lenovo

ThinkCentre
User Guide

Machine Types:
0806, 0810, 0821, 0823, 0827, 0829, 0832, 0835,
0842, 0844, 0846, 0848, 0851, and 4089

ThinkCentre

ThinkCentre
User Guide

Note

Before using this information and the product it supports, be sure to read and understand the *ThinkCentre Safety and Warranty Guide* and "Notices," on page 69.

Contents

Important safety information

CAUTION:
Before using this manual, be sure to read and understand all the related safety information for this product. Refer to the *ThinkCentre Safety and Warranty Guide* **that you received with this product for the latest safety information. Reading and understanding this safety information reduces the risk of personal injury and or damage to your product.**

If you no longer have a copy of the *ThinkCentre Safety and Warranty Guide*, you can obtain a Portable Document Format (PDF) version from the Lenovo® Support Web site at:
http://www.lenovo.com/support

Chapter 1. Product overview

This chapter provides information about the computer features, specifications, preinstalled software programs, and locations of connectors, components, parts on the system board, and internal drives.

This chapter contains the following topics:

- "Features": This section provides information about the computer features.
- "Specifications" on page 4: This section lists the physical specifications for your computer.
- "Software overview" on page 4: This section provides information about the software programs provided with your computer.
- "Locations" on page 7: This section provides information to help you locate your computer connectors, components, parts on the system board, and internal drives.

Features

This section provides information about the computer features.

> **System information**
>
> The following information covers a variety of models. For information about your specific model, use the Setup Utility program. See Chapter 4, "Using the Setup Utility program," on page 51.

Microprocessor

Your computer comes with one of the following microprocessors (internal cache size varies by model type):

- Intel® Celeron® microprocessor
- Intel Celeron dual-core microprocessor
- Intel Core™2 Duo microprocessor
- Intel Core 2 Quad microprocessor
- Intel Pentium® dual-core microprocessor

Memory module(s)

- Supports up to two double data rate 3 dual inline memory modules (DDR3 DIMMs)

Internal drives

- Card reader (available in some models)
- Optical drive
- Serial Advanced Technology Attachment (SATA) hard disk drive

Video subsystem

- Integrated graphics card functioning through a Video Graphics Array (VGA) connector

- Peripheral Component Interconnect (PCI) Express x16 graphics card slot on the system board for a discrete graphics card

Audio subsystem
- Integrated high-definition (HD) audio
- Headphone connector and microphone connector on the front panel
- Audio line-in connector, audio line-out connector, and microphone connector on the rear panel

Connectivity
- 10/100/1000 Mbps integrated Ethernet controller

System management features
- Ability to store the power-on self-test (POST) hardware test results
- Advanced Configuration and Power Interface (ACPI)
- Automatic power-on startup
- Desktop Management Interface (DMI)
- Intel Trusted Execution Technology (Intel TXT)
- Preboot Execution Environment (PXE)
- System Management (SM) Basic Input/Output System (BIOS) and SM software
- Wake on LAN (WOL)
- Windows Management Instrumentation (WMI)
  (WMI is the infrastructure for management data and operations on Windows operating systems.)

Input/Output (I/O) features
- 9-pin serial port (one standard and one optional)
- Ethernet connector
- Six Universal Serial Bus (USB) connectors
  (two USB connectors on the front panel and four USB connectors on the rear panel)
- Three audio connectors on the rear panel
  (audio line-in connector, audio line-out connector, and microphone connector)
- Two audio connectors on the front panel
  (headphone connector and microphone connector)
- VGA monitor connector on the rear panel

For more information, refer to "Locating connectors, controls, and indicators on the front of your computer" on page 7 and "Locating connectors and parts on the rear of your computer" on page 8.

Expansion
- One optical drive bay
- One slim card reader drive bay
- One PCI Express x1 card slot
- One PCI Express x16 graphics card slot
- Two hard disk drive bays
- Two PCI card slots

Power supply

Your computer comes with one of the following power supplies:

* 280-watt auto-sensing power supply
* 280-watt power supply with a manual voltage-selection switch
* 320-watt auto-sensing power supply

Security features

* A power-on password and an administrator password to deter unauthorized use of your computer
* Computrace
* Cover presence switch (also called intrusion switch) (available in some models)
* Enabling or disabling SATA devices
* Enabling or disabling the serial port
* Enabling or disabling USB connectors
* Keyboard with fingerprint reader (shipped with some models)
* Startup sequence control
* Startup without keyboard or mouse
* Support for the addition of an integrated cable lock (Kensington lock. See "Integrated cable lock" on page 39 for more information.)
* Support for the addition of a padlock (see "Padlock" on page 40 for more information)

Preinstalled software programs

Your computer is preinstalled with some software programs to help you work more easily and securely. For more information, see "Software overview" on page 4.

Preinstalled operating system

Your computer is preinstalled with one of the following operating systems:

* Microsoft® Windows® 7
* Microsoft Windows Vista®
* Microsoft Windows XP Professional
  (preinstalled through downgrade rights in Windows 7 Professional or Windows Vista Business)

Operating system(s), certified or tested for compatibility[1] (varies by model type)

* Linux®

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1. The operating system(s) listed here are being certified or tested for compatibility at the time this publication goes to press. Additional operating systems might be identified by Lenovo as compatible with your computer following the publication of this manual. This list is subject to change. To determine if an operating system has been certified or tested for compatibility, check the Web site of the operating system vendor.

Specifications

This section lists the physical specifications for your computer.

Dimensions

   Width: 160 mm (6.3 inches)

   Height: 388 mm (15.28 inches)

   Depth: 422 mm (16.61 inches)

Weight

   Maximum configuration as shipped: 9.4 kg (20.72 lbs)

Environment

   Air temperature:

      Operating: 10° to 35°C (50° to 95°F)

      Non-operating: -40° to 60°C (-40° to 140°F)

      Non-operating: -10° to 60°C (14° to 140°F) (without package)

   Humidity:

      Operating: 20% to 80% (non-condensing)

      Non-operating: 20% to 90% (non-condensing)

   Altitude:

      Operating: -50 to 10 000 ft (-15.2 to 3 048 m)

      Non-operating: -50 to 35 000 ft (-15.2 to 10 668 m)

Electrical input

   Input voltage:

      Low range:

         Minimum: 100 V ac

         Maximum: 127 V ac

         Input frequency range: 50 to 60 Hz

         Voltage-selection switch setting: 115 V ac

      High range:

         Minimum: 200 V ac

         Maximum: 240 V ac

         Input frequency range: 50 to 60 Hz

         Voltage-selection switch setting: 230 V ac

Software overview

The computer comes with a preinstalled operating system and several preinstalled applications.

Software provided with your Windows operating system

This section provides information about the software provided with your Windows operating system.

Software provided by Lenovo

The following software programs are provided by Lenovo to help you improve productivity and reduce the cost associated with maintaining your computer. Software programs provided with your computer might vary depending on your model type and preinstalled operating system.

Lenovo ThinkVantage Tools: The Lenovo ThinkVantage® Tools program guides you to a host of information sources and provides easy access to various tools to help you work more easily and securely. For more information, see "Lenovo ThinkVantage Tools" on page 63.

Note: The Lenovo ThinkVantage Tools program is only available on computers with the Windows 7 operating system from Lenovo.

ThinkVantage Productivity Center: The ThinkVantage Productivity Center program guides you to a host of information sources and tools to help you set up, understand, and maintain your computer, and enhance your computer performance. For more information, see "ThinkVantage Productivity Center" on page 64.

Note: The ThinkVantage Productivity Center program is only available on computers preinstalled with the Windows Vista operating system or the Windows XP operating system from Lenovo.

Lenovo Welcome: The Lenovo Welcome program introduces some innovative built-in features of Lenovo to you and guides you through some important setup tasks to help you make the most of your computer.

Note: The Lenovo Welcome program is only available on computers preinstalled with the Windows 7 operating system or the Windows Vista operating system from Lenovo.

Product Recovery: The Product Recovery program enables you to restore the contents of the hard disk drive to the factory default settings.

ThinkVantage Rescue and Recovery: The ThinkVantage Rescue and Recovery® (RnR) program is a one button recovery and restore solution that includes a set of self-recovery tools to help you diagnose computer problems, get help, and recover from system crashes, even if you cannot start the Windows operating system.

Password Manager: The Password Manager program automatically captures and fills in authentication information for Windows applications and Web sites.

Note: The Password Manager program is only available on computers preinstalled with the Windows 7 operating system from Lenovo.

ThinkVantage Client Security Solution: The ThinkVantage Client Security Solution (CSS) program helps you protect your information, including vital security information like passwords, encryption keys, and electronic credentials, while guarding against unauthorized user access to data.

Note: The ThinkVantage Client Security Solution program is only available on computers preinstalled with the Windows Vista operating system or the Windows XP operating system from Lenovo.

Power Manager: The Power Manager program provides convenient, flexible, and complete power management for your ThinkCentre® computer. By using the Power Manager program, you can adjust your power settings to achieve the best balance between system performance and power saving.

ThinkVantage System Update: The ThinkVantage System Update (TVSU) program helps you keep the software on your computer up-to-date by downloading and installing software packages (ThinkVantage applications, device

drivers, BIOS updates, and other third party applications). Some examples of software that you should keep updated are programs provided by Lenovo, such as the Rescue and Recovery program and the ThinkVantage Productivity Center program.

Fingerprint Software: The integrated fingerprint reader provided on some keyboards works with the Fingerprint Software program to enable you to enroll your fingerprint and associate it with your Windows password. As a result, fingerprint authentication can replace your password and enable simple and secure user access. A fingerprint reader keyboard is available with certain computers or can be purchased for computers that support this option.

Lenovo ThinkVantage Toolbox

The Lenovo ThinkVantage Toolbox program helps you maintain your computer, improve computing security, diagnose computer problems, get familiar with the innovative technologies provided by Lenovo, and get more information about your computer. For more information, see "Lenovo ThinkVantage Toolbox" on page 60.

PC-Doctor for Rescue and Recovery

The PC-Doctor for Rescue and Recovery diagnostic program is preinstalled on your ThinkCentre computer as part of the Rescue and Recovery workspace to help you diagnose hardware problems. It can also report operating-system-controlled settings that interfere with the correct operation of your system. Use the PC-Doctor for Rescue and Recovery diagnostic program if you are unable to start the Windows operating system. For more information, see "PC-Doctor for Rescue and Recovery" on page 60.

Adobe Reader

The Adobe Reader program is a tool used to view, print, and search PDF documents.

See "Online Books folder" on page 63 for more information about accessing and viewing the publications.

Antivirus software

Your computer comes with antivirus software that you can use to detect and eliminate viruses. Lenovo provides a full version of antivirus software on your computer with a free 30-day subscription. After 30 days, you must renew the license to continue receiving the antivirus software updates.

For more information about how to use your antivirus software, refer to the help system of your antivirus software.

Locations

This section provides information to help you locate your computer connectors, components, parts on the system board, and internal drives.

Locating connectors, controls, and indicators on the front of your computer

Figure 1 shows the locations of the connectors, controls, and indicators on the front of your computer.
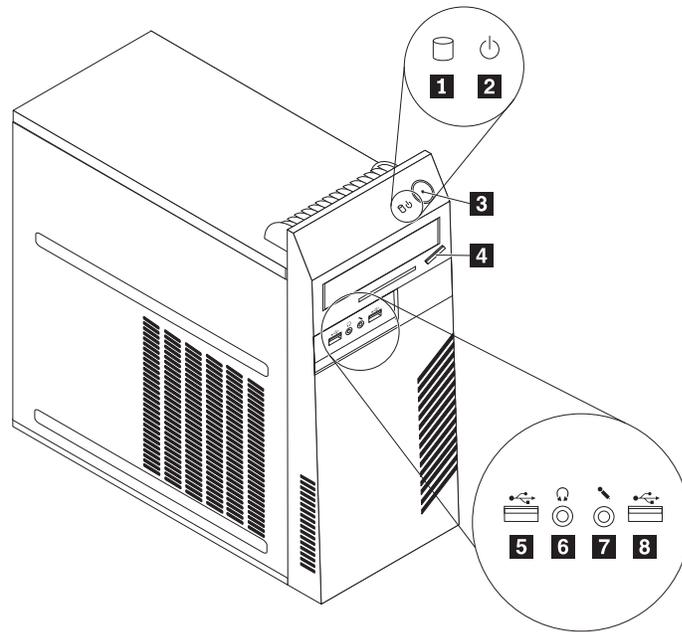
Figure 1. Front connector, control, and indicator locations

1	Hard disk drive activity indicator	**5**	USB connector
2	Power indicator	**6**	Headphone connector
3	Power switch	**7**	Microphone connector
4	Optical drive eject/close button	**8**	USB connector

Locating connectors and parts on the rear of your computer

Figure 2 shows the locations of the connectors and parts on the rear of your computer. Some connectors on the rear of your computer are color-coded to help you determine where to connect the cables on your computer.
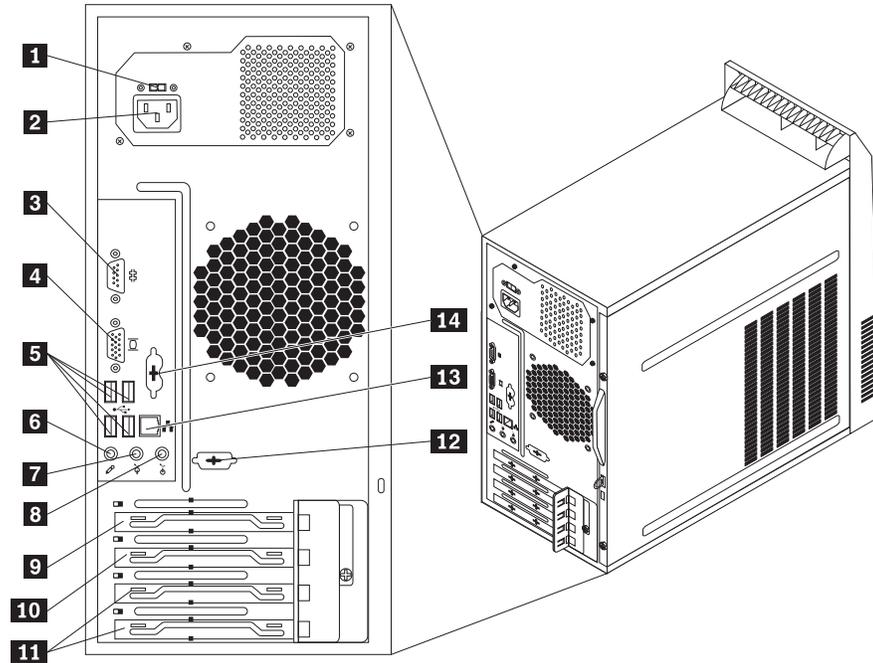
Figure 2. Rear connector and part locations

1 Voltage-selection switch (available on some models)
2 Power cord connector
3 Serial port
4 VGA monitor connector
5 USB connectors (4)
6 Microphone connector
7 Audio line-out connector

8 Audio line-in connector
9 PCI Express x16 graphics card slot
10 PCI Express x1 card slot
11 PCI card slots (2)
12 Serial port (available on some models)
13 Ethernet connector
14 Personal System/2® (PS/2®) keyboard and mouse connector (available on some models)

Connector	Description
Audio line-in connector	Used to receive audio signals from an external audio device, such as a stereo system. When you attach an external audio device, a cable is connected between the audio line-out connector of the device and the audio line-in connector of the computer.
Audio line-out connector	Used to send audio signals from the computer to external devices, such as powered stereo speakers (speakers with built-in amplifiers), headphones, multimedia keyboards, the audio line-in connector on a stereo system, or other external recording devices.
Ethernet connector	Used to attach an Ethernet cable for a local area network (LAN). **Note:** To operate the computer within FCC Class B limits, use a Category 5 Ethernet cable.
Microphone connector	Used to attach a microphone to your computer when you want to record sound or if you use speech-recognition software.
PS/2 keyboard connector (available on some models)	Used to attach a keyboard that uses a PS/2 keyboard connector.
PS/2 mouse connector (available on some models)	Used to attach a mouse, a trackball, or other pointing devices that use a PS/2 mouse connector.
Serial port	Used to attach an external modem, a serial printer, or other devices that use a 9-pin serial port.
USB connector	Used to attach a device that uses a USB connector, such as a USB keyboard, a USB mouse, a USB scanner, or a USB printer. If the USB connectors on your computer are not enough for you to connect all your USB devices, you can purchase a USB hub, which you can use to connect additional USB devices.
VGA monitor connector	Used to attach a VGA monitor or other devices that use a VGA monitor connector.

Locating components

Figure 3 shows the locations of the various components in your computer. To remove the computer cover and gain access to the inside of the computer, see "Removing the computer cover" on page 14.
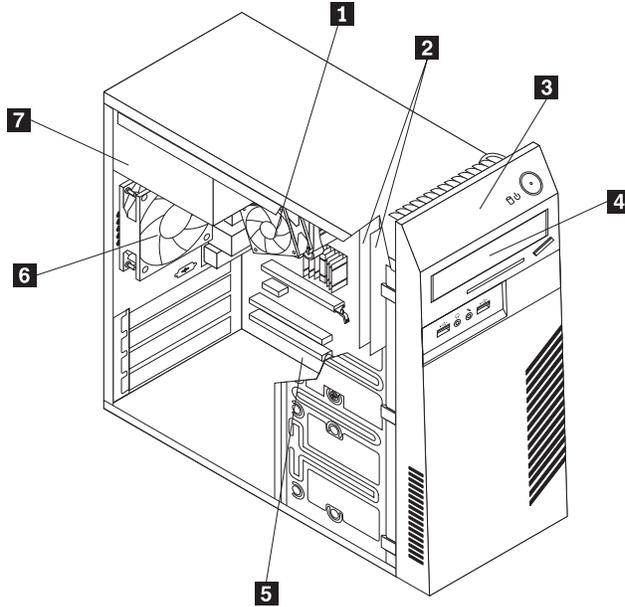
Figure 3. Component locations

1	Heat sink and fan assembly	**5**	System board
2	Memory modules (2)	**6**	Rear fan assembly
3	Front bezel	**7**	Power supply assembly
4	Optical drive		

Locating parts on the system board

Figure 4 shows the locations of the parts on the system board.
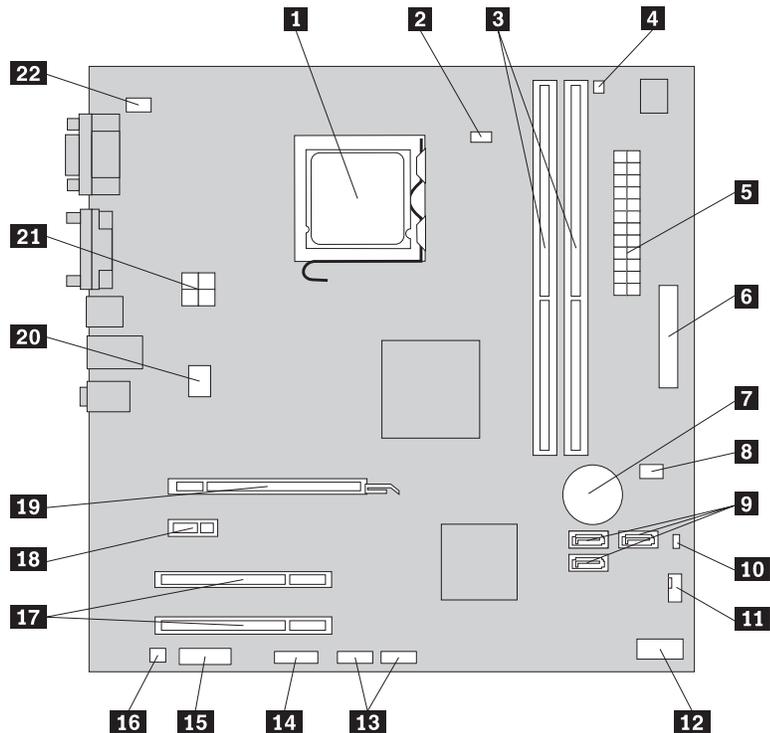
Figure 4. System board part locations

1	Microprocessor	**12**	Front panel connector
2	Microprocessor fan connector	**13**	USB connectors (2)
3	Memory slots (2)	**14**	Serial (COM 2) connector
4	Thermal sensor connector	**15**	Front audio connector
5	24-pin power connector	**16**	Internal speaker connector
6	Parallel connector	**17**	PCI card slots (2)
7	Battery	**18**	PCI Express x1 card slot
8	Cover presence switch connector (Intrusion switch connector) (some models)	**19**	PCI Express x16 graphics card slot
9	SATA connectors (3)	**20**	System fan connector
10	Clear CMOS (Complementary Metal Oxide Semiconductor) /Recovery jumper	**21**	4-pin power connector
11	Power fan connector	**22**	PS/2 keyboard and mouse connector

Locating internal drives

Internal drives are devices that your computer uses to read and store data. You can add drives to your computer to increase storage capacity and enable your computer to read other types of media. Internal drives are installed in bays. In this manual, the bays are referred to as bay 1, bay 2, and so on.

When installing or replacing an internal drive, it is important to note the type and size of the drive that you can install or replace in each bay and correctly connect the cables to the drive installed. Refer to the appropriate section in Chapter 2, "Installing or replacing hardware," on page 13 for instructions on how to install or replace internal drives for your computer.

Figure 5 shows the locations of the drive bays in your computer.
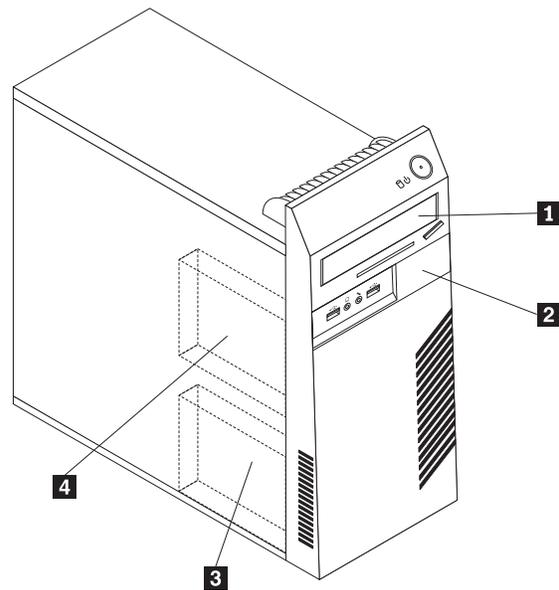
Figure 5. Drive bay locations

1 Bay 1 - Optical drive bay (with an optical drive installed)
2 Bay 2 - Slim card reader drive bay
3 Bay 3 - Primary SATA hard disk drive bay (with a 3.5-inch SATA hard disk drive installed)
4 Bay 4 - Secondary SATA hard disk drive bay

Chapter 2. Installing or replacing hardware

This chapter provides instructions on how to install or replace hardware for your computer.

This chapter contains the following topics:
- "Handling static-sensitive devices"
- "Installing or replacing hardware"
- "Obtaining device drivers" on page 38
- "Basic security features" on page 38

Handling static-sensitive devices

Do not open the static-protective package containing the new part until the defective part has been removed from the computer and you are ready to install the new part. Static electricity, although harmless to you, can seriously damage computer components and parts.

When you handle computer parts and components, take these precautions to avoid static-electricity damage:
- Limit your movement. Movement can cause static electricity to build up around you.
- Always carefully handle the parts and other computer components. Handle PCI cards, memory modules, system boards, and microprocessors by the edges. Never touch exposed circuitry.
- Prevent others from touching the parts and other computer components.
- Before you replace a new part, touch the static-protective package containing the new part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity from the package and your body.
- Remove the new part from the static-protective package and directly install it in the computer without placing it on any other surface. If it is hard for you to do this in your specific situation, place the static-protective package of the new part on a smooth, level surface, and then place the new part on the static-protective package.
- Do not place the part on the computer cover or other metal surface.

Installing or replacing hardware

This section provides instructions on how to install or replace hardware for your computer. You can expand the capabilities of your computer by adding memory modules, PCI cards, or drives, and maintain your computer by replacing the failing hardware.

Notes:
1. Use only computer parts provided by Lenovo.
2. When installing or replacing an option, use the appropriate instructions in this section along with the instructions that come with the option.

Installing external options

You can install external options to your computer, such as external speakers, a printer, or a scanner. For some external options, you must install additional software in addition to making the physical connection. When you install an external option, see "Locating connectors, controls, and indicators on the front of your computer" on page 7 and "Locating connectors and parts on the rear of your computer" on page 8 to identify the required connector. Then, use the instructions that come with the option to help you make the connection and install software or device drivers that are required for the option.

Removing the computer cover

> **Attention**
>
> Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to remove the computer cover.

CAUTION:

Turn off the computer and wait three to five minutes to let the computer cool before removing the computer cover.

To remove the computer cover, do the following:

1. Remove all media from the drives. Then, turn off all attached devices and the computer.
2. Disconnect all power cords from electrical outlets.
3. Disconnect the power cord, Input/Output (I/O) cables, and all other cables that are connected to the computer.
4. Remove any locking device that secures the computer cover, such as an integrated cable lock or a padlock. See "Integrated cable lock" on page 39 or "Padlock" on page 40.

5. Remove the two screws that secure the computer cover and slide the computer cover to the rear to remove it.
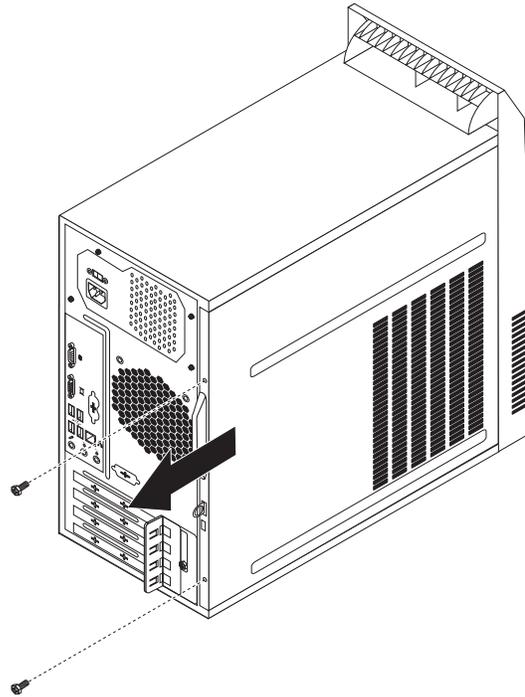
Figure 6. Removing the computer cover

Removing and reinstalling the front bezel

Attention

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This section provides instructions on how to remove and reinstall the front bezel.

To remove and reinstall the front bezel, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 14.

3. Remove the front bezel by releasing the three plastic tabs on the left side and pivoting the front bezel outward.
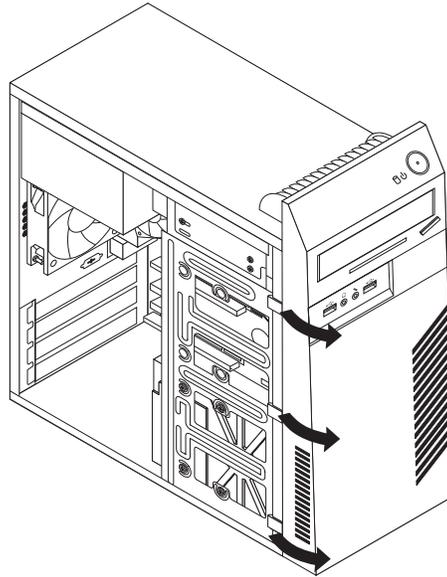
Figure 7. Removing the front bezel

4. To reinstall the front bezel, align the other three plastic tabs on the right side of the front bezel with the corresponding holes in the chassis, then pivot the front bezel inward until it snaps into position on the left side.
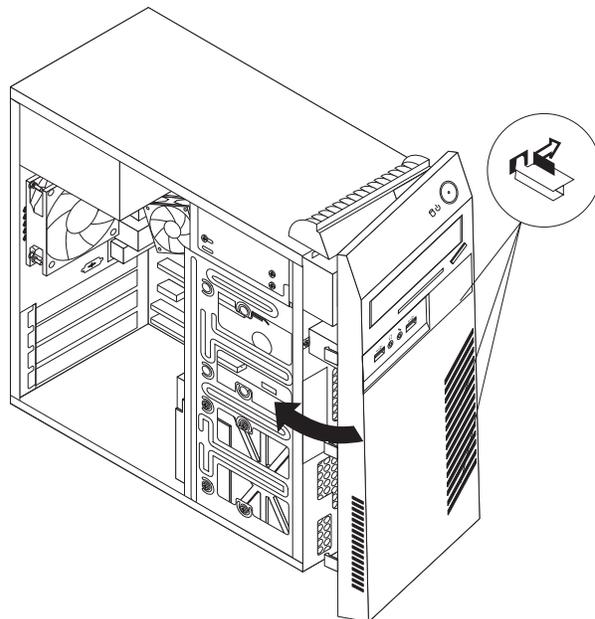
Figure 8. Reinstalling the front bezel

5. Go to "Completing the parts replacement" on page 37.

Installing or replacing a PCI card

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to install or replace a PCI card.

Your computer has one standard PCI card slot, two PCI Express x1 card slots, and one PCI Express x16 graphics card slot. See "Locating parts on the system board" on page 11.

To install or replace a PCI card, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 14.
3. At the rear of the computer, remove the screw that secures the PCI card latch.
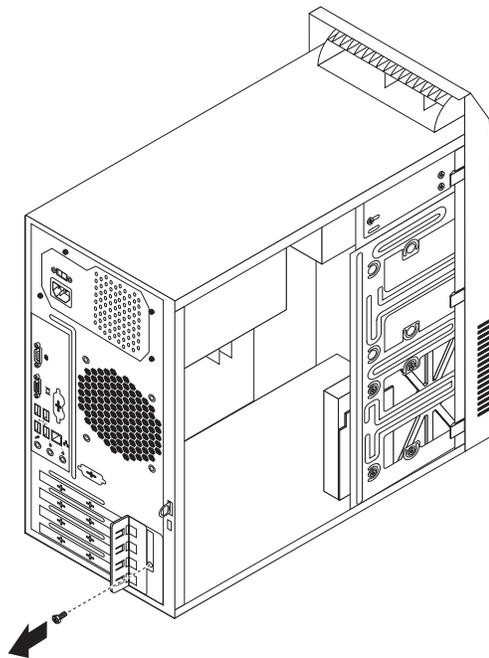
Figure 9. Removing the screw that secures the PCI card latch

4. Do one of the following:
   - If you are replacing a PCI card, open the PCI card latch and remove the old PCI card that is currently installed as shown in Figure 10.

   **Note:** If the PCI card is secured in place by a retaining latch **1**, press the retaining latch to release the PCI card from the latch. Then, grasp the PCI card by the edges and carefully pull it out of the slot. If necessary, alternate moving each side of the PCI card a small and equal amount until it is completely removed from the PCI card slot.
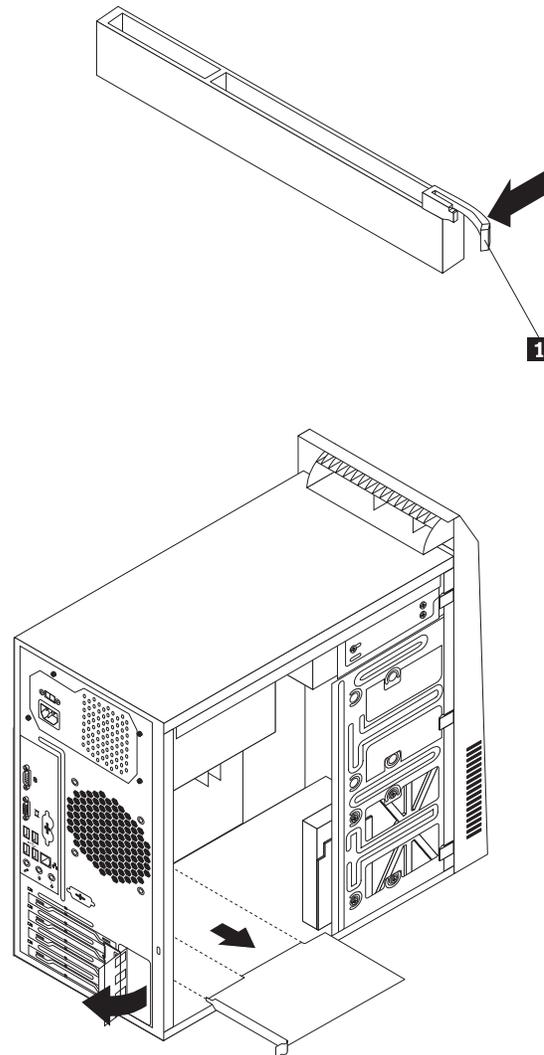
Figure 10. Removing the PCI card

   - If you are installing a PCI card, open the PCI card latch and remove the appropriate PCI card slot cover. See "Locating parts on the system board" on page 11 to identify the types of PCI card slots.
5. Remove the new PCI card from its static-protective package.

6. Install the new PCI card into the appropriate PCI card slot on the system board. Then, pivot the PCI card latch to the closed position to secure the PCI cards.
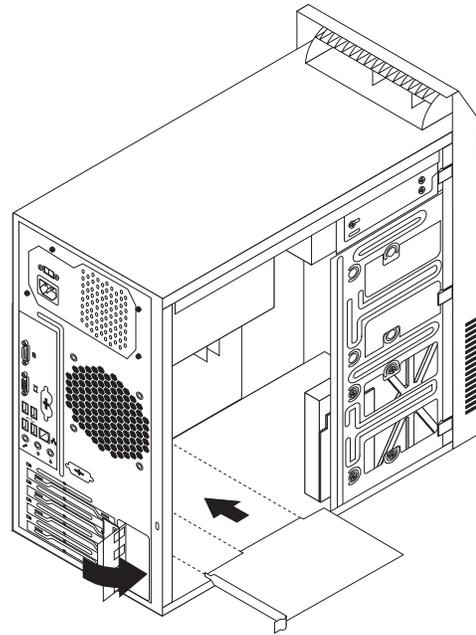
Figure 11. Installing the PCI card

7. Reinstall the screw to secure the PCI card latch in place.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 37.

Installing or replacing a memory module

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to install or replace a memory module.

Your computer has two memory slots for installing or replacing DDR3 SDRAM DIMMs that provide up to a maximum of 4 GB of system memory. When installing or replacing a memory module, use 1 GB or 2 GB DDR3 SDRAM DIMMs in any combination up to a maximum of 4 GB of system memory.

To install or replace a memory module, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 14.

3. Lay the computer on its side for easier access to the system board.

4. Locate the memory slots on the system board. See "Locating parts on the system board" on page 11.

5. Remove any parts and disconnect any cables that might prevent your access to the memory slots.

6. Do one of the following:

   - If you are replacing a memory module, open the retaining clips and remove the old memory module that is currently installed.
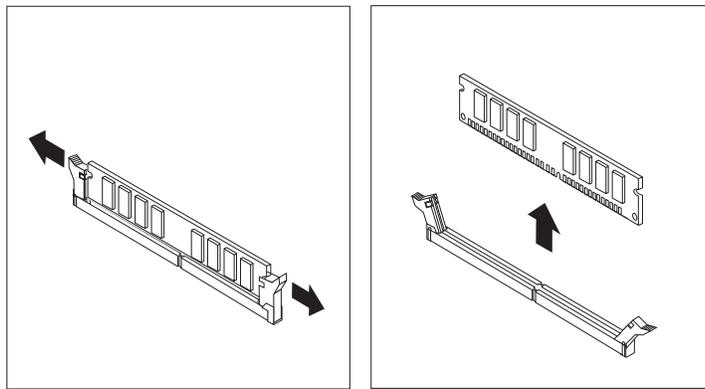
Figure 12. Removing the memory module

   - If you are installing a memory module, open the retaining clips of the memory slot into which you want to install the memory module.
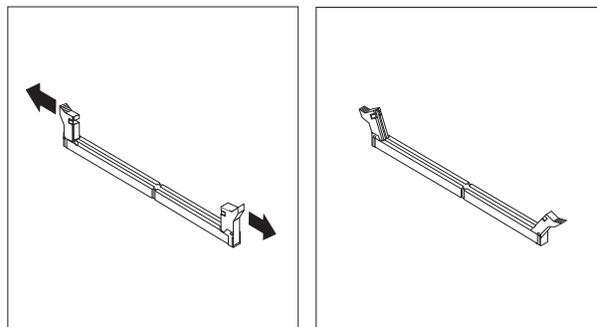
Figure 13. Opening the retaining clips of the memory slot

7. Position the new memory module over the memory slot. Make sure that the notch **1** on the new memory module is aligned with the key **2** in the memory slot. Then, press the new memory module straight down into the memory slot until the retaining clips close and the new memory module snaps into position.
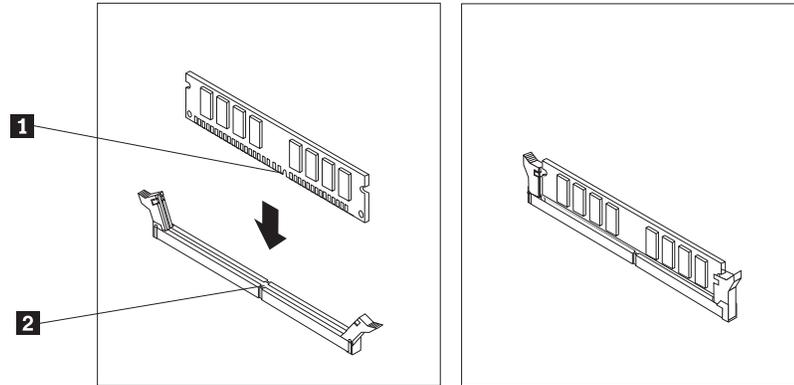
Figure 14. Installing the memory module

8. Reinstall any parts and reconnect any cables that have been removed or disconnected.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 37.

Replacing the battery

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

Your computer has a special type of memory that maintains the date, time, and configuration information for built-in features. The battery keeps this information active when you turn off the computer.

The battery normally requires no charging or maintenance throughout its life; however, no battery lasts forever. If the battery fails, the date, time, and configuration information, including passwords, are lost. An error message is displayed when you turn on the computer.

Before performing the following procedure, be sure to read and understand the information about replacing and disposing of the battery in the "Batteries" and "Lithium battery notice" sections of the *ThinkCentre Safety and Warranty Guide*.

To replace the battery, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 14.
3. Locate the battery. See "Locating parts on the system board" on page 11.
4. Remove any parts and disconnect any cables that might prevent your access to the battery.
5. Remove the old battery.
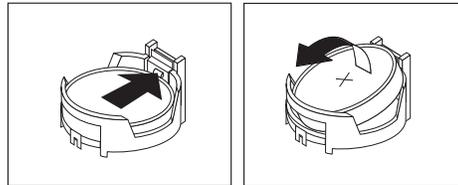
Figure 15. Removing the old battery

6. Install the new battery.
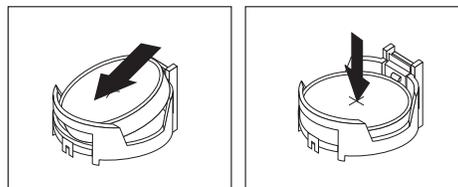
Figure 16. Installing the new battery

7. Reinstall any parts and reconnect any cables that have been removed or disconnected.
8. Reinstall the computer cover and reconnect all external cables. See "Completing the parts replacement" on page 37.
9. Turn on the computer and all attached devices.

   Note: When the computer is turned on for the first time after replacing the battery, an error message might be displayed. This is normal after replacing the battery.

10. Use the Setup Utility program to set the date, time, passwords, and any other configuration information. See Chapter 4, "Using the Setup Utility program," on page 51.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to "Completing the parts replacement" on page 37.

Replacing the power supply assembly

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the power supply assembly.

Although there are no moving parts in your computer after the power cord has been disconnected, the following warnings are required for your safety and proper Underwriters Laboratories (UL) certification.

DANGER

Hazardous moving parts. Keep fingers and other body parts away.
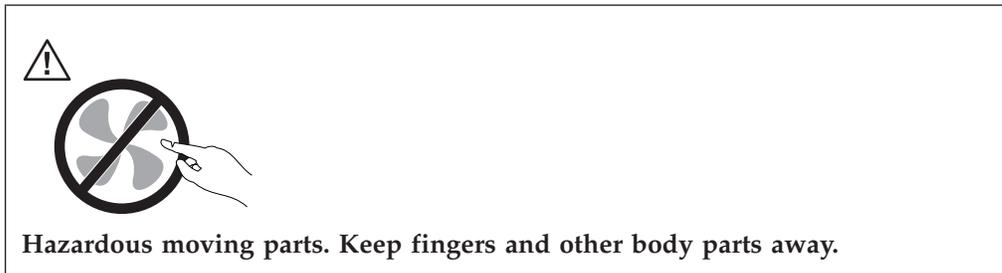
CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

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

To replace the power supply assembly, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 14.

3. Disconnect the power supply assembly cables from all drives and from the 24-pin power connector and 4-pin power connector on the system board. See "Locating parts on the system board" on page 11.

   Note: You might also need to release the power supply assembly cables from some cable clips or ties that secure the cables to the chassis.

4. Lay the computer on its side and remove the four screws that secure the power supply assembly. Then, slide the power supply assembly to the front of the chassis.
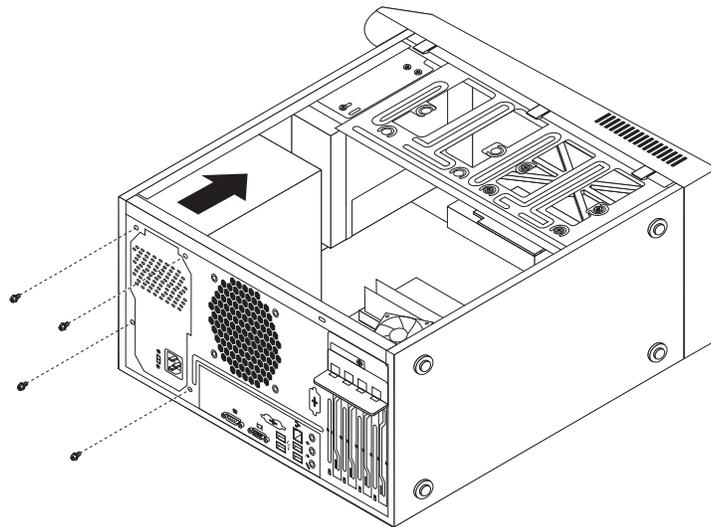
Figure 17. Removing the power supply assembly screws

5. Pivot the power supply assembly as shown and then lift the power supply assembly to remove it from the chassis.
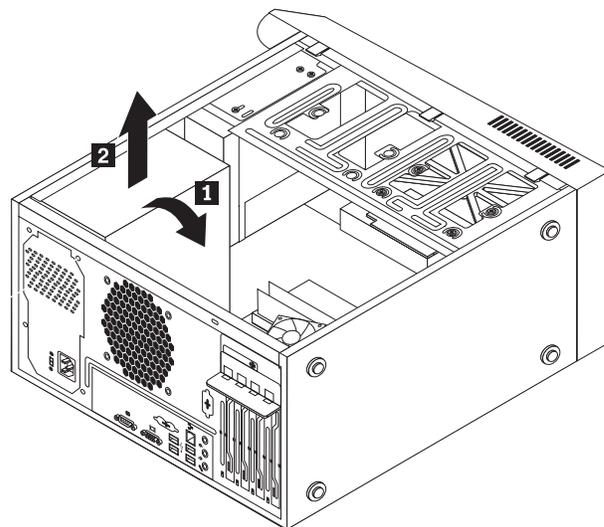
Figure 18. Removing the power supply assembly

6. Make sure that the new power supply assembly is the correct replacement. Some power supply assemblies automatically sense the voltage, some power supply assemblies are voltage specific, and some power supply assemblies have a voltage-selection switch. If your power supply assembly has a voltage-selection switch, make sure that you set the voltage-selection switch to match the voltage available at your electrical outlet. If necessary, use a ballpoint pen to slide the voltage-selection switch to the correct position.

   • If the voltage supply range in your local country or region is 100–127 V ac, set the voltage-selection switch to 115 V.

- If the voltage supply range in your local country or region is 200–240 V ac, set the voltage-selection switch to 230 V.

7. Install the new power supply assembly into the chassis so that the screw holes in the new power supply assembly are aligned with the corresponding holes in the rear of the chassis.

8. Install the four screws to secure the new power supply assembly in place.

   Note: Use only screws provided by Lenovo.

9. Connect the new power supply assembly cables to all drives and the system board. See "Locating parts on the system board" on page 11.

What to do next:
- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to "Completing the parts replacement" on page 37.

Replacing the heat sink and fan assembly

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

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This section provides instructions on how to replace the heat sink and fan assembly.

CAUTION:

The heat sink and fan assembly might be very hot. Turn off the computer and wait three to five minutes to let the computer cool before removing the computer cover.

To replace the heat sink and fan assembly, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 14.

3. Lay the computer on its side for easier access to the system board.

4. Locate the heat sink and fan assembly. See "Locating components" on page 10.

5. Disconnect any cables that might prevent your access to the heat sink and fan assembly.

6. Disconnect the heat sink and fan assembly cable from the microprocessor fan connector on the system board. See "Locating parts on the system board" on page 11.

7. Follow this sequence to remove the four screws that secure the heat sink and fan assembly to the system board:

   a. Partially remove screw **1**, then fully remove screw **2**, and then fully remove screw **1**.

   b. Partially remove screw **3**, then fully remove screw **4**, and then fully remove screw **3**.

   Note: Carefully remove the four screws from the system board to avoid any possible damage to the system board. The four screws cannot be removed from the heat sink and fan assembly.
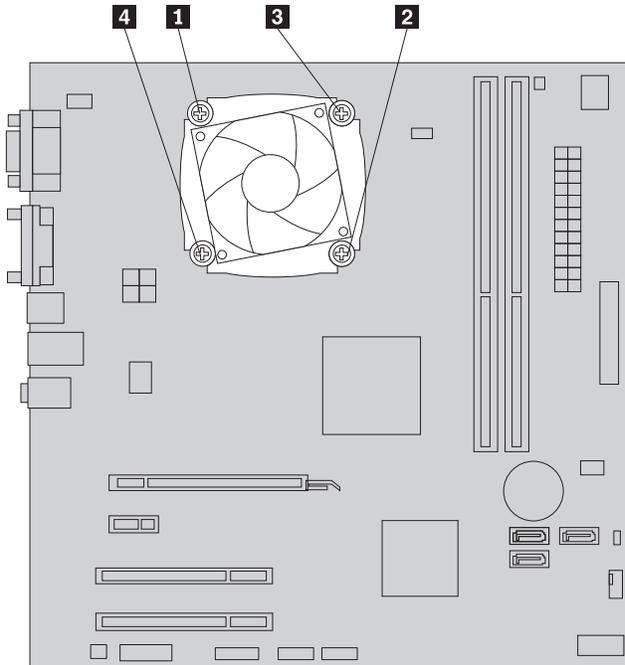
Figure 19. Screws that secure the heat sink and fan assembly

8. Lift the heat sink and fan assembly off the system board.

   Notes:

   a. You might have to gently twist the heat sink and fan assembly to free it from the microprocessor.

   b. When handling the heat sink and fan assembly, do not touch the thermal grease on the bottom of it.

9. Place the new heat sink and fan assembly on the system board so that the four screws are aligned with the corresponding holes in the system board. Make sure that you properly place the new heat sink and fan assembly so that you can easily connect the new heat sink and fan assembly cable to the microprocessor fan connector on the system board.

10. Follow this sequence to install the four screws to secure the new heat sink and fan assembly:

    a. Partially tighten screw **1**, then fully tighten screw **2**, and then fully tighten screw **1**.

    b. Partially tighten screw **3**, then fully tighten screw **4**, and then fully tighten screw **3**.

11. Connect the new heat sink and fan assembly cable to the microprocessor fan connector on the system board. See "Locating parts on the system board" on page 11.

12. Reconnect any cables that have been removed.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to "Completing the parts replacement" on page 37.

Replacing the microprocessor

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the microprocessor.

CAUTION:

The heat sink and microprocessor might be very hot. Turn off the computer and wait three to five minutes to let the computer cool before removing the computer cover.

To replace the microprocessor, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 14.

3. Lay the computer on its side for easier access to the system board.

4. Note the part and connector locations on the system board. See "Locating parts on the system board" on page 11. Then, remove any parts and disconnect any cables that might prevent your access to the heat sink and fan assembly.

5. Remove the heat sink and fan assembly. See "Replacing the heat sink and fan assembly" on page 25.

6. Place the heat sink and fan assembly on its side so that the thermal grease on the bottom of it does not get in contact with anything.

7. Lift the small handle **3** and open the retainer **1** to access the microprocessor **2** .
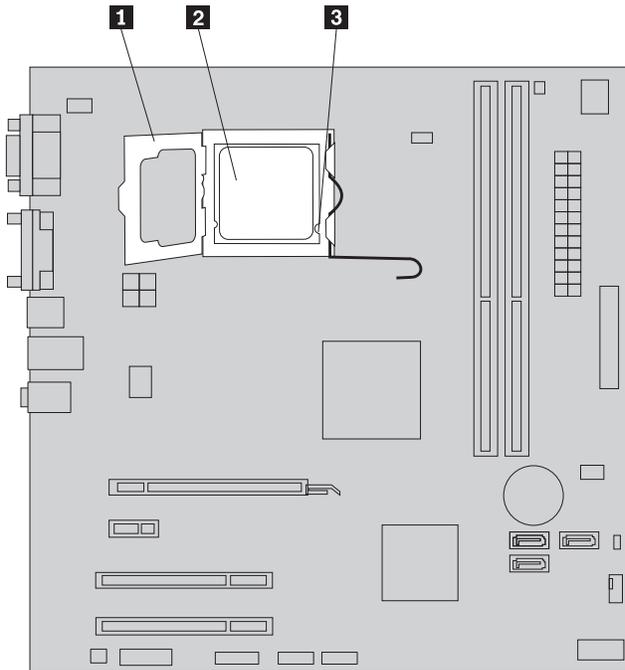
Figure 20. Accessing the microprocessor

8. Lift the microprocessor straight up and out of the microprocessor socket, as shown in Figure 21 on page 29.

   Notes:

   a. Your microprocessor and socket might look different from the one illustrated.

   b. Note the orientation of the microprocessor in the socket. You can either look for the small triangle **1** on one corner of the microprocessor or note the orientation of the notches **2** on the microprocessor. This is important when installing the new microprocessor on the system board.
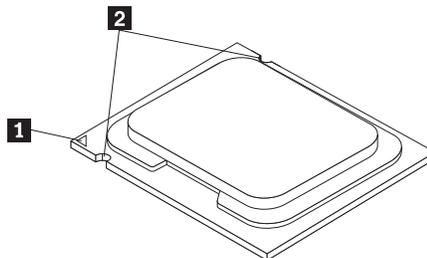
   c. Touch only the edges of the microprocessor. Do not touch the gold contacts on the bottom.

d. Do not drop anything onto the microprocessor socket while it is exposed. The socket pins must be kept as clean as possible.
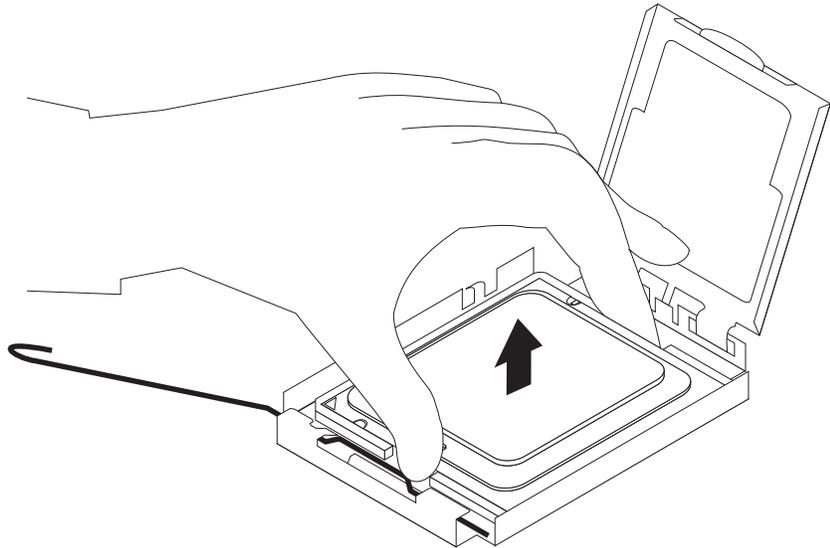
Figure 21. Removing the microprocessor

9. Make sure that the small handle is in the raised position.

10. Remove the new microprocessor ▮**1** from the protective cover ▮**2** that protects the gold contacts of the new microprocessor.
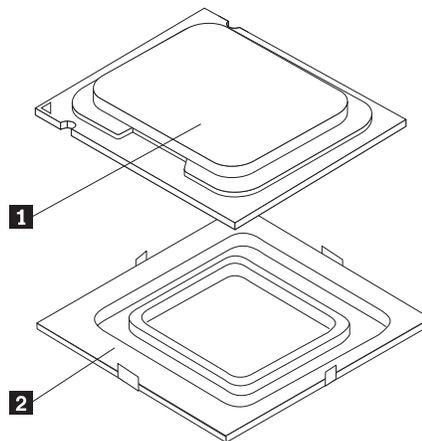
11. Hold the new microprocessor by the edges and align the notches on it with the tabs in the microprocessor socket, or align the small triangle on one corner of the microprocessor with the corresponding beveled corner of the microprocessor socket.

12. Lower the new microprocessor straight down into the microprocessor socket on the system board.

13. Close the microprocessor retainer and lock it into position with the small handle to secure the new microprocessor in the socket.

14. Reinstall the heat sink and fan assembly. See "Replacing the heat sink and fan assembly" on page 25.

15. Reinstall any parts and reconnect any cables that have been removed or disconnected.

Replacing the optical drive

┌───┐
| **Attention**
|
| Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support
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This section provides instructions on how to replace the optical drive.

To replace the optical drive, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 14.
3. Remove the front bezel. See "Removing and reinstalling the front bezel" on page 15.
4. Disconnect the signal cable and the power cable from the rear of the optical drive.
5. Remove the three screws that secure the optical drive. Then, slide the optical drive out of the front of the computer.
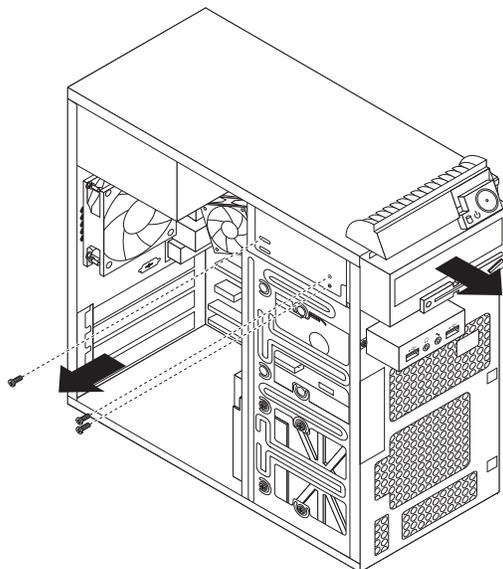
Figure 22. Removing the optical drive

6. Slide the new optical drive into the drive bay from the front and align the screw holes in the new optical drive with the corresponding holes in the drive

bay. Then, install the three screws to secure the new optical drive in place.

Figure 23. Installing the optical drive

7. Connect one end of the signal cable to the rear of the new optical drive and the other end to an available SATA connector on the system board. See "Locating parts on the system board" on page 11. Then, locate an available five-wire power connector and connect it to the rear of the new optical drive.

Figure 24. Connecting a SATA optical drive

What to do next:
- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to "Completing the parts replacement" on page 37.

Replacing the hard disk drive

Attention
Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the hard disk drive.

To replace the hard disk drive, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 14.
3. Locate the primary hard disk drive. See "Locating internal drives" on page 11.

    Note: There is also a secondary hard disk drive bay for you to purchase and install a secondary hard disk drive by yourself. If you want to install a secondary hard disk drive, use the same way of installing the primary hard disk drive.

4. Disconnect the signal cable and the power cable from the rear of the hard disk drive.
5. Remove the four screws that secure the hard disk drive. Then, slide the hard disk drive out of the chassis.
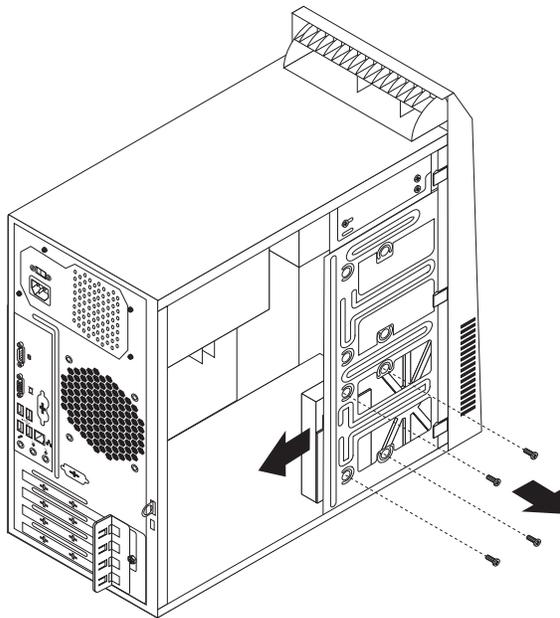
Figure 25. Removing the hard disk drive

6. Slide the new hard disk drive into the hard disk drive bay and align the screw holes in the new hard disk drive with the corresponding holes in the drive bay. Then, install the four screws to secure the new hard disk drive in place.
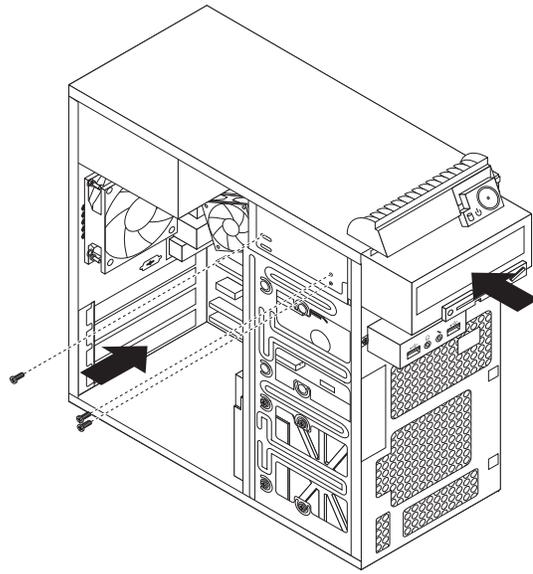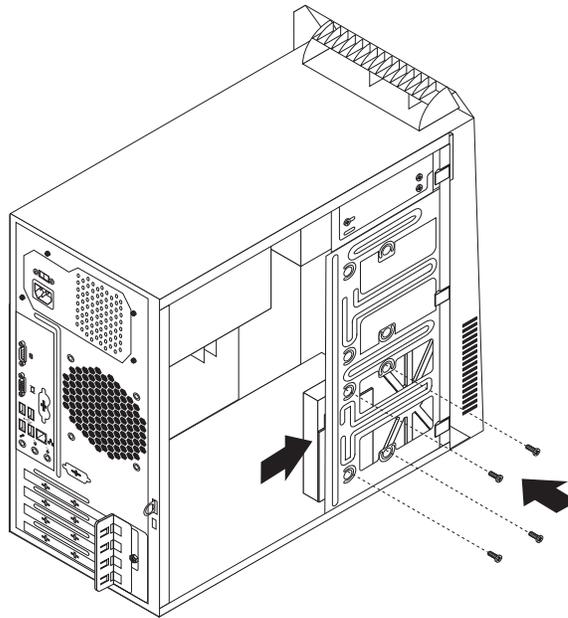

Figure 26. Installing the hard disk drive

7. Connect one end of the signal cable to the rear of the new hard disk drive and the other end to an available SATA connector on the system board. See "Locating parts on the system board" on page 11. Then, locate an available five-wire power connector and connect it to the rear of the new hard disk drive.

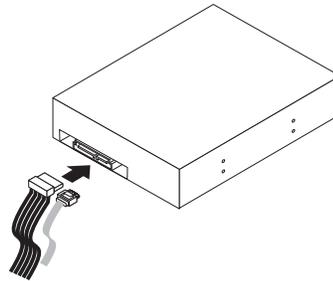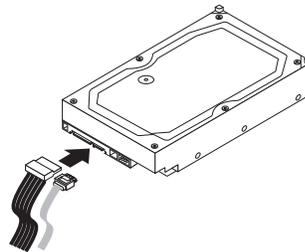*Figure 27. Connecting a SATA hard disk drive*

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 37.

Replacing the front audio and USB assembly

> **Attention**
>
> Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the front audio and USB assembly.

To replace the front audio and USB assembly, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 14.

3. Remove the front bezel. See "Removing and reinstalling the front bezel" on page 15.

4. Disconnect the front audio and USB assembly cables from the system board. See "Locating parts on the system board" on page 11.

5. Note the front audio and USB assembly cable routing and remove the screw that secures the front audio and USB assembly. Then, remove the front audio and USB assembly from the chassis.
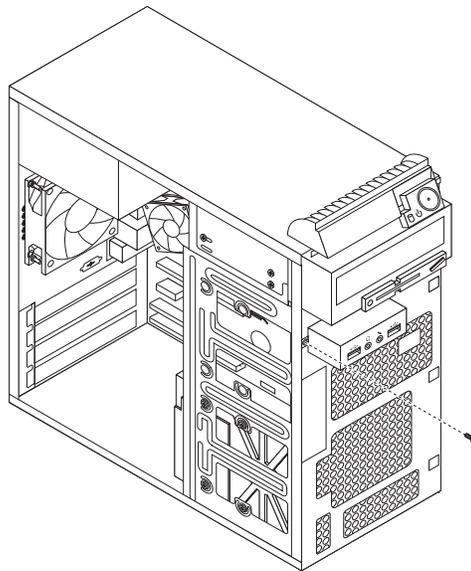
Figure 28. Removing the front audio and USB assembly

6. Route the cables of the new front audio and USB assembly through the hole in the chassis.

7. Position the new front audio and USB assembly to the chassis so that the screw hole in the new front audio and USB assembly is aligned with the corresponding hole in the chassis.

8. Install the screw to secure the new front audio and USB assembly in place.

9. Connect the new front audio and USB assembly cables to the system board. See "Locating parts on the system board" on page 11.

10. Reinstall the front bezel. See "Removing and reinstalling the front bezel" on page 15.

Replacing the rear fan assembly

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the rear fan assembly.

To replace the rear fan assembly, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 14.
3. Locate the rear fan assembly. See "Locating components" on page 10.
4. Disconnect the rear fan assembly cable from the system fan connector on the system board. See "Locating parts on the system board" on page 11.
5. The rear fan assembly is attached to the chassis by four rubber mounts. Carefully remove the four rubber mounts from the rear of the chassis by breaking them or cutting them with scissors.
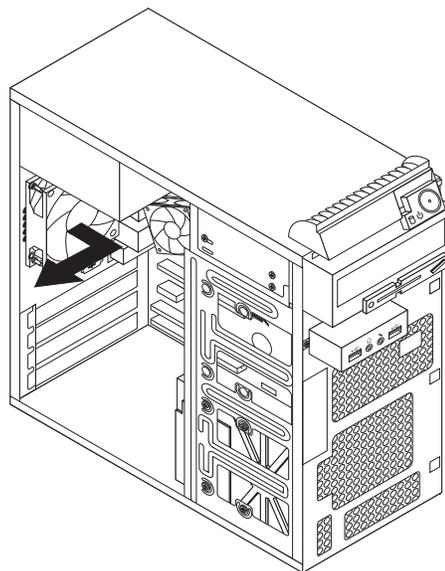
Figure 29. Removing the rear fan assembly

6. Remove the rear fan assembly out of the chassis.

7. Install the new rear fan assembly by aligning the rubber mounts of the rear fan assembly with the holes on the chassis and push the rubber mounts through the holes.

8. Pull on the tips of the rubber mounts until the rear fan assembly is in place.
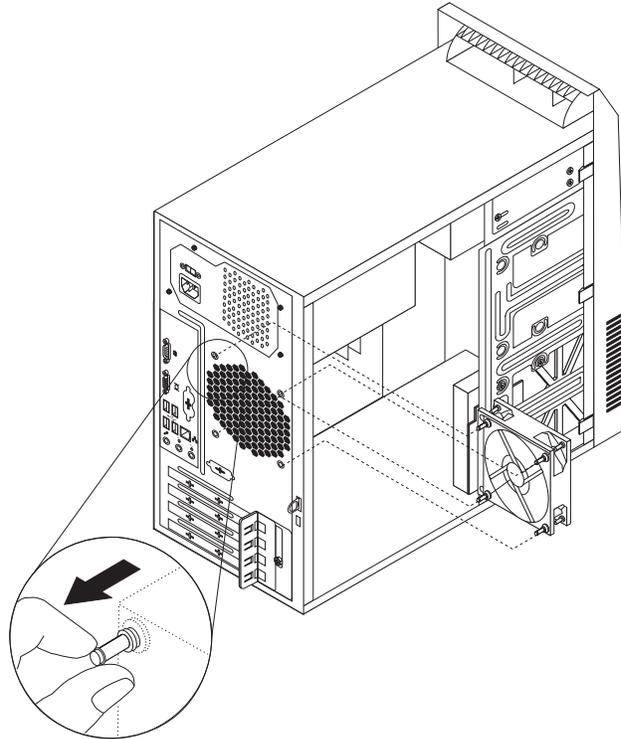
Figure 30. Replacing the rear fan assembly

9. Connect the rear fan assembly cable to the system fan connector on the system board.

10. Go to "Completing the parts replacement" on page 37.

Replacing the USB keyboard or mouse

Attention

Do not open your computer or attempt any repair before reading and understanding the "Important safety information" in the *ThinkCentre Safety and Warranty Guide* that came with your computer. To obtain a copy of the *ThinkCentre Safety and Warranty Guide*, go to: http://www.lenovo.com/support

This section provides instructions on how to replace the USB keyboard or mouse.

To replace the USB keyboard or mouse, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets.

2. Disconnect the cable of the old USB keyboard or mouse from the computer.

3. Connect the cable of the new USB keyboard or mouse to one of the USB connectors on the computer. Depending on where you want to connect the new USB keyboard or mouse, see "Locating connectors, controls, and indicators on the front of your computer" on page 7 or "Locating connectors and parts on the rear of your computer" on page 8.
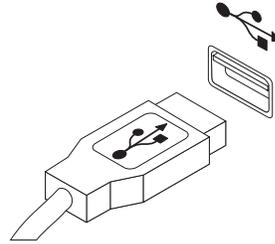
Figure 31. Connecting the USB keyboard or mouse

What to do next:
- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to "Completing the parts replacement."

Completing the parts replacement

After completing the installation or replacement for all parts, you need to reinstall the computer cover and reconnect cables.

To reinstall the computer cover and reconnect cables to your computer, do the following:

1. Make sure that all components have been reassembled correctly and that no tools or loose screws are left inside your computer. See "Locating components" on page 10 for the locations of the various components in your computer.

2. If you have removed the front bezel, reinstall it. See "Removing and reinstalling the front bezel" on page 15.

3. Properly route the cables and keep them clear of the hinges and sides of the computer chassis to avoid interference with closing the computer cover.

4. Position the computer cover on the chassis so that the rail guides on the bottom of the computer cover engage the rails. Then, slide the computer cover to the front of the computer until it snaps into position and is closed. Then, install the two screws to secure the computer cover.
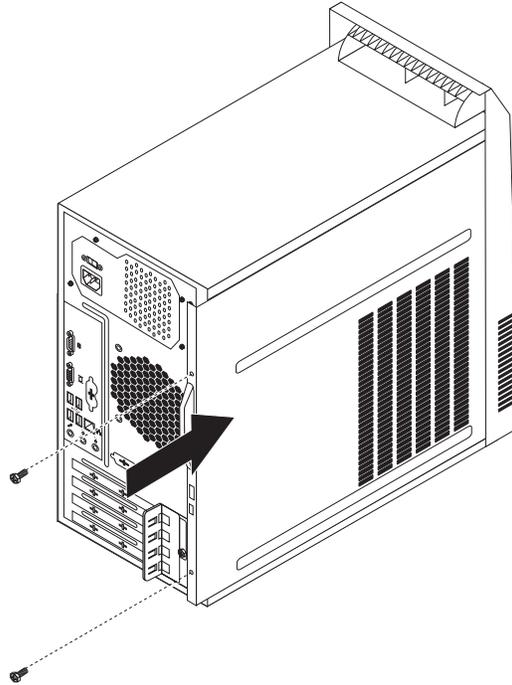
Figure 32. Reinstalling the computer cover

5. Lock the computer cover if you have a computer cover lock. See "Integrated cable lock" on page 39 or "Padlock" on page 40.
6. Reconnect the power cord and all other external cables to the computer. For connector locations, see "Locating connectors, controls, and indicators on the front of your computer" on page 7 and "Locating connectors and parts on the rear of your computer" on page 8.
7. Depending on the parts you installed or replaced, you might need to confirm the updated information in the Setup Utility program. See Chapter 4, "Using the Setup Utility program," on page 51.

Note: In most areas of the world, Lenovo requires the return of the defective Customer Replaceable Units (CRUs). Information about this will come with the new CRUs or will come a few days after you receive the new CRUs.

Obtaining device drivers

You can obtain device drivers for operating systems that are not preinstalled at http://www.lenovo.com/support. Installation instructions are provided in readme files with the device-driver files.

Basic security features

There are several security options available to help you prevent hardware theft and unauthorized access to your computer. In addition to physical locks, you can also prevent unauthorized use of your computer by a software lock that locks the keyboard until a correct password is typed in.

Integrated cable lock

An integrated cable lock, sometimes referred to as the Kensington lock, can be used to secure your computer to a desk, table, or other non-permanent fixture. The cable lock attaches to a security slot at the rear of your computer and is operated with a key. The cable lock also locks the computer cover. See Figure 33. This is the same type of lock used with many notebook computers. You can order an integrated cable lock from Lenovo by searching for *Kensington* at: http://www.lenovo.com/support

Note: Make sure that the integrated cable lock you installed does not interfere with other computer cables.
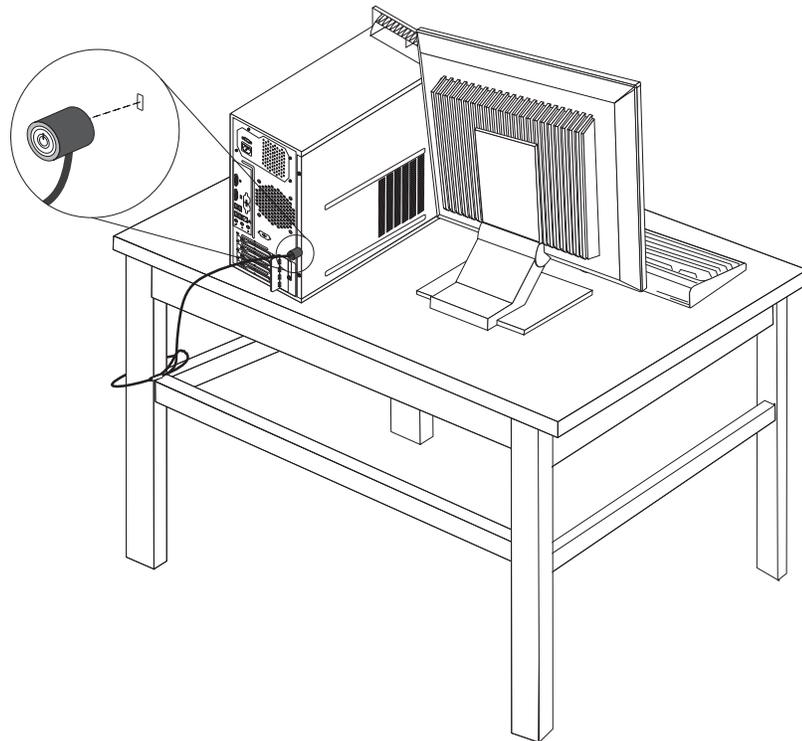
Figure 33. Installing an integrated cable lock

Padlock

Your computer is equipped with a padlock loop so that the computer cover cannot be removed when a padlock is installed.
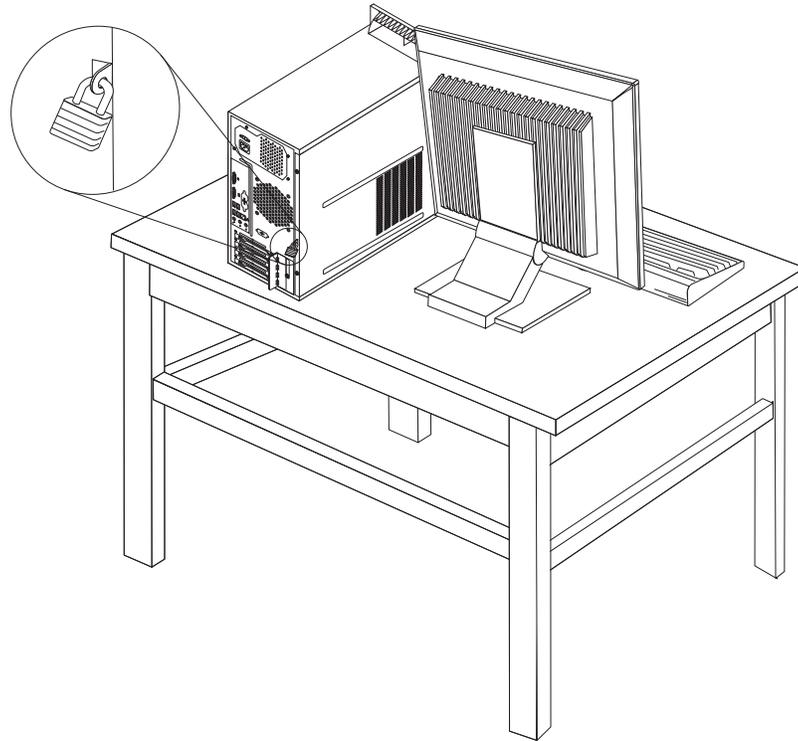
Figure 34. Installing a padlock

Password protection

To deter unauthorized use of your computer, you can use the Setup Utility program to set a password. When you turn on your computer, you are prompted to type the password. The computer cannot be used until a valid password is typed in. Refer to Chapter 4, "Using the Setup Utility program," on page 51 for more information.

Erasing a lost or forgotten password (clearing CMOS)

This section provides instructions on how to erase a lost or forgotten password, such as a user password.

To erase a lost or forgotten password, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See "Removing the computer cover" on page 14.
3. Locate the Clear CMOS /Recovery jumper on the system board. See "Locating parts on the system board" on page 11.
4. Remove any parts and disconnect any cables that might prevent your access to the Clear CMOS /Recovery jumper.
5. Move the jumper from the standard position (pin 1 and pin 2) to the maintenance position (pin 2 and pin 3).

6. Reinstall any parts and reconnect any cables that have been removed or disconnected.

7. Reinstall the computer cover and reconnect the power cords for the computer and monitor. See "Completing the parts replacement" on page 37.

8. Turn on the computer and leave it on for approximately 10 seconds. Then, turn off the computer by holding the power switch for approximately five seconds.

9. Repeat step 1 through step 4.

10. Move the Clear CMOS /Recovery jumper back to the standard position (pin 1 and pin 2).

11. Reinstall any parts and reconnect any cables that have been removed or disconnected.

12. Reinstall the computer cover and reconnect all cables. See "Completing the parts replacement" on page 37.

13. Turn on the computer. Your password has been erased and you can use the Setup Utility program to set a new password. See Chapter 4, "Using the Setup Utility program," on page 51 for more information.

Chapter 3. Recovery information

This chapter provides information about the recovery solutions provided by Lenovo.

This chapter contains the following topics:
- "Creating and using recovery media"
- "Performing backup and recovery operations" on page 45
- "Using the Rescue and Recovery workspace" on page 46
- "Creating and using a rescue medium" on page 47
- "Installing or reinstalling device drivers" on page 49
- "Solving recovery problems" on page 49

Notes:

1. There are a variety of methods to choose from when considering how to recover in the event of a software- or hardware-related problem. Some methods vary depending on the type of your operating system.

2. The product on the recovery media may be used only for the following purposes:
   - Restore the product preinstalled on your computer
   - Reinstall the product
   - Modify the product using the Additional Files

Creating and using recovery media

You can use recovery media to restore the hard disk drive to the factory default settings. Recovery media are useful if you transfer the computer to another area, sell the computer, recycle the computer, or put the computer in an operational state after all other methods of recovery have failed. As a precautionary measure, it is important to create recovery media as early as possible.

Note: The recovery operations you can perform using recovery media vary depending on the operating system from which the recovery media were created. The recovery media might contain a boot medium and a data medium. Your Microsoft Windows license permits you to create only one data medium, so it is important that you store the recovery media in a safe place after you have made them.

Creating recovery media

This section provides instructions on how to create recovery media on different operating systems.

Note: On the Windows 7 operating system, you can create recovery media using discs or external USB storage devices. On the Windows Vista and Windows XP operating systems, you can create recovery media using only discs, so this operation is also called "creating Product Recovery discs."

- To create recovery media on the Windows 7 operating system, click **Start → All Programs → Lenovo ThinkVantage Tools → Factory Recovery Disks**. Then, follow the instructions on the screen.

- To create Product Recovery discs on the Windows Vista operating system, click **Start → All Programs → ThinkVantage → Create Product Recovery Media**. Then, follow the instructions on the screen.
- To create Product Recovery discs on the Windows XP operating system, click **Start → All Programs → ThinkVantage → Create Recovery Media**. Then, follow the instructions on the screen.

Using recovery media

This section provides instructions on how to use recovery media on different operating systems.

- On the Windows 7 operating system and the Windows Vista operating system, you can use recovery media to restore the computer to the factory default settings only. You can use recovery media to put the computer in an operational state after all other methods of recovery have failed.

  Attention: When you use recovery media to restore the computer to the factory default settings, all the files currently on the hard disk drive will be deleted and replaced by the factory default settings.

  To use recovery media on the Windows 7 operating system or the Windows Vista operating system, do the following:

  1. Depending on the type of your recovery media, connect the boot medium (memory key or other USB storage device) to the computer, or insert the boot disc into the optical drive.
  2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
  3. Select the desired startup device and press Enter. The restore process begins.
  4. Follow the instructions on the screen to complete the operation.

  Notes:
  1. After restoring your computer to the factory default settings, you might have to reinstall device drivers for some devices. See "Installing or reinstalling device drivers" on page 49.
  2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These discs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.

- On the Windows XP operating system, you can use Product Recovery discs to restore your computer to the factory default settings, perform a custom factory recovery, or perform other rescue and recovery operations such as rescuing individual files. You will be given the option to enter the Rescue and Recovery workspace and choose from a variety of recovery operations.

  Attention: When you use Product Recovery discs to restore the computer to the factory default settings, all the files currently on the hard disk drive will be deleted and replaced by the factory default settings. During the restore process, you will be given the option to save one or more files currently on the hard disk drive to other media before the data is deleted.

  To use Product Recovery discs on the Windows XP operating system, do the following:

  1. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
  2. Insert the boot disc into the optical drive.

3. Select the optical drive with the boot disc as the startup device and press Enter. After a short delay, the Rescue and Recovery workspace opens.

4. On the **Rescue and Recovery** menu, click **Restore your system**.

5. Follow the instructions on the screen. Insert the appropriate Product Recovery disc when prompted.

Performing backup and recovery operations

The Rescue and Recovery program enables you to back up all your hard disk drive contents including the operating system, data files, software programs, and personal settings. You can designate where the Rescue and Recovery program stores the backup:

- In a protected area of your hard disk drive
- On the secondary hard disk drive if a secondary hard disk drive is installed in your computer
- On an attached external USB hard disk drive
- On a network drive
- On recordable discs (a recordable optical drive is required for this option)

After you have backed up the contents on the hard disk drive, you can restore the complete contents of the hard disk drive, restore only the selected files, or restore only the Windows operating system and applications.

Performing a backup operation

This section provides instructions on how to perform a backup operation using the Rescue and Recovery program on different operating systems.

- To perform a backup operation using the Rescue and Recovery program on the Windows 7 operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.
  2. In the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
  3. Click **Back up your hard drive** and select backup operation options. Then, follow the instructions on the screen to complete the backup operation.
- To perform a backup operation using the Rescue and Recovery program on the Windows Vista operating system or the Windows XP operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Rescue and Recovery**. The Rescue and Recovery program opens.
  2. In the Rescue and Recovery main window, click **Launch advanced Rescue and Recovery → Back up your hard drive**, and select backup operation options.
  3. Follow the instructions on the screen to complete the backup operation.

Performing a recovery operation

This section provides instructions on how to perform a recovery operation using the Rescue and Recovery program on different operating systems.

- To perform a recovery operation using the Rescue and Recovery program on the Windows 7 operating system, do the following:

1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.
2. In the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
3. Click the **Restore your system from a backup** icon.
4. Follow the instructions on the screen to complete the recovery operation.

- To perform a recovery operation using the Rescue and Recovery program on the Windows Vista operating system or the Windows XP operating system, do the following:

  1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Rescue and Recovery**. The Rescue and Recovery program opens.
  2. In the Rescue and Recovery main window, click **Launch advanced Rescue and Recovery**.
  3. Click the **Restore your system from a backup** icon.
  4. Follow the instructions on the screen to complete the recovery operation.

For more information about performing a recovery operation from the Rescue and Recovery workspace, see "Using the Rescue and Recovery workspace."

Using the Rescue and Recovery workspace

The Rescue and Recovery workspace resides in a protected, hidden area of your hard disk drive that operates independently from the Windows operating system. This enables you to perform recovery operations even if you cannot start the Windows operating system. You can perform the following recovery operations from the Rescue and Recovery workspace:

- Rescue files from your hard disk drive or from a backup

  The Rescue and Recovery workspace enables you to locate files on your hard disk drive and transfer them to a network drive or other recordable media, such as a USB device or a disc. This solution is available even if you did not back up your files or if changes were made to the files since your last backup operation. You can also rescue individual files from a Rescue and Recovery backup located on your local hard disk drive, a USB device, or a network drive.

- Restore your hard disk drive from a Rescue and Recovery backup

  If you have backed up your hard disk drive using the Rescue and Recovery program, you can restore the hard disk drive from a Rescue and Recovery backup, even if you cannot start the Windows operating system.

- Restore your hard disk drive to the factory default settings

  The Rescue and Recovery workspace enables you to restore the complete contents of your hard disk drive to the factory default settings. If you have multiple partitions on your hard disk drive, you have the option to restore the factory default settings to the C: partition and leave the other partitions intact. Because the Rescue and Recovery workspace operates independently from the Windows operating system, you can restore the factory default settings even if you cannot start the Windows operating system.

Attention: If you restore the hard disk drive from a Rescue and Recovery backup or restore the hard disk drive to the factory default settings, all files on the primary hard disk drive partition (usually drive C:) will be deleted in the recovery process. If possible, make copies of important files. If you are unable to start the Windows operating system, you can use the rescue files feature of the Rescue and Recovery workspace to copy files from your hard disk drive to other media.

To start the Rescue and Recovery workspace, do the following:

1. Make sure the computer is turned off.

2. Repeatedly press and release the F11 key when turning on the computer. When you hear beeps or see a logo screen, release the F11 key.

3. If you have set a Rescue and Recovery password, type your password when prompted. The Rescue and Recovery workspace opens after a short delay.

   Note: If the Rescue and Recovery workspace fails to open, see "Solving recovery problems" on page 49.

4. Do one of the following:

   • To rescue files from your hard disk drive or from a backup, click **Rescue files** and follow the instructions on the screen.

   • To restore your hard disk drive from a Rescue and Recovery backup or to restore your hard disk drive to the factory default settings, click **Restore your system** and follow the instructions on the screen.

For more information about the features of the Rescue and Recovery workspace, click **Help**.

Notes:

1. After restoring your hard disk drive to the factory default settings, you might have to reinstall device drivers for some devices. See "Installing or reinstalling device drivers" on page 49.

2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These discs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.

Creating and using a rescue medium

With a rescue medium, such as a disc or a USB hard disk drive, you can recover the computer from failures that prevent you from gaining access to the Rescue and Recovery workspace on your hard disk drive.

Notes:

1. The recovery operations you can perform using a rescue medium vary depending on the operating system.

2. The rescue disc can be started in all types of optical drives.

3. You can also run the PC-Doctor for Rescue and Recovery diagnostic program, after using a rescue medium to recover the computer from failures and gaining access to the Rescue and Recovery workspace.

Creating a rescue medium

This section provides instructions on how to create a rescue medium on different operating systems.

- To create a rescue medium on the Windows 7 operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.
  2. In the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
  3. Click the **Create Rescue Media** icon. The Create Rescue and Recovery Media window opens.
  4. In the **Rescue Media** area, select the type of the rescue medium you want to create. You can create a rescue medium using a disc, a USB hard disk drive, or a secondary internal hard disk drive.
  5. Click **OK** and follow the instructions on the screen to create a rescue medium.
- To create a rescue medium on the Windows Vista operating system or the Windows XP operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Create Recovery Media**. The Create Rescue and Recovery Media window opens.
  2. In the **Rescue Media** area, select the type of the rescue medium you want to create. You can create a rescue medium using a disc, a USB hard disk drive, or a secondary internal hard disk drive.
  3. Click **OK** and follow the instructions on the screen to create a rescue medium.

Using a rescue medium

This section provides instructions on how to use the rescue medium you have created.
- If you have created a rescue medium using a disc, use the following instructions to use the rescue medium:
  1. Turn off your computer.
  2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
  3. On the **Startup Device Menu**, select the desired optical drive as the first boot device. Then, insert the rescue disc into the optical drive and press Enter. The rescue medium starts.
- If you have created a rescue medium using a USB hard disk drive, use the following instructions to use the rescue medium:
  1. Attach the USB hard disk drive to one of the USB connectors on your computer.
  2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
  3. On the **Startup Device Menu**, select the USB hard disk drive as the first boot device and press Enter. The rescue medium starts.
- If you have created a rescue medium using the secondary internal hard disk drive, set the secondary internal hard disk drive as the first boot device in the startup device sequence to start the rescue medium. See "Selecting a startup device" on page 53.

  Note: In your computer, there is a secondary hard disk drive bay for you to install a secondary hard disk drive. You can purchase a secondary hard

disk drive by yourself. If you want to install a secondary hard disk drive, see "Replacing the hard disk drive" on page 31.

When the rescue medium starts, the Rescue and Recovery workspace opens. The help information for each feature is available from the Rescue and Recovery workspace. Follow the instructions to complete the recovery process.

Installing or reinstalling device drivers

Before installing or reinstalling device drivers, make sure that you have a preinstalled operating system and the documentation and software media for the device.

Device drivers for factory-installed devices are located on the computer hard disk drive (usually drive C:) in the SWTOOLS\DRIVERS subdirectory. The latest device drivers for factory-installed devices are also available at http://www.lenovo.com/support. Other device drivers are on the software media that come with individual devices.

To install or reinstall the device driver for a factory-installed device, do the following:

1. Turn on the computer.
2. Use Windows Explorer or **My Computer** to display the directory structure of your hard disk drive.
3. Go to the C:\SWTOOLS directory.
4. Open the DRIVERS folder. Within the DRIVERS folder, there are several subfolders named for various devices installed in your computer, such as AUDIO or VIDEO.
5. Open the appropriate device subfolder.
6. Do one of the following:
   - In the device subfolder, look for a SETUP.exe file. Double-click the file and follow the instructions on the screen to complete the installation.
   - In the device subfolder, look for a README.txt file or a file with the .txt extension. This file might be named after the operating system, such as WIN98.txt. The TXT file contains information about how to install the device driver. Follow the instructions to complete the installation.
   - If the device subfolder contains a file with the .inf extension and you want to install the device driver using the INF file, refer to your Windows Help and Support information system for detailed information about how to install the device driver.

Solving recovery problems

If you are unable to access the Rescue and Recovery workspace or the Windows environment, do one of the following:
- Use a rescue medium to start the Rescue and Recovery workspace. See "Creating and using a rescue medium" on page 47.
- Use recovery media if all other methods of recovery have failed and you need to restore the hard disk drive to the factory default settings. See "Creating and using recovery media" on page 43.

Note: If you are unable to access the Rescue and Recovery workspace or the Windows environment from a rescue medium, a recovery repair diskette, or

recovery media, you might not have the rescue device (an internal hard disk drive, a disc, a USB hard disk drive, or other external devices) set as the first boot device in the startup device sequence. You must first make sure that your rescue device is set as the first boot device in the startup device sequence in the Setup Utility program. See "Selecting a startup device" on page 53 for detailed information about temporarily or permanently changing the startup device sequence. For more information about the Setup Utility program, see Chapter 4, "Using the Setup Utility program," on page 51.

It is important to create a rescue medium, a recovery repair diskette, and a set of recovery media as early as possible and store them in a safe place for future use.

Chapter 4. Using the Setup Utility program

You can use the Setup Utility program to view and change the configuration settings of your computer, regardless of which operating system you are using. However, the operating system settings might override any similar settings in the Setup Utility program.

This chapter provides information about the following topics to help you use the Setup Utility program:

- "Starting the Setup Utility program"
- "Viewing or changing settings"
- "Using passwords"
- "Enabling or disabling a device" on page 53
- "Selecting a startup device" on page 53
- "Exiting the Setup Utility program" on page 54

Starting the Setup Utility program

This section provides instructions on how to start the Setup Utility program.

To start the Setup Utility program, do the following:

1. Make sure your computer is turned off.
2. Repeatedly press and release the F1 key when turning on the computer. When you hear multiple beeps or see a logo screen, release the F1 key. The Setup Utility program opens.

   Note: If a password has been set, the Setup Utility program menu will not be displayed until you type the correct password. For more information, see "Using passwords."

Viewing or changing settings

The Setup Utility program menu lists various items about the system configuration settings. To view or change the settings, start the Setup Utility program. See "Starting the Setup Utility program." Then, follow the instructions on the screen.

When working with the Setup Utility program, you must use the keyboard. The keys used to perform various tasks are displayed at the bottom of each screen.

Using passwords

By using the Setup Utility program, you can set a password to prevent unauthorized access to your computer and data. The following options are available to help you set a power-on password or an administrator password:

- **Set Power-On Password**
- **Set Administrator Password**

You do not have to set a password to use your computer. However, using a password improves computing security. If you decide to set a password, read the following sections.

Password considerations

A password can be any combination of up to 16 (1 to 16) alphabetic and numeric characters. For security reasons, it is recommended to use a strong password that cannot be easily compromised. To set a strong password, use the following guidelines:

Note: The Setup Utility program passwords are not case sensitive.

- Have at least eight characters in length
- Contain at least one alphabetic character and one numeric character
- Not be your name or your user name
- Not be a common word or a common name
- Be significantly different from your previous passwords

Power-on password

After you have set a power-on password using the **Set Power-On Password** option, a password prompt is displayed each time you turn on the computer. You cannot use the computer until a valid password is typed in. For more information about how to set a password, see "Setting, changing, or deleting a password."

Administrator password

The **Set Administrator Password** option enables you to set an administrator password, which deters unauthorized users from changing configuration settings. If you are responsible for maintaining the settings of several computers, you might want to set an administrator password. For more information about how to set a password, see "Setting, changing, or deleting a password."

After you have set an administrator password, a password prompt is displayed each time you try to access the Setup Utility program. You cannot access the Setup Utility program until a valid password is typed in.

If you have set both a power-on password and an administrator password, you can type either password to use your computer. However, to change any configuration settings, you must use your administrator password.

Setting, changing, or deleting a password

This section provides instructions on how to set, change, or delete a password.

To set, change, or delete a password, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 51.
2. From the Setup Utility program main menu, select **Security → Set Power-On Password** or **Set Administrator Password**.
3. Follow the instructions on the screen to set, change, or delete a password.

   Note: A password can be any combination of up to 16 (1 to 16) alphabetic and numeric characters. For more information, see "Password considerations."

Enabling or disabling a device

This section provides instructions on how to enable or disable user access to a device.

SATA Controller	When this option is set to **Disabled**, all devices connected to the SATA connectors (such as the hard disk drive and the optical drive) are disabled and will not be displayed in the system configuration.
USB Setup	Use this option to set up USB connectors.

To enable or disable a device, do the following:
1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 51.
2. From the Setup Utility program main menu, select **Devices**.
3. Depending on the device you want to enable or disable, do one of the following:
   - Select **ATA Drives Setup → SATA Controller** to enable or disable the devices connected to the SATA connectors on the system board.
   - Select **USB Setup** and follow the instructions on the screen to enable or disable the USB connector(s) of your choice.
4. Select the desired settings and press Enter.
5. Press Esc to return to the Setup Utility program main menu. You might have to press Esc several times.
6. Press F10 to save the new settings and exit the Setup Utility program.

   Notes:
   a. If you do not want to save the new settings, select **Exit → Discard Changes and Exit**.
   b. If you want to return to the default settings, press F9 or select **Exit → Load Optimal Defaults**.

Selecting a startup device

If your computer does not start up from a device (such as a hard disk drive or the disc in an optical drive) as expected, do one of the following to select the desired startup device.

Selecting a temporary startup device

This section provides instructions on how to select a temporary startup device. You can use the instructions in this section to start up from any startup device.

Note: Not all discs and hard disk drives are bootable.

To select a temporary startup device, do the following:
1. Turn off your computer.
2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
3. Select the desired startup device on the **Startup Device Menu** and press Enter.

Note: Selecting a startup device on the **Startup Device Menu** does not permanently change the startup device sequence.

Viewing or changing the startup device sequence

This section provides instructions on how to view or permanently change the configured startup device sequence.

To view or permanently change the configured startup device sequence, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 51.
2. Select **Startup → Primary Boot Sequence**. Read the information displayed on the right side of the screen.
3. Select the first boot device, second boot device, and so on.
4. Press Esc to return to the **Startup** menu. Then, select the devices for the **Automatic Boot Sequence** and **Error Boot Sequence**.
5. Press Esc to return to the Setup Utility program main menu. You might have to press Esc several times.
6. Press F10 to save the new settings and exit the Setup Utility program.

   Notes:

   a. If you do not want to save the new settings, select **Exit → Discard Changes and Exit**.
   b. If you want to return to the default settings, press F9 or select **Exit → Load Optimal Defaults**.

Exiting the Setup Utility program

After you finish viewing or changing settings, press Esc to return to the Setup Utility program main menu. You might have to press Esc several times. Then, you can do one of the following:

- If you want to save the new settings and exit the Setup Utility program, press F10. Otherwise, your changes will not be saved.
- If you do not want to save the new settings, select **Exit → Discard Changes and Exit**.
- If you want to return to the default settings, press F9 or select **Exit → Load Optimal Defaults**.

Chapter 5. Updating system programs

This chapter provides information about updating the POST and BIOS, and how to recover from a POST and BIOS update failure.

This chapter contains the following topics:
- "Using system programs"
- "Updating (flashing) the BIOS from a disc"
- "Updating (flashing) the BIOS from your operating system" on page 56
- "Recovering from a POST and BIOS update failure" on page 56

Using system programs

System programs are the basic layer of software built into your computer. System programs include the POST, the BIOS, and the Setup Utility program. The POST is a set of tests and procedures that are performed each time you turn on your computer. The BIOS is a layer of software that translates instructions from other layers of software into electrical signals that the computer hardware can execute. You can use the Setup Utility program to view or change the configuration settings of your computer. See Chapter 4, "Using the Setup Utility program," on page 51 for detailed information.

Your computer system board has a module called electrically erasable programmable read-only memory (EEPROM, also referred to as flash memory). You can easily update the POST, the BIOS, and the Setup Utility program by starting your computer with a system-program-update disc or running a special update program from your operating system.

Lenovo might make changes and enhancements to the POST and BIOS. When updates are released, they are available as downloadable files on the Lenovo Web site at http://www.lenovo.com. Instructions for using the POST and BIOS updates are available in a TXT file that is included with the update files. For most models, you can download either an update program to create a system-program-update disc or an update program that can be run from the operating system.

Updating (flashing) the BIOS from a disc

This section provides instructions on how to update (flash) the BIOS from a disc.

Note: You can download a self-starting bootable disc image (known as an ISO image) with the system program updates to create a system-program-update disc. Go to:
http://www.lenovo.com/support

To update (flash) the BIOS from a disc, do the following:
1. Turn off your computer.
2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
3. On the **Startup Device Menu**, select the desired optical drive as the startup device. Then, insert the disc into this optical drive and press Enter. The update begins.

4. When prompted to change the serial number, it is suggested that you do not make this change by pressing N. However, if you do want to change the serial number, press Y, then type in the serial number and press Enter.

5. When prompted to change the machine type and model, it is suggested that you do not make this change by pressing N. However, if you do want to change the machine type and model, press Y, then type in the machine type and model and press Enter.

6. Follow the instructions on the screen to complete the update. After the update is completed, remove the disc from the optical drive.

Updating (flashing) the BIOS from your operating system

Note: Because Lenovo makes constant improvements to its Web sites, the Web page contents are subject to change without notice, including the contents referenced in the following procedure.

To update (flash) the BIOS from your operating system, do the following:

1. Go to http://www.lenovo.com/support.
2. Do the following to locate the downloadable files for your machine type:
    a. In the **Enter a product number** field, type your machine type and click **Go**.
    b. Click **Downloads and drivers**.
    c. Select **BIOS** from the **Refine results** drop-down list box to easily locate all the BIOS related links.
    d. Click the BIOS update link.
3. Click the TXT file that contains the instructions for updating (flashing) the BIOS from your operating system.
4. Print these instructions. This is very important because these instructions will not be displayed on the screen after the download begins.
5. Follow the printed instructions to download, extract, and install the update.

Recovering from a POST and BIOS update failure

If the power to your computer is interrupted while the POST and BIOS is being updated, your computer might not restart correctly. If this happens, perform the following procedure, which is commonly called Boot-block Recovery.

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.

2. Remove the computer cover. See "Removing the computer cover" on page 14.

3. Locate the Clear CMOS /Recovery jumper on the system board. See "Locating parts on the system board" on page 11.

4. Remove any parts and disconnect any cables that might prevent your access to the Clear CMOS /Recovery jumper.

5. Move the jumper from the standard position (pin 1 and pin 2) to the maintenance position (pin 2 and pin 3).

6. Reinstall any parts and reconnect any cables that have been removed or disconnected.

7. Reinstall the computer cover and reconnect the power cords for the computer and monitor. See "Completing the parts replacement" on page 37.

8. Turn on the computer and then insert the POST and BIOS update (flash update) disc into the optical drive. The recovery session begins. The recovery session will take two to three minutes. During this time, you will hear a series of beeps.

9. After the recovery session is completed, there will be no video, the series of beeps will end, and the system will automatically turn off.

10. Repeat step 1 through step 4.

11. Move the jumper back to the standard position (pin 1 and pin 2).

12. Reinstall any parts and reconnect any cables that have been removed or disconnected.

13. Reinstall the computer cover and reconnect power cords and all other external cables. See "Completing the parts replacement" on page 37.

14. Turn on the computer and remove the disc from the optical drive.

Chapter 6. Troubleshooting and diagnostic programs

This chapter provides information about some basic troubleshooting and diagnostic programs. If your computer problem is not described in this chapter, see Chapter 7, "Getting information, help, and service," on page 63 for additional troubleshooting resources.

This chapter contains the following topics:
- "Basic troubleshooting"
- "Diagnostic programs" on page 60
- "Cleaning an optical mouse" on page 62

Basic troubleshooting

The following table provides some basic information to help you troubleshoot your computer problems.

Note: If you cannot solve the problem after doing the basic troubleshooting, have the computer serviced. Refer to the *ThinkCentre Safety and Warranty Guide* that came with your computer for the safety and warranty information and the list of service and support telephone numbers. You can also get the latest service and support telephone numbers and a PDF version of the *ThinkCentre Safety and Warranty Guide* from the Lenovo Support Web site at: http://www.lenovo.com/support

Symptom	Action
The computer does not start when you press the power switch.	Verify that: • The power cord is correctly connected to the rear of the computer and to a working electrical outlet. • The power indicator on the front of the computer is on. • The computer voltage matches the voltage available at the electrical outlet for your country or region.
The monitor screen is blank.	Verify that: • The monitor signal cable is correctly connected to the monitor and to the appropriate monitor connector on the computer. If your computer has a PCI graphics card installed, be sure to use the monitor connector on the graphics card rather than the integrated one on the system board. • The monitor power cord is correctly connected to the monitor and to a working electrical outlet. • The monitor is turned on and the brightness and contrast controls are set correctly. • The computer voltage matches the voltage available at the electrical outlet for your country or region.
The USB keyboard or mouse does not work.	Verify that: • The computer is turned on. • The USB keyboard or mouse is correctly connected to one of the USB connectors on the computer. • For the USB keyboard, no keys are stuck. • The USB mouse is clean. Refer to "Cleaning an optical mouse" on page 62.

Symptom	Action
The operating system does not start.	Verify that you list the device where the operating system resides in the startup device sequence. Usually, the operating system is on the hard disk drive. For more information, see "Selecting a startup device" on page 53.
The computer beeps multiple times before the operating system starts.	Verify that no keys are stuck.

Diagnostic programs

Diagnostic programs are used to test hardware components of your computer. Diagnostic programs can also report operating-system-controlled settings that interfere with the correct operation of your system. There are two programs preinstalled on your computer to help you diagnose computer problems:

- Lenovo ThinkVantage Toolbox (used when you are running the Windows operating system)
- PC-Doctor for Rescue and Recovery (used when you cannot start the Windows operating system)

Notes:

1. You can also download the PC-Doctor for DOS diagnostic program from http://www.lenovo.com/support. See "PC-Doctor for DOS" on page 61 for detailed information.
2. If you are unable to isolate and repair the problem yourself after running the programs, save and print the log files created by the programs. You will need the log files when you speak to a Lenovo technical support representative.

Lenovo ThinkVantage Toolbox

The Lenovo ThinkVantage Toolbox program helps you maintain your computer, improve computing security, diagnose computer problems, get familiar with the innovative technologies provided by Lenovo, and get more information about your computer. You can use the diagnostics feature of the Lenovo ThinkVantage Toolbox program to test devices, diagnose computer problems, create bootable diagnostic media, update system drivers, and view system information.

- To run the Lenovo ThinkVantage Toolbox program on the Windows 7 operating system, click **Start → All Programs → Lenovo ThinkVantage Tools → System Health and Diagnostics**. Follow the instructions on the screen.
- To run the Lenovo ThinkVantage Toolbox program on the Windows Vista operating system or the Windows XP operating system, click **Start → All Programs → ThinkVantage → Lenovo ThinkVantage Toolbox**. Follow the instructions on the screen.

For additional information about running the Lenovo ThinkVantage Toolbox program, refer to the Lenovo ThinkVantage Toolbox help system.

PC-Doctor for Rescue and Recovery

The PC-Doctor for Rescue and Recovery program is part of the Rescue and Recovery workspace on your Lenovo computer. Use the PC-Doctor for Rescue and Recovery program if you are unable to start the Windows operating system.

To run the PC-Doctor for Rescue and Recovery program from the Rescue and Recovery workspace, do the following:

1. Turn off the computer.
2. Repeatedly press and release the F11 key when turning on the computer. When you hear beeps or see a logo screen, release the F11 key. The Rescue and Recovery workspace opens after a short delay.
3. From the Rescue and Recovery workspace, select **Launch advanced Rescue and Recovery → Diagnose hardware**. The PC-Doctor for Rescue and Recovery program opens.
4. Select the desired diagnostic test. Then, follow the instructions on the screen.

For additional information about running the PC-Doctor for Rescue and Recovery program, refer to the PC-Doctor for Rescue and Recovery help system.

Note: If you encounter failures that prevent you from gaining access to the Rescue and Recovery workspace, you can run the PC-Doctor for Rescue and Recovery program after using a rescue medium to recover the computer from failures and gaining access to the Rescue and Recovery workspace. See "Creating and using a rescue medium" on page 47.

PC-Doctor for DOS

You can also download the latest version of the PC-Doctor for DOS diagnostic program from http://www.lenovo.com/support. The PC-Doctor for DOS diagnostic program runs independently of the Windows operating system. Use the PC-Doctor for DOS diagnostic program if you are unable to start the Windows operating system. You can run the PC-Doctor for DOS diagnostic program from a diagnostic disc that you created.

Creating a diagnostic disc

This section provides instructions on how to create a diagnostic disc.

To create a diagnostic disc, do the following:
1. Download a self-starting bootable disc image (known as an ISO image) of the diagnostic program from:
   http://www.lenovo.com/support
2. Use any disc burning software to create a diagnostic disc with the ISO image.

Running the diagnostic program from the diagnostic disc

This section provides instructions on how to run the diagnostic program from the diagnostic disc that you created.

To run the diagnostic program from the diagnostic disc that you created, do the following:
1. Make sure your computer is turned off.
2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
3. Insert the diagnostic disc into the optical drive.
4. Select the optical drive with the diagnostic disc as the startup device and press Enter. The diagnostic program opens.
5. Follow the instructions on the screen to run the desired diagnostic test. For additional help, press the F1 key.
6. Remove the diagnostic disc from the optical drive after completing the diagnostic test.

Cleaning an optical mouse

This section provides instructions on how to clean an optical mouse.

An optical mouse uses a LED and an optical sensor to navigate the pointer. If the pointer on the screen does not move smoothly with the optical mouse, you might need to clean the mouse.

To clean an optical mouse, do the following:
1. Turn off your computer.
2. Disconnect the mouse cable from the computer.
3. Turn the mouse upside down to check the lens.
   a. If there is a smudge on the lens, gently clean the area with a plain cotton-tipped swab.
   b. If there is debris in the lens, gently blow the debris away from the area.
4. Check the surface on which you are using the mouse. If you have a very intricate picture or pattern beneath the mouse, it may be difficult for the digital signal processor (DSP) to determine changes in the mouse position.
5. Reconnect the mouse cable to the computer.
6. Turn your computer back on.

Chapter 7. Getting information, help, and service

This chapter provides information about help, service, and technical assistance for Lenovo products.

This chapter contains the following topics:
- "Information resources"
- "Help and service" on page 65

Information resources

You can use the information in this section to access useful resources relating to your computing needs.

Online Books folder

The Online Books folder preinstalled on your computer contains the *ThinkCentre User Guide*, which provides information about your computer to help you set up, use, and maintain your computer. It requires no Internet access to view the publication.

To view the publication, click **Start → All Programs → Online Books → Online Books**, then double-click the publication for your computer. The publication is also available on the Lenovo Support Web site at:
http://www.lenovo.com/support

Notes:
1. The publication is in PDF version. To view the publication, you need to have the Adobe Reader program preinstalled on your computer. If the Adobe Reader program has not been installed on your computer, a message will be displayed when you attempt to view the PDF file and you will be guided through the Adobe Reader installation.
2. The publication is available in other languages on the Lenovo Support Web site at:
   http://www.lenovo.com/support
3. If you want to install a different language version of the Adobe Reader program rather than the version preinstalled on your computer, download the desired language version from the Adobe Web site at:
   http://www.adobe.com

Lenovo ThinkVantage Tools

Note: The Lenovo ThinkVantage Tools program is only available on computers with the Windows 7 operating system from Lenovo.

The Lenovo ThinkVantage Tools program helps you work more easily and securely by providing easy access to various technologies, such as:
- Lenovo ThinkVantage Toolbox
- Password Manager (available on some models)
- Power Manager
- Product Recovery

- Rescue and Recovery
- System Update

To access the Lenovo ThinkVantage Tools program, click **Start → All Programs → Lenovo ThinkVantage Tools**.

ThinkVantage Productivity Center

Note: The ThinkVantage Productivity Center program is only available on computers preinstalled with the Windows Vista operating system or the Windows XP operating system from Lenovo.

The ThinkVantage Productivity Center program contains information sources and tools designed to make computing easy and secure. It provides easy access to various technologies, such as:
- Client Security Solution (available on some models)
- Power Manager
- Product Recovery
- Rescue and Recovery
- System Update

To access the ThinkVantage Productivity Center program, click **Start → All Programs → ThinkVantage → Productivity Center**.

Lenovo Welcome

Note: The Lenovo Welcome program is only available on computers preinstalled with the Windows 7 operating system or the Windows Vista operating system from Lenovo.

The Lenovo Welcome program introduces some innovative built-in features of Lenovo to you and guides you through some important setup tasks to help you make the most of your computer.

Access Help

The Access Help information system provides information about getting started, doing basic tasks, customizing settings for your personal preference, protecting data, expanding and upgrading, and troubleshooting.
- To open the Access Help information system on the Windows 7 operating system, click **Start → Help and Support → Lenovo Access Help**.
- To open the Access Help information system on the Windows Vista operating system or the Windows XP operating system, click **Start → All Programs → ThinkVantage → Access Help**.

After you have opened the Access Help information system, use the left panel to make a selection from the **Contents** tab or the **Index** tab, or use the **Search** tab to find a particular word or phrase.

Safety and warranty

The *ThinkCentre Safety and Warranty Guide* that came with your computer contains information about safety, warranty, service and support phone numbers, CRUs, and other notices and information resources. You can also get the latest service and

support telephone numbers and a PDF version of the *ThinkCentre Safety and Warranty Guide* from the Lenovo Support Web site at:
http://www.lenovo.com/support

Before using the information in this manual and the product it supports, be sure to read and understand the *ThinkCentre Safety and Warranty Guide* and "Notices," on page 69.

Lenovo Web site (http://www.lenovo.com)

The Lenovo Web site provides up-to-date information and services to help you buy, upgrade, and maintain your computer. You can also do the following:

- Shop for desktop and notebook computers, monitors, projectors, upgrades and accessories for your computer, and special offers.
- Purchase additional services, such as support for hardware, operating systems, software programs, network setup and configuration, and custom installations.
- Purchase upgrades and extended hardware repair services.
- Download the latest device drivers and software updates for your computer model.
- Access the online manuals for your products.
- Access the Lenovo Limited Warranty.
- Access troubleshooting and support information for your computer model and other supported products.
- Find the service and support phone numbers for your country or region.
- Find a Service Provider located near you.

Help and service

This section provides information about obtaining help and service.

Using the documentation and diagnostic programs

If you experience problems with your computer, see Chapter 6, "Troubleshooting and diagnostic programs," on page 59. For information about additional resources to help you troubleshoot your computer problems, see "Information resources" on page 63.

If you suspect a software problem, see the documentation that came with the operating system or software program, including readme files and online help.

Most computers come with a set of diagnostic programs that you can use to help you identify hardware problems. For instructions on how to use the diagnostic programs on your computer, see "Diagnostic programs" on page 60.

You can get the latest technical information and download device drivers and updates from the Lenovo Support Web site at:
http://www.lenovo.com/support

Calling for service

During the warranty period, you can get help and information from the Lenovo Customer Support Center by telephone.

The following services are available during the warranty period:
- **Problem determination** - Trained service personnel are available to assist you with determining a hardware problem and deciding what action is necessary to solve the problem.
- **Hardware repair** - If the problem is caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management** - There might be changes that are required after a product has been sold. Lenovo or your reseller will make selected Engineering Changes (ECs) that apply to your hardware available.

The following items are not covered by the warranty:
- Replacement or use of parts not manufactured for or by Lenovo or non-warranted Lenovo parts
- Identification of software problem sources
- Configuration of the BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to the safety and warranty information that is provided with your computer for a complete explanation of warranty terms. You must retain your proof of purchase to obtain warranty service.

For a list of the Lenovo Support phone numbers for your country or region, go to http://www.lenovo.com/support and click **Support phone list** or refer to the *ThinkCentre Safety and Warranty Guide* that is provided with your computer.

Note: The service and support phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

If possible, be at your computer when you call and have the following information available:
- Machine type and model
- Serial numbers of your hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

Using other services

If you travel with your computer or relocate it to a country where your desktop or notebook computer machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by authorized Service Providers.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to http://www.lenovo.com/support, click **Warranty**, and follow the instructions on the screen.

For technical assistance with the installation of or questions related to Service Packs for your preinstalled Microsoft Windows product, refer to the Microsoft Product Support Services Web site at http://support.microsoft.com/directory or you can contact the Customer Support Center. Some fees might apply.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region. For more information about these services, go to the Lenovo Web site at: http://www.lenovo.com

Appendix. Notices

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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may

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vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Television output notice

The following notice applies to models that have the factory-installed television-output feature.

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