**lenovo**

ThinkCentre
User Guide

ThinkThinkThinkCentreThink

**Machine Types:** 0800, 0852, 0870, 2471, 2557, 3091, 3265, 3373, 3429, 3650, 3678, 4285, 5205, and 5248

# 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 85.

# Contents

# Important safety information

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

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

# Chapter 1. Product overview

This chapter provides information about the computer features, specifications, preinstalled software programs, and connector and part locations.

This chapter contains the following topics:

- "Features": This section provides information about the computer features.
- "Specifications" on page 5: This section lists the physical specifications for your computer.
- "Software overview" on page 6: This section provides information about the software programs provided with your computer.
- "Locating computer controls, connectors, and parts" on page 8: This section provides information to help you locate your computer controls, connectors and parts.

## 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 67.

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

- Intel® Core™ i3 microprocessor
- Intel Core i5 microprocessor
- Intel Pentium® microprocessor

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

  **Note:** Your computer supports both 1066 MHz and 1333 MHz DDR3 memory modules. However, if you are using the 1333 MHz memory module(s) with a microprocessor that runs at 1066 MHz (such as the Intel Pentium G6950 microprocessor), your memory module(s) will operate at 1066 MHz.

**Internal drives**
- One slim Serial Advanced Technology Attachment (SATA) optical drive
- One SATA hard disk drive

**Video subsystem**
- Integrated graphics card for a Video Graphics Array (VGA) IN connector and a DisplayPort out connector

**Audio subsystem**
- Integrated high-definition (HD) audio
- Microphone connector and headphone connector
- Internal speakers

**Connectivity**
- 10/100/1000 Mbps Ethernet controller

**System management features**
- Ability to store the power-on self-test (POST) hardware test results
- Advanced Configuration and Power Interface (ACPI) support
- Automatic power-on startup
- Desktop Management Interface (DMI)
- Intel Active Management Technology (AMT) (available in some models)
- Intel Rapid Storage Technology
- Preboot Execution Environment (PXE)
- System Management (SM) Basic Input/Output System (BIOS) and SM software
- Wake on LAN
- Windows Management Instrumentation (WMI)

**Input/Output (I/O) features**
- One DisplayPort connector
- One Ethernet connector
- One optional 9-pin serial port
- One optional card reader
- One optional ExpressCard slot
- One optional Personal System/2® (PS/2®) keyboard connector
- One optional PS/2 mouse connector
- One VGA IN connector
- Six USB (Universal Serial Bus) connectors
- Two audio connectors (microphone connector and headphone connector)

For more information about I/O features, see "Rear view" on page 10.

**Expansion**
- One hard disk drive bay
- One optical drive bay

**Power supply**
- 150-watt auto-sensing power supply

**Security features**
- Computrace
- Cover presence switch (also called intrusion switch) (available in some models)
- Enabling or disabling SATA devices
- Enabling or disabling the serial port
- Enabling or disabling USB connectors individually
- Keyboard with fingerprint reader (shipped with some models)

- Power-on password (POP), administrator password, and hard disk drive password to deter unauthorized use of your computer
- Startup sequence control
- Startup without keyboard or mouse
- Support for the addition of an integrated cable lock (Kensington lock)
- Trusted Platform Module (TPM)

**Preinstalled software programs**
Your computer is preinstalled with some software programs to help you work more easily and securely. For more information, see "Software overview" on page 6.

**Preinstalled operating system**
Your computer is preinstalled with one of the following operating systems:
- Microsoft® Windows® 7
- Microsoft Windows XP Professional (preinstalled through downgrade rights in Windows 7 Professional)

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

# Single-touch and multi-touch feature

**Note:** The single-touch feature or multi-touch feature is only available on some computer models.

Your computer might come with the single-touch feature or multi-touch feature depending on your model. If the single-touch feature or the multi-touch feature is available on your computer, you can tap the touch screen once with your finger to make a single click. To make a double-click, tap twice without pausing. To make a right-click, tap the touch screen once and then hold your finger on the touch screen until a round circle is displayed. Then, lift your finger off the touch screen. A context menu will be displayed, where you can make selections.

**Using the single-touch feature**: The single-touch feature enables you to use only one finger at a time to interact with your computer.

**Using the multi-touch feature**: The multi-touch feature enables you to use one or two fingers to interact with your computer. For example, you can zoom in, zoom out, scroll, or rotate on the touch screen with two fingers while browsing the Internet or reading or editing a document.

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

The following table shows the supported touch feature on each operating system edition.

*Table 1. Operating system edition and supported touch feature*

| Operating system edition | Supported touch feature |
|---|---|
| Windows 7 Enterprise | Single-touch or multi-touch |
| Windows 7 Home Basic | Single-touch |
| Windows 7 Home Premium | Single-touch or multi-touch |
| Windows 7 Professional | Single-touch or multi-touch |
| Windows 7 Starter | Single-touch |
| Windows 7 Ultimate | Single-touch or multi-touch |
| Windows XP | None |

# Specifications

This section lists the physical specifications for your computer.

**Computer dimensions (without a stand and frame foot)**

  Width: 560 mm (22.05 inches)

  Height: 392 mm (15.43 inches)

  Depth: 79 mm (3.11 inches) or 86 mm (3.39 inches) (varies by configuration)

**Computer dimensions (with a stand and frame foot)**

  Width: 560 mm (22.05 inches)

  Maximum height:

  – 421.9 mm (16.61 inches) (with a frame stand and frame foot)

  – 566.9 mm (22.32 inches) (with a lift stand)

  Depth: ranges from 109 mm (4.29 inches) to 250 mm (9.84 inches) (varies by configuration)

**Computer weight**

  Maximum configuration as shipped: 14.1 kg (31.09 lbs)

**Touch screen dimensions**

  Width: 531.4 mm (20.92 inches)

  Height: 311.6 mm (12.27 inches)

  Depth: 2 mm (0.08 inch)

**Lift stand**

  Height adjustment: 110 mm (4.33 inches)

  Tilt adjustment: -5° to 25° from the vertical

**Frame stand**

  Tilt adjustment: 15° to 45° from the vertical

**Environment**

  Air temperature:

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

    Non-operating: -20° to 60°C (-4° to 140°F) (with package)

  Humidity:

    Operating: 20% to 80% (10% per hour, non-condensing)

    Non-operating: 20% to 80% (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

    High range:

      Minimum: 200 V ac

      Maximum: 240 V ac

      Input frequency range: 50 to 60 Hz

# 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 79.

**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 80.

**Note:** The ThinkVantage Productivity Center program is only available on computers preinstalled with 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 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.

**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.

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

**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.

### 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 76.

### PC-Doctor for Rescue and Recovery

The PC-Doctor for Rescue and Recovery diagnostic program is preinstalled on your ThinkCentre computer as part of the Rescue and Recovery workspace to help you diagnose hardware problems. It can also report operating-system-controlled settings that interfere with the correct operation of your system. Use the PC-Doctor for Rescue and Recovery diagnostic program if you are unable to start the Windows operating system. For more information, see "PC-Doctor for Rescue and Recovery" on page 77.

### Adobe Reader

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

See "Online Books folder" on page 79 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.

# Locating computer controls, connectors, and parts

This section provides information to help you locate your computer controls, connectors, and parts.

## Front view

Figure 1 shows the locations of the controls and parts on the front of your computer.
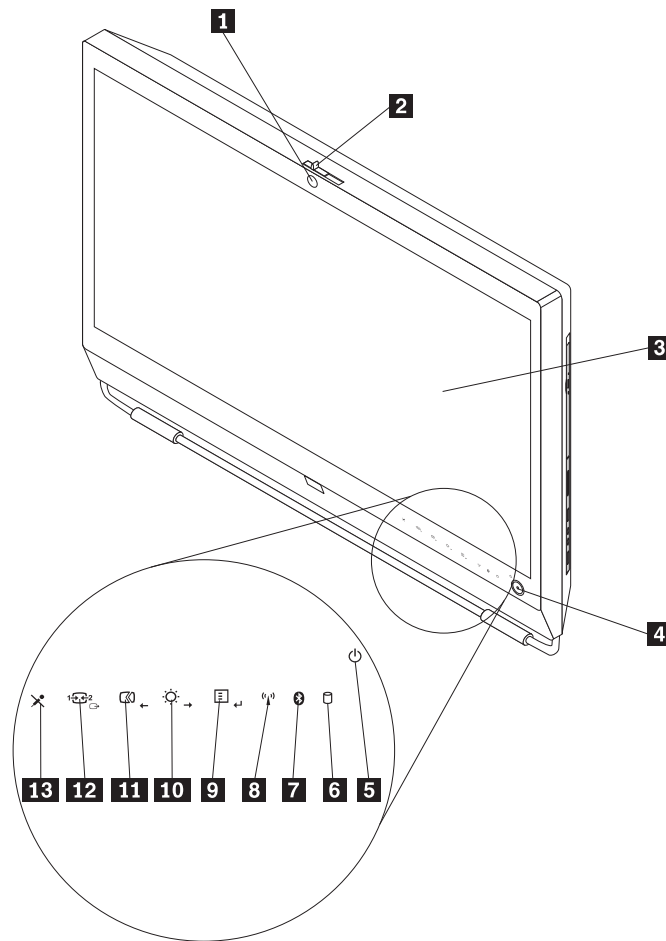


*Figure 1. Front control and part locations*

1 Integrated camera with MIC (microphone) (available in some models)
2 Integrated camera on/off button
3 Liquid crystal display (LCD) panel
4 Power switch
5 Power indicator
6 Hard disk drive activity indictor
7 Bluetooth activity indicator

8 Wireless activity indicator
9 Menu/Enter
10 Brightness control /Right
11 Image setup control /Left
12 Monitor mode control /Exit
13 Microphone mute/on control

## Using your computer in monitor mode

Your computer can work in two modes: computer mode or monitor mode. This section provides instructions on how to use your computer in monitor mode.

To use your computer in monitor mode, you need to have a second computer. Connect one end of the VGA cable to the VGA IN connector on the rear of your computer, and the other end to the VGA connector on the second computer. Use the monitor mode control ⏚ on the front of your computer to switch your computer between computer mode and monitor mode.

The following table shows the functions of each control when your computer works in computer mode or monitor mode.

| Icon | Control | Description |
|------|---------|-------------|
| ▣ ↵ | Menu | Open the main On-Screen Display (OSD) menu. |
| | Enter | Confirm a selection. |
| ☼ → | Brightness control | Adjust overall monitor brightness. |
| | Right | Move to the right. |
| ⬚ ← | Image setup control | Automatically optimize the image. |
| | Left | Move to the left. |
| ⏚ | Cancel/Exit | Cancel an operation or exit the main OSD menu. |
| | Monitor mode control | Switch your computer between computer mode and monitor mode. |

# Rear view

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.
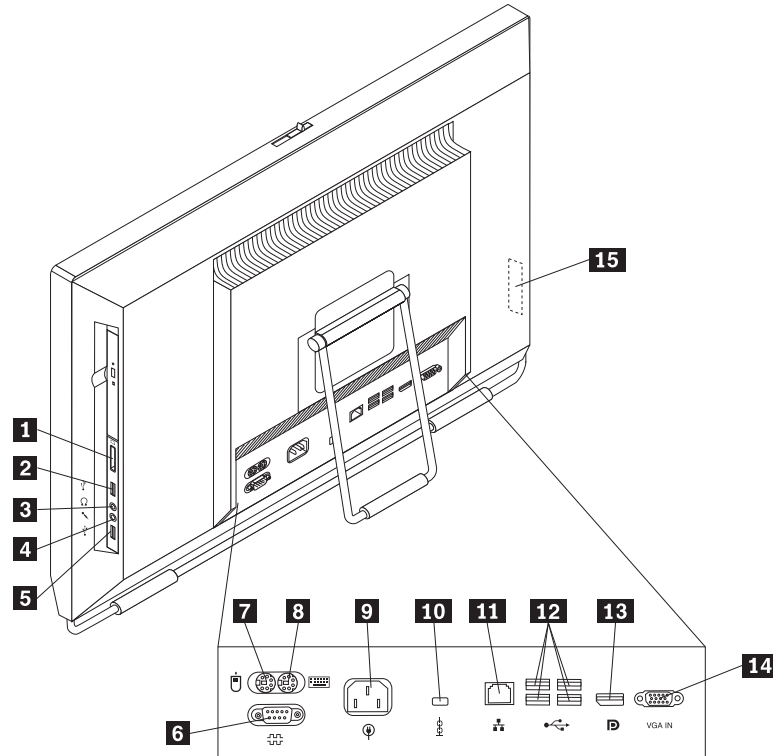


*Figure 2. Rear connector locations*

1 Card reader
(available in some models)
2 USB connector
3 Headphone connector
4 Microphone connector
5 USB connector
6 Serial port (available in some models)
7 PS/2 mouse connector
(available in some models)
8 PS/2 keyboard connector
(available in some models)

9 Power cord connector
10 Integrated cable lock slot
11 Ethernet connector
12 USB connectors (4)
13 DisplayPort out connector
14 VGA IN connector
15 ExpressCard slot
(available in some models)

| Connector | Description |
|---|---|
| DisplayPort out connector | Used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a DisplayPort 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 (optional) | Used to attach a keyboard that uses a PS/2 keyboard connector. |
| PS/2 mouse connector (optional) | Used to attach a mouse, a trackball, or other pointing devices that use a PS/2 mouse connector. |
| Serial port (optional) | 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 requires a USB connector, such as a USB keyboard, a USB mouse, a USB scanner, or a USB printer. If you have more than eight USB devices, you can purchase a USB hub, which you can use to connect additional USB devices. |
| VGA IN connector | Used to connect your computer to a VGA monitor connector on a second computer so that you can use your computer in monitor mode. |

# Component locations

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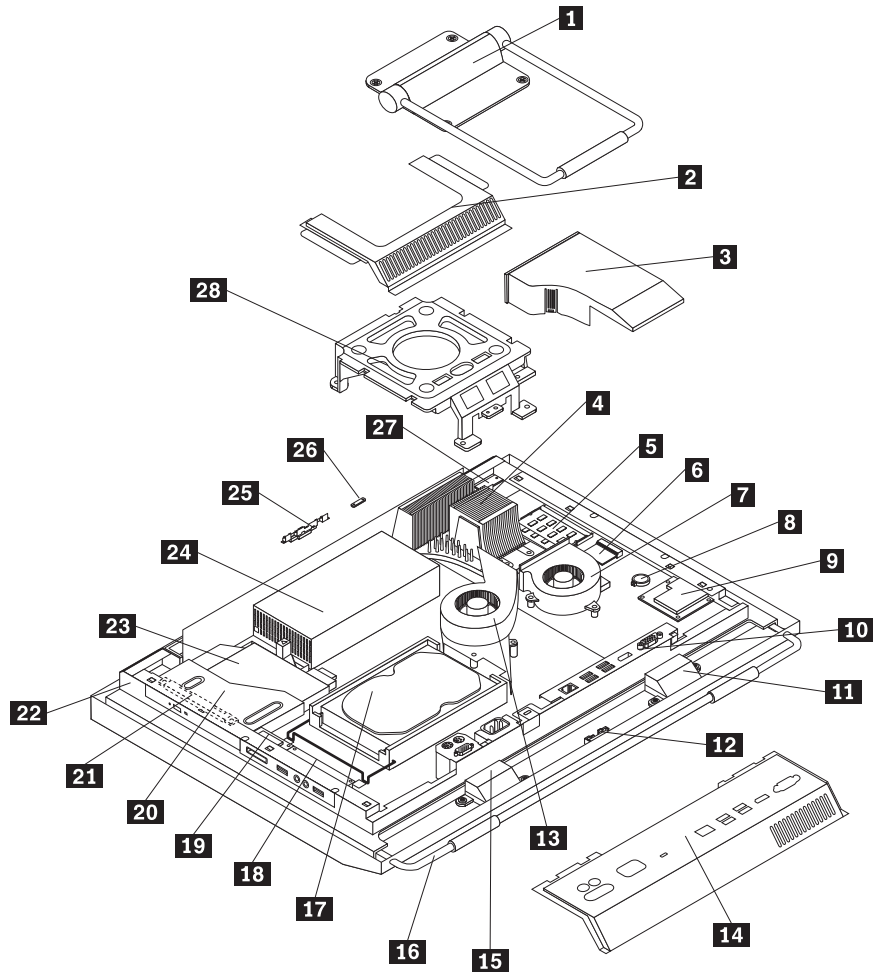


*Figure 3. Component locations*

| | | | |
|---|---|---|---|
| 1 | Frame stand | 15 | Internal speaker |
| 2 | Wall mount cover | 16 | Frame foot |
| 3 | Fan duct | 17 | Hard disk drive |
| 4 | Heat sink | 18 | Right I/O assembly |
| 5 | Memory modules (2) | 19 | Card reader* |
| 6 | WI-FI card* | 20 | Optical drive bay |
| 7 | Microprocessor fan | 21 | Inverter |
| 8 | Battery | 22 | Computer main bracket |
| 9 | ExpressCard* | 23 | Optical drive* |
| 10 | Rear I/O assembly | 24 | Power supply |
| 11 | Internal speaker | 25 | Integrated camera with microphone* |
| 12 | Bluetooth module* | 26 | Ambient light sensor* |
| 13 | System fan | 27 | Multi-touch board* |
| 14 | Rear I/O assembly cover | 28 | Wall mount |

**Notes:**

1. * denotes optional parts, which are available in some models.
2. Your computer might come with a frame stand or a lift stand. For more information about the lift stand, see "Removing or reinstalling the lift stand" on page 17.

## System board part and connector locations

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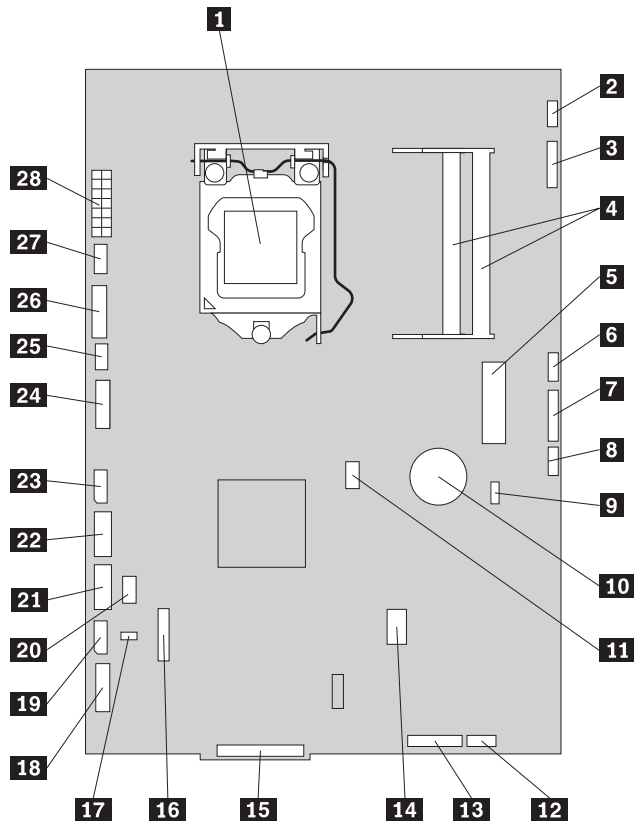


*Figure 4. System board part and connector locations*

1 Microprocessor
2 Multi-touch board cable connector
3 Integrated camera cable connector
4 Memory slots (2)
5 Mini PCI Express slot
6 Ambient light sensor cable connector
7 Bluetooth module cable connector
8 Wireless keyboard and mouse connector
9 Clear CMOS (Complementary Metal Oxide Semiconductor) /Recovery jumper
10 Battery

11 Microprocessor fan connector
12 Internal speaker cable connector
13 Power switch cable connector

15 Rear I/O assembly connector
16 COM connector
17 Thermal sensor connector
18 Right I/O assembly cable connector
19 Hard disk drive power connector
20 PS/2 keyboard and mouse connector
21 SATA connector
22 SATA connector
23 Optical drive power connector

24 Low-voltage differential signaling (LVDS) cable connector
25 System fan connector
26 Inverter connector
27 Power supply fan connector

`14` ExpressCard connector    `28` Power supply connector

# Chapter 2. Installing or replacing hardware

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

This chapter contains the following topics:
- "Installing or replacing hardware"
- "Obtaining device drivers" on page 56
- "Basic security features" on page 56

## Installing or replacing hardware

This section provides instructions on how to install or replace hardware for your computer. You can maintain your computer or expand the capabilities of your computer by installing or replacing 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 computer controls, connectors, and parts" on page 8 to identify the required connector. Then, use the instructions that come with the option to help you make the connection and install any software or device drivers that are required for the option.

### Installing a computer wall mount

Your computer supports UL (Underwriters Laboratories) certified 100 mm × 100 mm (3.94 inches × 3.94 inches) wall mounts. For proper mounting, use four screws of the following specifications:
Diameter × Pitch × Length: 4 mm × 0.7 mm × 10 mm (0.16 inch × 0.03 inch × 0.39 inch)

**Note:** When installing a computer wall mount, make sure that you leave at least a 60 mm (2.36 inches) space between the wall and your computer for easy access to the connectors on the rear of your computer.

# 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 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.  Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3.  Remove any locking device that secures the computer cover, such as an integrated cable lock. See "Integrated cable lock" on page 57.
4.  Press the two cover-release buttons on the computer cover as shown, slide the computer cover toward the top of the computer, and then lift the computer cover up to remove it from the chassis.
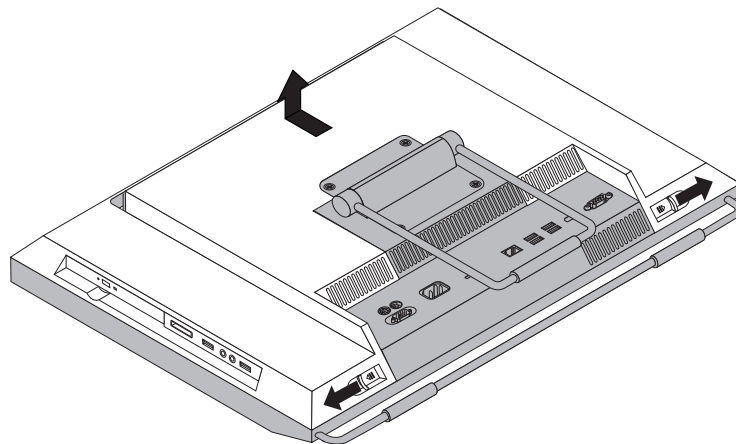


*Figure 5. Removing the computer cover*

## Removing or reinstalling the frame stand

Your computer might come with a frame stand or a lift stand. This section provides instructions on how to remove or reinstall the frame stand. For information about the lift stand, see "Removing or reinstalling the lift stand" on page 17.

To remove or reinstall the frame stand, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the four screws that secure the frame stand. Keep the four screws, and put them aside. You will need them when installing the frame stand.
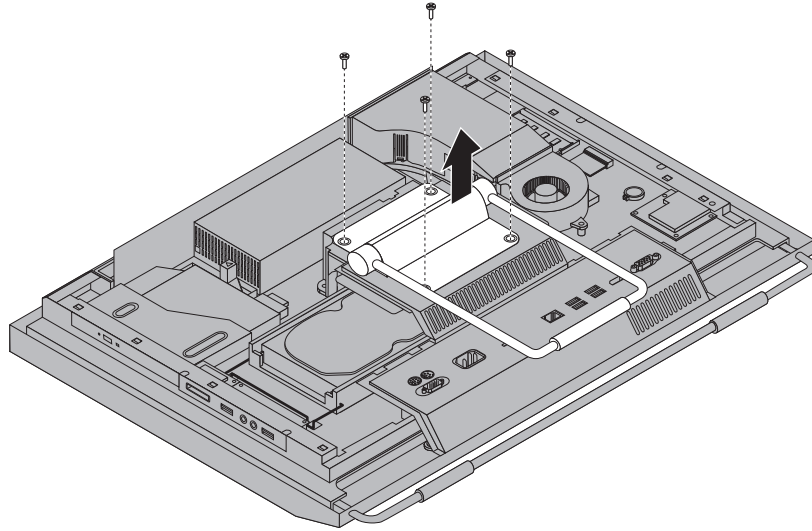
*Figure 6. Removing the frame stand*

4. Lift the frame stand off the computer and put it in a safe place.

5. To reinstall the frame stand, position the frame stand so that the four screw holes align with those in the computer wall mount and then install the four screws to secure the frame stand.

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**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 55.
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## Removing or reinstalling the lift stand

Your computer might come with a lift stand or a frame stand. This section provides instructions on how to remove or reinstall the lift stand. For information about the frame stand, see "Removing or reinstalling the frame stand" on page 16.

To remove or reinstall the lift stand, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the three screws that secure the lift stand. Keep the three screws, and put them aside. You will need them when installing the lift stand. Remove the lift stand from the computer.
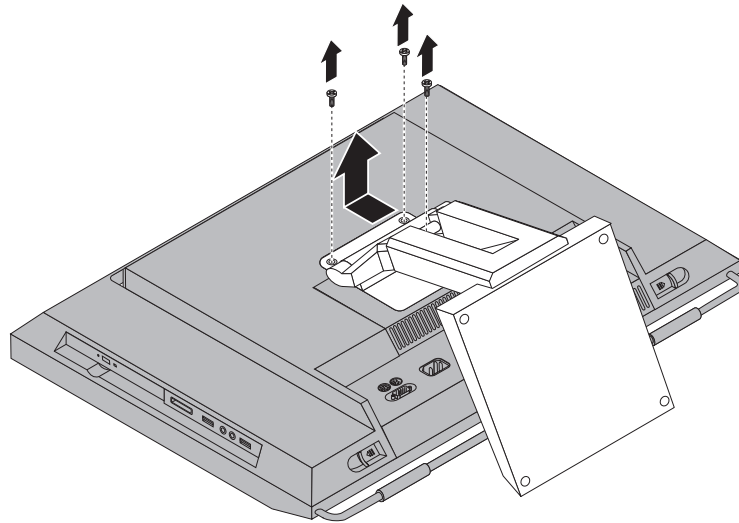


*Figure 7. Removing the lift stand*

4. To reinstall the lift stand, insert the two tabs **1** on the lift stand into the corresponding holes in the computer wall mount, and then slide the lift stand toward the bottom of the computer. Align the three screw holes in the lift stand with those in the computer wall mount and then install the three screws to secure the lift stand.
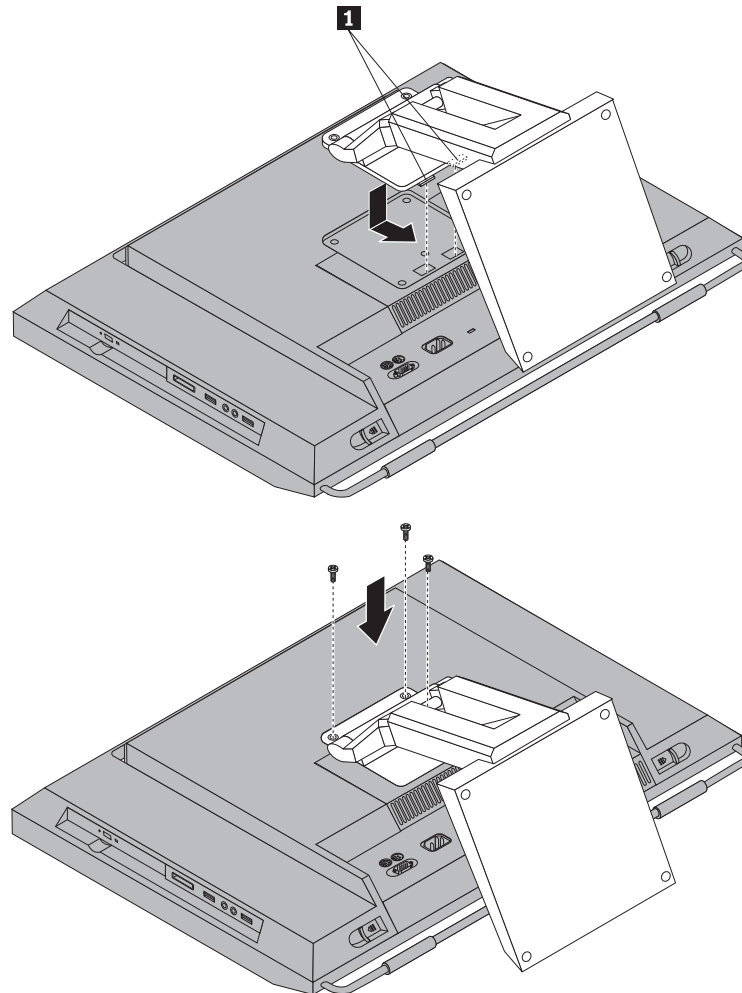


*Figure 8. Reinstalling the lift stand*

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**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 55.

# Removing or reinstalling the rear I/O assembly cover

This section provides instructions on how to remove or reinstall the rear I/O assembly cover.

To remove or reinstall the rear I/O assembly cover, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the computer cover. See "Removing the computer cover" on page 16.

4. Locate the rear I/O assembly cover. See "Component locations" on page 12.

5. Carefully release the bottom of the rear I/O assembly cover from the computer front bezel and then release the top of the rear I/O assembly cover from the computer wall mount cover.
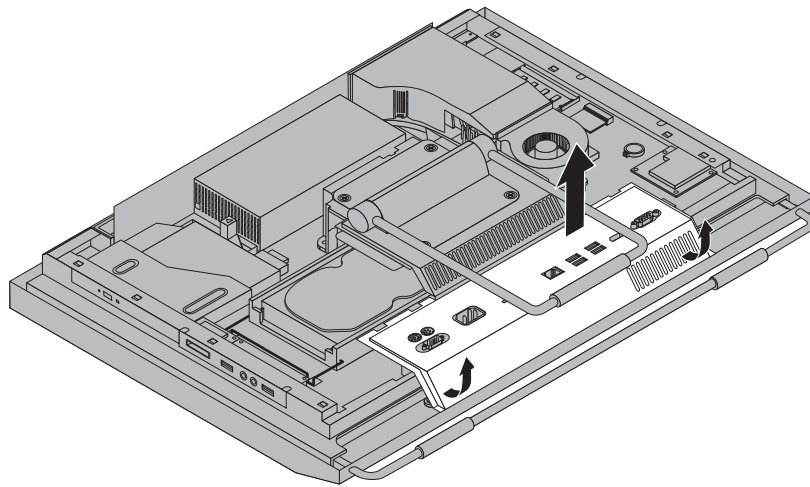
*Figure 9. Removing the rear I/O assembly cover*

6. To reinstall the rear I/O assembly cover, engage the bottom of the rear I/O assembly cover with the computer front bezel and then press the top of the rear I/O assembly cover downward until it snaps into place.

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**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 55.

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# Removing or reinstalling the wall mount cover

To remove or reinstall the wall mount cover, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the computer cover. See "Removing the computer cover" on page 16.

4. Remove the rear I/O assembly cover from the rear I/O assembly. See "Removing or reinstalling the rear I/O assembly cover" on page 20.

5. Remove the frame stand or lift stand. See "Removing or reinstalling the frame stand" on page 16 or "Removing or reinstalling the lift stand" on page 17.

6. Remove the screw that secures the wall mount cover, slide the wall mount cover to the bottom of the computer, and then lift it up to remove it from the wall mount.
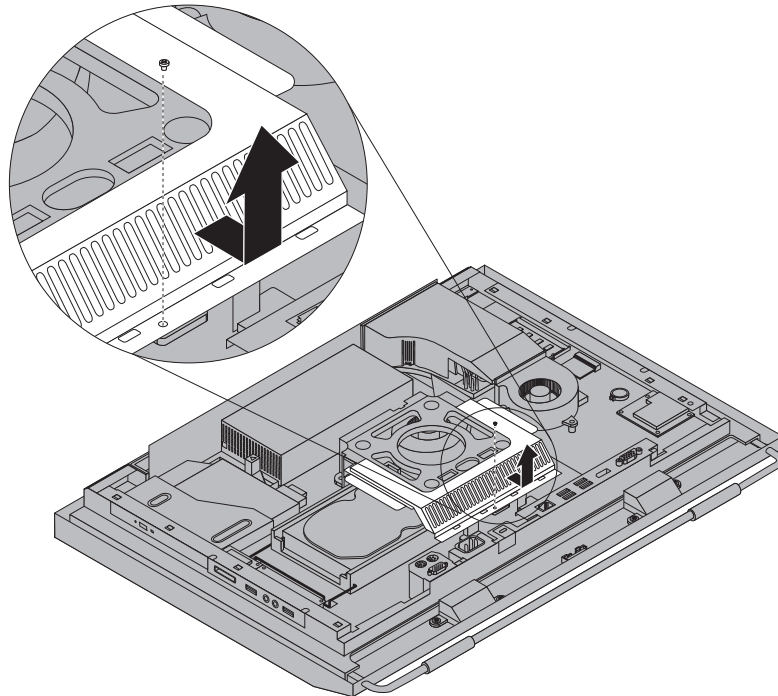


*Figure 10. Removing the wall mount cover*

7. To reinstall the wall mount cover, align the screw hole in the wall mount cover with the corresponding hole in the wall mount and then install the screw to secure the wall mount cover.

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**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 55.

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## Removing or reinstalling the wall mount

To remove or reinstall the wall mount, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the computer cover. See "Removing the computer cover" on page 16.

4. Remove the rear I/O assembly cover from the rear I/O assembly. See "Removing or reinstalling the rear I/O assembly cover" on page 20.

5. Remove the frame stand or lift stand. See "Removing or reinstalling the frame stand" on page 16 or "Removing or reinstalling the lift stand" on page 17.

6. Remove the wall mount cover. See "Removing or reinstalling the wall mount cover" on page 20.

7. Disconnect the thermal sensor cable from the system board. See "System board part and connector locations" on page 13.

8. Remove the four screws **1** that secure the wall mount to the computer main bracket and then lift the wall mount off the computer main bracket.
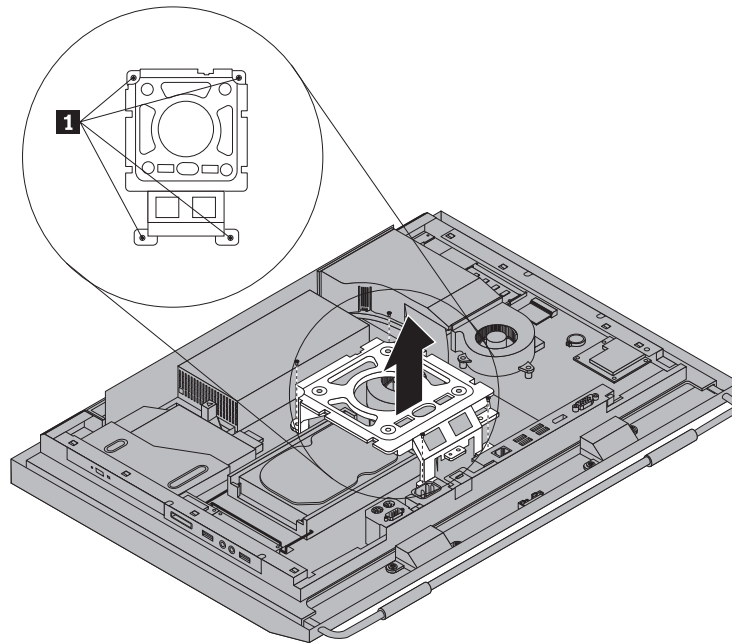


*Figure 11. Removing the computer wall mount*

9. To reinstall the computer wall mount, position the wall mount on the computer main bracket and align the screw holes in the wall mount with those in the computer main bracket.

10. Reinstall the four screws to secure the wall mount to the computer main bracket.

11. Reconnect the thermal sensor cable to the system board. See "System board part and connector locations" on page 13.

12. Reinstall the wall mount cover. See "Removing or reinstalling the wall mount cover" on page 20.

# 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 SODIMMs (small outline dual inline memory modules). When installing or replacing a memory module, use 1 gigabytes (GB) or 2 GB DDR3 SODIMMs in any combination up to a maximum of 4 GB of system memory.

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

1. Remove all media from the drives and turn off all attached devices and the computer. Then, disconnect all power cords from electrical outlets and disconnect all cables that are connected to the computer.
2. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Locate the memory slots. See "Component locations" on page 12.
5. Open the retaining clips. If you are replacing an old memory module, open the retaining clips and remove the old memory module, as shown:
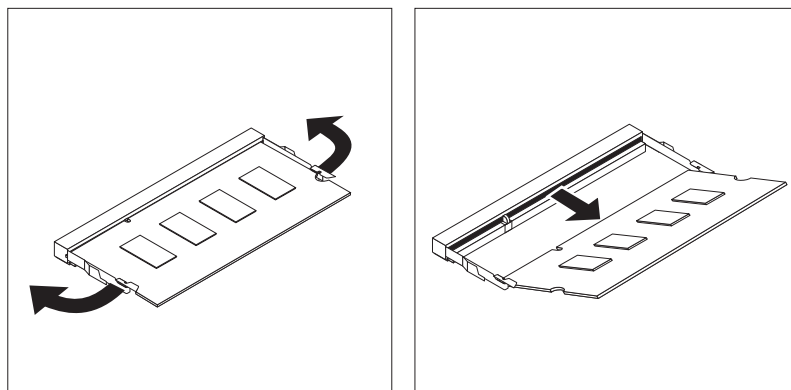


*Figure 12. Removing the memory module*

6. Insert the notched end **2** of the new memory module into the slot **1** . Press the memory module firmly and pivot the memory module until it snaps into place. Make sure that the memory module is secured in the slot and does not move easily.
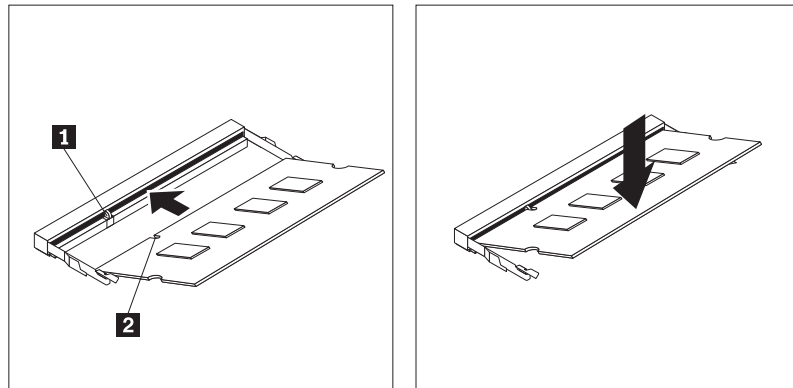


*Figure 13. Installing a memory module*

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**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 55.

## Replacing the battery

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

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This section provides instructions on how to replace the battery.

Your computer has a special type of memory that maintains the date, time, and settings for built-in features, such as parallel-port assignments (configuration). A battery keeps the information active when you turn off the computer.

The battery normally requires no charging or maintenance throughout its life. However, if the battery fails, the date, time, and configuration information (including passwords) are lost. An error message will be displayed when you turn on the computer.

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

To replace the battery, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the computer cover. See "Removing the computer cover" on page 16.

4. Locate the battery on the system board. See "System board part and connector locations" on page 13.

5. Remove the battery.
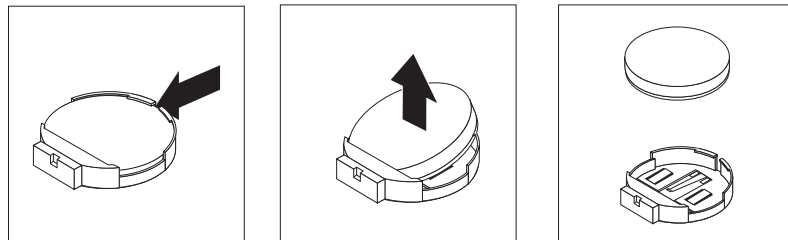


*Figure 14. Removing the battery*

6. Install a new battery.
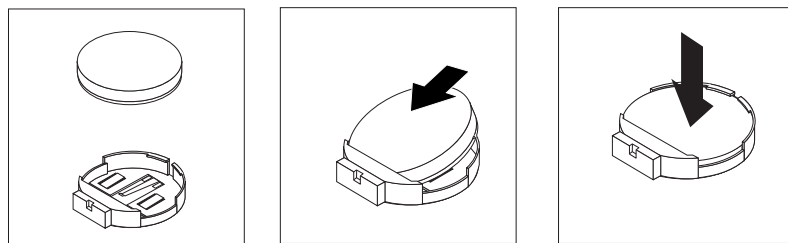


*Figure 15. Installing a new battery*

7. Reinstall the computer cover and connect the cables. See "Completing the parts replacement" on page 55.

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

8. Turn on the computer and all attached devices.

9. Use the Setup Utility program to set the date, time, and any passwords. See Chapter 4, "Using the Setup Utility program," on page 67.

---
**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 55.

---

# Replacing the hard disk drive

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

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

To replace the hard disk drive, do the following:

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

2. Remove the computer cover. See "Removing the computer cover" on page 16.

3. Locate the hard disk drive in the computer. See "Component locations" on page 12.

4. Pull the handle **1** of the hard disk drive bracket upward and then slide the hard disk drive outward to remove it from the hard disk drive bay.
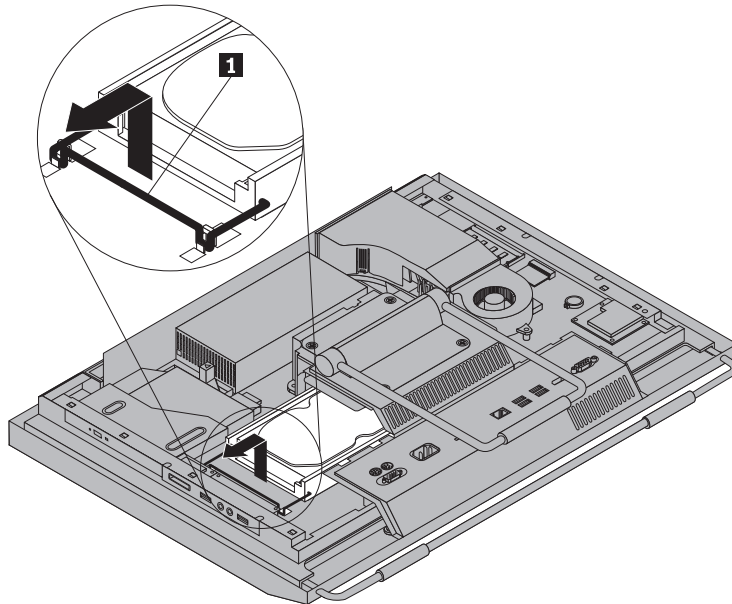


*Figure 16. Removing the hard disk drive*

5. Flex the sides of the hard disk drive bracket properly to remove the hard disk drive out of the bracket.

6. To install the new hard disk drive into the bracket, flex the bracket and align pin **1**, pin **2**, pin **3**, and pin **4** on the bracket with the corresponding holes in the hard disk drive. Do not touch the circuit board **5** on the bottom of the hard disk drive.
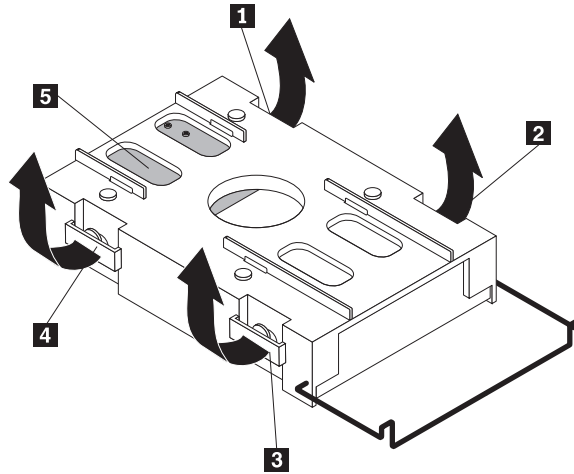


*Figure 17. Installing the hard disk drive into the bracket*

7. Align the four pins **1** on the hard disk drive bracket with the corresponding slots in the hard disk drive bay.
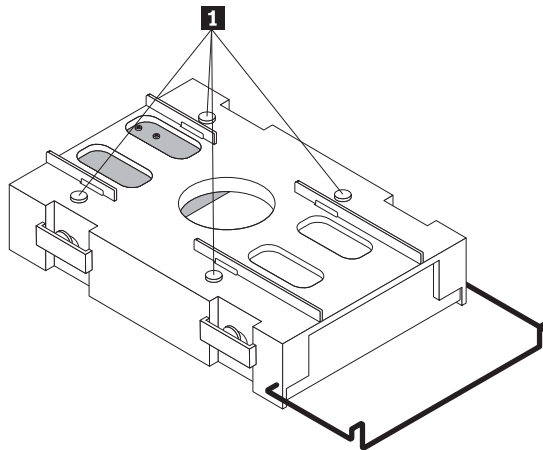


*Figure 18. Installing the hard disk drive*

8. Slide the new hard disk drive with the bracket into the hard disk drive bay. Press the handle of the hard disk drive bracket downward until it is secured by the two tabs **1**.
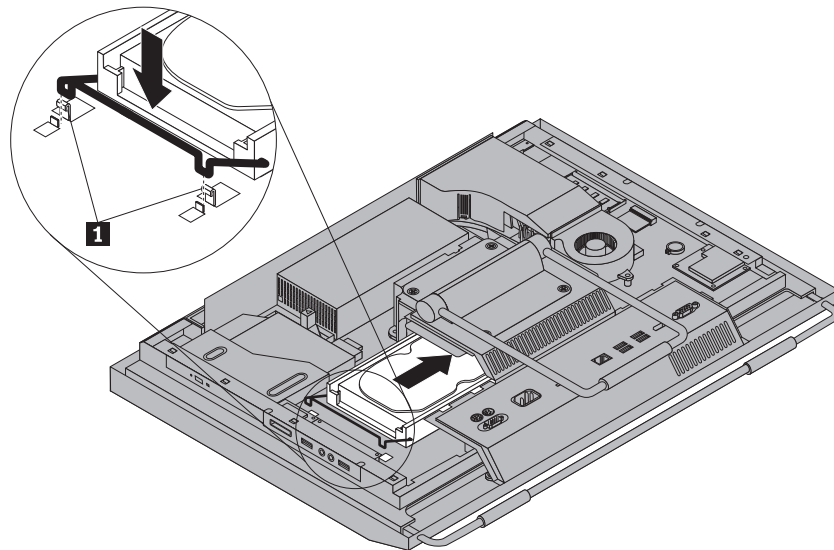


*Figure 19. Installing the hard disk drive*

> **What to do next:**
> - To work with another piece of hardware, go to the appropriate section.
> - To complete the installation or replacement, go to "Completing the parts replacement" on page 55.

## 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.

**Note:** The optical drive is available only in some models.

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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the computer cover. See "Removing the computer cover" on page 16.

4. Locate the optical drive. See "Component locations" on page 12.

5. Press the optical drive release button **1** toward the top of the computer and then slide the optical drive out of the optical drive bay.
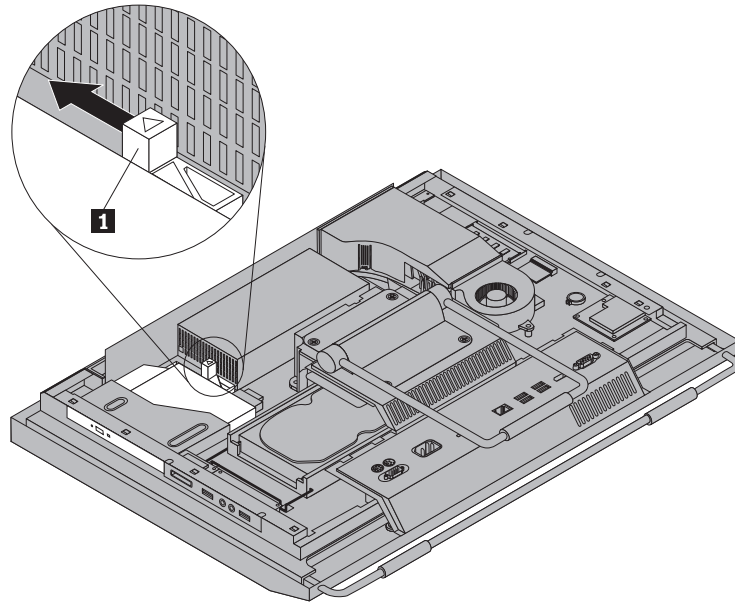


*Figure 20. Removing the optical drive*

6. To install a new optical drive, slide the new optical drive into the optical drive bay until it snaps into position.



*Figure 21. Installing the optical drive*

---
**What to do next:**
- To work with another piece of hardware, go to the appropriate section.
- To complete the installation or replacement, go to "Completing the parts replacement" on page 55.
---

## Replacing the heat sink

---
**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.

**CAUTION:**



**The heat sink 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, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Locate the heat sink on the system board. See "Component locations" on page 12.
5. Remove the fan duct by pressing the two tabs **1** inward and then pivoting the fan duct upward.
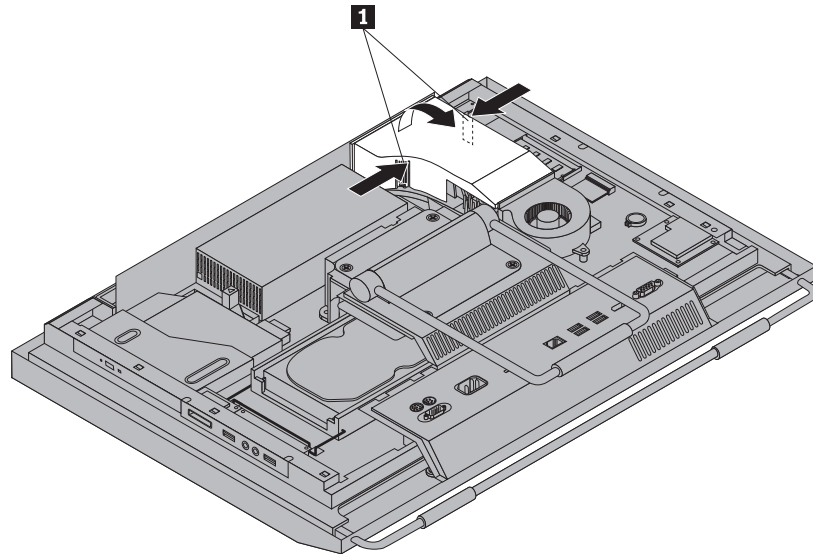


*Figure 22. Removing the fan duct*

6. Follow this sequence to remove the four screws that secure the heat sink to the system board:

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

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

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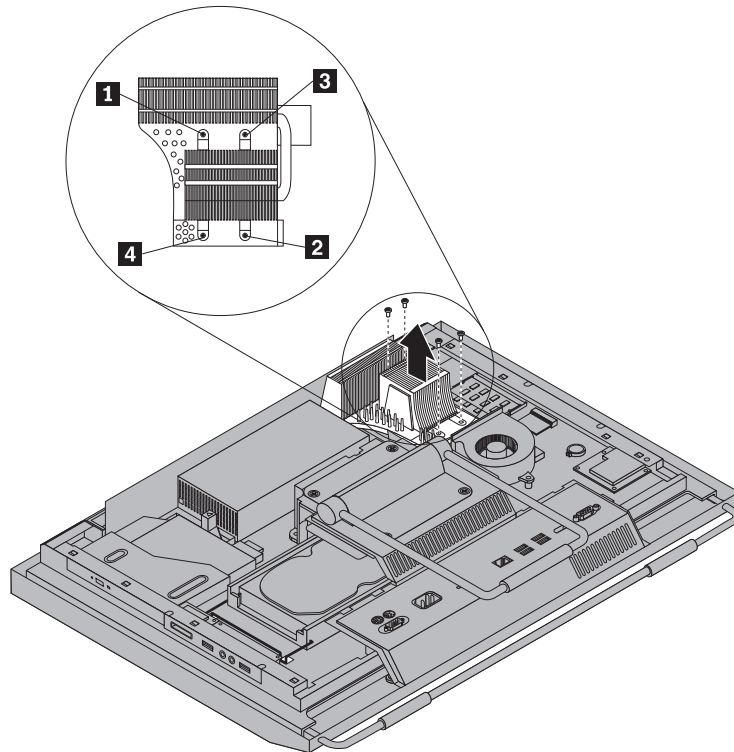


*Figure 23. Removing the heat sink*

7. Lift the failing heat sink off the system board.

   **Notes:**

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

   b. Do not touch the thermal grease while handling the heat sink.

8. Position the new heat sink on the system board so that the four screws are aligned with the corresponding holes in the system board.

9. Follow this sequence to install the four screws to secure the heat sink, as shown in Figure 23.

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

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

10. To reinstall the fan duct, position the fan duct on the heat sink and then press the fan duct downward until the two tabs on the fan duct are secured into place.
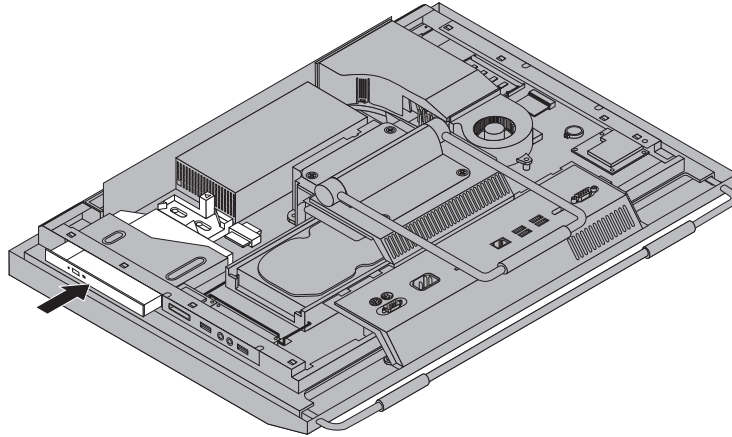
> **What to do next:**
> - To work with another piece of hardware, go to the appropriate section.
> - To complete the installation or replacement, go to "Completing the parts replacement" on page 55.

## 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Remove the fan duct and the heat sink from the system board. See "Replacing the heat sink" on page 30.

5. Lift the small handle **1** and open the retainer **2** to access the microprocessor **3** .
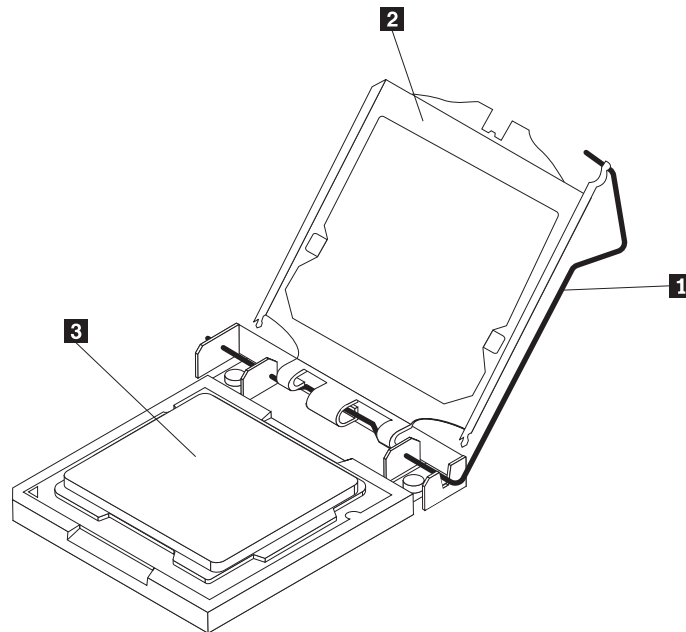
6. Lift the microprocessor straight up and out of the socket. See Figure 24 on page 35.

   **Notes:**

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

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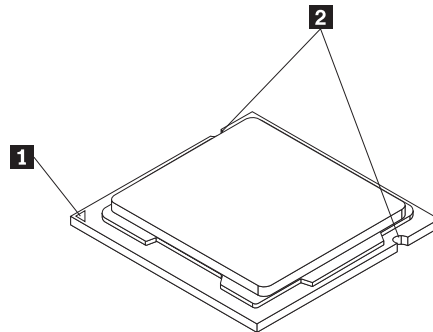
   c. Touch only the sides of the microprocessor. Do not touch the gold contacts on the bottom.

   d. Do not drop anything onto the microprocessor socket while it is exposed. The socket pins must be kept as clean as possible.
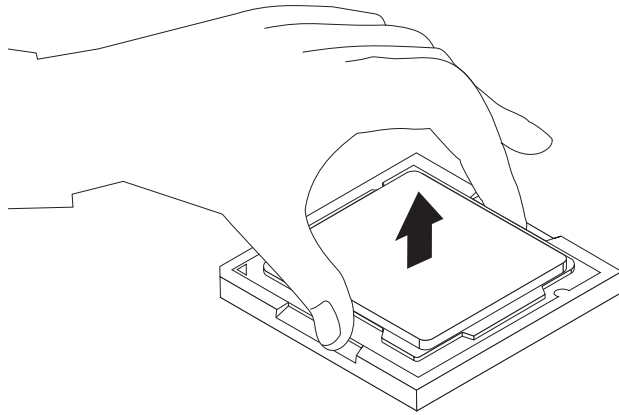
*Figure 24. Removing the microprocessor*

7. Make sure that the small handle is in the raised position and the microprocessor retainer is fully open.

8. Hold the new microprocessor and align the notches **2** on it with the alignment keys in the microprocessor socket, or align the small triangle **1** on one corner of the new microprocessor with the corresponding beveled corner of the microprocessor socket.
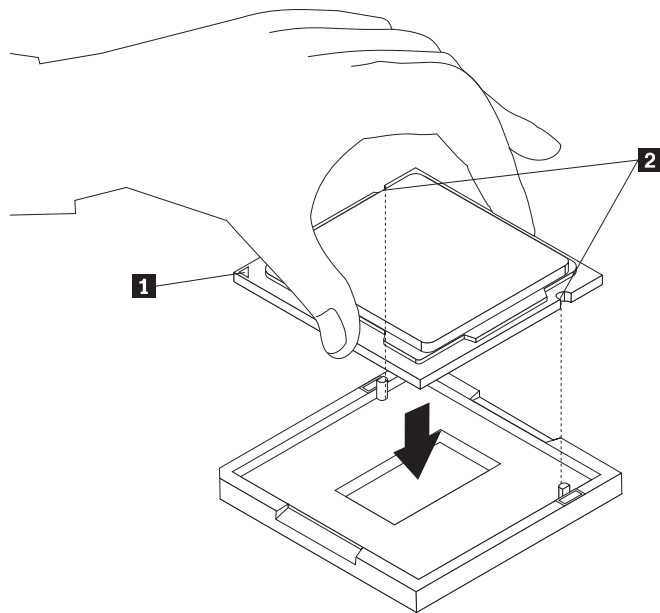


*Figure 25. Installing the microprocessor*

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

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

11. Reinstall the heat sink and the fan duct. See "Replacing the heat sink" on page 30.

12. Reinstall any other parts or reconnect any other cables you 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 55.

## Replacing the WI-FI 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 replace the WI-FI card.

**Note:** The WI-FI card is available only in some models.

To replace the WI-FI 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Locate the WI-FI card on the system board. See "Component locations" on page 12.
5. Disconnect the two cables from the WI-FI card.

6. Carefully remove the two screws that secure the WI-FI card to the system board. Then, pivot the WI-FI card upward and lift the WI-FI card to remove it from the mini PCI Express slot.
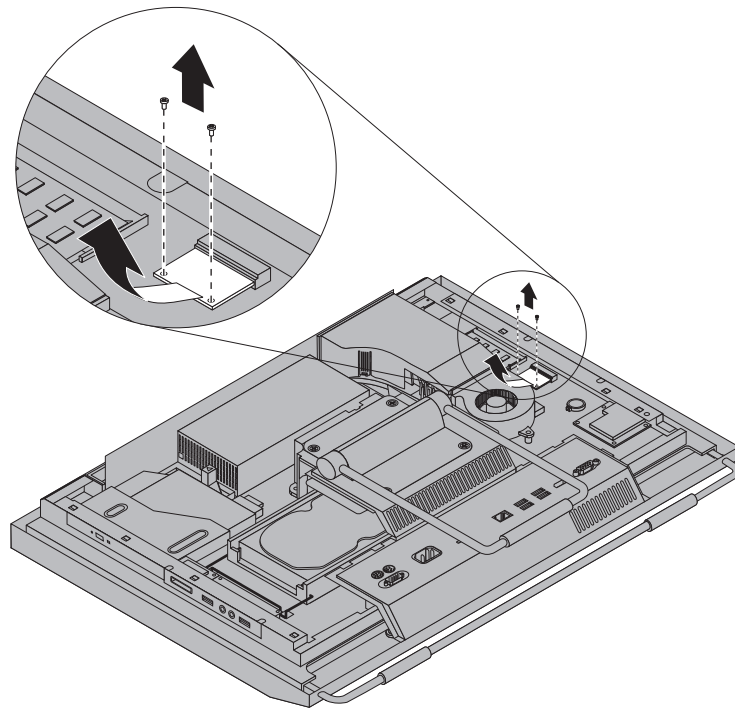


*Figure 26. Removing the WI-FI card*

7. Insert the notched end of the new WI-FI card into the mini PCI Express slot. Press the new WI-FI card firmly and then pivot the WI-FI card to align the screw holes in the new WI-FI card with those in the system board.
8. Install the two screws to secure the new WI-FI card to the system board.
9. Connect the two cables to the new WI-FI card.

---

**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 55.

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## Replacing the Bluetooth module

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**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 Bluetooth module.

**Note:** The Bluetooth module is available only in some models.

To replace the Bluetooth 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the computer cover. See "Removing the computer cover" on page 16.

4. Remove the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.

5. Locate the Bluetooth module in the computer. See "Component locations" on page 12.

6. Note the Bluetooth module cable routing and disconnect the cable from the system board.

7. Carefully release the Bluetooth module and lift the Bluetooth module out of the computer.
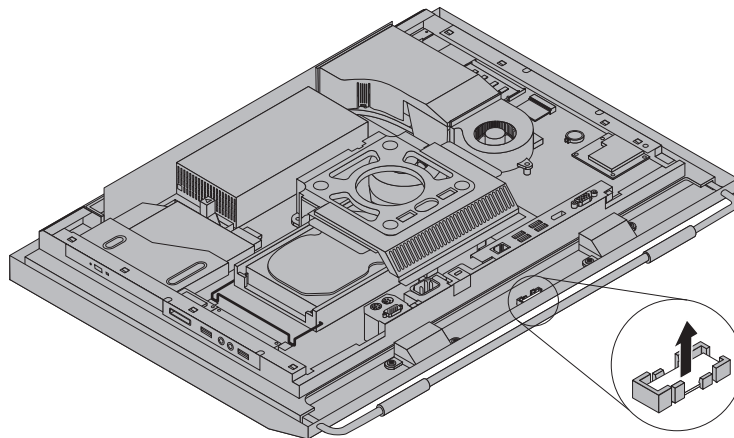


*Figure 27. Removing the Bluetooth module*

8. Position the new Bluetooth module into the computer front bezel and then press the new Bluetooth module downward until it is secured into place.

9. Connect the new Bluetooth module cable to the system board. See "System board part and connector locations" on page 13.

10. Reinstall the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.

---

**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 55.

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# Replacing the multi-touch board

> **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 multi-touch board.

**Note:** The multi-touch board is available only in some models.

To replace the multi-touch board, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Locate the multi-touch board in the computer. See "Component locations" on page 12.
5. Note the multi-touch board cable routing and disconnect the three multi-touch board cables from the system board and the multi-touch screen.
6. Carefully remove the two screws **1** that secure the multi-touch board and then lift the multi-touch board off the computer main bracket.
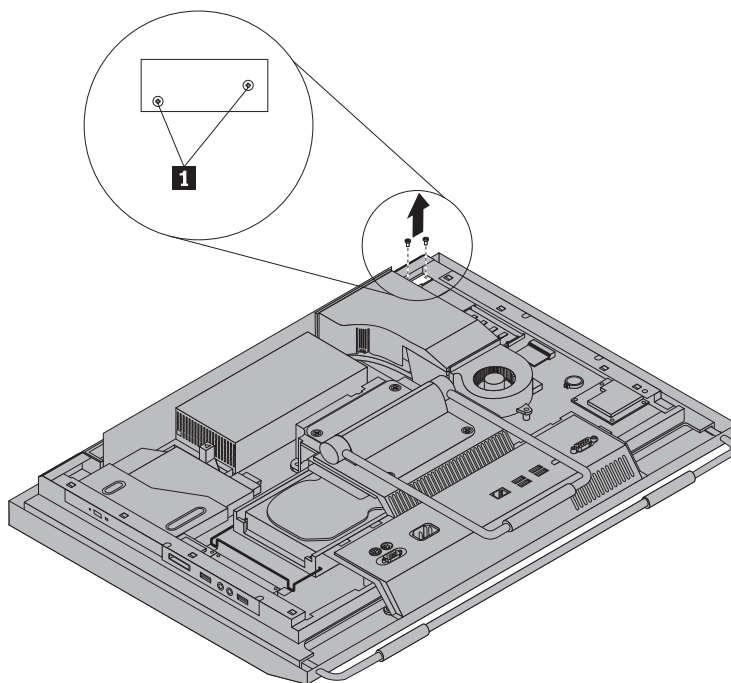


*Figure 28. Removing the multi-touch board*

7. Align the screw holes in the new multi-touch board with those in the computer main bracket and then install the two screws to secure the multi-touch board.

8. Connect the new multi-touch board cables to the system board and the multi-touch screen. See "System board part and connector locations" on page 13.

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**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 55.

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## Replacing the ambient light sensor

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**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 ambient light sensor.

**Note:** The ambient light sensor is available only in some models.

To replace the ambient light sensor, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.

3. Remove the computer cover. See "Removing the computer cover" on page 16.

4. Locate the ambient light sensor in the computer. See "Component locations" on page 12.

5. Carefully remove the two screws **1** that secure the ambient light sensor and then lift the ambient light sensor out of the computer.
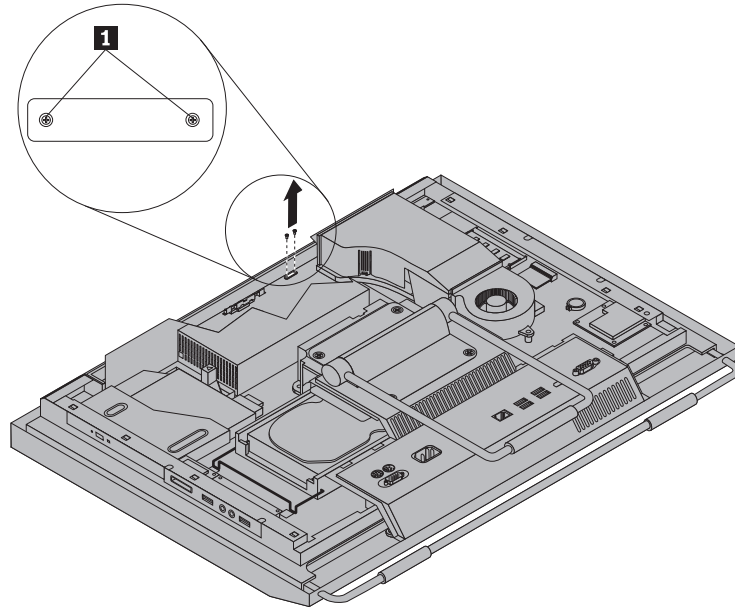


*Figure 29. Removing the ambient light sensor*

6. Disconnect the ambient light sensor cable from the system board.
7. Align the screw holes in the new ambient light sensor with the corresponding holes in the computer and then install the two screws to secure the ambient light sensor.
8. Connect the new ambient light sensor cable to the system board. See "System board part and connector locations" on page 13.

---

**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 55.

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## Replacing the ExpressCard

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**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 ExpressCard.

**Note:** The ExpressCard is available only in some models.

To replace the ExpressCard, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Locate the ExpressCard in the computer. See "Component locations" on page 12.
5. Carefully remove the four screws **1** that secure the ExpressCard to the system board and then lift it off the system board.
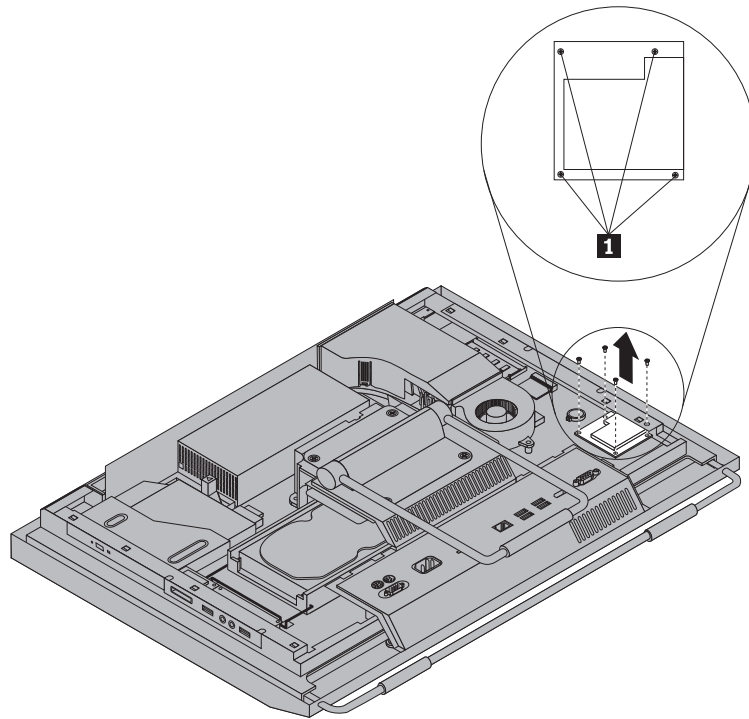


*Figure 30. Removing the ExpressCard*

6. Connect the new ExpressCard to the ExpressCard connector on the system board. Align the screw holes in the new ExpressCard with the corresponding holes in the system board and then install the four screws to secure the new ExpressCard.

---

**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 55.

---

## Replacing the internal speakers

> **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 internal speakers.

To replace the internal speakers, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Remove the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.
5. Locate the internal speakers in the computer. See "Component locations" on page 12.
6. Note the location of the internal speaker cable connection. Note the routing of the internal speaker cables. Disconnect the internal speaker cables from the system board.

7. Remove the two screws **1** that secure each internal speaker to the front bezel, and then remove the internal speakers from the computer.
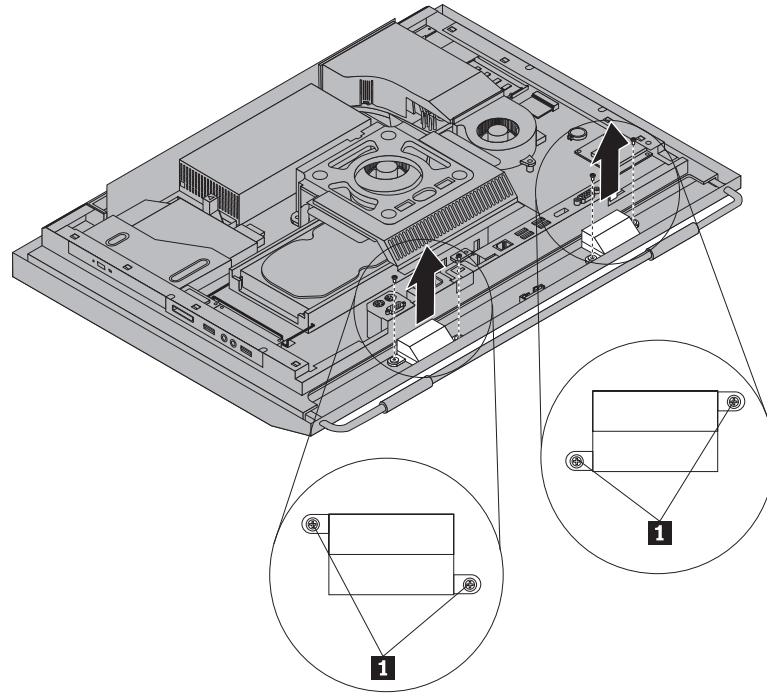


*Figure 31. Removing the internal speakers*

8. Route the new internal speaker cables and then position the new internal speakers on the front bezel so that the two screw holes in each internal speaker align with those in the front bezel.
9. Reinstall the two screws to secure each of the internal speakers to the front bezel.
10. Reconnect the internal speaker cables to the system board. See "System board part and connector locations" on page 13.
11. Reinstall the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.

---

**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 55.

---

## Replacing the integrated camera with microphone

---

**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 integrated camera with microphone.

**Note:** The integrated camera with microphone is available only in some models.

To replace the integrated camera with microphone, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Locate the integrated camera with microphone in the computer. See "Component locations" on page 12.
5. Note the routing of the integrated camera cable and then disconnect the integrated camera cable from the system board. See "System board part and connector locations" on page 13.
6. Remove the two screws **1** that secure the integrated camera with microphone to the front bezel, and then remove the integrated camera with microphone from the computer.
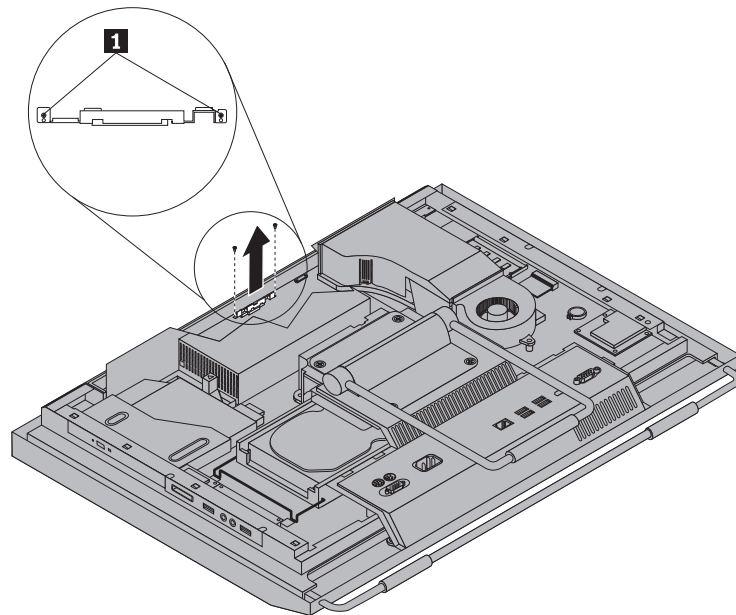


*Figure 32. Removing the integrated camera with microphone*

7. Route the new integrated camera cable and then position the new integrated camera with microphone in place. Align the two screw holes in the new integrated camera with microphone with those in the front bezel.
8. Reinstall the two screws to secure the new integrated camera with microphone to the front bezel.
9. Connect the integrated camera cable to the system board. See "System board part and connector locations" on page 13.

> **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 55.

## Replacing the microprocessor 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 microprocessor fan assembly.

To replace the microprocessor 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Remove the frame stand or lift stand. See "Removing or reinstalling the frame stand" on page 16 or "Removing or reinstalling the lift stand" on page 17.
5. Remove the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.
6. Remove the wall mount cover. See "Removing or reinstalling the wall mount cover" on page 20.
7. Note the routing of the microprocessor fan assembly cable and then disconnect the microprocessor fan assembly cable from the system board.

8. Remove the three screws  **1**  that secure the microprocessor fan assembly and then lift the microprocessor fan assembly off the system board.
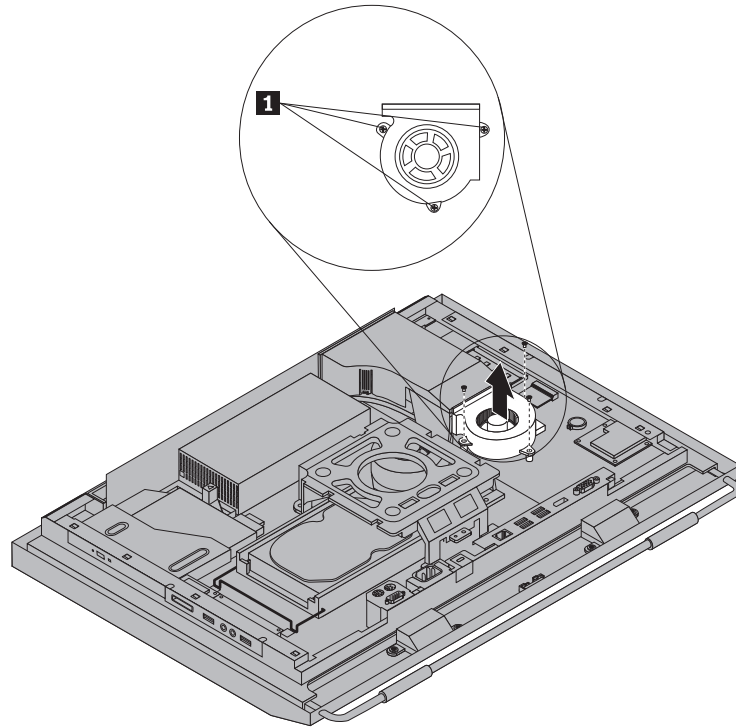


*Figure 33. Removing the microprocessor fan assembly*

9. Position the new microprocessor fan assembly on the system board and align the three screw holes in the new microprocessor fan assembly with those in the system board.
10. Install the three screws to secure the microprocessor fan assembly to the system board.
11. Connect the microprocessor fan assembly cable to the system board. See "System board part and connector locations" on page 13.
12. Reinstall the wall mount cover and the rear I/O assembly cover.

---

**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 55.

---

## Replacing the card reader

---

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

---

This section provides instructions on how to replace the card reader.

**Note:** The card reader is available only in some models.

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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Locate the card reader in the computer. See "Component locations" on page 12.
5. Disconnect the USB cable from the card reader.
6. Remove the two screws that secure the card reader and then lift the card reader out of the computer.
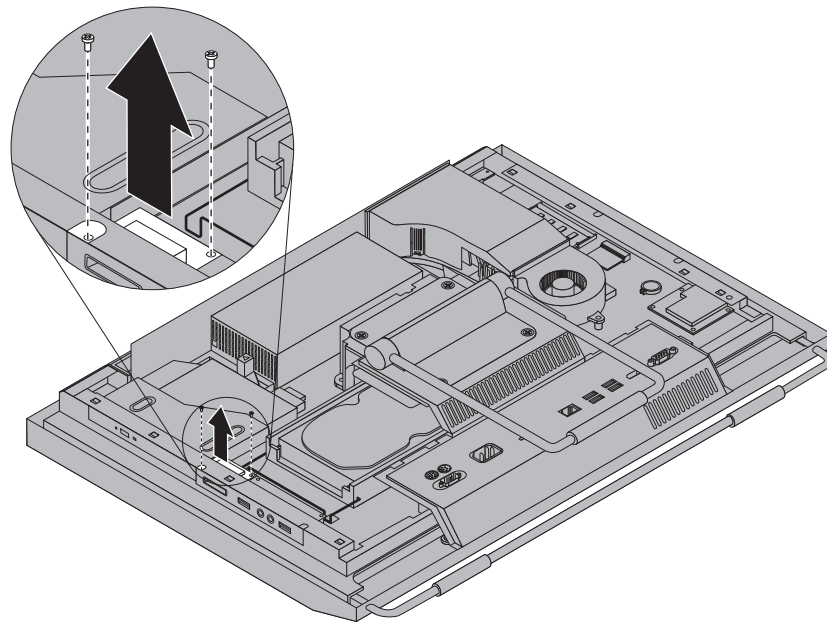


*Figure 34. Removing the card reader*

7. Align the screw holes in the new card reader with those in the computer and then install the two screws to secure the card reader.
8. Connect the USB cable to the new card reader.

---

**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 55.

---

# Replacing the rear I/O 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 I/O assembly.

To replace the rear I/O 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Remove the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.
5. Locate the rear I/O assembly. See "Component locations" on page 12.

6. Remove the four screws **1** that secure the rear I/O assembly and then remove the rear I/O assembly from the computer.
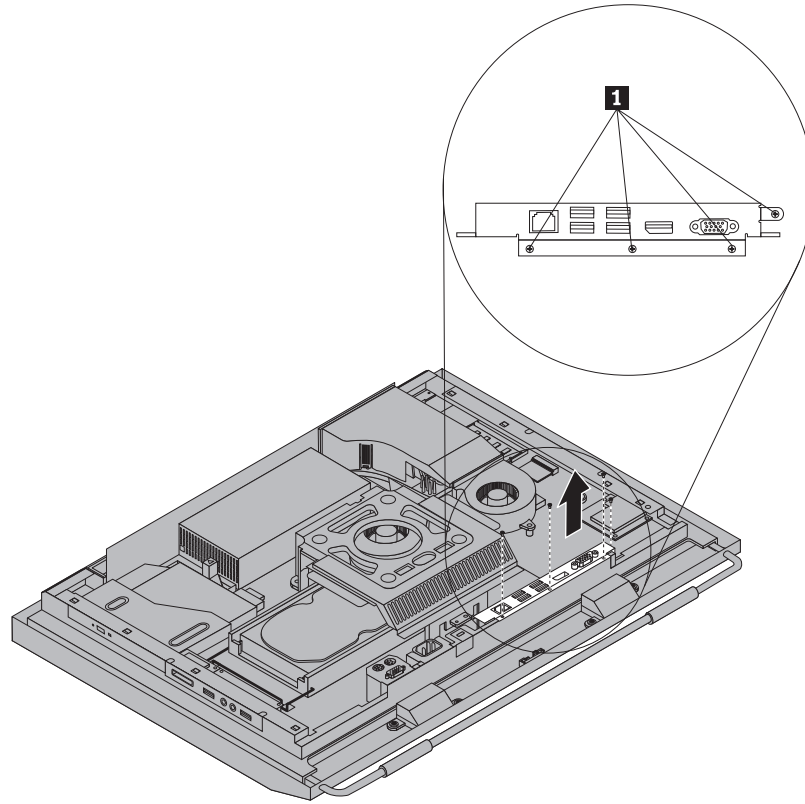


*Figure 35. Removing the rear I/O assembly*

7. To install the new rear I/O assembly into the computer, connect the new rear I/O assembly to the rear I/O assembly connector on the system board, and then align the four screw holes with those in the computer main bracket. See "System board part and connector locations" on page 13.
8. Install the four screws to secure the rear I/O assembly to the computer main bracket.
9. Reinstall the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.

---
**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 55.
---

## Replacing the right I/O 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 right I/O assembly.

To replace the right I/O 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your
   computer and gently lay it down so that the screen is against the surface and
   the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Locate the right I/O assembly. See "Component locations" on page 12.
5. Disconnect the right I/O assembly cable and the intrusion switch cable from
   the right I/O assembly.
6. Remove the three screws **1** that secure the right I/O assembly and then
   remove the right I/O assembly from the computer.
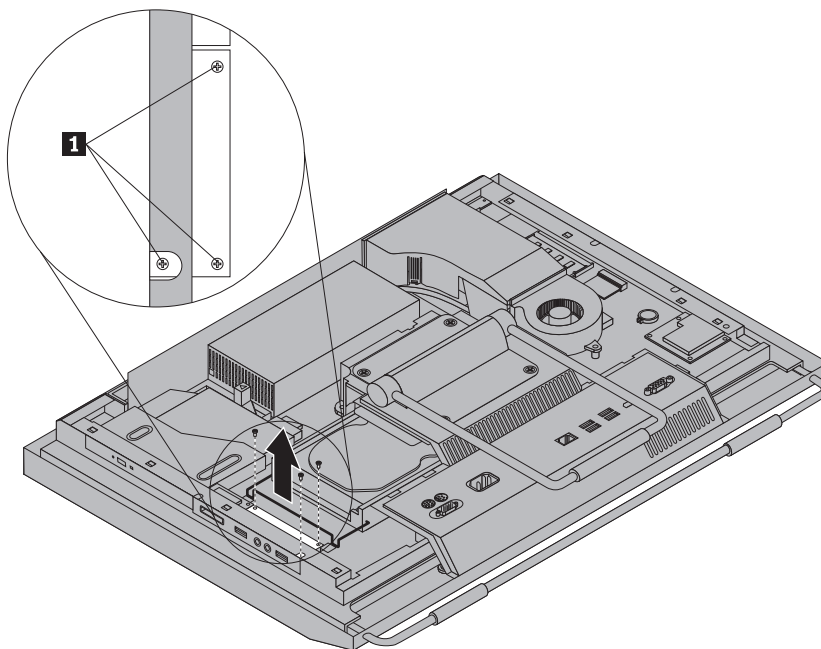


*Figure 36. Removing the right I/O assembly*

7. To install the new right I/O assembly into the computer, position the new right
   I/O assembly into place and then align the screw holes with the corresponding
   holes in the computer main bracket.

8. Install the three screws to secure the right I/O assembly to the computer main bracket.
9. Connect the right I/O assembly cable and the intrusion switch cable to the new right I/O assembly.

---
**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 55.

---

## Replacing the power supply

---
**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.

To replace the power supply, 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. Place a soft, clean towel or cloth on the desk or surface. Hold the sides of your computer and gently lay it down so that the screen is against the surface and the cover is facing up.
3. Remove the computer cover. See "Removing the computer cover" on page 16.
4. Disconnect the power supply cable from the system board. See "System board part and connector locations" on page 13.
5. Remove the hard disk drive. See "Replacing the hard disk drive" on page 26.
6. Remove the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.

7. Remove the four screws **1** that secure the power supply and then remove the two screws **2** that secure the power cord connector bracket. Note the routing of the power cord connector cable **3** . Lift the power supply up to remove it from the computer main bracket.
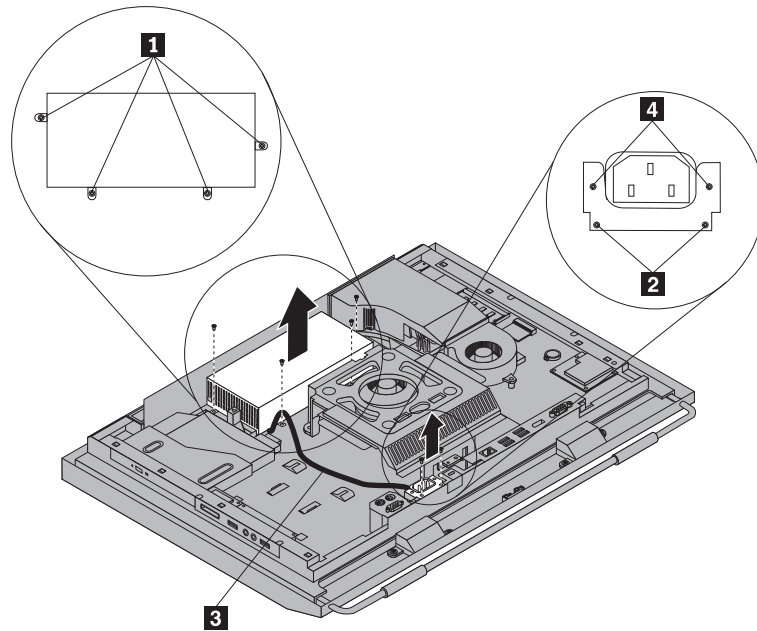


*Figure 37. Removing the power supply*

8. Remove the two screws **4** (as shown in Figure 37) that secure the power cord connector and then remove the power cord connector from the power cord connector bracket.
9. Install the two screws to secure the new power cord connector to the power cord connector bracket.
10. Position the new power supply in the computer and align the four screw holes in the new power supply with those in the computer main bracket. Install the four screws to secure the new power supply.
11. Route the new power cord connector cable and then position the power cord connector bracket on the bottom of the computer main bracket.
12. Align the two screw holes in the power cord connector bracket with those in the computer main bracket and install the two screws to secure the power cord connector bracket.
13. Connect the new power supply cable to the power supply connector on the system board. See "System board part and connector locations" on page 13.
14. Reinstall the hard disk drive. See "Replacing the hard disk drive" on page 26.
15. Reinstall the rear I/O assembly cover. See "Removing or reinstalling the rear I/O assembly cover" on page 20.

---

**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 55.

---

# Replacing the keyboard

> **Attention**
>
> Do not 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 any media from the drives. Then, turn off all attached devices and the computer.
2. Disconnect all power cords from electrical outlets.
3. Locate the keyboard connector.

   **Note:** Your keyboard might be connected to a PS/2 keyboard connector **1** or a USB connector **2**.
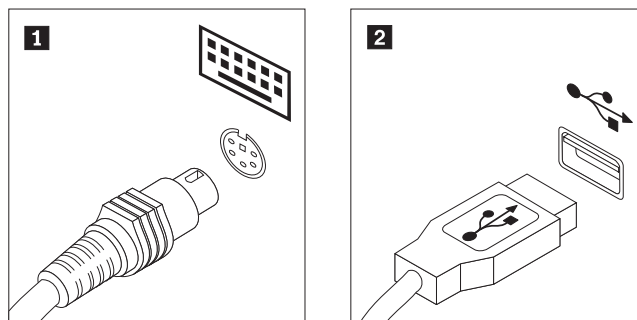


*Figure 38. Keyboard connectors*

4. Disconnect the failing keyboard cable from the computer.
5. Connect a new keyboard to the appropriate connector on the computer.
6. Reconnect all power cords to electrical outlets.

# Replacing the mouse

> **Attention**
>
> Do not 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 any media from the drives. Then, turn off all attached devices and the computer.
2. Disconnect all power cords from electrical outlets.
3. Locate the mouse connector.

**Note:** Your mouse might be connected to a PS/2 mouse connector **1** or a USB connector **2** .
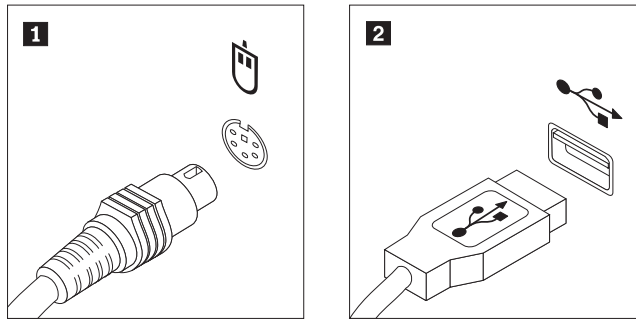


*Figure 39. Mouse connectors*

4. Disconnect the failing mouse cable from the computer.
5. Connect a new mouse cable to the appropriate connector on the computer.
6. Reconnect all power cords to electrical outlets.

## 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, 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 "Component locations" on page 12 for the locations of various components in your computer.
2. Make sure that the cables are routed correctly before reinstalling the computer cover. Keep cables clear of the hinges and sides of the computer chassis to avoid interference with reinstalling the computer cover.

3. Lower and position the computer cover into place and then slide the computer cover toward the bottom of the computer until the cover is secured into place.
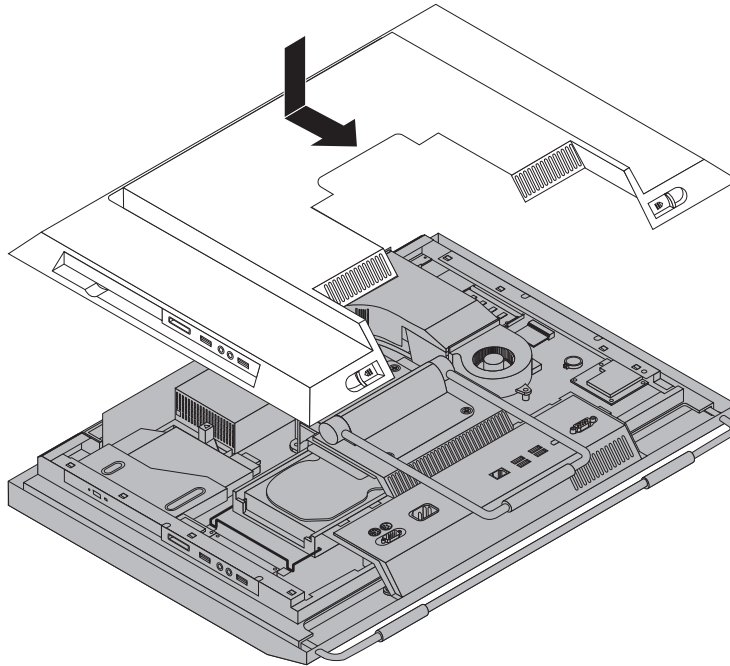


*Figure 40. Installing the computer cover*

4. Lock the computer cover if you have an integrated cable lock. See "Integrated cable lock" on page 57 and "Rear view" on page 10.
5. Reconnect the external cables and power cord to the computer. See "Rear view" on page 10.
6. Depending on the parts you installed or replaced, you might need to confirm the updated information in the Setup Utility program. Refer to Chapter 4, "Using the Setup Utility program," on page 67.

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

## Obtaining device drivers

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

## Basic security features

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

# Integrated cable lock

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

An integrated cable lock, sometimes referred to as the Kensington lock, can be used to secure your computer to a desk, a table, or other non-permanent fixture. The integrated cable lock attaches to the integrated cable lock slot in the rear of your computer and is operated with a key. See "Rear view" on page 10 for the location of the integrated cable lock slot. This is the same type of lock used with many notebook computers. You can order an integrated cable lock from Lenovo by searching for *Kensington* at:
http://www.lenovo.com/support
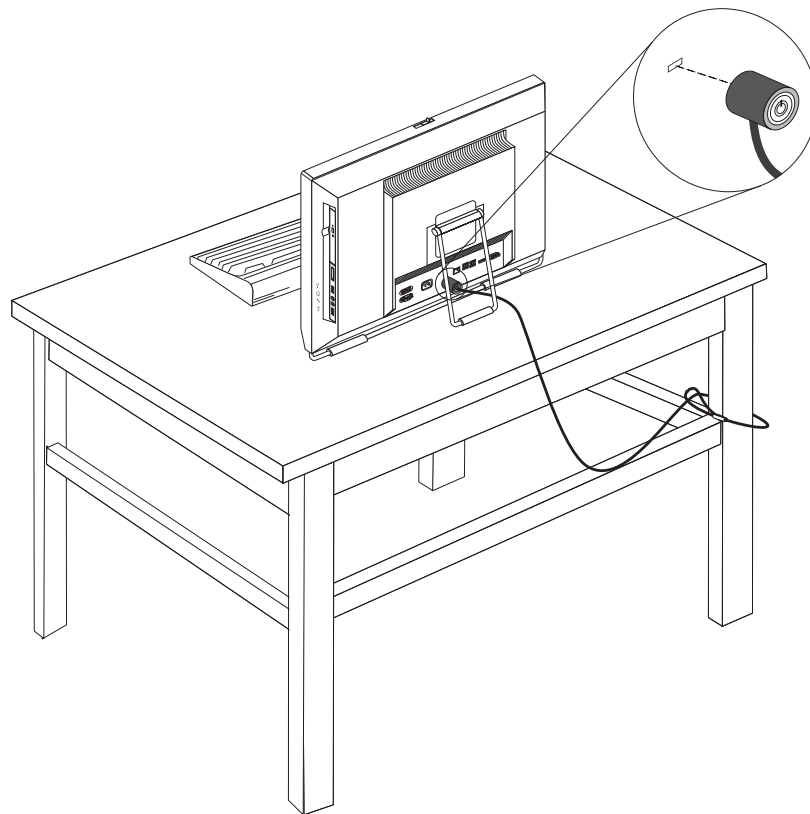
*Figure 41. Integrated cable lock*

# Password protection

To deter unauthorized use of your computer, you can use the Setup Utility program to set a password. When you turn on your computer, you are prompted to type the password. The computer cannot be used until a valid password is typed in. Refer to Chapter 4, "Using the Setup Utility program," on page 67 for more information.

## Erasing lost or forgotten passwords (clearing CMOS)

This section provides instructions on how to erase lost or forgotten passwords, 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 "System board part and connector locations" on page 13.
4. Move the jumper from the standard position (pin 1 and pin 2) to the maintenance position (pin 2 and pin 3).
5. Close the computer cover and connect the power cord. See "Completing the parts replacement" on page 55.
6. 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.
7. Repeat step 1 through step 3.
8. Move the Clear CMOS /Recovery jumper back to the standard position (pin 1 and pin 2).
9. Close the computer cover and connect the power cord. See "Completing the parts replacement" on page 55.

# 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 61
- "Using the Rescue and Recovery workspace" on page 62
- "Creating and using a rescue medium" on page 63
- "Installing or reinstalling device drivers" on page 64
- "Solving recovery problems" on page 65

**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 XP operating system, you can create recovery media using only discs, so this operation is also called "creating Product Recovery discs."

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

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

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

  **Notes:**

  1. After restoring your computer to the factory default settings, you might have to reinstall device drivers for some devices. See "Installing or reinstalling device drivers" on page 64.
  2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These discs are provided only with computers preinstalled with Microsoft Office or Microsoft Works.

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

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

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

  1. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
  2. Insert the boot disc into the optical drive.
  3. Select the optical drive with the boot disc as the startup device and press Enter. After a short delay, the Rescue and Recovery workspace opens.
  4. On the **Rescue and Recovery** menu, click **Restore your system**.
  5. Follow the instructions on the screen. Insert the appropriate Product Recovery disc when prompted.

# Performing backup and recovery operations

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

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

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

## Performing a backup operation

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

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

## Performing a recovery operation

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

- To perform a recovery operation using the Rescue and Recovery program on the Windows 7 operating system, do the following:
  1. From the Windows desktop, click **Start → All Programs → Lenovo ThinkVantage Tools → Enhanced Backup and Restore**. The Rescue and Recovery program opens.
  2. In the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
  3. Click the **Restore your system from a backup** icon.
  4. Follow the instructions on the screen to complete the recovery operation.

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

  1. From the Windows desktop, click **Start → All Programs → ThinkVantage → Rescue and Recovery**. The Rescue and Recovery program opens.

  2. In the Rescue and Recovery main window, click **Launch advanced Rescue and Recovery**.

  3. Click the **Restore your system from a backup** icon.

  4. Follow the instructions on the screen to complete the recovery operation.

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

## Using the Rescue and Recovery workspace

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

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

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

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

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

- Restore your hard disk drive to the factory default settings

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

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

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

1. Make sure the computer is turned off.

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

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

**Note:** If the Rescue and Recovery workspace fails to open, see "Solving recovery problems" on page 65.

4. Do one of the following:
   - To rescue files from your hard disk drive or from a backup, click **Rescue files** and follow the instructions on the screen.
   - To restore your hard disk drive from a Rescue and Recovery backup or to restore your hard disk drive to the factory default settings, click **Restore your system** and follow the instructions on the screen.

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

**Notes:**

1. After restoring your hard disk drive to the factory default settings, you might have to reinstall device drivers for some devices. See "Installing or reinstalling device drivers" on page 64.

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

## Creating and using a rescue medium

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

**Notes:**

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

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

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

## Creating a rescue medium

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

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

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

## Using a rescue medium

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

- If you have created a rescue medium using a disc, do the following to use the rescue medium:
   1. Turn off your computer.
   2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
   3. On the **Startup Device Menu**, select the desired optical drive as the first boot device. Then, insert the rescue disc into the optical drive and press Enter. The rescue medium starts.

- If you have created a rescue medium using a USB hard disk drive, do the following to use the rescue medium:
   1. Attach the USB hard disk drive to one of the USB connectors on your computer.
   2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
   3. On the **Startup Device Menu**, select the USB hard disk drive as the first boot device and press Enter. The rescue medium starts.

- If you have created a rescue medium using the secondary internal hard disk drive, set the secondary internal hard disk drive as the first boot device in the startup device sequence to start the rescue medium. See "Selecting a startup device" on page 69.

   **Note:** The secondary internal hard disk drive is only available in some computer models.

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

## Installing or reinstalling device drivers

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

Device drivers for factory-installed devices are located on the computer hard disk drive (usually drive C:) in the SWTOOLS\DRIVERS subdirectory. The latest device

drivers for factory-installed devices are also available at http://www.lenovo.com/
support. Other device drivers are on the software media that come with individual
devices.

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

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

## Solving recovery problems

If you are unable to access the Rescue and Recovery workspace or the Windows
environment, do one of the following:

- Use a rescue medium to start the Rescue and Recovery workspace. See "Creating
  and using a rescue medium" on page 63.
- 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 59.

Note: If you are unable to access the Rescue and Recovery workspace or the
      Windows environment from a rescue medium or recovery media, you might
      not have the rescue device (an internal hard disk drive, a disc, a USB hard
      disk drive, or other external devices) set as the first boot device in the
      startup device sequence. You must first make sure that your rescue device is
      set as the first boot device in the startup device sequence in the Setup Utility
      program. See "Selecting a startup device" on page 69 for detailed
      information about temporarily or permanently changing the startup device
      sequence. For more information about the Setup Utility program, see
      Chapter 4, "Using the Setup Utility program," on page 67.

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

# Chapter 4. Using the Setup Utility program

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

This chapter provides information about the following topics to help you use the Setup Utility program:
- "Starting the Setup Utility program"
- "Viewing or changing settings"
- "Using passwords"
- "Selecting a startup device" on page 69
- "Exiting the Setup Utility program" on page 70

## Starting the Setup Utility program

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

To start the Setup Utility program, do the following:
1. Make sure your computer is turned off.
2. Repeatedly press and release the F1 key when turning on the computer. When you see a logo screen, release the F1 key. The Setup Utility program opens.

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

## Viewing or changing settings

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

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

## Using passwords

By using the Setup Utility program, you can set a password to prevent unauthorized access to your computer and data. The following options are available to help you set an administrator password, a power-on password, or a hard disk drive password:
- **Set Administrator Password**
- **Set Power-On Password**
- **Hard Disk 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.

**67**

## Password considerations

A password can be any combination of up to 64 (1 to 64) alphabetic and numeric characters. For security reasons, it is recommended to use a strong password that cannot be easily compromised. To set a strong password, use the following guidelines:

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

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

## 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 a user password and an administrator password, you can type either password to use your computer. However, to change any configuration settings, you must use your administrator password.

## Power-on password

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

## Hard disk drive password

The **Hard Disk Password** option enables you to set a hard disk drive password, which prevents unauthorized access to the data on the hard disk drive. When a hard disk drive password is set, you are prompted to type a valid password each time you try to access the hard disk drive. For more information on how to set a hard disk drive password, see "Setting, changing, or deleting a password."

## Setting, changing, or deleting a password

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

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

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 67.
2. From the Setup Utility program main menu, select **Security**.
3. Depending on the password type, select **Set Administrator Password**, **Set Power-On Password**, or **Hard Disk Password**.
4. Follow the instructions on the screen to set, change, or delete a password.

**Note:** A password can be any combination of up to 64 (1 to 64) alphabetic and numeric characters. For more information, see "Password considerations" on page 68.

## Enabling or disabling a device

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

| | |
|---|---|
| **USB Support** | Use this option to enable or disable a USB connector. When a USB connector is disabled, the device connected to the USB connector cannot be used. |
| **SATA Controller** | When this option is set to **Disabled**, the device connected to the SATA connector (such as the hard disk drive or the optical drive) is disabled and cannot be accessed. |

To enable or disable a device, do the following:

1. Start the Setup Utility program. See "Starting the Setup Utility program" on page 67.
2. Depending on the device you want to enable or disable, do one of the following:
   - From the Setup Utility program main menu, select **Devices → USB Setup** and follow the instructions on the screen to enable or disable the USB connector(s) of your choice.
   - From the Setup Utility program main menu, select **Devices → ATA Drive Setup → SATA Controller** to enable or disable the device connected to the corresponding SATA connector on the system board.
3. Select the desired settings and press Enter.
4. Press Esc to return to the Setup Utility program main menu. You might have to press Esc several times.
5. Press F10 to save the new settings and exit the Setup Utility program.

   **Notes:**

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

## Selecting a startup device

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

### Selecting a temporary startup device

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

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

To select a temporary startup device, do the following:

1. Turn off your computer.
2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
3. Select the desired startup device on the **Startup Device Menu** and press Enter 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 67.
2. Select **Startup → Primary Boot Sequence**. Read the information displayed on the right side of the screen.
3. Select the first boot device, second boot device, and so on.
4. Press Esc to return to the **Startup** menu. Then, select the devices for the **Automatic Boot Sequence** and **Error Boot Sequence**.
5. Press Esc to return to the Setup Utility program main menu. You might have to press Esc several times.
6. Press F10 to save the new settings and exit the Setup Utility program.

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

## Exiting the Setup Utility program

After you finish viewing or changing settings, press Esc to return to the Setup Utility program main menu. You might have to press Esc several times. Then, you can do one of the following:
- If you want to save the new settings and exit the Setup Utility program, press F10 or select **Exit → Save Changes and Exit**. Otherwise, your changes will not be saved.
- If you do not want to save the new settings, select **Exit → Discard Changes and Exit**.
- If you want to return to the default settings, press F9 or select **Exit → Load Optimal Defaults**.

# Chapter 5. Updating system programs

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

This chapter contains the following topics:
- "Using system programs"
- "Updating (flashing) the BIOS from a disc"
- "Updating (flashing) the BIOS from your operating system" on page 72
- "Recovering from a POST/BIOS update failure" on page 72

## Using system programs

System programs are the basic layer of software built into your computer. System programs include the POST, the BIOS, and the Setup Utility program. The POST is a set of tests and procedures that are performed each time you turn on your computer. The BIOS is a layer of software that translates instructions from other layers of software into electrical signals that the computer hardware can execute. You can use the Setup Utility program to view or change the configuration 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 the POST, the BIOS, and the Setup Utility program by starting your computer with a system-program-update disc or running a special update program from your operating system.

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

## Updating (flashing) the BIOS from a disc

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

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

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

4. When prompted to change the serial number, it is suggested that you press N. However, if you do want to change the serial number, press Y, then type in the serial number and press Enter.

5. When prompted to change the machine type and model, it is suggested that you press N. However, if you do want to change the machine type and model, press Y, then type in the machine type and model and press Enter.

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

## Updating (flashing) the BIOS from your operating system

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

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

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

## Recovering from a POST/BIOS update failure

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

1. 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 "System board part and connector locations" on page 13.
4. Move the jumper from the standard position (pin 1 and pin 2) to the maintenance position (pin 2 and pin 3).
5. Install the computer cover and reconnect all cables and power cords that were disconnected. See "Completing the parts replacement" on page 55.
6. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
7. Insert the POST/BIOS update (flash) disc into the optical drive. Then, select the optical drive as the startup device and press Enter. The recovery session begins.

**Note:** The recovery session will take two to three minutes. During this time you will hear a series of beeps.

8. After the recovery session is completed, the series of beeps will end, and the system will automatically turn off. Remove the disc from the optical drive before the system completely turns off.

9. Repeat steps 1 through 3.

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

11. Install the computer cover and reconnect all cables and power cords that were disconnected. See "Completing the parts replacement" on page 55.

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

# Chapter 6. Troubleshooting and diagnostic programs

This chapter provides information about some basic troubleshooting and diagnostic programs. If your computer problem is not described in this chapter, see Chapter 7, "Getting information, help, and service," on page 79 for additional troubleshooting resources.

This chapter contains the following topics:
- "Basic troubleshooting"
- "Diagnostic programs" on page 76
- "Cleaning an optical mouse" on page 78

## Basic troubleshooting

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

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

| Symptom | Action |
|---|---|
| The computer does not start when you press the power switch. | Verify that:<br>• The power cord is correctly connected to the rear of the computer and to a working electrical outlet.<br>• The power indicator on the front of the computer is on.<br>• The computer voltage matches the voltage available at the electrical outlet for your country or region. |
| The monitor screen is blank. | Verify that:<br>• The power cord is correctly connected to the rear of the computer and to a working electrical outlet.<br>• The computer voltage matches the voltage available at the electrical outlet for your country or region.<br>• The brightness and contrast controls are set correctly. |
| The USB keyboard or mouse does not work. | Verify that:<br>• The computer is turned on.<br>• The USB keyboard or mouse is correctly connected to one of the USB connectors on the computer.<br>• For the USB keyboard, no keys are stuck.<br>• The USB mouse is clean. Refer to "Cleaning an optical mouse" on page 78. |

| Symptom | Action |
|---|---|
| The wireless keyboard or mouse does not work. | Verify that:<br><br>• The computer is turned on.<br>• The battery or batteries installed in the wireless keyboard or mouse are in good condition.<br>• The wireless configurations are all set correctly. You might need to refer to the documentation that come with the wireless keyboard or mouse, or refer to your Windows Help and Support information system for wireless related instructions. If your wireless mouse has a dongle, make sure the dongle is correctly connected to one of the USB connectors on the computer.<br>• For the wireless keyboard, no keys are stuck.<br>• The wireless mouse is clean. |
| 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 69. |
| The computer beeps multiple times before the operating system starts. | Verify that no keys are stuck. |

## Diagnostic programs

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

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

**Notes:**

1. You can also download the PC-Doctor for DOS diagnostic program from http://www.lenovo.com/support. See "PC-Doctor for DOS" on page 77 for detailed information.

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

### Lenovo ThinkVantage Toolbox

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

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

• To run the Lenovo ThinkVantage Toolbox program on the Windows XP operating system, click **Start → All Programs → ThinkVantage → Lenovo ThinkVantage Toolbox**. Follow the instructions on the screen.

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

# PC-Doctor for Rescue and Recovery

The PC-Doctor for Rescue and Recovery 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 desired diagnostic test. Then, follow the instructions on the screen.

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

**Note:** If you encounter failures that prevent you from gaining access to the Rescue and Recovery workspace, you can run the PC-Doctor for Rescue and Recovery program after using a rescue medium to recover the computer from failures and gaining access to the Rescue and Recovery workspace. See "Creating and using a rescue medium" on page 63.

# PC-Doctor for DOS

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

## Creating a diagnostic disc

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

To create a diagnostic disc, do the following:

1. Download a self-starting bootable disc image (known as an ISO image) of the diagnostic program from:
   http://www.lenovo.com/support
2. Use any 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. Make sure that your computer is turned off.

2. Repeatedly press and release the F12 key when turning on the computer. When the **Startup Device Menu** opens, release the F12 key.
3. Insert the diagnostic disc into the optical drive.
4. Select the optical drive with the diagnostic disc as the startup device and press Enter. The diagnostic program opens.
5. Follow the instructions on the screen to run the desired diagnostic test. For additional help, press the F1 key.
6. Remove the diagnostic disc from the optical drive after completing the diagnostic test.

## Cleaning an optical mouse

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

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

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

# Chapter 7. Getting information, help, and service

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

This chapter contains the following topics:
- "Information resources"
- "Help and service" on page 81

## Information resources

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

### Online Books folder

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

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

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

### Lenovo ThinkVantage Tools

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

The Lenovo ThinkVantage Tools program helps you work more easily and securely by providing easy access to various tools, such as:
- Lenovo ThinkVantage Toolbox
- Power Manager
- Product Recovery
- Rescue and Recovery

- System Update

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

## ThinkVantage Productivity Center

**Note:** The ThinkVantage Productivity Center program is only available on computers preinstalled with the Windows 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:
- Power Manager
- Product Recovery
- Rescue and Recovery
- System Update

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

## Lenovo Welcome

**Note:** The Lenovo Welcome program is only available on computers preinstalled with the Windows 7 operating system 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 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 85.

## 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 contains information about obtaining help and service.

## Using the documentation and diagnostic programs

If you experience a problem with your computer, see Chapter 6, "Troubleshooting and diagnostic programs," on page 75. For information on additional resources to help you troubleshoot your computer problem, see "Information resources" on page 79.

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

Most computers come with a set of diagnostic programs that you can use to help you identify hardware problems. For instructions on using the diagnostic programs, see "Diagnostic programs" on page 76.

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 by telephone through the Customer Support Center.

The following services are available during the warranty period:

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

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:** Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

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

## Using other services

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

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

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

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

# Purchasing additional services

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

# Appendix. Notices

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## Television output notice

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

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Part Number:  89Y8034

Printed in USA