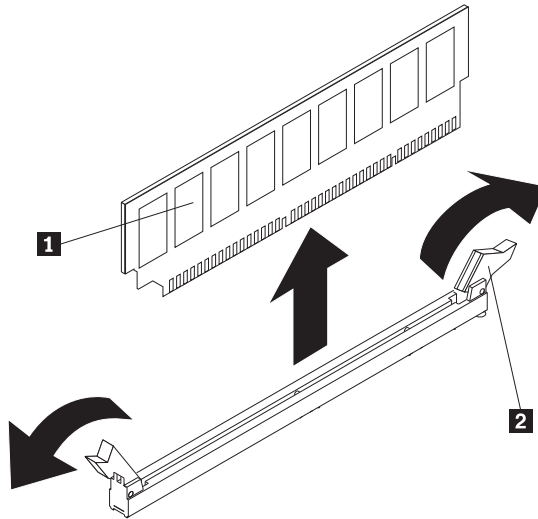
See “System-board internal connectors” on page 118 for the location of the DIMM connectors on the system board.

Attention: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when working inside the server with the power on.

To install a DIMM, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and peripheral devices and disconnect the power cords and all external cables, if necessary.
3. Remove the cover (see “Removing the side cover” on page 130).
4. Open the retaining clip on each end of the DIMM connector.

Attention: To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.



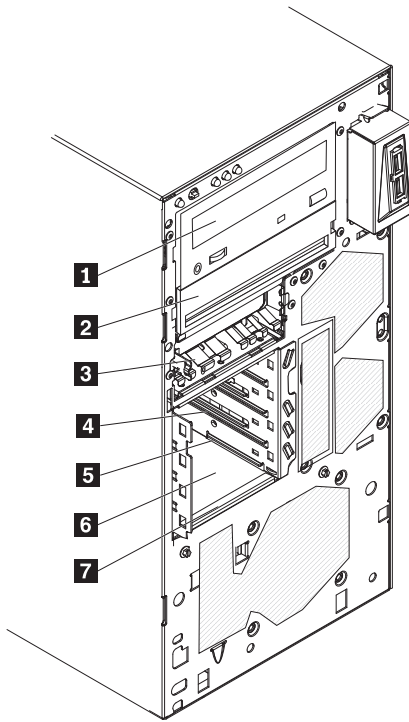
5. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
6. Turn the DIMM so that the DIMM keys align correctly with the connector.
7. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the DIMM connector (see “System-board internal connectors” on page 118 for the location of the DIMM connectors).
8. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector.

Note: If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

9. Go to “Completing the FRU replacement” on page 190.

Replacing internal drives

See “Specifications” on page 11 for information about the types of drives that the server supports and other important information. The following figure shows the locations of the drive bays in the server.



- 1** Bay 1
- 2** Bay 2
- 3** Bay 3
- 4** Bay 4
- 5** Bay 5
- 6** Bay 6
- 7** Bay 7

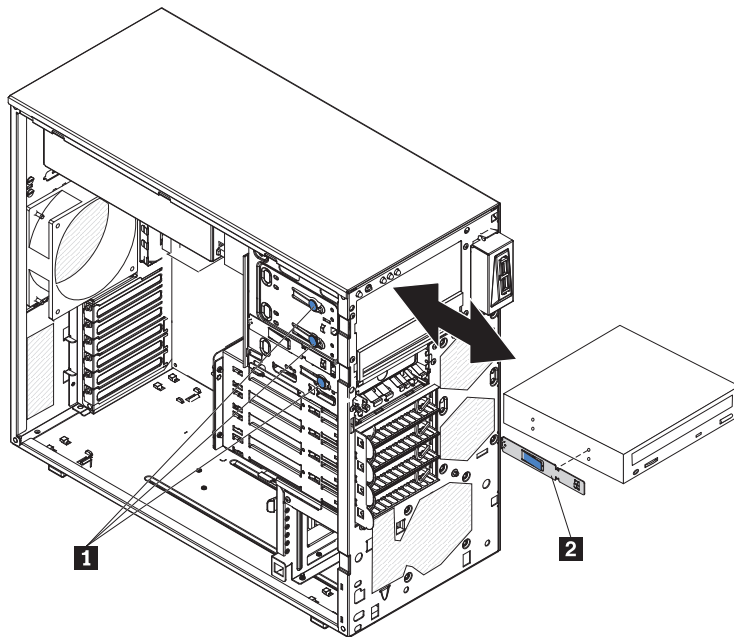
The following notes describe the types of drives that the server supports and other information that you must consider when replacing an internal drive:

- Make sure that you have all the cables and other equipment that is specified in the documentation that comes with the drive.
- Select the bay in which you want to install the drive.
- Check the instructions that come with the drive to see whether you have to set any switches or jumpers on the drive. If you are installing a SAS or SATA device, be sure to set the SAS or SATA ID for that device.
- Optional internal or external USB diskette drives, tape drives, DVD-ROM, and multiburner drives are examples of removable-media drives. You can install removable-media drives in bays 1, 2, and 3 only.
- The SATA removable-media drives that you install in bay 1 connects to the SATA 4 connector on the system board and the drive in bay 2 connects to the SATA 5 connector on the system board.
- To install a 3.5-inch drive in a 5.25-inch bay, you must use the 5.25-inch conversion kit.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all bays and PCI and PCI Express slots covered or occupied. When you install a drive, PCI, or PCI Express adapter, save the EMC shield and filler panel from the bay or PCI or PCI Express adapter slot cover in the event that you later remove the device.
- See <http://www.lenovo.com/thinkserver> and click the **Options** tab for a list of supported options.

Removing a DVD drive

To remove a DVD drive, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Remove the lower bezel, and then remove the upper bezel (see “Removing the two-piece bezel” on page 131).
5. Disconnect the power and signal cables from the drive that is to be removed.
6. Press and hold the blue release button on the side of the bay to release the drive; then, pull the drive out of the front of the server.



- 1** Release buttons **2** Drive retainer clip

7. Remove the drive retainer clip from the side of the drive. Save the clip to use when you install the replacement drive.
8. If you are instructed to return the drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a DVD drive

To install a DVD drive, complete the following steps:

1. If you are replacing a removed drive with a new drive, make sure that:
 - You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
 - You have checked the instructions that come with the new drive to determine whether you must set any switches or jumpers in the drive.
 - You have removed the blue optical drive rails from the side of the old drive and have them available for installation on the new drive.

Note: If you are installing a drive that contains a laser, observe the following safety precaution.

Statement 3:



CAUTION:

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

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



DANGER

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

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

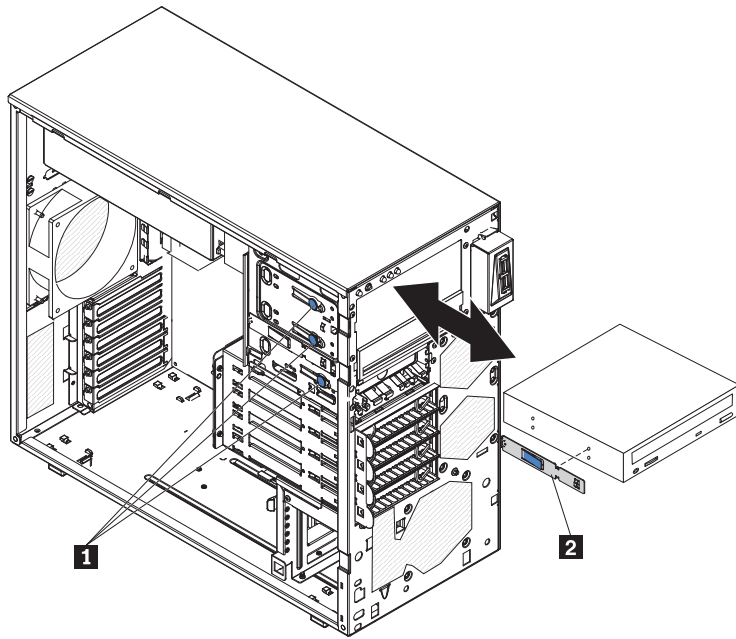


Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

2. Touch the static-protective package that contains the new DVD drive to any unpainted metal surface on the server; then, remove the DVD drive from the package and place it on a static-protective surface.
3. Follow the instructions that come with the drive to set jumpers or switches, if there are any.

Note: You might find it easier to install the new drive from the front and then attach the cables.

4. If you are installing a 3.5-inch drive in bay 2, attach a 5.25-inch conversion kit to the 3.5-inch drive. Remove the drive retainer clip from the side of the drive cage of bay 1 or bay 2. Slide the drive retainer clip to the front to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.



- 1** Release buttons
- 2** Drive retainer clip

5. Push the drive into the bay.
6. Connect the power and signal cables to the drive (see “Power and signal cables for internal drives” on page 151.)

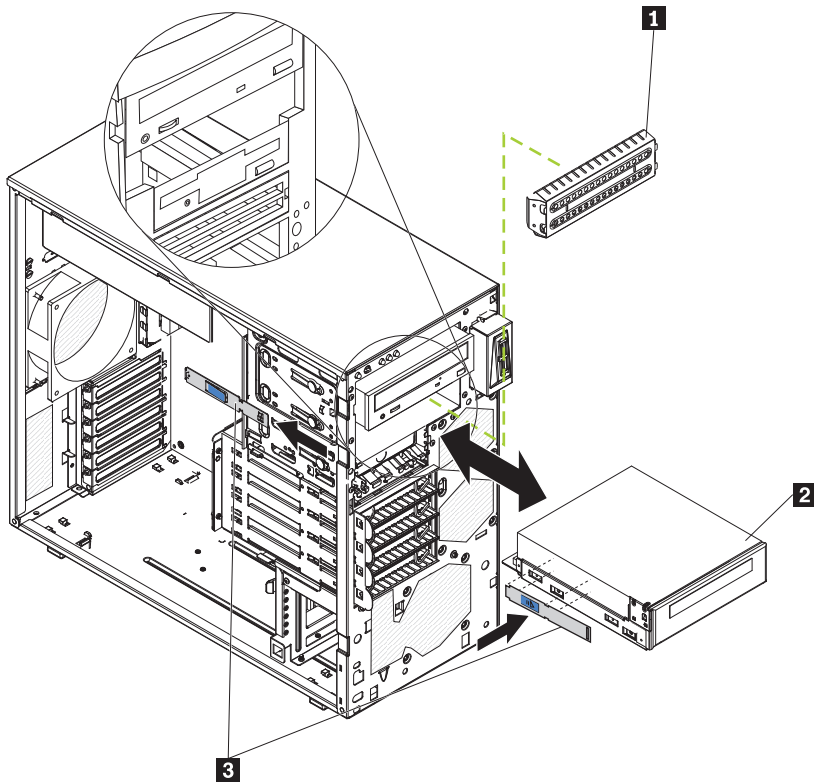
Note: Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).

7. Go to “Completing the FRU replacement” on page 190.

Removing a tape drive

To remove a tape drive, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
3. Unlock and remove the side cover (see “Installing the side cover” on page 131).
4. Remove the lower bezel (see “Installing the lower bezel” on page 133).
5. Remove the upper bezel (see “Installing the upper bezel” on page 134).
6. Disconnect the power and signal cables from the drive that is to be removed.
7. Press and hold the blue release button on the side of the bay to release the drive; then, pull the drive out of the front of the server.
8. Remove the drive retainer clip from the side of the drive. Save the clip to use when you install the replacement drive.



- 1** EMC shield
- 2** Tape drive
- 3** Drive retainer clip

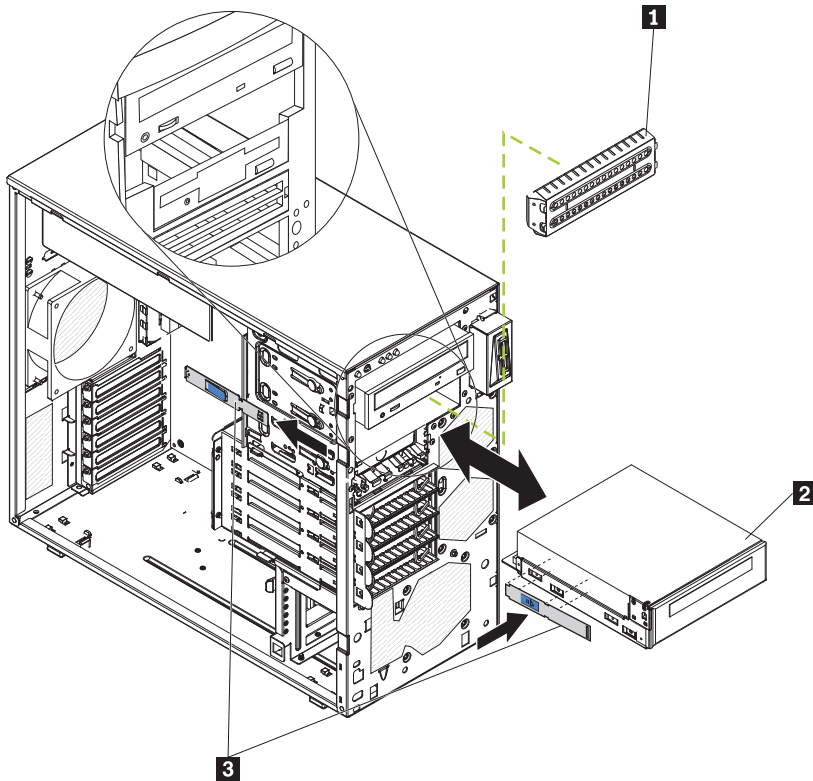
9. If you are instructed to return the drive, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a tape drive

To install a tape drive, complete the following steps:

1. If you are replacing a removed drive with a new drive, make sure that:
 - You have all the cables and other equipment that is specified in the documentation that comes with the new drive.
 - You check the instructions that come with the new drive to determine whether you must set any switches or jumpers on the drive.
 - You have removed the drive retainer clip on the side of the old drive and have it available for installation on the new drive.
2. Read the safety information that begins on page 1.
3. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
4. Unlock and remove the side cover (see “Installing the side cover” on page 131).
5. Remove the lower bezel (see “Installing the lower bezel” on page 133).
6. Remove the upper bezel (see “Installing the upper bezel” on page 134).
7. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
8. Set any jumpers or switches on the drive according to the documentation that comes with the drive.

9. Remove the drive retainer clip from the side of the drive cage of bay 1 or bay 2. Slide the drive retainer clip to the front to remove it from the drive cage; then, snap the drive retainer clip into the screw holes on the side of the drive.



- 1 EMC shield
- 2 Tape drive
- 3 Drive retainer clip

10. Remove the EMC filler.
11. Push the drive into the bay.

Note: A tape drive can be installed in bay 1 or bay 2

12. Connect one end of the applicable signal cable into the rear of the drive and make sure that the other end of this cable is connected into the applicable connector on the system board (see “Power and signal cables for internal drives” on page 151.)
13. Route the signal cable so that it does not block the airflow to the rear of the drives or over the microprocessor and dual inline memory modules (DIMMs).
14. Connect the power cable to the rear of the drive. The connectors are keyed and can be inserted only one way.
15. Go to “Completing the FRU replacement” on page 190.

Removing a hot-swap hard disk drive

This procedure applies only to server models that have hot-swap hard disk drives.

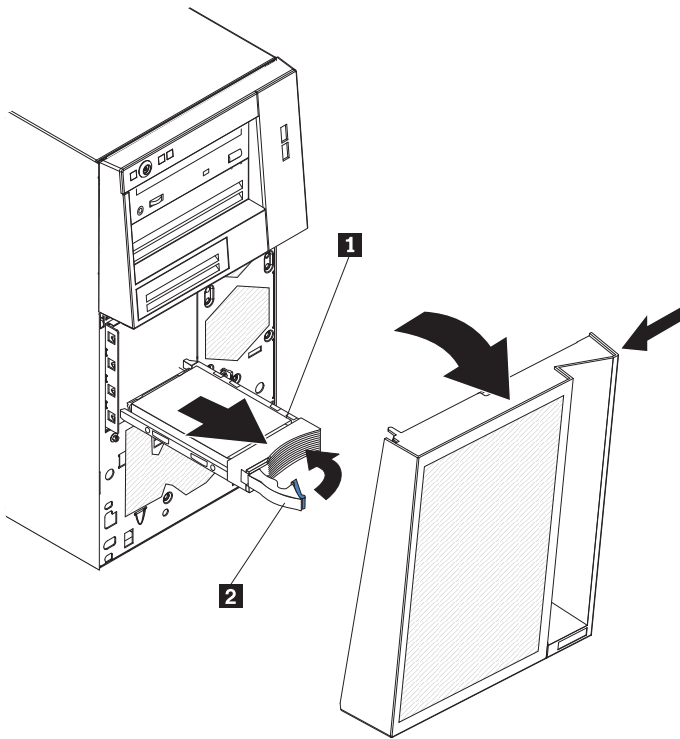
Attention: To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.

To remove a hot-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page 1.

Note: You do not have to turn off the server to remove hot-swap drives from the hot-swap drive bays.

2. Remove the lower bezel (see “Removing the two-piece bezel” on page 131).
3. Rotate the drive tray handle of the drive assembly that is to be removed to the open position (based on your model).



- 1** Drive-tray assembly
- 2** Drive tray handle (in open position)

4. Grasp the handle of the drive assembly that is to be replaced and pull the assembly out of the bay.
5. If you are instructed to return the drive assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

IDs for hot-swap hard disk drives

On some models, the hot-swap-drive backplane controls the IDs of the internal hot-swap drive bays. The following table lists the IDs of the hard disk drives and backplane that are connected to one channel in the hot-swap models. In the typical configuration, the standard hard disk drives and backplane are connected to channel A. This table applies only to server models that support four hard disk drives.

Table 14. IDs of the hot-swap drives (models with four drive bays)

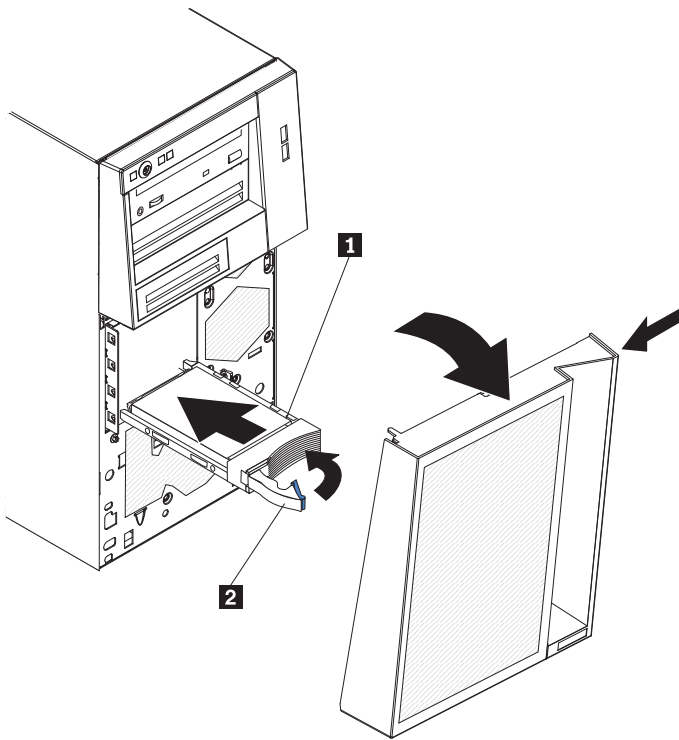
Drive bay	ID
4	0
5	1
6	2
7	3

Installing a hot-swap hard disk drive

This procedure applies only to server models that have hot-swap hard disk drives. Before you install a hot-swap hard disk drive, read the following information:

- The hot-swap drives must be either all SAS hard disk drives or all SATA hard disk drives; the two types cannot be combined.
- Inspect the drive tray for signs of damage.
- To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or a filler panel installed in each drive bay.
- You do not have to turn off the server to install hot-swap drives in the hot-swap drive bays.
- See “Replacing internal drives” on page 140 for additional information.

To install a hot-swap hard disk drive (based on your model), complete the following steps.



1. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
2. Make sure that the drive tray handle is in the open position.
3. Align the drive assembly with the guide rails in the bay; then, carefully slide the drive assembly **1** into the drive bay until the drive stops.
4. Rotate the drive tray handle to the closed position **2**.
5. Check the hard disk drive status indicator to make sure that the hard disk drive is operating correctly. (You might have to restart the server for the drive to be recognized.) If the amber hard disk drive status LED for a drive is lit continuously, it indicates that the drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, this indicates that the drive is being accessed.

Note: If the server is configured for RAID operation using a ServeRAID™ controller, you might have to reconfigure the disk arrays after you replace hard disk drives. See the ServeRAID documentation for additional information about RAID operation.

6. Go to “Completing the FRU replacement” on page 190.

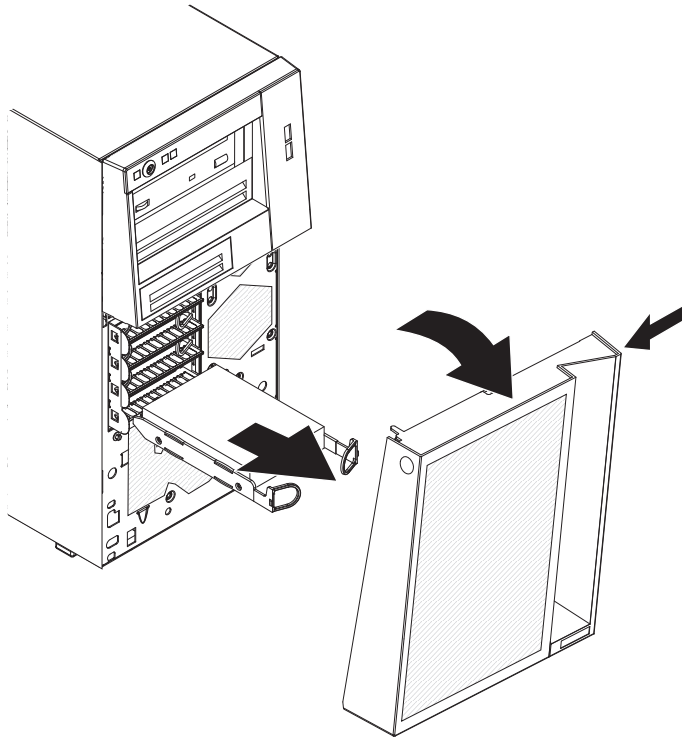
Removing a simple-swap hard disk drive

This procedure applies only to server models that have simple-swap SATA hard disk drives.

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before you remove or install a simple-swap hard disk drive.

To remove a simple-swap hard disk drive, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Remove the lower bezel (see “Removing the two-piece bezel” on page 131).
4. Pull the loops of the drive assembly that is to be removed toward each other; then, pull the assembly out of the bay.



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

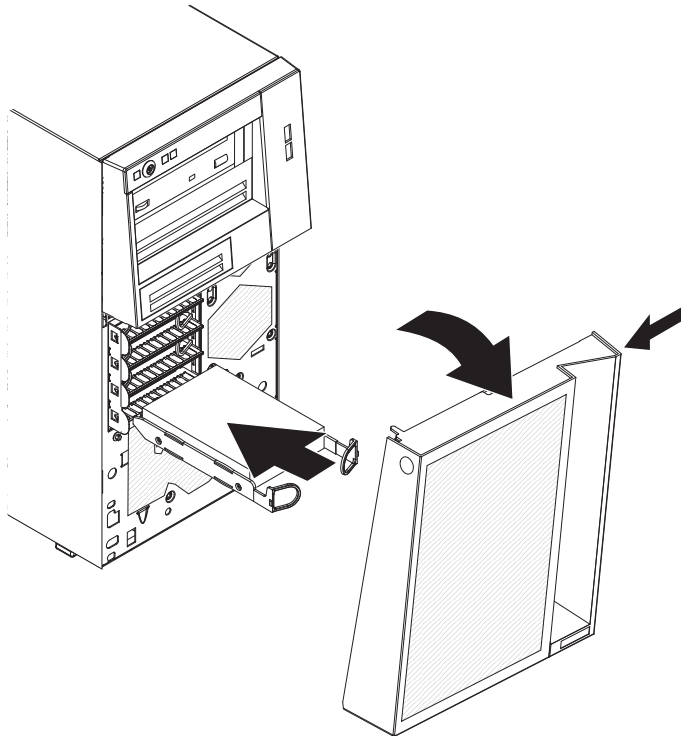
Installing a simple-swap hard disk drive

This procedure applies only to server models that have simple-swap SATA hard disk drives.

Attention: Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server you remove or install a simple-swap hard disk drive.

To install a simple-swap hard disk drive, complete the following steps:

1. Touch the static-protective package that contains the drive to any unpainted metal surface on the server; then, remove the drive from the package and place it on a static-protective surface.
2. Align the drive assembly with the guide rails in the bay.



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

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

4. Go to “Completing the FRU replacement” on page 190.

Power and signal cables for internal drives

The server uses cables to connect SATA attached, simple-swap SATA, hot-swap SATA and hot-swap SAS devices to the power supply and to the system board. (See “System-board internal connectors” on page 118 for the location of system-board connectors.) Review the following information before connecting power and signal cables to internal drives:

- The drives that are preinstalled in the server come with power and signal cables attached. If you replace any drives, remember which cable is attached to which drive.
- When you install a drive, make sure that one of the signal cable drive connectors is connected to the drive and that the connector at the other end of the signal cable is connected to the system board or a compatible adapter or controller that you have installed.
- When you route a cable, make sure that it does not block the airflow to the rear of the drives or over the microprocessor or DIMMs.

The following cables are provided:

- **Power cables:** Four-wire power cables connect the drives to the power supply. At the ends of these cables are plastic connectors that can be attached to different drives; these connectors vary in size. Use either a four-wire power cable or SATA power cable with SATA drives, but do not use both at the same time (use one or the other).
- **Signal cables:** Signal cables are typically flat cables, also called ribbon cables, that connect SATA attached, SATA and SAS to the system board. Two or three types of signal cables come with the server:
 - **SATA attached (for optical drives):** The flat SATA-attached signal cable has two connectors. One of these connectors is attached to the optical drive, and one is attached to one of the connectors on the system board.
 - **Simple-swap SATA:** Simple-swap SATA models come with four SATA cables that are already connected to the system board and the backplate at the rear of the simple-swap drive cage.
 - **Hot-swap SAS/SATA:** Hot-swap SAS/SATA models come with one or two (depending on the model) data cables that connect the SAS/SATA controller to the hot-swap backplane. The data cable provides inherent connectivity for the SAS or SATA drives that the server supports. Therefore, additional cabling is not required for these drives.

For more information about the requirements for SAS/SATA cables and connecting SAS/SATA devices, see the documentation that comes with these devices.

See <http://www.lenovo.com/thinkserver> and click the **Options** tab for a list of supported options.

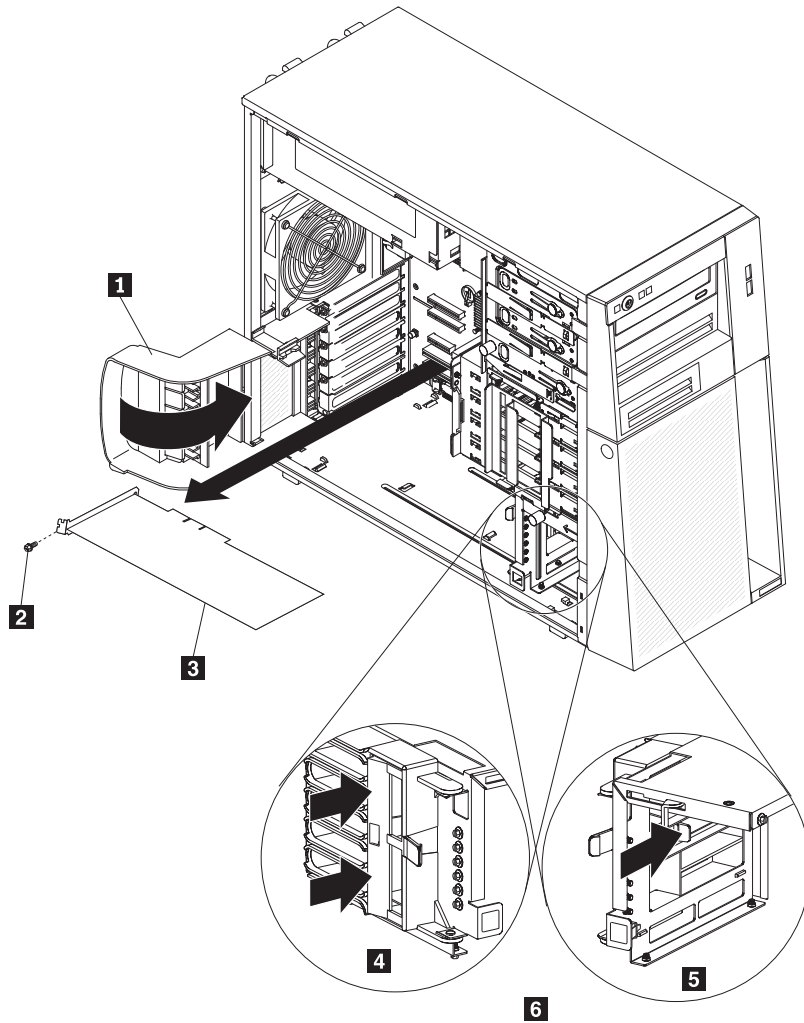
Replacing an adapter

Use the following procedures to replace an adapter.

Removing an adapter

To remove an adapter, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Disconnect any cables from the adapter or any cables that impede access to the adapter.
5. Open the rear retention bracket.
6. If you are removing a full-length adapter, press on the retaining tab (two blue pull points) on the left side of the front adapter-retention bracket until the release lever on the right side of the bracket clicks into place.
7. Remove the expansion-slot screw at the rear of the adapter if any.
8. Carefully grasp the adapter by its top edge or upper corners. And pull the adapter from the server.
Attention: Expansion-slot covers must be installed in all empty slots. This maintains the electronic emissions standards of the computer and ensures proper ventilation of computer components.



9. If you are not replacing the adapter, install an expansion-slot cover in the expansion-slot opening.
10. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when you install an adapter. Adapter that the server supports might vary, depending on your server model.

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you must change the switch setting or jumper settings on the adapter, follow the instructions that come with the adapter.
- Read the documentation that comes with your operating system.
- The server comes with the following adapter connectors or slots:
 - Slot 1, PCIe2 x8 (x8, x4, x1) 25W
 - Slot 2, PCIe2 x8 (x8, x4, x1) 25W
 - Slot 3, PCIe2 x1 10W
 - Slot 4, PCI 32bit, 33MHz
 - Slot 5, PCI 32bit, 33MHz
- Some server models come with a ServeRAID-BR10il v2 SAS/SATA RAID controller installed. The ServeRAID-BR10il v2 controller enables integrated RAID levels-0 and level-1.

- You can install full-length adapters that are included in the supported options list in slots 1 through 5 (depending on your model).
- The 32-bit slots 4 and 5 support 5.0 V keyed PCI adapters; they do not support 3.3 V keyed adapters. Universal adapters are supported in slots 4 and 5 if they are universally keyed.
- The server scans PCI Express Gen 2 x8 (x8) slot 1, PCI Express Gen 2 x8 (x8) slot 2, PCI Express Gen 2 x4 (x4) slot 3, and PCI slots 4 and 5 to assign system resources. Then, the server starts the PCI devices in the following order, if you have not changed the default startup sequence: PCI Express Gen 2 x8 (x8) slot 1, PCI Express Gen 2 x8 (x8) slot 2, PCI Express Gen 2 x4 (x4) slot 3, PCI slot 4, and PCI slot 5.
- See <http://www.lenovo.com/thinkserver> and click the **Options** tab for a list of supported options.

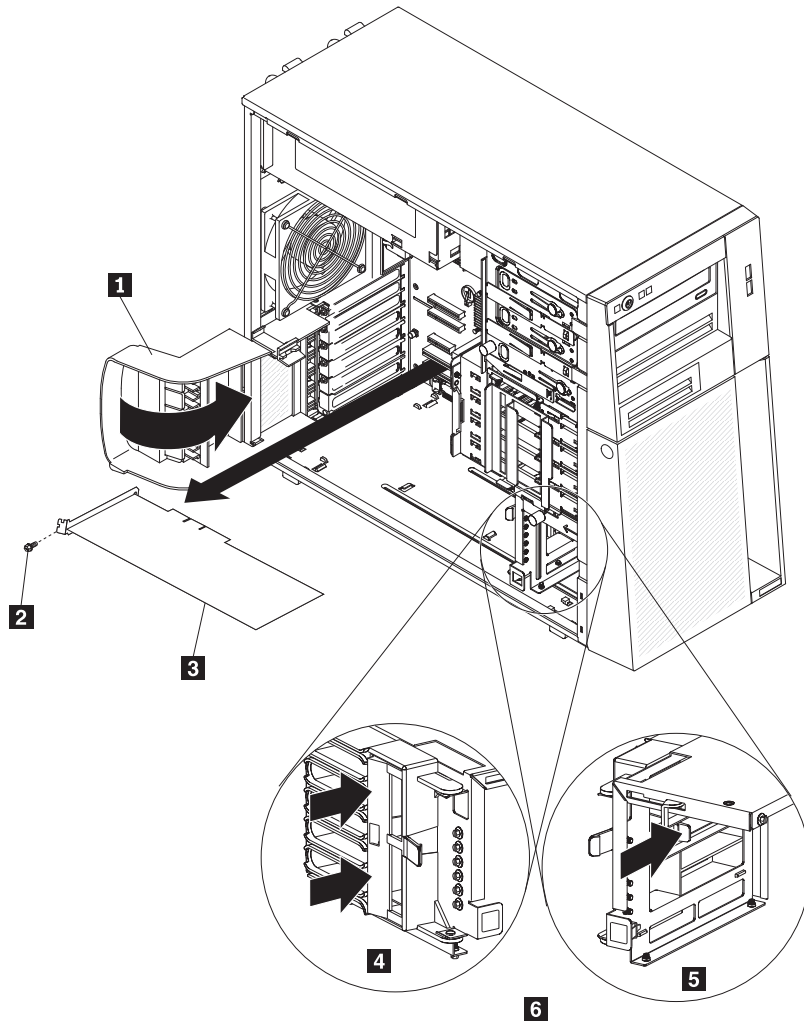
To install an adapter, complete the following steps.

Note: Static electricity that is released to internal server components when the server is powered-on might cause the server to stop, which might result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

To install an adapter, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and peripheral devices and disconnect all external cables and power cords; then, remove the side cover. See “Removing the side cover” on page 130.
3. Follow the cabling instructions, if any, that come with the adapter. Route the adapter cables before you install the adapter.
4. Follow the instructions that come with the adapter to set jumpers or switches, if any.
5. Rotate the rear adapter-retention bracket to the open position and remove it from the server.
6. Remove the screw that secures the expansion-slot cover to the chassis. Store the expansion-slot cover and screw in a safe place for future use.

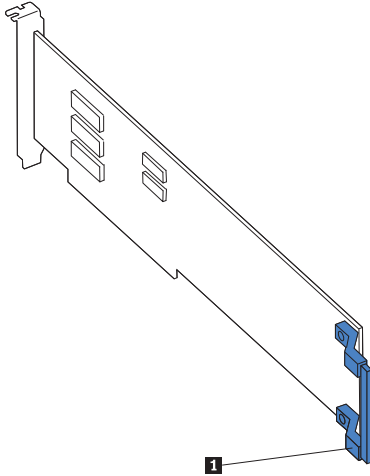
Note: Expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions standards of the server and ensures proper ventilation of server components.



- 1** Rear adapter retention bracket
- 2** Expansion-slot screw (optional)
- 3** Adapter
- 4** Left side
- 5** Right side
- 6** Front adapter retention bracket

7. Touch the static-protective package that contains the adapter to any unpainted metal surface on the server. Then, remove the adapter from the static-protective package. Avoid touching the components and gold-edge connectors on the adapter.

8. If you are installing a full-length adapter, remove the blue adapter guide (if any) from the end of the adapter.



1 Adapter guide

9. Carefully grasp the adapter by the top edge or upper corners, and align it with the expansion slot guides; then, press the adapter *firmly* into the expansion slot. Move the adapter directly from the static-protective package to the expansion slot.

Attention: Make sure that the adapter is correctly seated in the expansion slot before you turn on the server. Incomplete installation of an adapter might damage the system board or the adapter.

10. Install an expansion-slot screw at the rear of the adapter.
11. If you are installing a full-length adapter, press on the release lever on the right side of the front adapter-retention bracket to release the retaining tab on the left side of the bracket.
12. Connect required cables to the adapter. Route cables so that they do not block the flow of air from the fans.
13. Reinstall the rear adapter-retention bracket; then, rotate the bracket to the closed position.

Note: If any adapters in the server are large or have heavy cables attached to them, you can remove the rear adapter-retention bracket and secure all of the adapters with expansion-slot screws.

14. Go to “Completing the FRU replacement” on page 190.

Replacing the ServeRAID-BR10il v2 SAS/SATA controller

Use the following procedures to replace the ServeRAID-BR10il v2 SAS/SATA controller.

Removing a ServeRAID BR10-il controller

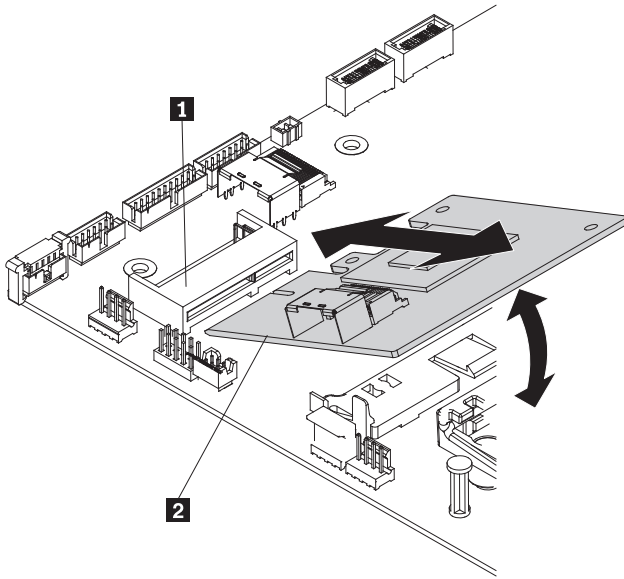
To remove the mini-SAS/SATA RAID controller, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.

Note: When you disconnect the power source from the server, you lose the ability to view the LEDs because the LEDs are not lit when the power source is removed. Before you disconnect the power source, make a note of which LEDs are lit, including the LEDs that are lit on the operation information panel and LEDs inside the server on the system board.

3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Open the rear adapter-retention bracket until the release lever on the right side of the bracket clicks into place.

5. Squeeze the tabs on both sides of the connector on the signal cable and remove the cable from the SAS/SATA controller cable connector **1**.

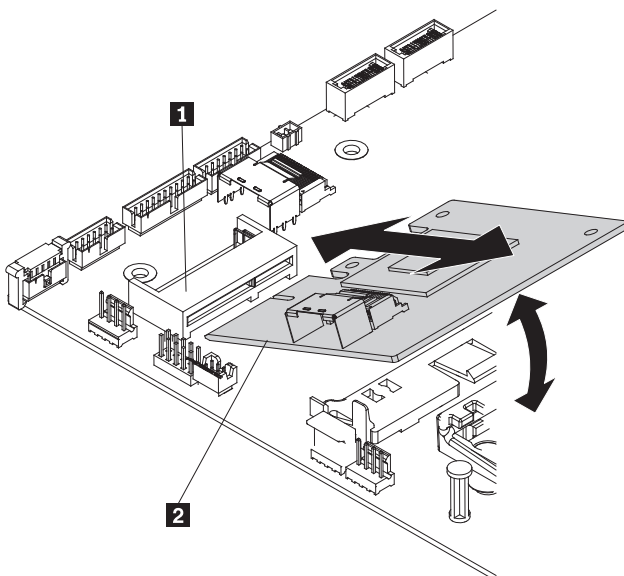


6. Carefully disengage the tabs on each side of the SAS/SATA controller connector and the front of the SAS/SATA controller from the plastic standoff.
7. Grasp the edges of the SAS/SATA controller **2** and pull it out of the connector. If the standoff comes away from the system board with the controller, gently pull it out of the controller and push it back into the hole on the system board.
8. If you are instructed to return the SAS/SATA controller, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a ServeRAID BR10-il controller

To install the SAS/SATA RAID controller, complete the following steps:

1. Touch the static-protective package that contains the SAS/SATA controller to any unpainted surface on the outside of the server; then, remove the SAS/SATA controller from the package.
2. Position the SAS/SATA controller over the connector and the plastic standoff; then, press the SAS/SATA controller firmly into the connector and onto the plastic standoff.



3. Connect the signal cable to the SAS/SATA controller.
4. Install and lock the side cover (see “Installing the side cover” on page 131).
5. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Removing an optional ServeRAID-MR10i SAS/SATA controller

To remove a ServeRAID-MR10i SAS/SATA adapter, complete the following steps:

1. Read the safety information beginning on page 1.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 130).
3. Rotate the rear adapter-retention bracket to the open (unlocked) position.
4. Disconnect any cables connected to the adapter.
Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10i adapter connector, open and close the clips gently.
5. Carefully grasp the end of the ServeRAID adapter and pull it out of the connector.
6. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an optional ServeRAID-MR10i SAS/SATA controller

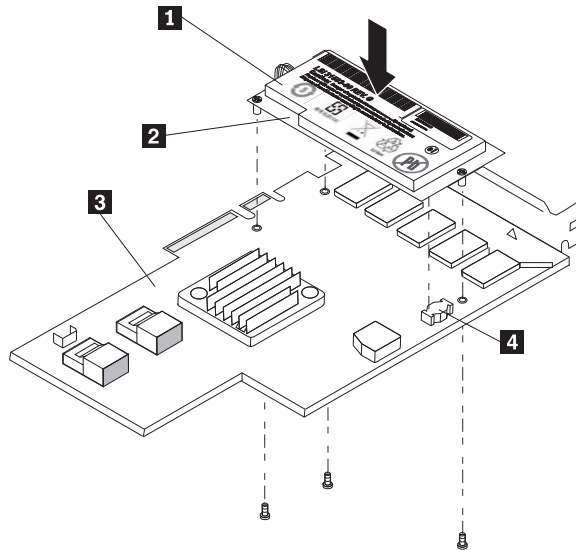
The optional IBM ServeRAID-MR10i SAS/SATA controller can be installed in either PCI slot 1 or slot 2 on the system board. The ServeRAID-MR10i adapter is supported on hot-swap server models only. The IBM ServeRAID-MR10i SAS/SATA adapter enables integrated RAID levels 0, 1, 5, 6, and 10 support capability on hot-swap hard disk drives. For configuration information, see the documentation on the ServeRAID CD that comes with the adapter.

Important: To ensure that any of your ServeRAID 10i, 10is, or 10M adapters function properly on UEFI-based servers, make sure that the adapter firmware level is updated to at least 11.xx-XXX, and the supporting drivers.

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

To install a ServeRAID-MR10i adapter, complete the following steps:

1. Read the safety information beginning on page 1.
2. Touch the static-protective package containing the ServeRAID-MR10i adapter to any unpainted metal surface on the server. Then, remove the ServeRAID-MR10i adapter from the package.
3. If the battery pack (battery carrier and battery) did not come installed on the ServeRAID adapter, install the battery pack.
 - a. Align the battery carrier pins and the connector for the battery carrier with the pin holes and connector on the ServeRAID adapter; then, lower the battery carrier onto the ServeRAID adapter.



- 1** Battery
- 2** Battery carrier
- 3** RAID adapter
- 4** Connector for battery carrier

- b. Press the battery carrier into the connector on the ServeRAID adapter until it is firmly connected.
- c. Secure the battery carrier to the ServeRAID adapter with the screws that came with the battery pack.
- 4. Open the rear retention bracket.
- 5. Turn the ServeRAID-MR10i adapter so that the ServeRAID-MR10i adapter keys align correctly with the connector.

Attention: Incomplete insertion might cause damage to the system board or the ServeRAID-MR10i adapter.

- 6. Take the signal cable that is attached to the drive backplane and connect it to the ServeRAID adapter.

Note: When you restart the server, you are prompted to import the existing RAID configuration to the new ServeRAID adapter.

- 7. Press the ServeRAID-MR10i adapter firmly into the connector on the system board.
- 8. Reconnect the cables to the new ServeRAID-MR10i adapter.

Removing an optional ServeRAID-MR10is VAULT SAS/SATA controller

To remove a ServeRAID-MR10is SAS/SATA adapter, complete the following steps:

- 1. Read the safety information beginning on page 1.
- 2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 130)
- 3. Rotate the rear adapter-retention bracket to the open (unlocked) position.
- 4. Open the rear retention bracket.
- 5. Disconnect any cables connected to the adapter.

Attention: To avoid breaking the retaining clips or damaging the ServeRAID-MR10is adapter connector, open and close the clips gently.

- 6. Carefully grasp the end of the ServeRAID adapter and pull it out of the connector.

7. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Replacing a PCIe adapter card

Use the following procedures to replace a PCIe adapter card.

Removing a PCIe adapter card

To remove a PCIe adapter card, complete the following steps:

1. Read the safety information beginning on page 1.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables. Remove the side cover (see “Removing the side cover” on page 130).
3. Rotate the rear adapter-retention bracket to the open (unlocked) position.
4. Disconnect any cables connected to the adapter.
Attention: To avoid breaking the retaining clips or damaging the adapter connector, open and close the clips gently.
5. Carefully grasp the end of the adapter and pull it out of the connector.
6. If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a PCIe adapter card

A PCIe adapter card can be installed in either PCI slot 1 or 2 on the system board. The PCIe adapter card is supported on hot-swap server models only. The PCIe adapter card enables integrated RAID levels 0, 1, 5, 6, and 10 support capability on hot-swap hard disk drives. For configuration information, see the documentation that comes with the adapter.

Important: To ensure that your PCIe adapter card functions properly on UEFI-based servers, make sure that the adapter firmware level is updated and the supporting drivers are installed.

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

To install the PCIe adapter card, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables.
Attention: To avoid breaking the retaining clips or damaging the PCIe adapter card connector, open and close the clips gently.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Remove the hard disk drive fan assembly:
 - a. Rotate the hard disk drive fan assembly cable out of the system board.
 - b. Remove all hard disk drives.
 - c. Press and hold the drive cage release tab on the side of the drive cage; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
 - d. Pull out on the hard disk drive fan assembly release tabs (at the blue dots); then, rotate the hard disk drive fan assembly away from the drive cage slightly.
5. Disconnect the signal and power cables and the existing SAS/SATA controller (if one is installed); then, remove the controller from the server.
6. Touch the static-protective package that contains the PCIe adapter card to any unpainted metal surface on the server. Then, remove the PCIe adapter card from the package.

7. Align the PCIe adapter card so that the keys align correctly with the connector on the system board.
Attention: Incomplete insertion might cause damage to the system board or the PCIe adapter card.

Note: The drive cage should be in the open position. This illustration shows it in the closed position.

8. Press the PCIe adapter card firmly into the connector on the system board.
9. Take the other end of the signal cable that is attached to the drive backplane section for drive bays 0 through 3 (as labeled on the front of the drive cage) and connect it to the connector that is closest to the battery on the PCIe adapter card.
10. Replace the hard disk drive fan assembly:
 - a. Insert the hard disk drive fan assembly retaining tab over the right edge of the hard disk drive backplane; then, rotate the hard disk drive fan assembly toward the backplane. Do not fully close the hard disk drive fan assembly.
 - b. Route the signal cables and power cable through the slot on the edge of the hard disk drive fan assembly. Make sure that the cables will not be pinched between the hard disk drive fan assembly and the hard disk drive backplane when the assembly is installed.
 - c. Rotate the hard disk drive fan assembly toward the backplane until the release tabs are fully engaged and snap into place.
11. Reconnect the hard disk drive fan assembly cable to the system board.
12. Rotate the drive cage back into the server until it stops; then, press and hold the retaining tab on top of the drive cage while you rotate the drive cage into the chassis until it is in the closed position.
13. Reinstall the hard disk drives.

Note: Before you continue, check all internal power cables to make sure that they are connected to the system board and other optional devices.

14. Go to “Completing the FRU replacement” on page 190.

Replacing a USB embedded hypervisor flash device

Use the following procedures to replace the hypervisor flash device.

Removing a USB embedded hypervisor flash device

To remove the hypervisor flash device, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and peripheral devices and disconnect all power cords.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Unlock the USB retaining latch by squeezing the two retaining clips toward each other. Then, lift up the bracket cover.
5. Grasp the flash device and pull to remove it from the connector.
6. Press down on the retaining latch to return it to the original position.
7. If you are instructed to return the flash device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a USB embedded hypervisor flash device

To install the hypervisor flash device, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Unlock the USB retaining latch by squeezing the two retaining clips toward each other.

5. Align the flash device with the connector on the system board and push it into the connector until it is firmly seated.
6. Press down on the retaining latch to lock the flash device into the USB connector.
7. Go to “Completing the FRU replacement” on page 190.

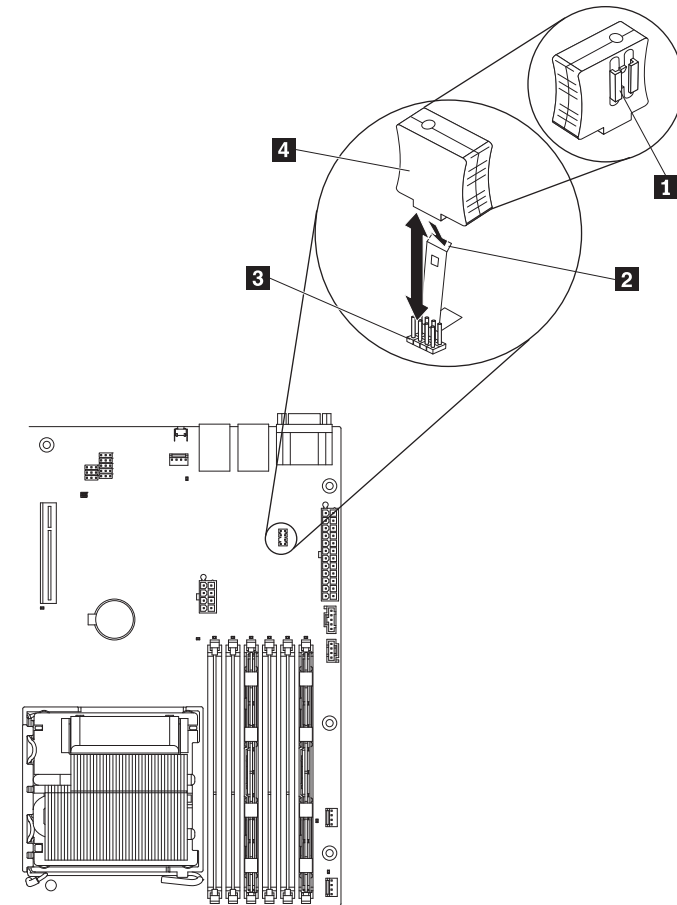
Replacing the virtual media key

Use the following procedures to replace the virtual media key.

Removing the virtual media key

To remove the virtual media key, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and peripheral devices and disconnect all power cords; then, remove the side cover (see “Removing the side cover” on page 130).
3. Grasp the virtual media key and gently slide it up and off of the mounting tab.



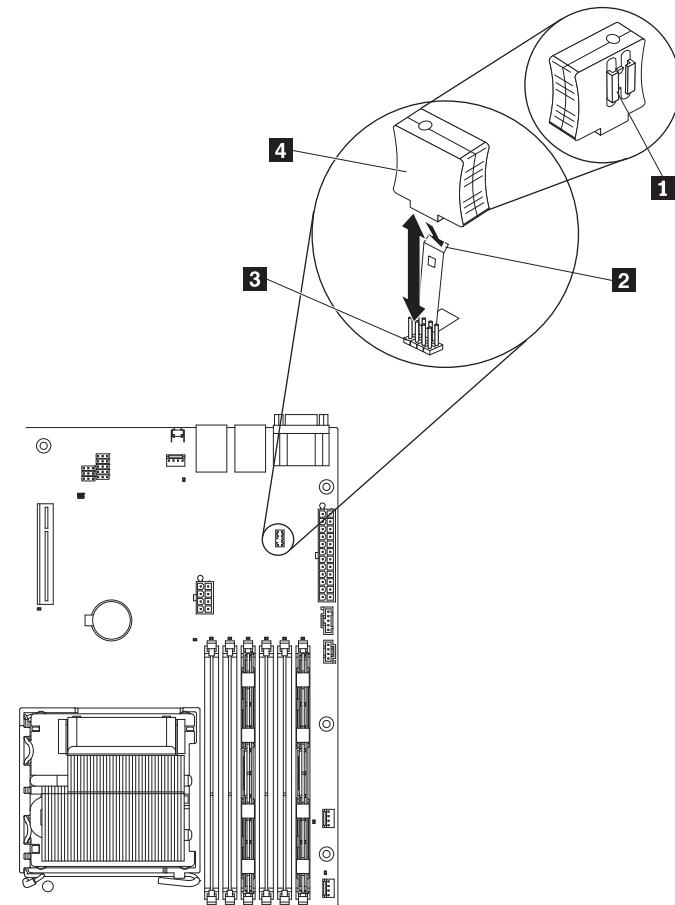
- 1 Mounting bracket (feet)
- 2 Mounting tab
- 3 Virtual media key connector
- 4 Virtual media key (front)

4. If you are instructed to return the virtual media key, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the virtual media key

To install the virtual media key, complete the following steps:

1. Read the safety information that begins on page 1.
2. Unlock and remove the side cover (see “Removing the side cover” on page 130).
3. Align the virtual media key with the mounting tab and slide it down the tab onto the connector on the system board. Press the virtual media key down into the connector until it is firmly seated on the system board.



- 1 Mounting bracket (rear)
- 2 Mounting tab
- 3 Virtual media key connector
- 4 Virtual media key (front)

4. Go to “Completing the FRU replacement” on page 190.

Replacing the rear system fan

Attention:

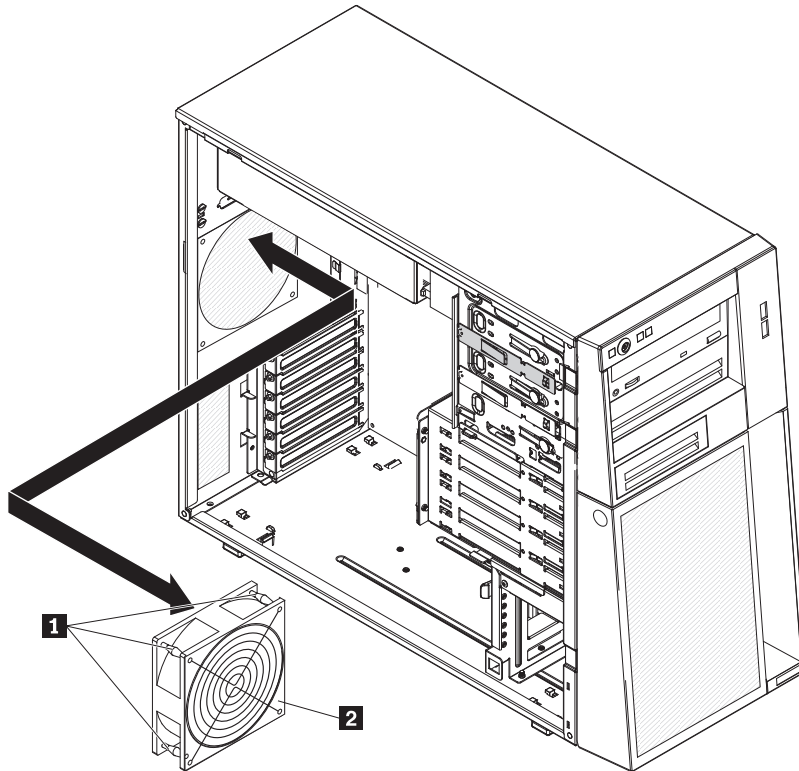
- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

Use the following procedures to replace the rear system fan.

Removing the rear system fan

To remove the rear system fan, complete the following steps:

1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Unlock and remove the side cover (see “Removing the side cover” on page 130).
3. Remove any adapters that impede access to the fan and the fan connector on the system board (see “Replacing an adapter” on page 152).
4. Disconnect the fan cable from the system board.
5. Grasp the fan **2** with both hands and pull firmly, extending the rubber grommets **1**. The grommets will be pulled through the holes in either the fan or the chassis and can then be removed.

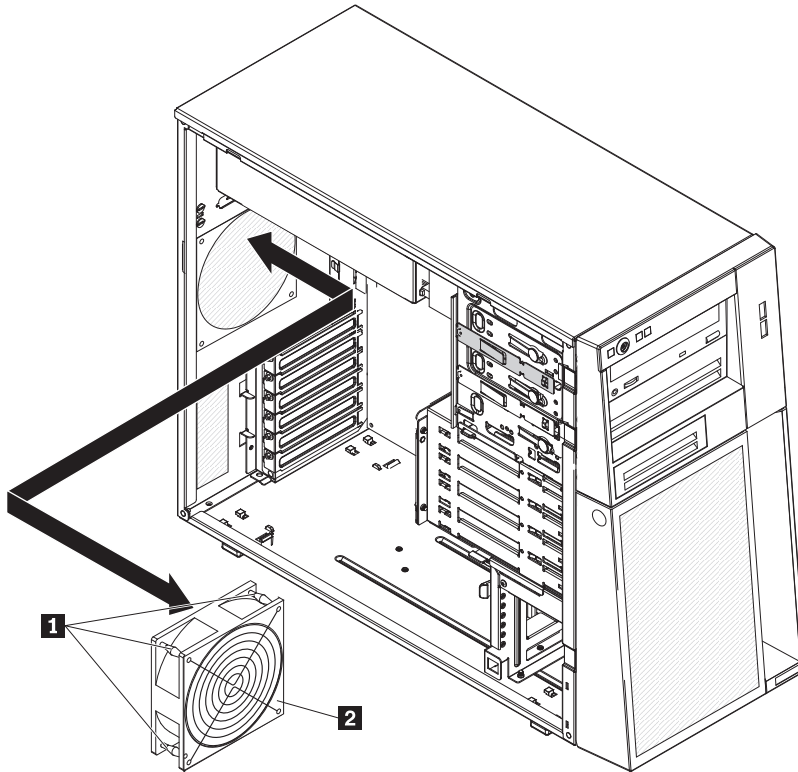


6. Pull the fan up and out of the chassis.
7. If you are instructed to return the fan, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the rear system fan

To install the rear system fan, complete the following steps:

1. The replacement fan comes with the rubber grommets installed **1**; however, they might have come out during shipment. If any of the rubber grommets are missing from the fan, install them on the fan before you continue. Use needle-nosed pliers to pull the grommets through the holes in the fan.
2. Position the fan **2** so that the grommets protrude through the holes in the chassis; then, use needle-nosed pliers to pull the grommets through the holes from outside the chassis.



3. Connect the fan cable to the system board (see “System-board internal connectors” on page 118 for the location of the rear fan connector).
4. Install any adapters that you removed (see “Installing an adapter” on page 153).
5. Go to “Completing the FRU replacement” on page 190.

Replacing the hard disk drive fan assembly

Use the following procedures to replace the hard disk drive fan assembly. These procedures apply only to server models that have a hard disk drive fan assembly.

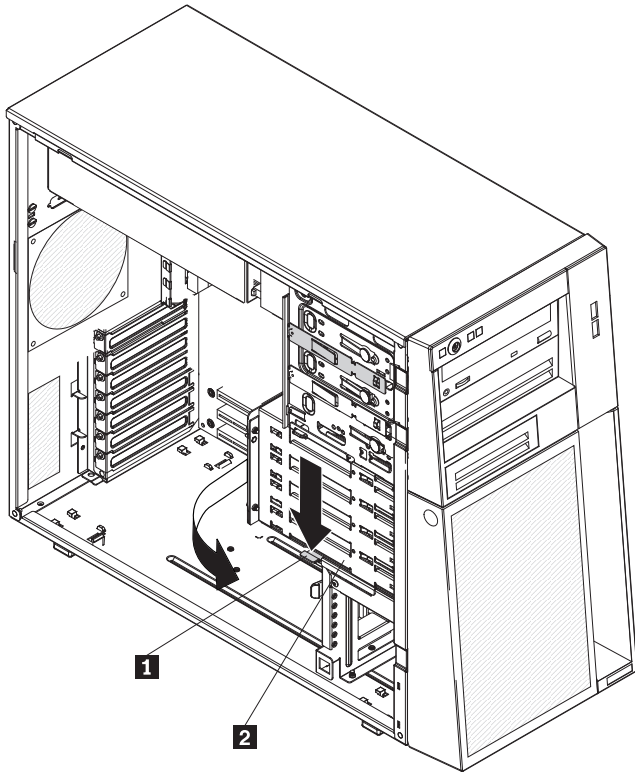
Attention:

- Replace a failed fan within 48 hours.
- To ensure proper cooling and airflow, do not operate the server for more than 30 minutes with the side cover removed.

Removing the hard disk drive fan assembly

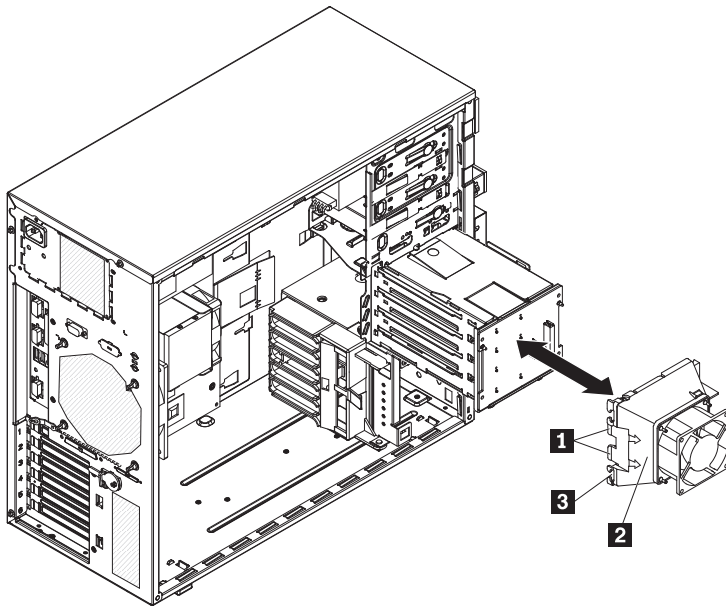
To remove the hard disk drive fan assembly, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Rotate the rear adapter-retention bracket to the open (unlocked) position.
5. Disconnect the hard disk drive fan assembly cable from the system board, making a note of the cable was connected to the hard disk drive fan connector for later installation.
6. Remove the lower bezel (see “Removing the two-piece bezel” on page 131).
7. Remove the hard disk drives.
8. Lift up and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.



- 1** Drive cage release tab
- 2** Hard disk drive cage

9. Pull out on the hard disk drive fan assembly release tabs; then, rotate the assembly away from the drive cage slightly.



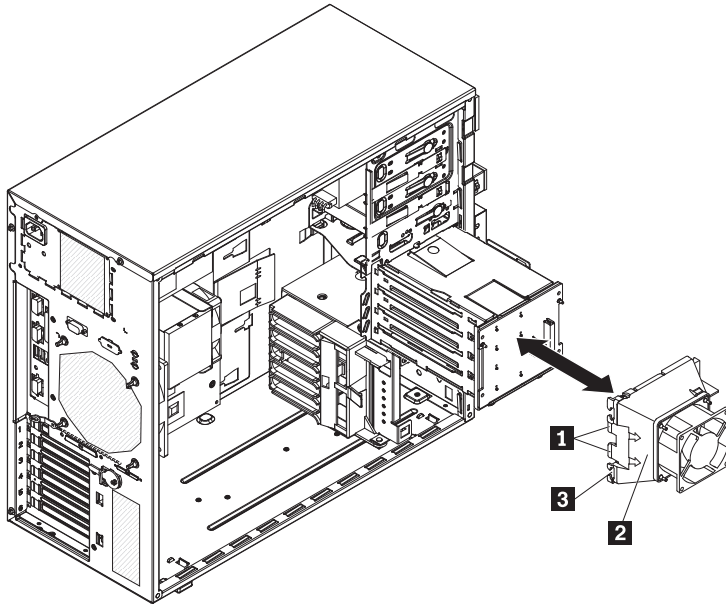
- 1** Release tabs
- 2** Hard disk drive fan assembly
- 3** Slot

10. Remove the cable from the slot on the hard disk drive fan assembly; then, rotate the assembly away from the drive cage and remove the assembly from the drive cage.
11. If you are instructed to return the hard disk drive fan assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the hard disk drive fan assembly

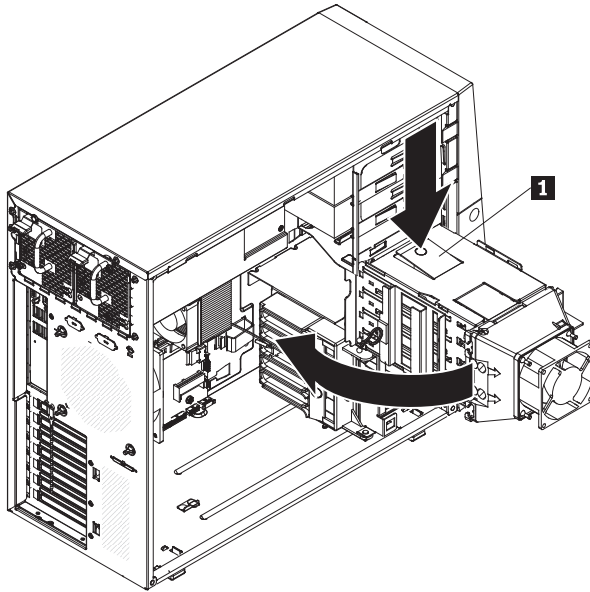
To install the hard disk drive fan assembly, complete the following steps:

1. Insert the hard disk drive fan assembly retaining tab over the right edge of the hard disk drive backplane; then, rotate the fan assembly toward the backplane. Do not fully close the hard disk drive fan assembly.



- 1** Release tabs
- 2** Hard disk drive fan assembly
- 3** Slot

2. Route the hard disk drive signal and power cables through the slots on the edge of the hard disk drive fan assembly. Make sure that the cables will not be pinched between the hard disk drive assembly and the hard disk drive backplane when the assembly is installed.
3. Rotate the hard disk drive fan assembly toward the backplane. Align the right edge of the hard disk drive fan assembly and the right edge of the backplane. Make sure the release tabs are fully engaged on the drive cage.
4. Rotate the drive cage toward the front of the server until it stops; then, lift and hold the retaining tab **1** on top of the drive cage while you rotate the drive cage into the chassis until it locks into place.



5. Connect the hard disk drive fan assembly cable to the system board (see “System-board internal connectors” on page 118 for the location of the hard disk drive fan connector).
6. Reinstall the hard disk drives.

Note: Before you continue, check all internal power cables to be sure that they are connected to the system board and other optional devices.

7. Go to “Completing the FRU replacement” on page 190.

Replacing the simple-swap backplate

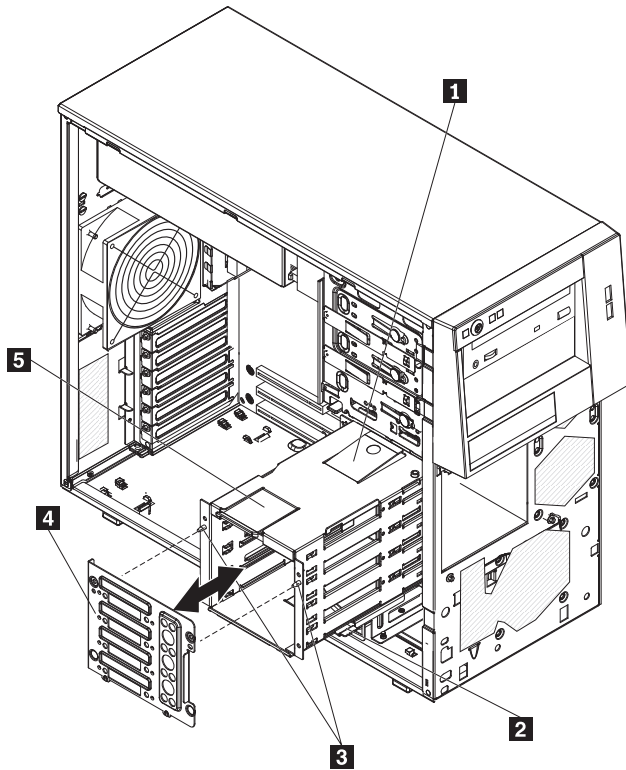
Use these procedures to replace the simple-swap backplate. This procedure applies only to server models with the simple-swap SATA backplate installed on the back of the hard disk drive cage.

Removing the simple-swap backplate

To remove the simple-swap backplate, complete the following steps:

Note: You need a screwdriver in order to complete the steps.

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Remove the lower bezel (see “Removing the two-piece bezel” on page 131).
5. Remove the simple-swap hard disk drives that are installed in the hard disk drive cage (see “Removing a simple-swap hard disk drive” on page 150).
6. Remove the hard disk drive fan assembly from the hard disk drive cage (see “Replacing the hard disk drive fan assembly” on page 165).
7. Disconnect the power cable from the simple-swap backplate.
8. Disconnect the signal cable from the system board.
9. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
10. Lift up on the retaining latch at the top of the drive cage; then, tilt the top of the simple-swap backplate away from the drive cage until it is clear of the locating pins.



- 1** Retaining tab
- 2** Drive cage release tab
- 3** Locating pins
- 4** Simple-swap backplate
- 5** Retaining latch

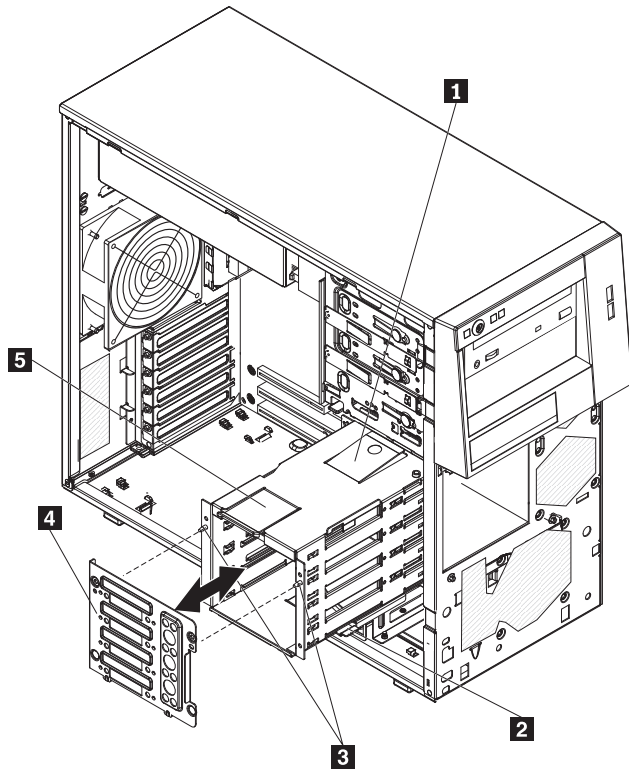
11. Lift the simple-swap backplate out of the lower lip on the drive cage and set it aside.
12. If you are instructed to return the simple-swap backplate, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the simple-swap backplate

This procedure applies only to server models with the simple-swap SATA backplate installed on the back of the hard disk drive cage.

To install the simple-swap backplate, complete the following steps.

1. Position the bottom edge of the simple-swap backplate on the lower lip of the drive cage.



- 1** Retaining tab
- 2** Drive cage release tab
- 3** Locating pins
- 4** Simple-swap backplate
- 5** Retaining latch

2. Tilt the top of the simple-swap backplate toward the drive cage and over the locating pins until the retaining latch is engaged securely.
3. Press and hold the retaining tab on top of the cage; then, rotate the drive cage into the chassis until it locks into place.
4. Connect the signal cables to the system board (see “System-board internal connectors” on page 118 for the location of the Serial ATA drive connectors).
5. Connect the power cables to the simple-swap backplate.
6. Install the hard disk drive fan assembly on the hard disk drive cage (see “Replacing the hard disk drive fan assembly” on page 165).
7. Install the simple-swap hard disk drives that you removed from the hard disk drive cage (see “Installing a simple-swap hard disk drive” on page 151).
8. Go to “Completing the FRU replacement” on page 190.

Replacing the SAS/SATA hard disk drive backplane

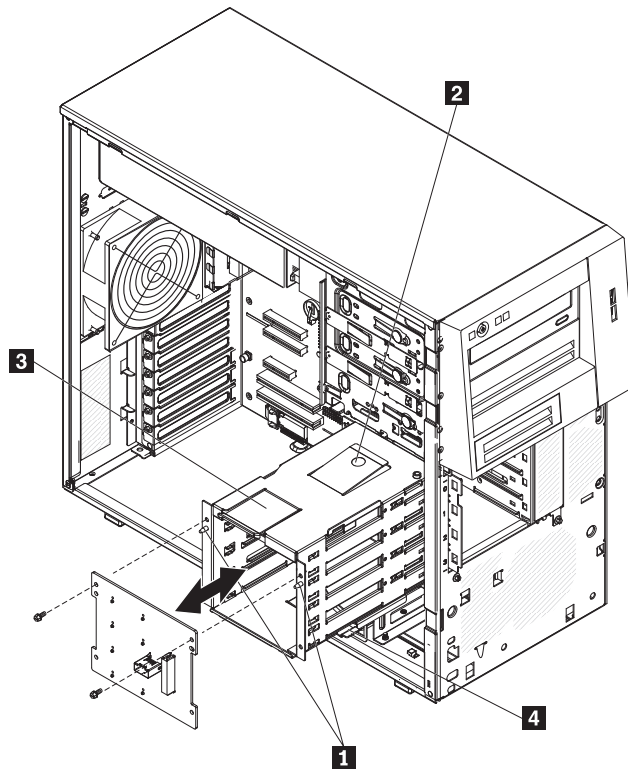
Use these procedures to replace the SAS/SATA hard disk drive backplane. These procedures apply only to hot-swap server models with a SAS/SATA hard disk drive backplane installed on the back of the hard disk drive cage.

Removing the SAS/SATA hard disk drive backplane

To remove the SAS/SATA hard disk drive backplane, complete the following steps:

1. Read the safety information that begins on page 1.

2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Remove the lower bezel (see “Removing the two-piece bezel” on page 131).
5. Remove the hot-swap SAS/SATA hard disk drives installed in the hard disk drive cage (see “Removing a hot-swap hard disk drive” on page 146).
6. Remove the hard disk drive fan assembly from the hard disk drive cage (see “Removing the hard disk drive fan assembly” on page 165).
7. Disconnect the power and signal cables from the hard disk drive backplane.
8. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
9. Remove the two screws that secure the SAS/SATA hard disk drive backplane to the drive cage.



- | | |
|----------|------------------------|
| 1 | Locating pins |
| 2 | Retaining tab |
| 3 | Retaining latch |
| 4 | Drive cage release tab |

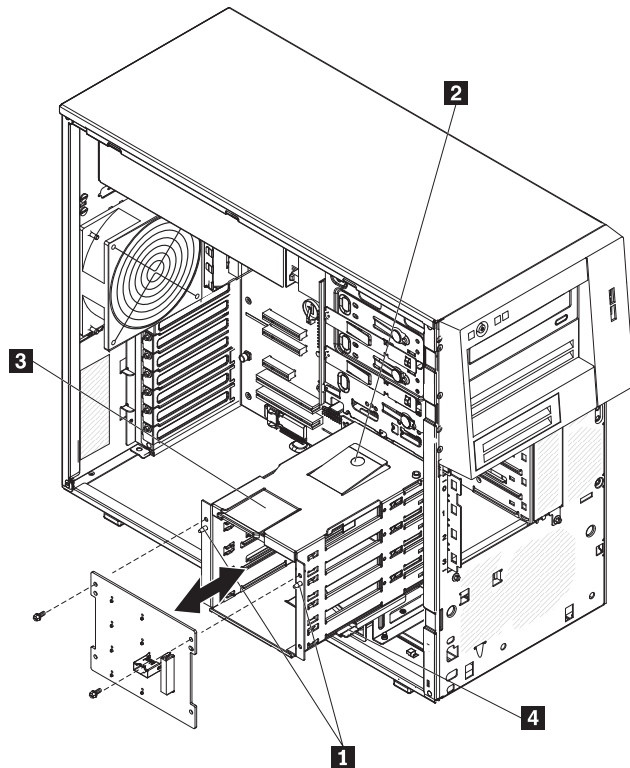
10. Tilt the top of the hard disk drive backplane away from the drive cage until it is clear of the locating pins.
11. Lift the SAS/SATA hard disk drive backplane out of the lower lip on the drive cage and set it aside.
12. If you are instructed to return the SAS/SATA hard disk drive backplane, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the SAS/SATA hard disk drive backplane

This procedure applies only to hot-swap server models with a SAS/SATA hard disk drive backplane installed on the back of the hard disk drive cage.

To install the hard disk drive backplane, complete the following steps:

1. Place the bottom edge of the SAS/SATA hard disk drive backplane in the lower lip of the drive cage.
2. Tilt the top of the SAS/SATA hard disk drive backplane toward the drive cage and over the locating pins.



- | | |
|----------|------------------------|
| 1 | Locating pins |
| 2 | Retaining tab |
| 3 | Retaining latch |
| 4 | Drive cage release tab |

3. Install the two screws that secure the SAS/SATA hard disk drive backplane to the drive cage.
4. Press and hold the retaining tab on top of the cage; then, rotate the drive cage into the chassis until it locks into place.
5. Connect the power and signal cables to the hard disk drive backplane.
6. Install the hard disk drive fan assembly onto the hard disk drive cage (see “Installing the hard disk drive fan assembly” on page 167).
7. Install the hot-swap hard disk drives that you removed from the hard disk drive cage (see “Installing a hot-swap hard disk drive” on page 148).
8. Go to “Completing the FRU replacement” on page 190.

Replacing the front-panel assembly

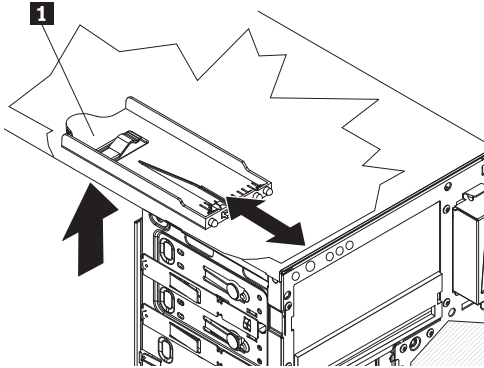
Use the following procedures to replace the front-panel assembly.

Removing the front-panel assembly

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

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).

4. Remove the lower bezel, and then remove the upper bezel (see “Removing the two-piece bezel” on page 131).
5. Slide the drives in bay 1 and bay 2 forward slightly (see “Removing a DVD drive” on page 142 for more information). It is not necessary to remove these drives.
6. If the server has hot-swap power supplies, remove the power supplies and the power supply cage (see “Replacing the hot-swap power supply cage” on page 177).
7. Disconnect the front-panel assembly cable from the system board, and note the routing of the cable (see “System-board internal connectors” on page 118 for the location of the front-panel connector).

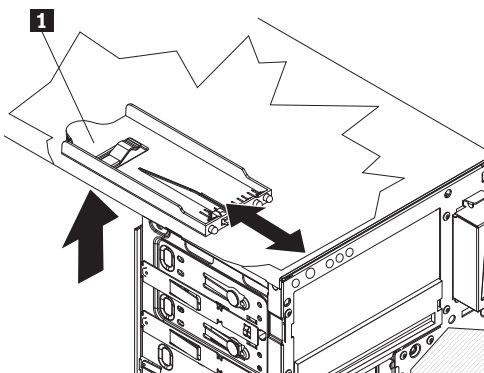


8. Press up on the release tab of the front-panel assembly **1** and pull the assembly toward the rear of the server; then, remove the front-panel assembly from the chassis.
9. If you are instructed to return the front-panel assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the front-panel assembly

To install the front-panel assembly, complete the following steps:

1. Position the front end of the front-panel assembly in the channel above drive bay 1 on the left side of the chassis.



2. Push the front-panel assembly **1** toward the front of the chassis until it clicks into place.
3. Reroute and connect the front-panel assembly cable to the system board (see “System-board internal connectors” on page 118 for the location of the front-panel connector).
4. If the server has hot-swap power supplies, install the power supply cage and the power supplies (see “Replacing the hot-swap power supply cage” on page 177).
5. Push the drives in bay 1 and bay 2 into the drive bays (see “Installing a DVD drive” on page 142 for more information).
6. Go to “Completing the FRU replacement” on page 190.

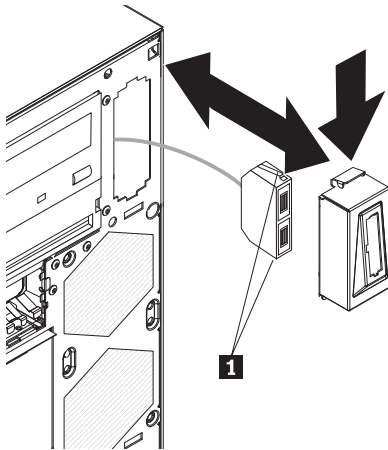
Replacing the front USB connector assembly

Use the following procedures to replace the front USB connector assembly.

Removing the front USB connector assembly

To remove the front USB connector assembly, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Remove the lower bezel, and then remove the upper bezel (see “Removing the two-piece bezel” on page 131).
5. Disconnect the front USB cable from the system board, and note the routing of the cable (see “System-board internal connectors” on page 118 for the location of the front USB connector).
6. Press down and hold the release tab on the top of the front USB housing; then, tilt the top of the housing away from the chassis and lift the housing out of the opening in the chassis.

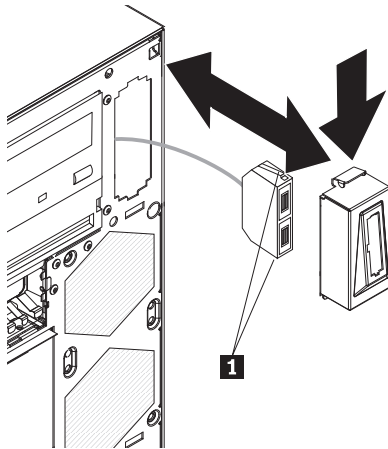


7. Squeeze the spring clips **1** on the sides of the front USB connector assembly and pull the assembly out of the back of the housing.
8. Carefully pull the front USB cable out of the opening in the chassis.
9. If you are instructed to return the front USB connector assembly, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the front USB connector assembly

To install the front USB connector assembly, complete the following steps:

1. Carefully insert the front USB cable through the opening in the front of the chassis.



2. Squeeze the spring clips **1** on the sides of the front USB connector assembly and insert the assembly into the housing through the back of the housing.
3. Place the bottom edge of the housing into the bottom of the opening in the chassis; then, tilt the top of the housing into position until it clicks into place.
4. Reroute and connect the front USB cable to the front USB connector on the system board (see “System-board internal connectors” on page 118 for the location of the front USB connector).
5. Go to “Completing the FRU replacement” on page 190.

Replacing the rear adapter retention bracket

Use the following procedures to replace the rear adapter-retention bracket.

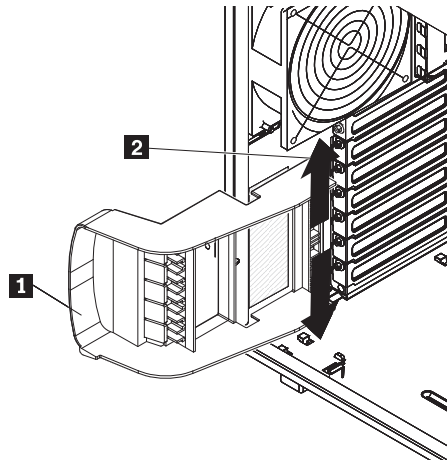
Removing the rear adapter retention bracket

To remove the rear adapter retention bracket, complete the following steps:

1. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
2. Unlock and remove the side cover (see “Removing the side cover” on page 130).
3. Remove all adapters (if necessary) and place the adapters on static-protective surface.

Note: You might find it helpful to note where each adapter is installed before you remove the adapters.

4. Release the rear adapter-retention bracket by lifting up on the rear adapter-retention bracket, and rotate the bracket partially toward the closed position.
5. Grasp the bracket on one side at the hinge point and pull inward (while you rotate the bracket slightly toward the front of the server) until the bracket **1** is free of the hinge pin **2**; then, grasp the bracket on the other side at the hinge point, pull inward until the bracket is free of the hinge pin, and remove the rear adapter-retention bracket from the server.



Installing the rear adapter retention bracket

To install the rear adapter retention bracket, complete the following steps:

1. Position the rear adapter retention bracket so that the hole in one of the hinge points is aligned with the hinge pin on the chassis; then, place the hinge pin through the hole on the chassis.
2. Rotate the rear adapter-retention bracket into place so that the hole in the opposite hinge point snaps into place over the hinge pin on the chassis.
3. Install the adapters.
4. Go to “Completing the FRU replacement” on page 190.

Replacing the front adapter retention bracket

Use the following procedures to replace the front adapter retention bracket.

Removing the front adapter retention bracket

To remove the front adapter retention bracket, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Open the front and rear adapter-retention brackets.
5. Remove all adapters (if necessary) and place them on a static-protective surface.

Note: You might find it helpful to note where each adapter is installed before you remove the adapters.

6. Grasp one side of the bracket at a hinge point and pull outward (while you rotate the bracket slightly toward the rear of the server) until the hinge pin on the bracket is free of the hole; then, grasp the bracket on the other side at the hinge point, pull outward until the bracket is free of the hinge pin, and remove the rear adapter-retention bracket from the server.

Installing the front adapter retention bracket

To install the front adapter retention bracket, complete the following steps:

1. Insert one of the hinge pins on the front adapter-retention bracket into the metal hinge point on the fan cage assembly.
2. Rotate the other hinge pin on the front adapter-retention bracket into position and push the hinge pin into the other metal hinge point. The hinge pin will protrude through the hole in the metal hinge point when the adapter-retention bracket is seated correctly.

3. Reinstall any adapters that you removed earlier.
4. Close the front and rear adapter retention brackets.
5. Go to “Completing the FRU replacement” on page 190.

Replacing the hot-swap power supply cage

Use the following procedures to replace the power supply cage. This procedure applies only to server models that have a hot-swap power supply.

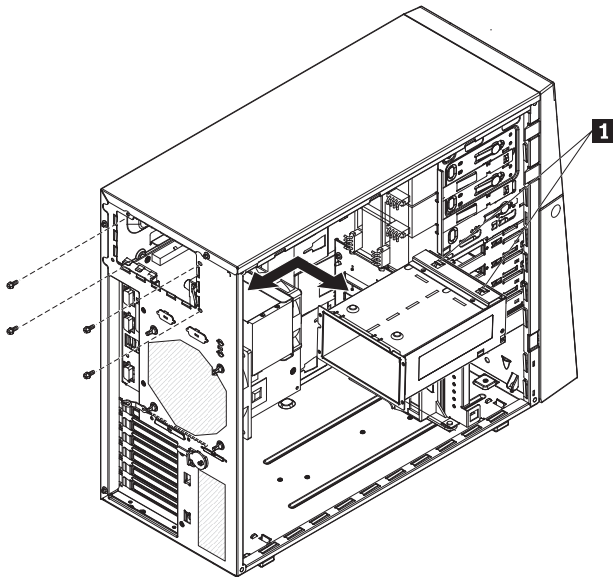
Removing the hot-swap power supply cage

To remove the power supply cage, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).
4. Remove the hot-swap power supplies (see “Replacing a non-hot-swap power supply” on page 180).

Note: It might be helpful to lay the server on its side for the remainder of this procedure.

5. Disconnect the cables from the power supply cage to the system board and all internal components.
6. Remove the four black screws that secure the power supply cage to the chassis; then, slide the cage toward the front of the server to disengage the retaining clips **1** from the top of the chassis and lift the cage out of the chassis.



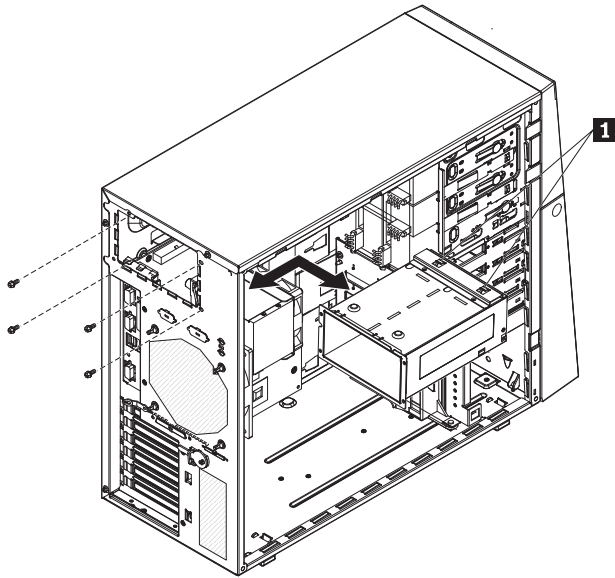
7. If you are instructed to return the power supply cage, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the hot-swap power supply cage

This procedure applies only to server models that have hot-swap power supply.

To install the hot-swap power supply cage, complete the following steps:

1. Place the power supply cage into the chassis and slide it toward the rear of the server until the retaining clips **1** engage the top of the chassis.



2. Install the four screws that secure the power supply cage to the chassis.
3. Connect the cables from the power supply cage to the system board and all internal components (see “System-board internal connectors” on page 118 for the locations of the internal connectors).
4. Reinstall both hot-swap power supplies (see “Installing a hot-swap power supply” on page 179).
5. Go to “Completing the FRU replacement” on page 190.

Replacing a hot-swap power supply

This procedure applies only to server models that have hot-swap power supplies.

When you remove or install a hot-swap power supply, observe the following precautions.

Statement 8:



CAUTION:

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



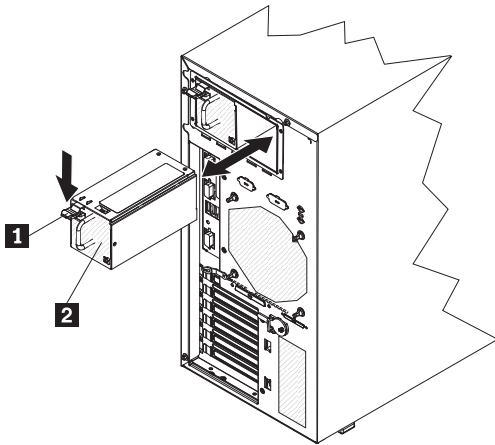
Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Removing a hot-swap power supply

To remove a hot-swap power supply, complete the following steps:

1. Read the safety information that begins on page “Important Safety Information” on page 1.

2. Disconnect the power cord from the power supply that is to be removed.
3. Press down on the orange release lever **1** and pull the power supply **2** out of the bay, using the handle.



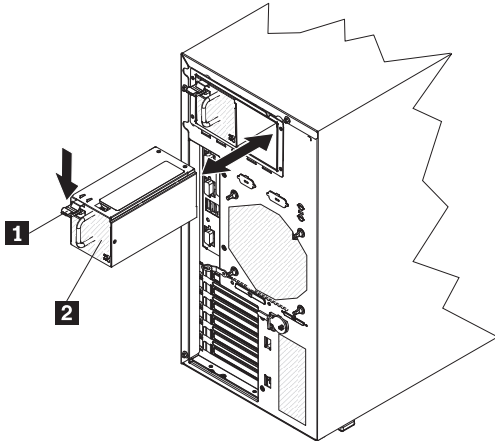
4. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a hot-swap power supply

This procedure applies only to server models that have hot-swap power supplies.

To install a hot-swap power supply, complete the following steps:

1. Place the power supply into the bay guides.



2. Using the handle, push the power supply toward the front of the chassis until it locks into place.
3. Connect one end of the power cord into the connector on the back of the power supply and connect the other end of the power cord into a properly grounded electrical outlet.
4. Make sure that both the ac and dc power LEDs on the rear of the power supply are lit, indicating that the power supply is operating correctly.

Replacing a non-hot-swap power supply

This procedure applies only to server models that have a non-hot-swap power supply.

When you remove or install a non-hot-swap power supply, observe the following precautions.

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.

Removing a non-hot-swap power supply

To remove a non-hot-swap power supply, complete the following steps:

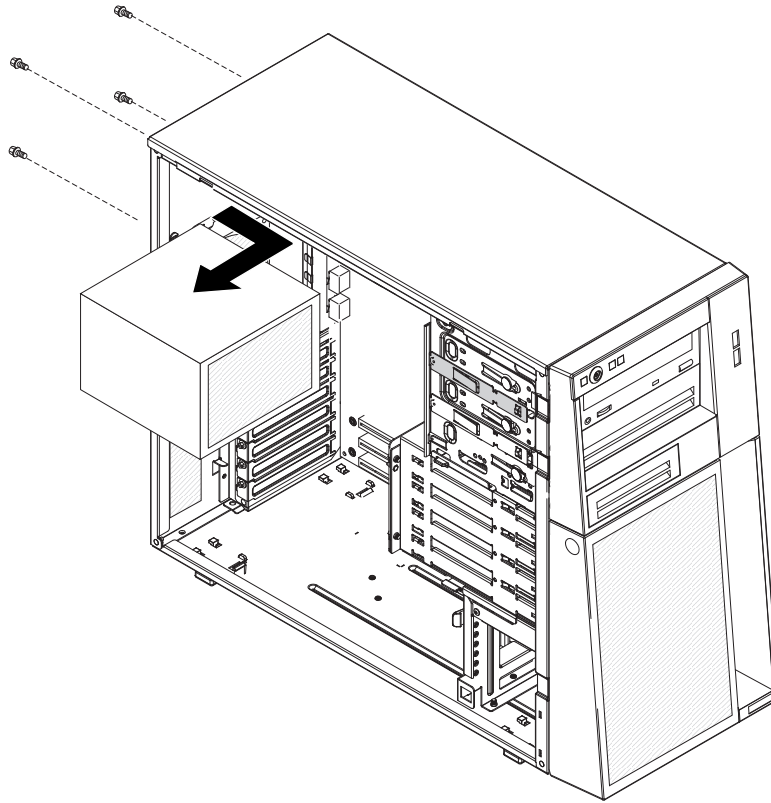
1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Unlock and remove the side cover (see “Removing the side cover” on page 130).

Note: It might be helpful to lay the server on its side for the remainder of this procedure.

4. Disconnect the cables from the power supply to the system board and all internal components.

Attention: Support the power supply while you remove the mounting screws. After the screws are removed, the power supply is loose and can damage other components in the server.

5. While you support the power supply, remove the four screws that secure it to the chassis; then, lift the power supply out of the chassis. Save the screws to use when you install the replacement power supply.



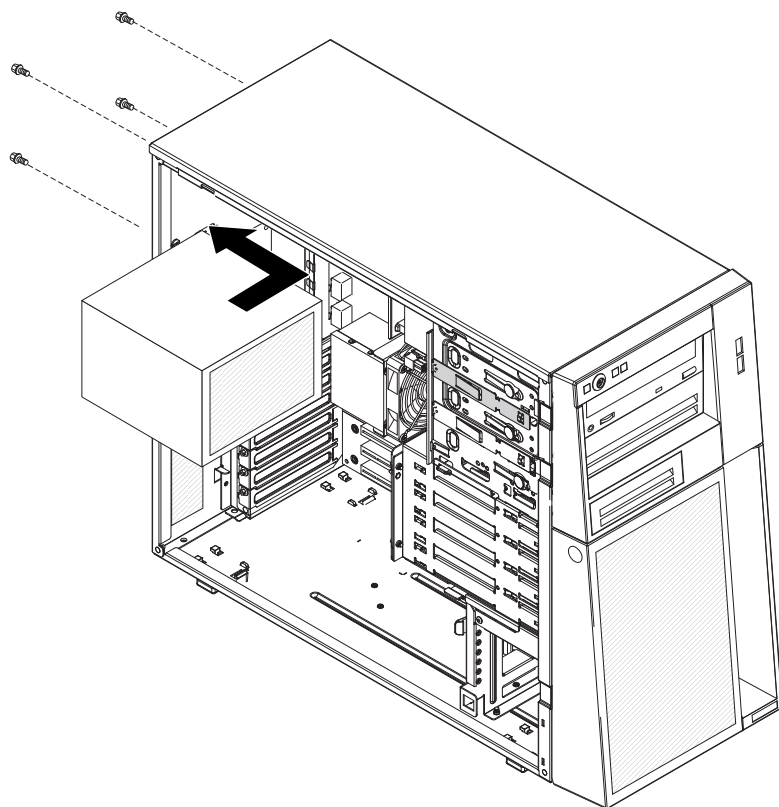
6. If you are instructed to return the power supply, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a non-hot-swap power supply

This procedure applies only to server models that have a non-hot-swap power supply.

To install a non-hot-swap power supply, complete the following steps:

1. Position the power supply in the chassis so that the screw holes in the power supply are aligned with the corresponding holes in the rear of the chassis.



2. Install the four screws that secure the power supply to the chassis.
3. Connect the cables from the power supply to the system board and all internal components (see “System-board internal connectors” on page 118 for the locations of the internal connectors).
4. Go to “Completing the FRU replacement” on page 190.

Replacing the microprocessor and fan sink

Use the following procedures to replace the microprocessor and fan sink.

Removing the microprocessor and fan sink

To remove the microprocessor and fan sink, complete the following steps:

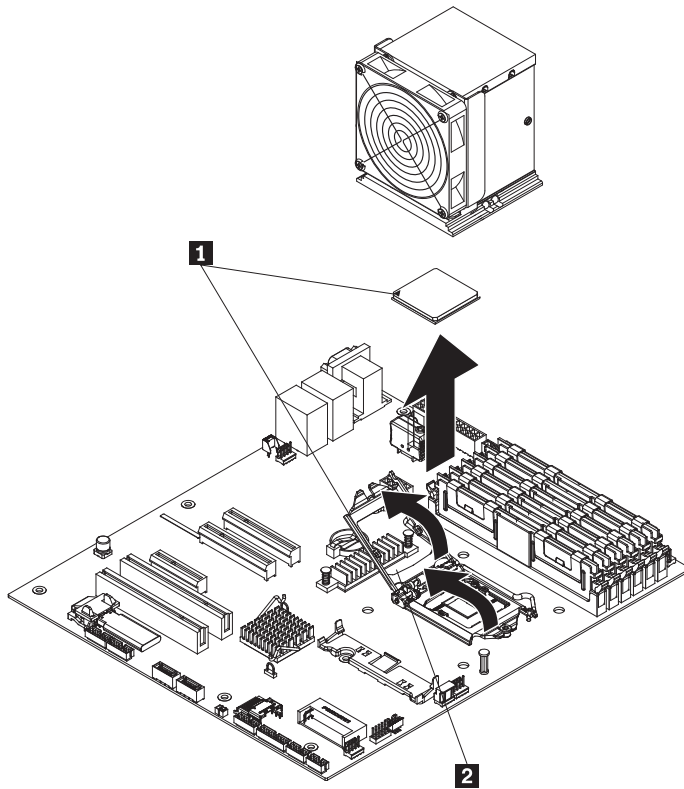
1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Turn the server on its side so that it is lying flat, with the cover facing up.
4. Unlock and remove the side cover (see “Removing the side cover” on page 130).
5. Remove the lower bezel (see “Removing the two-piece bezel” on page 131).
6. Remove the hard disk drives.
7. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
8. Disconnect any cables that impede access to the fan sink and microprocessor.

Attention: The fan-sink retention lever is spring-loaded when the fan sink is in place. Releasing the lever too quickly or allowing it to spring upward can damage the fan sink and surrounding components.

9. Remove the fan sink from the microprocessor:
 - a. Disconnect the fan-sink cable from the system board.

- b. Release the fan-sink retention lever by pressing down on the end, moving it to the side and slowly releasing it to the open (up) position.

Important: Be careful when you handle the microprocessor and fan sink. If the microprocessor and fan sink will be reused, do not contaminate the thermal material between them.



- c. Tip the top of the fan sink toward the front of the server while you slide it away from the lower flange of the retention module; then, remove it from the server. After removal, place the fan sink on its side on a clean, flat surface.

Attention: The microprocessor retention latch is spring-loaded when the microprocessor is in place. Releasing the latch too quickly or allowing it to spring upward can damage the microprocessor and surrounding components.

10. Release the microprocessor retention latch by pressing down on the end, moving it to the side, and slowly releasing it to the open (up) position.
11. Open the microprocessor bracket frame by lifting up the tab on the top edge.
12. Carefully lift the microprocessor straight up and out of the socket, and place it on a static-protective surface.
13. If you are instructed to return the microprocessor and fan sink, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the microprocessor and fan sink

To install the microprocessor, complete the following steps:

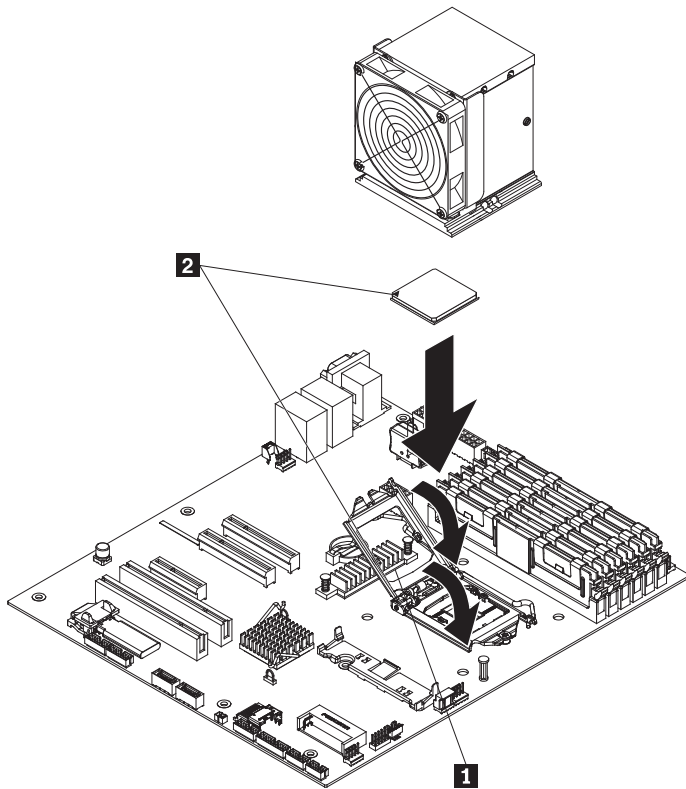
1. Touch the static-protective package that contains the microprocessor to any unpainted metal surface on the server. Then, remove the microprocessor from the package.
2. Remove the protective cover, tape, or label from the surface of the microprocessor socket, if any is present.
3. Rotate the release lever on the microprocessor socket to the fully open position.

Attention: Make sure that the release lever on the microprocessor socket is in the fully open position before you insert the microprocessor in the socket. Failure to do so might result in permanent damage to the microprocessor, microprocessor socket, and system board.

- Carefully grasp the microprocessor and place the microprocessor into the microprocessor socket.

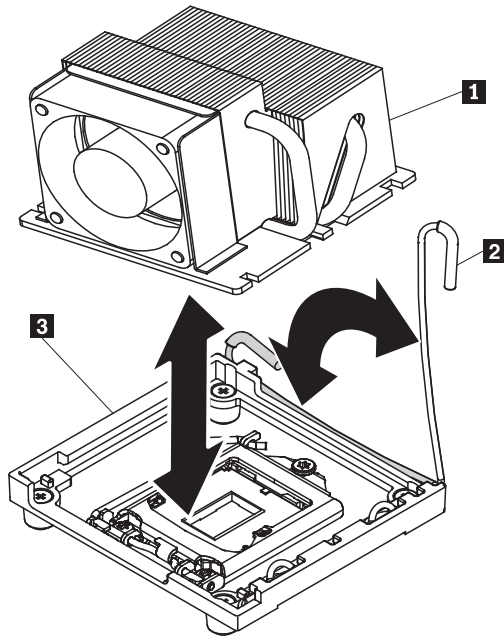
Note: To maintain correct orientation between the microprocessor and the microprocessor socket during installation, observe the following information:

- The microprocessor has two notches that are keyed to two tabs on the sides of the socket.
- A triangle-shaped indicator on one corner of the microprocessor points to a 45-degree angle on one corner of the socket.
- Do not use excessive force when you press the microprocessor into the socket.



- Close the microprocessor bracket frame; then, close the microprocessor retention latch and lock it securely in place.
- Install the fan sink:
 - Make sure that the fan sink retention lever is in the fully open position.

Important: Be careful when you handle the microprocessor and fan sink. Do not contaminate the thermal material between them.



- b. Slide the bottom edge of the fan sink under the lower flange of the retention module; then, place the top of the fan sink onto the top of the retention module.
 - c. Close the fan sink retention lever and lock it securely in place.
 - d. Reconnect the fan sink cable to the system board (see “System-board internal connectors” on page 118 for the location of the fan-sink connector).
7. Reconnect any cables that you disconnected during the removal of the old microprocessor.
 8. Rotate the drive cage toward the front of the server until it stops; then, lift and hold the retaining tab on top of the drive cage while you rotate the drive cage into the chassis until it locks into place.
 9. Reinstall the hard disk drives.
 10. Go to “Completing the FRU replacement” on page 190.

Thermal grease

The thermal grease must be replaced whenever the fan sink has been removed from the top of the microprocessor and is going to be reused or when debris is found in the grease.

When you are installing the fan sink on the same microprocessor that is was removed from, make sure that:

- The thermal grease on the fan sink and microprocessor is not contaminated.
- Additional thermal grease is not added to the existing thermal grease on the fan sink and microprocessor.

Note:

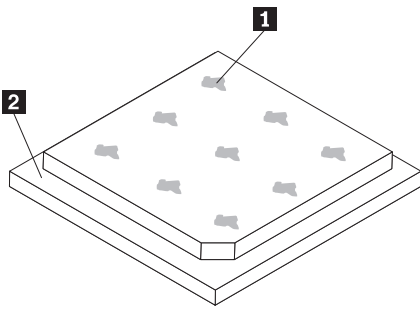
- Read the Safety information on page 1.
- Read “Handling static-sensitive devices” on page 129.

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

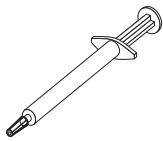
1. Place the fan sink on a clean work surface.
2. Remove the cleaning pad from its package and unfold it completely.
3. Use the cleaning pad to wipe the thermal grease from the bottom of the fan sink.

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

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



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



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

6. Install the fan sink onto the microprocessor as described in “Installing the microprocessor and fan sink” on page 183.

Replacing the system board

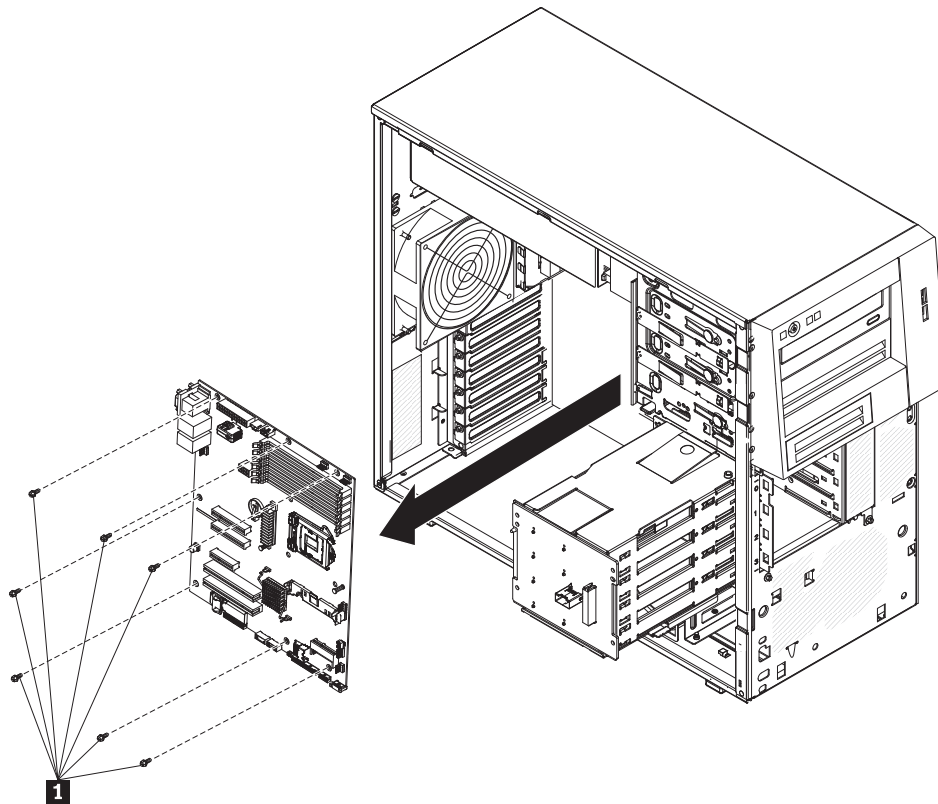
Use the following procedures to replace the system board.

Removing the system board

To remove the system board, complete the following steps:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices; then, disconnect all power cords and external cables.
3. Turn the server on its side so that it is lying flat, with the cover facing up.
4. Unlock and remove the side cover (see “Removing the side cover” on page 130).
5. Note where each cable is connected; then, disconnect all cables from the system board.
6. Press and hold the drive cage release tab; then, rotate the drive cage out of the chassis until the retaining tab on top of the cage locks into place.
7. Remove any of the following components (in addition to others that might not be listed) that are installed on the system board and put them in a safe, static-protective place:
 - Adapters (see “Replacing an adapter” on page 152).
 - SAS/SATA controller (see “Removing a ServeRAID BR10-il controller” on page 156).
 - Virtual media key (see “Removing the virtual media key” on page 162).
 - Microprocessor and fan sink (see “Removing the microprocessor and fan sink” on page 182).
 - DIMMs (see “Removing a memory module” on page 137).
 - Battery (see “Installing the battery” on page 189).
 - SAS/SATA controller (see “Removing a ServeRAID BR10-il controller” on page 156).
 - Hypervisor key (see “Removing a USB embedded hypervisor flash device” on page 161).
 - The fan connector covers.

8. Remove the microprocessor and fan sink (see “Removing the microprocessor and fan sink” on page 182.)
9. Remove the eight screws (seven in front and one in rear) **1** that secure the system board to the chassis.



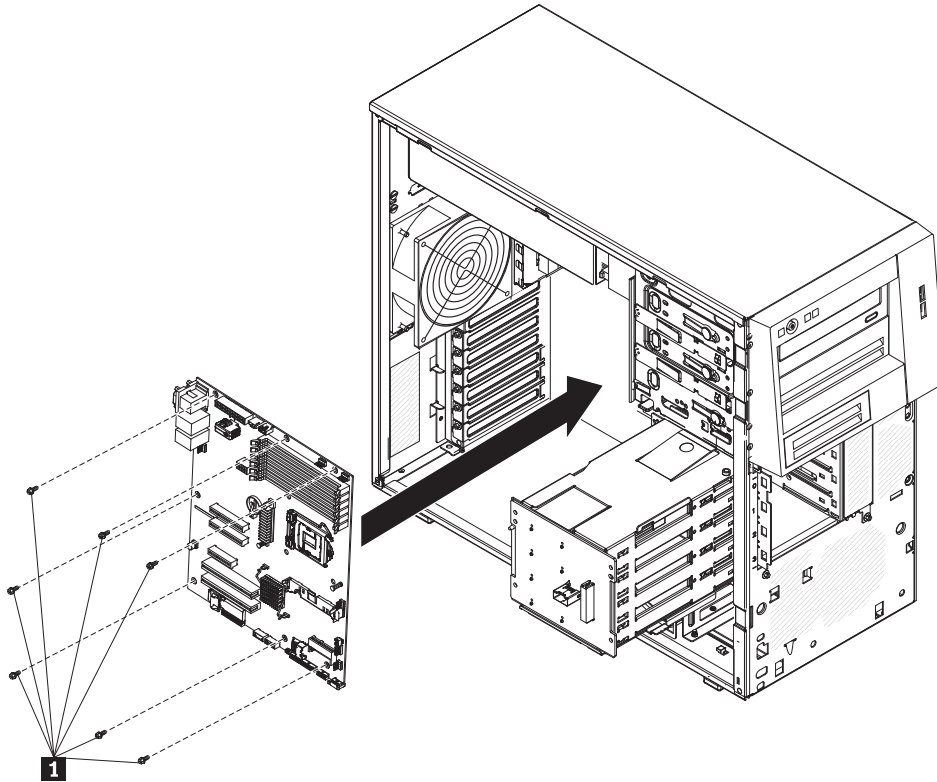
10. Slide the system board toward the front of the server to disengage the tabs on the fan sink mounting bracket from the slots on the bottom of the chassis; then, carefully lift the system board out of the server.
11. Remove the fan connector covers from fan connectors 1, 3, and 5 on the system board. Then, put the fan connector covers aside for use later.
12. If you are instructed to return the system board, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the system board

To install the system board, complete the following steps:

1. Touch the static-protective package that contains the system board to any unpainted metal surface on the server. Then, remove the system board from the package.
2. Install the fan connector covers onto fan connectors 1, 3, and 5 on the system board.
3. Install the microprocessor and fan sink (see “Installing the microprocessor and fan sink” on page 183.)
4. Insert the system board into the chassis and slide it toward the rear of the server until the tabs on the fan sink mounting bracket is fully engaged in the holes for fan sink mounting bracket slots on the bottom the chassis.

Note: The tabs are fully engaged when the screw holes in the system board are aligned with the corresponding holes in the chassis.



5. Install the eight screws (seven in front and one in rear) that secure the system board to the chassis.
6. Install any of the following components that you removed from the system board:
 - The fan connector covers.
 - Hypervisor key (see “Installing a USB embedded hypervisor flash device” on page 161).
 - Virtual media key (see “Installing the virtual media key” on page 163).
 - SAS/SATA controller (see “Installing a ServeRAID BR10-il controller” on page 157).
 - Battery (see “Installing the battery” on page 189).
 - DIMMs (see “Installing a memory module” on page 138).
 - Microprocessor and fan sink (see “Installing the microprocessor and fan sink” on page 183).
 - Adapters (see “Installing an adapter” on page 153).
7. Press and hold the retaining tab on top of the cage; then, rotate the drive cage into the chassis until it locks into place.
8. Reconnect any cables to the system board that you disconnected during removal.
9. When a new system board is installed, you must update the UUID and the DMI/SMBIOS data. See “Updating the Universal Unique Identifier (UUID)” on page 195 and “Updating the DMI/SMBIOS data” on page 196.
10. Go to “Completing the FRU replacement” on page 190.

Replacing the battery

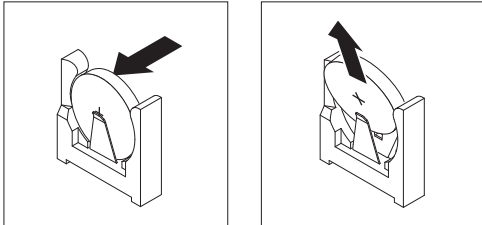
Use the following procedures to replace the battery.

Removing the battery

To remove the battery, do the following:

1. Read the safety information that begins on page 1.
2. Turn off the server and all attached devices.

3. Disconnect all external cables and power cords.
4. Turn the server on its side so that it is lying flat, with the side cover facing up.
5. Unlock and remove the left-side cover (see “Removing the side cover” on page 130).
6. Locate the battery on the system board (see “System-board internal connectors” on page 118).
7. Remove the battery:
 - a. Use one finger to push the battery horizontally out of its socket, pushing it away from the socket.
 - b. Lift and remove the battery from the socket.



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

Installing the battery

The following notes describe information that you must consider when you replace the battery in the server:

- You must replace the battery with a lithium battery of the same type from the same manufacturer.
- After you replace the battery, you must reconfigure the server and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

Statement 2:

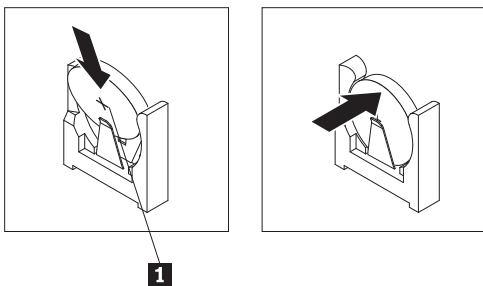


CAUTION:

When replacing the lithium battery, use only 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



To install the replacement battery, do the following:

1. Follow any special handling and installation instructions that come with the replacement battery.

2. Insert the replacement battery **1**:
 - a. Hold the battery in a vertical orientation so that the smaller side is facing the socket.
 - b. Place the battery into its socket, and press the battery towards the socket until it clicks into place. Make sure that the battery clip holds the battery securely.
3. Install and lock the left-side cover (see “Installing the side cover” on page 131).
4. Reconnect the external cables and power cords; then, turn on the attached devices and turn on the server.

Note: You must wait approximately 2 1/2 minutes after you connect the server power cord to an electrical outlet before the power-control button becomes active.

5. Start the Setup Utility and reset the configuration:
 - Set the system date and time.
 - Set the power-on password.
 - Reconfigure the server.See “Using the Setup Utility” on page 246.
6. Go to “Completing the FRU replacement.”

Completing the FRU replacement

To complete the FRU replacement, you must:

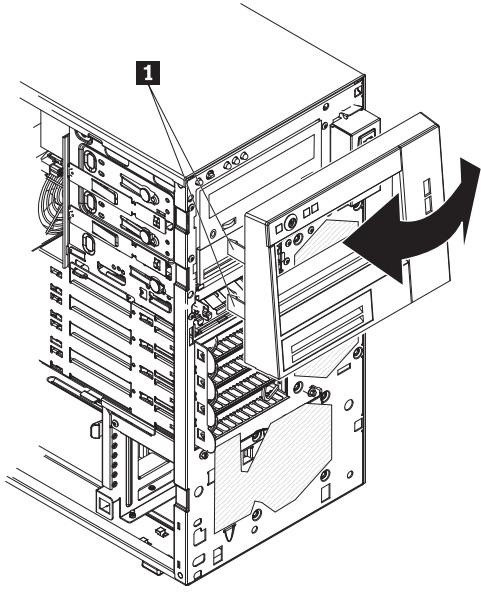
- If removed, reinstall the two-piece bezel (see “Reinstalling the two-piece bezel”).
- If removed, reinstall the side cover (see “Reinstalling the side cover” on page 193.)
- Connect all the cables (see “Connecting the cables” on page 194.)
- For some devices, run the Setup utility (see “Using the Setup Utility” on page 246.)

Follow the instructions in this section.

Reinstalling the two-piece bezel

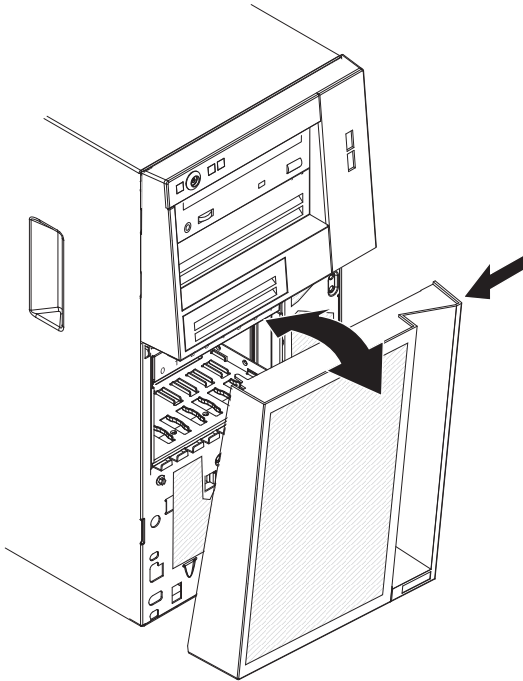
To reinstall the two-piece bezel, complete the following steps:

1. Install the upper bezel on the front of the server chassis:
 - a. Insert the two right-side tabs on the upper bezel into the matching holes on the right side of the chassis.
 - b. Rotate the upper bezel to the left side of the chassis and press the bezel clips into the matching indentations on the left side of the chassis until the bezel clips snap into place.



2. Install the lower bezel:

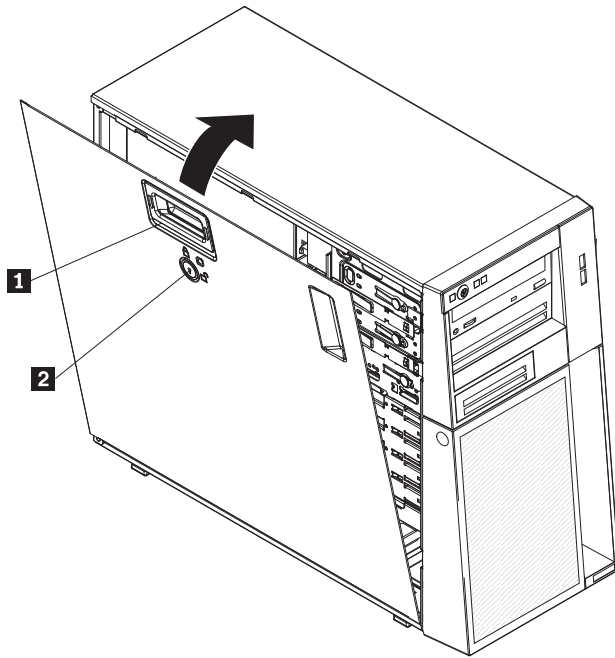
- a. Insert the two bottom tabs on the lower bezel into the matching holes in the front of the chassis.



- b. Rotate the top of the lower bezel up to the chassis; then, press the blue release tab on the right side of the lower bezel and completely close the lower bezel until it locks securely into place.

Reinstalling the side cover

If you removed the side cover, reinstall it.



Note: The rear adapter-retention bracket rests against the server side cover. You might find it easier to lay the server on its side to replace the side cover.

To reinstall the side cover, complete the following steps:

1. Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server. Also, make sure that all internal cables are correctly routed.

Note: The cover-release latch must be in the unlocked (opened) position before you install the side cover.

2. Position the lip on the bottom edge of the side cover on the ledge on the bottom of the chassis; then, rotate the cover up to the chassis, and then press down on the cover release latch and push the cover completely closed until it latches securely into place.
3. Press down on the cover-release latch and close the cover to secure it in place.
4. Lock the side cover.

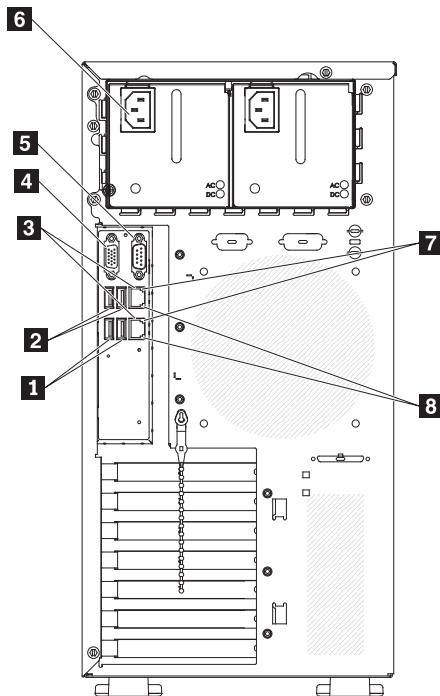
Note: When you lock the server side cover, it locks both the cover and the bezel.

Connecting the cables

Attention: To prevent damage to equipment, connect the power cords last.

If the server cables and connector panel have color-coded connections, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue panel connector, a red cable end with a red connector, and so on.

The following illustration shows the input/output (I/O) connectors on the rear of the server.



Updating the server configuration

When you start the server for the first time after you add or remove a device, you might receive a message that the configuration has changed. The Setup Utility starts automatically so that you can save the new configuration settings. For more information, see Chapter 8, “Configuring the server,” on page 245.

Some optional devices have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each device.

The server comes with at least one microprocessor. If more than one microprocessor is installed, the server can operate as a symmetric multiprocessing (SMP) server. You might have to upgrade the operating system to support SMP. For more information, see “Typical operating system installation” on page 257 and the operating-system documentation.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.

For information about configuring the integrated Gigabit Ethernet controller, see “Configuring the Gigabit Ethernet controllers” on page 265.

Updating the Universal Unique Identifier (UUID)

The Universal Unique Identifier (UUID) must be updated when the system board is replaced. Use the Advanced Settings Utility to update the UUID in the UEFI-based server. The ASU is an online tool that supports several operating systems. Make sure that you download the version for your operating system. To download the ASU and update the UUID, complete the following steps:

1. Download the Advanced Settings Utility (ASU):
 - a. Go to: <http://www.lenovo.com/support>.
 - b. From the **Select your product** list, select **Servers and Storage**.
 - c. In the **Browse by product** window **Family:** list, select **ThinkServer TS200**.
 - d. Click **Downloads and drivers** to link to the ASU program.
2. ASU sets the UUID in the Integrated Management Module (IMM). Select one of the following methods to access the Integrated Management Module (IMM) to set the UUID:
 - Online from the target system (LAN or keyboard console style (KCS) access)
 - Remote access to the target system (LAN based)
3. Copy and unpack the ASU package, which also includes other required files, to the server. Make sure that you unpack the ASU and the required files to the same directory. In addition to the application executable (asu or asu64), the following files are required:
 - For Windows based operating systems:
 - `ibm_rndis_server_os.inf`
 - `device.cat`
 - For Linux based operating systems:
 - `cdc_interface.sh`
4. After you install ASU, use the following command syntax to set the UUID:

```
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> [access_method]
```

Where:

<uuid_value>

Up to 16-byte hexadecimal value assigned by you.

[access_method]

The access method that you selected to use from the following methods:

- Online authenticated LAN access, type the command:

```
[host <imm_internal_ip>] [user <imm_user_id>] [password <imm_password>]
```

Where:

imm_internal_ip

The IMM internal LAN/USB IP address. The default value is 169.254.95.118.

imm_user_id

The IMM account (1 of 12 accounts). The default value is USERID.

imm_password

The IMM account password (1 of 12 accounts). The default value is PASSWORD (with a zero 0 not an O).

Note: If you do not specify any of these parameters, ASU will use the default values. When the default values are used and ASU is unable to access the IMM using the online authenticated LAN access method, ASU will automatically use the unauthenticated KCS access method.

The following commands are examples of using the userid and password default values and not using the default values:

Example that does not use the userid and password default values:
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> user <user_id>
password <password>

Example that does use the userid and password default values:
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example:

```
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value>
```

The KCS access method uses the IPMI/KCS interface. This method requires that the IPMI driver be installed. Some operating systems have the IPMI driver installed by default. ASU provides the corresponding mapping layer. See the *Advanced Settings Utility Users Guide* for more details. You can access the ASU Users Guide from the Lenovo support Web site.

- a. Go to: <http://www.lenovo.com/support>.
 - b. From the **Select your product** list, select **Servers and Storage**.
 - c. In the **Browse by product** window **Family:** list, select **ThinkServer TS200**.
 - d. Click **User's guides and manuals** to link to the ASU Users Guide.
- Remote LAN access, type the command:

Note: When using the remote LAN access method to access IMM using the LAN from a client, the *host* and the *imm_external_ip* address are required parameters.

```
host <imm_external_ip> [user <imm_user_id>[[password <imm_password>]]
```

Where:

imm_external_ip

The external IMM LAN IP address. There is no default value. This parameter is required.

imm_user_id

The IMM account (1 of 12 accounts). The default value is USERID.

imm_password

The IMM account password (1 of 12 accounts). The default value is PASSWORD (with a zero 0 not an O).

The following commands are examples of using the user ID and password default values and not using the default values:

Example that does not use the user ID and password default values:

```
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> host <imm_ip>  
user <user_id> password <password>
```

Example that does use the userid and password default values:

```
asu set SYSTEM_PROD_DATA.SysInfoUUID <uuid_value> host <imm_ip>
```

5. Restart the server.

Updating the DMI/SMBIOS data

The Desktop Management Interface (DMI) must be updated when the system board is replaced. Use the Advanced Settings Utility to update the DMI in the UEFI-based server. The ASU is an online tool that supports several operating systems. Make sure that you download the version for your operating system. To download the ASU and update the DMI, complete the following steps.

1. Download the Advanced Settings Utility (ASU):
 - a. Go to: <http://www.lenovo.com/support>.

- b. From the **Select your product** list, select **Servers and Storage**.
 - c. In the **Browse by product** window **Family:** list, select **ThinkServer TS200**.
 - d. Click **Downloads and drivers** to link to the ASU program.
2. ASU sets the DMI in the Integrated Management Module (IMM). Select one of the following methods to access the Integrated Management Module (IMM) to set the DMI:
 - Online from the target system (LAN or keyboard console style (KCS) access)
 - Remote access to the target system (LAN based)
 3. Copy and unpack the ASU package, which also includes other required files, to the server. Make sure that you unpack the ASU and the required files to the same directory. In addition to the application executable (asu or asu64), the following files are required:
 - For Windows based operating systems:
 - ibm_rndis_server_os.inf
 - device.cat
 - For Linux based operating systems:
 - cdc_interface.sh
 4. After you install ASU, Type the following commands to set the DMI:

```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
```

Where:

<m/t_model>

The server machine type and model number. Type *mtm xxxxyy*, where *xxxx* is the machine type and *yyy* is the server model number.

<s/n> The serial number on the server. Type *sn zzzzzzz*, where *zzzzzzz* is the serial number.

<asset_method>

The server asset tag number. Type *asset aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa*, where *aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa* is the asset tag number.

[access_method]

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:
`[host <imm_internal_ip>] [user <imm_user_id>] [password <imm_password>]`

Where:

imm_internal_ip

The IMM internal LAN/USB IP address. The default value is 169.254.95.118.

imm_user_id

The IMM account (1 of 12 accounts). The default value is USERID.

imm_password

The IMM account password (1 of 12 accounts). The default value is PASSWORD (with a zero 0 not an O).

Note: If you do not specify any of these parameters, ASU will use the default values. When the default values are used and ASU is unable to access the IMM using the online authenticated LAN access method, ASU will automatically use the following unauthenticated KCS access method.

The following commands are examples of using the *userid* and *password* default values and not using the default values:

Examples that do not use the userid and password default values:

```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
user <imm_user_id> password <imm_password>
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> user <imm_user_id>
password <imm_password>
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
user <imm_user_id> password <imm_password>
```

Examples that do use the userid and password default values:

```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

The KCS access method uses the IPMI/KCS interface. This method requires that the IPMI driver be installed. Some operating systems have the IPMI driver installed by default. ASU provides the corresponding mapping layer. To see the *Advanced Settings Utility Users Guide*. You can access the ASU Users Guide from the Lenovo support Web site.

- a. Go to: <http://www.lenovo.com/support>.
- b. From the **Select your product** list, select **Servers and Storage**.
- c. In the **Browse by product** window **Family:** list, select **ThinkServer TS200**.
- d. Click **User's guides and manuals** to link to the ASU Users Guide.

The following commands are examples of using the userid and password default values and not using the default values:

Examples that do not use the userid and password default values:

```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
```

- Remote LAN access, type the command:

Note: When using the remote LAN access method to access IMM using the LAN from a client, the *host* and the *imm_external_ip* address are required parameters.

```
host <imm_external_ip> [user <imm_user_id>[[password <imm_password>]]
```

Where:

imm_external_ip

The external IMM LAN IP address. There is no default value. This parameter is required.

imm_user_id

The IMM account (1 of 12 accounts). The default value is USERID.

imm_password

The IMM account password (1 of 12 accounts). The default value is PASSWORD (with a zero 0 not an O).

The following commands are examples of using the userid and password default values and not using the default values:

Examples that do not use the userid and password default values:

```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> host <imm_ip>
user <imm_user_id> password <imm_password>
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> host <imm_ip>
user <imm_user_id> password <imm_password>
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> host <imm_ip>
```

```
user <imm_user_id> password <imm_password>
```

Examples that do use the userid and password default values:

```
asu set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> host <imm_ip>
```

```
asu set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> host <imm_ip>
```

```
asu set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> host <imm_ip>
```

5. Restart the server.

Chapter 7. Parts listing, TS200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530

The following replaceable components are available for the ThinkServer TD200 Types 6522, 6523, 6524, 6525, 6526, 6528, 6529, and 6530 servers. To check for an updated parts listing on the Web, complete the following steps:

1. Go to <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS200**, and click **Continue**.

Replaceable server components

Replaceable components are of three types:

- **Self-service customer replaceable unit (CRU):** Replacement of self-service CRUs is your responsibility. If Lenovo installs a self-service CRU at your request, you will be charged for the installation.
- **Optional-service customer replaceable unit:** You may install an optional-service CRU yourself or request Lenovo 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.

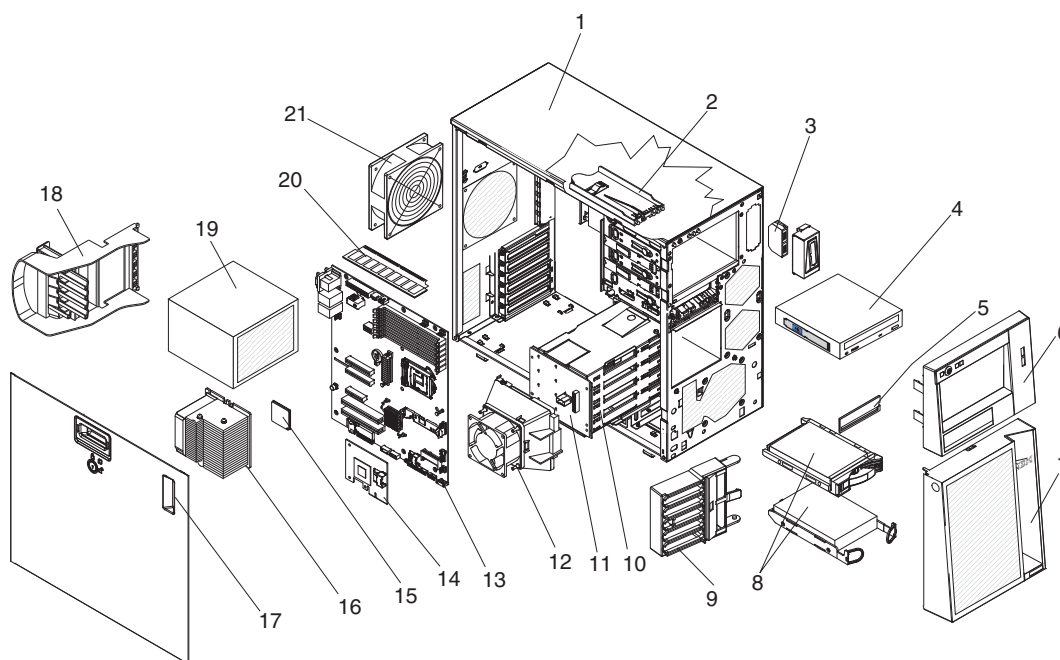


Table 15. Parts listing, Type 6522

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
1	Chassis assembly (models CTO All Models)			49Y8457
2	Operator Information Panel Assembly (models CTO All Models)		49Y8456	
3	Front USB connector assembly (models CTO All Models)		49Y8449	
4	DVD-RAM Drive, SATA (models CTO)	43W8467		
4	DVD-ROM Drive, SATA (models CTO)	43W8466		
5	Bezel Kit (models CTO All Models)	42C8942		
6	Bezel, upper (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2947		
7	Bezel, lower (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2948		

Table 15. Parts listing, Type 6522 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
8	Hard disk drive, 250GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11G 11M 11A 11J)	45J9634		
8	Hard disk drive, 500GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U1024		
8	Hard disk drive, 250GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9642		
8	Hard disk drive, 500GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9644		
8	Hard disk drive, 146GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9658		
8	Hard disk drive, 750GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9638		
8	Hard disk drive, 750GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9646		
8	Hard disk drive, 300GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9660		
8	Hard disk drive, IBM 1TB 7200 SATA 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9648		
8	Hard disk drive, IBM 450GB 15K SAS 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2108		
8	Hard disk drive, IBM Server 1TB 7200 SATA 3.5" Simple Swap HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2916		
8	Hard disk drive, 73GB 15K 3.5" Hot-Swap SAS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2088		
8	Hard disk drive, ThinkServer 300GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3014		
8	Hard disk drive, ThinkServer 450GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3015		
8	Hard disk drive, ThinkServer 600GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3016		
9	Retention bracket (front), adapter (models CTO All Models)		13N2993	
10	Hard disk drive cage, 3.5-inch drives (models CTO All Models)		49Y8451	
11	SAS/SATA hard disk drive backplane (for 3.5-inch drive cage) (models CTO All Models)	49Y4462		
11	SATA backplate, simple-swap (models)	25R8842		
12	Hard disk drive fan assembly (for 3.5-inch drive cage) (models)		39Y9860	
13	System board assembly (models CTO All Models)			69Y1013
14	ServeRAID-BR10il SAS/SATA controller (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	49Y4737		

Table 15. Parts listing, Type 6522 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
15	Microprocessor, Celeron G1101 2.26GHz/1066MHz-2MB 2C (models CTO)			49Y4645
15	Microprocessor, Xeon X3460 2.8GHz/1333MHz-8MB 4C (models CTO)			49Y4646
15	Microprocessor, Xeon X3430 2.4GHz/1333MHz-8MB 4C (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)			49Y4647
15	Microprocessor, Xeon X3440 2.53GHz/1333MHz-8MB 4C (models CTO)			49Y4648
15	Microprocessor, Xeon X3450 2.67GHz/1333MHz-8MB 4C (models CTO)			49Y4649
15	Microprocessor, Pentium G6950 2.8 GHz/1066MHz-3MB 2C (models CTO)			49Y4668
15	Microprocessor, Xeon X3470 2.93GHz/1333MHz-8MB 4C (models CTO)			46C6775
15	Microprocessor, Core i3-540 3.06 GHz/1333MHz-4MB 2C (models CTO)			59Y3175
15	Microprocessor, Core i3-530 2.93 GHz/1333MHz-4MB 2C (models CTO)			59Y3176
16	Fan sink (models CTO All Models)		49Y8390	
17	Side cover with lock (models CTO All Models)		49Y8447	
18	Retention bracket (rear), adapter (models CTO All Models)		49Y8450	
19	Power supply, 401w PSU Fixed (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)			46M6678
19	Power supply, 430w PSU H/S (models CTO)	46M6679		
20	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
20	Memory, 1GB (1x1GB, Single Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP UDIMM(models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2906		
20	Memory, 2GB DDR3-1333 2Rx8 LP UDIMM (models CTO)	46U2907		
20	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
20	Memory, 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM (models CTO)	46U2941		
20	Memory, 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM (models CTO)	46U2942		
21	System fan, rear (models CTO All Models)		49Y8445	
	System battery (models CTO All Models)	33F8354		
	EMC SAS/SATA Backplate (models CTO All Models)		25R8784	
	ServeRAID-MR10i adapter (models CTO)	43W4297		
	ServeRAID-MR10is VAULT adapter (models CTO)	44E8696		
	IBM 3Gb SAS HBA Controller v2 (models CTO)	44E8701		
	ServeRAID M5015 SAS/SATA Controller (models CTO)	46M0851		

Table 15. Parts listing, Type 6522 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	ServeRAID M5025 SAS/SATA Controller (models CTO)	46M0854		
	ServeRAID M1015 SAS/SATA Controller (models CTO)	46M0862		
	ServeRAID-MR10i Li-Ion Battery (models CTO)	43W4301		
	ServeRAID-MR10M SAS/SATA Controller with Remote Battery Kit (models CTO)	43W4341		
	ServeRAID M1015 RAID 5 Upgrade Key (models CTO)	46M0864		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	NetXtreme II 1000 Express Ethernet Adapter (models CTO)	39Y6070		
	PRO/1K PT Dual adapter (models CTO)	39Y6128		
	PRO/1K PT Quad adapter (models CTO)	39Y6138		
	PRO/1K PF Srvr adapter (models CTO)	42C1752		
	QLogic 10Gb CNA adapter (models CTO)	42C1802		
	8x 2.5" Gen2 Cage (models CTO)	49Y8460		
	8x 2.5" Fan Duct (models CTO)	49Y8461		
	Cable, backplane configuration (3.5-inch hot-swap hard disk drive) (models CTO All Models)		49Y8448	
	Cable, SAS signal (3.5-inch hot-swap hard disk drive) (models CTO All Models)		46M6498	
	Cable, SATA signal (3.5-inch simple-swap hard disk drive) (models CTO All Models)		49Y8444	
	Cable 1Mx4 SAS-Mini (models CTO All Models)		39R6530	
	Cable 3Mx4 SAS-Mini (models CTO All Models)		39R6532	
	Cable, optical disk drive/tape drive (models CTO All Models)		25R5635	
	EMC shield (models CTO All Models)		49Y8455	
	EMC shield kit, optical disk drive/tape drive (models CTO All Models)		13N2997	
	Feet, chassis (models CTO All Models)		13N2985	
	Hard disk drive carrier, 3.5-inch simple-swap (models CTO All Models)		42C7495	
	Hard disk drive shield (models CTO All Models)		44X0388	
	Keylock, keyed-alike (models CTO All Models)		26K7363	
	Keylock, keyed-random (models CTO All Models)		26K7364	
	SAS Filler 3.5-inch (models CTO All Models)		39M4375	
	Kit, Retainer (for optical and diskette drives) (models CTO All Models)		39R9369	
	Power supply unit adapter (models CTO All Models)		42C7509	
	Miscellaneous parts kit (models CTO All Models)		39Y9773	
	Power supply cage, 430 watt (models CTO All Models)		49Y8459	

Table 15. Parts listing, Type 6522 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	Retention module (for fan sink) (models CTO All Models)		49Y8458	
	Side/top cover (models CTO All Models)		49Y8446	
	System service label (models CTO All Models)		49Y8452	
	USB hypervisor key (models)			
	Virtual media key (models)			

6522 Software FRU		FRU#
EasyManage (models CTO All Models)		69Y9937
Documentation DVD (models CTO All Models)		90Y1164
EasyStartup (models CTO All Models)		90Y1165
WS2008 R2 FOUND 64bit US (models CTO All Models)		90Y1166
WS2008 R2 FOUND 64bit NL (models CTO All Models)		90Y1167
WS2008 R2 FOUND 64bit FR (models CTO All Models)		90Y1168
WS2008 R2 FOUND 64bit GR (models CTO All Models)		90Y1169
WS2008 R2 FOUND 64bit IT (models CTO All Models)		90Y1170
WS2008 R2 FOUND 64bit JP (models CTO All Models)		90Y1171
WS2008 R2 FOUND 64bit SP (models CTO All Models)		90Y1172
WS2008 R2 FOUND 64bit TR (models CTO All Models)		90Y1173
WS 2008 SBS SP2 STD 64bit US (models CTO All Models)		90Y1174
WS 2008 SBS SP2 STD 64bit NL (models CTO All Models)		90Y1175
WS 2008 SBS SP2 STD 64bit FR (models CTO All Models)		90Y1176
WS 2008 SBS SP2 STD 64bit GR (models CTO All Models)		90Y1177
WS 2008 SBS SP2 STD 64bit IT (models CTO All Models)		90Y1178
WS 2008 SBS SP2 STD 64bit JP (models CTO All Models)		90Y1179
WS 2008 SBS SP2 STD 64bit SP (models CTO All Models)		90Y1180
WS 2008 SBS SP2 STD 64bit TR (models CTO All Models)		90Y1181
WS 2008 SBS SP2 PREM 64bit US (models CTO All Models)		90Y1182
WS 2008 R2 STD 64bit US (models CTO All Models)		90Y1183
WS 2008 R2 STD 64bit FR (models CTO All Models)		90Y1184
WS 2008 R2 STD 64bit GR (models CTO All Models)		90Y1185
WS 2008 R2 STD 64bit JP (models CTO All Models)		90Y1186
WS 2008 R2 STD 64bit SP (models CTO All Models)		90Y1187
WS 2008 R2 STD 64bit IT (models CTO All Models)		90Y1188
WS 2008 R2 STD 64bit TR (models CTO All Models)		90Y1189
WS 2008 R2 STD 64bit NL (models CTO All Models)		90Y1190
WS 2008 R2 ENT 64bit US (models CTO All Models)		90Y1191
WS 2008 R2 ENT 64bit NL (models CTO All Models)		90Y1192
WS 2008 R2 ENT 64bit FR (models CTO All Models)		90Y1193

6522 Software FRU	FRU#
WS 2008 R2 ENT 64bit GR (models CTO All Models)	90Y1194
WS 2008 R2 ENT 64bit IT (models CTO All Models)	90Y1195
WS 2008 R2 ENT 64bit JP (models CTO All Models)	90Y1196
WS 2008 R2 ENT 64bit SP (models CTO All Models)	90Y1197
WS 2008 R2 ENT 64bit TR (models CTO All Models)	90Y1198
ROK WS2008 FOUND 64bit MUI EN/JP (models CTO All Models)	90Y1199
ROK WS2008 FOUND 64bit MUI EN/FR/GR/SP/IT (models CTO All Models)	90Y1200

Table 16. Parts listing, Type 6523

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
1	Chassis assembly (models CTO All Models)			49Y8457
2	Operator Information Panel Assembly (models CTO All Models)		49Y8456	
3	Front USB connector assembly (models CTO All Models)		49Y8449	
4	DVD-RAM Drive, SATA (models CTO)	43W8467		
4	DVD-ROM Drive, SATA (models CTO)	43W8466		
5	Bezel Kit (models CTO All Models)	42C8942		
6	Bezel, upper (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2947		
7	Bezel, lower (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2948		
8	Hard disk drive, 250GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11G 11M 11A 11J)	45J9634		
8	Hard disk drive, 500GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U1024		
8	Hard disk drive, 250GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9642		
8	Hard disk drive, 500GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9644		
8	Hard disk drive, 146GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9658		
8	Hard disk drive, 750GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9638		
8	Hard disk drive, 750GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9646		
8	Hard disk drive, 300GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9660		
8	Hard disk drive, IBM 1TB 7200 SATA 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9648		
8	Hard disk drive, IBM 450GB 15K SAS 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2108		

Table 16. Parts listing, Type 6523 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
8	Hard disk drive, IBM Server 1TB 7200 SATA 3.5" Simple Swap HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2916		
8	Hard disk drive, 73GB 15K 3.5" Hot-Swap SAS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2088		
8	Hard disk drive, ThinkServer 300GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3014		
8	Hard disk drive, ThinkServer 450GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3015		
8	Hard disk drive, ThinkServer 600GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3016		
9	Retention bracket (front), adapter (models CTO All Models)		13N2993	
10	Hard disk drive cage, 3.5-inch drives (models CTO All Models)		49Y8451	
11	SAS/SATA hard disk drive backplane (for 3.5-inch drive cage) (models CTO All Models)	49Y4462		
11	SATA backplate, simple-swap (models)	25R8842		
12	Hard disk drive fan assembly (for 3.5-inch drive cage) (models)		39Y9860	
13	System board assembly (models CTO All Models)			69Y1013
14	ServeRAID-BR10il SAS/SATA controller (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	49Y4737		
15	Microprocessor, Celeron G1101 2.26GHz/1066MHz-2MB 2C (models CTO)			49Y4645
15	Microprocessor, Xeon X3460 2.8GHz/1333MHz-8MB 4C (models CTO)			49Y4646
15	Microprocessor, (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)			49Y4647
15	Microprocessor, Xeon X3440 2.53GHz/1333MHz-8MB 4C (models CTO)			49Y4648
15	Microprocessor, Xeon X3450 2.67GHz/1333MHz-8MB 4C (models CTO)			49Y4649
15	Microprocessor, Pentium G6950 2.8 GHz/1066MHz-3MB 2C (models CTO)			49Y4668
15	Microprocessor, Xeon X3470 2.93GHz/1333MHz-8MB 4C (models CTO)			46C6775
15	Microprocessor, Core i3-540 3.06 GHz/1333MHz-4MB 2C (models CTO)			59Y3175
15	Microprocessor, Core i3-530 2.93 GHz/1333MHz-4MB 2C (models CTO)			59Y3176
16	Fan sink (models CTO All Models)		49Y8390	
17	Side cover with lock (models CTO All Models)		49Y8447	

Table 16. Parts listing, Type 6523 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
18	Retention bracket (rear), adapter (models CTO All Models)		49Y8450	
19	Power supply, 401w PSU Fixed (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)			46M6678
19	Power supply, 430w PSU H/S (models CTO)	46M6679		
20	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
20	Memory, 1GB (1x1GB, Single Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP UDIMM(models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2906		
20	Memory, 2GB DDR3-1333 2Rx8 LP UDIMM (models CTO)	46U2907		
20	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
20	Memory, 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2941		
20	Memory, 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2942		
21	System fan, rear (models CTO All Models)		49Y8445	
	System battery (models CTO All Models)	33F8354		
	EMC SAS/SATA Backplate (models CTO All Models)		25R8784	
	ServeRAID-MR10i adapter (models CTO)	43W4297		
	ServeRAID-MR10is VAULT adapter (models CTO)	44E8696		
	IBM 3Gb SAS HBA Controller v2 (models CTO)	44E8701		
	ServeRAID M5015 SAS/SATA Controller (models CTO)	46M0851		
	ServeRAID M5025 SAS/SATA Controller (models CTO)	46M0854		
	ServeRAID M1015 SAS/SATA Controller (models CTO)	46M0862		
	ServeRAID-MR10i Li-Ion Battery (models CTO)	43W4301		
	ServeRAID-MR10M SAS/SATA Controller with Remote Battery Kit (models CTO)	43W4341		
	ServeRAID M1015 RAID 5 Upgrade Key (models CTO)	46M0864		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	NetXtreme II 1000 Express Ethernet Adapter (models CTO)	39Y6070		
	PRO/1K PT Dual adapter (models CTO)	39Y6128		
	PRO/1K PT Quad adapter (models CTO)	39Y6138		
	PRO/1K PF Srvr adapter (models CTO)	42C1752		
	QLogic 10Gb CNA adapter (models CTO)	42C1802		
	8x 2.5" Gen2 Cage (models CTO)	49Y8460		
	8x 2.5" Fan Duct (models CTO)	49Y8461		
	Cable, backplane configuration (3.5-inch hot-swap hard disk drive) (models CTO All Models)		49Y8448	

Table 16. Parts listing, Type 6523 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	Cable, SAS signal (3.5-inch hot-swap hard disk drive) (models CTO All Models)		46M6498	
	Cable, SATA signal (3.5-inch simple-swap hard disk drive) (models CTO All Models)		49Y8444	
	Cable 1Mx4 SAS-Mini (models CTO All Models)		39R6530	
	Cable 3Mx4 SAS-Mini (models CTO All Models)		39R6532	
	Cable, optical disk drive/tape drive (models CTO All Models)		25R5635	
	EMC shield (models CTO All Models)		49Y8455	
	EMC shield kit, optical disk drive/tape drive (models CTO All Models)		13N2997	
	Feet, chassis (models CTO All Models)		13N2985	
	Hard disk drive carrier, 3.5-inch simple-swap (models CTO All Models)		42C7495	
	Hard disk drive shield (models CTO All Models)		44X0388	
	Keylock, keyed-alike (models CTO All Models)		26K7363	
	Keylock, keyed-random (models CTO All Models)		26K7364	
	SAS Filler 3.5-inch (models CTO All Models)		39M4375	
	Kit, Retainer (for optical and diskette drives) (models CTO All Models)		39R9369	
	Power supply unit adapter (models CTO All Models)		42C7509	
	Miscellaneous parts kit (models CTO All Models)		39Y9773	
	Power supply cage, 430 watt (models CTO All Models)		49Y8459	
	Retention module (for fan sink) (models CTO All Models)		49Y8458	
	Side/top cover (models CTO All Models)		49Y8446	
	System service label (models CTO All Models)		49Y8452	
	USB hypervisor key (models)			
	Virtual media key (models)			

6523 Software FRU	FRU#
EasyManage (models CTO All Models)	69Y9937
Documentation DVD (models CTO All Models)	90Y1164
EasyStartup (models CTO All Models)	90Y1165
WS2008 R2 FOUND 64bit US (models CTO All Models)	90Y1166
WS2008 R2 FOUND 64bit NL (models CTO All Models)	90Y1167
WS2008 R2 FOUND 64bit FR (models CTO All Models)	90Y1168
WS2008 R2 FOUND 64bit GR (models CTO All Models)	90Y1169
WS2008 R2 FOUND 64bit IT (models CTO All Models)	90Y1170
WS2008 R2 FOUND 64bit JP (models CTO All Models)	90Y1171
WS2008 R2 FOUND 64bit SP (models CTO All Models)	90Y1172

6523 Software FRU	FRU#
WS2008 R2 FOUND 64bit TR (models CTO All Models)	90Y1173
WS 2008 SBS SP2 STD 64bit US (models CTO All Models)	90Y1174
WS 2008 SBS SP2 STD 64bit NL (models CTO All Models)	90Y1175
WS 2008 SBS SP2 STD 64bit FR (models CTO All Models)	90Y1176
WS 2008 SBS SP2 STD 64bit GR (models CTO All Models)	90Y1177
WS 2008 SBS SP2 STD 64bit IT (models CTO All Models)	90Y1178
WS 2008 SBS SP2 STD 64bit JP (models CTO All Models)	90Y1179
WS 2008 SBS SP2 STD 64bit SP (models CTO All Models)	90Y1180
WS 2008 SBS SP2 STD 64bit TR (models CTO All Models)	90Y1181
WS 2008 SBS SP2 PREM 64bit US (models CTO All Models)	90Y1182
WS 2008 R2 STD 64bit US (models CTO All Models)	90Y1183
WS 2008 R2 STD 64bit FR (models CTO All Models)	90Y1184
WS 2008 R2 STD 64bit GR (models CTO All Models)	90Y1185
WS 2008 R2 STD 64bit JP (models CTO All Models)	90Y1186
WS 2008 R2 STD 64bit SP (models CTO All Models)	90Y1187
WS 2008 R2 STD 64bit IT (models CTO All Models)	90Y1188
WS 2008 R2 STD 64bit TR (models CTO All Models)	90Y1189
WS 2008 R2 STD 64bit NL (models CTO All Models)	90Y1190
WS 2008 R2 ENT 64bit US (models CTO All Models)	90Y1191
WS 2008 R2 ENT 64bit NL (models CTO All Models)	90Y1192
WS 2008 R2 ENT 64bit FR (models CTO All Models)	90Y1193
WS 2008 R2 ENT 64bit GR (models CTO All Models)	90Y1194
WS 2008 R2 ENT 64bit IT (models CTO All Models)	90Y1195
WS 2008 R2 ENT 64bit JP (models CTO All Models)	90Y1196
WS 2008 R2 ENT 64bit SP (models CTO All Models)	90Y1197
WS 2008 R2 ENT 64bit TR (models CTO All Models)	90Y1198
ROK WS2008 FOUND 64bit MUI EN/JP (models CTO All Models)	90Y1199
ROK WS2008 FOUND 64bit MUI EN/FR/GR/SP/IT (models CTO All Models)	90Y1200

Table 17. Parts listing, Type 6524

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
1	Chassis assembly (models CTO All Models)			49Y8457
2	Operator Information Panel Assembly (models CTO All Models)		49Y8456	
3	Front USB connector assembly (models CTO All Models)		49Y8449	
4	DVD-RAM Drive, SATA (models CTO)	43W8467		
4	DVD-ROM Drive, SATA (models CTO)	43W8466		
5	Bezel Kit (models CTO All Models)	42C8942		
6	Bezel, upper (models CTO All Models)	46U2947		

Table 17. Parts listing, Type 6524 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
7	Bezel, lower (models CTO All Models)	46U2948		
8	Hard disk drive, 250GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11G 11M 11A 11J)	45J9634		
8	Hard disk drive, 500GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO)	46U1024		
8	Hard disk drive, 250GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO)	45J9642		
8	Hard disk drive, 500GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO)	45J9644		
8	Hard disk drive, 146GB 15K 3.5" Hot-Swap SAS (models CTO)	45J9658		
8	Hard disk drive, 750GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO)	45J9638		
8	Hard disk drive, 750GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO)	45J9646		
8	Hard disk drive, 300GB 15K 3.5" Hot-Swap SAS (models CTO)	45J9660		
8	Hard disk drive, IBM 1TB 7200 SATA 3.5" HS HDD (models CTO)	45J9648		
8	Hard disk drive, IBM 450GB 15K SAS 3.5" HS HDD (models CTO)	46U2108		
8	Hard disk drive, IBM Server 1TB 7200 SATA 3.5" Simple Swap HDD (models CTO)	46U2916		
8	Hard disk drive, 73GB 15K 3.5" Hot-Swap SAS HDD (models CTO)	46U2088		
8	Hard disk drive, ThinkServer 300GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3014		
8	Hard disk drive, ThinkServer 450GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3015		
8	Hard disk drive, ThinkServer 600GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3016		
9	Retention bracket (front), adapter (models CTO All Models)		13N2993	
10	Hard disk drive cage, 3.5-inch drives (models CTO All Models)		49Y8451	
11	SAS/SATA hard disk drive backplane (for 3.5-inch drive cage) (models CTO All Models)	49Y4462		
11	SATA backplate, simple-swap (models)	25R8842		
12	Hard disk drive fan assembly (for 3.5-inch drive cage) (models)		39Y9860	
13	System board assembly (models CTO All Models)			69Y1013
14	ServeRAID-BR10il SAS/SATA controller (models CTO)	49Y4737		
15	Microprocessor, Celeron G1101 2.26GHz/1066MHz-2MB 2C (models CTO)			49Y4645

Table 17. Parts listing, Type 6524 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
15	Microprocessor, Xeon X3460 2.8GHz/1333MHz-8MB 4C (models CTO)			49Y4646
15	Microprocessor (models CTO)			49Y4647
15	Microprocessor, Xeon X3440 2.53GHz/1333MHz-8MB 4C (models CTO)			49Y4648
15	Microprocessor, Xeon X3450 2.67GHz/1333MHz-8MB 4C (models CTO)			49Y4649
15	Microprocessor, Pentium G6950 2.8 GHz/1066MHz-3MB 2C (models CTO)			49Y4668
15	Microprocessor, Xeon X3470 2.93GHz/1333MHz-8MB 4C (models CTO)			46C6775
15	Microprocessor, Core i3-540 3.06 GHz/1333MHz-4MB 2C (models CTO)			59Y3175
15	Microprocessor, Core i3-530 2.93 GHz/1333MHz-4MB 2C (models CTO)			59Y3176
16	Fan sink (models CTO All Models)		49Y8390	
17	Side cover with lock (models CTO All Models)		49Y8447	
18	Retention bracket (rear), adapter (models CTO All Models)		49Y8450	
19	Power supply, 401w PSU Fixed (models CTO)			46M6678
19	Power supply, 430w PSU H/S (models CTO)	46M6679		
20	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
20	Memory, 1GB (1x1GB, Single Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP UDIMM (models CTO)	46U2906		
20	Memory, 2GB DDR3-1333 2Rx8 LP UDIMM (models CTO)	46U2907		
20	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
20	Memory, 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2941		
20	Memory, 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2942		
21	System fan, rear (models CTO All Models)		49Y8445	
	System battery (models CTO All Models)	33F8354		
	EMC SAS/SATA Backplate (models CTO All Models)		25R8784	
	ServeRAID-MR10i adapter (models CTO)	43W4297		
	ServeRAID-MR10is VAULT adapter (models CTO)	44E8696		
	IBM 3Gb SAS HBA Controller v2 (models CTO)	44E8701		
	ServeRAID M5015 SAS/SATA Controller (models CTO)	46M0851		
	ServeRAID M5025 SAS/SATA Controller (models CTO)	46M0854		
	ServeRAID M1015 SAS/SATA Controller (models CTO)	46M0862		
	ServeRAID-MR10i Li-Ion Battery (models CTO)	43W4301		

Table 17. Parts listing, Type 6524 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	ServeRAID-MR10M SAS/SATA Controller with Remote Battery Kit (models CTO)	43W4341		
	ServeRAID M1015 RAID 5 Upgrade Key (models CTO)	46M0864		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	NetXtreme II 1000 Express Ethernet Adapter (models CTO)	39Y6070		
	PRO/1K PT Dual adapter (models CTO)	39Y6128		
	PRO/1K PT Quad adapter (models CTO)	39Y6138		
	PRO/1K PF Srvr adapter (models CTO)	42C1752		
	QLogic 10Gb CNA adapter (models CTO)	42C1802		
	8x 2.5" Gen2 Cage (models CTO)	49Y8460		
	8x 2.5" Fan Duct (models CTO)	49Y8461		
	Cable, backplane configuration (3.5-inch hot-swap hard disk drive) (models CTO All Models)		49Y8448	
	Cable, SAS signal (3.5-inch hot-swap hard disk drive) (models CTO All Models)		46M6498	
	Cable, SATA signal (3.5-inch simple-swap hard disk drive) (models CTO All Models)		49Y8444	
	Cable 1Mx4 SAS-Mini (models CTO All Models)		39R6530	
	Cable 3Mx4 SAS-Mini (models CTO All Models)		39R6532	
	Cable, optical disk drive/tape drive (models CTO All Models)		25R5635	
	EMC shield (models CTO All Models)		49Y8455	
	EMC shield kit, optical disk drive/tape drive (models CTO All Models)		13N2997	
	Feet, chassis (models CTO All Models)		13N2985	
	Hard disk drive carrier, 3.5-inch simple-swap (models CTO All Models)		42C7495	
	Hard disk drive shield (models CTO All Models)		44X0388	
	Keylock, keyed-alike (models CTO All Models)		26K7363	
	Keylock, keyed-random (models CTO All Models)		26K7364	
	SAS Filler 3.5-inch (models CTO All Models)		39M4375	
	Kit, Retainer (for optical and diskette drives) (models CTO All Models)		39R9369	
	Power supply unit adapter (models CTO All Models)		42C7509	
	Miscellaneous parts kit (models CTO All Models)		39Y9773	
	Power supply cage, 430 watt (models CTO All Models)		49Y8459	
	Retention module (for fan sink) (models CTO All Models)		49Y8458	
	Side/top cover (models CTO All Models)		49Y8446	
	System service label (models CTO All Models)		49Y8452	

Table 17. Parts listing, Type 6524 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	USB hypervisor key (models)			
	Virtual media key (models)			

6524 Software FRU		FRU#
EasyManage (models CTO All Models)		69Y9937
Documentation DVD (models CTO All Models)		90Y1164
EasyStartup (models CTO All Models)		90Y1165
WS2008 R2 FOUND 64bit US (models CTO All Models)		90Y1166
WS2008 R2 FOUND 64bit NL (models CTO All Models)		90Y1167
WS2008 R2 FOUND 64bit FR (models CTO All Models)		90Y1168
WS2008 R2 FOUND 64bit GR (models CTO All Models)		90Y1169
WS2008 R2 FOUND 64bit IT (models CTO All Models)		90Y1170
WS2008 R2 FOUND 64bit JP (models CTO All Models)		90Y1171
WS2008 R2 FOUND 64bit SP (models CTO All Models)		90Y1172
WS2008 R2 FOUND 64bit TR (models CTO All Models)		90Y1173
WS 2008 SBS SP2 STD 64bit US (models CTO All Models)		90Y1174
WS 2008 SBS SP2 STD 64bit NL (models CTO All Models)		90Y1175
WS 2008 SBS SP2 STD 64bit FR (models CTO All Models)		90Y1176
WS 2008 SBS SP2 STD 64bit GR (models CTO All Models)		90Y1177
WS 2008 SBS SP2 STD 64bit IT (models CTO All Models)		90Y1178
WS 2008 SBS SP2 STD 64bit JP (models CTO All Models)		90Y1179
WS 2008 SBS SP2 STD 64bit SP (models CTO All Models)		90Y1180
WS 2008 SBS SP2 STD 64bit TR (models CTO All Models)		90Y1181
WS 2008 SBS SP2 PREM 64bit US (models CTO All Models)		90Y1182
WS 2008 R2 STD 64bit US (models CTO All Models)		90Y1183
WS 2008 R2 STD 64bit FR (models CTO All Models)		90Y1184
WS 2008 R2 STD 64bit GR (models CTO All Models)		90Y1185
WS 2008 R2 STD 64bit JP (models CTO All Models)		90Y1186
WS 2008 R2 STD 64bit SP (models CTO All Models)		90Y1187
WS 2008 R2 STD 64bit IT (models CTO All Models)		90Y1188
WS 2008 R2 STD 64bit TR (models CTO All Models)		90Y1189
WS 2008 R2 STD 64bit NL (models CTO All Models)		90Y1190
WS 2008 R2 ENT 64bit US (models CTO All Models)		90Y1191
WS 2008 R2 ENT 64bit NL (models CTO All Models)		90Y1192
WS 2008 R2 ENT 64bit FR (models CTO All Models)		90Y1193
WS 2008 R2 ENT 64bit GR (models CTO All Models)		90Y1194
WS 2008 R2 ENT 64bit IT (models CTO All Models)		90Y1195
WS 2008 R2 ENT 64bit JP (models CTO All Models)		90Y1196

6524 Software FRU		FRU#
WS 2008 R2 ENT 64bit SP (models CTO All Models)		90Y1197
WS 2008 R2 ENT 64bit TR (models CTO All Models)		90Y1198
ROK WS2008 FOUND 64bit MUI EN/JP (models CTO All Models)		90Y1199
ROK WS2008 FOUND 64bit MUI EN/FR/GR/SP/IT (models CTO All Models)		90Y1200

Table 18. Parts listing, Type 6525

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
1	Chassis assembly (models CTO All Models)			49Y8457
2	Operator Information Panel Assembly (models CTO All Models)		49Y8456	
3	Front USB connector assembly (models CTO All Models)		49Y8449	
4	DVD-RAM Drive, SATA (models CTO)	43W8467		
4	DVD-ROM Drive, SATA (models CTO)	43W8466		
5	Bezel Kit (models CTO All Models)	42C8942		
6	Bezel, upper (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	46U2947		
7	Bezel, lower (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	46U2948		
8	Hard disk drive, 250GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11G 11M 11A 11J)	45J9634		
8	Hard disk drive, 500GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U1024		
8	Hard disk drive, 250GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	45J9642		
8	Hard disk drive, 500GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	45J9644		
8	Hard disk drive, 146GB 15K 3.5" Hot-Swap SAS (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	45J9658		
8	Hard disk drive, 750GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9638		
8	Hard disk drive, 750GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	45J9646		

Table 18. Parts listing, Type 6525 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
8	Hard disk drive, 300GB 15K 3.5" Hot-Swap SAS (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	45J9660		
8	Hard disk drive, IBM 1TB 7200 SATA 3.5" HS HDD (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	45J9648		
8	Hard disk drive, IBM 450GB 15K SAS 3.5" HS HDD (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	46U2108		
8	Hard disk drive, BM Server 1TB 7200 SATA 3.5" Simple Swap HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2916		
8	Hard disk drive, 73GB 15K 3.5" Hot-Swap SAS HDD (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	46U2088		
8	Hard disk drive, ThinkServer 300GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3014		
8	Hard disk drive, ThinkServer 450GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3015		
8	Hard disk drive, ThinkServer 600GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3016		
9	Retention bracket (front), adapter (models CTO All Models)		13N2993	
10	Hard disk drive cage, 3.5-inch drives (models CTO All Models)		49Y8451	
11	SAS/SATA hard disk drive backplane (for 3.5-inch drive cage) (models CTO All Models)	49Y4462		
11	SATA backplate, simple-swap (models)	25R8842		
12	Hard disk drive fan assembly (for 3.5-inch drive cage) (models)		39Y9860	
13	System board assembly (models CTO All Models)			69Y1013
14	ServeRAID-BR10il SAS/SATA controller (models CTO)	49Y4737		
15	Microprocessor, Celeron G1101 2.26GHz/1066MHz-2MB 2C (models CTO)			49Y4645
15	Microprocessor, Xeon X3460 2.8GHz/1333MHz-8MB 4C (models CTO)			49Y4646
15	Microprocessor, (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)			49Y4647
15	Microprocessor, Xeon X3440 2.53GHz/1333MHz-8MB 4C (models CTO)			49Y4648
15	Microprocessor, Xeon X3450 2.67GHz/1333MHz-8MB 4C (models CTO 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J)			49Y4649

Table 18. Parts listing, Type 6525 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
15	Microprocessor, Pentium G6950 2.8 GHz/1066MHz-3MB 2C (models CTO)			49Y4668
15	Microprocessor, Xeon X3470 2.93GHz/1333MHz-8MB 4C (models CTO)			46C6775
15	Microprocessor, Core i3-540 3.06 GHz/1333MHz-4MB 2C (models CTO)			59Y3175
15	Microprocessor, Core i3-530 2.93 GHz/1333MHz-4MB 2C (models CTO)			59Y3176
16	Fan sink (models CTO All Models)		49Y8390	
17	Side cover with lock (models CTO All Models)		49Y8447	
18	Retention bracket (rear), adapter (models CTO All Models)		49Y8450	
19	Power supply, 401w PSU Fixed (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)			46M6678
19	Power supply, 430w PSU H/S (models CTO)	46M6679		
20	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
20	Memory, 1GB (1x1GB, Single Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP UDIMM(models CTO)	46U2906		
20	Memory, 2GB DDR3-1333 2Rx8 LP UDIMM (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2907		
20	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	46U1992		
20	Memory, 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J)	46U2941		
20	Memory, 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2942		
21	System fan, rear (models CTO All Models)		49Y8445	
	System battery (models CTO All Models)	33F8354		
	EMC SAS/SATA Backplate (models CTO All Models)		25R8784	
	ServeRAID-MR10i adapter (models CTO)	43W4297		
	ServeRAID-MR10is VAULT adapter (models CTO)	44E8696		
	IBM 3Gb SAS HBA Controller v2 (models CTO)	44E8701		
	ServeRAID M5015 SAS/SATA Controller (models CTO)	46M0851		
	ServeRAID M5025 SAS/SATA Controller (models CTO)	46M0854		
	ServeRAID M1015 SAS/SATA Controller (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12U 12F 12S 12L 12D 12Y 12G 12M 12A 12J 13G 13M 13A 13J 14U 14F 14S 14L 14D 14Y 14G 14M 14A 14J)	46M0862		
	ServeRAID-MR10i Li-Ion Battery (models CTO)	43W4301		

Table 18. Parts listing, Type 6525 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	ServeRAID-MR10M SAS/SATA Controller with Remote Battery Kit (models CTO)	43W4341		
	ServeRAID M1015 RAID 5 Upgrade Key (models CTO)	46M0864		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	NetXtreme II 1000 Express Ethernet Adapter (models CTO)	39Y6070		
	PRO/1K PT Dual adapter (models CTO)	39Y6128		
	PRO/1K PT Quad adapter (models CTO)	39Y6138		
	PRO/1K PF Srvr adapter (models CTO)	42C1752		
	QLogic 10Gb CNA adapter (models CTO)	42C1802		
	8x 2.5" Gen2 Cage (models CTO)	49Y8460		
	8x 2.5" Fan Duct (models CTO)	49Y8461		
	Cable, backplane configuration (3.5-inch hot-swap hard disk drive) (models CTO All Models)		49Y8448	
	Cable, SAS signal (3.5-inch hot-swap hard disk drive) (models CTO All Models)		46M6498	
	Cable, SATA signal (3.5-inch simple-swap hard disk drive) (models CTO All Models)		49Y8444	
	Cable 1Mx4 SAS-Mini (models CTO All Models)		39R6530	
	Cable 3Mx4 SAS-Mini (models CTO All Models)		39R6532	
	Cable, optical disk drive/tape drive (models CTO All Models)		25R5635	
	EMC shield (models CTO All Models)		49Y8455	
	EMC shield kit, optical disk drive/tape drive (models CTO All Models)		13N2997	
	Feet, chassis (models CTO All Models)		13N2985	
	Hard disk drive carrier, 3.5-inch simple-swap (models CTO All Models)		42C7495	
	Hard disk drive shield (models CTO All Models)		44X0388	
	Keylock, keyed-alike (models CTO All Models)		26K7363	
	Keylock, keyed-random (models CTO All Models)		26K7364	
	SAS Filler 3.5-inch (models CTO All Models)		39M4375	
	Kit, Retainer (for optical and diskette drives) (models CTO All Models)		39R9369	
	Power supply unit adapter (models CTO All Models)		42C7509	
	Miscellaneous parts kit (models CTO All Models)		39Y9773	
	Power supply cage, 430 watt (models CTO All Models)		49Y8459	
	Retention module (for fan sink) (models CTO All Models)		49Y8458	
	Side/top cover (models CTO All Models)		49Y8446	
	System service label (models CTO All Models)		49Y8452	

Table 18. Parts listing, Type 6525 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	USB hypervisor key (models)			
	Virtual media key (models)			

6525 Software FRU		FRU#
EasyManage (models CTO All Models)		69Y9937
Documentation DVD (models CTO All Models)		90Y1164
EasyStartup (models CTO All Models)		90Y1165
WS2008 R2 FOUND 64bit US (models CTO All Models)		90Y1166
WS2008 R2 FOUND 64bit NL (models CTO All Models)		90Y1167
WS2008 R2 FOUND 64bit FR (models CTO All Models)		90Y1168
WS2008 R2 FOUND 64bit GR (models CTO All Models)		90Y1169
WS2008 R2 FOUND 64bit IT (models CTO All Models)		90Y1170
WS2008 R2 FOUND 64bit JP (models CTO All Models)		90Y1171
WS2008 R2 FOUND 64bit SP (models CTO All Models)		90Y1172
WS2008 R2 FOUND 64bit TR (models CTO All Models)		90Y1173
WS 2008 SBS SP2 STD 64bit US (models CTO All Models)		90Y1174
WS 2008 SBS SP2 STD 64bit NL (models CTO All Models)		90Y1175
WS 2008 SBS SP2 STD 64bit FR (models CTO All Models)		90Y1176
WS 2008 SBS SP2 STD 64bit GR (models CTO All Models)		90Y1177
WS 2008 SBS SP2 STD 64bit IT (models CTO All Models)		90Y1178
WS 2008 SBS SP2 STD 64bit JP (models CTO All Models)		90Y1179
WS 2008 SBS SP2 STD 64bit SP (models CTO All Models)		90Y1180
WS 2008 SBS SP2 STD 64bit TR (models CTO All Models)		90Y1181
WS 2008 SBS SP2 PREM 64bit US (models CTO All Models)		90Y1182
WS 2008 R2 STD 64bit US (models CTO All Models)		90Y1183
WS 2008 R2 STD 64bit FR (models CTO All Models)		90Y1184
WS 2008 R2 STD 64bit GR (models CTO All Models)		90Y1185
WS 2008 R2 STD 64bit JP (models CTO All Models)		90Y1186
WS 2008 R2 STD 64bit SP (models CTO All Models)		90Y1187
WS 2008 R2 STD 64bit IT (models CTO All Models)		90Y1188
WS 2008 R2 STD 64bit TR (models CTO All Models)		90Y1189
WS 2008 R2 STD 64bit NL (models CTO All Models)		90Y1190
WS 2008 R2 ENT 64bit US (models CTO All Models)		90Y1191
WS 2008 R2 ENT 64bit NL (models CTO All Models)		90Y1192
WS 2008 R2 ENT 64bit FR (models CTO All Models)		90Y1193
WS 2008 R2 ENT 64bit GR (models CTO All Models)		90Y1194
WS 2008 R2 ENT 64bit IT (models CTO All Models)		90Y1195
WS 2008 R2 ENT 64bit JP (models CTO All Models)		90Y1196

6525 Software FRU		FRU#
WS 2008 R2 ENT 64bit SP (models CTO All Models)		90Y1197
WS 2008 R2 ENT 64bit TR (models CTO All Models)		90Y1198
ROK WS2008 FOUND 64bit MUI EN/JP (models CTO All Models)		90Y1199
ROK WS2008 FOUND 64bit MUI EN/FR/GR/SP/IT (models CTO All Models)		90Y1200

Table 19. Parts listing, Type 6526

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
1	Chassis assembly (models CTO All Models)			49Y8457
2	Operator Information Panel Assembly (models CTO All Models)		49Y8456	
3	Front USB connector assembly (models CTO All Models)		49Y8449	
4	DVD-RAM Drive, SATA (models CTO)	43W8467		
4	DVD-ROM Drive, SATA (models CTO)	43W8466		
5	Bezel Kit (models CTO All Models)	42C8942		
6	Bezel, upper (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2947		
7	Bezel, lower (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2948		
8	Hard disk drive, 250GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11G 11M 11A 11J)	45J9634		
8	Hard disk drive, 500GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U1024		
8	Hard disk drive, 250GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9642		
8	Hard disk drive, 500GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9644		
8	Hard disk drive, 146GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9658		
8	Hard disk drive, 750GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9638		
8	Hard disk drive, 750GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9646		
8	Hard disk drive, 300GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9660		
8	Hard disk drive, IBM 1TB 7200 SATA 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9648		
8	Hard disk drive, IBM 450GB 15K SAS 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2108		
8	Hard disk drive, IBM Server 1TB 7200 SATA 3.5" Simple Swap HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2916		

Table 19. Parts listing, Type 6526 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
8	Hard disk drive, 73GB 15K 3.5" Hot-Swap SAS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2088		
8	Hard disk drive, ThinkServer 300GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3014		
8	Hard disk drive, ThinkServer 450GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3015		
8	Hard disk drive, ThinkServer 600GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3016		
9	Retention bracket (front), adapter (models CTO All Models)		13N2993	
10	Hard disk drive cage, 3.5-inch drives (models CTO All Models)		49Y8451	
11	SAS/SATA hard disk drive backplane (for 3.5-inch drive cage) (models CTO All Models)	49Y4462		
11	SATA backplate, simple-swap (models)	25R8842		
12	Hard disk drive fan assembly (for 3.5-inch drive cage) (models)		39Y9860	
13	System board assembly (models CTO All Models)			69Y1013
14	ServeRAID-BR10il SAS/SATA controller (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	49Y4737		
15	Microprocessor, Celeron G1101 2.26GHz/1066MHz-2MB 2C (models CTO)			49Y4645
15	Microprocessor, Xeon X3460 2.8GHz/1333MHz-8MB 4C (models CTO)			49Y4646
15	Microprocessor, (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)			49Y4647
15	Microprocessor, Xeon X3440 2.53GHz/1333MHz-8MB 4C (models CTO)			49Y4648
15	Microprocessor, Xeon X3450 2.67GHz/1333MHz-8MB 4C (models CTO)			49Y4649
15	Microprocessor, Pentium G6950 2.8 GHz/1066MHz-3MB 2C (models CTO)			49Y4668
15	Microprocessor, Xeon X3470 2.93GHz/1333MHz-8MB 4C (models CTO)			46C6775
15	Microprocessor, Core i3-540 3.06 GHz/1333MHz-4MB 2C (models CTO)			59Y3175
15	Microprocessor, Core i3-530 2.93 GHz/1333MHz-4MB 2C (models CTO)			59Y3176
16	Fan sink (models CTO All Models)		49Y8390	
17	Side cover with lock (models CTO All Models)		49Y8447	
18	Retention bracket (rear), adapter (models CTO All Models)		49Y8450	
19	Power supply, 401w PSU Fixed (models CTO)			46M6678

Table 19. Parts listing, Type 6526 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
19	Power supply, 430w PSU H/S (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46M6679		
20	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
20	Memory, 1GB (1x1GB, Single Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP UDIMM(models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2906		
20	Memory, 2GB DDR3-1333 2Rx8 LP UDIMM (models CTO)	46U2907		
20	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
20	Memory, 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2941		
20	Memory, 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2942		
21	System fan, rear (models CTO All Models)		49Y8445	
	System battery (models CTO All Models)	33F8354		
	EMC SAS/SATA Backplate (models CTO All Models)		25R8784	
	ServeRAID-MR10i adapter (models CTO)	43W4297		
	ServeRAID-MR10is VAULT adapter (models CTO)	44E8696		
	IBM 3Gb SAS HBA Controller v2 (models CTO)	44E8701		
	ServeRAID M5015 SAS/SATA Controller (models CTO)	46M0851		
	ServeRAID M5025 SAS/SATA Controller (models CTO)	46M0854		
	ServeRAID M1015 SAS/SATA Controller (models CTO)	46M0862		
	ServeRAID-MR10i Li-Ion Battery (models CTO)	43W4301		
	ServeRAID-MR10M SAS/SATA Controller with Remote Battery Kit (models CTO)	43W4341		
	ServeRAID M1015 RAID 5 Upgrade Key (models CTO)	46M0864		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	NetXtreme II 1000 Express Ethernet Adapter (models CTO)	39Y6070		
	PRO/1K PT Dual adapter (models CTO)	39Y6128		
	PRO/1K PT Quad adapter (models CTO)	39Y6138		
	PRO/1K PF Srvr adapter (models CTO)	42C1752		
	QLogic 10Gb CNA adapter (models CTO)	42C1802		
	8x 2.5" Gen2 Cage (models CTO)	49Y8460		
	8x 2.5" Fan Duct (models CTO)	49Y8461		
	Cable, backplane configuration (3.5-inch hot-swap hard disk drive) (models CTO All Models)		49Y8448	
	Cable, SAS signal (3.5-inch hot-swap hard disk drive) (models CTO All Models)		46M6498	
	Cable, SATA signal (3.5-inch simple-swap hard disk drive) (models CTO All Models)		49Y8444	

Table 19. Parts listing, Type 6526 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	Cable 1Mx4 SAS-Mini (models CTO All Models)		39R6530	
	Cable 3Mx4 SAS-Mini (models CTO All Models)		39R6532	
	Cable, optical disk drive/tape drive (models CTO All Models)		25R5635	
	EMC shield (models CTO All Models)		49Y8455	
	EMC shield kit, optical disk drive/tape drive (models CTO All Models)		13N2997	
	Feet, chassis (models CTO All Models)		13N2985	
	Hard disk drive carrier, 3.5-inch simple-swap (models CTO All Models)		42C7495	
	Hard disk drive shield (models CTO All Models)		44X0388	
	Keylock, keyed-alike (models CTO All Models)		26K7363	
	Keylock, keyed-random (models CTO All Models)		26K7364	
	SAS Filler 3.5-inch (models CTO All Models)		39M4375	
	Kit, Retainer (for optical and diskette drives) (models CTO All Models)		39R9369	
	Power supply unit adapter (models CTO All Models)		42C7509	
	Miscellaneous parts kit (models CTO All Models)		39Y9773	
	Power supply cage, 430 watt (models CTO All Models)		49Y8459	
	Retention module (for fan sink) (models CTO All Models)		49Y8458	
	Side/top cover (models CTO All Models)		49Y8446	
	System service label (models CTO All Models)		49Y8452	
	USB hypervisor key (models)			
	Virtual media key (models)			

6526 Software FRU		FRU#
EasyManage (models CTO All Models)		69Y9937
Documentation DVD (models CTO All Models)		90Y1164
EasyStartup (models CTO All Models)		90Y1165
WS2008 R2 FOUND 64bit US (models CTO All Models)		90Y1166
WS2008 R2 FOUND 64bit NL (models CTO All Models)		90Y1167
WS2008 R2 FOUND 64bit FR (models CTO All Models)		90Y1168
WS2008 R2 FOUND 64bit GR (models CTO All Models)		90Y1169
WS2008 R2 FOUND 64bit IT (models CTO All Models)		90Y1170
WS2008 R2 FOUND 64bit JP (models CTO All Models)		90Y1171
WS2008 R2 FOUND 64bit SP (models CTO All Models)		90Y1172
WS2008 R2 FOUND 64bit TR (models CTO All Models)		90Y1173
WS 2008 SBS SP2 STD 64bit US (models CTO All Models)		90Y1174
WS 2008 SBS SP2 STD 64bit NL (models CTO All Models)		90Y1175

6526 Software FRU	FRU#
WS 2008 SBS SP2 STD 64bit FR (models CTO All Models)	90Y1176
WS 2008 SBS SP2 STD 64bit GR (models CTO All Models)	90Y1177
WS 2008 SBS SP2 STD 64bit IT (models CTO All Models)	90Y1178
WS 2008 SBS SP2 STD 64bit JP (models CTO All Models)	90Y1179
WS 2008 SBS SP2 STD 64bit SP (models CTO All Models)	90Y1180
WS 2008 SBS SP2 STD 64bit TR (models CTO All Models)	90Y1181
WS 2008 SBS SP2 PREM 64bit US (models CTO All Models)	90Y1182
WS 2008 R2 STD 64bit US (models CTO All Models)	90Y1183
WS 2008 R2 STD 64bit FR (models CTO All Models)	90Y1184
WS 2008 R2 STD 64bit GR (models CTO All Models)	90Y1185
WS 2008 R2 STD 64bit JP (models CTO All Models)	90Y1186
WS 2008 R2 STD 64bit SP (models CTO All Models)	90Y1187
WS 2008 R2 STD 64bit IT (models CTO All Models)	90Y1188
WS 2008 R2 STD 64bit TR (models CTO All Models)	90Y1189
WS 2008 R2 STD 64bit NL (models CTO All Models)	90Y1190
WS 2008 R2 ENT 64bit US (models CTO All Models)	90Y1191
WS 2008 R2 ENT 64bit NL (models CTO All Models)	90Y1192
WS 2008 R2 ENT 64bit FR (models CTO All Models)	90Y1193
WS 2008 R2 ENT 64bit GR (models CTO All Models)	90Y1194
WS 2008 R2 ENT 64bit IT (models CTO All Models)	90Y1195
WS 2008 R2 ENT 64bit JP (models CTO All Models)	90Y1196
WS 2008 R2 ENT 64bit SP (models CTO All Models)	90Y1197
WS 2008 R2 ENT 64bit TR (models CTO All Models)	90Y1198
ROK WS2008 FOUND 64bit MUI EN/JP (models CTO All Models)	90Y1199
ROK WS2008 FOUND 64bit MUI EN/FR/GR/SP/IT (models CTO All Models)	90Y1200

Table 20. Parts listing, Type 6528

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
1	Chassis assembly (models CTO All Models)			49Y8457
2	Operator Information Panel Assembly (models CTO All Models)		49Y8456	
3	Front USB connector assembly (models CTO All Models)		49Y8449	
4	DVD-RAM Drive, SATA (models CTO)	43W8467		
4	DVD-ROM Drive, SATA (models CTO)	43W8466		
5	Bezel Kit (models CTO All Models)	42C8942		
6	Bezel, upper (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2947		
7	Bezel, lower (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2948		

Table 20. Parts listing, Type 6528 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
8	Hard disk drive, 250GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11G 11M 11A 11J)	45J9634		
8	Hard disk drive, 500GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U1024		
8	Hard disk drive, 250GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9642		
8	Hard disk drive, 500GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9644		
8	Hard disk drive, 146GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9658		
8	Hard disk drive, 750GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9638		
8	Hard disk drive, 750GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9646		
8	Hard disk drive, 300GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9660		
8	Hard disk drive, IBM 1TB 7200 SATA 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	45J9648		
8	Hard disk drive, IBM 450GB 15K SAS 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2108		
8	Hard disk drive, IBM Server 1TB 7200 SATA 3.5" Simple Swap HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2916		
8	Hard disk drive, 73GB 15K 3.5" Hot-Swap SAS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2088		
8	Hard disk drive, ThinkServer 300GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3014		
8	Hard disk drive, ThinkServer 450GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3015		
8	Hard disk drive, ThinkServer 600GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3016		
9	Retention bracket (front), adapter (models CTO All Models)		13N2993	
10	Hard disk drive cage, 3.5-inch drives (models CTO All Models)		49Y8451	
11	SAS/SATA hard disk drive backplane (for 3.5-inch drive cage) (models CTO All Models)	49Y4462		
11	SATA backplate, simple-swap (models)	25R8842		
12	Hard disk drive fan assembly (for 3.5-inch drive cage) (models)		39Y9860	
13	System board assembly (models CTO All Models)			69Y1013
14	ServeRAID-BR10iL SAS/SATA controller (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	49Y4737		

Table 20. Parts listing, Type 6528 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
15	Microprocessor, Celeron G1101 2.26GHz/1066MHz-2MB 2C (models CTO)			49Y4645
15	Microprocessor, Xeon X3460 2.8GHz/1333MHz-8MB 4C (models CTO)			49Y4646
15	Microprocessor, (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)			49Y4647
15	Microprocessor, Xeon X3440 2.53GHz/1333MHz-8MB 4C (models CTO)			49Y4648
15	Microprocessor, Xeon X3450 2.67GHz/1333MHz-8MB 4C (models CTO)			49Y4649
15	Microprocessor, Pentium G6950 2.8 GHz/1066MHz-3MB 2C (models CTO)			49Y4668
15	Microprocessor, Xeon X3470 2.93GHz/1333MHz-8MB 4C (models CTO)			46C6775
15	Microprocessor, Core i3-540 3.06 GHz/1333MHz-4MB 2C (models CTO)			59Y3175
15	Microprocessor, Core i3-530 2.93 GHz/1333MHz-4MB 2C (models CTO)			59Y3176
16	Fan sink (models CTO All Models)		49Y8390	
17	Side cover with lock (models CTO All Models)		49Y8447	
18	Retention bracket (rear), adapter (models CTO All Models)		49Y8450	
19	Power supply, 401w PSU Fixed (models CTO)			46M6678
19	Power supply, 430w PSU H/S (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46M6679		
20	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
20	Memory, 1GB (1x1GB, Single Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP UDIMM(models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	46U2906		
20	Memory, 2GB DDR3-1333 2Rx8 LP UDIMM (models CTO)	46U2907		
20	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
20	Memory, 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2941		
20	Memory, 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2942		
21	System fan, rear (models CTO All Models)		49Y8445	
	System battery (models CTO All Models)	33F8354		
	EMC SAS/SATA Backplate (models CTO All Models)		25R8784	
	ServeRAID-MR10i adapter (models CTO)	43W4297		
	ServeRAID-MR10is VAULT adapter (models CTO)	44E8696		
	IBM 3Gb SAS HBA Controller v2 (models CTO)	44E8701		
	ServeRAID M5015 SAS/SATA Controller (models CTO)	46M0851		

Table 20. Parts listing, Type 6528 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	ServeRAID M5025 SAS/SATA Controller (models CTO)	46M0854		
	ServeRAID M1015 SAS/SATA Controller (models CTO)	46M0862		
	ServeRAID-MR10i Li-Ion Battery (models CTO)	43W4301		
	ServeRAID-MR10M SAS/SATA Controller with Remote Battery Kit (models CTO)	43W4341		
	ServeRAID M1015 RAID 5 Upgrade Key (models CTO)	46M0864		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	NetXtreme II 1000 Express Ethernet Adapter (models CTO)	39Y6070		
	PRO/1K PT Dual adapter (models CTO)	39Y6128		
	PRO/1K PT Quad adapter (models CTO)	39Y6138		
	PRO/1K PF Srvr adapter (models CTO)	42C1752		
	QLogic 10Gb CNA adapter (models CTO)	42C1802		
	8x 2.5" Gen2 Cage (models CTO)	49Y8460		
	8x 2.5" Fan Duct (models CTO)	49Y8461		
	Cable, backplane configuration (3.5-inch hot-swap hard disk drive) (models CTO All Models)		49Y8448	
	Cable, SAS signal (3.5-inch hot-swap hard disk drive) (models CTO All Models)		46M6498	
	Cable, SATA signal (3.5-inch simple-swap hard disk drive) (models CTO All Models)		49Y8444	
	Cable 1Mx4 SAS-Mini (models CTO All Models)		39R6530	
	Cable 3Mx4 SAS-Mini (models CTO All Models)		39R6532	
	Cable, optical disk drive/tape drive (models CTO All Models)		25R5635	
	EMC shield (models CTO All Models)		49Y8455	
	EMC shield kit, optical disk drive/tape drive (models CTO All Models)		13N2997	
	Feet, chassis (models CTO All Models)		13N2985	
	Hard disk drive carrier, 3.5-inch simple-swap (models CTO All Models)		42C7495	
	Hard disk drive shield (models CTO All Models)		44X0388	
	Keylock, keyed-alike (models CTO All Models)		26K7363	
	Keylock, keyed-random (models CTO All Models)		26K7364	
	SAS Filler 3.5-inch (models CTO All Models)		39M4375	
	Kit, Retainer (for optical and diskette drives) (models CTO All Models)		39R9369	
	Power supply unit adapter (models CTO All Models)		42C7509	
	Miscellaneous parts kit (models CTO All Models)		39Y9773	

Table 20. Parts listing, Type 6528 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	Power supply cage, 430 watt (models CTO All Models)		49Y8459	
	Retention module (for fan sink) (models CTO All Models)		49Y8458	
	Side/top cover (models CTO All Models)		49Y8446	
	System service label (models CTO All Models)		49Y8452	
	USB hypervisor key (models)			
	Virtual media key (models)			

6528 Software FRU		FRU#
EasyManage (models CTO All Models)		69Y9937
Documentation DVD (models CTO All Models)		90Y1164
EasyStartup (models CTO All Models)		90Y1165
WS2008 R2 FOUND 64bit US (models CTO All Models)		90Y1166
WS2008 R2 FOUND 64bit NL (models CTO All Models)		90Y1167
WS2008 R2 FOUND 64bit FR (models CTO All Models)		90Y1168
WS2008 R2 FOUND 64bit GR (models CTO All Models)		90Y1169
WS2008 R2 FOUND 64bit IT (models CTO All Models)		90Y1170
WS2008 R2 FOUND 64bit JP (models CTO All Models)		90Y1171
WS2008 R2 FOUND 64bit SP (models CTO All Models)		90Y1172
WS2008 R2 FOUND 64bit TR (models CTO All Models)		90Y1173
WS 2008 SBS SP2 STD 64bit US (models CTO All Models)		90Y1174
WS 2008 SBS SP2 STD 64bit NL (models CTO All Models)		90Y1175
WS 2008 SBS SP2 STD 64bit FR (models CTO All Models)		90Y1176
WS 2008 SBS SP2 STD 64bit GR (models CTO All Models)		90Y1177
WS 2008 SBS SP2 STD 64bit IT (models CTO All Models)		90Y1178
WS 2008 SBS SP2 STD 64bit JP (models CTO All Models)		90Y1179
WS 2008 SBS SP2 STD 64bit SP (models CTO All Models)		90Y1180
WS 2008 SBS SP2 STD 64bit TR (models CTO All Models)		90Y1181
WS 2008 SBS SP2 PREM 64bit US (models CTO All Models)		90Y1182
WS 2008 R2 STD 64bit US (models CTO All Models)		90Y1183
WS 2008 R2 STD 64bit FR (models CTO All Models)		90Y1184
WS 2008 R2 STD 64bit GR (models CTO All Models)		90Y1185
WS 2008 R2 STD 64bit JP (models CTO All Models)		90Y1186
WS 2008 R2 STD 64bit SP (models CTO All Models)		90Y1187
WS 2008 R2 STD 64bit IT (models CTO All Models)		90Y1188
WS 2008 R2 STD 64bit TR (models CTO All Models)		90Y1189
WS 2008 R2 STD 64bit NL (models CTO All Models)		90Y1190
WS 2008 R2 ENT 64bit US (models CTO All Models)		90Y1191
WS 2008 R2 ENT 64bit NL (models CTO All Models)		90Y1192

6528 Software FRU		FRU#
WS 2008 R2 ENT 64bit FR (models CTO All Models)		90Y1193
WS 2008 R2 ENT 64bit GR (models CTO All Models)		90Y1194
WS 2008 R2 ENT 64bit IT (models CTO All Models)		90Y1195
WS 2008 R2 ENT 64bit JP (models CTO All Models)		90Y1196
WS 2008 R2 ENT 64bit SP (models CTO All Models)		90Y1197
WS 2008 R2 ENT 64bit TR (models CTO All Models)		90Y1198
ROK WS2008 FOUND 64bit MUI EN/JP (models CTO All Models)		90Y1199
ROK WS2008 FOUND 64bit MUI EN/FR/GR/SP/IT (models CTO All Models)		90Y1200

Table 21. Parts listing, Type 6529

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
1	Chassis assembly (models CTO All Models)			49Y8457
2	Operator Information Panel Assembly (models CTO All Models)		49Y8456	
3	Front USB connector assembly (models CTO All Models)		49Y8449	
4	DVD-RAM Drive, SATA (models CTO)	43W8467		
4	DVD-ROM Drive, SATA (models CTO)	43W8466		
5	Bezel Kit (models CTO All Models)	42C8942		
6	Bezel, upper (models CTO)	46U2947		
7	Bezel, lower (models CTO)	46U2948		
8	Hard disk drive, 250GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO 11G 11M 11A 11J)	45J9634		
8	Hard disk drive, 500GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO)	46U1024		
8	Hard disk drive, 250GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO)	45J9642		
8	Hard disk drive, 500GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO)	45J9644		
8	Hard disk drive, 146GB 15K 3.5" Hot-Swap SAS (models CTO)	45J9658		
8	Hard disk drive, 750GB 7200 RPM 3.5" Simple-Swap SATA II (models CTO)	45J9638		
8	Hard disk drive, 750GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO)	45J9646		
8	Hard disk drive, 300GB 15K 3.5" Hot-Swap SAS (models CTO)	45J9660		
8	Hard disk drive, IBM 1TB 7200 SATA 3.5" HS HDD (models CTO)	45J9648		
8	Hard disk drive, IBM 450GB 15K SAS 3.5" HS HDD (models CTO)	46U2108		
8	Hard disk drive, IBM Server 1TB 7200 SATA 3.5" Simple Swap HDD (models CTO)	46U2916		

Table 21. Parts listing, Type 6529 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
8	Hard disk drive, 73GB 15K 3.5" Hot-Swap SAS HDD (models CTO)	46U2088		
8	Hard disk drive, ThinkServer 300GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3014		
8	Hard disk drive, ThinkServer 450GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3015		
8	Hard disk drive, ThinkServer 600GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3016		
9	Retention bracket (front), adapter (models CTO All Models)		13N2993	
10	Hard disk drive cage, 3.5-inch drives (models CTO All Models)		49Y8451	
11	SAS/SATA hard disk drive backplane (for 3.5-inch drive cage) (models CTO All Models)	49Y4462		
11	SATA backplate, simple-swap (models)	25R8842		
12	Hard disk drive fan assembly (for 3.5-inch drive cage) (models)		39Y9860	
13	System board assembly (models CTO All Models)			69Y1013
14	ServeRAID-BR10il SAS/SATA controller (models CTO)	49Y4737		
15	Microprocessor, Celeron G1101 2.26GHz/1066MHz-2MB 2C (models CTO)			49Y4645
15	Microprocessor, Xeon X3460 2.8GHz/1333MHz-8MB 4C (models CTO)			49Y4646
15	Microprocessor, (models CTO)			49Y4647
15	Microprocessor, Xeon X3440 2.53GHz/1333MHz-8MB 4C (models CTO)			49Y4648
15	Microprocessor, Xeon X3450 2.67GHz/1333MHz-8MB 4C (models CTO)			49Y4649
15	Microprocessor, Pentium G6950 2.8 GHz/1066MHz-3MB 2C (models CTO)			49Y4668
15	Microprocessor, Xeon X3470 2.93GHz/1333MHz-8MB 4C (models CTO)			46C6775
15	Microprocessor, Core i3-540 3.06 GHz/1333MHz-4MB 2C (models CTO)			59Y3175
15	Microprocessor, Core i3-530 2.93 GHz/1333MHz-4MB 2C (models CTO)			59Y3176
16	Fan sink (models CTO All Models)		49Y8390	
17	Side cover with lock (models CTO All Models)		49Y8447	
18	Retention bracket (rear), adapter (models CTO All Models)		49Y8450	
19	Power supply, 401w PSU Fixed (models CTO)			46M6678
19	Power supply, 430w PSU H/S (models CTO)	46M6679		
20	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		

Table 21. Parts listing, Type 6529 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
20	Memory, 1GB (1x1GB, Single Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP UDIMM(models CTO)	46U2906		
20	Memory, 2GB DDR3-1333 2Rx8 LP UDIMM (models CTO)	46U2907		
20	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
20	Memory, 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2941		
20	Memory, 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2942		
21	System fan, rear (models CTO All Models)		49Y8445	
	System battery (models CTO All Models)	33F8354		
	EMC SAS/SATA Backplate (models CTO All Models)		25R8784	
	ServeRAID-MR10i adapter (models CTO)	43W4297		
	ServeRAID-MR10is VAULT adapter (models CTO)	44E8696		
	IBM 3Gb SAS HBA Controller v2 (models CTO)	44E8701		
	ServeRAID M5015 SAS/SATA Controller (models CTO)	46M0851		
	ServeRAID M5025 SAS/SATA Controller (models CTO)	46M0854		
	ServeRAID M1015 SAS/SATA Controller (models CTO)	46M0862		
	ServeRAID-MR10i Li-Ion Battery (models CTO)	43W4301		
	ServeRAID-MR10M SAS/SATA Controller with Remote Battery Kit (models CTO)	43W4341		
	ServeRAID M1015 RAID 5 Upgrade Key (models CTO)	46M0864		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	NetXtreme II 1000 Express Ethernet Adapter (models CTO)	39Y6070		
	PRO/1K PT Dual adapter (models CTO)	39Y6128		
	PRO/1K PT Quad adapter (models CTO)	39Y6138		
	PRO/1K PF Srvr adapter (models CTO)	42C1752		
	QLogic 10Gb CNA adapter (models CTO)	42C1802		
	8x 2.5" Gen2 Cage (models CTO)	49Y8460		
	8x 2.5" Fan Duct (models CTO)	49Y8461		
	Cable, backplane configuration (3.5-inch hot-swap hard disk drive) (models CTO All Models)		49Y8448	
	Cable, SAS signal (3.5-inch hot-swap hard disk drive) (models CTO All Models)		46M6498	
	Cable, SATA signal (3.5-inch simple-swap hard disk drive) (models CTO All Models)		49Y8444	
	Cable 1Mx4 SAS-Mini (models CTO All Models)		39R6530	
	Cable 3Mx4 SAS-Mini (models CTO All Models)		39R6532	
	Cable, optical disk drive/tape drive (models CTO All Models)		25R5635	

Table 21. Parts listing, Type 6529 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	EMC shield (models CTO All Models)		49Y8455	
	EMC shield kit, optical disk drive/tape drive (models CTO All Models)		13N2997	
	Feet, chassis (models CTO All Models)		13N2985	
	Hard disk drive carrier, 3.5-inch simple-swap (models CTO All Models)		42C7495	
	Hard disk drive shield (models CTO All Models)		44X0388	
	Keylock, keyed-alike (models CTO All Models)		26K7363	
	Keylock, keyed-random (models CTO All Models)		26K7364	
	SAS Filler 3.5-inch (models CTO All Models)		39M4375	
	Kit, Retainer (for optical and diskette drives) (models CTO All Models)		39R9369	
	Power supply unit adapter (models CTO All Models)		42C7509	
	Miscellaneous parts kit (models CTO All Models)		39Y9773	
	Power supply cage, 430 watt (models CTO All Models)		49Y8459	
	Retention module (for fan sink) (models CTO All Models)		49Y8458	
	Side/top cover (models CTO All Models)		49Y8446	
	System service label (models CTO All Models)		49Y8452	
	USB hypervisor key (models)			
	Virtual media key (models)			

6529 Software FRU		FRU#
EasyManage (models CTO All Models)		69Y9937
Documentation DVD (models CTO All Models)		90Y1164
EasyStartup (models CTO All Models)		90Y1165
WS2008 R2 FOUND 64bit US (models CTO All Models)		90Y1166
WS2008 R2 FOUND 64bit NL (models CTO All Models)		90Y1167
WS2008 R2 FOUND 64bit FR (models CTO All Models)		90Y1168
WS2008 R2 FOUND 64bit GR (models CTO All Models)		90Y1169
WS2008 R2 FOUND 64bit IT (models CTO All Models)		90Y1170
WS2008 R2 FOUND 64bit JP (models CTO All Models)		90Y1171
WS2008 R2 FOUND 64bit SP (models CTO All Models)		90Y1172
WS2008 R2 FOUND 64bit TR (models CTO All Models)		90Y1173
WS 2008 SBS SP2 STD 64bit US (models CTO All Models)		90Y1174
WS 2008 SBS SP2 STD 64bit NL (models CTO All Models)		90Y1175
WS 2008 SBS SP2 STD 64bit FR (models CTO All Models)		90Y1176
WS 2008 SBS SP2 STD 64bit GR (models CTO All Models)		90Y1177
WS 2008 SBS SP2 STD 64bit IT (models CTO All Models)		90Y1178
WS 2008 SBS SP2 STD 64bit JP (models CTO All Models)		90Y1179

6529 Software FRU	FRU#
WS 2008 SBS SP2 STD 64bit SP (models CTO All Models)	90Y1180
WS 2008 SBS SP2 STD 64bit TR (models CTO All Models)	90Y1181
WS 2008 SBS SP2 PREM 64bit US (models CTO All Models)	90Y1182
WS 2008 R2 STD 64bit US (models CTO All Models)	90Y1183
WS 2008 R2 STD 64bit FR (models CTO All Models)	90Y1184
WS 2008 R2 STD 64bit GR (models CTO All Models)	90Y1185
WS 2008 R2 STD 64bit JP (models CTO All Models)	90Y1186
WS 2008 R2 STD 64bit SP (models CTO All Models)	90Y1187
WS 2008 R2 STD 64bit IT (models CTO All Models)	90Y1188
WS 2008 R2 STD 64bit TR (models CTO All Models)	90Y1189
WS 2008 R2 STD 64bit NL (models CTO All Models)	90Y1190
WS 2008 R2 ENT 64bit US (models CTO All Models)	90Y1191
WS 2008 R2 ENT 64bit NL (models CTO All Models)	90Y1192
WS 2008 R2 ENT 64bit FR (models CTO All Models)	90Y1193
WS 2008 R2 ENT 64bit GR (models CTO All Models)	90Y1194
WS 2008 R2 ENT 64bit IT (models CTO All Models)	90Y1195
WS 2008 R2 ENT 64bit JP (models CTO All Models)	90Y1196
WS 2008 R2 ENT 64bit SP (models CTO All Models)	90Y1197
WS 2008 R2 ENT 64bit TR (models CTO All Models)	90Y1198
ROK WS2008 FOUND 64bit MUI EN/JP (models CTO All Models)	90Y1199
ROK WS2008 FOUND 64bit MUI EN/FR/GR/SP/IT (models CTO All Models)	90Y1200

Table 22. Parts listing, Type 6530

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
1	Chassis assembly (models CTO All Models)			49Y8457
2	Operator Information Panel Assembly (models CTO All Models)		49Y8456	
3	Front USB connector assembly (models CTO All Models)		49Y8449	
4	DVD-RAM Drive, SATA (models CTO)	43W8467		
4	DVD-ROM Drive, SATA (models CTO)	43W8466		
5	Bezel Kit (models CTO All Models)	42C8942		
6	Bezel, upper (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	46U2947		
7	Bezel, lower (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	46U2948		
8	Hard disk drive, 250GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	45J9642		

Table 22. Parts listing, Type 6530 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
8	Hard disk drive, 500GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	45J9644		
8	Hard disk drive, 146GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	45J9658		
8	Hard disk drive, 750GB 7200 RPM 3.5" Hot-Swap SATA II (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	45J9646		
8	Hard disk drive, 300GB 15K 3.5" Hot-Swap SAS (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	45J9660		
8	Hard disk drive, IBM 1TB 7200 SATA 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	45J9648		
8	Hard disk drive, IBM 450GB 15K SAS 3.5" HS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	46U2108		
8	Hard disk drive, 73GB 15K 3.5" Hot-Swap SAS HDD (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	46U2088		
8	Hard disk drive, ThinkServer 300GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3014		
8	Hard disk drive, ThinkServer 450GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3015		
8	Hard disk drive, ThinkServer 600GB 6Gbps 15K 3.5' Hot-Swap SAS drive (models CTO All Models)	46U3016		
9	Retention bracket (front), adapter (models CTO All Models)		13N2993	
10	Hard disk drive cage, 3.5-inch drives (models CTO All Models)		49Y8451	
11	SAS/SATA hard disk drive backplane (for 3.5-inch drive cage) (models)	49Y4462		
11	SATA backplate, simple-swap (models)	25R8842		
12	Hard disk drive fan assembly (for 3.5-inch drive cage) (models)		39Y9860	
13	System board assembly (models CTO All Models)			69Y1013
14	ServeRAID-BR10il SAS/SATA controller (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J)	49Y4737		

Table 22. Parts listing, Type 6530 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
15	Microprocessor, Celeron G1101 2.26GHz/1066MHz-2MB 2C (models CTO)			49Y4645
15	Microprocessor, Xeon X3460 2.8GHz/1333MHz-8MB 4C (models CTO 14G 14M 14A 14J)			49Y4646
15	Microprocessor, (models CTO)			49Y4647
15	Microprocessor, Xeon X3440 2.53GHz/1333MHz-8MB 4C (models CTO)			49Y4648
15	Microprocessor, Xeon X3450 2.67GHz/1333MHz-8MB 4C (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J)			49Y4649
15	Microprocessor, Pentium G6950 2.8 GHz/1066MHz-3MB 2C (models CTO)			49Y4668
15	Microprocessor, Xeon X3470 2.93GHz/1333MHz-8MB 4C (models CTO)			46C6775
15	Microprocessor, Core i3-540 3.06 GHz/1333MHz-4MB 2C (models CTO)			59Y3175
15	Microprocessor, Core i3-530 2.93 GHz/1333MHz-4MB 2C (models CTO)			59Y3176
16	Fan sink (models CTO All Models)		49Y8390	
17	Side cover with lock (models CTO All Models)		49Y8447	
18	Retention bracket (rear), adapter (models CTO All Models)		49Y8450	
19	Power supply, 401w PSU Fixed (models CTO)			46M6678
19	Power supply, 430w PSU H/S (models CTO 11U 11F 11S 11L 11D 11Y 11G 11M 11A 11J 12G 12M 12A 12J 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	46M6679		
20	Memory, 1GB DDR3-1333 1Rx8 LP RDIMM (models CTO)	46U1991		
20	Memory, 1GB (1x1GB, Single Rankx8) PC3-10600 CL9 ECC DDR3 1333MHz LP UDIMM(models CTO 12G 12M 12A 12J)	46U2906		
20	Memory, 2GB DDR3-1333 2Rx8 LP UDIMM (models CTO)	46U2907		
20	Memory, 2GB DDR3-1333 2Rx8 LP RDIMM (models CTO)	46U1992		
20	Memory, 4GB (1x4GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO 13U 13F 13S 13L 13D 13Y 13G 13M 13A 13J 14G 14M 14A 14J)	46U2941		
20	Memory, 8GB (1x8GB, Quad Rankx8) PC3-8500 CL7 ECC DDR3 1066MHz LP RDIMM(models CTO)	46U2942		
21	System fan, rear (models CTO All Models)		49Y8445	
	System battery (models CTO All Models)	33F8354		
	EMC SAS/SATA Backplate (models)		25R8784	
	ServeRAID-MR10i adapter (models CTO)	43W4297		
	ServeRAID-MR10is VAULT adapter (models CTO)	44E8696		

Table 22. Parts listing, Type 6530 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	IBM 3Gb SAS HBA Controller v2 (models CTO)	44E8701		
	ServeRAID M5015 SAS/SATA Controller (models CTO)	46M0851		
	ServeRAID M5025 SAS/SATA Controller (models CTO)	46M0854		
	ServeRAID M1015 SAS/SATA Controller (models CTO)	46M0862		
	ServeRAID-MR10i Li-Ion Battery (models CTO)	43W4301		
	ServeRAID-MR10M SAS/SATA Controller with Remote Battery Kit (models CTO)	43W4341		
	ServeRAID M1015 RAID 5 Upgrade Key (models CTO)	46M0864		
	ServeRAID M5014 SAS/SATA Controller (models CTO)	46M0922		
	NetXtreme II 1000 Express Ethernet Adapter (models CTO)	39Y6070		
	PRO/1K PT Dual adapter (models CTO)	39Y6128		
	PRO/1K PT Quad adapter (models CTO)	39Y6138		
	PRO/1K PF Srvr adapter (models CTO)	42C1752		
	QLogic 10Gb CNA adapter (models CTO)	42C1802		
	8x 2.5" Gen2 Cage (models CTO)	49Y8460		
	8x 2.5" Fan Duct (models CTO)	49Y8461		
	Cable, backplane configuration (3.5-inch hot-swap hard disk drive) (models CTO All Models)		49Y8448	
	Cable, SAS signal (3.5-inch hot-swap hard disk drive) (models CTO All Models)		46M6498	
	Cable, SATA signal (3.5-inch simple-swap hard disk drive) (models CTO All Models)		49Y8444	
	Cable 1Mx4 SAS-Mini (models CTO All Models)		39R6530	
	Cable 3Mx4 SAS-Mini (models CTO All Models)		39R6532	
	Cable, optical disk drive/tape drive (models CTO All Models)		25R5635	
	EMC shield (models CTO All Models)		49Y8455	
	EMC shield kit, optical disk drive/tape drive (models CTO All Models)		13N2997	
	Feet, chassis (models CTO All Models)		13N2985	
	Hard disk drive carrier, 3.5-inch simple-swap (models CTO All Models)		42C7495	
	Hard disk drive shield (models CTO All Models)		44X0388	
	Keylock, keyed-alike (models CTO All Models)		26K7363	
	Keylock, keyed-random (models CTO All Models)		26K7364	
	SAS Filler 3.5-inch (models CTO All Models)		39M4375	
	Kit, Retainer (for optical and diskette drives) (models CTO All Models)		39R9369	
	Power supply unit adapter (models CTO All Models)		42C7509	

Table 22. Parts listing, Type 6530 (continued)

Index	Description	CRU part number (Self-service)	CRU part number (Optional-service)	FRU part number
	Miscellaneous parts kit (models CTO All Models)		39Y9773	
	Power supply cage, 430 watt (models CTO All Models)		49Y8459	
	Retention module (for fan sink) (models CTO All Models)		49Y8458	
	Side/top cover (models CTO All Models)		49Y8446	
	System service label (models CTO All Models)		49Y8452	
	USB hypervisor key (models)			
	Virtual media key (models)			

6530 Software FRU		FRU#
EasyManage (models CTO All Models)		69Y9937
Documentation DVD (models CTO All Models)		90Y1164
EasyStartup (models CTO All Models)		90Y1165
WS2008 R2 FOUND 64bit US (models CTO All Models)		90Y1166
WS2008 R2 FOUND 64bit NL (models CTO All Models)		90Y1167
WS2008 R2 FOUND 64bit FR (models CTO All Models)		90Y1168
WS2008 R2 FOUND 64bit GR (models CTO All Models)		90Y1169
WS2008 R2 FOUND 64bit IT (models CTO All Models)		90Y1170
WS2008 R2 FOUND 64bit JP (models CTO All Models)		90Y1171
WS2008 R2 FOUND 64bit SP (models CTO All Models)		90Y1172
WS2008 R2 FOUND 64bit TR (models CTO All Models)		90Y1173
WS 2008 SBS SP2 STD 64bit US (models CTO All Models)		90Y1174
WS 2008 SBS SP2 STD 64bit NL (models CTO All Models)		90Y1175
WS 2008 SBS SP2 STD 64bit FR (models CTO All Models)		90Y1176
WS 2008 SBS SP2 STD 64bit GR (models CTO All Models)		90Y1177
WS 2008 SBS SP2 STD 64bit IT (models CTO All Models)		90Y1178
WS 2008 SBS SP2 STD 64bit JP (models CTO All Models)		90Y1179
WS 2008 SBS SP2 STD 64bit SP (models CTO All Models)		90Y1180
WS 2008 SBS SP2 STD 64bit TR (models CTO All Models)		90Y1181
WS 2008 SBS SP2 PREM 64bit US (models CTO All Models)		90Y1182
WS 2008 R2 STD 64bit US (models CTO All Models)		90Y1183
WS 2008 R2 STD 64bit FR (models CTO All Models)		90Y1184
WS 2008 R2 STD 64bit GR (models CTO All Models)		90Y1185
WS 2008 R2 STD 64bit JP (models CTO All Models)		90Y1186
WS 2008 R2 STD 64bit SP (models CTO All Models)		90Y1187
WS 2008 R2 STD 64bit IT (models CTO All Models)		90Y1188
WS 2008 R2 STD 64bit TR (models CTO All Models)		90Y1189
WS 2008 R2 STD 64bit NL (models CTO All Models)		90Y1190
WS 2008 R2 ENT 64bit US (models CTO All Models)		90Y1191

6530 Software FRU	FRU#
WS 2008 R2 ENT 64bit NL (models CTO All Models)	90Y1192
WS 2008 R2 ENT 64bit FR (models CTO All Models)	90Y1193
WS 2008 R2 ENT 64bit GR (models CTO All Models)	90Y1194
WS 2008 R2 ENT 64bit IT (models CTO All Models)	90Y1195
WS 2008 R2 ENT 64bit JP (models CTO All Models)	90Y1196
WS 2008 R2 ENT 64bit SP (models CTO All Models)	90Y1197
WS 2008 R2 ENT 64bit TR (models CTO All Models)	90Y1198
ROK WS2008 FOUND 64bit MUI EN/JP (models CTO All Models)	90Y1199
ROK WS2008 FOUND 64bit MUI EN/FR/GR/SP/IT (models CTO All Models)	90Y1200

Power cords

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

Lenovo 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): 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.

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

Table 23. Power cords, Type 6522

Lenovo Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 11L 11Y)
39M5081	US/Canada 2.8M (models CTO 11U 11F 11S 11L 11D 11A)
39M5199	Japan 2.8M (models CTO 11J)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 11S 11L 11Y 11G)
39M5102	ANZ 2.8M (models CTO 11M)
39M5130	Denmark 2.8M (models CTO 11G)
39M5144	S. Africa 2.8M (models CTO 11G 11M 11A)
39M5151	UK 2.8M (models CTO 11G 11A)
39M5158	Switzerland 2.8M (models CTO 11G)
39M5172	Israel 2.8M (models CTO 11G)
39M5179	Europe 2.8M (models CTO)
39M5206	China 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 24. Power cords, Type 6523

Lenovo Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 11L 11Y)
39M5081	US/Canada 2.8M (models CTO 11U 11F 11S 11L 11D 11A)
39M5199	Japan 2.8M (models CTO 11J)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 11S 11L 11Y 11G)
39M5102	ANZ 2.8M (models CTO 11M)
39M5130	Denmark 2.8M (models CTO 11G)
39M5144	S. Africa 2.8M (models CTO 11G 11M 11A)
39M5151	UK 2.8M (models CTO 11G 11A)
39M5158	Switzerland 2.8M (models CTO 11G)
39M5172	Israel 2.8M (models CTO 11G)
39M5179	Europe 2.8M (models CTO)
39M5206	China 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 25. Power cords, Type 6524

Lenovo Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO)
39M5081	US/Canada 2.8M (models CTO)
39M5199	Japan 2.8M (models CTO)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO)
39M5102	ANZ 2.8M (models CTO)
39M5130	Denmark 2.8M (models CTO)
39M5144	S. Africa 2.8M (models CTO)
39M5151	UK 2.8M (models CTO)
39M5158	Switzerland 2.8M (models CTO)
39M5172	Israel 2.8M (models CTO)
39M5179	Europe 2.8M (models CTO)
39M5206	China 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 26. Power cords, Type 6525

Lenovo Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 11L 11Y 12L 12Y 14L 14Y)
39M5081	US/Canada 2.8M (models CTO 11U 11F 11S 11L 11D 11A 12U 12F 12S 12L 12D 12A 13A 14U 14F 14S 14L 14D)
39M5199	Japan 2.8M (models CTO 11J 12J 13J 14J)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 11S 11L 11Y 11G 12S 12L 12Y 12G 13G 14S 14L 14Y 14G)
39M5102	ANZ 2.8M (models CTO 11M 12M 13M 14M)
39M5130	Denmark 2.8M (models CTO 11G 12G 14G)
39M5144	S. Africa 2.8M (models CTO 11G 11M 11A 12G 12M 12A 13G 13M 13A 14G 14M 14A)
39M5151	UK 2.8M (models CTO 11G 11A 12G 12A 13G 13A 14G 14A)
39M5158	Switzerland 2.8M (models CTO 11G 12G 13G 14G)
39M5172	Israel 2.8M (models CTO 11G 12G 13G 14G)
39M5179	Europe 2.8M (models CTO)
39M5206	China 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 27. Power cords, Type 6526

Lenovo Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 11L 11Y)
39M5081	US/Canada 2.8M (models CTO 11U 11F 11S 11L 11D 11A)
39M5199	Japan 2.8M (models CTO 11J)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 11S 11L 11Y 11G)
39M5102	ANZ 2.8M (models CTO 11M)
39M5130	Denmark 2.8M (models CTO 11G)
39M5144	S. Africa 2.8M (models CTO 11G 11M 11A)
39M5151	UK 2.8M (models CTO 11G 11A)
39M5158	Switzerland 2.8M (models CTO 11G)
39M5172	Israel 2.8M (models CTO 11G)
39M5179	Europe 2.8M (models CTO)
39M5206	China 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 28. Power cords, Type 6528

Lenovo Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 11L 11Y)
39M5081	US/Canada 2.8M (models CTO 11U 11F 11S 11L 11D 11A)
39M5199	Japan 2.8M (models CTO 11J)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 11S 11L 11Y 11G)
39M5102	ANZ 2.8M (models CTO 11M)
39M5130	Denmark 2.8M (models CTO 11G)
39M5144	S. Africa 2.8M (models CTO 11G 11M 11A)
39M5151	UK 2.8M (models CTO 11G 11A)
39M5158	Switzerland 2.8M (models CTO 11G)
39M5172	Israel 2.8M (models CTO 11G)
39M5179	Europe 2.8M (models CTO)
39M5206	China 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 29. Power cords, Type 6529

Lenovo Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO)
39M5081	US/Canada 2.8M (models CTO)
39M5199	Japan 2.8M (models CTOJ)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO)
39M5102	ANZ 2.8M (models CTO)
39M5130	Denmark 2.8M (models CTO)
39M5144	S. Africa 2.8M (models CTO)
39M5151	UK 2.8M (models CTO)
39M5158	Switzerland 2.8M (models CTO)
39M5172	Israel 2.8M (models CTO)
39M5179	Europe 2.8M (models CTO)
39M5206	China 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Table 30. Power cords, Type 6530

Lenovo Power cord part number	Used in these countries and regions
39M5068	Argentina 2.8M (models CTO 11L 11Y 13L 13Y)
39M5081	US/Canada 2.8M (models CTO 11U 11F 11S 11L 11D 11A 12A 13U 13F 13S 13L 13D 13A 14A)
39M5199	Japan 2.8M (models CTO 11J 12J 13J 14J)
39M5123	Europe 2.8M (models CTO)
39M5165	Italy 2.8M (models CTO 11S 11L 11Y 11G 12G 13S 13L 13Y 13G 14G)
39M5102	ANZ 2.8M (models CTO 11M 12M 13M 14M)
39M5130	Denmark 2.8M (models CTO 11G 12G 13G 14G)
39M5144	S. Africa 2.8M (models CTO 11G 11M 11A 12G 12M 12A 13G 13M 13A 14G 14M 14A)
39M5151	UK 2.8M (models CTO 11G 11A 12G 12A 13G 13A 14G 14A)
39M5158	Switzerland 2.8M (models CTO 11G 12G 13G 14G)
39M5172	Israel 2.8M (models CTO 11G 12G 13G 14G)
39M5179	Europe 2.8M (models CTO)
39M5206	China 2.8M (models CTO)
39M5219	Korea 2.8M (models CTO)
39M5226	India 2.8M (models CTO)
39M5233	Brazil 2.8M (models CTO)
39M5247	Taiwan 2.8M (models CTO)

Chapter 8. Configuring the server

The following configuration programs come with the server:

- **Setup Utility program**

The Setup Utility program is part of the UEFI. 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.

- **Boot Manager program**

The Boot Manager program is part of the server firmware. Use it to override the startup sequence that is set in the Setup Utility and temporarily assign a device to be first in the startup sequence.

- **ThinkServer EasyStartup program**

This program simplifies the process of configuring your RAID controllers and installing your operating system. It is on the *ThinkServer EasyStartup* DVD provided with your server. For details, see “Using the *EasyStartup* DVD” on page 255.

- **Integrated Management Module**

Use the integrated management module (IMM) for configuration, to update the firmware and sensor data record/field replaceable unit (SDR/FRU) data, and to remotely manage a network.

- **ThinkServer EasyManage products**

ThinkServer EasyManage Core Server and ThinkServer EasyManage Agent work together to provide centralized hardware and software inventory management and secure automated system management through a single console. See “Installing ThinkServer EasyManage software” on page 262.

- **Remote presence capability and blue-screen capture**

The remote presence and blue-screen capture feature are integrated into the Integrated Management Module (IMM). The virtual media key is required to enable the remote presence functions. When the optional virtual media key is installed in the server, it activates the remote presence functions. Without the virtual media key, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you will still be able to access the Web interface without the virtual media key. You can order the optional Lenovo Virtual Media Key, if one did not come with your server. For more information about how to enable the remote presence function, see “Using the remote presence capability and blue-screen capture” on page 264.

- **LSI Configuration Utility program**

Use the LSI Configuration Utility program to configure the integrated SAS/SATA controller with RAID capabilities and the devices that are attached to it. For information about using this program, see “Using LSI Configuration Utility program” on page 252.

- **Ethernet controller configuration**

For information about configuring the Ethernet controller, see “Configuring the Gigabit Ethernet controllers” on page 265.

- **IBM Advanced Settings Utility (ASU) program**

Use this program as an alternative to the Setup utility for modifying UEFI settings and IMM settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the server to access the Setup utility. For more information about using this program, see .

Using the Setup Utility

The Setup Utility program is part of the UEFI. You can use it 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
- View and change the startup characteristics of the server and the order of startup devices (startup-drive sequence)
- View and change settings for advanced hardware features
- View and clear the event and error logs
- Change interrupt request (IRQ) settings
- Resolve configuration conflicts

Starting the Setup Utility

To start the Setup Utility, do the following:

1. Turn on the server.

Note: Approximately 1 to 3 minutes after the server is connected to power, the power-control button becomes active.

2. When the prompt <F1> Setup is displayed, press F1. If you have set an administrator password, you must type the administrator password to access the full Setup Utility menu. If you do not type the administrator password, a limited Setup Utility menu is available.
3. Select settings to view or change.

Setup Utility menu choices

The following choices are on the Setup Utility main menu for the UEFI. Depending on the version of the firmware, some menu choices might differ slightly from these descriptions.

- **System Information**

Select this choice to view information about the server. When you make changes through other choices in the Setup Utility, some of those changes are reflected in the system information; you cannot change settings directly in the system information. This choice is on the full Setup Utility menu only.

- **System Summary**

Select this choice to view configuration information, including the ID, speed, and cache size of the microprocessors, machine type and model of the server, the serial number, the system UUID, and the amount of installed memory. When you make configuration changes through other options in the Setup Utility, the changes are reflected in the system summary; you cannot change settings directly in the system summary.

- **Product Data**

Select this choice to view the system-board identifier, the revision level or issue date of the firmware, the integrated management module and diagnostics code, and the version and date.

This choice is on the full Setup Utility menu only.

- **System Settings**

Select this choice to view or change the server component settings.

- **Processors**

Select this choice to view or change the processor settings.

- **Memory**

Select this choice to view or change the memory settings.

- **Devices and I/O Ports**

Select this choice to view or change assignments for devices and input/output (I/O) ports. You can configure the serial ports; configure remote console redirection; enable or disable integrated Ethernet controllers, the SAS/SATA controller, SATA DVD drive channels, and PCI slots; and view the system Ethernet MAC addresses. If you disable a device, it cannot be configured, and the operating system will not be able to detect it (this is equivalent to disconnecting the device).

- **Power**

Select this choice to view or change power capping to control consumption, processors, and performance states.

- **Legacy Support**

Select this choice to view or set legacy support.

- **Force Legacy Video on Boot**

Select this choice to force INT video support, if the operating system does not support UEFI video output standards.

- **Rehook INT**

Select this choice to enable or disable devices from taking control of the boot process. The default is **Disable**.

- **Legacy Thunk Support**

Select this choice to enable or disable UEFI to interact with PCI mass storage devices that are non-UEFI compliant.

- **Integrated Management Module**

Select this choice to view or change the settings for the integrated management module.

- **POST Watchdog Timer**

Select this choice to view or enable the POST watchdog timer.

- **POST Watchdog Timer Value**

Select this choice to view or set the POST loader watchdog timer value.

- **Reboot System on NMI**

Enable or disable restarting the system whenever a nonmaskable interrupt (NMI) occurs. **Disabled** is the default.

- **Commands on USB Interface Preference**

Select this choice to enable or disable the Ethernet over USB interface on IMM.

- **Network Configuration**

Select this choice to view the system management network interface port, the IMM MAC address, the current IMM IP address, and the host name; define the static IMM IP address, subnet mask, and gateway address; specify whether to use the static IP address or have DHCP assign the IMM IP address; save the network changes; and reset the IMM.

- **Reset IMM to Defaults**

Select this choice to view or reset IMM to the default settings.

- **Reset IMM**

Select this choice to reset IMM.

- **System Security**

Select this choice to view or configure Trusted Platform Module (TPM) support.

- **Adapters and UEFI Drivers**

Select this choice to view information about the UEFI 1.10 and UEFI 2.0 compliant controllers and drivers installed in the server.

- **Network**

Select this choice to view or configure the network device options, such as iSCSI, PXE, and network devices.

Note: The configuration forms for UEFI 2.1 and greater compliant add-on network devices might be located here.

- **Date and Time**

Select this choice to set the date and time in the server, in 24-hour format (*hour:minute:second*).

This choice is on the full Setup Utility menu only.

- **Start Options**

Select this choice to view or change the start options, including the startup sequence, keyboard NumLock state, PXE boot option, and PCI device boot priority. Changes in the startup options take effect when you start the server.

The startup sequence specifies the order in which the server checks devices to find a boot record. The server starts from the first boot record that it finds. For example, you can define a startup sequence that checks for a disc in the DVD drive, then checks the hard disk drive, and then checks a network adapter.

This choice is on the full Setup Utility menu only.

- **Boot Manager**

Select this choice to view, add, delete, or change the device boot priority, boot from a file, select a one-time boot, or reset the boot order to the default setting.

If the server has Wake on LAN hardware and software and the operating system supports Wake on LAN functions, you can specify a startup sequence for the Wake on LAN functions. For example, you can define a startup sequence that checks for a disc in the CD-RW/DVD drive, then checks the hard disk drive, and then checks a network adapter.

- **System Event Logs**

Select this choice to enter the System Event Manager, where you can view the error messages in the system event logs. You can use the arrow keys to move between pages in the error log.

The system event logs contain all event and error messages that have been generated during POST, by the systems-management interface handler, and by the system service processor. Run the diagnostic programs to get more information about error codes that occur.

Important: If the system-error LED on the front of the server is lit but there are no other error indications, clear the IMM system-event log. Also, after you complete a repair or correct an error, clear the IMM system-event log to turn off the system-error LED on the front of the server.

- **POST Event Viewer**

Select this choice to enter the POST event viewer to view the POST error messages.

- **System Event Log**

Select this choice to view the IMM system event log.

- **Clear System Event Log**

Select this choice to clear the IMM system event log.

- **User Security**

Select this choice to set, change, or clear passwords. See “Passwords” on page 249 for more information.

This choice is on the full and limited Setup Utility menu.

- **Power-on Password**

Select this choice to set or change a power-on password. See “Power-on password” on page 249 for more information.

- **Administrator Password**

Select this choice to set or change an administrator password. An administrator password is intended to be used by a system administrator; it limits access to the full Setup Utility menu. If an administrator password is set, the full Setup Utility menu is available only if you type the administrator password at the password prompt. For more information, see “Administrator password” on page 250.

- **Save Settings**

Select this choice to save the changes that you have made in the settings.

- **Restore Settings**

Select this choice to cancel the changes that you have made in the settings and restore the previous settings.

- **Load Default Settings**

Select this choice to cancel the changes that you have made in the settings and restore the factory settings.

- **Exit Setup**

Select this choice to exit from the Setup Utility. If you have not saved the changes that you have made in the settings, you are asked whether you want to save the changes or exit without saving them.

Passwords

From the **System Security** choice, you can set, change, and delete a power-on password and an administrator password. The **System Security** choice is on the full Configuration/Setup Utility menu only.

If you set only a power-on password, you must type the power-on password to complete the system startup; you have access to the full Configuration/Setup Utility menu.

An administrator password is intended to be used by a system administrator; it limits access to the full Configuration/Setup Utility menu. If you set only an administrator password, you do not have to type a password to complete the system startup, but you must type the administrator password to access the Configuration/Setup Utility menu.

If you set a power-on password for a user and an administrator password for a system administrator, you can type either password to complete the system startup. A system administrator who types the administrator password has access to the full Configuration/Setup Utility menu; the system administrator can give the user authority to set, change, and delete the power-on password. A user who types the power-on password has access to only the limited Configuration/Setup Utility menu; the user can set, change, and delete the power-on password, if the system administrator has given the user that authority.

Power-on password

If a power-on password is set, when you turn on the server, the system startup will not be completed until you type the power-on password. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

If a power-on password is set, you can enable the Unattended Start mode, in which the keyboard and mouse remain locked but the operating system can start. You can unlock the keyboard and mouse by typing the power-on password.

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

- If an administrator password is set, type the administrator password at the password prompt (see “Administrator password” on page 250). Start the Configuration/Setup Utility program and reset the power-on password.
- Remove the battery from the server and then reinstall it. For instructions for removing the battery, see “Removing the battery” on page 188.
- Change the position of the clear CMOS jumper on the system board to bypass the power-on password check. See “Power-on password” for additional information.

Attention: Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. See the safety information in “Important Safety Information” on page 1 and “Handling static-sensitive devices” on page 129. Do not change settings or move jumpers on any system-board switch or jumper block that is not shown in this document.

Administrator password

If an administrator password is set, you must type the administrator password for access to the full Setup utility menu. You can use any combination of up to seven characters (A - Z, a - z, and 0 - 9) for the password.

If you forget the administrator password, you can reset it after you change the position of the clear CMOS jumper.

Resetting passwords

If you forget the power-on password or administrator password, you can move the clear-CMOS jumper block on the system board to pins 2 and 3, to clear CMOS memory and bypass the power-on or administrator password check. The jumper location is shown in the following illustration.

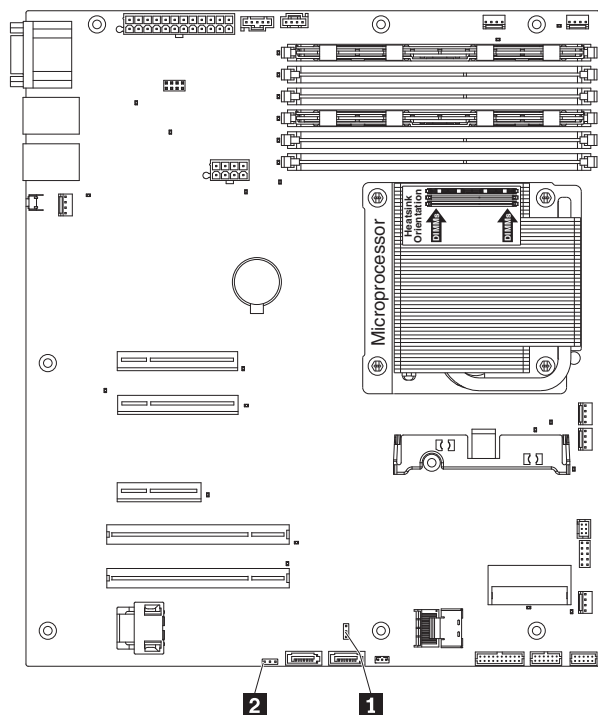


Table 31. System board jumpers

Jumper number	Jumper name	Jumper setting
JP1	Clear CMOS jumper 1	<ul style="list-style-type: none"> Pins 1 and 2: Keep CMOS data (default). Pins 2 and 3: Clear CMOS data (including power-on password and administrator password)
JP6	Boot block jumper 2	<ul style="list-style-type: none"> Pins 1 and 2: Boot from primary BIOS page (default) . Pins 2 and 3: Boot from backup BIOS page.

Notes:

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

Using the Boot Manager program

The Boot Manager program is a built-in, menu-driven configuration utility program that you can use to temporarily redefine the first startup device without changing settings in the Setup Utility.

To use the Boot Manager program, do the following:

1. Turn off the server.
2. Restart the server.
3. When the prompt <F12> Select Boot Device is displayed, press F12. If a bootable USB mass storage device is installed, a submenu item (**USB Key/Disk**) is displayed.
4. Use the Up arrow and Down arrow keys to select an item from the **Boot Selection Menu** and press Enter. The server attempts to boot from the selected device.

The next time the server starts, it returns to the startup sequence that is set in the Setup Utility.

Configuring RAID controllers

The following table lists the various utilities available to configure RAID controllers before an operating system is installed.

Table 32. RAID configuration utilities

RAID configuration utility	Description	Location	Where to find more information
EasyStartup RAID configuration utility	<ul style="list-style-type: none">• For use with all factory-supported RAID controllers• Automatically detects hardware and lists all supported RAID configurations• Configures one or more disk arrays per controller depending on the number of drives attached to the controller and the RAID level selected• Supports hot-spare drives• Creates a RAID response file that can be used to configure RAID controllers on similarly configured Lenovo servers.	EasyStartup DVD	"Using the <i>EasyStartup</i> DVD" on page 255
MegaRAID BIOS Configuration Utility (WebBIOS)	For: <ul style="list-style-type: none">• IBM ServeRAID-BR10il v2 SAS/SATA Controller• IBM ServeRAID-MR10i SAS/SATA Controller• IBM ServeRAID-MR10is VAULT SAS/SATA Controller• IBM ServeRAID-M1015 SAS/SATA controller• IBM ServeRAID-M5015 SAS/SATA controller	In system firmware. To access: <ul style="list-style-type: none">• Use UEFI Setup Utility.• Press Ctrl + H at the WebBIOS prompt during startup.	"Using the WebBIOS utility" on page 254

Table 32. RAID configuration utilities (continued)

RAID configuration utility	Description	Location	Where to find more information
LSI Configuration Utility	<p>For:</p> <ul style="list-style-type: none"> • IBM ServeRAID-BR10il v2 SAS/SATA Controller • IBM ServeRAID-MR10i SAS/SATA Controller • IBM ServeRAID-MR10is VAULT SAS/SATA Controller • IBM ServeRAID-M1015 SAS/SATA controller • IBM ServeRAID-M5015 SAS/SATA controller 	<p>In system firmware. To access:</p> <ul style="list-style-type: none"> • Use UEFI Setup Utility. • Press Ctrl + C at the LSI prompt during startup. 	<p>“Using LSI Configuration Utility program”</p>

Using LSI Configuration Utility program

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

- Use the LSI Configuration Utility program to perform the following tasks:
 - Perform a low-level format on a hard disk drive
 - Create an array of hard disk drives with or without a hot-spare drive
 - Set protocol parameters on hard disk drives

The integrated SAS/SATA controller with RAID capabilities supports RAID arrays. You can use the LSI Configuration Utility program to configure RAID 1 (IM), RAID 1E (IME), and RAID 0 (IS) for a single pair of attached devices. If you install a different type of RAID controller, follow the instructions in the documentation that comes with the adapter to view or change settings for attached devices.

When you are using the LSI Configuration Utility program to configure and manage arrays, consider the following information:

- The integrated SAS/SATA controller with RAID capabilities supports the following features:
 - Integrated Mirroring (IM) with hot-spare support (also known as RAID 1)

Use this option to create an integrated array of two disks plus up to two optional hot spares. All data on the primary disk can be migrated.
 - Integrated Mirroring Enhanced (IME) with hot-spare support (also known as RAID 1E)

Use this option to create an integrated mirror enhanced array of three to eight disks, including up to two optional hot spares. All data on the array disks will be deleted.
 - Integrated Striping (IS) (also known as RAID 0)

Use this option to create an integrated striping array of two to eight disks. All data on the array disks will be deleted.
- Hard disk drive capacities affect how you create arrays. The drives in an array can have different capacities, but the RAID controller treats them as if they all have the capacity of the smallest hard disk drive.
- If you use an integrated SAS/SATA controller with RAID capabilities to configure a RAID 1 (mirrored) array after you have installed the operating system, you will lose access to any data or applications that were previously stored on the secondary drive of the mirrored pair.
- If you install a different type of RAID controller, see the documentation that comes with the controller for information about viewing and changing settings for attached devices.

Starting the LSI Configuration Utility program

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

1. Turn on the server.

Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.

2. When the prompt <F1 Setup> is displayed, press F1. If you have set an administrator password, you are prompted to type the password.
3. Select **System Settings** → **Adapters and UEFI drivers**.
4. Select **Please refresh this page on the first visit** and press Enter.
5. Select **LSI controller_driver_name Driver** and press Enter, where *controller_driver_name* is the name of the SAS/SATA controller driver. For the SAS/SATA controller driver name, see the documentation that comes with your controller.
6. To perform storage-management tasks, follow the procedures in the documentation that comes with the SAS/SATA controller.

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

Formatting a hard disk drive

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

Note: Before you format a hard disk, make sure that the disk is not part of a mirrored pair.

To format a drive, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drive that you want to format and press Enter.
2. Select **SAS Topology** and press Enter.
3. Select **Direct Attach Devices** and press Enter.
4. To highlight the drive that you want to format, use the Up Arrow and Down Arrow keys. To scroll left and right, use the Left Arrow and Right Arrow keys or the End key. Press Alt+D.
5. To start the low-level formatting operation, select **Format** and press Enter.

Creating a RAID array of hard disk drives

To create a RAID array of hard disk drives, complete the following steps:

1. From the list of adapters, select the controller (channel) for the drives that you want to mirror.
2. Select **RAID Properties**.
3. Select the type of array that you want to create.
4. Use the arrow keys to highlight the first drive in the pair; then, press the Minus (-) or Plus (+) key to change the mirror value to **Primary**.
5. Continue to select the next drive using the Minus (-) or Plus (+) key until you have selected all the drives for your array.
6. Press C to create the disk array.
7. Select **Apply changes and exit menu** to create the array.

Using the WebBIOS utility

The WebBIOS configuration utility enables you to create and manage RAID configurations on LSI SAS controllers. The WebBIOS utility resides in the SAS controller BIOS and operates independently of the operating system. The WebBIOS utility provides a configuration wizard to guide you through the configuration of virtual disks and physical arrays.

Starting the WebBIOS utility

Perform the following steps to start the WebBIOS utility and access the main menu:

1. After you turn on the power and when the computer is starting, you are prompted to press Ctrl + H when the following message is displayed:

```
Copyright© LSI Logic Corporation  
Press <Ctrl><H> for WebBIOS
```

2. Select a controller from the list.
3. Click **Start**. The main WebBIOS utility interface is displayed. You can toggle between the physical view and logical view of the storage devices that are connected to the controller. Click **Physical View** or **Logical View** on the menu in the left pane to change the view.

Main menu of the WebBIOS utility

The main menu includes the following options:

Adapter Properties

From this view, you can display and modify the properties of the SAS controller that is currently selected.

Scan Devices

From this view, you can re-scan the physical and virtual disks for any changes in the drive status or physical configuration.

Virtual Disks

From this view, you can display and modify the virtual disk properties, delete virtual disks, initialize disks, and perform other tasks.

Physical Drives

From this view, you can view the physical drive properties, create hot spare disks, and perform other tasks.

Configuration Wizard

Select this to start the Configuration Wizard and create a new storage configuration, clear a configuration, or add a new configuration.

Adapter Selection

From this view, you can select a different SAS adapter. Then, you can view information about the adapter and the drives connected to it, or create a new configuration for the adapter.

Physical View or Logical View

Select this to toggle between the Physical View and Logical View.

Events

From this view, you can display the system events in the Event Information page.

Exit Select this to exit the WebBIOS utility and continue with the system boot.

Creating a storage configuration using the Configuration Wizard

Follow these steps to start create a storage configuration:

1. Click **Configuration Wizard** to start the wizard.
2. Select a configuration option:

Attention: If you select **Clear Configuration** or **New Configuration**, all existing data in the configuration is deleted. Make a backup copy of any data that you want to keep before selecting these options.

Clear Configuration

Clears the existing configuration.

New Configuration

Clears the existing configuration and lets you create a new configuration.

Add Configuration

Retains the existing storage configuration and adds new drives to it (this does not cause any data loss).

3. Click **Next**.

4. Select a configuration mode from the following options:

Custom Configuration

In this mode, you can control all attributes of the new storage configuration.

Auto Configuration and Redundancy

This mode automatically creates an optimal RAID 1 or RAID 5 configuration, providing data redundancy.

Auto Configuration without Redundancy

This mode automatically creates a non-redundant RAID 0 configuration.

5. Click **Next** to continue.

Viewing and changing properties

You can view information for one LSI SAS at a time. If your system has multiple LSI SAS adapters, you can view information for a different adapter, click **Adapter Selection** on the main view. To view the properties for the currently selected adapter, click **Adapter Properties** on the main WebBIOS screen.

Viewing and changing virtual disk properties

On the WebBIOS main screen, select a virtual disk from the list and click **Virtual Disk**.

The Properties panel displays the RAID level, state, size, and stripe size.

The Policies panel lists the virtual disk policies that were defined when the storage configuration was created. To change any of these policies, select a policy from the menu and click **Change**. The Operations panel lists operations that can be performed on the virtual disk. Select the operation and click **Go**. Then choose from the following operations:

- Select **Del** to delete this virtual disk.
- Select **Locate** and the LEDs flash on the physical drives used by this virtual disk.
- Select **Fast** or **Slow** to initialize this virtual disk.

Attention: Before you run an initialization, back up any data on the virtual disk that you want to save. All data on the virtual disk is lost when you initialize it.

Using the *EasyStartup* DVD

The *EasyStartup* DVD simplifies the process of configuring your RAID controllers and installing an operating system. The program works in conjunction with your Windows or Linux operating-system installation disc to automate the process of installing the operating system and associated device drivers.

If you did not receive an *EasyStartup* DVD with your server, you can download an image from the Lenovo Support Web site at: <http://www.lenovo.com/support>

The EasyStartup program has the following features:

- Self-booting DVD
- Easy-to-use, language-selectable interface
- Integrated help system
- Automatic hardware detection
- RAID configuration utility
- Device drivers (based on the server model and detected devices)
- Selectable partition size and file system type
- Support for Windows, Red Hat, and SUSE Server operating systems
- Installs the operating system and device drivers in an unattended mode to save time
- Creates a reusable response file that can be used with similarly configured Lenovo servers to make future installations even faster

Before you use the *EasyStartup* DVD

Functionality and supported operating systems can vary with different versions of the EasyStartup program. To learn more about the version you have, do the following:

1. Insert the *EasyStartup* DVD and restart the server.
2. Advance to the Home screen.
3. Click **Compatibility notes**. The compatibility notes feature provides detailed information about the RAID controllers, operating systems, and server configurations supported by that version of the EasyStartup program.
4. Click **User Guide**. The user guide provides an overview of the various functions provided by that version of the EasyStartup program.

Before using the EasyStartup program to install an operating system, make sure any external storage devices and fiber channels are configured correctly.

EasyStartup overview

The EasyStartup program requires a supported Lenovo server with an enabled, startable (bootable) DVD drive. In addition to the *EasyStartup* DVD, you also must have the operating-system installation CD or DVD and the product key or installation number for the operating system (if provided).

The EasyStartup program performs the following tasks:

- Detects installed hardware devices
- Guides you through the process of configuring one or more RAID controllers
- Guides you through the process of creating a response file for the unattended installation of the operating system
- Enables you to create scripts or commands that run at the end of the operating system installation process
- Facilitates the installation of the ThinkServer EasyManage products and DVD-burning software (Windows installation only)
- Prepares the hard disk for installation
- Prompts you to insert the operating-system installation disc
- Initiates an unattended installation of the operating system and device drivers

Setup and configuration

When you start the *EasyStartup* DVD, you will be prompted for the following:

- Select the language in which you want to view the program.
- Select the language of the keyboard you will be using with the program.

Note: The following language keyboards are supported: English, Dutch, French, German, Italian, Japanese, Spanish, and Turkish.

You will then see one or more reminders about configuring storage devices, and then you will be presented with the Lenovo License Agreement. Read the license agreement carefully. You must agree with terms in order to continue.

After agreeing to the license agreement, you will be given the following choices:

- Continue to the main program interface
- Use a shortcut to install an operating system based on a response file that you previously created using the EasyStartup program
- Use a short cut to configure RAID controllers based on a RAID response file that you previously created using the EasyStartup program

If you continue to the main program interface, you will have the following selectable options:

- **Compatibility notes:** This selection provides information about the RAID controllers, operating systems, and server configurations supported by that version of the EasyStartup program.
- **User Guide:** This selection provides information about the features provided by that version of the EasyStartup program.
- **Hardware list:** This selection displays a list of hardware devices detected by the EasyStartup program.
- **Configure RAID:** This selection enables you to view the current RAID configuration for each installed RAID controller and make changes if needed.
- **Install operating system:** This selection displays a series of choices and prompts to collect information required for installation, prepares the hard disk for installation, and then initiates the installation process using the user-provided operating-system installation CD or DVD.
- **About:** This selection displays version information and legal notices.

Configuring RAID

The RAID configuration feature that is part of the EasyStartup program enables you to view and change RAID settings for supported RAID controllers. Through this feature, you have the ability to configure each installed controller. The program automatically detects the number of discs currently attached to the controller, determines the possible RAID configurations that can be configured, and prompts you through the steps to configure one or more disc arrays with or without hot-spare drives. As you configure each controller you will be given the option to save the RAID configuration settings to a RAID response file, which you can use on other similarly configured Lenovo servers. This method satisfies most users' needs.

Note: The EasyStartup program provides limited support for the IBM ServeRAID-BR10il v2 SAS/SATA Controller. You must use the LSI Configuration Utility to configure the disc array for this controller. However, after the disc arrays are configured, you can use the EasyStartup program to install the operating system and associated device driver. See "Using LSI Configuration Utility program" on page 252 for details.

Typical operating system installation

When you select **Install operating system**, you will be prompted for information required for the installation. The prompts vary depending on the operating system selected. This section describes the tasks associated with a typical Windows operating system installation. Each task must be completed in order before moving to the next task.

Note: Ensure that your RAID controller is correctly configured before you select an operating system to install.

- **Select operating system:** This task enables you to select the operating system that you will be installing.
- **Select disk:** This task enables you to select the disk where you want to install the operating system.

Note: The disk that you select must be set as the boot disk in UEFI.

- **Partitions options:** This task enables you to choose whether you want to repartition the selected drive or use an existing partition.
- **Partition settings:** This task enables you to choose the file system type and define the partition size.
- **Installation settings:** This task prompts you for user and system settings, the operating system product key, and the administrator password.
- **Network settings:** This task prompts you for domain and workgroup settings, Ethernet controller type, IP address settings, DNS settings, and WINS address settings.
- **Install applications:** This task enables you to run custom commands or scripts at the end of the installation process. It also facilitates the installation of DVD-burning software and ThinkServer EasyManage software products.
- **Install Windows components:** This task enables you to install optional Windows components such as IIS, ASP.NET, and SNMP.
- **Confirm settings:** This task enables you to review all of the information you provided.
- **Save response file:** This task gives you the option of saving the information on a diskette or USB device as a response file for future installations on similarly configured Lenovo servers.
- **Start installation:** This task starts the actual installation process. First, the disk is prepared using the disk and partition information you specified. Then you are prompted to insert the operating system disk, and the operating system is installed using the information that you specified.

Installing your operating system without using EasyStartup

If you have already configured the server hardware and you are not using the EasyStartup program to install your operating system, do the following to download the latest operating-system installation instructions from the Lenovo Support Web site:

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

1. Go to <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS200**, and click **Continue**.
4. Select the operating system that you want from the **Operating system** list, and click **Continue**.
5. Click **Operating system installation** to download instructions to install the operating system.

Updating the firmware

The firmware in the server is periodically updated and is available for download on the Lenovo Support Web site. Go to <http://www.lenovo.com/support> to check for the latest level of firmware, such as unified extensible firmware interface (UEFI) code, vital product data (VPD) code, device drivers, and service processor firmware.

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 from a diskette or CD image.

- UEFI code is stored in programmable ROM (flash memory) on the system board.
- IMM firmware is stored in ROM on the baseboard management controller on the system board.
- Ethernet firmware is stored in ROM on the Ethernet controller.
- ServeRAID firmware is stored in ROM on the RAID controller.
- Major components contain VPD code. You can use the Advanced Settings Utility program to update the VPD code (see “IBM Advanced Settings Utility program” on page 262).

The following items are downloadable at <http://www.lenovo.com/support>:

- Diagnostics programs
- IMM firmware
- Ethernet firmware

Using the EasyUpdate Firmware Updater tool

ThinkServer EasyUpdate Firmware Updater is a software application that enables you to maintain your system firmware up to date and helps you avoid unnecessary outages. Firmware Updater updates the server firmware in two steps, by updating system firmware, adapter firmware, and hard disk drive (HDD) firmware.

To update your system, first go to the Lenovo Support Web site and obtain the ISO file.

1. Go to <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS200**, and click **Continue**.
4. Click **Downloads and drivers** to download firmware updates.
5. Download the ThinkServer firmware update media ISO file.
6. Burn the ISO image on to a CD or DVD.
7. Insert the media in the server DVD drive, and start the server to that drive.
8. The application starts automatically. Hardware detection runs, and a list of applicable firmware updates is displayed.

Note: You need to boot the CD or DVD two times; one time to update the system and adapter firmware and one time to update the HDD firmware.

9. Select the firmware updates that you want to install.

Before distributing the firmware update to other servers, ensure that your server can restart successfully without encountering hardware problems.

Starting the backup server firmware

The system board contains a backup copy area for the server firmware. This is a secondary copy of the server firmware that you update only during the process of updating the server firmware. If the primary copy of the server firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, place the JP6 jumper in the backup position (pins 2 and 3).

Use the backup copy of the server firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, move the JP6 jumper back to the primary position (pins 1 and 2).

Recovering the UEFI firmware

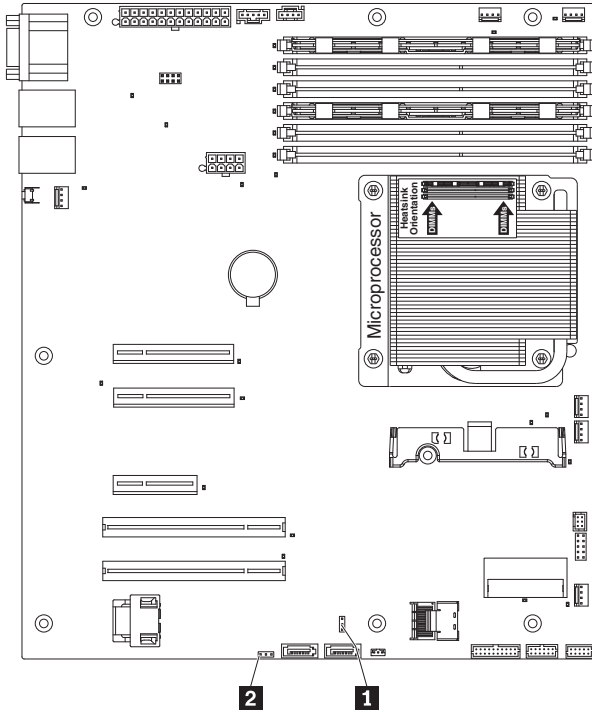
If the UEFI firmware has become damaged, such as from a power failure during an update, you can recover the UEFI firmware using the boot block jumper and a UEFI recovery diskette.

The system board contains a backup copy area for the server firmware. This is a secondary copy of the server firmware that you update only during the process of updating the server firmware. If the primary copy of the server firmware becomes damaged, use this backup copy.

To force the server to start from the backup copy, turn off the server; then, place jumper JP6 **2** in the backup position (pins 2 and 3).

- Pins 1 and 2: Boot from primary BIOS page (default) .
- Pins 2 and 3: Boot from backup BIOS page.

Use the backup copy of the server firmware until the primary copy is restored. After the primary copy is restored, turn off the server; then, move jumper JP6 **2** back to the primary position (pins 1 and 2).



The following table describes the jumpers on the system board.

Table 33. System board jumpers

Jumper number	Jumper name	Jumper setting
JP1	Clear CMOS jumper 1	<ul style="list-style-type: none"> • Pins 1 and 2: Keep CMOS data (default). • Pins 2 and 3: Clear CMOS data (including power-on password and administrator password)
JP6	Boot block jumper 2	<ul style="list-style-type: none"> • Pins 1 and 2: Boot from primary BIOS page (default) . • Pins 2 and 3: Boot from backup BIOS page.

Notes:

1. If no jumper is present, the server responds as if the pins are set to 1 and 2.
2. Changing the position of the UEFI boot recovery jumper from pins 1 and 2 to pins 2 and 3 before the server is turned on alters which flash ROM page is loaded. Do not change the jumper pin position after the server is turned on. This can cause an unpredictable problem.

Using the integrated management module

The integrated management module (IMM) is a second generation of the functions that were formerly provided by the baseboard management controller hardware. It combines service processor functions, video controller, and (when an optional virtual media key is installed) remote presence function in a single chip.

The IMM supports the following basic systems-management features:

- Environmental monitor with fan speed control for temperature, voltages, fan failure, and power supply failure.
- DIMM error assistance. The Unified Extensible Firmware Interface (UEFI) disables a failing DIMM that is detected during POST, and the IMM lights the associated system error LED and the failing DIMM error LED.
- System-event log (SEL).
- ROM-based IMM firmware flash updates.
- Auto Boot Failure Recovery (ABR).
- A virtual media key, which enables remote presence support (remote video, remote keyboard/mouse, and remote storage).
- Nonmaskable interrupt (NMI) detection and reporting.
- Automatic Server Restart (ASR) when POST is not complete or the operating system hangs and the operating system watchdog timer times-out. The IMM might be configured to watch for the operating system watchdog timer and reboot the system after a timeout, if the ASR feature is enabled. Otherwise, the IMM allows the administrator to generate a nonmaskable interrupt (NMI) by pressing an NMI button on the system board for an operating-system memory dump. ASR is supported by IPMI.
- Intelligent Platform Management Interface (IPMI) Specification V2.0 and Intelligent Platform Management Bus (IPMB) support.
- Invalid system configuration (CNFG) LED support.
- Serial port redirection over Telnet or SSH.
- Serial over LAN (SOL).
- Query power supply input power.
- PECI 2 support.
- Power/reset control (power-on, hard and soft shutdown, hard and soft reset, schedule power control).
- Alerts (in-band and out-of-band alerting, PET traps - IPMI style, SNMP, e-mail).
- Operating-system failure blue screen capture.
- Command-line interface.
- Configuration save and restore.
- PCI configuration data.
- Boot sequence manipulation.

The IMM also provides the following remote server management capabilities through the OSA SMBridge management utility program:

- **Command-line interface (IPMI Shell)**

The command-line interface provides direct access to server management functions through the IPMI 2.0 protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

- **Serial over LAN**

Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the UEFI settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

IBM Advanced Settings Utility program

The IBM Advanced Settings Utility (ASU) program is an alternative to the UEFI Setup Utility program for modifying UEFI settings. Use the ASU program online or out of band to modify UEFI settings from the command line without the need to restart the system to access the UEFI Setup Utility program.

You also can use the ASU program to configure the optional remote presence features or other IMM settings. The remote presence features provide enhanced systems-management capabilities.

In addition, the ASU program provides limited settings for configuring the IPMI function in the IMM through the command-line interface.

Use the command-line interface to issue setup commands. You can save any of the settings as a file and run the file as a script. The ASU program supports scripting environments through a batch-processing mode.

Installing ThinkServer EasyManage software

You can install the ThinkServer EasyManage Core Server program from the ThinkServer EasyManage CD or you can download and install the program from <http://www.lenovo.com/support>. After one instance of the ThinkServer EasyManage Core Server has been installed, you can use the ThinkServer EasyManage Agent installer to install the agent on other servers and clients on the network.

Also, the ThinkServer EasyStartup program provides an option to either install the ThinkServer EasyManage Agent as part of the operating system installation process or install a desktop icon to assist with the installation of the ThinkServer EasyManage Core Server after the operating system has been installed.

Installation requirements

Before installing ThinkServer EasyManage software on your server, your environment must meet the following requirements:

- Microsoft® Windows Server 2008 is installed on the server where you intend to install the Core Server.
- The original Windows Server operating system installation CDs are available in case files are needed while installing the prerequisites.
- The server has Internet access to obtain prerequisites and to activate the software after the installation is complete.
- The server has a static IP address.
- The server is not a domain controller. However, it is recommended to have the server join a domain.
- The account that you use to log in and to install the Core Server has Administrator privileges on the server with full read/write access. Ideally, this account is also a Domain Administrator account. This account will be used to create the initial administrator-level account used to log in to the ThinkServer EasyManage console.
- Any previous agent from EasyManage or LANDesk must be removed prior to installing the Core Server and Management Console.

Installation order

The order in which you install the operating system and Windows Components is critical to install ThinkServer EasyManage software successfully. To ensure a clean, working installation of ThinkServer EasyManage software, use the following installation order:

1. Install Microsoft Windows Server 2008 32-bit with the latest Service Pack.
2. Install the Windows Components: See “Installing Windows 2008 32-bit components” on page 263.
3. Use Windows Update to install all available critical updates.

4. Download Microsoft Web Services Enhancement 2.0 Service Pack 3 (LANDesk Process Manager only) from the following Web site: <http://www.microsoft.com/downloads/details.aspx?FamilyID=1ba1f631-c3e7-420a-bc1e-ef18bab66122&DisplayLang=en>. Install the software using the default settings.

Note: This specific version is required.

5. Use Windows Update to install all available critical updates.
6. Launch the EasyManage installation.
7. After ThinkServer EasyManage is installed, enable Security and Patch Manager to obtain the LANDesk 8.8 Software Updates. In the console application, click **Help -> LANDesk -> Security Updates** for a guide to configuring Security and Patch Manager.
8. Install Adobe® Flash Player 9 if you plan to use the Management Console functions from the same server on which the Core Server is installed. You can obtain Adobe Flash Player 9 from the Adobe Web site: <http://www.adobe.com/products/flashplayer/>

Installing Windows 2008 32-bit components

To install the Windows Server 2008 32-bit components necessary for a ThinkServer EasyManage core server installation, complete the steps in this section.

Installing Web Server Role (IIS)

To install the Web Server Role (IIS), do the following:

1. Click **Start -> Server Manager**.
2. Under Roles Summary, click **Add Roles**. The **Add Roles** wizard appears.
3. Click **Next**.
4. Select the checkbox next to **Web Server (IIS)**. A dialog box displays the additional features that are required.
5. Click **Add Required Features**, then click **Next**. In the list of additional role services that can be installed, ensure that the following are selected:
 - HTTP Redirection
 - Static Content
 - ASP.NET
 - ASP
 - CGI
 - Server Side Includes
 - Windows Authentication
 - IIS 6 Metabase Compatibility

Note: When you select **ASP.Net** or **ASP**, a dialog box displays the additional role services required. Click **Add Required Role Services**.

6. Click **Install**.

Note: If IIS is already installed and certain Role Services are still required, expand **Roles** in the tree view on the left in Server Manager and click on **Web Server (IIS)**, then click on **Add Role Services**. Select the necessary role services and click **Install**.

Installing Microsoft SNMP services

To install Microsoft SNMP services, do the following:

1. Click **Add Features** in the **Features Summary** section on the main page of Server Manager.
2. Select the **SNMP Services** checkbox.
3. Click **Next**, then **Install**.

Uninstalling the LANDesk Software Agent

If the Core Server has LANDesk agents on it from a previous Management Suite release, it will fail the autorun prerequisite check. You must remove the old agents by running `uninstallwinclient.exe` file from the `\Program Files\LANDesk\ManagementSuite` folder.

Using the remote presence capability and blue-screen capture

The remote presence and blue-screen capture features are integrated functions of the integrated management module (IMM). When the optional Lenovo Virtual Media Key is installed in the server, it activates the remote presence functions. The virtual media key is required to enable the integrated remote presence and blue-screen capture features. Without the virtual media key, you will not be able to access the network remotely to mount or unmount drives or images on the client system. However, you can still access the Web interface without the key.

After the virtual media key is installed in the server, it is authenticated to determine whether it is valid. If the key is not valid, you receive a message from the Web interface (when you attempt to start the remote presence feature) indicating that the hardware key is required to use the remote presence feature.

The virtual media key has an LED. When this LED is lit and green, it indicates that the key is installed and functioning correctly. When the LED is not lit, it indicates that the key might not be installed correctly.

The remote presence feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1280 x 1024 at 75 Hz, regardless of the system state
- Remotely accessing the server, using the keyboard and mouse from a remote client
- Mapping the DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

Enabling the remote presence feature

To enable the remote presence feature, complete the following steps:

1. Install the virtual media key into the dedicated slot on the system board (see “Installing the virtual media key” on page 163).
2. Turn on the server.

Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.

Obtaining the IP address for the IMM

To access the Web interface, you need the IP address for the IMM. You can obtain the IMM IP address through the Setup utility. The server comes with a default IP address for the IMM of 192.168.70.125. To locate the IP address, complete the following steps:

1. Turn on the server.

Note: Approximately 1 to 3 minutes after the server is connected to ac power, the power-control button becomes active.

2. When the prompt <F1> Setup is displayed, press F1. (This prompt is displayed on the screen for only a few seconds. You must press F1 quickly.) If you have set both a power-on password and an administrator password, you must type the administrator password to access the full Setup utility menu.
3. From the Setup utility main menu, select **System Settings**.
4. On the next screen, select **Integrated Management Module**.
5. On the next screen, select **Network Configuration**.
6. Find the IP address and write it down.
7. Exit from the Setup utility.

Logging on to the Web interface

To log on to the Web interface to use the remote presence functions, complete the following steps:

1. Open a Web browser and in the **address** or **URL** field, type the IP address or host name of the IMM to which you want to connect.

Note: The IMM defaults to DHCP. If a DHCP host is not available, the IMM assigns a static IP address of 192.168.70.125.

2. On the Login page, type the user name and password. If you are using the IMM for the first time, you can obtain the user name and password from your system administrator. All login attempts are documented in the event log.

Note: The IMM is set initially with a user name of USERID and password of PASSWORD (passw0rd with a zero, not a the letter O). You have read/write access. You must change the default password the first time you log on.

3. On the Welcome page, type a timeout value (in minutes) in the field that is provided. The IMM will log you off of the Web interface if your browser is inactive for the number of minutes that you entered for the timeout value.
4. Click **Continue** to start the session. The System Health page provides a quick view of the system status.

Enabling the Intel Gigabit Ethernet Utility program

The Intel Gigabit Ethernet Utility program is part of the server firmware. You can use it to configure the network as a startable device, and you can customize where the network startup option appears in the startup sequence. Enable and disable the Intel Gigabit Ethernet Utility program from the Setup utility.

Configuring the Gigabit Ethernet controllers

The Ethernet controllers are integrated on the system board. They provide an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server support auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operate at that rate and mode.

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the *Intel Hartwell 82574L Gigabit Ethernet Software* CD that comes with the server. To find updated information about configuring the controllers, complete the following steps.

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

1. Go to <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers and Storage** from the **Select your product** list.
3. From **Family** list, select **ThinkServer TS200**, and click **Continue**.

Enabling and configuring Serial over LAN (SOL)

Establish a Serial over LAN (SOL) connection to manage servers from a remote location. You can remotely view and change the BIOS settings, restart the server, identify the server, and perform other management functions. Any standard Telnet client application can access the SOL connection.

To enable and configure the server for SOL, you must update and configure the UEFI code; update and configure the integrated management module (IMM) firmware; update and configure the Ethernet controller firmware; and enable the operating system for an SOL connection.

UEFI update and configuration

To update and configure the UEFI code to enable SOL, complete the following steps:

1. Update the UEFI code:
 - a. Download the latest version of the UEFI code from <http://www.lenovo.com/support>.
 - b. Update the UEFI code, following the instructions that come with the update file that you downloaded.
2. Update the IMM firmware:
 - a. Download the latest version of the IMM firmware from <http://www.lenovo.com/support>.
 - b. Update the IMM firmware, following the instructions that come with the update file that you downloaded.
3. Configure the UEFI settings:
 - a. When you are prompted to start the Configuration/Setup Utility program, restart the server and press F1.
 - b. Select **System Settings** → **Devices and I/O Ports**.
 - c. Select **Console Redirection Settings**; then, make sure that the values are set as follows:
 - **COM Port 1:** Enable
 - **Remote Console:** Enable
 - **Serial Port Sharing:** Enable
 - **Serial Port Access Mode:** Dedicated COM1 Settings
 - **Baud Rate:** 115200
 - **Data Bits:** 8
 - **Parity:** None Stop
 - **Bits:** 1
 - **Thermal Emulation:** ANSI
 - **Active After Boot:** Enable
 - **Flow Control:** Hardware
 - d. Press Esc twice to exit the **Devices and I/O Ports** section of the Configuration/Setup Utility program.
 - e. Select **Save Settings**; then, press Enter.
 - f. Press Enter to confirm.
 - g. Select **Exit Setup**; then, press Enter.
 - h. Make sure that Yes, exit the Setup Utility is selected; then, press Enter.

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Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Lenovo makes no representation or warranties regarding non-Lenovo products and services, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

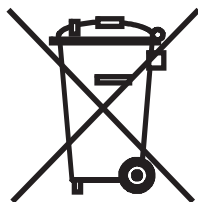
Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. Information on Lenovo product recycling offerings can be found on Lenovo's Internet site at

<http://www.lenovo.com/lenovo/environment/recycling>.

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. Lenovo recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. Lenovo dispone de una serie de programas y servicios de devolución de productos, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de Lenovo en el sitio web de Lenovo

<http://www.lenovo.com/lenovo/environment/recycling>.



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

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

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

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

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

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

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

Compliance with Republic of Turkey Directive on the Restriction of Hazardous Substances

Meets requirements of the Republic of Turkey Directive on the Restriction of the Use of Certain Hazardous Substances In Electrical and Electronic Equipment (EEE).

Türkiye EEE Yönetmeliğine Uygunluk Beyanı

Bu Lenovo ürünü, T.C. Çevre ve Orman Bakanlığı'nın "Elektrik ve Elektronik Eşyalarda Bazı Zararlı Maddelerin Kullanımının Sınırlandırılmasına Dair Yönetmelik (EEE)" direktiflerine uygundur.

EEE Yönetmeliğine Uygundur.

Recycling statements for Japan

日本のリサイクルに関して

本機器またはモニターの回収リサイクルについて

企業のお客様が、本機が使用済みとなり廃棄される場合は、廃棄物処理法の規定により、産業廃棄物として、地域を管轄する県知事あるいは、政令市長の許可を持った産業廃棄物処理業者に適正処理を委託する必要があります。また、弊社では資源有効利用促進法に基づき使用済みパソコンの回収および再利用・再資源化を行う「PC 回収リサイクル・サービス」を提供しています。詳細については、以下のURL にアクセスしてください。

<http://www.ibm.com/jp/pc/service/recycle/pcrecycle>

また、同法により、家庭で使用済みとなったパソコンのメーカー等による回収再資源化が2003年10月1日よりスタートしました。詳細については、以下のURL にアクセスしてください。

<http://www.ibm.com/jp/pc/service/recycle/personal>

重金属を含む内部部品の廃棄処理について

本機器のプリント基板等には微量の重金属(鉛など)が使用されています。使用後は適切な処理を行うため、上記「本機器またはモニターの回収リサイクルについて」に従って廃棄してください。

リチウム電池交換後の廃棄処理について

本機器には、ボタン型のリチウム電池がシステム・ボード上に取り付けられています。この電池を交換する場合には、お買い上げいただいた販売店にお問い合わせいただくか、弊社の修理サービスをご利用ください。万一お客様が交換された場合の古い電池を廃棄する際は、ビニール・テープなどで絶縁処理をして、お買い上げいただいた販売店にお問い合わせいただくか、もしくは産業廃棄物処理業者に処理をご依頼ください。また一般家庭などから、一般廃棄物として自治体に廃棄を依頼するときは、地方自治体の条例・規則に従って廃棄してください。

Battery return program

This product may contain a lithium or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal or batteries outside the United States, go to <http://www.lenovo.com/lenovo/environment> or contact your local waste disposal facility.

For Taiwan: Please recycle batteries.



For the European Union:

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

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

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

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

any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, go to <http://www.lenovo.com/lenovo/environment>.

For California:

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

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

German Ordinance for Work gloss statement

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

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

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo 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. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Lenovo 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.

Germany Class A compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmitteln

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher "Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

Japan 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。

Taiwan Class A warning statement

警告使用者
此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適當的對策。

People's Republic of China Class A warning statement

声 明

此为 A 级产品,在生活环境中,
该产品可能会造成无线电干扰。
在这种情况下,可能需要用户对其
干扰采取切实可行的措施。

Korea Class A warning statement

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자
또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 판매 또는
구입하였을 때에는 가정용으로 교환하시기 바랍니다.

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