lenovo

ThinkCentre
User Guide

ThinkThinkThinkCentreThink

Machine Types: 3379, 5897, 6137, 6234, 6258, 6303, 7174, 7220, 7346, 7354, 7357, 7360, 7483, 7582, 7627, 7630, 7638, 8910, and 9964

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 describes the computer features, specifications, preinstalled software programs, and part and connector locations.

Features

This section provides an overview of 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," on page 49.

Microprocessor
- Intel® Celeron® processor
- Intel Core™ 2 Duo processor
- Intel Core 2 Quad processor
- Intel Pentium® dual-core processor
- Internal cache (size varies by model type)

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

Internal drives
- Card reader (some models)
- Optical drive
- SATA (Serial Advanced Technology Attachment) internal hard disk drive (some models)
- Solid State Drive (SSD) (some models)

Video subsystem
- Integrated graphics card for a VGA (Video Graphics Array) connector and DisplayPort connector
- PCI (Peripheral Component Interconnect) Express x16 graphics card slot on the system board for a discrete graphics card

Audio subsystem
- High Definition (HD) with ADI 1882 Audio Codec
- Audio line-in connector, audio line-out connector, and microphone connector on the rear panel
- Microphone connector and headphone connector on the front panel
- Internal speaker (some models)

Connectivity
- 10/100/1000 Mbps integrated Ethernet controller
- PCI V.90 Data/Fax modem (some models)

System management features
- Ability to store power-on self-test (POST) hardware test results
- Automatic power-on startup
- Alert Standard Format 2.0
- Intel Active Management Technology (AMT) (some models)
- Intel matrix storage manager
- Preboot Execution Environment (PXE) and Dynamic Host Configuration Protocol (DHCP)
- Remote Administration
- Secure Managed Client (SMC) (some models)
- System Management (SM) Basic Input/Output System (BIOS) and SM software
- Wake on LAN
- Wake on Ring (in the Setup Utility program, this feature is called Serial Port Ring Detect for an external modem)

Input/Output (I/O) features
- 9-pin serial port (one standard and one optional)
- Eight USB connectors (two on the front panel and six on the rear panel)
- Ethernet connector
- One DisplayPort connector
- One eSATA connector
- Standard keyboard connector (some models)
- Standard mouse connector (some models)
- Three audio connectors (audio line-in connector, audio line-out connector, and microphone connector) on the rear panel
- Two audio connectors (microphone connector and headphone connector) on the front panel
- VGA monitor connector

Expansion
- One card reader
- One hard disk drive bay
- One optical drive bay
- One PCI card slot
- One PCI Express x16 graphics card slot

Power supply
- 280-watt auto-sensing power supply
- Automatic 50/60 Hz input frequency switching
- Advanced Configuration and Power Interface (ACPI) support

Security features
- Computrace
- Cover presence switch (also called intrusion switch, some models)
- Hard Disk User Password
- Keyboard with fingerprint reader (some models)
- Power-On Password (POP) and Administrator Password for BIOS access
- Serial and parallel port I/O control
- Startup sequence control
- Startup without diskette drive, keyboard, or mouse
- Support for the addition of an integrated cable lock (Kensington lock)
- Support to enable or disable a device
- Trusted Platform Module (TPM)
- Unattended start mode
- USB switch on/off individually

Software programs, preinstalled
Your computer might come with preinstalled software programs. If it does, an operating system, device drivers to support built-in features, and other support programs are included. For more information, see "Software overview" on page 5.

Operating system, preinstalled
- Microsoft® Windows® 7
- Microsoft Windows Vista®
- Microsoft Windows XP Professional
  (preinstalled through downgrade rights in Windows 7 Professional, Windows 7 Ultimate, Windows Vista Business, or Windows Vista Ultimate)

Operating systems, certified or tested for compatibility[1] (varies by model type)
- Linux®

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1. The operating systems 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 booklet. Corrections and additions to this list are 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: 317 mm (12.48 inches)

   Height: 99 mm (3.90 inches)

   Depth: 355 mm (13.98 inches)

Weight

   Maximum configuration as shipped: 7.5 kg (16.53 lbs)

Environment

   Air temperature:

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

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

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

   Humidity:

      Operating: 10% to 80% (10% per hour, non condensing)

      Non-operating: 10% to 90% (10% per hour, non condensing)

   Maximum 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

This section describes the software preinstalled on the computers that have an internal hard disk drive and an operating system from Lenovo.

Software provided with your Windows operating system

This section describes the Windows applications included with your computer.

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 preinstalled with Windows 7 from Lenovo.

ThinkVantage Productivity Center: The ThinkVantage Productivity Center program guides you to a host of information and tools to help you set up, understand, maintain, and enhance your computer.

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

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 users diagnose computer problems, get help, and recover from system crashes quickly, even if the primary operating system will not start.

ThinkVantage Client Security Solution: The ThinkVantage Client Security Solution (CSS) program is available on select Lenovo computers. It helps 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 Windows Vista or Windows XP from Lenovo.

Password Manager: The Password Manager program helps you automatically capture and fill in authentication information for Windows applications and Web sites.

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

ThinkVantage System Update: The ThinkVantage System Update (TVSU) program helps you keep the software on your system up-to-date, by downloading and installing software packages (TVT applications, device drivers, BIOS flashes, 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 Productivity Center program.

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

Fingerprint Software: The integrated fingerprint reader provided on some keyboards enables you to enroll your fingerprint and associate it with your power-on password, hard disk drive password, and Windows password. As a result, fingerprint authentication can replace passwords and enable simple and secure user access. A fingerprint reader keyboard is available with select 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. See "Lenovo ThinkVantage Toolbox" on page 59 for detailed information.

Note: The Lenovo ThinkVantage Toolbox program is only available on computers preinstalled with Windows 7 from Lenovo.

Lenovo System Toolbox

The Lenovo System Toolbox diagnostic program is preinstalled on your hard disk drive. This diagnostic program works through the Windows operating system to diagnose hardware problems and report operating-system-controlled settings that can cause hardware failures. See "Lenovo System Toolbox" on page 59 for more information.

Note: The Lenovo System Toolbox program is only available on computers preinstalled with Windows Vista or Windows XP from Lenovo.

PC-Doctor for Rescue and Recovery

The PC-Doctor for Rescue and Recovery diagnostic program is preinstalled on your hard disk drive. It is part of the Rescue and Recovery workspace on each Lenovo computer to diagnose hardware problems and report operating-system-controlled settings that can cause hardware failures. Use the PC-Doctor for Rescue and Recovery if you are unable to start the Windows operating system. See "PC-Doctor for Rescue and Recovery" on page 60 for more information.

Adobe Reader

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

See "Online Books folder" on page 63 for more information about accessing the online books and the Lenovo Web site.

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 hard disk drive with a free 30-day subscription. After 30 days, you must renew the license to continue receiving the antivirus program updates.

Locations

Locating connectors on the front of your computer

Figure 1 shows the locations of the connectors on the front of your computer.

Note: Not all computer models have the following connectors.
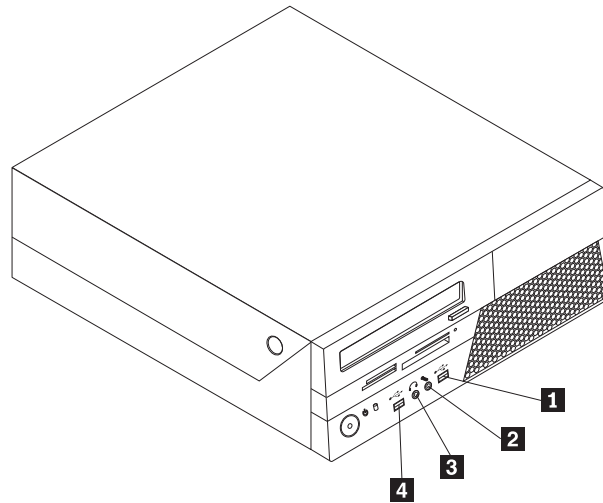
Figure 1. Front connector locations

1 USB connector   3 Headphone connector
2 Microphone connector   4 USB connector

Locating connectors on the rear of your computer

Figure 2 shows the locations of the connectors 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.
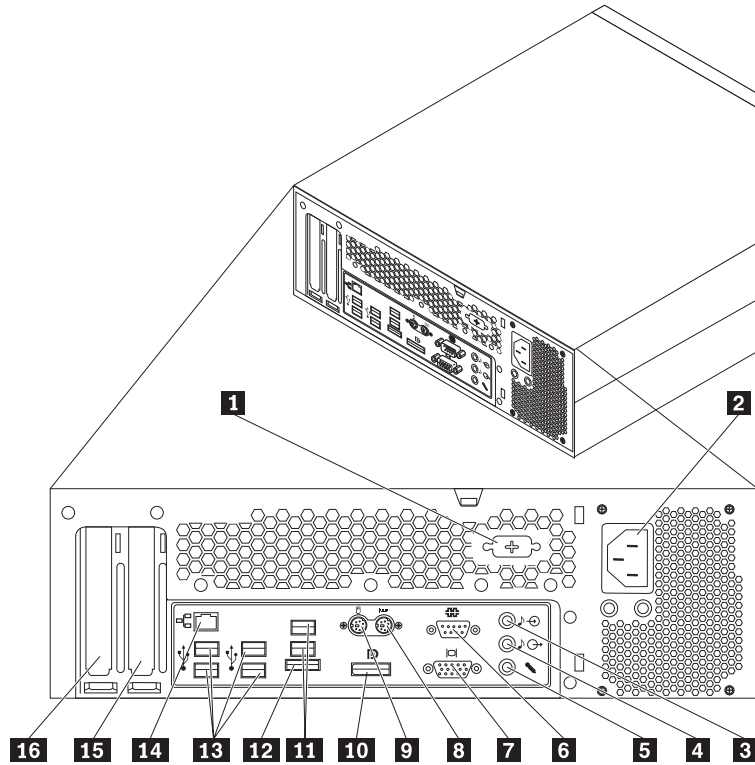
Figure 2. Rear connector locations

1	Serial port (some models)	**9**	Standard mouse connector (some models)
2	Power cord connector	**10**	DisplayPort connector
3	Audio line-in connector	**11**	USB connectors (2)
4	Audio line-out connector	**12**	eSATA connector
5	Microphone connector	**13**	USB connectors (4)
6	Serial port	**14**	Ethernet connector
7	VGA monitor connector	**15**	PCI Express x16 graphics card slot
8	Standard keyboard connector (some models)	**16**	PCI card slot

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, or the audio line-in connector on a stereo system or other external recording device.
DisplayPort connector	Used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a DisplayPort connector.
eSATA connector	Use this external Serial Advanced Technology Attachment (eSATA) connector to attach an external hard disk drive.
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.
Serial port	Used to attach an external modem, a serial printer, or other devices that use a 9-pin serial port.
Standard keyboard connector	Used to attach a keyboard that uses a standard keyboard connector.
Standard mouse connector	Used to attach a mouse, a trackball, or other pointing devices that use a standard mouse connector.
USB connector	Used to attach a device that requires a Universal Serial Bus (USB) connector, such as a USB keyboard, a USB mouse, a USB scanner or a USB printer. If you have more than eight 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 open the computer cover, see "Opening the computer cover" on page 14.
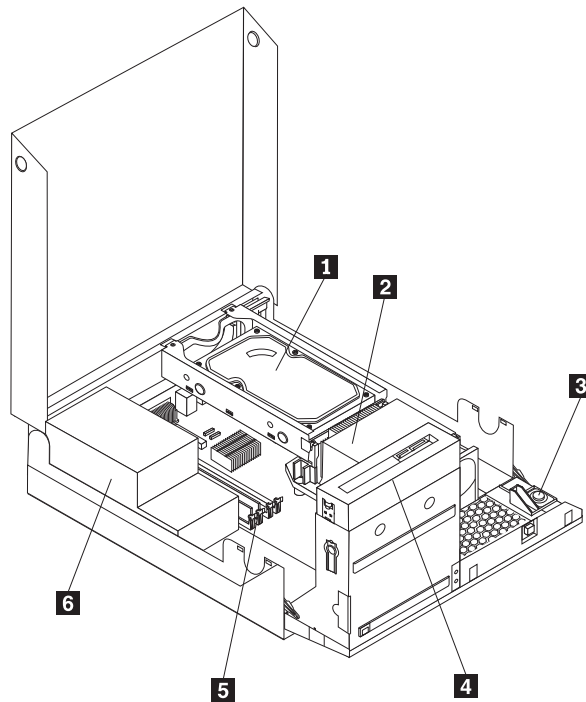
Figure 3. Component locations

1	Hard disk drive (some models)	**4**	Optical drive
2	Microprocessor, heat sink and fan assembly	**5**	Memory slots (4)
3	Internal speaker (some models)	**6**	Power supply assembly

Locating parts on the system board

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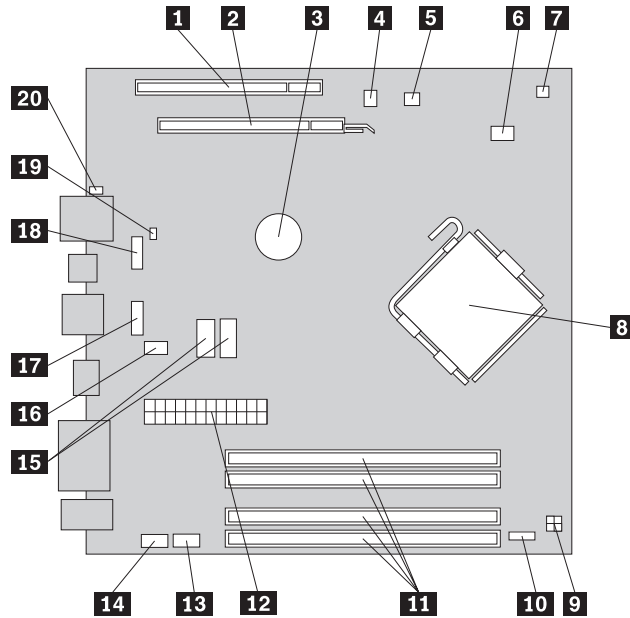
Figure 4. System board parts locations

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

Chapter 2. Installing options and replacing hardware

This chapter provides instructions for installing options and replacing hardware for your computer. You can expand the capabilities of your computer by adding memory modules, PCI cards, or drives. When installing or replacing an option, use these instructions along with the instructions that come with the option.

Important: Before you install or replace any option, be sure to read and understand the "Important safety information" in the *ThinkCentre Safety and Warranty Guide*. The precautions and guidelines will help you work safely.

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 parts and other computer components, take these precautions to avoid static-electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle parts and other computer components carefully. Handle PCI cards, memory modules, system boards, and microprocessors by the edges. Never touch any 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 part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the new part from the static-protective packaging, and install it directly in the computer without setting the part down. When this is not possible, place the static-protective package that the part came in on a smooth, level surface and place the part on it.
- Do not place the part on the computer cover or other metal surface.

Installing options and replacing hardware

This section provides introductions for installing options and replacing hardware for your computer. When installing or replacing an option, use these instructions along with the instructions that come with the option.

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

Note: Use only computer parts provided by Lenovo.

Installing external options

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

Opening 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 open the computer cover.

CAUTION:

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

> **Important**
> Be sure to read and understand "Handling static-sensitive devices" on page 13 before opening the computer cover.

To open the computer cover:

1. Remove any media from the drives, shut down your operating system, and turn off all attached devices and the computer.
2. Unplug all power cords from electrical outlets.
3. Disconnect the cables attached to the computer. This includes power cords, input/output (I/O) cables, and any other cables that are connected to the computer. See "Locating connectors on the front of your computer" on page 7 and "Locating connectors on the rear of your computer" on page 8.
4. Remove any locking devices, such as a cable lock that secures the computer cover.

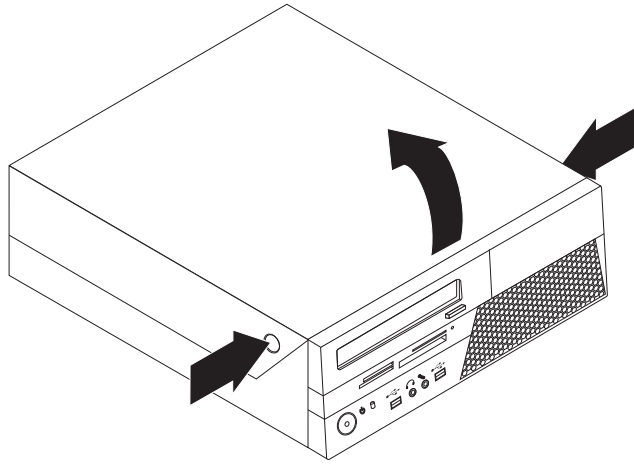5. Press the buttons on the sides of the computer and pivot the computer cover upward to open.

Figure 5. Opening the computer cover

Accessing the system board components and drives

This section provides instructions on how to access the system board components and drives.

To access the system board components and drives:

1. Open the computer cover. See "Opening the computer cover" on page 14.
2. On some models, you might need to pivot the optical drive bay assembly upward and remove the hard disk drive to access the internal components. See "Replacing the hard disk drive" on page 24.

   Notes:

   a. Make sure you note the locations of any cables that you disconnect from the drives or the system board.
   b. Make sure the hard disk drive assembly is in the latched down position before closing the computer cover to prevent damage to the hard disk drive.
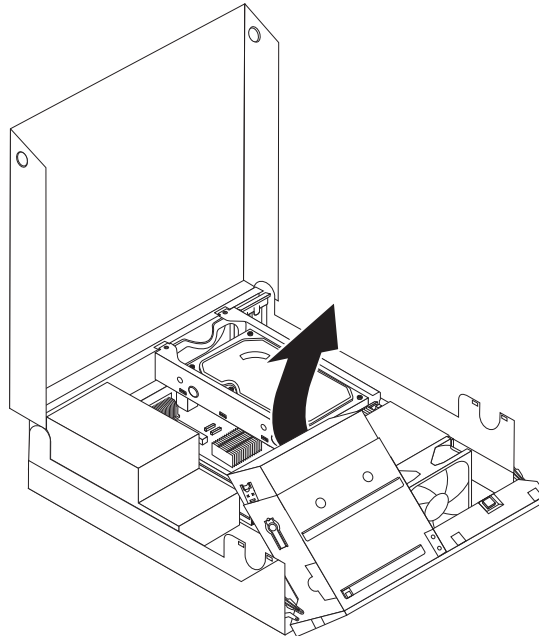
Figure 6. Pivoting the optical drive bay assembly

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 four slots for installing or replacing DDR3 DIMMs (double data rate 3 dual inline memory modules) that provide up to a maximum of 8 GB system memory. When installing or replacing a memory module, use 1 GB or 2 GB DDR3 DIMMs in any combination up to a maximum of 8 GB.

To install or replace a memory module:

1. Open the computer cover. See "Opening the computer cover" on page 14.
2. Pivot the optical drive bay assembly upward to access the memory slots. See "Accessing the system board components and drives" on page 16.
3. Remove any parts that might prevent your access to the memory slots.
4. Locate the memory slots.
5. Open the retaining clips.
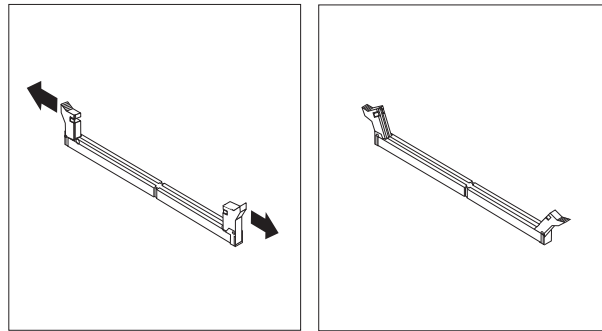
Figure 7. Opening the retaining clips

If you are replacing an old memory module, open the retaining clips and remove the memory module being replaced as shown.
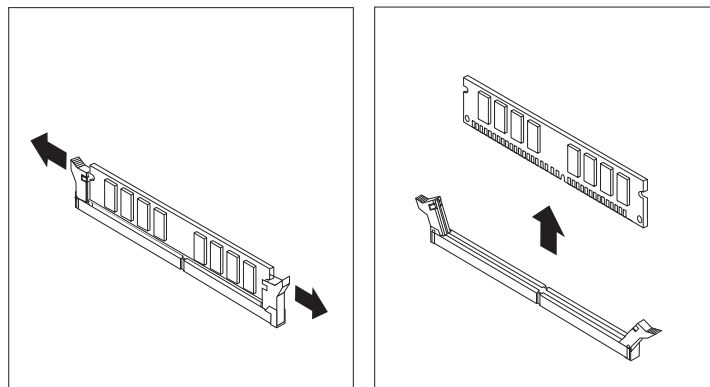
Figure 8. Removing the old memory module

6. Position the new memory module over the memory slot. Make sure that the notch **1** on the memory module aligns correctly with the slot key **2** on the system board. Push the memory module straight down into the slot until the retaining clips close.

Figure 9. Installing the memory module

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 36.

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 and one PCI Express x16 graphics card slot.

To install or replace a PCI card:

1. Open the computer cover. See "Opening the computer cover" on page 14.
2. Rotate the card retainer to the open position. If you are installing a PCI card, remove the appropriate slot cover. If you are replacing an old PCI card, remove the old card that is currently installed.
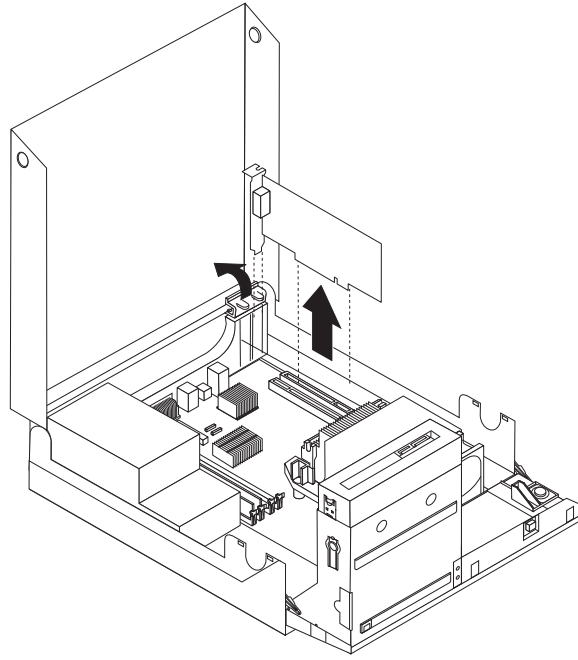
Figure 10. Removing a PCI card

Notes:

a. The card fits tightly into the card slot. If necessary, alternate moving each side of the card a small amount until it is removed from the card slot.
b. If the card is held in place by a retaining latch, press the card retaining latch **1** as shown to disengage the latch. Grasp the card and gently pull it out of the slot.
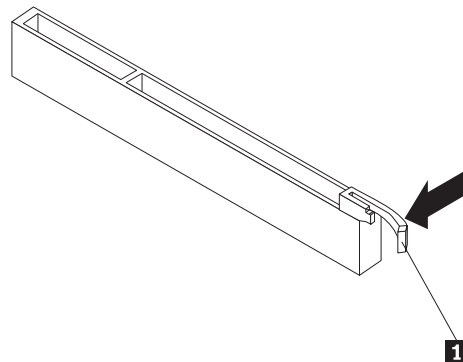
3. Remove the new PCI card from its static-protective package.

4. Install the new card into the appropriate card slot on the system board and rotate the card retainer to the closed position. See "Locating parts on the system board" on page 11.
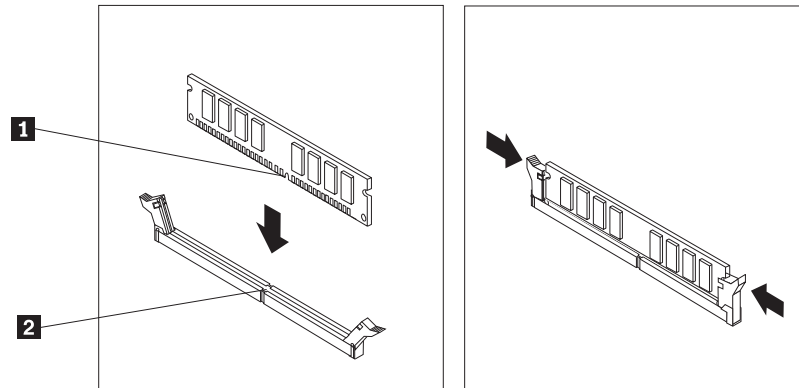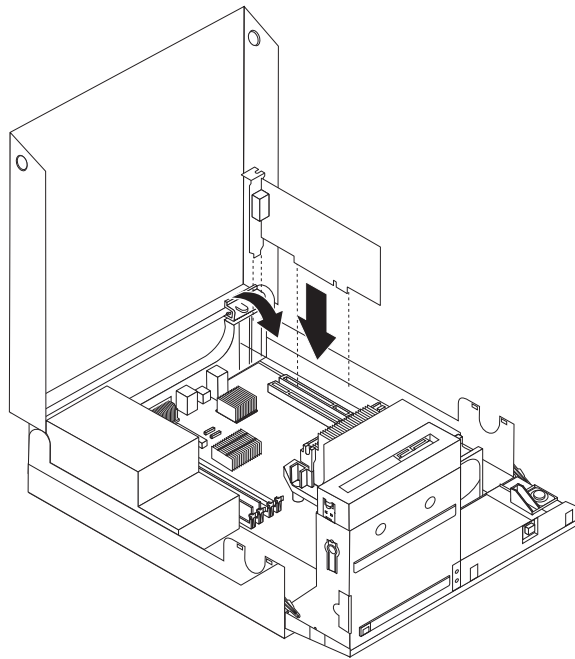

Figure 11. Installing the PCI card

> **What to do next:**
> - To work with another option, go to the appropriate section.
> - To complete the installation, go to "Completing the parts replacement" on page 36.

Installing internal drives

This section provides instructions on how to install the 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. Some of the types of drives that are available for your computer are:
- Serial Advanced Technology Attachment (SATA) hard disk drives
- Solid State Drive
- SATA optical drives, such as CD drives or DVD drives
- Removable media drives

Note: These types of drives are also referred to as integrated drive electronics (IDE) drives.

Internal drives are installed in bays. In this manual, the bays are referred to as bay 1, bay 2, and so on.

When you install an internal drive, it is important to note the type and size of the drive that you can install in each bay. Also, it is important to correctly connect the internal drive cables to the installed drive.

Drive specifications

Your computer comes with the following factory-installed drives:
- A 3.5-inch hard disk drive in bay 1
- An optical drive in bay 2 (some models)

Figure 12 shows the locations of the drive bays.
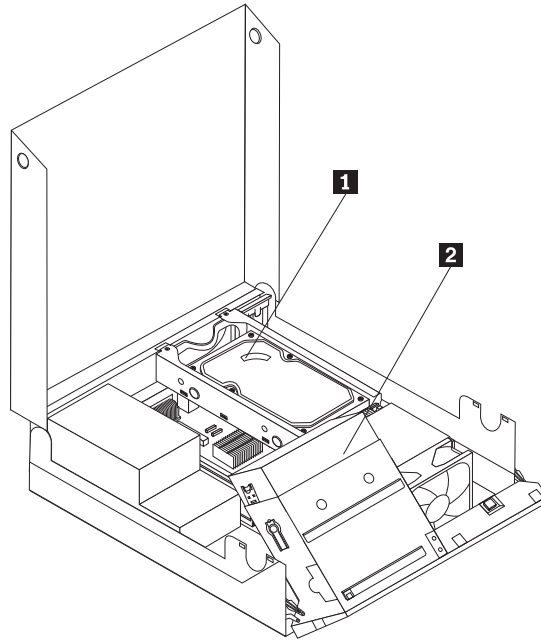
Figure 12. Drive bay locations

The following list describes the type and size of the drive that you can install in each bay:

1 Bay 1 - Maximum height: 25.8 mm (1 inch)	3.5-inch hard disk drive 1.8-inch Solid State Drive (requires a Universal Adapter Bracket, 3.5 to 1.8-inch)
2 Bay 2 - Maximum height: 43 mm (1.7 inches) Maximum length: 180 mm (7.08 inches)	Optical drive, such as a CD drive or a DVD drive (preinstalled in some models) 3.5-inch hard disk drive (requires a Universal Adapter Bracket, 5.25 to 3.5-inch)* 5.25-inch hard disk drive

* You can obtain a Universal Adapter Bracket, 5.25 to 3.5-inch from a local computer retailer or by contacting the Customer Support Center.

Installing a drive in bay 2

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 a drive in bay 2.

To install an optical drive or an additional hard disk drive in bay 2:

1. Open the computer cover. See "Opening the computer cover" on page 14.
2. If there is a metal static shield installed in the drive bay, remove the metal shield by using a flat-blade screwdriver to gently pry it loose.
3. If you are installing a drive with accessible media, such as an optical drive, remove the plastic panel in the bezel by squeezing the plastic tabs that secure the panel on the inside of the bezel.

   Note: If you are installing a 3.5-inch hard disk drive, you must use a Universal Adapter Bracket, 5.25 to 3.5-inch. You can obtain this bracket from a local computer retailer or by contacting the Customer Support Center.
4. Install the retainer that comes with your drive on the side of the drive.
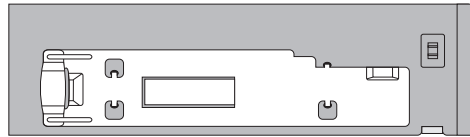
Figure 13. Installing the retainer

5. Slide the drive into the bay until it locks into position.
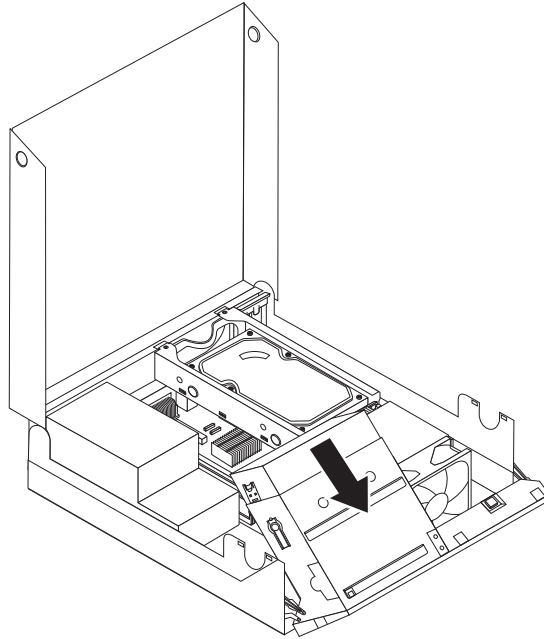
Figure 14. Installing a drive in bay 2

6. Pivot the optical drive bay assembly upward to gain access to the cable connections and connect the signal cable and the power cable for the drive.
7. Continue at "Connecting a SATA drive."

Connecting a SATA drive

A SATA optical drive or a SATA hard disk drive can be connected to any available SATA connector.

1. Locate the signal cable that comes with the new drive.
2. Locate an available SATA connector on the system board. See "Locating parts on the system board" on page 11.
3. Connect one end of the signal cable to the drive and the other end to the available SATA connector on the system board.
4. Locate one of the extra five-wire power connectors and connect it to the drive.
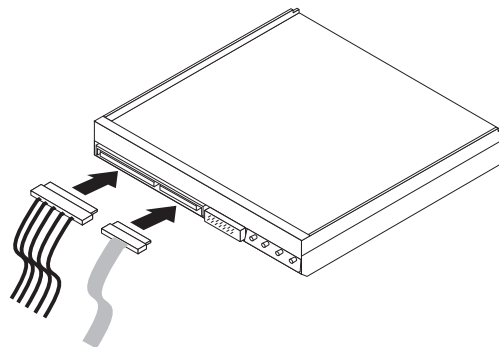
Figure 15. Connecting a SATA drive

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 if your computer has one. For computer models that do not have an internal hard disk drive and use a remote hard disk drive accessed through the SMC - Storage Array, contact your network or storage administrator.

Important

When you receive a new hard disk drive, you also receive a set of *Product Recovery discs*. The set of *Product Recovery discs* enables you to restore the contents of the hard disk drive to the factory default settings. For more information on recovering factory-installed software, refer to Chapter 3, "Recovery information," on page 41.

To replace the hard disk drive:

1. Open the computer cover. See "Opening the computer cover" on page 14.
2. You might need to pivot the optical drive bay assembly upward to gain easy access to the hard disk drive.
3. Locate the hard disk drive.

4. Push the blue handle of the hard disk drive bracket inwards to release the two clips **1** that secure the hard disk drive to the chassis and then pivot the hard disk drive upwards.
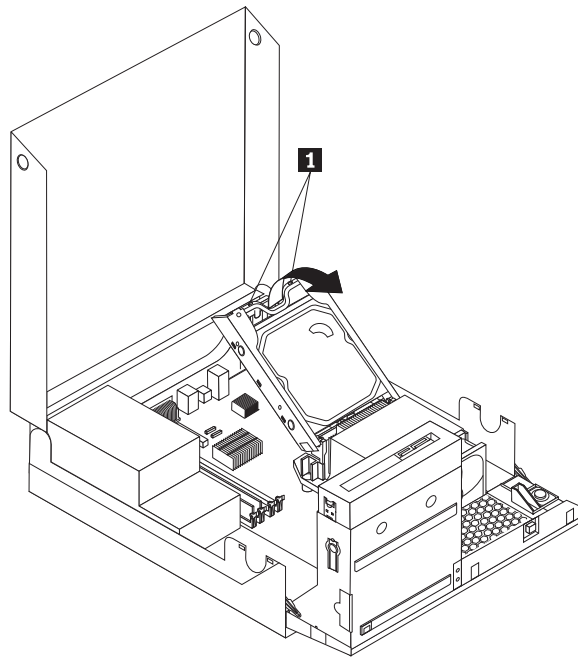
Figure 16. Removing the hard disk drive

5. Disconnect the signal cable and the power cable from the hard disk drive and then lift the hard disk drive up to completely remove it from the chassis.
6. Remove the failing hard disk drive from the bracket by flexing the sides of the bracket enough.

7. To install a new hard disk drive into the bracket, flex the bracket and align pin **1**, pin **2**, pin **3**, and pin **4** on the bracket with the holes in the hard disk drive.
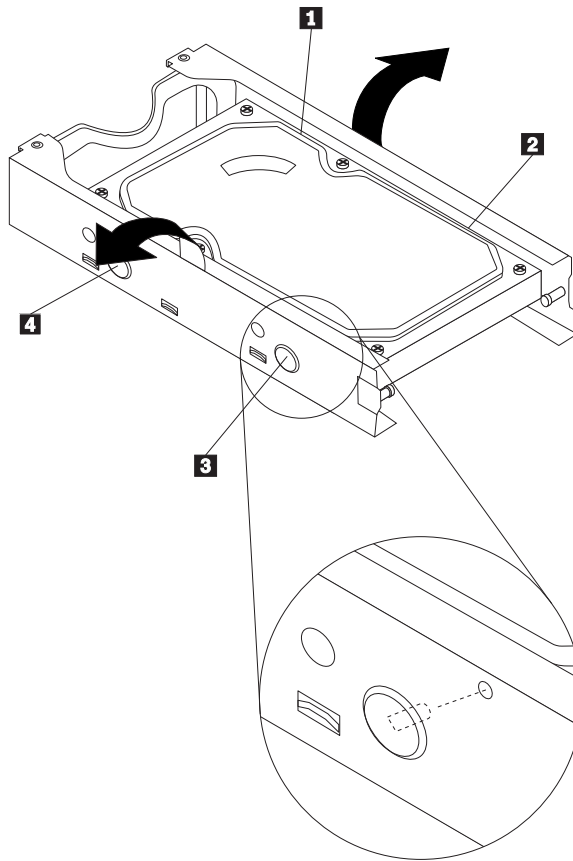
Figure 17. Installing the hard disk drive bracket

> **Important:** Do not touch the circuit board on the bottom of the hard disk drive.

8. Connect the signal cable and the power cable to the new hard disk drive.
9. Install the new hard disk drive and bracket into the hard disk drive retainer and rotate down until the two clips on the blue handle of the hard disk drive bracket snap into position.
10. Go to "Completing the parts replacement" on page 36.

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

This section provides instructions on how to replace the optical drive.

To replace the optical drive:

1. Open the computer cover. See "Opening the computer cover" on page 14.
2. Pivot the optical drive bay assembly upward to gain easy access to the optical drive.
3. Disconnect the signal cable and the power cable from the rear of the optical drive.
4. Press the optical drive lock **1** and slide the optical drive out of the rear of the drive bay assembly.
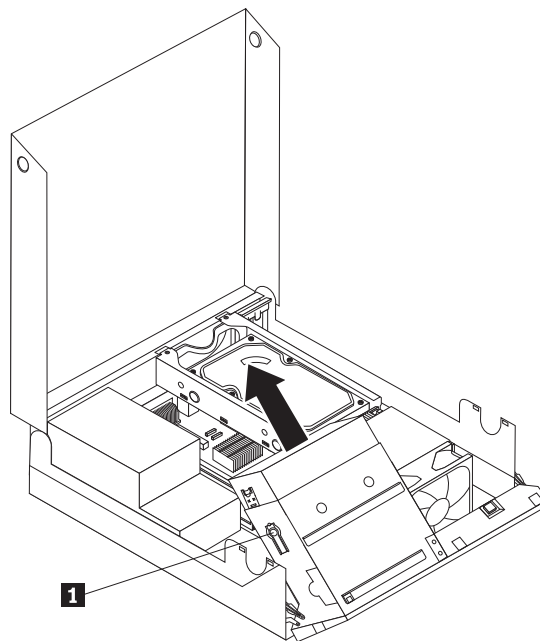
Figure 18. Removing the old optical drive

5. Remove the optical drive retainer from the drive being replaced and then install the retainer on the left side of the new drive to be installed.
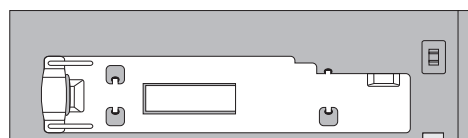
Figure 19. Installing the retainer

6. Install the new optical drive into the drive bay until it snaps into position.
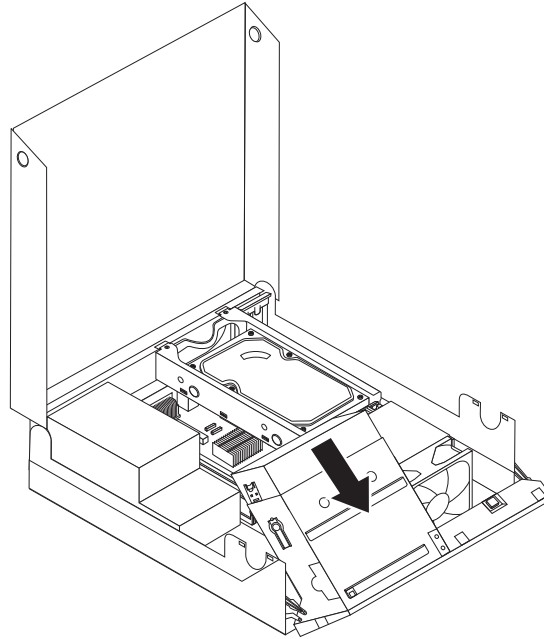
Figure 20. Installing a new optical drive

7. Connect the signal cable and the power cable to the rear of the optical drive.
8. Go to "Completing the parts replacement" on page 36.

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 settings for built-in features, such as parallel-port assignments (configuration). A 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.

Refer to the "Lithium battery notice" in the *ThinkCentre Safety and Warranty Guide* for information about replacing and disposing of the battery.

To replace the battery:
1. Open the computer cover. See "Opening the computer cover" on page 14.
2. Access the system board. See "Accessing the system board components and drives" on page 16.
3. Locate the battery. See "Locating parts on the system board" on page 11.

4. Remove the old battery.
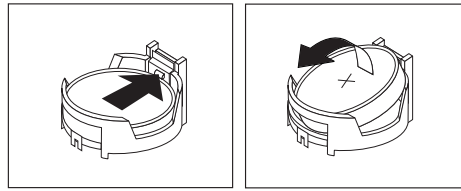
Figure 21. Removing the old battery

5. Install a new battery.
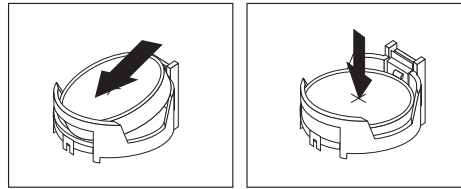
Figure 22. Installing a new battery

6. Reinstall the hard disk drive if removed. See "Replacing the hard disk drive" on page 24.
7. Close the computer cover and connect the cables. See "Completing the parts replacement" on page 36.

   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.

8. Turn on the computer and all attached devices.
9. Use the Setup Utility program to set the date, time, and any passwords. See Chapter 4, "Using the Setup Utility," on page 49.

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.

To replace the power supply assembly:

1. Remove the four screws at the rear of the chassis that secure the power supply assembly.
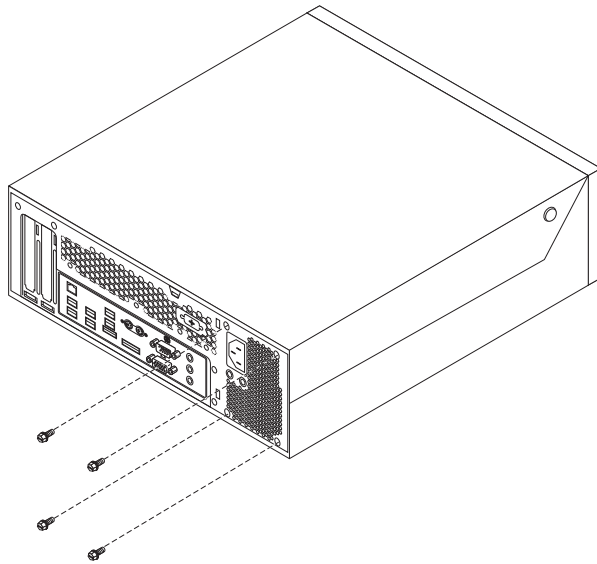
Figure 23. Removing the retaining screws for the power supply assembly

2. Open the computer cover. See "Opening the computer cover" on page 14.
3. Pivot the optical drive bay assembly upward to gain access to the power supply assembly.
4. Locate the power supply assembly. See "Locating components" on page 10.

5. Disconnect the power supply assembly cables from all drives and from the power connectors **1** and **2** on the system board.

> **Note:** You might need to remove the hard disk drive to gain easy access to the power connector **2** . See "Replacing the hard disk drive" on page 24.
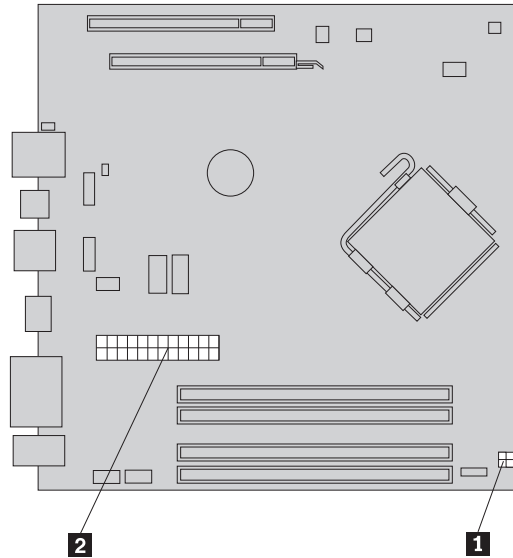
Figure 24. Power connectors on the system board

6. Release the power supply assembly cables from the cable clips and ties in the chassis.
7. Slide the power supply assembly away from the chassis and remove it from the computer.
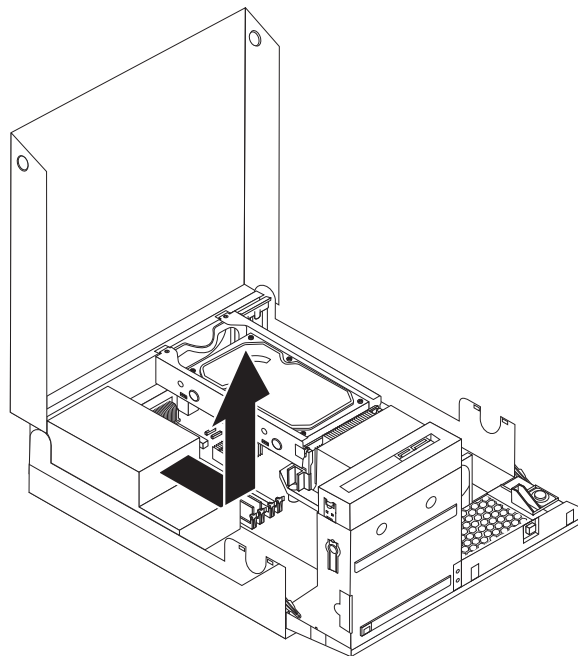
Figure 25. Removing the power supply assembly

8. Install the new power supply assembly into the chassis so that the screw holes in the new power supply assembly align with those in the chassis.

9. Install and tighten the four screws at the rear of the chassis to secure the power supply assembly.

   Note: Use only the screws provided by Lenovo.

10. Reconnect all the power supply assembly cables to the drives and the system board.

11. Secure the power supply assembly cables with the cable clips and ties in the chassis.

12. Go to "Completing the parts replacement" on page 36.

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

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 opening the computer cover.

To replace the heat sink and fan assembly:

1. Open the computer cover. See "Opening the computer cover" on page 14.

2. Pivot the optical drive bay assembly upward to gain easy access to the heat sink and fan assembly.

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

4. Remove the heat sink and fan assembly from the system board by pivoting the lever **1** that secures the heat sink and fan assembly until it is fully in the up position.

   Note: It helps to remove the hard disk drive before this step. See "Replacing the hard disk drive" on page 24.
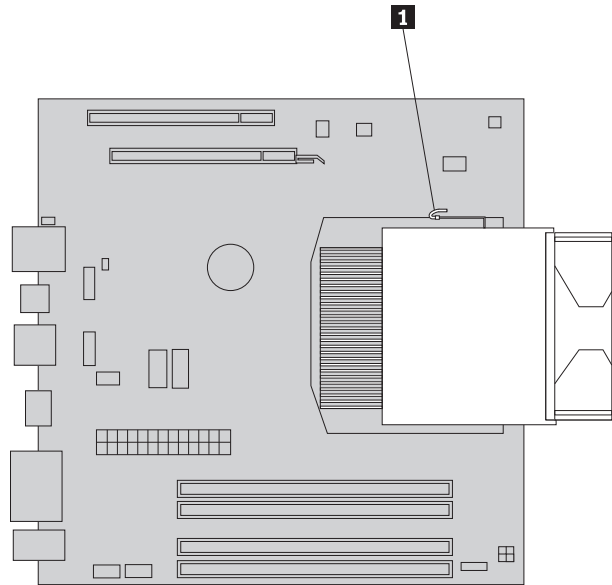
Figure 26. Removing the heat sink and fan assembly

5. Carefully 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. Do not touch the thermal grease while handling the heat sink and fan assembly.
6. Place the new heat sink and fan assembly into position and lower the lever to secure the new heat sink and fan assembly.
7. Connect the 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.
8. Go to "Completing the parts replacement" on page 36.

Replacing the card reader

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 card reader.

To replace the card reader:
1. Open the computer cover. See "Opening the computer cover" on page 14.
2. Pivot the optical drive bay assembly upward to gain access to the card reader.
3. Locate the card reader.
4. Disconnect the card reader cable from the front USB connector on the system board. See "Locating parts on the system board" on page 11.

   Note: Make sure you note the location of the cable when you disconnect the cable from the system board.
5. Remove the screw that secures the card reader to the chassis.
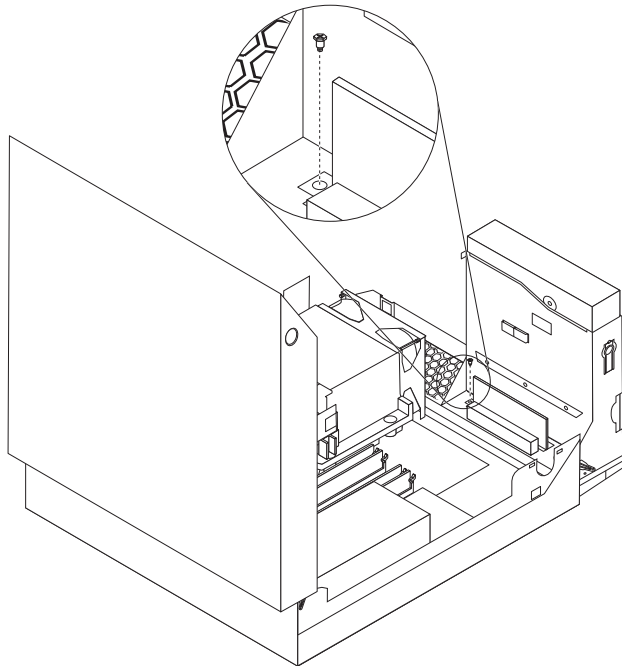
Figure 27. Removing the securing screw of the card reader

6. Remove the card reader from the chassis.
7. Install a new card reader into the chassis and align the screw hole in the card reader with the hole in the chassis.
8. Install the screw to secure the new card reader to the chassis.
9. Reconnect the card reader cable to the system board.
10. Go to "Completing the parts replacement" on page 36.

Replacing the keyboard

This section provides instructions on how to replace the keyboard.

To replace the keyboard:

1. Remove any media from the drives, shut down your operating system, and turn off all attached devices and the computer.
2. Unplug all power cords from electrical outlets.
3. Locate the keyboard connector.

   Note: Your keyboard might be connected to a standard keyboard connector **1** or a USB connector **2**. Depending on where your keyboard is connected, see "Locating connectors on the rear of your computer" on page 8 or "Locating connectors on the front of your computer" on page 7.
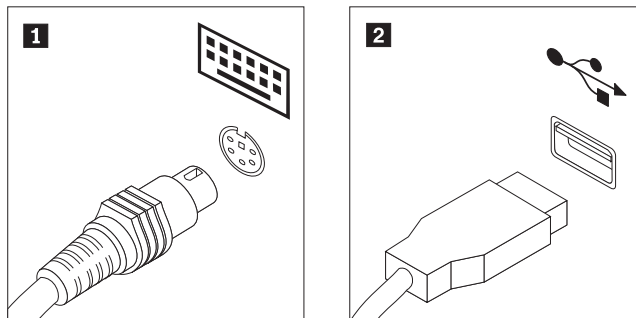
Figure 28. Keyboard connectors

4. Disconnect the failing keyboard cable from the computer.
5. Connect a new keyboard to the appropriate connector on the computer.
6. Go to "Completing the parts replacement" on page 36.

Replacing the mouse

This section provides instructions on how to replace the mouse.

To replace the mouse:

1. Remove any media from the drives, shut down your operating system, and turn off all attached devices and the computer.

2. Unplug all power cords from electrical outlets.
3. Locate the connector for the mouse.

   Note: Your mouse might be connected to a standard mouse connector **1** or a USB connector **2** . Depending on where your mouse is connected, see "Locating connectors on the rear of your computer" on page 8 or "Locating connectors on the front of your computer" on page 7.
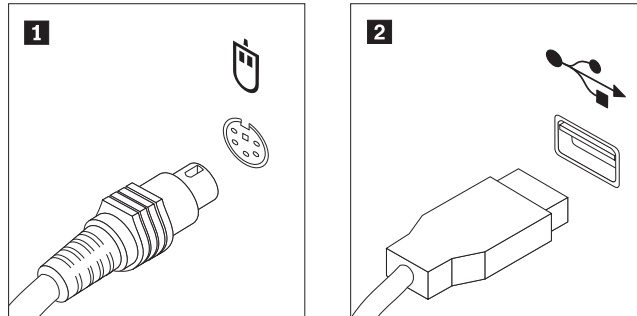
Figure 29. Mouse connectors

4. Disconnect the failing mouse cable from the computer.
5. Connect a new mouse cable to the appropriate connector on the computer.
6. Go to "Completing the parts replacement."

Completing the parts replacement

After completing all parts replacements, you need to reinstall the computer cover and reconnect cables, such as power cords. Depending on the parts replaced, you might need to confirm the updated information in the Setup Utility program. Refer to Chapter 4, "Using the Setup Utility," on page 49.

To close the computer cover and reconnect cables to your computer:

1. Ensure 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 various components.

2. Ensure that the cables are routed correctly before lowering the optical drive bay assembly.

> **Important**
>
> Correctly route all power supply cables to avoid interference with the drive bay assembly. Keep cables clear of the hinges and sides of the computer chassis.
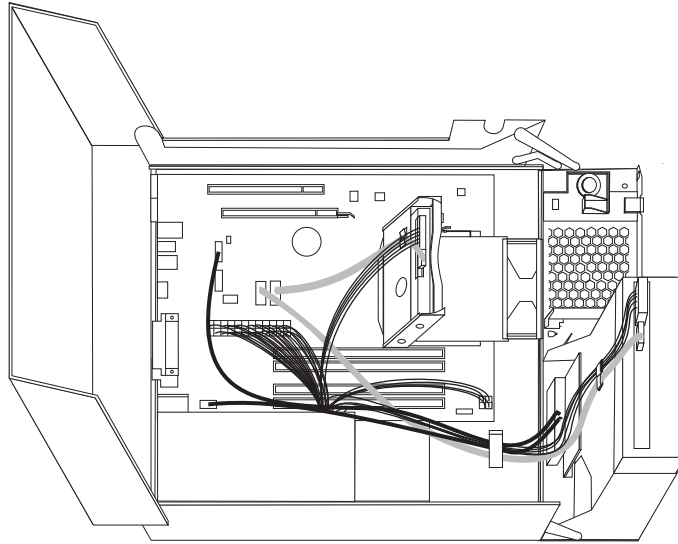
Figure 30. Cable routing

3. Lower the optical drive bay assembly.
4. Close the computer cover.
5. If a computer cover lock is installed, lock the computer cover.
6. Reconnect the external cables and power cords to the computer. See "Locating connectors on the rear of your computer" on page 8.
7. To update your configuration, see Chapter 4, "Using the Setup Utility," on page 49.

Note: In most areas of the world, Lenovo requires the return of the defective Customer Replaceable Unit (CRU). Information about this will come with the CRU or will come a few days after the CRU arrives.

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.

Installing security features

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

Make sure that any security cables you installed do not interfere with other computer cables.

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 buttons used to open the computer cover. This is the same type of lock used with many notebook computers. You can order a security cable directly from Lenovo by searching on *Kensington* at: http://www.lenovo.com/support
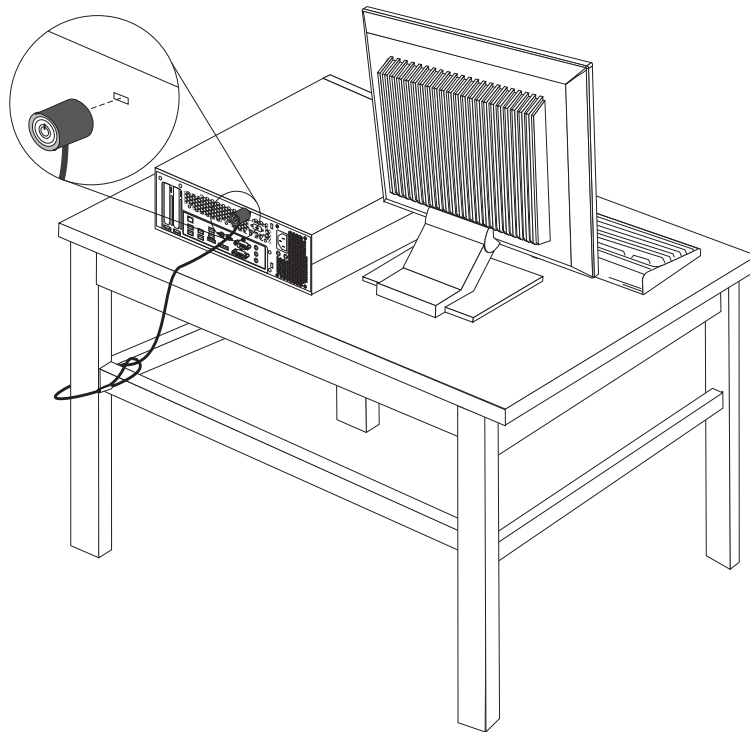
Figure 31. Integrated cable lock

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 to unlock the keyboard for normal use. Refer to Chapter 4, "Using the Setup Utility," on page 49 for more information.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Completing the parts replacement" on page 36.

Erasing lost or forgotten passwords (clearing CMOS)

This section contains instructions on erasing some lost or forgotten passwords, such as a user password.

To erase lost or forgotten passwords:

1. Open the computer cover. See "Opening the computer cover" on page 14.
2. Access the system board. See "Accessing the system board components and drives" on page 16.

   Note: You must remove the hard disk drive to gain access to the Clear CMOS/Recovery jumper.

3. Locate the Clear CMOS/Recovery jumper on the system board. See "Locating parts on the system board" on page 11.
4. Move the jumper from the standard position (pin 1 and pin 2) to the maintenance or configure position (pin 2 and pin 3).
5. Reinstall the hard disk drive.
6. Lower the optical drive bay assembly and reconnect any cables that were disconnected.
7. Close the computer cover and connect the power cord. See "Completing the parts replacement" on page 36.
8. Restart the computer and leave it on for approximately 10 seconds. Turn off the computer by holding the power switch for approximately five seconds. The computer will turn off.
9. Repeat step 1 through step 3.
10. Move the Clear CMOS/Recovery jumper back to the standard position (pin 1 and pin 2).
11. Reinstall the hard disk drive if removed.
12. Lower the optical drive bay assembly and reconnect any cables that were disconnected.
13. Close the computer cover and connect the power cord. See "Completing the parts replacement" on page 36.

Chapter 3. Recovery information

This chapter will help you get familiar with recovery solutions provided by Lenovo. This chapter explains when and how to use the following recovery methods:

- Creating and using recovery media
- Performing backup and recovery operations
- Using the Rescue and Recovery workspace
- Creating and using rescue media
- Creating and using a recovery repair diskette
- Installing or reinstalling device drivers
- Setting a rescue device in the startup sequence
- Solving recovery problems

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

Recovery media enable you 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 soon as possible.

Note: The recovery operations you can perform using recovery media vary depending on the operating system from which they are created. Your Microsoft Windows license permits you to create only one data medium, so it is important that you store the created recovery medium in a safe place.

Creating recovery media

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

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

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

- To create Product Recovery discs on Windows XP, 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.

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

  Attention: When you use recovery media to restore the computer to the factory default settings on Windows 7 or Windows Vista, all the files currently on the system drive or the hard disk drive will be deleted and replaced by the factory default settings.

  1. Depending on the type of your recovery media, connect your boot medium (memory key or USB hard disk drive) to your computer, or insert the boot disc into your CD or DVD drive.
  2. Restart your computer.
  3. Repeatedly press and release the F12 key when turning on the computer. When the Startup Device Menu window opens, release the F12 key.
  4. Depending on the type of your recovery media, select the proper startup device and press Enter. After a short delay, the Product Recovery program opens.
  5. Follow the instructions on the screen.

     After restoring the computer to the factory default settings, you might have to reinstall some software programs or device drivers. See "Installing or reinstalling device drivers" on page 47 for details.

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

  Attention: When you use Product Recovery discs to restore the computer to the factory default settings on Windows XP, 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.

  1. Insert the boot disc into your CD or DVD drive.
  2. Restart your computer.
  3. Repeatedly press and release the F12 key when turning on the computer. When the Startup Device Menu window opens, release the F12 key.
  4. Select the CD or DVD drive as the startup device and press Enter. After a short delay, the Rescue and Recovery workspace opens.
  5. From the **Rescue and Recovery** menu, click **Restore your system**.
  6. Follow the instructions on the screen.

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:

- On a protected area of your hard disk drive
- On a secondary hard disk drive installed in your computer
- On an attached external USB hard disk drive
- On a network drive
- On recordable CDs or DVDs (a recordable CD or DVD 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 Windows 7, 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. From 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. Follow the instructions on the screen.
- To perform a backup operation using the Rescue and Recovery program on Windows Vista or Windows XP, do the following:
  1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Rescue and Recovery**. The Rescue and Recovery program opens.
  2. From 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.

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 Windows 7, 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. From 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 perform a recovery operation using the Rescue and Recovery program on Windows Vista or Windows XP, do the following:
  1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Rescue and Recovery**. The Rescue and Recovery program opens.
  2. From 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.

For more information about performing a recovery operation from the Rescue and Recovery workspace, see "Using the Rescue and Recovery workspace" on page 44.

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 the Windows operating system cannot be started. 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, a disc, or a diskette. 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 in 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.
3. When you hear beeps or see a logo screen, release the F11 key.
4. 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 48.
5. 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 a 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 47.

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 CDs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.

Creating and using rescue media

With rescue media, 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 rescue media vary depending on the operating system.

2. The rescue discs can be started in any type of CD or DVD drive.

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 rescue media

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

- To create a rescue medium on Windows 7, 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. From 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 rescue media 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 on Windows Vista or Windows XP, 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 rescue media 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.

Using rescue media

This section provides instructions on how to use the rescue media you have created.

Note: Make sure your rescue device (optical drive, USB device, or the secondary internal hard disk drive) is set as the first boot device in the startup device sequence before doing this procedure. See "Selecting a startup device" on page 51.

To use the rescue medium you have created, do one of the following:

- If you have created the rescue medium using a disc, make sure that your computer is turned on and insert the rescue disc. Then, restart the computer. The rescue medium starts.
- If you have created the rescue medium using a USB hard disk drive, attach the USB hard disk drive to one of the USB connectors on your computer. Then, turn on the computer. The rescue medium starts.
- If you have created the rescue medium using a secondary internal hard disk drive, set the secondary internal hard disk drive as the first boot device in the startup device sequence. Then, the rescue medium starts.

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.

Creating and using a recovery repair diskette

If you are unable to access the Rescue and Recovery workspace or the Windows environment, use a recovery repair diskette to repair the Rescue and Recovery workspace or repair a file needed to enter the Windows environment. It is important to create a recovery repair diskette as early as possible and store it in a safe place as a precautionary measure.

Note: You need to have a diskette drive for creating and using a recovery repair diskette. If you do not have an internal diskette drive, you can use an external USB diskette drive.

Creating a recovery repair diskette

This section provides instructions on how to create a recovery repair diskette.

To create a recovery repair diskette, do the following:

1. Turn on the computer, and make sure that your computer has Internet access.
2. Follow the instructions on the Web site at:

http://www.lenovo.com/think/support/site.wss/document.do?lndocid=MIGR-54483

3. After the recovery repair diskette is created, take out the diskette from the diskette drive and label it *Recovery Repair Diskette*. Then, store it in a safe place for future use.

Using a recovery repair diskette

This section provides instructions on how to use a recovery repair diskette.

To use the recovery repair diskette you created, do the following:

1. Turn off the computer.
2. Insert the recovery repair diskette into the diskette drive.
3. Turn on the computer and follow the instructions on the screen.

Notes:

1. If the repair operation completes without any error, you will be able to access the Rescue and Recovery workspace by repeatedly pressing the F11 key while you restart your computer. When you hear beeps or see a logo screen, release the F11 key. You will also be able to access the Windows environment after the repair operation completes.

2. If an error message appears during the repair operation and the repair operation cannot be completed, you might have a problem with the partition that contains the Rescue and Recovery workspace. Use a rescue medium to access the Rescue and Recovery workspace. For information about creating and using rescue media, see "Creating and using rescue media" on page 45.

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 folder. 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 a 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 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, click **Start → Help and Support** to enter the Windows Help and Support information system for the detailed information about how to install the device driver.
   - In the device subfolder, look for a SETUP.EXE file. Double-click the file and follow the instructions on the screen.

Setting a rescue device in the startup sequence

Before you start the Rescue and Recovery program from an internal hard disk drive, a disc, a USB hard disk drive, or other external devices, 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. Refer to "Selecting a startup device" on page 51 for detailed information about temporarily or permanently changing the startup sequence.

Note: If you use an external device, you must first turn off your computer before connecting the external device.

For more information on the Setup Utility program, see Chapter 4, "Using the Setup Utility," on page 49.

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 rescue media" on page 45.
- Use a recovery repair diskette to repair the Rescue and Recovery workspace or repair a file needed to enter the Windows environment. See "Creating and using a recovery repair diskette" on page 46.
- Use a recovery medium if you want to restore the system drive or the hard disk drive to the factory default settings. See "Creating and using recovery media" on page 41.

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 a recovery medium, you might not have the rescue device, diskette drive, or recovery device set as the first boot device in the startup device sequence. For more information, see "Setting a rescue device in the startup sequence."

It is important to create a rescue medium, a recovery repair diskette, and a recovery medium as early as possible and store them in a safe place.

Chapter 4. Using the Setup Utility

The Setup Utility program is used 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.

Starting the Setup Utility program

To start the Setup Utility program, do the following:

1. If your computer is already on when you start this procedure, turn off the computer.
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.

   Note: If a Power-On Password or an Administrator Password has been set, the Setup Utility program menu is not displayed until you type the correct password. For more information, see "Using passwords."

The Setup Utility program might start automatically when POST detects that hardware has been removed or new hardware has been installed in your computer.

Viewing and changing settings

The Setup Utility program menu lists items that identify system configuration topics. To view or change settings, see "Starting the Setup Utility program."

When working with the Setup Utility program menu, 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 passwords to prevent unauthorized access to your computer and data. See "Starting the Setup Utility program." The following types of passwords are available:

- Power-On Password
- Administrator Password
- Hard Disk User Password

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

Password considerations

A password can be any combination of up to 64 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:

- Have at least eight characters in length
- Contain at least one alphabetic character and one numeric character
- Setup Utility program and hard disk drive passwords are not case sensitive
- Not be your name or your user name
- Not be a common word or a common name
- Be significantly different from your previous password

Power-On Password

When a Power-On Password is set, the computer cannot be used until a valid password is typed from the keyboard.

Administrator Password

Setting an Administrator Password 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.

After you set an Administrator Password, a password prompt is displayed each time you try to access the Setup Utility program.

If both the Power-On and Administrator passwords are set, you can type either password. However, you must use your Administrator Password to change any configuration settings.

Hard Disk User Password

When a Hard Disk User Password is set, it prevents unauthorized access to the data on the hard disk drive.

Setting, changing, and deleting 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 49.
2. From the Setup Utility program main menu, select **Security → Set Passwords**.
3. Follow the instructions displayed on the right side of the screen to set, change, or delete the password you want.

   Note: A password can be any combination of up to 64 alphabetic and numeric characters. For more information, see "Password considerations."

Enabling or disabling a device

This section provides information on how to enable or disable user access to the following devices:

Serial ATA	When this feature is set to **Disabled**, all devices connected to the SATA connectors (such as hard disk drives or the optical drive) are disabled and will not be displayed in the system configuration.
External SATA Port	When this feature is set to **Disabled**, the device connected to the External SATA connector cannot be accessed.
Legacy Diskette A (some models)	When this feature is set to **Disabled**, the diskette drive cannot be accessed.

To enable or disable a device, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 49.
2. From the Setup Utility program, select **Devices** or select **Devices → ATA Drive Setup**.
3. Select the desired devices and settings and press Enter.
4. Return to the Setup Utility program menu and select **Exit** and then **Save Settings** or **Save and exit the Setup Utility**.

   Note: If you do not want to save the settings, select **Exit the Setup Utility without saving**.

Selecting a startup device

If your computer does not start up from a device such as the disc, diskette, or hard disk drive as expected, do one of the following to select the startup device you want.

Selecting a temporary startup device

Use this procedure to startup from any start device.

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

1. Turn off your computer.
2. Repeatedly press and release the F12 key when turning on the computer. When the Please select boot device window displays, release the F12 key.
3. Select the desired startup device from the **Startup Device** Menu and press Enter to begin.

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

Selecting or changing the 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 49.
2. Select **Startup → Startup Sequence**. See the information displayed on the right side of the screen.
3. Select the devices for the Primary Startup Sequence, the Automatic Startup Sequence, and the Error Startup Sequence.
4. Select **Exit** from the Setup Utility menu and then **Save Settings** or **Save and exit the Setup Utility**.

If you have changed these settings and want to return to the default settings, select **Load Default Settings** on the **Exit** menu.

Exiting from the Setup Utility program

After you finish viewing or changing settings, press Esc to return to the Setup Utility program menu (you might have to press Esc several times). If you want to save the new settings, select **Save Settings** or **Save and exit the Setup Utility**. Otherwise, your changes will not be saved.

Chapter 5. Updating system programs

This chapter contains information about updating POST/BIOS and how to recover from a POST/BIOS update failure.

Using system programs

System programs are the basic layer of software built into your computer. System programs include the POST, the BIOS code, and the Setup Utility program. POST is a set of tests and procedures that are performed each time you turn on your computer. 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 and change the configuration and setup of your computer.

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 POST, BIOS, and the Setup Utility program by starting your computer with a flash 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/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 (flash) disc or an update program that can be run from the operating system.

Note: You can download a self-starting bootable CD/DVD image (known as an ISO image) of the diagnostics program to support computers without a diskette drive. Go to:
http://www.lenovo.com

Updating (flashing) BIOS from a disc

This section provides instructions on how to update (flash) the BIOS from a disc. System BIOS program updates are available at:
http://www.lenovo.com/support

To update (flash) BIOS from a disc:
1. Make sure the optical drive you want to use is set as the first boot device in the startup device sequence. See "Selecting or changing the startup device sequence" on page 52.
2. Make sure the computer is turned on. Insert the disc into the optical drive.
3. Turn off the computer and back on again. The update begins.
4. When prompted to change the serial number, press N.

   Note: If you want to change the serial number, press Y when prompted. Type in the serial number and then press Enter.
5. When prompted to change the machine type/model, press N.

Note: If you want to change the machine type/model, press Y when prompted. Type in the machine type/model and then press Enter.

6. Follow the instructions on the screen to complete the update.

Updating (flashing) BIOS from your operating system

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

To update (flash) BIOS from your operating system:

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** in the **Refine results** field to easily locate all the BIOS related links.
   d. Click the BIOS update link.
   e. Click the TXT file that contains the instructions for updating (flashing) BIOS from your operating system.
3. Print these instructions. This is very important because they are not on the screen after the download begins.
4. Follow the printed instructions to download, extract, and install the update.

Recovering from a POST/BIOS update failure

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

1. Turn off the computer and any attached devices, such as printers, monitors, and external drives.
2. Unplug all power cords from electrical outlets, and open the computer cover. Refer to "Opening the computer cover" on page 14.
3. Access the system board. Refer to "Accessing the system board components and drives" on page 16.
4. Locate the Clear CMOS/Recovery jumper on the system board. Refer to "Locating parts on the system board" on page 11.
5. Remove any cables that impede access to the Clear CMOS/Recovery jumper.
6. Move the jumper from the standard position (pin 1 and pin 2) to pin 2 and pin 3.
7. Reconnect any cables that were disconnected and reinstall the hard disk drive if removed.
8. Close the computer cover and reconnect the power cords for the computer and monitor to electrical outlets. Refer to "Completing the parts replacement" on page 36.
9. Turn on the computer and the monitor. Insert the POST/BIOS update (flash) disc into the optical drive.
10. Turn the computer off and back on again.
11. The recovery session will take two to three minutes. During this time you will hear a series of beeps. After the update session is completed, there will be no

video, the series of beeps will end, and the system will automatically turn off. Remove the disc from the optical drive before the system completely turns off.

12. Repeat steps 2 through 5.

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

14. Reconnect any cables that were disconnected and reinstall the hard disk drive if removed.

15. Close the computer cover and reconnect the power cords for the computer and monitor to electrical outlets. Refer to "Completing the parts replacement" on page 36.

16. Turn on the computer to restart the operating system.

Chapter 6. Troubleshooting and diagnostics

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

Basic troubleshooting

The following table provides information to help you troubleshoot your computer problem.

Symptom	Action
The computer does not start when you press the power button.	Verify that: • The power cord is plugged into the rear of the computer and into a working electrical outlet. • If your computer has a secondary power switch on the back of the computer, make sure that it is switched on. • The power indicator on the front of the computer is on. • The voltage is set to the correct setting for your country. If you cannot correct the problem, have the computer serviced. Refer to the safety and warranty information that is provided with your computer for a list of service and support telephone numbers.
The monitor screen is blank.	Verify that: • The monitor cable is securely attached to the rear of the monitor and to the rear of the computer. • The monitor power cord is plugged into the monitor and into a working electrical outlet. • The monitor is turned on and the brightness and contrast controls are set correctly. • The voltage is set to the correct setting for your country. • The monitor signal cable is securely connected to the monitor and to the monitor connector on the computer. **Note:** If your computer has two monitor connectors, verify that your monitor is connected to the option connector rather than the one in the rear of the system board. For more information, see "Connecting your computer" in the *ThinkCentre Safety and Warranty Guide*. If you cannot correct the problem, have the computer serviced. Refer to the safety and warranty information that is provided with your computer for a list of service and support telephone numbers.

Symptom	Action
The keyboard does not work. The computer does not respond to the keyboard.	Verify that: • The computer is turned on. • The monitor is turned on and the brightness and contrast controls are set correctly. • The keyboard is securely connected to the keyboard connector on the computer. • No keys are stuck. If you cannot correct the problem, have the computer serviced. Refer to the safety and warranty information that is provided with your computer for a list of service and support telephone numbers.
The USB Keyboard does not work.	Verify that: • The computer is turned on. • The keyboard is securely connected to a USB connector on the front or rear of the computer. • No keys are stuck. If you cannot correct the problem, have the computer serviced. Refer to the safety and warranty information that is provided with your computer for a list of service and support telephone numbers.
The mouse does not work. The computer does not respond to the mouse.	Verify that: • The computer is turned on. • The mouse is securely connected to the mouse connector on the computer. • The mouse is clean. Refer to "Cleaning the mouse" on page 61 for further information. If you cannot correct the problem, have the computer serviced. Refer to the safety and warranty information that is provided with your computer for a list of service and support telephone numbers.
The operating system will not start.	Verify that: • There is no diskette in the diskette drive. • The startup sequence includes the device where the operating system resides. Usually, the operating system is on the hard disk drive. For more information, see "Selecting a startup device" on page 51. **Note:** For SMC computers, you might receive the error message "No operating system found. Press F1 to repeat boot sequence." In this case, press Ctrl+Alt+Delete instead of F1 to establish a connection to the storage area network where your operating system is stored. Verify that the user name is not logged on in another location. If you cannot correct the problem, have the computer serviced. Refer to the safety and warranty information that is provided with your computer for a list of service and support telephone numbers.
The SMC login prompt disappears before you log on and then a black screen displays (for SMC computers only).	Contact your administrator.
The computer beeps multiple times before the operating system starts.	Verify that no keys are stuck down. If you cannot correct the problem, have the computer serviced. Refer to the safety and warranty information that is provided with your computer for a list of service and support telephone numbers.

Diagnostic programs

Diagnostic programs are used to test hardware components of your computer and report operating-system-controlled settings that can cause hardware failures. There are two programs preinstalled on your computer to help you diagnose computer problems:

- Lenovo ThinkVantage Toolbox or Lenovo System Toolbox, depending on your operating system (used when you are running the Windows operating system)
- PC-Doctor for Rescue and Recovery (used when your Windows operating system does not start)

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 60 for detailed information.
2. If you are unable to isolate and repair the problem yourself after running the diagnostic programs, save and print the log files created by the diagnostic programs. You will need the log files when you speak to a Lenovo technical support representative.

Lenovo ThinkVantage Toolbox

Note: The Lenovo ThinkVantage Toolbox program is only available on computers preinstalled with Windows 7 from Lenovo.

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 problems, create bootable diagnostic media, update system drivers, and review system information.

To diagnose the computer problems by using the Lenovo ThinkVantage Toolbox program, click **Start → All Programs → Lenovo ThinkVantage Tools → System Health and Diagnostics → Diagnostics**. Follow the instructions on the screen. For additional information, refer to the Lenovo ThinkVantage Toolbox help system.

Lenovo System Toolbox

Note: The Lenovo System Toolbox program is only available on computers preinstalled with Windows Vista or Windows XP from Lenovo.

The Lenovo System Toolbox is a diagnostic program that works through the Windows operating system and enables you to view symptoms and solutions for computer problems, access the Lenovo troubleshooting center, update system drivers, and review system information.

To run the Lenovo System Toolbox, click **Start → All Programs → Lenovo Services → Lenovo System Toolbox**. Follow the instructions on the screen. For additional information about running the diagnostic program, refer to the Lenovo System Toolbox help system.

The Lenovo System Toolbox also has problem determination aids that determine software and usage problems.

PC-Doctor for Rescue and Recovery

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

To run the PC-Doctor for Rescue and Recovery 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, stop pressing 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 diagnostic program opens.
4. Select the diagnostic test you want to run. Then, follow the instructions on the screen.

For additional information about running the PC-Doctor for Rescue and Recovery, 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 diagnostic 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 rescue media" on page 45.

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 if you are unable to start the Windows operating system or if the two diagnostic programs preinstalled on your computer have not been successful in isolating a possible problem. You can run the PC-Doctor for DOS 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 CD/DVD image (known as an ISO image) of the diagnostic program from:
   http://www.lenovo.com/support
2. Use any CD/DVD burning software to create a diagnostic disc with the ISO image.

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

To run the diagnostic program from a diagnostic disc that you created, do the following:

1. Make sure the optical drive you want to use is set as the first boot device in the startup device sequence. See "Selecting a startup device" on page 51.

2. Make sure the computer is turned on and then insert the disc into the optical drive. The diagnostic program opens.

   Note: You can insert the disc into the optical drive when you are setting the startup device sequence. However, if you insert the disc into the optical drive when you have already entered the operating system, you need to restart the computer to access the diagnostic program.

3. Follow the instructions on the screen to select the diagnostic test you want to run.

   Note: For additional help, press the F1 key.

4. Remove the diagnostic disc from the optical drive when you complete the diagnostic process.

Cleaning the mouse

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

Optical mouse

An optical mouse uses a light-emitting diode (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 the optical mouse:
1. Turn off your computer.
2. Disconnect the mouse cable from the computer.
3. Turn the mouse upside down to look at 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.

Non-optical mouse

The non-optical mouse uses a ball to navigate the pointer. If the pointer on the screen does not move smoothly with the mouse, you might need to clean the mouse.

To clean a non-optical mouse:

Note: The following illustration might be slightly different from your mouse.
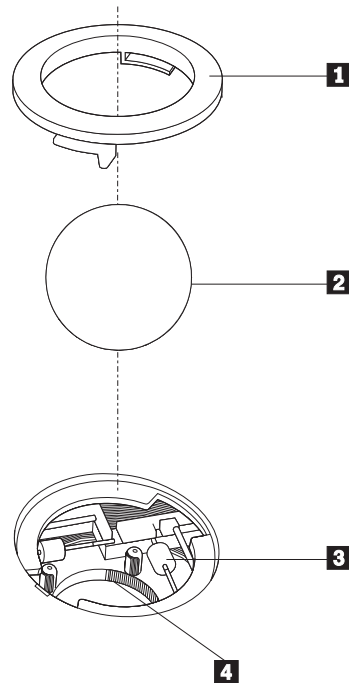
1 Retainer ring
2 Ball
3 Plastic rollers
4 Ball cage

1. Turn off your computer.
2. Disconnect the mouse cable from the computer.
3. Turn the mouse upside down. Twist the retainer ring **1** to the unlocked position to remove the ball.
4. Place your hand over the retainer ring and ball **2** , and then turn the mouse right-side up, so that the retainer ring and ball fall out into your hand.
5. Wash the ball in warm, soapy water then dry it with a clean cloth.
6. Blow air carefully into the ball cage **4** to dislodge dust and lint.
7. Look for a buildup of dirt on the plastic rollers **3** inside the ball cage. This buildup usually appears as a stripe running across the middle of the rollers.
8. If the rollers are dirty, clean them by using a cotton swab soaked in isopropyl (rubbing) alcohol. Turn the rollers with your finger and continue swabbing them until all the dirt is removed. Be sure the rollers are still centered in their channels after you clean them.
9. Remove any fibers from the swab that might be remaining on the rollers.
10. Replace the ball and the retainer ring. Twist the retainer ring to the locked position.
11. Reconnect the mouse cable to the computer.
12. Turn your computer back on.

Chapter 7. Getting information, help, and service

This chapter contains information about help, service, and technical assistance for products manufactured by Lenovo.

Information resources

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

Online Books folder

Note: The Online Books folder is only available on computers that have an internal hard disk drive and preinstalled software from Lenovo.

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

Notes:
1. The publications are in Portable Document Format (PDF). To view the publications, you need to have the Adobe Reader preinstalled on your computer. If the Adobe Reader has not been installed on your computer, a message will appear when you attempt to view the PDF file and you will be guided through the Adobe Reader installation.
2. The publications are 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 rather than the version preinstalled on your computer, download the language version you want from the Adobe Web site at:
   http://www.adobe.com

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.

Note: The Lenovo ThinkVantage Tools program is only available on computers that have an internal hard disk drive, a preinstalled Windows 7 operating system, and preinstalled software programs from Lenovo.

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

ThinkVantage Productivity Center

The ThinkVantage Productivity Center guides you to a host of information sources and provides easy access to various tools to help you work more easily and securely.

Note: The ThinkVantage Productivity Center is only available on computers that have an internal hard disk drive, a preinstalled Windows Vista or Windows XP operating system, and preinstalled software programs from Lenovo.

The ThinkVantage Productivity Center provides easy access to various technologies, such as:
- Client Security Solution
- Power Manager
- Productivity Center
- Product Recovery
- Rescue and Recovery
- System Update

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

Lenovo Welcome

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

Note: The Lenovo Welcome program is only available on computers that have an internal hard disk drive, a preinstalled Windows 7 or Windows Vista operating system, and preinstalled software programs from Lenovo.

Access Help

The Access Help provides information about getting started, doing basic tasks, customizing settings for your personal preference, protecting data, expanding and upgrading, and troubleshooting.

Note: The Access Help is only available on computers that have an internal hard disk drive and preinstalled software from Lenovo.
- To open the Access Help on Windows 7, click **Start → Help and Support → Lenovo Access Help**.
- To open the Access Help on Windows Vista or Windows XP, click **Start → All Programs → ThinkVantage → Access Help**.

After you have opened the Access Help, 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 is provided with your computer contains information on safety, setup, warranty, and notices. Read and understand all safety information before using this product.

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, application 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 Statement of 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 contains information about obtaining help and service.

Using the documentation and diagnostic programs

If you experience a problem with your computer, see Chapter 6, "Troubleshooting and diagnostics," on page 57. For information on additional resources to help you troubleshoot your computer problem, see "Information resources" on page 63.

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

Most computers come with a set of diagnostic programs that help you identify hardware problems. For instructions on using the diagnostic programs, see "Diagnostic programs" on page 59.

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

Calling for service

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

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 fix 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.

These 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 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: 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. 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 service providers authorized to perform warranty service.

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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Television output notice

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