



ThinkCentre User Guide



ThinkThink**ThinkCentre**Think

Machine Types: 3308, 3317, 4013, 4478, 5043, 5237, 5393, 5526,
and 6674

lenovo

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 79.

First Edition (January 2010)

© Copyright Lenovo 2010.

LENOVO products, data, computer software, and services have been developed exclusively at private expense and are sold to governmental entities as commercial items as defined by 48 C.F.R. 2.101 with limited and restricted rights to use, reproduction and disclosure.

LIMITED AND RESTRICTED RIGHTS NOTICE: If products, data, computer software, or services are delivered pursuant a General Services Administration "GSA" contract, use, reproduction, or disclosure is subject to restrictions set forth in Contract No. GS-35F-05925.

Contents

Important safety information v

Chapter 1. Product overview 1

Features	1
Specifications	4
Software overview	5
Software provided with your Windows operating system	5
Locations	8
Locating connectors on the front of your computer	8
Locating connectors on the rear of your computer	9
Locating components	11
Locating parts on the system board	12
Locating internal drives	12

Chapter 2. Installing or replacing hardware 15

Handling static-sensitive devices	15
Installing or replacing hardware	15
Installing external options	15
Removing the computer cover	16
Removing and reinstalling the front bezel	17
Installing or replacing a PCI card	19
Installing or replacing a memory module	21
Replacing the power supply assembly	23
Replacing the heat sink and fan assembly	25
Replacing the microprocessor	27
Replacing the optical drive	30
Replacing the primary hard disk drive	32
Replacing the secondary hard disk drive	35
Replacing the card reader.	38
Replacing the front fan assembly	40
Replacing the rear fan assembly	43
Replacing the keyboard	44
Replacing the mouse	45
Completing the parts replacement.	46
Obtaining device drivers	47
Installing security features	47
Integrated cable lock	48
Padlock.	49
Password protection	49
Erasing a lost or forgotten password (clearing CMOS).	49

Chapter 3. Recovery information 51

Creating and using recovery media	51
Creating recovery media	51
Using recovery media	52
Performing backup and recovery operations	53
Performing a backup operation.	53
Performing a recovery operation	53
Using the Rescue and Recovery workspace.	54
Creating and using rescue media	55
Creating rescue media.	55
Using rescue media.	56

Creating and using a recovery repair diskette	56
Creating a recovery repair diskette	57
Using a recovery repair diskette	57
Installing or reinstalling device drivers	57
Setting a rescue device in the startup sequence	58
Solving recovery problems	58

Chapter 4. Using the Setup Utility program 59

Starting the Setup Utility program.	59
Viewing and changing settings	59
Using passwords	59
Password considerations	60
Set Power-On Password	60
Set Administrator Password	60
Setting, changing, or deleting a password	60
Enabling or disabling a device	61
Selecting a startup device.	61
Selecting a temporary startup device	61
Viewing or changing the startup device sequence	62
Exiting from the Setup Utility program	62

Chapter 5. Updating system programs 63

Using system programs	63
Updating (flashing) BIOS from a disc.	63
Updating (flashing) BIOS from your operating system	64
Recovering from a POST/BIOS update failure.	64

Chapter 6. Troubleshooting and diagnostics 67

Basic troubleshooting	67
Diagnostic programs	68
Lenovo ThinkVantage Toolbox	68
Lenovo System Toolbox	68
PC-Doctor for Rescue and Recovery	69
PC-Doctor for DOS.	69
Cleaning the mouse	70
Optical mouse	70
Non-optical mouse	71

Chapter 7. Getting information, help, and service 73

Information resources	73
Online Books folder	73
Lenovo ThinkVantage Tools	73
ThinkVantage Productivity Center.	74
Lenovo Welcome	74
Access Help	74
Safety and warranty	74
Lenovo Web site (http://www.lenovo.com).	75
Help and service	75
Using the documentation and diagnostic programs	75

Calling for service	75	Television output notice	80
Using other services	76	European conformance CE mark	80
Purchasing additional services	77	Trademarks	80
Appendix. Notices	79	Index	81

Important safety information

CAUTION:

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

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

<http://www.lenovo.com/support>

Chapter 1. Product overview

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

This chapter contains the following sections:

- “Features”: This section provides information about the computer features.
- “Specifications” on page 4: This section lists the physical specifications for your computer.
- “Software overview” on page 5: This section provides information about the software programs provided with your computer.
- “Locations” on page 8: This section provides information to help you locate your computer connectors, components, parts on the system board, and internal drives.

Features

This section provides information about the computer features.

System information

The following information covers a variety of models. For information about your specific model, use the Setup Utility program. See Chapter 4, “Using the Setup Utility program,” on page 59.

Microprocessor

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

- AMD® Athlon™ II microprocessor
- AMD Phenom™ II microprocessor
- AMD Sempron™ microprocessor

Memory

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

Internal drives

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

Video subsystem

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

Audio subsystem

- Integrated high-definition (HD) audio
- Microphone connector and headphone connector on the front panel
- Audio line-in connector, audio line-out connector, and microphone connector on the rear panel
- Internal speaker (available in some models)

Connectivity

- 10/100/1000 Mbps integrated Ethernet controller
- Modem (available in some models)

System management features

- Ability to store power-on self-test (POST) hardware test results
- Advanced Configuration and Power Interface (ACPI) support
- Automatic power-on startup
- Desktop Management Interface (DMI)
- Preboot Execution Environment (PXE)
- 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)
- 25-pin parallel port (optional through your PCI card in some models)
- Ethernet connector
- PS/2[®] keyboard connector
- PS/2 mouse connector
- Six Universal Serial Bus (USB) connectors (two on the front panel and four on the rear panel; there might also be two optional USB connectors on the rear panel)
- Two audio connectors on the front panel (headphone connector and microphone connector)
- Three audio connectors on the rear panel (audio line-in connector, audio line-out connector, and microphone connector)
- VGA monitor connector and DVI monitor connector

Expansion

- One drive bay for a card reader
- Two hard disk drive bays (one standard and one optional)
- Two optical drive bays
- One PCI card slot
- Two PCI Express x1 card slots
- One PCI Express x16 graphics card slot

Power supply

Your computer comes with one of the following power supplies:

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

Security features

- Cover presence switch (also called intrusion switch) (available in some models)
- Enabling or disabling SATA devices
- Enabling or disabling the serial port
- Enabling or disabling USB connectors individually
- Keyboard with fingerprint reader (shipped with some models)
- Power-On Password (POP) and Administrator Password for BIOS access
- Startup sequence control
- Startup without keyboard or mouse
- Support for the addition of an integrated cable lock (Kensington lock)
- Support for the addition of a padlock

Preinstalled software programs

Your computer is preinstalled with some software programs to help you work. For more information, see “Software overview” on page 5.

Preinstalled operating system

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

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

Operating system(s), certified or tested for compatibility¹ (varies by model type)

- Linux®

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

Specifications

This section lists the physical specifications for your computer.

Dimensions

Width: 175 mm (6.9 inches)

Height: 412 mm (16.2 inches)

Depth: 442 mm (17.4 inches)

Weight

Maximum configuration as shipped: 11 kg (24.3 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: 20% to 80% (10% per hour, non condensing)

Non-operating: 20% to 90% (10% per hour, non condensing)

Altitude:

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

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

Electrical input

Input voltage:

Low range:

Minimum: 100 V ac

Maximum: 127 V ac

Input frequency range: 50 to 60 Hz

Voltage-selection switch setting: 115 V ac

High range:

Minimum: 200 V ac

Maximum: 240 V ac

Input frequency range: 50 to 60 Hz

Voltage-selection switch setting: 230 V ac

Software overview

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

Software provided with your Windows operating system

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

Software provided by Lenovo

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

Lenovo ThinkVantage Tools: The Lenovo ThinkVantage® Tools program guides you to a host of information sources and provides easy access to various tools to help you work more easily and securely. For more information, see “Lenovo ThinkVantage Tools” on page 73.

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

ThinkVantage Productivity Center: The ThinkVantage Productivity Center program guides you to a host of information sources and tools to help you set up, understand, and maintain your computer, and enhance your computer performance. For more information, see “ThinkVantage Productivity Center” on page 74.

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

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

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

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

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

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

ThinkVantage Client Security Solution: The ThinkVantage Client Security Solution (CSS) program helps you protect your information, including vital

security information like passwords, encryption keys, and electronic credentials, while guarding against unauthorized user access to data.

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

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

ThinkVantage System Update: The ThinkVantage System Update (TVSU) program helps you keep the software on your computer up-to-date by downloading and installing software packages (ThinkVantage applications, device drivers, BIOS updates, and other third party applications). Some examples of software that you should keep updated are programs provided by Lenovo, such as the Rescue and Recovery program and the ThinkVantage Productivity Center program.

ThinkVantage System Migration Assistant: The ThinkVantage System Migration Assistant (SMA) program helps you migrate the work environment from one computer to another. System administrators can use SMA either to set up a standard work environment for a company or to upgrade the computer of an individual user. Individual users can use SMA either to back up a computer or to migrate settings and files from one computer to another.

Note: The ThinkVantage System Migration Assistant program is only available on certain computers.

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

Lenovo ThinkVantage Toolbox

The Lenovo ThinkVantage Toolbox program helps you maintain your computer, improve computing security, diagnose computer problems, get familiar with the innovative technologies provided by Lenovo, and get more information about your computer. For more information, see “Lenovo ThinkVantage Toolbox” on page 68.

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

Lenovo System Toolbox

The Lenovo System Toolbox diagnostic program is preinstalled on your computer. This diagnostic program works through the Windows operating system to diagnose hardware problems and report operating-system-controlled settings that can cause hardware failures. For more information, see “Lenovo System Toolbox” on page 68.

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

PC-Doctor for Rescue and Recovery

The PC-Doctor for Rescue and Recovery diagnostic program is preinstalled on your ThinkCentre computer as part of the Rescue and Recovery workspace. It helps you diagnose hardware problems and report operating-system-controlled settings that can cause hardware failures. Use the PC-Doctor for Rescue and Recovery program if you are unable to start the Windows operating system. For more information, see “PC-Doctor for Rescue and Recovery” on page 69.

Adobe Reader

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

See “Online Books folder” on page 73 for more information about accessing and viewing the publications.

Antivirus software

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

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

Locations

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

Locating connectors on the front of your computer

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

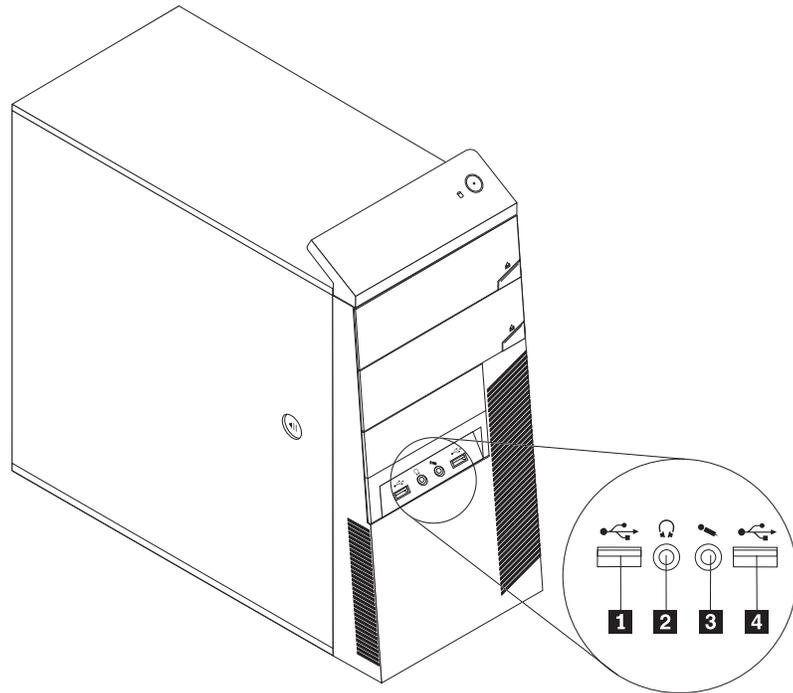


Figure 1. Front connector locations

- | | |
|------------------------------|-------------------------------|
| 1 USB connector | 3 Microphone connector |
| 2 Headphone 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.

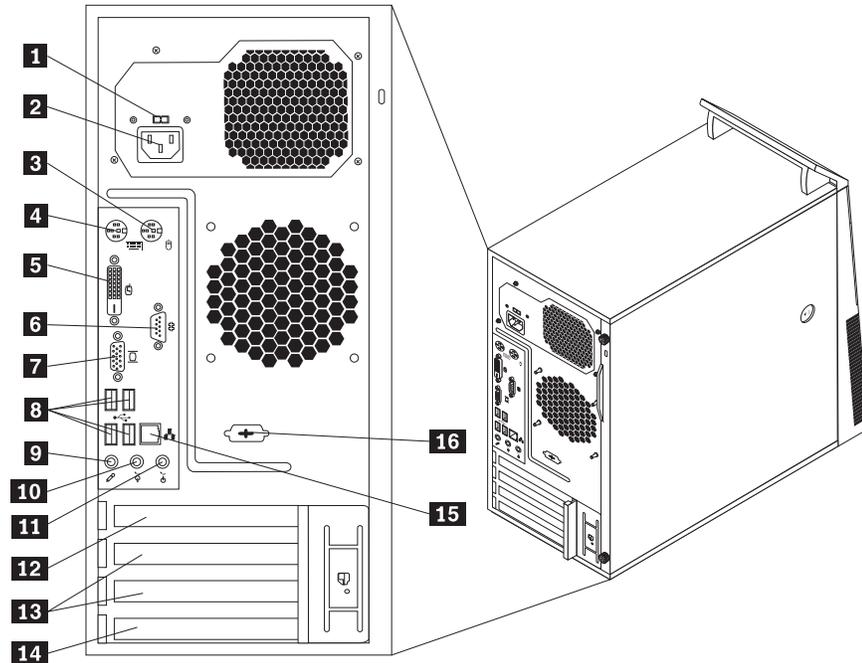


Figure 2. Rear connector locations

- | | |
|-----------------------------------|--|
| 1 Voltage-selection switch | 9 Microphone connector |
| 2 Power cord connector | 10 Audio line-out connector |
| 3 PS/2 mouse connector | 11 Audio line-in connector |
| 4 PS/2 keyboard connector | 12 PCI Express x16 graphics card slot |
| 5 DVI monitor connector | 13 PCI Express x1 card slots (2) |
| 6 Serial port | 14 PCI card slot |
| 7 VGA monitor connector | 15 Ethernet connector |
| 8 USB connectors (4) | 16 Serial port (available in some models) |

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

Locating components

Figure 3 shows the locations of the various components in your computer. To remove the computer cover and gain access to the inside of the computer, see “Removing the computer cover” on page 16.

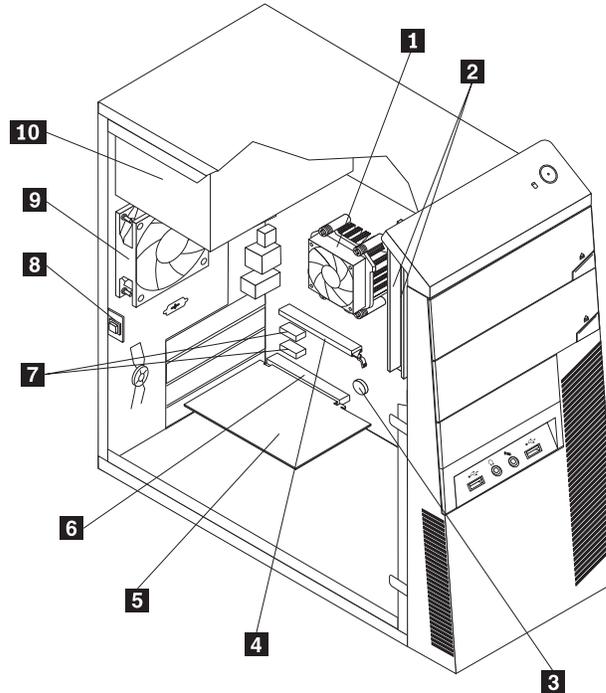


Figure 3. Component locations

- | | |
|---|---|
| 1 Heat sink and fan assembly | 6 PCI card slot |
| 2 Memory modules (2) | 7 PCI Express x1 card slots (2) |
| 3 Battery | 8 Cover presence switch
(Intrusion switch) (available in some models) |
| 4 PCI Express x16 graphics card slot | 9 Rear fan assembly |
| 5 PCI card | 10 Power supply assembly |

Locating parts on the system board

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

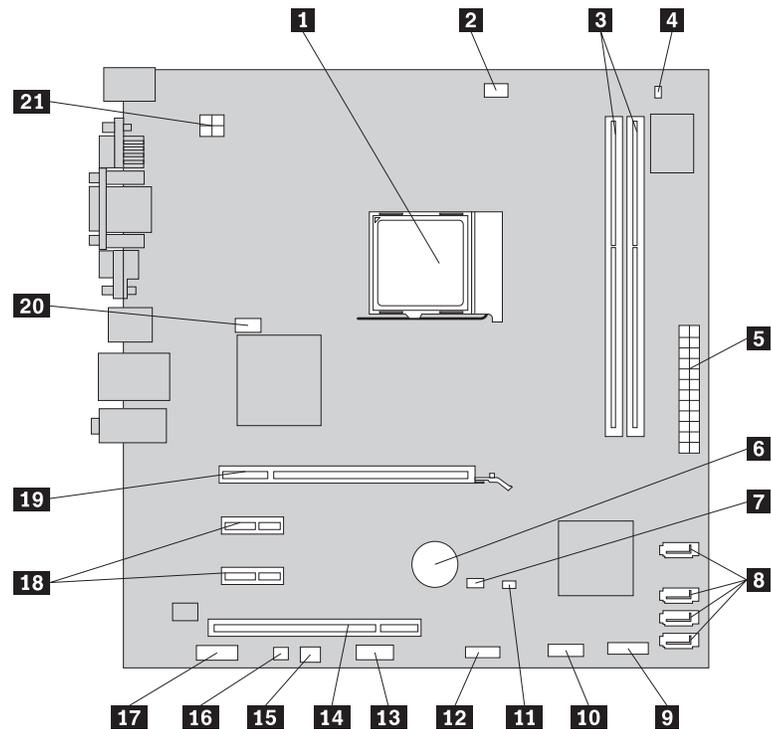


Figure 4. System board part locations

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

Locating internal drives

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

When installing or replacing an internal drive, it is important to note the type and size of the drive that you can install or replace in each bay and correctly connect the cables to the drive installed. Refer to the appropriate section in Chapter 2, "Installing or replacing hardware," on page 15 for instructions on how to install or replace internal drives for your computer.

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

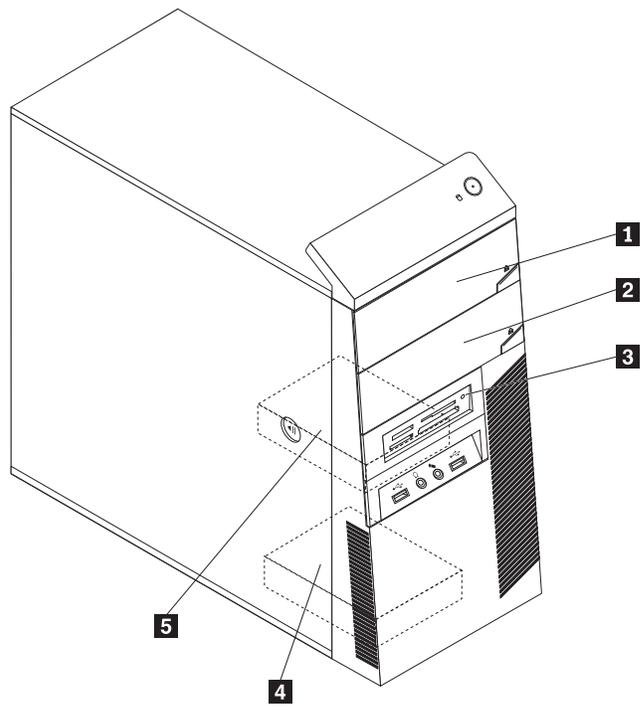


Figure 5. Drive bay locations

- 1** Bay 1 - Optical drive bay (with an optical drive installed)
- 2** Bay 2 - Optical drive bay
- 3** Bay 3 - Card reader (available in some models)
- 4** Bay 4 - Secondary SATA hard disk drive bay (with a 3.5-inch SATA hard disk drive installed in some models)
- 5** Bay 5 - Primary SATA hard disk drive bay (with a 3.5-inch SATA hard disk drive installed)

Chapter 2. Installing or replacing hardware

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

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 exposed circuitry.
- Prevent others from touching the parts and other computer components.
- Before you replace a new part, touch the static-protective package containing the new part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity from the package and your body.
- If possible, remove the new part from the static-protective package and install it directly in the computer without setting it down. If this is not possible, place the static-protective package of the new part on a smooth, level surface, and then place the new part on the static-protective package.
- Do not place the part on the computer cover or other metal surface.

Installing or replacing hardware

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

Notes:

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

Installing external options

You can install external options to your computer, such as external speakers, a printer, or a scanner. For some external options, you must install additional software in addition to making the physical connection. When you install an external option, see “Locating connectors on the front of your computer” on page 8 and “Locating connectors on the rear of your computer” on page 9 to identify the required connector. Then, use the instructions that come with the option to help you make the connection and install software or device drivers that are required for the option.

Removing the computer cover

Attention

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

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

CAUTION:



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

To remove the computer cover, do the following:

1. Remove all media from the drives. Then, turn off all attached devices and the computer.
2. Disconnect all power cords from electrical outlets.
3. Disconnect the power cord, Input/Output (I/O) cables, and all other cables that are connected to the computer.
4. Remove any locking device that secures the computer cover, such as an integrated cable lock or a padlock. See "Integrated cable lock" on page 48 or "Padlock" on page 49.
5. Remove the thumbscrews that secure the computer cover.

6. Press the cover-release button on the side of the computer cover and slide the computer cover to the rear to remove.

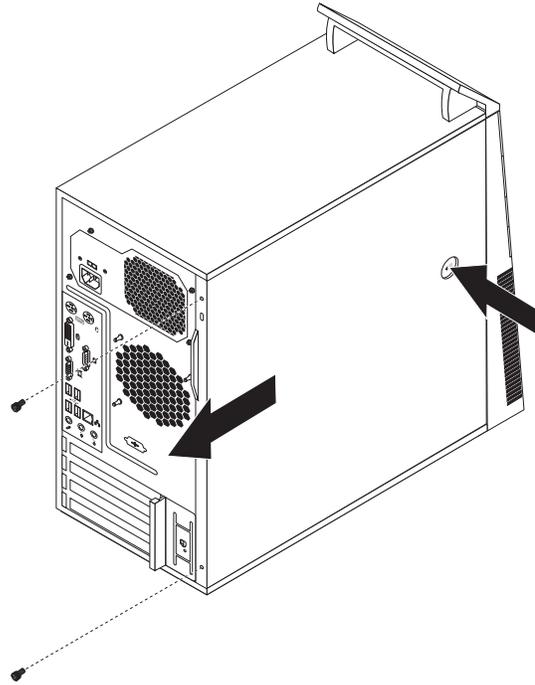


Figure 6. Removing the computer cover

Removing and reinstalling the front bezel

Attention

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

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

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

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.

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

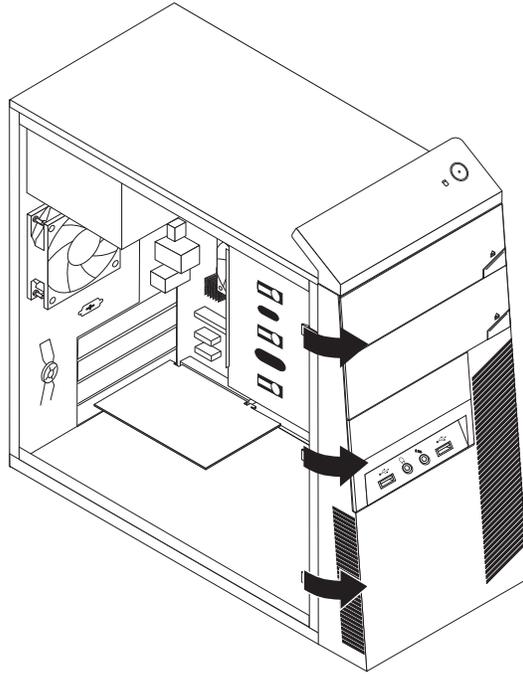


Figure 7. Removing the front bezel

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

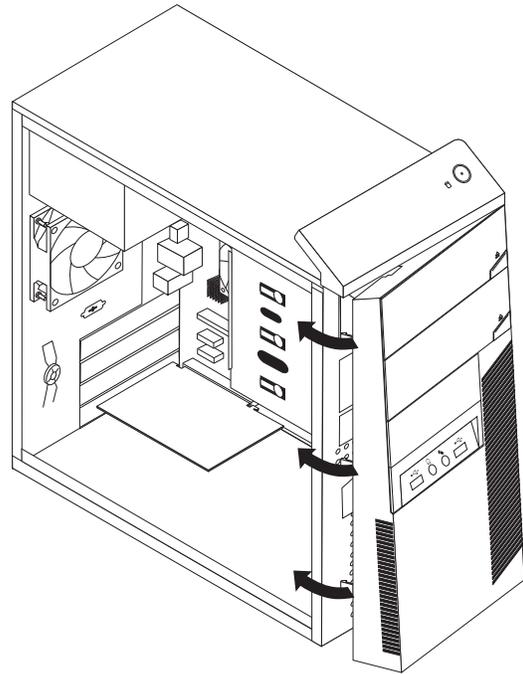


Figure 8. Reinstalling the front bezel

5. Go to “Completing the parts replacement” on page 46.

Installing or replacing a PCI card

Attention

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

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

Your computer has one standard PCI card slot, two PCI Express x1 card slots, and one PCI Express x16 graphics card slot.

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

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Remove all parts and disconnect all cables that might prevent your access to the PCI card slots.
4. At the rear of the computer, press the release button **1** to open the PCI card latch **2**.

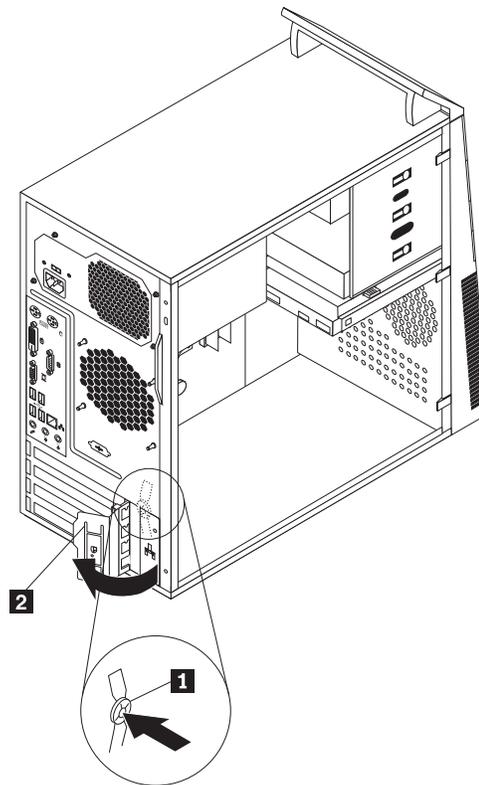


Figure 9. Opening the PCI card latch

5. If you are installing a PCI card, remove the appropriate PCI card slot cover. If you are replacing a PCI card, locate the appropriate PCI card slot on the system board and remove the old PCI card that is currently installed. See “Locating parts on the system board” on page 12.

Notes:

- a. The PCI card fits tightly into the PCI card slot. If necessary, alternate moving each side of the PCI card a small and equal amount until it is completely removed from the PCI card slot.
- b. If the PCI card is secured in place by a retaining latch **1**, press the retaining latch to release the PCI card from the latch. Then, grasp the PCI card by the edges and carefully pull it out of the slot.

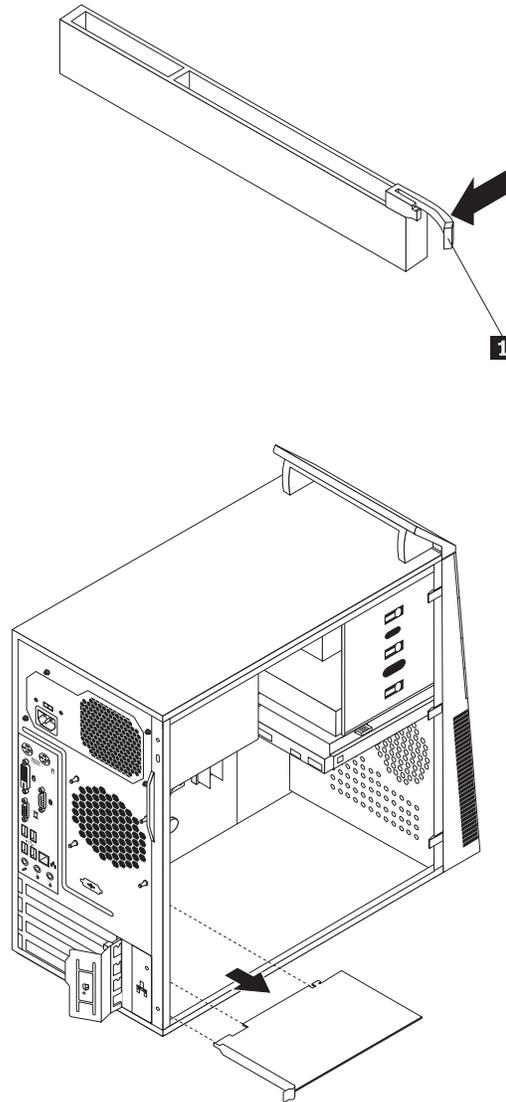


Figure 10. Removing the PCI card

6. Remove the new PCI card from its static-protective package.

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

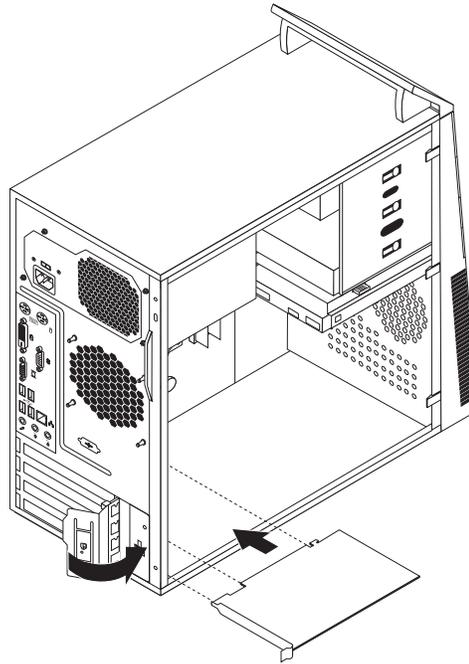


Figure 11. Installing the PCI card

8. Reinstall all parts and reconnect all cables that have been removed.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to “Completing the parts replacement” on page 46.

Installing or replacing a memory module

Attention

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

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

Your computer has two slots for installing or replacing DDR3 DIMMs that provide up to a maximum of 4 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 4 GB.

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

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Lay the computer on its side for easier access to the system board.
4. Locate the memory slots on the system board. See “Locating parts on the system board” on page 12.
5. Remove all parts and disconnect all cables that might prevent your access to the memory slots.
6. If you are replacing a memory module, open the retaining clips and remove the old memory module that is currently installed. If you are installing a memory module, go to step 7.

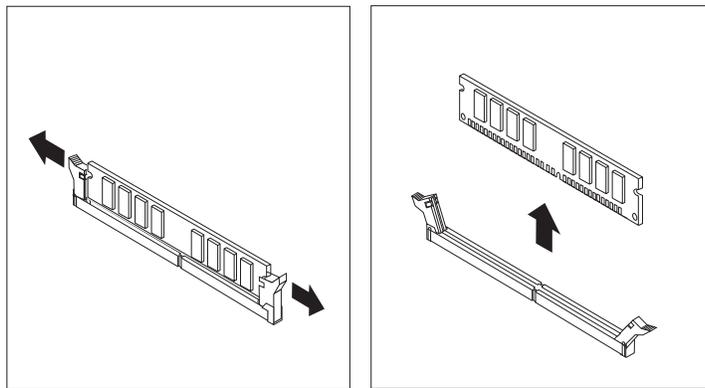


Figure 12. Removing the memory module

7. Open the retaining clips of the memory slot into which you want to install the new memory module.

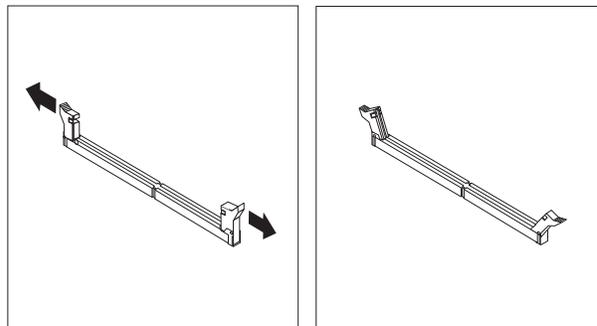


Figure 13. Opening the retaining clips of the memory slot

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

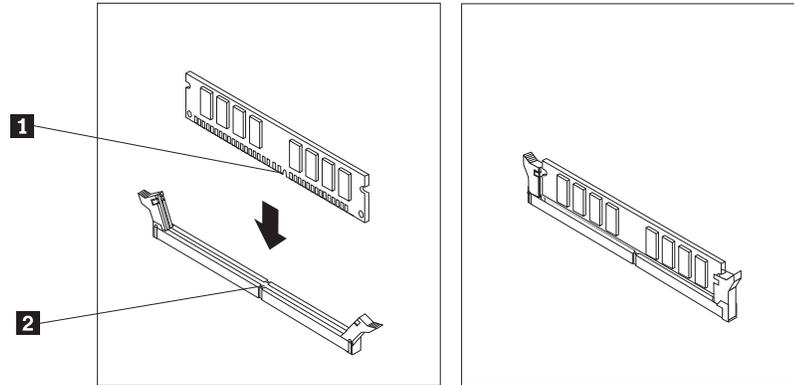


Figure 14. Installing the memory module

- Reinstall all parts and reconnect all cables that have been removed.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to “Completing the parts replacement” on page 46.

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, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Disconnect the power supply assembly cables from the system board and all drives. See “Locating parts on the system board” on page 12.

4. Lay the computer on its side and remove the four screws that secure the power supply assembly, as shown in the following illustration:

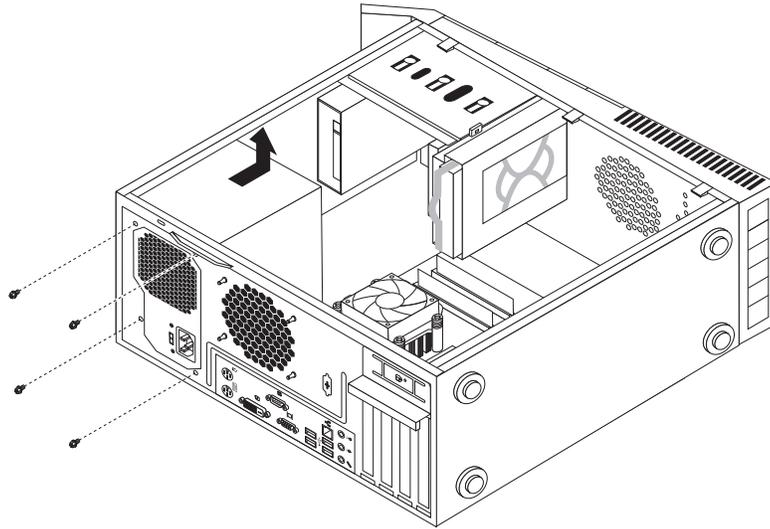


Figure 15. Removing the screws that secure the power supply assembly

5. Remove the old power supply assembly out of the chassis.
6. Make sure that the new power supply assembly is the correct replacement. Some power supply assemblies automatically sense the voltage, some power supply assemblies are voltage specific, and some power supply assemblies have a voltage-selection switch. If your power supply assembly has a voltage-selection switch, make sure that you set the voltage-selection switch to match the voltage available at your electrical outlet. If necessary, use a ballpoint pen to slide the voltage-selection switch to a different position.
 - If the voltage supply range in your local country or region is 100–127 V ac, set the voltage-selection switch to 115 V.
 - If the voltage supply range in your local country or region is 200–240 V ac, set the voltage-selection switch to 230 V.
7. Install the new power supply assembly into the chassis so that the screw holes in the new power supply assembly are aligned with the corresponding holes in the chassis.
8. Install the four screws to secure the new power supply assembly in place.

Note: Use only screws provided by Lenovo.

9. Connect the new power supply assembly cables to the system board and all drives.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

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 removing the computer cover.

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

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Lay the computer on its side for easier access to the system board.
4. Locate the heat sink and fan assembly. See “Locating components” on page 11.
5. Disconnect the heat sink and fan assembly cable from the microprocessor fan connector on the system board. See “Locating parts on the system board” on page 12.

6. Remove the four screws **1** that secure the heat sink and fan assembly to the system board.

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

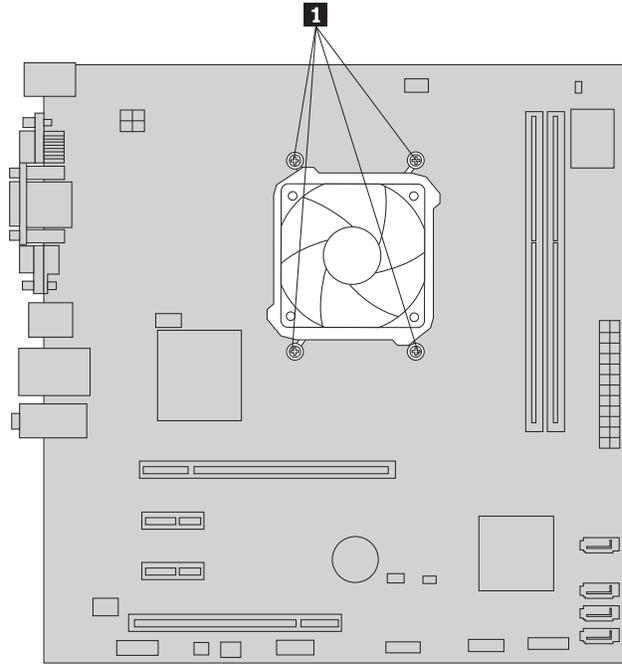


Figure 16. Screws that secure the heat sink and fan assembly

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

Notes:

- a. You might have to gently twist the heat sink and fan assembly to free it from the microprocessor.
 - b. When handling the heat sink and fan assembly, do not touch the thermal grease on the bottom of the heat sink and fan assembly.
8. Place the new heat sink and fan assembly on the system board so that the four screws are aligned with the corresponding holes in the system board. Make sure that you place the new heat sink and fan assembly correctly so that you can easily connect the heat sink and fan assembly cable to the microprocessor fan connector on the system board.
 9. Alternate tightening each screw a small and equal amount until the heat sink and fan assembly is secured to the system board. Do not over-tighten the screws.
 10. Connect the new heat sink and fan assembly cable to the microprocessor fan connector on the system board. See “Locating parts on the system board” on page 12.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

Replacing the microprocessor

Attention

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

This section provides instructions on how to replace the microprocessor.

CAUTION:

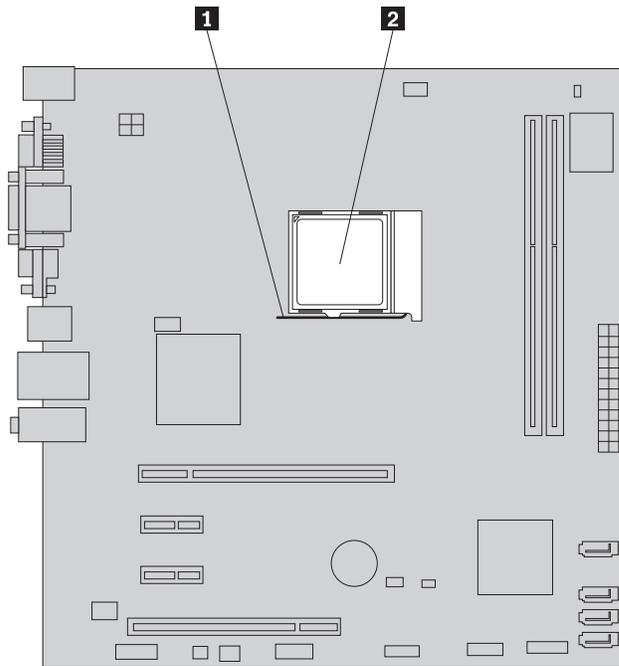


The heat sink and microprocessor might be very hot. Turn off the computer and wait three to five minutes to let the computer cool before removing the computer cover.

To replace the microprocessor, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Lay the computer on its side for easier access to the system board.
4. Note the part and connector locations on the system board. See “Locating parts on the system board” on page 12. Then, remove all parts and disconnect all cables that might prevent your access to the heat sink and fan assembly.
5. Remove the heat sink and fan assembly. See “Replacing the heat sink and fan assembly” on page 25.
6. Place the heat sink and fan assembly on its side so that the thermal grease on the bottom of it does not get in contact with anything.

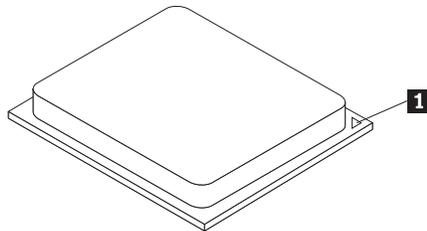
7. Lift the small handle **1** to release the microprocessor **2** secured on the system board.



8. Lift the microprocessor straight up and out of the socket. As shown in Figure 17 on page 29.

Notes:

- a. Your microprocessor and socket might look different from the one illustrated.
- b. Note the orientation of the microprocessor in the socket. You can look for the small triangle **1** on one corner of the microprocessor. This is important when installing the new microprocessor on the system board.



- c. Touch only the sides of the microprocessor. Do not touch the gold contacts on the bottom.

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

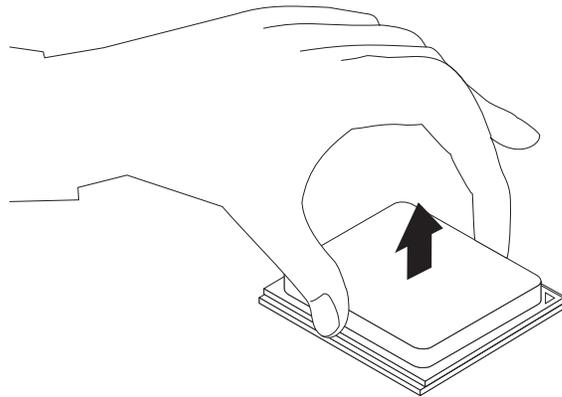


Figure 17. Removing the microprocessor

9. Make sure that the small handle is in the raised position.
10. Remove the protective cover that protects the gold contacts of the new microprocessor.
11. Hold the new microprocessor by its sides and align the small triangle on one corner of the new microprocessor with the corresponding small triangle on one corner of the microprocessor socket.
12. Lower the new microprocessor straight down into the microprocessor socket on the system board.
13. Lower the small handle to secure the new microprocessor in the socket.
14. Reinstall the heat sink and fan assembly. See “Replacing the heat sink and fan assembly” on page 25.
15. Reinstall all parts and reconnect all cables that have been removed.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

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, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Remove the front bezel. See “Removing and reinstalling the front bezel” on page 17.
4. Disconnect the signal cable and the power cable from the rear of the optical drive.
5. Press the blue release button **1** and slide the optical drive out of the optical drive bay.

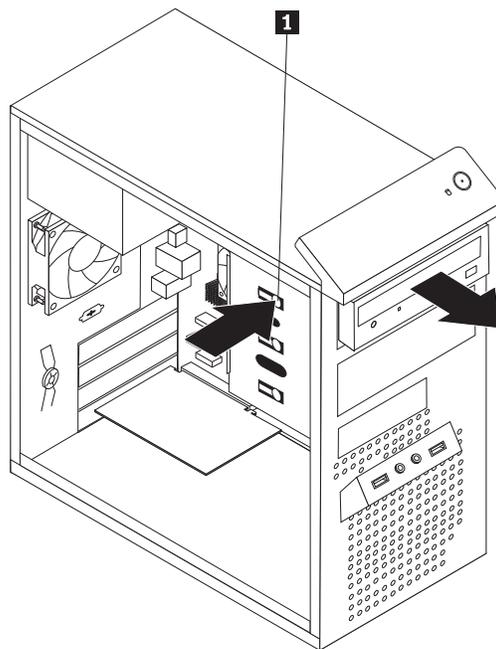


Figure 18. Removing the optical drive

6. Install the optical drive retainer **1** on the side of the new optical drive. Then, slide the new optical drive into the optical drive bay from the front until it snaps into position.

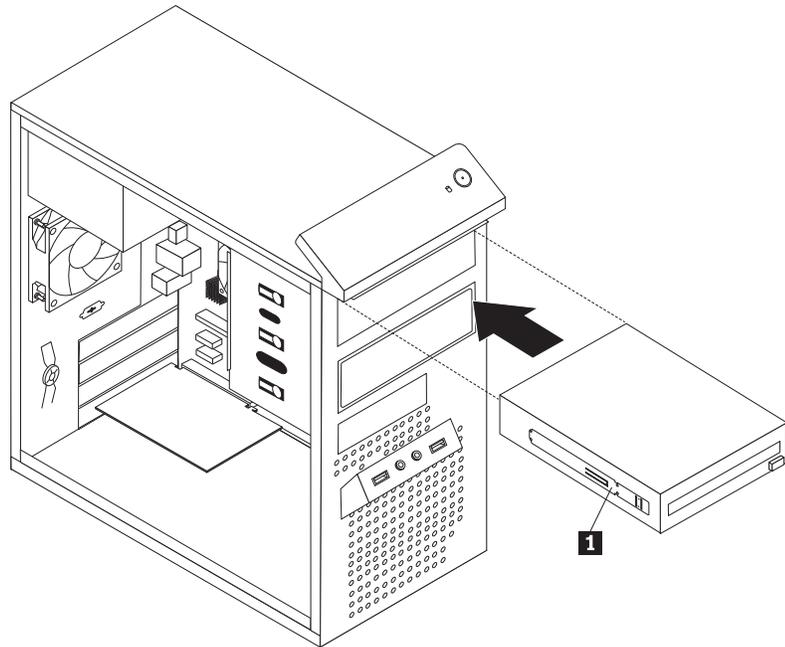


Figure 19. Installing the optical drive

7. Connect the signal cable and the power cable to the rear of the new optical drive. See “Connecting a SATA drive.”
8. Reinstall the front bezel. See “Removing and reinstalling the front bezel” on page 17.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

Connecting a SATA drive

You can connect a SATA optical drive or a SATA hard disk drive to an available SATA connector on the system board.

To connect a SATA drive, do the following:

1. Connect one end of the signal cable to the SATA drive and the other end to an available SATA connector on the system board. See “Locating parts on the system board” on page 12.

2. Locate an available five-wire power connector and connect it to the SATA drive.

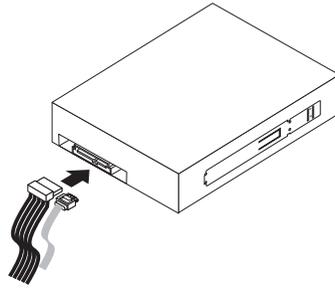


Figure 20. Connecting a SATA optical drive

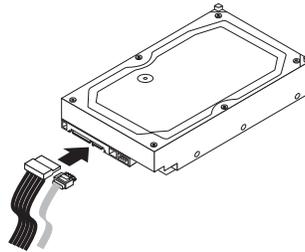


Figure 21. Connecting a SATA hard disk drive

Replacing the primary 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 primary hard disk drive.

To replace the primary hard disk drive, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Locate the primary hard disk drive. See “Locating internal drives” on page 12.
4. Disconnect the signal cable and the power cable from the rear of the primary hard disk drive.

5. Press the blue release tab **1** downwards, slide the hard disk drive cage **2** to the rear of the computer, and pivot it outward to completely remove it from the chassis. Then, carefully pull on the blue handle **3** to slide the hard disk drive out of the drive cage.

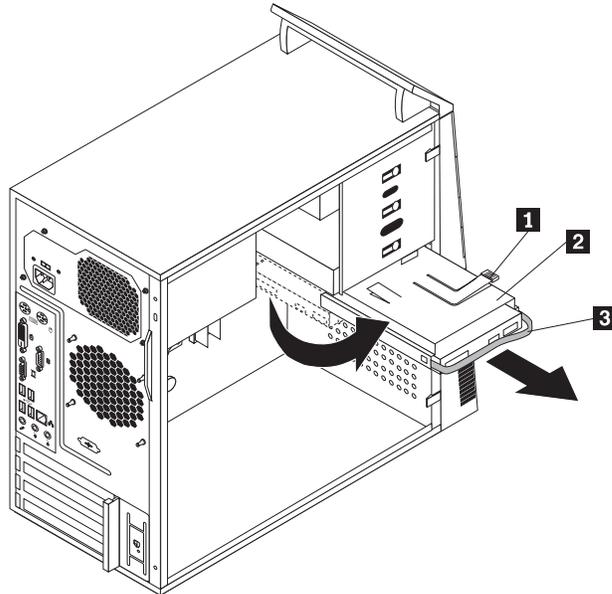


Figure 22. Removing the primary hard disk drive

6. Flex the sides of the blue bracket properly to remove the hard disk drive from the bracket.
7. To install a new hard disk drive into the blue bracket, flex the sides of the bracket properly and align pin **1**, pin **2**, pin **3**, and pin **4** on the bracket with the corresponding holes in the hard disk drive. Do not touch the circuit board **5** on the bottom of the hard disk drive.

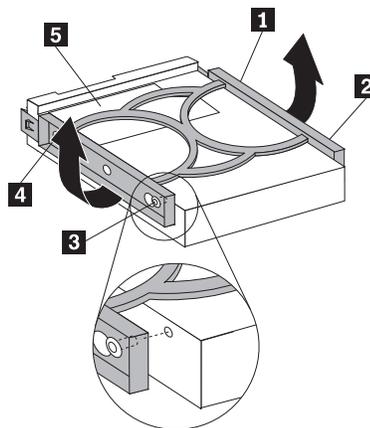


Figure 23. Installing the hard disk drive into the bracket

8. Slide the new hard disk drive with the bracket into the drive cage until it snaps into position.

9. Align the pivot pin on the hard disk drive cage with the slot **1** in the upper drive cage, as shown in Figure 24. Then, slide the drive cage with the new hard disk drive into the chassis.
10. Connect the signal cable and the power cable to the rear of the new hard disk drive. See “Connecting a SATA drive” on page 31.
11. Press down on the metal latch **2** and pivot the drive cage into place. Then, slide the drive cage to the front of the computer until it snaps into position.

Note: There are two arrows, one on the hard disk drive cage and one on the upper drive cage. The arrows are aligned when the hard disk drive cage is in the proper position.

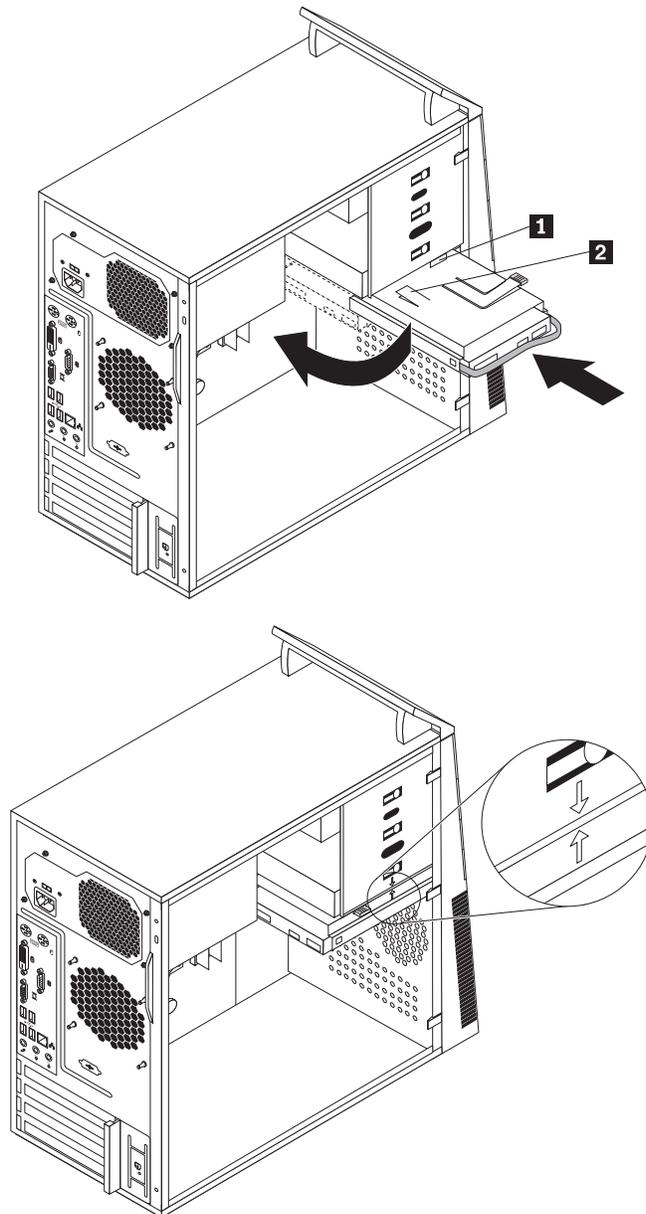


Figure 24. Installing the primary hard disk drive

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

Replacing the secondary 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>

Note: Depending on the model type, your computer might come with a secondary hard disk drive bay for installing or replacing a secondary hard disk drive.

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

To replace the secondary hard disk drive, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Locate the secondary hard disk drive. See “Locating internal drives” on page 12.
4. Disconnect the signal cable and the power cable from the secondary hard disk drive.

5. Press the blue release button **1** to release the hard disk drive cage from the chassis. Then, lift the hard disk drive cage and completely remove it out of the chassis.

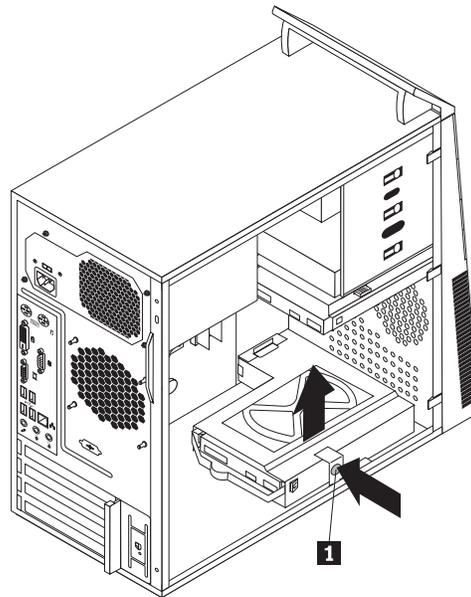


Figure 25. Removing the secondary hard disk drive

6. Carefully pull on the blue handle to slide the hard disk drive out of the drive cage.
7. Flex the sides of the blue bracket properly to remove the hard disk drive from the bracket.
8. To install a new hard disk drive into the blue bracket, flex the sides of the bracket properly and align pin **1**, pin **2**, pin **3**, and pin **4** on the bracket with the corresponding holes in the hard disk drive. Do not touch the circuit board **5** on the bottom of the hard disk drive.

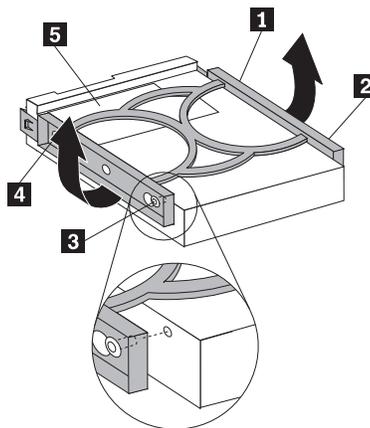


Figure 26. Installing the hard disk drive into the bracket

9. Slide the new hard disk drive with the bracket into the drive cage until it snaps into position.

- Slide the hard disk drive cage with the new hard disk drive into the chassis until it is directly underneath the metal tab **1**.

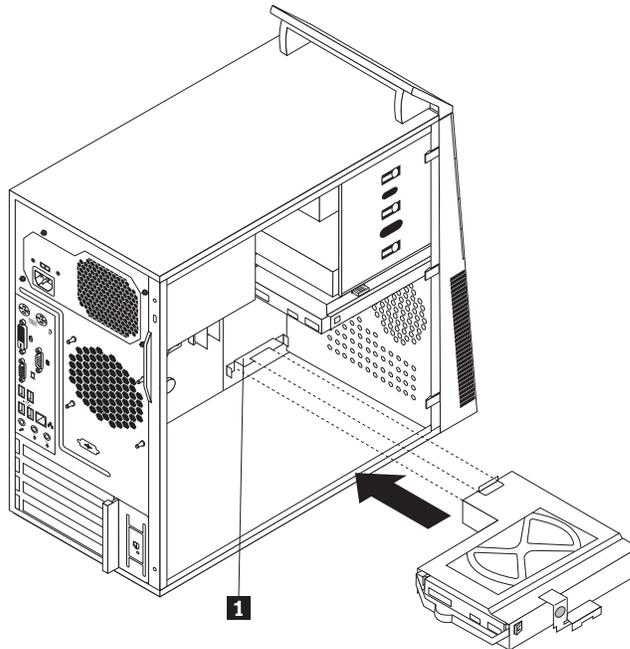


Figure 27. Installing the secondary hard disk drive

- Press the hard disk drive cage downwards until it snaps into position.

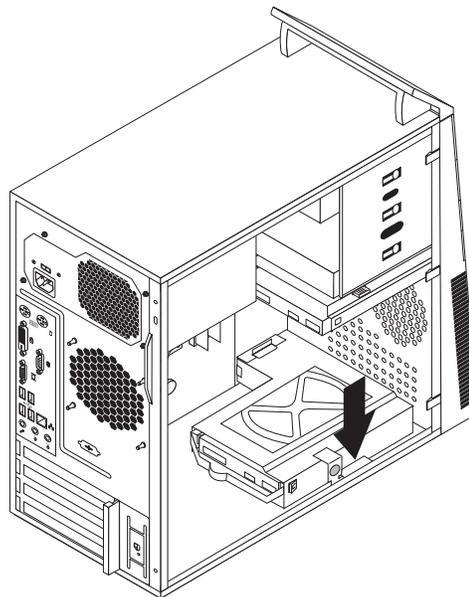


Figure 28. Securing the secondary hard disk drive in place

- Connect the signal cable and the power cable to the rear of the new hard disk drive. See “Connecting a SATA drive” on page 31.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

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>

Depending on the model type, your computer might have a card reader installed. This section provides instructions on how to replace the card reader.

To replace the card reader, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Remove the front bezel. See “Removing and reinstalling the front bezel” on page 17.
4. Disconnect the card reader cable from the front USB connector on the system board. See “Locating parts on the system board” on page 12.

Note: If your computer has a secondary hard disk drive installed, remove the secondary hard disk drive to get easier access to the front USB connector on the system board. See “Replacing the secondary hard disk drive” on page 35.

5. Press the release button **1** and slide the card reader out of the front of the computer.

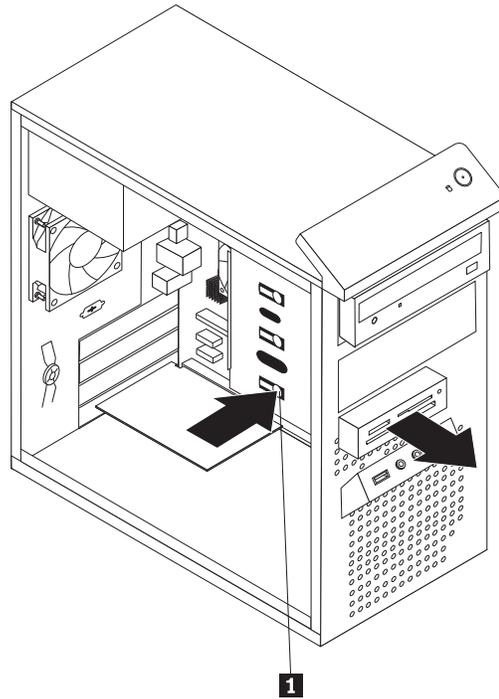


Figure 29. Removing the card reader

6. Remove the retaining bracket **1** from the old card reader and install it on the new card reader. Then, slide the new card reader into the drive bay until it snaps into position.

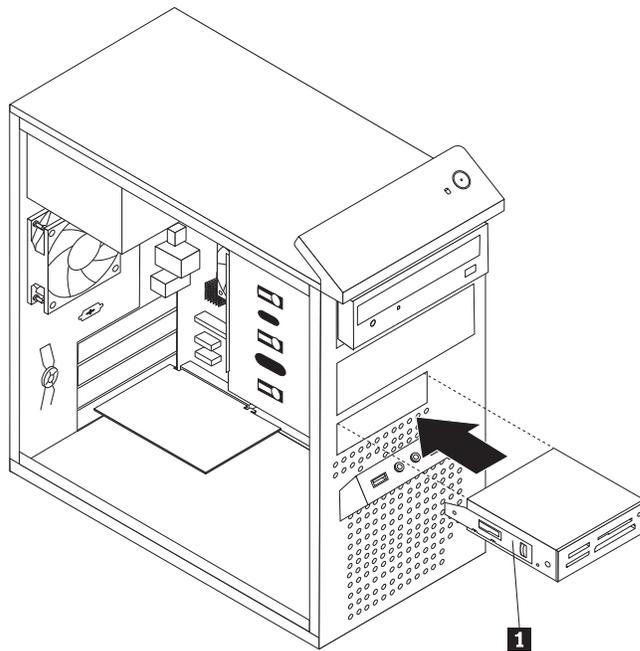


Figure 30. Installing the card reader

7. Connect the new card reader cable to one of the front USB connectors on the system board. See “Locating parts on the system board” on page 12.
8. Reinstall the secondary hard disk drive if you have removed it. See “Replacing the secondary hard disk drive” on page 35.
9. Reinstall the front bezel. See “Removing and reinstalling the front bezel” on page 17.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

Replacing the front 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>

Depending on the model type, your computer might have a front fan assembly installed. This section provides instructions on how to replace the front fan assembly.

To replace the front fan assembly, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Remove the front bezel. See “Removing and reinstalling the front bezel” on page 17.
4. Disconnect the front fan assembly cable from the power fan connector on the system board. See “Locating parts on the system board” on page 12.

5. Release the two tabs **1** that secure the front fan assembly to the chassis, and then completely remove the front fan assembly off the chassis.

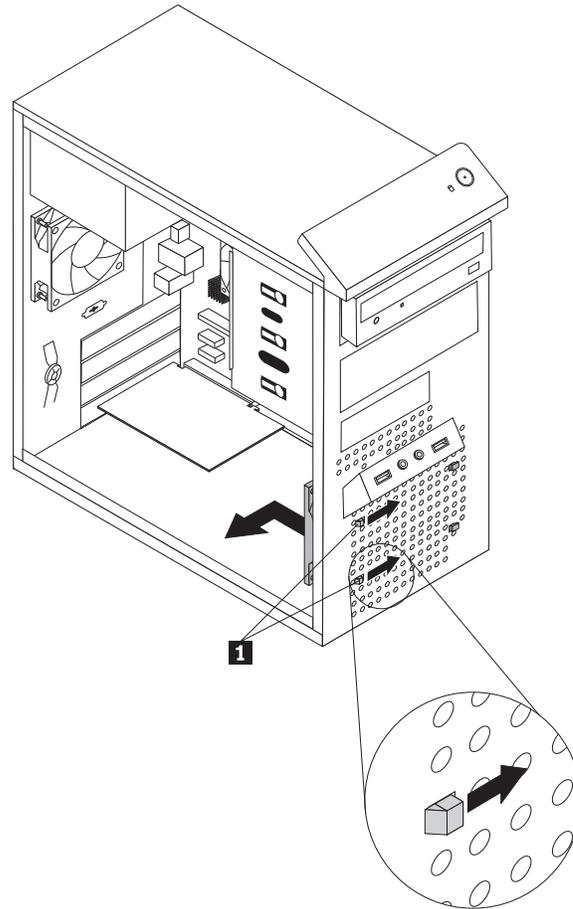


Figure 31. Removing the front fan assembly

6. Insert the two tabs **2** of the new front fan assembly into the corresponding holes in the front of the chassis. Then, press the other two tabs **1** through the other two holes until the new front fan assembly is secured in place.

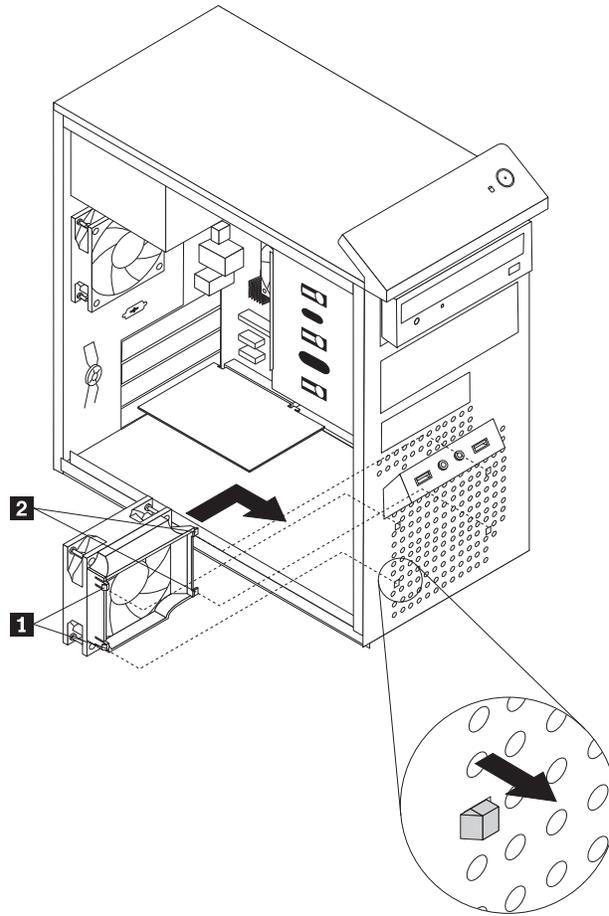


Figure 32. Installing the front fan assembly

7. Connect the new front fan assembly cable to the power fan connector on the system board. See “Locating parts on the system board” on page 12.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

Replacing the rear fan assembly

Attention

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

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

To replace the rear fan assembly, do the following:

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Locate the rear fan assembly. See “Locating components” on page 11.
4. Disconnect the rear fan assembly cable from the system fan connector on the system board. See “Locating parts on the system board” on page 12.
5. The rear fan assembly is attached to the chassis by four rubber mounts. Remove the rear fan assembly by cutting the rubber mounts and gently pulling the rear fan assembly out of the chassis.

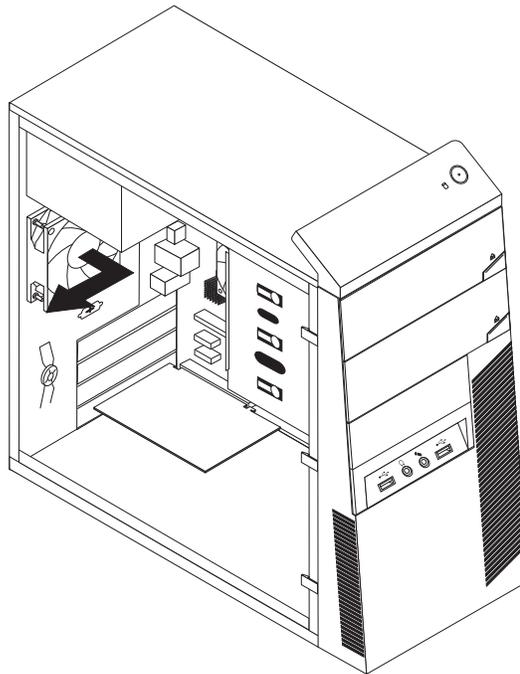


Figure 33. Removing the rear fan assembly

6. Install the new rear fan assembly by aligning the new rubber mounts that came with the new rear fan assembly with the corresponding holes in the rear of the chassis, and then push the rubber mounts through the holes.

Note: The new rear fan assembly will have four new rubber mounts attached.

- Carefully pull on the tips of the rubber mounts until the new rear fan assembly is secured in place.

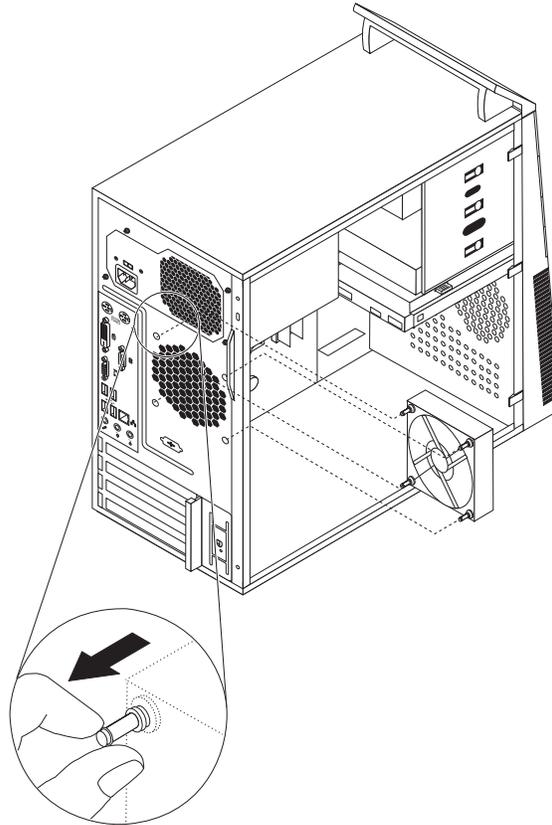


Figure 34. Installing the rear fan assembly

- Connect the new rear fan assembly cable to the system fan connector on the system board. See “Locating parts on the system board” on page 12.

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

Replacing the keyboard

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 keyboard.

To replace the keyboard, do the following:

1. Remove all media from the drives. Then, turn off all attached devices and the computer.
2. Disconnect all power cords from electrical outlets.
3. Disconnect the old keyboard cable from the computer.
4. Connect a new keyboard to the appropriate connector on the computer. Your keyboard might be connected to a PS/2 keyboard connector **1** or a USB connector **2**. Depending on where you want to connect your keyboard, see “Locating connectors on the front of your computer” on page 8 or “Locating connectors on the rear of your computer” on page 9.

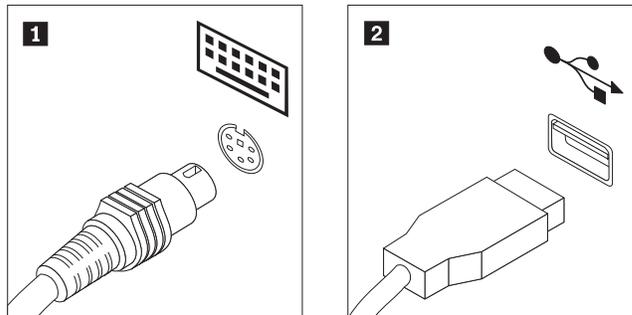


Figure 35. Keyboard connectors

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement” on page 46.

Replacing the mouse

Attention

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

This section provides instructions on how to replace the mouse.

To replace the mouse, do the following:

1. Remove all media from the drives. Then, turn off all attached devices and the computer.
2. Disconnect all power cords from electrical outlets.
3. Disconnect the old mouse cable from the computer.

4. Connect a new mouse to the appropriate connector on the computer. Your mouse might be connected to a PS/2 mouse connector **1** or a USB connector **2**. Depending on where you want to connect your mouse, see “Locating connectors on the front of your computer” on page 8 or “Locating connectors on the rear of your computer” on page 9.

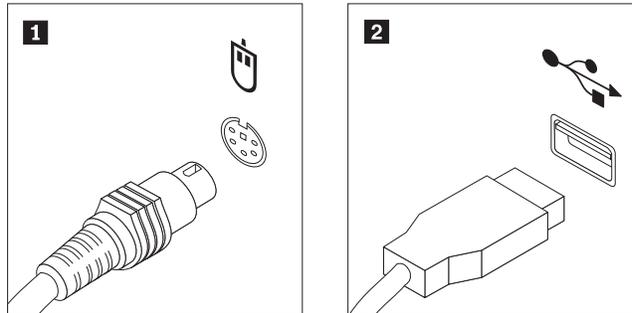


Figure 36. Mouse connectors

What to do next:

- To work with another piece of hardware, go to the appropriate section.
- To complete the replacement, go to “Completing the parts replacement.”

Completing the parts replacement

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

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

1. Make sure that all components have been reassembled correctly and that no tools or loose screws are left inside your computer. See “Locating components” on page 11 for the locations of the various components in your computer.
2. If you have removed the front bezel, reinstall it. See “Removing and reinstalling the front bezel” on page 17.

3. Position the computer cover on the chassis so that the rail guides on the bottom of the computer cover engage the rails. Then, slide the computer cover closed until it snaps into position.

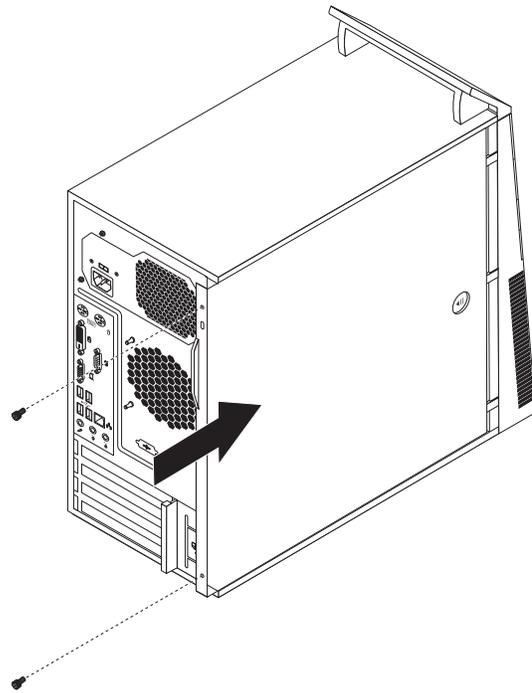


Figure 37. Reinstalling the computer cover

4. Install the screws to secure the computer cover.
5. Lock the computer cover if you have a computer cover lock. See “Integrated cable lock” on page 48 or “Padlock” on page 49.
6. Reconnect the external cables and power cords to the computer. See “Locating connectors on the front of your computer” on page 8 and “Locating connectors on the rear of your computer” on page 9.
7. Depending on the parts you installed or replaced, you might need to confirm the updated information in the Setup Utility program. See Chapter 4, “Using the Setup Utility program,” on page 59.

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

Obtaining device drivers

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

Installing security features

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

Integrated cable lock

An integrated cable lock, sometimes referred to as the Kensington lock, can be used to secure your computer to a desk, table, or other non-permanent fixture. The cable lock attaches to a security slot at the rear of your computer and is operated with a key. The cable lock also locks the computer cover. See Figure 38. This is the same type of lock used with many notebook computers. You can order an integrated cable lock directly from Lenovo by searching for *Kensington* at: <http://www.lenovo.com/support>

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

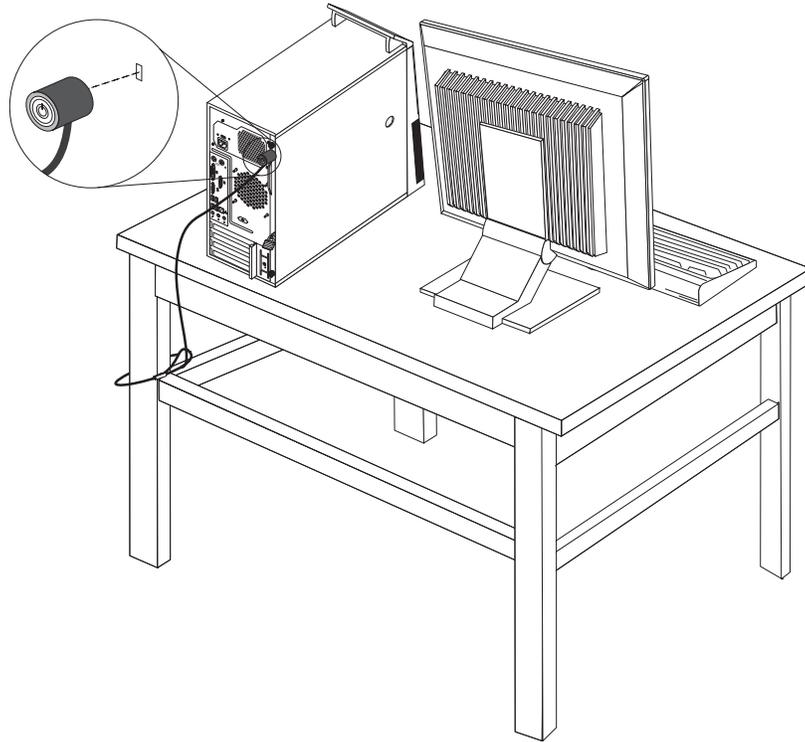


Figure 38. Installing an integrated cable lock

Padlock

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

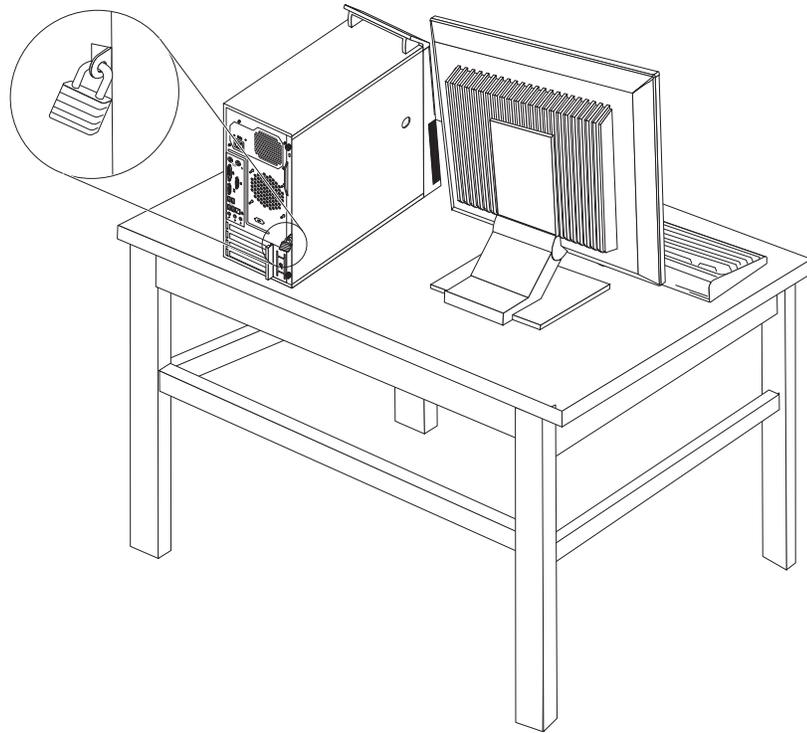


Figure 39. Installing a padlock

Password protection

To deter unauthorized use of your computer, you can use the Setup Utility program to set a password. When you turn on your computer, you are prompted to type the password. The computer cannot be used until a valid password is typed in. Refer to Chapter 4, “Using the Setup Utility program,” on page 59 for more information.

Erasing a lost or forgotten password (clearing CMOS)

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

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

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Locate the Clear CMOS /Recovery jumper on the system board. See “Locating parts on the system board” on page 12.
4. Remove all parts and disconnect all cables that might prevent your access to the Clear CMOS /Recovery jumper.
5. Move the jumper from the standard position (pin 1 and pin 2) to the maintenance position (pin 2 and pin 3).
6. Reinstall all parts and reconnect all cables that have been removed.

7. Reinstall the computer cover and reconnect the power cords for the computer and monitor. See "Completing the parts replacement" on page 46.
8. Turn on the computer and leave it on for approximately 10 seconds. Then, turn off the computer by holding the power switch for approximately five seconds.
9. Repeat step 1 through step 4.
10. Move the Clear CMOS /Recovery jumper back to the standard position (pin 1 and pin 2).
11. Reinstall all parts and reconnect all cables that have been removed.
12. Reinstall the computer cover and reconnect all cables. See "Completing the parts replacement" on page 46.
13. Turn on the computer. Your password has been erased and you can use the Setup Utility program to set a new password. See Chapter 4, "Using the Setup Utility program," on page 59 for more information.

Chapter 3. Recovery information

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

This chapter contains the following topics:

- “Creating and using recovery media”
- “Performing backup and recovery operations” on page 53
- “Using the Rescue and Recovery workspace” on page 54
- “Creating and using rescue media” on page 55
- “Creating and using a recovery repair diskette” on page 56
- “Installing or reinstalling device drivers” on page 57
- “Setting a rescue device in the startup sequence” on page 58
- “Solving recovery problems” on page 58

Notes:

1. There are a variety of methods to choose from when considering how to recover in the event of a software- or hardware-related problem. Some methods vary depending on the type of your operating system.
2. The product on the recovery media may be used only for the following purposes:
 - Restore the product preinstalled on your computer
 - Reinstall the product
 - Modify the product using the Additional Files

Creating and using recovery media

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

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

Creating recovery media

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

Note: On the Windows 7 operating system, you can create recovery media using discs or external USB storage devices. On the Windows Vista operating system and the Windows XP operating system, you can create recovery media using discs only.

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

Using recovery media

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

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

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

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

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

After restoring the computer to the factory default settings, you might have to reinstall some software programs or device drivers. See “Using the Rescue and Recovery workspace” on page 54 for details.

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

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

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

1. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
2. Insert the boot disc into the optical drive.
3. Select the optical drive you want to use as the startup device and press Enter. After a short delay, the Rescue and Recovery workspace opens.
4. On the **Rescue and Recovery** menu, click **Restore your system**.

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

Performing backup and recovery operations

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

- In a protected area of your hard disk drive
- On 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 the Windows 7 operating system, do the following:
 1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.
 2. 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 the Windows Vista operating system or the Windows XP operating system, do the following:
 1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Rescue and Recovery**. The Rescue and Recovery program opens.
 2. 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 the Windows 7 operating system, do the following:
 1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.

2. 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 the Windows Vista operating system or the Windows XP operating system, do the following:
 1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Rescue and Recovery**. The Rescue and Recovery program opens.
 2. 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.”

Using the Rescue and Recovery workspace

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

- **Rescue files from your hard disk drive or from a backup**
 The Rescue and Recovery workspace enables you to locate files on your hard disk drive and transfer them to a network drive or other recordable media, such as a USB device, 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 of the Rescue and Recovery workspace to copy files from your hard disk drive to other media.

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

1. Make sure the computer is turned off.
2. Repeatedly press and release the F11 key when turning on the computer.
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 58.

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 57.
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 all types 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 the Windows 7 operating system, do the following:
 1. From the Windows desktop, click **Start** → **All Programs** → **Lenovo ThinkVantage Tools** → **Enhanced Backup and Restore**. The Rescue and Recovery program opens.
 2. 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 the Windows Vista operating system or the Windows XP operating system, do the following:
 1. From the Windows desktop, click **Start** → **All Programs** → **ThinkVantage** → **Create Recovery Media**. The Create Rescue and Recovery Media window opens.
 2. In the **Rescue Media** area, select the type of 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 “Viewing or changing the startup device sequence” on page 62.

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 into the optical drive. 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.

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?Indocid=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:

Note: Make sure your external diskette drive is set as the first boot device in the startup device sequence before doing this procedure. See “Viewing or changing the startup device sequence” on page 62.

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

Notes:

1. If the repair operation finishes 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 finishes.
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 a rescue medium, see “Creating and using rescue media” on page 55.

Installing or reinstalling device drivers

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

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

To install or reinstall 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 SETUP.exe file. Double-click the file and follow the instructions on the screen.
 - In the device subfolder, look for a README.txt file or a file with the .txt extension. This file might be named after the operating system, such as WIN98.txt. The TXT file contains information about how to install the device driver. Follow the instructions to complete the installation.
 - If the device subfolder contains a file with the .inf extension and you want to install the device driver using the INF file, refer to your Windows Help and Support information system for detailed information about how to install the device driver.

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 61 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 about the Setup Utility program, see Chapter 4, “Using the Setup Utility program,” on page 59.

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 55.
- 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 56.
- Use recovery media if all other methods of recovery have failed and you need to restore the hard disk drive to the factory default settings. See “Creating and using recovery media” on page 51.

Note: If you are unable to access the Rescue and Recovery workspace or the Windows environment from a rescue medium, a recovery repair diskette, or recovery media, you might not have the rescue device (external diskette drive, CD drive, DVD drive, or USB hard disk drive) 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 recovery media as early as possible and store them in a safe place.

Chapter 4. Using the Setup Utility program

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

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

- “Starting the Setup Utility program”
- “Viewing and changing settings”
- “Using passwords”
- “Enabling or disabling a device” on page 61
- “Selecting a startup device” on page 61
- “Exiting from the Setup Utility program” on page 62

Starting the Setup Utility program

To start the Setup Utility program, do the following:

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

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

Viewing and changing settings

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

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

Using passwords

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

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

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

Password considerations

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

- Have at least eight characters in length and contain at least one alphabetic character and one numeric character
- Setup Utility program 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 passwords

Set Power-On Password

After you have set a power-on password using the **Set Power-On Password** option, the user is prompted to type a valid password each time the computer is turned on. The computer cannot be used until a valid password is typed in. For more information on how to set a password, see “Setting, changing, or deleting a password.”

Set Administrator Password

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

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

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

Setting, changing, or deleting a password

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

1. Start the Setup Utility program. See “Starting the Setup Utility program” on page 59.
2. From the Setup Utility program main menu, select **Security** → **Set Power-On Password** or **Set Administrator Password**.
3. Follow the instructions on the screen to set, change, or delete a password.

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

Enabling or disabling a device

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

SATA Controller	When this option is set to Disabled , all devices connected to the SATA connectors (such as hard disk drives or the optical drive) are disabled and will not be displayed in the system configuration.
Serial Port1 Address	Use this option to control the Input/Output of the serial port.
USB Setup	Use this option to set up USB connectors.

To enable or disable a device, do the following:

1. Start the Setup Utility program. See “Starting the Setup Utility program” on page 59.
2. From the Setup Utility program main menu, select **Devices**.
3. Depending on the device you want to enable or disable, do one of the following:
 - Select **ATA Drives Setup** → **SATA Controller** to enable or disable the devices connected to the SATA connectors.
 - Select **Serial Port Setup** → **Serial Port1 Address** to enable or disable the serial port.
 - Select **USB Setup** and follow the instructions on the screen to enable or disable the USB connector(s) of your choice.
4. Select the desired settings and press Enter.
5. Press Esc to return to the Setup Utility program main menu. You might have to press Esc several times.
6. Press F10 to save and exit the Setup Utility program.

Notes:

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

Selecting a startup device

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

Selecting a temporary startup device

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

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

To select a temporary startup device, do the following:

1. Turn off your computer.
2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.

3. Select the desired startup device on the **Startup Device Menu** and press Enter to begin.

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

Viewing or changing the startup device sequence

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

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

1. Start the Setup Utility program. See “Starting the Setup Utility program” on page 59.
2. Select **Startup → Primary Boot Sequence**. Read the information displayed on the right side of the screen.
3. Select the first boot device, second boot device, and so on.
4. Press Esc to return to the **Startup** menu. Then, select the devices for the **Automatic Boot Sequence** and **Error Boot Sequence**.
5. Press Esc to return to the Setup Utility program main menu. You might have to press Esc several times.
6. Press F10 to save and exit the Setup Utility program.

Notes:

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

Exiting from the Setup Utility program

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

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

Chapter 5. Updating system programs

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

This chapter provides information about the following topics:

- “Using system programs”
- “Updating (flashing) BIOS from a disc”
- “Updating (flashing) BIOS from your operating system” on page 64
- “Recovering from a POST/BIOS update failure” on page 64

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) BIOS from a disc. System program updates are available at:
<http://www.lenovo.com/support>

To update (flash) BIOS from a disc, do the following:

1. Turn off your computer.
2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
3. On the **Startup Device Menu**, select the optical drive of your choice as the first boot device.

4. Insert the disc into the optical drive and press Enter. The update begins.
5. When prompted to change the serial number, press N. If you want to change the serial number, press Y when prompted. Type in the serial number and press Enter.
6. When prompted to change the machine type/model, press N. If you want to change the machine type/model, press Y when prompted. Type in the machine type/model and press Enter.
7. Follow the instructions on the screen to complete the update. After the update is completed, remove the disc from the optical drive.

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, do the following:

1. Go to <http://www.lenovo.com/support>.
2. Do the following to locate the downloadable files for your machine type:
 - a. In the **Enter a product number** field, type your machine type and click **Go**.
 - b. Click **Downloads and drivers**.
 - c. Select **BIOS** in the **Refine results** field to easily locate all the BIOS related links.
 - d. Click the BIOS update link.
3. Click the TXT file that contains the instructions for updating (flashing) BIOS from your operating system.
4. Print these instructions. This is very important because these instructions are not on the screen after the download begins.
5. 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 that is commonly called Boot-block Recovery.

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Remove the computer cover. See “Removing the computer cover” on page 16.
3. Locate the Clear CMOS /Recovery jumper on the system board. See “Locating parts on the system board” on page 12.
4. Remove all parts and disconnect all cables that might prevent your access to the Clear CMOS /Recovery jumper.
5. Move the jumper from the standard position (pin 1 and pin 2) to the maintenance position (pin 2 and pin 3).
6. Reinstall all parts and reconnect all cables that have been removed.
7. Reinstall the computer cover and reconnect the power cords for the computer and monitor. See “Completing the parts replacement” on page 46.
8. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.

9. On the **Startup Device Menu**, select the optical drive of your choice as the first boot device.
10. Insert the POST/BIOS update (flash update) disc into the optical drive and press Enter. The recovery begins. The recovery session will take two to three minutes. During this time, you will hear a series of beeps.
11. After the recovery session is completed, there will be no video, the series of beeps will end, and the system will automatically turn off.
12. Repeat step 1 through step 4.
13. Move the jumper back to the standard position (pin 1 and pin 2).
14. Reinstall all parts and reconnect all cables that have been removed.
15. Reinstall the computer cover and reconnect power cords and other cables. See "Completing the parts replacement" on page 46.
16. Turn on the computer and remove the disc from the optical drive.

Chapter 6. Troubleshooting and diagnostics

This chapter provides information about some basic troubleshooting and diagnostic programs. If your computer problem is not described here, see Chapter 7, “Getting information, help, and service,” on page 73 for additional troubleshooting resources.

Basic troubleshooting

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

Note: If you cannot solve the problem after doing the basic troubleshooting, have the computer serviced. Refer to the *ThinkCentre Safety and Warranty Guide* that came with your computer for the safety and warranty information and the list of service and support phone numbers.

Symptom	Action
The computer does not start when you press the power switch.	Verify that: <ul style="list-style-type: none">• The power cord is correctly connected to the rear of the computer and to a working electrical outlet.• If there is a secondary power switch on the back of your computer, make sure that it is switched on.• The power indicator on the front of the computer is on.• The computer voltage matches the voltage available at the electrical outlet for your country or region.
The monitor screen is blank.	Verify that: <ul style="list-style-type: none">• The monitor signal cable is correctly connected to the monitor and to the appropriate monitor connector on the computer.• The monitor power cord is correctly connected to the monitor and to a working electrical outlet.• The monitor is turned on and the brightness and contrast controls are set correctly.• The computer voltage matches the voltage available at the electrical outlet for your country or region.• If your computer has two monitor connectors, be sure to use the connector on the graphics card.
The keyboard does not work.	Verify that: <ul style="list-style-type: none">• The computer is turned on.• The monitor is turned on and the brightness and contrast controls are set correctly.• The keyboard is correctly connected to an appropriate keyboard connector (the PS/2 keyboard connector or one of the USB connectors) on the computer.• No keys are stuck.
The mouse does not work.	Verify that: <ul style="list-style-type: none">• The computer is turned on.• The mouse is correctly connected to an appropriate mouse connector (the PS/2 mouse connector or one of the USB connectors) on the computer.• The mouse is clean. Refer to “Cleaning the mouse” on page 70.

Symptom	Action
The operating system does not start.	Verify that you list the device where the operating system resides in the startup device sequence. Usually, the operating system is on the hard disk drive. For more information, see "Selecting a startup device" on page 61.
The computer beeps multiple times before the operating system starts.	Verify that no keys are stuck.

Diagnostic programs

Diagnostic programs are used to test hardware components of your computer 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 you cannot start the Windows operating system)

Notes:

1. You can also download the PC-Doctor for DOS diagnostic program from <http://www.lenovo.com/support>. See "PC-Doctor for DOS" on page 69 for detailed information.
2. If you are unable to isolate and repair the problem yourself after running the programs, save and print the log files created by the programs. You will need the log files when you speak to a Lenovo technical support representative.

Lenovo ThinkVantage Toolbox

Note: The Lenovo ThinkVantage Toolbox program is only available on computers preinstalled with the Windows 7 operating system 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 computer problems, create bootable diagnostic media, update system drivers, and view system information.

To run the Lenovo ThinkVantage Toolbox program, click **Start** → **All Programs** → **Lenovo ThinkVantage Tools** → **System Health and Diagnostics**. Follow the instructions on the screen.

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

Lenovo System Toolbox

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

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

To run the Lenovo System Toolbox program, click **Start → All Programs → Lenovo Services → Lenovo System Toolbox**. Follow the instructions on the screen.

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

PC-Doctor for Rescue and Recovery

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

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

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

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

Note: If you encounter failures that prevent you from gaining access to the Rescue and Recovery workspace, you can run the PC-Doctor for Rescue and Recovery program after using a rescue medium to recover the computer from failures and gaining access to the Rescue and Recovery workspace. See “Creating and using rescue media” on page 55.

PC-Doctor for DOS

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

Creating a diagnostic disc

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

To create a diagnostic disc, do the following:

1. Download a self-starting bootable 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 the diagnostic disc

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

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

1. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
2. Insert the diagnostic disc into the optical drive.
3. Select the optical drive with the diagnostic disc as the startup device and press Enter. The diagnostic program opens.
4. Follow the instructions on the screen to select the diagnostic test of your choice. For additional help, press the F1 key.
5. 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.

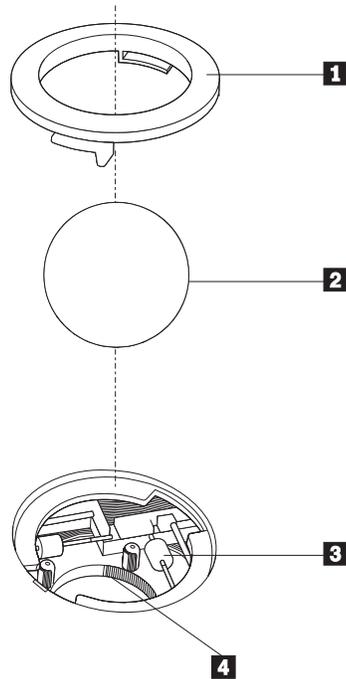
To clean the optical mouse, do the following:

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 following illustration shows the components of a non-optical mouse.

Note: The illustration might be slightly different from your mouse.



- 1** Retainer ring
- 2** Ball
- 3** Plastic rollers
- 4** Ball cage

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 the non-optical mouse, do the following:

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 reveal the ball.
4. Place your hand over the retainer ring and ball **2**, and then turn the mouse bottom-side down, 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. Carefully blow air 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. Reinstall 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 provides 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

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 publications.

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 PDF version. To view the publications, you need to have the Adobe Reader program preinstalled on your computer. If the Adobe Reader program has not been installed on your computer, a message will 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 program rather than the version preinstalled on your computer, download the language version of your choice from the Adobe Web site at:
<http://www.adobe.com>

Lenovo ThinkVantage Tools

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

The Lenovo ThinkVantage Tools program helps you work more easily and securely by providing easy access to various tools, such as:

- Lenovo ThinkVantage Toolbox
- Password Manager
- Power Manager
- Product Recovery
- Rescue and Recovery
- ThinkVantage System Update

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

ThinkVantage Productivity Center

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

The ThinkVantage Productivity Center program contains information sources and tools designed to make computing easy and secure. It provides easy access to various technologies, such as:

- Client Security Solution or Password Manager
- Power Manager
- Product Recovery
- Rescue and Recovery

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

Lenovo Welcome

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

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

Access Help

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

- To open the Access Help information system on the Windows 7 operating system, click **Start → Help and Support → Lenovo Access Help**.
- To open the Access Help information system on the Windows Vista operating system or the Windows XP operating system, click **Start → All Programs → ThinkVantage → Access Help**.

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

Safety and warranty

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

Before using the information in this manual and the product it supports, be sure to read and understand the *ThinkCentre Safety and Warranty Guide* and “Notices,” on page 79.

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

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

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

Help and service

This section provides information about obtaining help and service.

Using the documentation and diagnostic programs

If you experience problems with your computer, see Chapter 6, “Troubleshooting and diagnostics,” on page 67. For information about additional resources to help you troubleshoot your computer problems, see “Information resources” on page 73.

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

Most computers come with a set of diagnostic programs that you can use to help you identify hardware problems. For instructions on how to use the diagnostic programs on your computer, see “Diagnostic programs” on page 68.

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

Calling for service

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

The following services are available during the warranty period:

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

The following items are not covered by the warranty:

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

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

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

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

If possible, be at your computer when you call and have the following information available:

- Machine type and model
- Serial numbers of your hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

Using other services

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

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

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

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

Purchasing additional services

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

Appendix. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area. Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

*Lenovo (United States), Inc.
1009 Think Place - Building One
Morrisville, NC 27560
U.S.A.
Attention: Lenovo Director of Licensing*

LENOVO PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. Lenovo may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

The products described in this document are not intended for use in implantation or other life support applications where malfunction may result in injury or death to persons. The information contained in this document does not affect or change Lenovo product specifications or warranties. Nothing in this document shall operate as an express or implied license or indemnity under the intellectual property rights of Lenovo or third parties. All information contained in this document was obtained in specific environments and is presented as an illustration. The result obtained in other operating environments may vary.

Lenovo may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any references in this publication to non-Lenovo Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this Lenovo product, and use of those Web sites is at your own risk.

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

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

Television output notice

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

This product incorporates copyright protection technology that is protected by method claims of certain U.S. patents and other intellectual property rights owned by Macrovision Corporation and other rights owners. Use of this copyright protection technology must be authorized by Macrovision Corporation, and is intended for home and other limited viewing uses only unless otherwise authorized by Macrovision Corporation. Reverse engineering or disassembly is prohibited.

European conformance CE mark



Trademarks

Lenovo, the Lenovo logo, PS/2, Rescue and Recovery, ThinkCentre, and ThinkVantage are trademarks of Lenovo in the United States, other countries, or both.

Microsoft, Windows, and Windows Vista are trademarks of the Microsoft group of companies.

AMD, AMD Athlon, AMD Phenom, AMD Sempron, and combinations thereof are trademarks of Advanced Micro Devices, Inc.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

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

Index

A

- Access Help 74
- antivirus software 7
- audio line-in connector 10
- audio line-out connector 10
- audio subsystem 2

B

- backup and recovery operations 53
- basic troubleshooting 67
- BIOS, updating (flashing) 63, 64
- Boot-block Recovery 64

C

- cable lock, security 48
- card reader
 - replacing 38
- changing
 - startup device sequence 62
- cleaning the mouse 70
- CMOS, clearing 49
- components, internal 11
- computer cover
 - removing 16
- computer cover, reinstalling 46
- connector description 10
- connectors
 - front 8
 - rear 9
- considerations, password 60
- creating
 - and using a recovery repair diskette 56
 - and using rescue media 55
- creating and using
 - recovery media 51
- CRU
 - completing the installation 46
 - completing the replacement 46
- Customer Support Center 75

D

- device drivers 47
 - installing 57
 - reinstalling 57
- devices, handling static-sensitive 15
- diagnostic programs, using 75
- diagnostics, troubleshooting 67
- diskette, creating and using a recovery repair 56
- documentation, using 75
- drivers, device 47
- drives
 - internal 12
- DVI monitor connector 10

E

- environment, operating 4
- Ethernet 2
- Ethernet connector 10
- exiting, Setup Utility program 62
- expansion 2
- external options, installing 15

F

- failure, recovering from POST/BIOS 64
- features 1
- flashing BIOS 63
- front bezel
 - removing, reinstalling 17
- front connectors 8
- front fan assembly
 - replacing 40

G

- getting
 - help 73
 - information 73
 - service 73

H

- heat sink and fan assembly
 - replacing 25
- help
 - Access Help 74
 - and service 75
 - getting 73

I

- important safety information v
- information
 - getting 73
 - important safety v
 - resources 73
 - safety 74
 - warranty 74
- Input/Output (I/O) features 2
- installing
 - device drivers 57
 - installing options
 - security features 47
 - installing, replacing
 - memory module 21
 - PCI card 19
 - internal
 - drives 12
 - internal drives 1

K

- keyboard
 - replacing 44

L

- Lenovo System Toolbox 68
- Lenovo ThinkVantage Toolbox 68
- Lenovo ThinkVantage Tools 73
- Lenovo Web site 75
- Lenovo Welcome 5
- locating components 11

M

- media, creating and using recovery media 51
- media, creating and using rescue 55
- memory module 21
 - installing, replacing 21
- microphone connector 10
- microprocessor
 - replacing 27
- mouse
 - cleaning 70
 - non-optical 71
 - optical mouse 70
 - replacing 45

N

- non-optical mouse 71
- notice, television output 80
- notices 79

O

- Online Books folder 73
- operations, backup and recovery 53
- optical drive
 - replacing 30
- optical mouse 70

P

- padlock 49
- parts replacement, completing 46
- password
 - considerations 60
 - erasing 49
 - lost or forgotten 49
 - setting, changing, deleting 60
- password protection 49
- PC-Doctor for Rescue and Recovery 69
- PCI card 19
 - installing, replacing 19
 - slots 19
- PCI card latch 19
- physical specifications 4
- power supply
 - features 3
- power supply assembly
 - replacing 23
- power-on self-test (POST) 63

- primary hard disk drive
 - replacing 32
- programs, updating system 63
- protection, password 49
- PS/2 keyboard connector 10
- PS/2 mouse connector 10
- purchasing additional services 77

R

- rear connectors 9
- rear fan assembly
 - replacing 43
- recovering
 - from a POST/BIOS update failure 64
 - software 51
- recovery
 - Boot-block Recovery 64
 - operations, backup and 53
 - problems, solving 58
 - recovery repair diskette, creating and using 56
- recovery media, creating and using 51
- reinstalling
 - device drivers 57
- removing
 - computer cover 16
- removing, reinstalling
 - front bezel 17
- replacing
 - card reader 38
 - front fan assembly 40
 - heat sink and fan assembly 25
 - keyboard 44
 - microprocessor 27
 - mouse 45
 - optical drive 30
 - power supply assembly 23
 - primary hard disk drive 32
 - rear fan assembly 43
 - secondary hard disk drive 35
- Rescue and Recovery 51
 - workspace, Rescue and Recovery 54
- Rescue and Recovery workspace 54
- rescue device, startup sequence 58
- rescue media, creating and using 55
- resources, information 73

S

- safety v
- safety information 74
- secondary hard disk drive
 - replacing 35
- security
 - cable lock 48
 - enabling or disabling 61
 - features 3, 47
 - padlock 49
- selecting
 - startup device 61
 - temporary startup device 61
- serial port 10
- service
 - and help 75
 - Customer Support Center 75
 - getting 73

- services
 - other 76
 - purchasing additional 77
- Set Administrator Password 60
- Set Power-On Password 60
- setting
 - rescue device 58
- settings
 - changing 59
 - viewing 59
- Setup Utility program 59
- Setup Utility program, exiting 62
- Setup Utility program, starting 59
- software
 - recovering 51
- software overview 5
- solving recovery problems 58
- starting the Setup Utility program 59
- startup device 61
 - sequence, changing 62
 - temporary, selecting 61
- static-sensitive devices, handling 15
- system
 - management 2
 - programs 63
- system board
 - connectors 12
 - locating parts 12
 - location 12

workspace, backup and recovery 54

T

- television output notice 80
- temporary startup device 61
- ThinkVantage Productivity Center 74
- trademarks 80
- troubleshooting, basic 67
- troubleshooting, diagnostics 67

U

- updating
 - (flashing) BIOS 63
 - system programs 63
- updating (flashing) BIOS 64
- USB connector 10
- using
 - diagnostic programs 75
 - documentation 75
 - other services 76
 - passwords 59
 - recovery repair diskette, creating and using 56
 - rescue media, creating and 55
 - Setup Utility program 59

V

- VGA monitor connector 10
- video subsystem 1
- viewing and changing settings 59

W

- warranty information 74
- Web site, Lenovo 75

lenovo®

Part Number: 71Y9118

Printed in USA

(1P) P/N: 71Y9118

