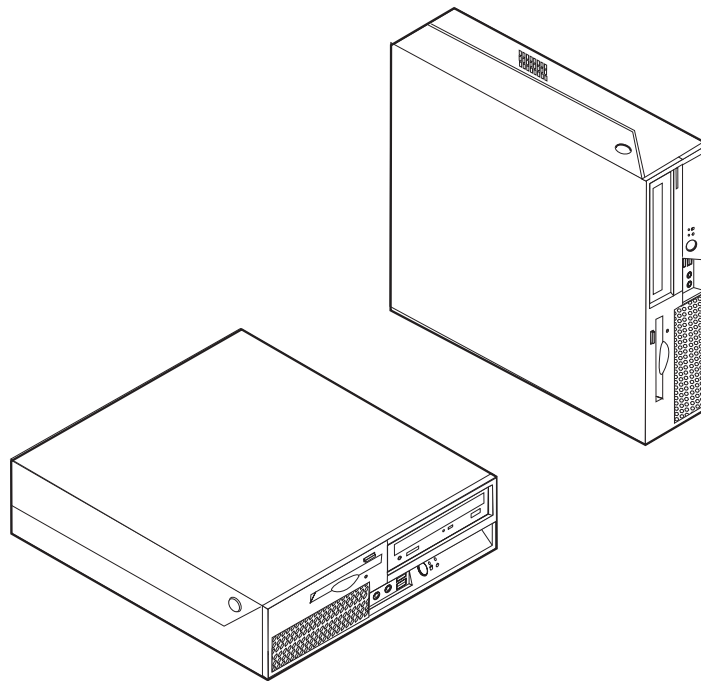ThinkCentre

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ThinkCentre

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Types 8804, 8808, 8813

> **Note**
>
> Before using this information and the product it supports, be sure to read the "Important safety information" on page v and Appendix B, "Notices," on page 71.

Contents

Important safety information

> **Note**
> Please read important safety information first.

This information can help you safely use your desktop or notebook personal computer. Follow and retain all information included with your computer. The information in this document does not alter the terms of your purchase agreement or the Lenovo™ Statement of Limited Warranty.

Customer safety is important. Our products are developed to be safe and effective. However, personal computers are electronic devices. Power cords, power adapters, and other features can create potential safety risks that can result in physical injury or property damage, especially if misused. To reduce these risks, follow the instructions included with your product, observe all warnings on the product and in the operating instructions, and review the information included in this document carefully. By carefully following the information contained in this document and provided with your product, you can help protect yourself from hazards and create a safer computer work environment.

Note: This information includes references to power adapters and batteries. In addition to notebook computers, some products (such as speakers and monitors) ship with external power adapters. If you have such a product, this information applies to your product. In addition, your computer product contains a coin-sized internal battery that provides power to your system clock even when the machine is unplugged, so the battery safety information applies to all computers.

Conditions that require immediate action

Products can become damaged due to misuse or neglect. Some product damage is serious enough that the product should not be used again until it has been inspected and, if necessary, repaired by an authorized servicer.

As with any electronic device, pay close attention to the product when it is turned on. On very rare occasions, you might notice an odor or see a puff of smoke or sparks vent from your machine. Or you might hear sounds like popping, cracking or hissing. These conditions might merely mean that an internal electronic component has failed in a safe and controlled manner. Or, they might indicate a potential safety issue. However, do not take risks or attempt to diagnose the situation yourself contact the Customer Support Center.

Frequently inspect your computer and its components for damage or wear or signs of danger. If you have any question about the condition of a component, do not use the product. Contact the Customer Support Center or the product manufacturer for instructions on how to inspect the product and have it repaired, if necessary.

In the unlikely event that you notice any of the conditions listed below, or if you have any safety concerns with your product, stop using the product and unplug it from the power source and telecommunication lines until you can

speak to the Customer Support Center for further guidance. See "Information resources" on page 59 for more information.

- Power cords, plugs, power adapters, extension cords, surge protectors, or power supplies that are cracked, broken or damaged.
- Signs of overheating, smoke, sparks or fire.
- Damage to a battery (such as cracks, dents, creases), discharge from a battery, or a buildup of foreign substances on the battery.
- A cracking, hissing or popping sound, or strong odor that comes from the product.
- Signs that liquid has been spilled or an object has fallen onto the computer product, the power cord or power adapter.
- The computer product, the power cord or power adapter has been exposed to water.
- The product has been dropped or damaged in any way.
- The product does not operate normally when you follow the operating instructions.

Note: If you notice these conditions with a product (such as an extension cord) that is not manufactured for or by Lenovo, stop using that product until you can contact the product manufacturer for further instructions, or until you get a suitable replacement.

General safety guidelines

Always observe the following precautions to reduce the risk of injury and property damage.

Service

Do not attempt to service a product yourself unless instructed to do so by the Customer Support Center or your documentation. Use only a service provider who is approved to repair your particular product.

Note: Some parts can be upgraded or replaced by the customer. These parts are referred to as Customer Replaceable Units, or CRUs. Lenovo expressly identifies CRUs as such, and provides documentation with instructions when it is appropriate for customers to replace those parts. You must closely follow all instructions when performing such replacements. Always make sure that the power is turned off and that the product is unplugged from any power source before you attempt the replacement. If you have any questions or concerns, contact the Customer Support Center.

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

Danger
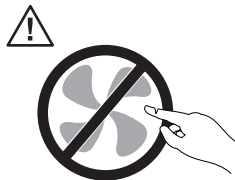
Hazardous moving parts. Keep fingers and other body parts away.

Attention

Before replacing any CRUs, turn off the computer and wait three to five minutes to let the computer cool before opening the cover.

Power cords and power adapters

Use only the power cords and power adapters supplied by the product manufacturer.

The power cords shall be safety approved. For Germany, it shall be H05VV-F, 3G, 0.75 mm^2, or better. For other countries, the suitable types shall be used accordingly.

Never wrap a power cord around the power adapter or other object. Doing so can stress the cord in ways that can cause the cord to fray, crack or crimp. This can present a safety hazard.

Always route power cords so that they will not be walked on, tripped over, or pinched by objects.

Protect the cord and power adapters from liquids. For instance, do not leave your cord or power adapter near sinks, tubs, toilets, or on floors that are cleaned with liquid cleansers. Liquids can cause a short circuit, particularly if the cord or power adapter has been stressed by misuse. Liquids can also cause gradual corrosion of the power cord terminals and/or the connector terminals on the adapter which can eventually result in overheating.

Always connect power cords and signal cables in the correct order and ensure that all power cord connectors are securely and completely plugged into receptacles.

Do not use any power adapter that shows corrosion at the ac input pins and/or shows signs of overheating (such as deformed plastic) at the ac input or anywhere on the power adapter.

Do not use any power cords where the electrical contacts on either end show signs of corrosion or overheating or where the power cord appears to have been damaged in any way.

Extension cords and related devices

Ensure that extension cords, surge protectors, uninterruptible power supplies, and power strips that you use are rated to handle the electrical requirements of the product. Never overload these devices. If power strips are used, the load should not exceed the power strip input rating. Consult an electrician for more information if you have questions about power loads, power requirements, and input ratings.

Plugs and outlets

If a receptacle (power outlet) that you intend to use with your computer equipment appears to be damaged or corroded, do not use the outlet until it is replaced by a qualified electrician.

Do not bend or modify the plug. If the plug is damaged, contact the manufacturer to obtain a replacement.

Some products are equipped with a three-pronged plug. This plug fits only into a grounded electrical outlet. This is a safety feature. Do not defeat this safety feature by trying to insert it into a non-grounded outlet. If you cannot insert the plug into the outlet, contact an electrician for an approved outlet adapter or to replace the outlet with one that enables this safety feature. Never overload an electrical outlet. The overall system load should not exceed 80 percent of the branch circuit rating. Consult an electrician for more information if you have questions about power loads and branch circuit ratings.

Be sure that the power outlet you are using is properly wired, easily accessible, and located close to the equipment. Do not fully extend power cords in a way that will stress the cords.

Carefully connect and disconnect the equipment from the electrical outlet.

Batteries

All personal computers manufactured by Lenovo contain a non-rechargeable coin cell battery to provide power to the system clock. In addition, many mobile products, such as notebook computers, utilize a rechargeable battery pack to provide system power when in portable mode. Batteries supplied by Lenovo for use with your product have been tested for compatibility and should only be replaced with approved parts.

Never attempt to open or service any battery. Do not crush, puncture, or incinerate batteries or short circuit the metal contacts. Do not expose the battery to water or other liquids. Only recharge the battery pack strictly according to instructions included in the product documentation.

Battery abuse or mishandling can cause the battery to overheat, which can cause gasses or flame to "vent" from the battery pack or coin cell. If your battery is damaged, or if you notice any discharge from your battery or the buildup of foreign materials on the battery leads, stop using the battery and obtain a replacement from the battery manufacturer.

Batteries can degrade when they are left unused for long periods of time. For some rechargeable batteries (particularly Lithium Ion batteries), leaving a battery unused in a discharged state could increase the risk of a battery short circuit, which could

shorten the life of the battery and can also pose a safety hazard. Do not let rechargeable Lithium-Ion batteries completely discharge or store these batteries in a discharged state.

Heat and product ventilation

Computers generate heat when turned on and when batteries are charging. Notebook PCs can generate a significant amount of heat due to their compact size. Always follow these basic precautions:

- Do not leave the base of your notebook computer in contact with your lap or any part of your body for an extended period when the computer is functioning or when the battery is charging. Your computer produces some heat during normal operation. Extended contact with the body could cause discomfort or, potentially, a skin burn.
- Do not operate your computer or charge the battery near flammable materials or in explosive environments.
- Ventilation slots, fans and/or heat sinks are provided with the product for safety, comfort, and reliable operation. These features might inadvertently become blocked by placing the product on a bed, sofa, carpet, or other flexible surface. Never block, cover or disable these features.

You should inspect your desktop computer for dust accumulation at least once every three months. Before inspecting your computer, turn off the power and unplug the computer's power cord from the electrical outlet; then remove any dust from vents and perforations in the bezel. If you notice external dust accumulation, you should also examine and remove dust from the inside of the computer including heat sink inlet fins, power supply vents, and fans. Always turn off and unplug the computer before opening the cover. If possible, avoid operating your computer within 2 feet of high-traffic areas. If you must operate your computer in or near a high-traffic area, you should inspect and, if necessary, clean your computer more frequently.

For your safety and to maintain optimum computer performance, always follow these basic precautions with your desktop computer:

- Keep the cover closed whenever the computer is plugged in.
- Regularly inspect the outside of the computer for dust accumulation.
- Remove dust from vents and any perforations in the bezel. More frequent cleanings might be required for computers in dusty or high-traffic areas.
- Do not restrict or block any ventilation openings.
- Do not store or operate your computer inside furniture, as this might increase the risk of overheating.
- Airflow temperatures into the computer should not exceed 35° C (95° F).
- Do not use non-desktop air filtration devices.

CD and DVD drive safety

CD and DVD drives spin discs at a high speed. If a CD or DVD is cracked or otherwise physically damaged, it is possible for the disc to break apart or even shatter when the CD drive is in use. To protect against possible injury due to this situation, and to reduce the risk of damage to your machine, do the following:

- Always store CD/DVD discs in their original packaging
- Always store CD/DVD discs out of direct sunlight and away from direct heat sources
- Remove CD/DVD discs from the computer when not in use

- Do not bend or flex CD/DVD discs, or force them into the computer or their packaging
- Check CD/DVD discs for cracks before each use. Do not use cracked or damaged discs

Additional safety information

> **Danger**
> **Electrical current from power, telephone, and communication cables is hazardous.**

To avoid a shock hazard:
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To connect:	To disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Lithium battery notice

> **Caution**
> **Danger of explosion if battery is incorrectly replaced.**

When replacing the lithium coin cell battery, use only the same or an equivalent type that is recommended by the manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:
- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

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

Modem safety information

> **Caution**
>
> **To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.**

To reduce the risk of fire, electrical shock, or injury when using telephone equipment, always follow basic safety precautions, such as:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.

Laser compliance statement

Some personal computer models are equipped from the factory with a CD-ROM drive or a DVD-ROM drive. CD-ROM drives and DVD-ROM drives are also sold separately as options. CD-ROM drives and DVD-ROM drives are laser products. These drives are certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, these drives are certified to conform to the requirements of the International Electrotechnical Commission (IEC) 60825-1 and CENELEC EN 60825-1 for Class 1 laser products.

When a CD-ROM drive or a DVD-ROM drive is installed, note the following handling instructions.

> **Caution**
>
> **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

Removing the covers of the CD-ROM drive or DVD-ROM drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive or DVD-ROM drive. **Do not remove the drive covers.**

Some CD-ROM drives and DVD-ROM drives contain an embedded Class 3A or Class 3B laser diode. Note the following statement.

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

Power supply statement

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

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

Introduction

This *User Guide* contains the following information:

- Chapter 1, "Arranging your workspace," on page 1 provides information about setting up your computer for comfort and the impact of light sources, air circulation, and electrical outlets.
- Chapter 2, "Setting up your computer," on page 3 provides information about setting up your computer and software and operating system installation.
- Chapter 3, "Installing options," on page 11 provides information on the features and options that are available for your computer.
- Chapter 4, "Recovering software," on page 37 provides instructions on how to use the ThinkVantage® Rescue and Recovery™ program to create product recovery disks, back up data, recover software, and restore the entire contents of your hard disk to a previously saved state.
- Chapter 5, "Using the Setup Utility," on page 45 provides instructions on how to view and change the configuration settings of your computer.
- Chapter 6, "Updating system programs," on page 49 provides information about updating POST/BIOS and how to recover from a POST/BIOS update failure.
- Chapter 7, "Troubleshooting and diagnostics," on page 53 provides information about basic troubleshooting and diagnostic tools for your computer.
- Chapter 8, "Getting information, help, and service," on page 59 provides information about the wide variety of helpful resources available from Lenovo.
- Appendix A, "Manual modem commands," on page 63 provides commands for manually programming your modem.
- Appendix B, "Notices," on page 71 provides notices and trademark information.

Chapter 1. Arranging your workspace

To get the most from your computer, arrange both the equipment you use and your work area to suit your needs and the kind of work you do. Your comfort is of foremost importance, but light sources, air circulation, and the location of electrical outlets also can affect the way you arrange your workspace.

Comfort

Although no single working position is ideal for everyone, here are a few guidelines to help you find a position that suits you best.

Sitting in the same position for a long time can cause fatigue. A good chair can make a big difference. The backrest and seat should adjust independently and provide good support. The seat should have a curved front to relieve pressure on the thighs. Adjust the seat so that your thighs are parallel to the floor and your feet are either flat on the floor or on a footrest.

When using the keyboard, keep your forearms parallel to the floor and your wrists in a neutral, comfortable position. Try to keep a light touch on the keyboard and your hands and fingers relaxed. You can change the angle of the keyboard for maximum comfort by adjusting the position of the keyboard feet.
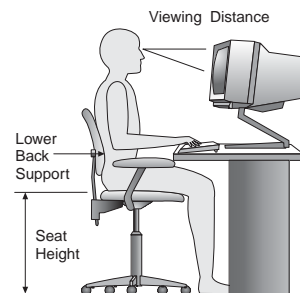
Adjust the monitor so the top of the screen is at, or slightly below, eye level. Place the monitor at a comfortable viewing distance, usually 51 to 61 cm (20 to 24 in.), and position it so you can view it without having to twist your body. Also position other equipment you use regularly, such as the telephone or a mouse, within easy reach.

Glare and lighting

Position the monitor to minimize glare and reflections from overhead lights, windows, and other light sources. Even reflected light from shiny surfaces can cause annoying reflections on your monitor screen. Place the monitor at right angles to windows and other light sources, when possible. Reduce overhead lighting, if necessary, by turning off lights or using lower wattage bulbs. If you install the monitor near a window, use curtains or blinds to block the sunlight. You might have to adjust the brightness and contrast controls on the monitor as the room lighting changes throughout the day.

Where it is impossible to avoid reflections or to adjust the lighting, an antiglare filter placed over the screen might be helpful. However, these filters might affect the clarity of the image on the screen; try them only after you have exhausted other methods of reducing glare.

Dust buildup compounds problems associated with glare. Remember to clean your monitor screen periodically using a soft cloth moistened with a nonabrasive liquid glass cleaner.

Air circulation

Your computer and monitor produce heat. The computer has a fan that pulls in fresh air and forces out hot air. The monitor lets hot air escape through vents. Blocking the air vents can cause overheating, which might result in a malfunction or damage. Place the computer and monitor so that nothing blocks the air vents; usually, 51 mm (2 in.) of air space is sufficient. Also, make sure the vented air is not blowing on someone else.

Electrical outlets and cable lengths

The location of electrical outlets and the length of power cords and cables that connect to the monitor, printer, and other devices might determine the final placement of your computer.

When arranging your workspace:
- Avoid the use of extension cords. When possible, plug the computer power cord directly into an electrical outlet.
- Keep power cords and cables neatly routed away from walkways and other areas where they might get kicked accidentally.

For more information about power cords, see "Power cords and power adapters" on page vii and the warranty and safety information that is provided with your computer.

Chapter 2. Setting up your computer

Before you begin, make sure you set up your computer in the best possible work area that suits your needs and the kind of work you do. For more information, refer to Chapter 1, "Arranging your workspace," on page 1.

Note: Read "Important safety information" on page v before you set up your computer. The precautions and guidelines will help you work safely.

Connecting your computer

Use the following information when connecting your computer. Look for the small connector icons on the back of your computer.

If your computer cables and connector panel have color-coded connectors, match the color of the cable end with the color of the connector. For example, match a blue cable end with a blue connector or a red cable end with a red connector.

Note: Depending on your model type, your computer might not have all of the connectors that are described in this section.

1. Check the position of the voltage-selection switch on the rear of the computer. Use a ballpoint pen to slide the switch, if necessary.
   - If the voltage supply range is 100–127 V ac, set the switch to 115 V.
   - If the voltage supply range is 200–240 V ac, set the switch to 230 V.
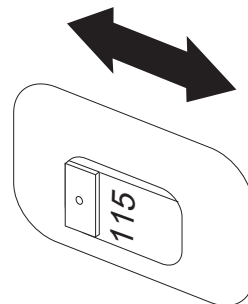
2. Connect the Universal Serial Bus (USB) keyboard cable to a USB connector.
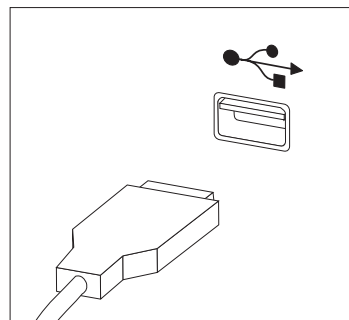
   Note: Some models will have keyboards with a fingerprint reader. After you setup and turn on your computer, refer to the Access Help online help

system for information about your fingerprint reader. See "Access Help" on page 60 for instructions on how to open the online help system.

3. Connect the USB mouse cable to a USB connector.
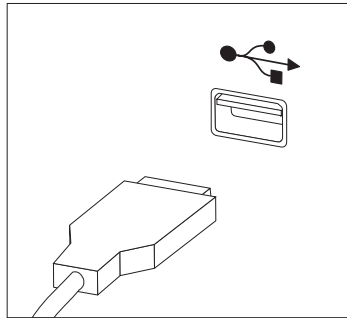
4. Connect the monitor cable to the monitor connector on the computer.
   - If you have a Video Graphics Array (VGA) Standard monitor, connect the cable to the connector as shown.
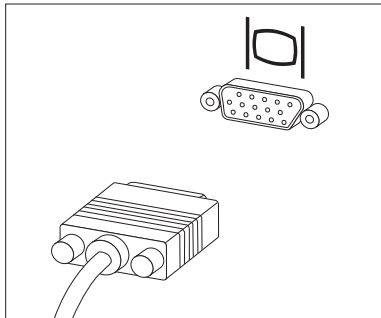
   Note: If your model has two monitor connectors, be sure to use the connector on the accelerated graphics port (AGP) adapter.

   - If you have a digital video interface (DVI) monitor, connect the cable to the connector as shown.
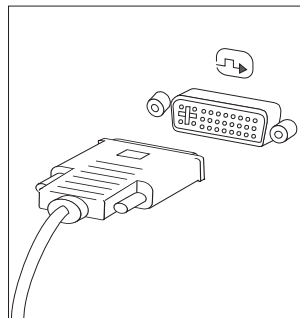
   Note: Your computer must have an adapter installed that supports the DVI monitor.

5. If you have a modem, connect the modem using the following information.
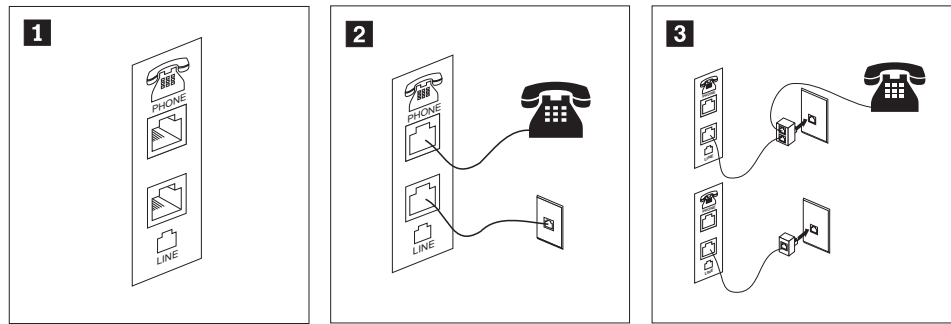
1   This illustration shows the two connections on the back of the computer that are needed to set up your modem.

2   In the United States and other countries or regions that use the RJ-11 telephone outlet, attach one end of the telephone cable to the telephone and the other end to the telephone connector on the back of the computer. Attach one end of the modem cable to the modem connector on the back of the computer and the other end to the telephone outlet.

3   In countries or regions that do not use RJ-11 telephone outlets, a splitter or converter is required to attach the cables to the telephone outlet, as shown at the top of the illustration. You also can use the splitter or converter without the telephone, as shown at the bottom of the illustration.

6. If you have audio devices, attach them using the following instructions. For more information about speakers, see steps 7 and 8 on page 6.
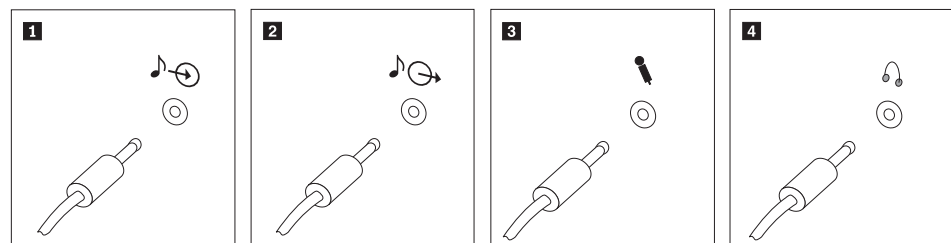
1 Audio line-in	This connector receives audio signals from an external audio device, such as a stereo system.
2 Audio line-out	This connector sends audio signals from the computer to external devices, such as powered stereo speakers.
3 Microphone	Use this connector to attach a microphone to your computer when you want to record sound or if you use speech-recognition software.
4 Headphone	Use this connector to attach headphones to your computer when you want to listen to music or other sounds without disturbing anyone. This connector might be located on the front of the computer.

7. If you have *powered* speakers with an ac adapter, use the following instructions.
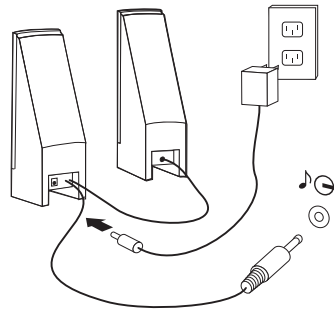
a. Connect the cable that runs between the speakers, if necessary. On some speakers, this cable is permanently attached.
b. Connect the ac adapter cable to the speaker.
c. Connect the speakers to the computer.
d. Connect the ac adapter to the ac power source.

8. If you have *unpowered* speakers with no ac adapter, use the following instructions.
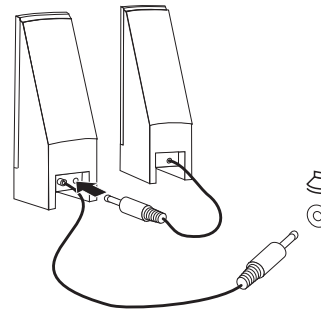
a. Connect the cable that runs between the speakers, if necessary. On some speakers, this cable is permanently attached.
b. Connect the speakers to the computer.

9. Connect any additional devices that you have. Your computer might not have all connectors that are shown.
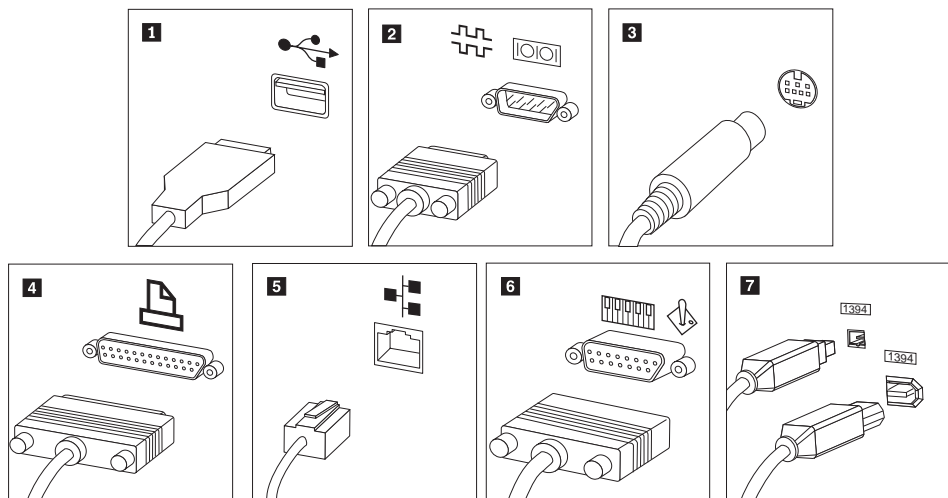
1 USB	Use this connector to attach a device that requires a USB connection, such as a keyboard, mouse, scanner, printer, or personal digital assistant (PDA).
2 Serial	Use this connector to attach an external modem, serial printer, or other device that uses a 9-pin serial connector.
3 S-video	Use this connector to attach a television set that has an S-Video connector. This connector is present on some high-performance video adapters.
4 Parallel	Use this connector to attach a parallel printer or any other device that requires a 25-pin parallel connection.
5 Ethernet	Use this connector to attach the computer to an Ethernet-type local area network or to a cable modem.
	Important: To operate the computer within FCC limits when it is connected to an Ethernet network, use a Category 5 Ethernet cable.
6 MIDI/joystick	Use this connector to attach a joystick, gamepad, or a musical instrument digital interface (MIDI) device such as a MIDI keyboard.
7 IEEE 1394	This connector is sometimes called Firewire because it transmits data rapidly. There are two types of IEEE 1394 connectors: the 4-pin and the 6-pin. IEEE 1394 offers connection to several types of consumer electronics, including digital audio devices and scanners.

10. Connect the power cords to properly grounded electrical outlets.
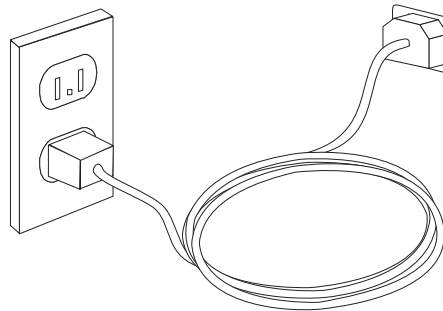
Note: Refer to the Access Help online help system for more information about connectors. See "Access Help" on page 60 for instructions on how to open the online help system.

Turning on power

Turn on the monitor and other external devices first, and then turn on the computer. When the power-on self-test (POST) is finished, the logo window closes. If your computer has preinstalled software, the software installation program starts.

If you experience any problems during startup, see Chapter 7, "Troubleshooting and diagnostics," on page 53. For additional help, refer to Chapter 8, "Getting information, help, and service," on page 59. You can get help and information by telephone through the Customer Support Center. Refer to the warranty and safety information that is provided with your computer for the Service and Support worldwide telephone list.

Finishing the software installation

> **Important**
>
> Read the license agreements carefully before using the programs on this computer. These agreements detail your rights, obligations, and warranties for the software on this computer. By using these programs, you accept the terms of the agreements. If you do not accept the agreements, do not use the programs. Instead, promptly return the entire computer for a full refund.

After you start the computer for the first time, follow the instructions on the screen to complete the software installation. If you do not complete the software installation the first time the computer is turned on, unpredictable results might occur. When the installation is complete, refer to the Access Help online help system to learn more about your computer. See "Access Help" on page 60 for instructions on how to open the online help system.

Note: Some models might have a multilingual version of Microsoft® Windows® XP Pro preinstalled. If your computer has the multilingual version, you will be prompted to choose a language during the initial installation process. After installation, the language version can be changed through the Windows Control Panel.

Completing important tasks

After you have set up your computer, perform the following tasks, which will save you time and trouble later:

- Create a diagnostic CD image or diagnostic diskettes. Diagnostic programs are used to test hardware components of your computer and report operating-system-controlled settings that can cause hardware failures. Making a diagnostic CD image or diagnostic diskettes ahead of time assures that you will be able to run diagnostics if the Recovery and Recovery workspace becomes inaccessible. For more information, see "PC-Doctor for DOS" on page 55.
- Record your computer machine type, model, and serial number. If you need service or technical support, you will probably be asked for this information. For further information, see the warranty and safety information that is provided with your computer.

Updating your operating system

Microsoft makes updates available for various operating systems through the Microsoft Windows Update Web site. The Web site automatically determines what Windows updates are available for your specific computer and lists those updates only. Updates could include security fixes, new versions of Windows components (such as media player), fixes to other portions of the Windows operating system, or enhancements.

Refer to the Access Help online help system for more information about updating your operating system. See "Access Help" on page 60 for instructions on how to open the online help system.

Installing other operating systems

If you install your own operating system, follow the instructions that come with your operating system CDs or diskettes. Remember to install all device drivers after you install your operating system. Installation instructions are usually provided with the device drivers.

Updating your antivirus software

Your computer comes with the Symantec Client Security software you can use to detect and eliminate viruses. You should run the LiveUpdate application to get the latest updates from the Symantec Client Security Web site. LiveUpdate will download the latest virus list and Symantec Client Security will use the new list when it scans your computer the next time.

Refer to the Access Help online help system for more information about updating your antivirus software. See "Access Help" on page 60 for instructions on how to open the online help system.

Shutting down the computer

When you are ready to turn off your computer, always follow the shutdown procedure for your operating system. This prevents the loss of unsaved data or damage to your software programs. To shut down the Microsoft Windows operating system click **Shut Down** from the Start menu. Select **Shut Down** from the drop down menu and click **OK**.

Chapter 3. Installing options
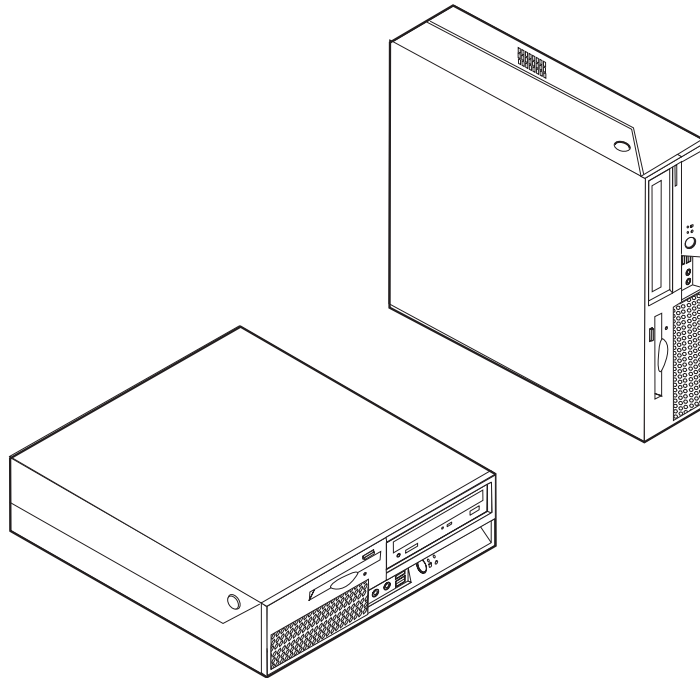
This chapter provides an introduction to the features and options that are available for your computer. You can expand the capabilities of your computer by adding memory, adapters, or drives. When installing an option, use these instructions along with the instructions that come with the option.

> **Important**
>
> Before you install or remove any option, read "Important safety information" on page v. These precautions and guidelines will help you work safely.

Note: Use only the parts provided by Lenovo.

Features

This section provides an overview of the computer features and preinstalled software.

> **System information**
>
> The following information covers a variety of models. For information for your specific model, use the Setup Utility. See Chapter 5, "Using the Setup Utility," on page 45.

Microprocessor
- Intel® Pentium® 4 processor with HyperThreading Technology
- Intel Pentium D processor

- Intel Celeron® D processor
- Intel Core™ 2 Duo processor
- Internal cache (size varies by model type)

Memory
- Support for two double data rate 2 dual inline memory modules (DDR2 DIMMs)
- Flash memory for system programs (varies by model type)

Internal drives
- 3.5-inch, half-inch (slim) diskette drive (some models)
- Serial Advanced Technology Attachment (SATA) internal hard disk drive
- Optical drive (some models)

Video subsystem
- An integrated graphics controller for a Video Graphics Array (VGA) monitor
- Intel Graphics Media Accelerator 3000 with dual display support

Audio subsystem
- HD with ADI 1983 Audio Codec
- Microphone and headphone connectors on the front panel
- Line in and line out connectors on the rear panel
- Mono internal speaker (some models)

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

System management features
- Remote Program Load (RPL) and Dynamic Host Configuration Protocol (DHCP)
- Wake on LAN®
- Wake on Ring (in the Setup Utility program, this feature is called Serial Port Ring Detect for an external modem)
- Remote Administration
- Automatic power-on startup
- System Management (SM) BIOS and SM software
- Ability to store power-on self-test (POST) hardware test results

Input/output features
- 25-pin Extended Capabilities Port (ECP)/Extended Parallel Port (EPP)
- 9-pin serial connector
- Eight USB connectors (two on front panel and six on rear panel)
- Ethernet connector
- VGA monitor connector
- Two audio connectors (line in and line out) on rear panel
- Two audio connectors (microphone and headphone) on front panel

Expansion
- Three drive bays
- One 32-bit PCI adapter connector
- One PCI Express x1 adapter connector

Power
- 225 Watt power supply with manual voltage selection switch
- Automatic 50/60 Hz input frequency switching
- Advanced Configuration and Power Interface (ACPI) support

Security features
- User and administrator passwords for BIOS access
- Support for the addition of an integrated cable lock (Kensington lock)
- Keyboard with fingerprint reader (some models, see the ThinkVantage Productivity Center program for more information)
- Cover presence switch (some models)
- Startup sequence control
- Startup without diskette drive, keyboard, or mouse
- Unattended start mode
- Diskette and hard disk I/O control
- Serial and parallel port I/O control
- Security profile by device

Preinstalled software
Your computer might come with preinstalled software. If it does, an operating system, device drivers to support built-in features, and other support programs are included.

Operating systems, preinstalled (varies by model)

Note: Not all countries or regions have these operating systems.
- Microsoft® Windows® XP Home
- Microsoft Windows XP Professional

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

---

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

Available options

The following are some available options:

- External options
  - Parallel port devices, such as printers and external drives
  - Serial port devices, such as external modems and digital cameras
  - Audio devices, such as external speakers for the sound system
  - USB devices, such as printers, joysticks, and scanners
  - Security devices, such as an integrated cable lock
  - Monitors
- Internal options
  - System memory, called dual inline memory modules (DIMMs)
  - Peripheral component interconnect (PCI) adapter
  - PCI Express x1 adapter
  - Optical drive, such as CD drives and DVD drives (some models)
  - Hard disk drive

For the latest information about available options, see the Lenovo Web site at http://www.lenovo.com/ or contact your reseller or marketing representative.

Specifications

This section lists the physical specifications for your computer.

Dimensions

    Width: 310 mm (12.2 in.)

    Height: 85 mm (3.35 in.)

    Depth: 358 mm (14.1 in.)

Weight

    Minimum configuration as shipped: 7.3 kg (16 lbs)

    Maximum configuration: 8.5 kg (18.7 lbs)

Environment

    Air temperature:

        Operating at 0 - 3000 ft (914.4 m): 10° to 35°C (50° to 95°F)

        Operating at 3000 ft - 7000 ft (2134 m): 10° to 32°C (50° to 89.6°F)

        Non-operating: 10° to 43°C (50° to 110°F)

    Humidity:

        Operating: 8% to 80%

        Non-operating: 8% to 80%

        Transit: 8% to 90%

    Maximum altitude: 7000 ft (2133.6 m)

Electrical input

    Input voltage:

        Low range:

            Minimum: 100 V ac

            Maximum: 127 V ac

            Input frequency range: 50/60 Hz

            Voltage switch setting: 115 V ac

        High range:

            Minimum: 200 V ac

            Maximum: 240V ac

            Input frequency range: 50/60 Hz

            Voltage switch setting: 230 V ac

        Input kilovolt-amperes (kVA) (approximate):

            Minimum configuration as shipped: 0.10 kVA

            Maximum configuration: 0.24 kVA

Supported operating positions

To provide proper air flow to internal components, you must position your computer in one of the positions as illustrated below.
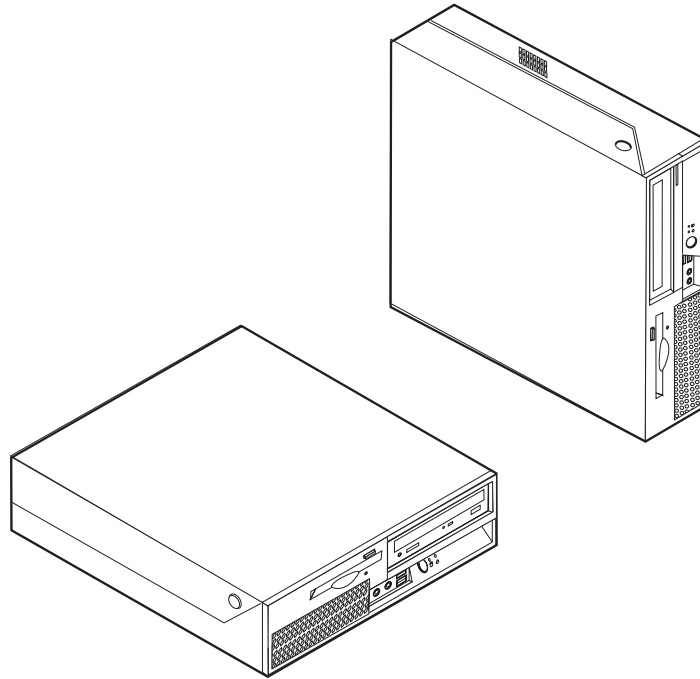
Tools required

To install some options in your computer, you might need a flat-blade or Phillips screwdriver. Additional tools might be needed for certain options. See the instructions that come with the option.

Handling static-sensitive devices

Static electricity, although harmless to you, can seriously damage computer components and options.

When you add an option, do *not* open the static-protective package containing the option until you are instructed to do so.

When you handle options and other computer components, take these precautions to avoid static electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.
- Always handle components carefully. Handle adapters and memory modules by the edges. Never touch any exposed circuitry.
- Prevent others from touching components.
- When you install a new option, touch the static-protective package containing the option to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.

- When possible, remove the option and install it directly in the computer without setting the option down. When this is not possible, place the static-protective package that the option came in on a smooth, level surface and place the option on it.
- Do not place the option on the computer cover or other metal surface.

Installing external options

This section shows the various external connectors on your computer to which you can attach external options, 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 adding an external option, use the information in this section to identify the required connector, and then use the instructions that come with the option to help you make the connection and install any software or device drivers that are required for the option.

Locating controls and connectors on the front of your computer

The following illustration shows the locations of the controls and connectors on the front of your computer.
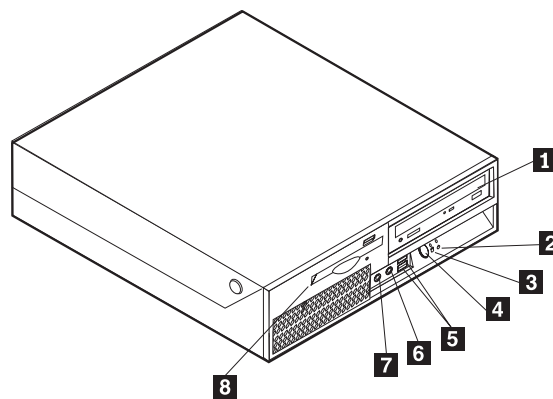
1	Optical drive	5	USB connectors (2)
2	Hard disk drive activity indicator	6	Microphone connector
3	Power-on indicator	7	Headphone connector
4	Power button	8	Diskette drive

Locating connectors on the rear of your computer

The following illustration shows the locations of connectors on the rear of your computer.
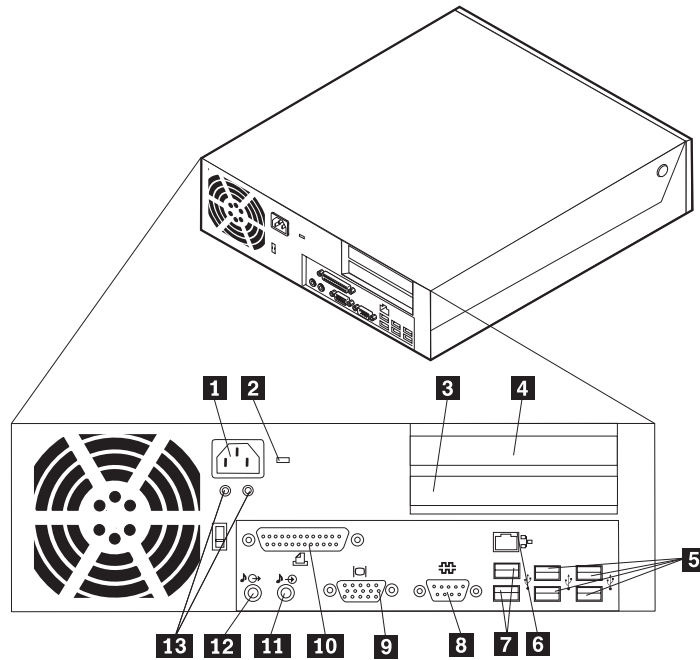
1 Power cord connector	8 Serial connector
2 Cable lock latch	9 VGA monitor connector
3 PCI Express x1 adapter connector	10 Parallel connector
4 PCI adapter connector	11 Audio line in connector
5 USB connectors (4)	12 Audio line out connector
6 Ethernet connector	13 Power supply diagnostic LEDs
7 USB connectors (2)	

Note: Some connectors on the rear of your computer are color-coded to help you determine where to connect the cables on your computer.

Connector	Description
USB connectors	Used to attach a device that requires a Universal Serial Bus (USB) connection, such as a USB keyboard, USB mouse, USB scanner or 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.
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.
Serial connector	Used to attach an external modem, serial printer, or other devices that use a 9-pin serial connector.
Parallel connector	Used to attach a parallel printer, parallel scanner, or other devices that use a 25-pin parallel connector.
Audio line in connector	Used to receive audio signals from an external audio device, such as a stereo system. When you attach an external audio device, a cable is connected between the audio line out connector of the device and the audio line in connector of the computer.
Audio line out connector	Used to send audio signals from the computer to external devices, such as powered stereo speakers (speakers with built-in amplifiers), headphones, multimedia keyboards, or the audio line in connector on a stereo system or other external recording device.

Obtaining device drivers

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

Opening the cover

> **Important**
>
> Read "Important safety information" on page v and "Handling
> static-sensitive devices" on page 16 before opening the computer cover.

To open the computer cover:

1. Remove any media (diskettes, CDs, or tapes) from the drives, shut down your operating system, and turn off all attached devices.

2. Unplug all power cords from electrical outlets.

3. Disconnect all cables attached to the computer. This includes power cords, input/output (I/O) cables, and any other cables that are connected to the computer.

4. Remove any locking devices such as a cable lock that secure the cover.

5. Press the buttons on the sides of the computer and pivot the computer cover upward to open the computer as shown.
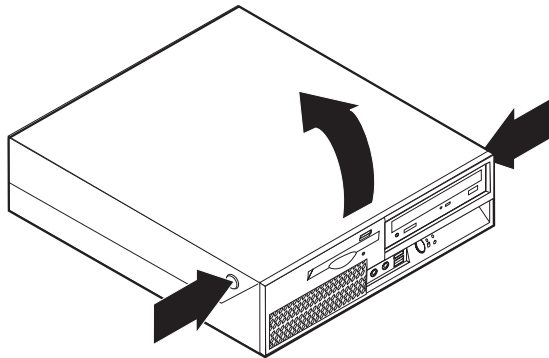
Locating components

The following illustration will help you locate the various components in your computer.
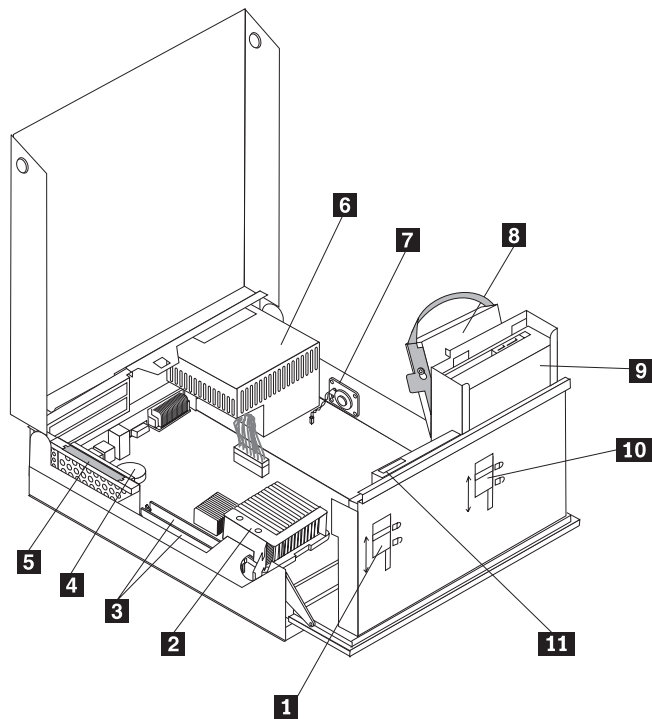
1	Diskette drive lock	7	Internal speaker
2	Microprocessor and heat sink	8	Hard disk drive
3	Memory modules (2)	9	Optical drive
4	Battery	10	Optical drive lock
5	PCI riser assembly	11	Diskette drive
6	Power supply assembly		

Accessing system board components and drives

You might need to pivot the drive bay assembly upward and remove the PCI riser and adapters to access system board components such as memory, the battery, and to access the drives.

To access system board components and the drives:

1. Open the computer cover. See "Opening the cover" on page 20.
2. Pivot the drive bay assembly upward as illustrated.

   Note: Make sure you note the location of any cables that you disconnect from the drives or the system board.
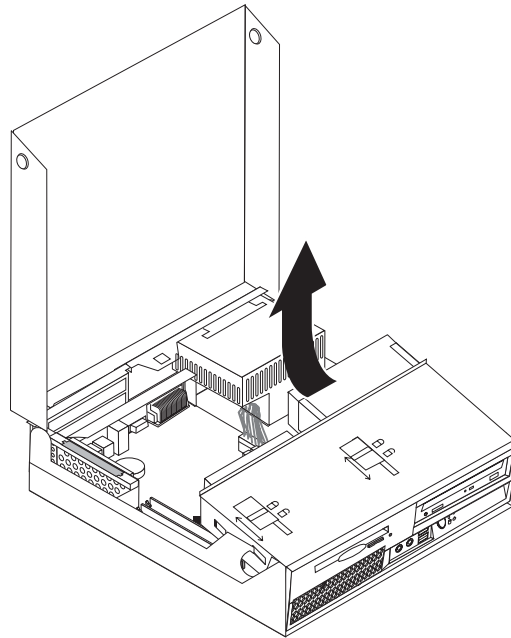
3. If any PCI adapters are installed, remove the PCI riser and adapter cards. Do not remove any adapters from the riser card. See "Installing PCI adapters" on page 25.

Identifying parts on the system board

The system board (sometimes called the *planar* or *motherboard*) is the main circuit board in your computer. It provides basic computer functions and supports a variety of devices that are factory-installed or that you can install later.

The following illustration shows the locations of parts on the system board.
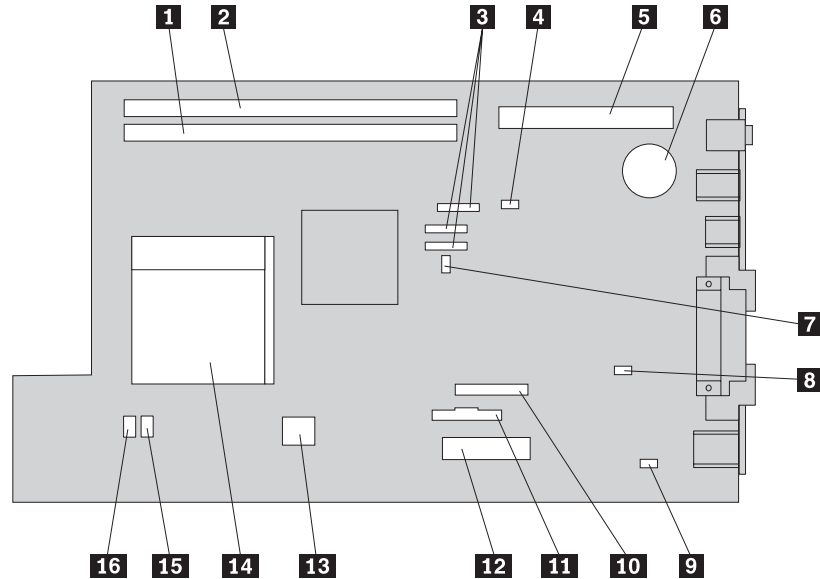
1	Memory connector 1	**9**	Internal speaker connector
2	Memory connector 2	**10**	Diskette drive connector
3	SATA IDE connectors (3)	**11**	Front panel connector
4	Clear CMOS/Recovery jumper	**12**	Power supply connector
5	PCI riser connector	**13**	12v power connector
6	Battery	**14**	Microprocessor
7	Cover presence switch (some models)	**15**	Fan connector 2
8	Temperature sensor connector	**16**	Fan connector 1

Installing memory

Your computer has two connectors for installing double date rate 2 dual inline memory modules (DDR2 DIMMs) that provide up to a maximum of 4.0 GB of system memory.

When installing memory modules, the following rules apply:
- Use 1.8 V, 240-pin, double data rate 2 synchronous dynamic random access memory (DDR2 SDRAM).
- Use 256 MB, 512 MB, 1.0 GB, or 2.0 GB memory modules in any combination up to a maximum of 4.0 GB.

Note: Only DDR2 SDRAM DIMMs can be used.

To install a memory module:
1. Open the computer cover. See "Opening the cover" on page 20.
2. Access the system board. See "Accessing system board components and drives" on page 22.
3. Locate the memory connectors. See "Identifying parts on the system board" on page 23.
4. Open the retaining clips.
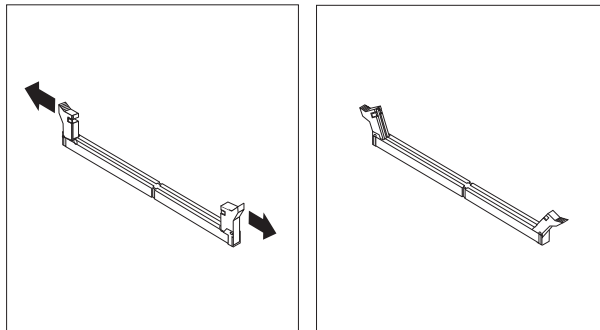
5. Position the memory module over the memory connector. Make sure that the notch **1** on the memory module aligns correctly with the connector key **2** on the system board. Push the memory module straight down into the connector until the retaining clips close.
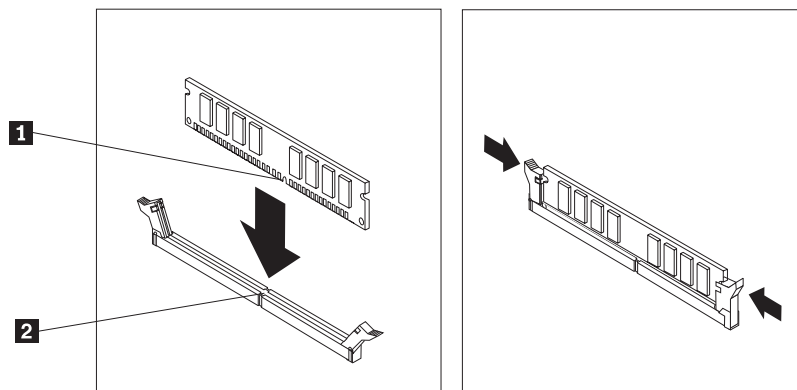
6. Reinstall the PCI riser assembly if it was removed.

Installing PCI adapters

This section provides information and instructions for installing and removing PCI adapters. Your computer has a riser card with one PCI adapter connector and one PCI Express x1 adapter connector.

To install a PCI adapter:

1. Open the computer cover. See "Opening the cover" on page 20.
2. While holding the left rear of the computer chassis down, pull upward on the handle provided to remove the PCI riser and any adapters that are currently installed.
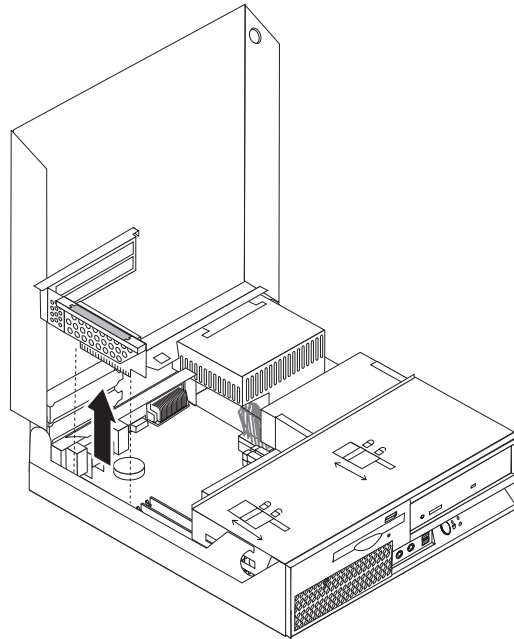
3. Release the adapter latch and remove the connector cover for the appropriate expansion connector.
4. Remove the adapter from its static-protective package.

5. Install the adapter into the appropriate connector in the PCI riser.

   Note: The top connector is for the PCI adapter and the bottom connector is for the PCI Express x1 adapter.

6. Close the adapter latch to retain the adapters.
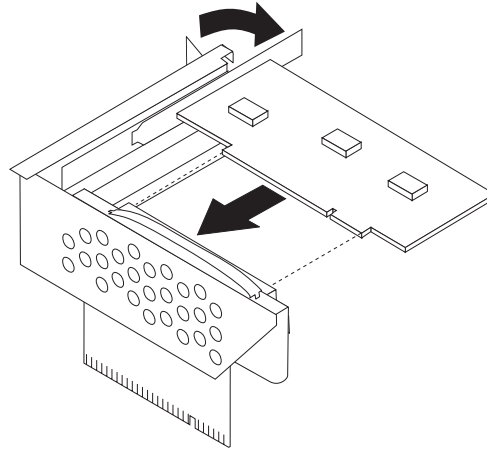
7. Reinstall the PCI riser assembly.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Closing the cover and connecting the cables" on page 35.

Installing internal drives

This section provides information and instructions for installing and removing internal drives.

Internal drives are devices that your computer uses to read and store data. You can add drives to your computer to increase storage capacity and to enable your computer to read other types of media. Some of the different drives that are available for your computer are:
- Serial Advanced Technology Attachment (SATA) hard disk drives
- SATA Optical drives, such as CD drives or DVD drives
- Removable media drives

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

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

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

Drive specifications

Your computer comes with the following factory-installed drives:
- A 3.5-inch hard disk drive in bay 1
- An optical drive in bay 2 (some models)
- A 3.5-inch diskette drive in bay 3 (some models)

Any bay that does not have a drive installed has a static shield and bay panel installed.

The following illustration shows the locations of the drive bays.
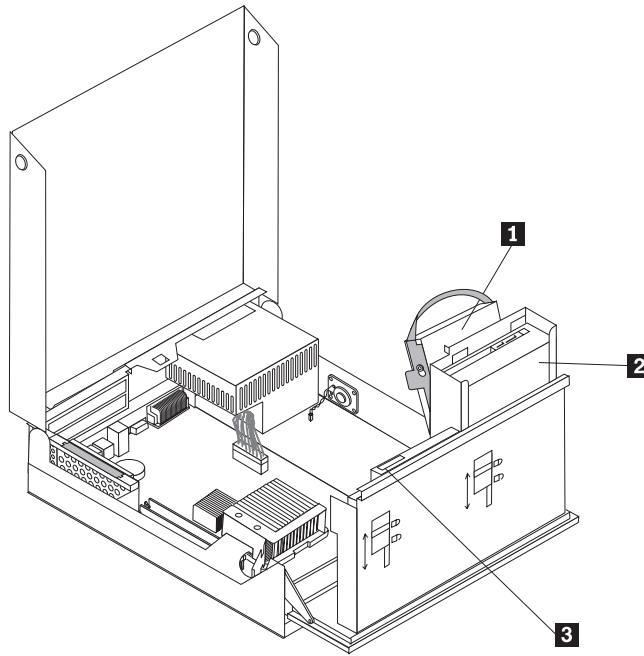
The following list describes the types and size of drives you can install in each bay:

1	Bay 1 - Maximum height: 26.1 mm (1.0 in.)	3.5-inch hard disk drive (preinstalled)
2	Bay 2 - Maximum height: 43.0 mm (1.7 in.)	Optical drives, such as CD drive or DVD drive (preinstalled in some models) 3.5-inch hard disk drive (requires a Universal Adapter Bracket, 5.25 to 3.5-inch) * 5.25-inch hard disk drive
3	Bay 3 - Maximum height: 12.7 mm (0.5 in.)	3.5-inch diskette drive (preinstalled in some models)

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

Installing a drive in bay 2

To install an optical drive or an additional hard disk drive in bay 2, do the following:

1. Open the computer cover. See "Opening the cover" on page 20.
2. Pivot the drive bay assembly upward to gain access to the cable connections.
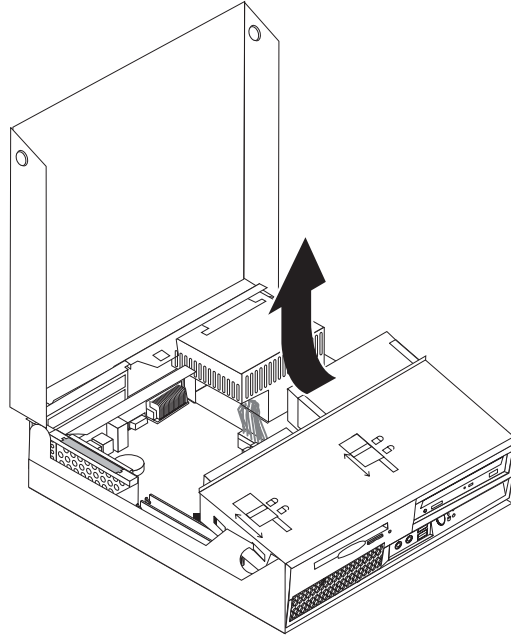
3. Remove the front bezel by releasing the tab as shown and pivoting the bezel outward from the bottom.
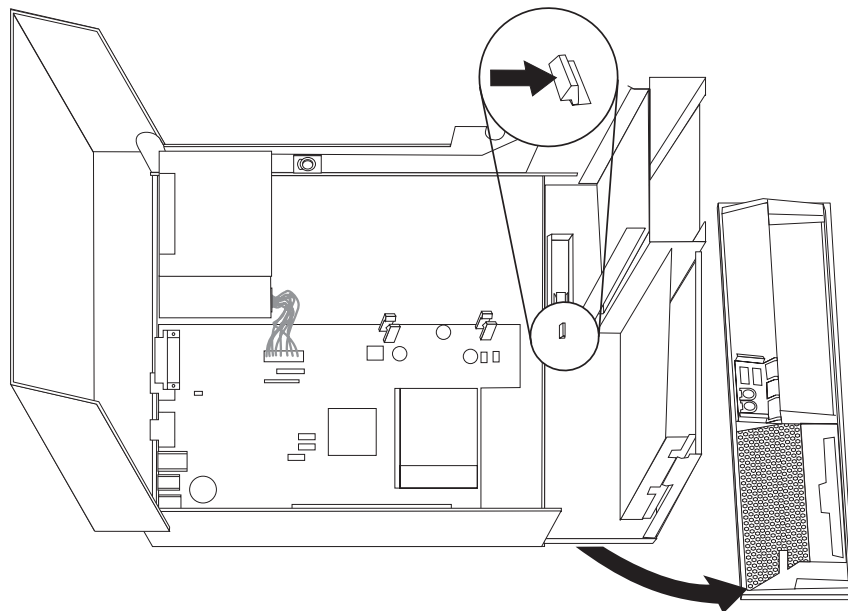
4. Lower the drive bay assembly.
5. Remove the metal shield from the drive bay by using a flat-blade screwdriver to gently pry it loose.
6. If you are installing a drive with accessible media, such as an optical drive, remove the plastic panel in the bezel by squeezing the plastic tabs that secure the panel on the inside of the bezel.

> **Note:** If you are installing a 3.5-inch hard disk drive you must use a Universal Adapter Bracket, 5.25 to 3.5-inch. You can obtain this bracket from a local computer retailer or by contacting the Customer Support Center.

7. Reinstall the front bezel.
8. Slide the optical drive lock to the unlock position. See "Locating components" on page 21.
9. If you are installing a 3.5-inch drive, install the drive into the Universal Adapter Bracket, 5.25 to 3.5-inch.
10. Install the drive into the drive bay until it snaps into position.
11. Slide the optical drive lock **1** to the locked position.
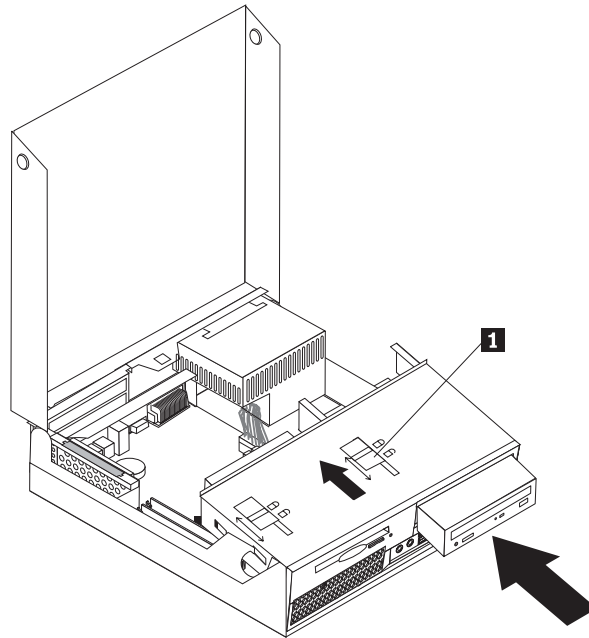
12. Pivot the drive bay assembly upward to gain access to the cable connections.
13. Connect at "Connecting a serial ATA drive."

Connecting a serial ATA drive

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

1. Locate the signal cable that comes with the new drive.
2. Locate the available SATA connector on the system board. See "Identifying parts on the system board" on page 23.
3. Connect one end of the signal cable to the drive and the other to the available SATA connector on the system board.

4. Locate one of the extra five-wire power connectors and connect it to the drive.
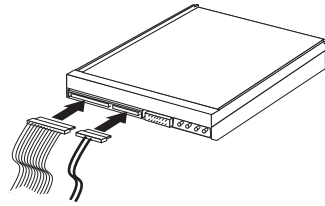
> **What to do next:**
>
> - To work with another option, go to the appropriate section.
> - To complete the installation, go to "Closing the cover and connecting the cables" on page 35.

Installing a diskette drive in bay 3

To install a diskette drive in bay 3, do the following:

1. Open the computer cover. See "Opening the cover" on page 20.
2. Pivot the drive bay assembly upward to gain access to the cable connections.
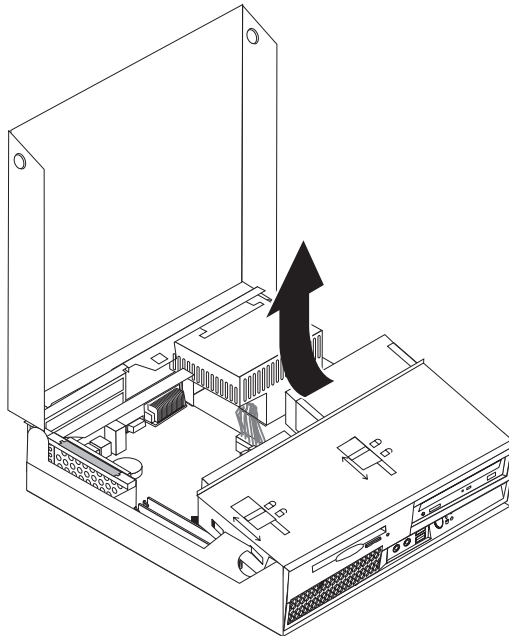
3. Remove the front bezel by releasing the tab as shown and pivoting the bezel outward from the bottom.
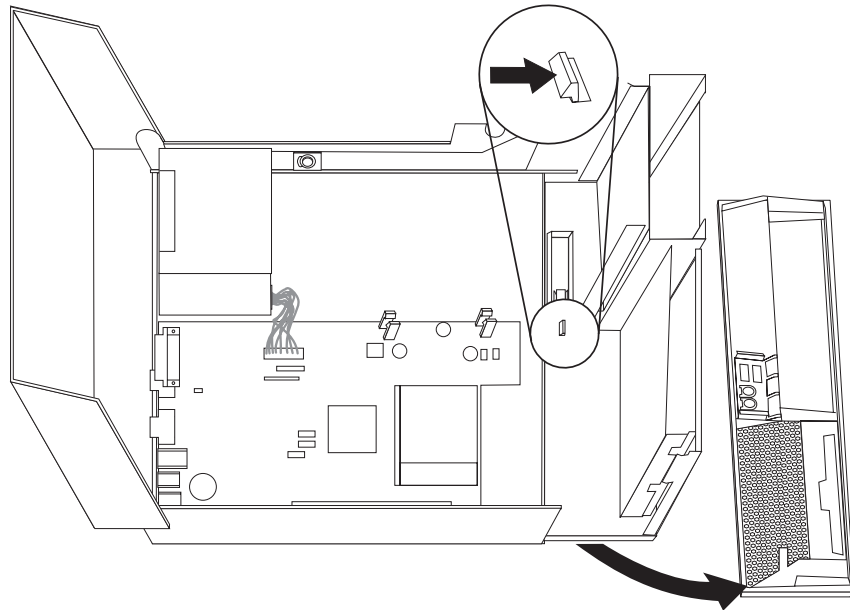
4. Lower the drive bay assembly.
5. Remove the metal shield from the diskette drive bay by using a flat-blade screwdriver to gently pry it loose.
6. Remove the plastic panel in the bezel by squeezing the plastic tabs that secure the panel on the inside of the bezel.
7. Reinstall the front bezel.
8. Slide the diskette drive lock to the unlock position. See "Locating components" on page 21.
9. Connect the flat cable to the new drive.

10. Install the new drive from the rear of the drive bay assembly and slide the diskette drive lock **1** to the locked position.
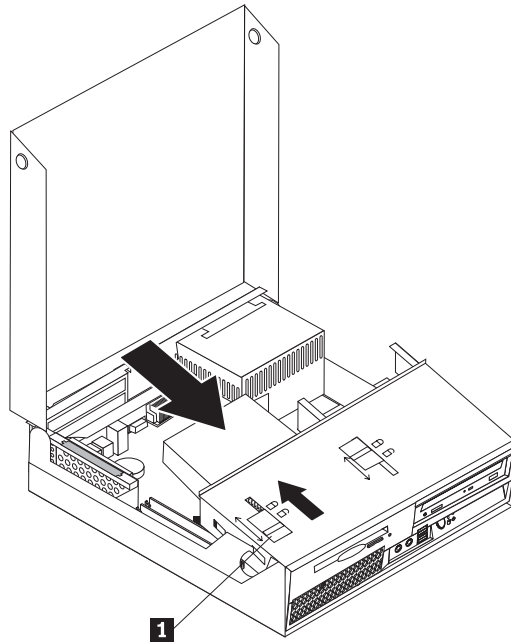
What to do next:

- To work with another option, go to the appropriate section.
- To complete the installation, go to "Closing the cover and connecting the cables" on page 35.

Security features

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

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

Integrated cable lock

With an integrated cable lock (sometimes referred to as the Kensington lock), you can secure your computer to a desk, table, or other non-permanent fixture. The cable lock attaches to a security slot at the rear of your computer and is operated with a key. The cable lock also locks the buttons used to open the computer cover. This is the same type of lock used with many laptop computers. You can order a security cable directly from Lenovo. Go to http://www.lenovo.com/support/ and search on *Kensington*.
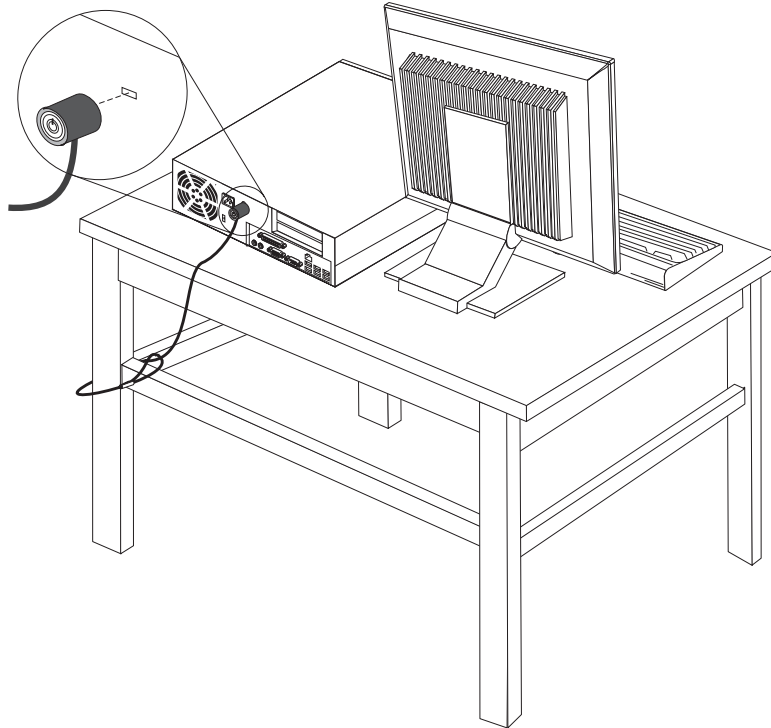
Password protection

To deter unauthorized use of your computer, you can use the Setup Utility program to set a password. When you turn on your computer you are prompted to type the password to unlock the keyboard for normal use.

What to do next:
- To work with another option, go to the appropriate section.
- To complete the installation, go to "Closing the cover and connecting the cables" on page 35.

Changing 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 this information active when you turn off the computer.

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

Refer to "Lithium battery notice" on page x for information about replacing and disposing of the battery.

To change the battery:

1. Turn off the computer and disconnect the power cord from the electrical outlet and from the computer.
2. Open the computer cover. See "Opening the cover" on page 20.
3. Access the system board. See "Accessing system board components and drives" on page 22.
4. Locate the battery. See "Identifying parts on the system board" on page 23.
5. Remove the old battery.
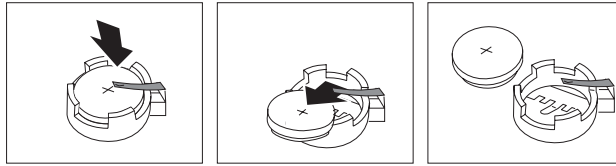
6. Install the new battery.
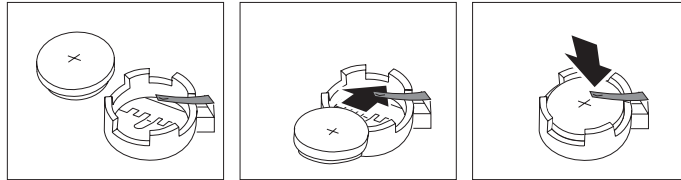
7. Reinstall the PCI riser assembly if removed.
8. Close the computer cover, and connect the cables. See "Closing the cover and connecting the cables" on page 35.

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

9. Turn on the computer and all attached devices.
10. Use the Setup Utility program to set the date and time and any passwords. See Chapter 5, "Using the Setup Utility," on page 45.

Erasing a lost or forgotten password (clearing CMOS)

This section applies to lost or forgotten passwords. For more information about lost or forgotten passwords, go to the ThinkVantage Productivity Center program.

To erase a forgotten password:

1. Open the computer cover. See"Opening the cover" on page 20.
2. Access the system board. See "Accessing system board components and drives" on page 22.
3. Locate the Clear CMOS/Recovery jumper on the system board. See "Identifying parts on the system board" on page 23.
4. Move the jumper from the standard position (pins 1 and 2) to the maintenance or configure position (pins 2 and 3).
5. Reinstall the PCI riser assembly if removed.
6. Lower the drive bay assembly and reconnect any cables that were disconnected.

7. Close the computer cover and connect the power cord. See "Closing the cover and connecting the cables."

8. Restart the computer, leave it on for approximately 10 seconds. Turn off the computer by holding the power switch for approximately 5 seconds. The computer will turn off.

9. Repeat steps 1 through 3 on page 34.

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

11. Reinstall the PCI riser assembly if removed.

12. Close the computer cover and connect the power cord. See "Closing the cover and connecting the cables."

Closing the cover and connecting the cables

After working with options, you need to install any removed parts, close the computer cover, and reconnect cables, including telephone lines and power cords. Also, depending on the option that is installed, you might need to confirm the updated information in the Setup Utility program.

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

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your computer.

2. Make sure that the cables are routed correctly before lowering the drive bay assembly.

> **Important**
>
> Correctly route all power supply cables to avoid interference with the drive bay assembly. Keep cables clear of the hinges and sides of the computer chassis.
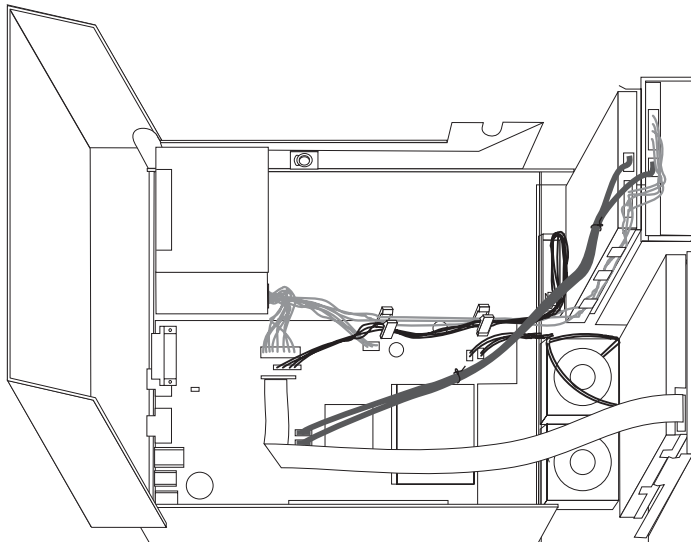
3. Lower the drive bay assembly and make sure that the drive locks are both in the locked position. Otherwise, you cannot close the computer cover.

4. Close the computer cover.

5. Install any locking devices such as a cable lock as necessary.
6. Reconnect the external cables and power cords to the computer. See "Locating connectors on the rear of your computer" on page 18.
7. To update the configuration, see Chapter 5, "Using the Setup Utility," on page 45.

Chapter 4. Recovering software

The Rescue and Recovery™ program is software aimed at helping users restore their computer data and recover from software or hardware-related failures. In the event of a computer failure, use the Rescue and Recovery program to restore the contents of the primary hard drive to a previously saved state. This chapter will help you become familiar with recovery solutions provided by Lenovo.

The Rescue and Recovery program has two components, Rescue and Recovery (Windows environment) and Rescue and Recovery workspace. Recovery operations can be launched from Windows or from a Rescue and Recovery workspace environment that is independent of the Windows operating system.

If you encounter a problem, use the recovery tools from either the Windows environment or from the Rescue and Recovery workspace to perform one of the two recovery operations:

- Rescue files
- Restore your system or your individual files

See "Using the Rescue and Recovery workspace" on page 39 to perform one of the two recovery operations.

Refer to the Access Help online help system for additional information about the Rescue and Recovery program. For information on how to access the online help system, see "Access Help" on page 60. The following information refers to the Rescue and Recovery Windows environment.

Creating and using product recovery discs

If your computer is equipped with a recordable CD or DVD drive, you can create a set of Product Recovery discs that enables you to restore the contents of the hard disk to the same state as when the computer was originally shipped from the factory. Product Recovery discs are useful if you transfer the computer to another area, sell the computer, recycle the computer, or as a last resort put the computer in an operational state after all other methods of recovery have failed. It is important to create a set of Product Recovery discs as soon as possible.

Note: Your Microsoft Windows license permits you to create only one set of Product Recovery discs, so it is important that you store the discs in a safe place after you make them.

To create Product Recovery discs, do the following:

1. From the Windows desktop, click **Start**, select **All Programs**, select **ThinkVantage**, click **Create Recovery Media**.
2. Follow the instructions on the screen.

To use Product Recovery discs, do the following:

Attention: When you restore the factory contents from the Product Recovery discs, all files currently on the hard disk will be deleted and replaced by the original factory contents. During the restore process, you will be given the opportunity to save one or more files currently on your hard disk drive to other media before any data is removed.

1. Insert the Rescue and Recovery disc into your CD or DVD drive.
2. Restart your computer.
3. After a short delay, the Rescue and Recovery workspace opens.

   Note: If the Rescue and Recovery workspace fails to open, you might not have your startup device (CD drive or DVD drive) set correctly in your BIOS startup sequence. See "Setting a rescue device in the startup sequence" on page 42 for more information.

4. In the Rescue and Recovery menu, click **Restore your system.**
5. Follow the instructions on the screen. Insert the appropriate Product Recovery disc when prompted.

Note: After restoring your hard disk to the original factory content, you might have to reinstall some software or drivers. See "Using the Rescue and Recovery workspace" on page 39 for details.

Backup and recovery

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

- On a protected area of your hard disk
- On a second hard disk installed in your computer
- On an externally attached USB hard disk
- On a network drive
- On recordable CDs or DVDs (a recordable CD or DVD drive is required for this option)

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

To perform a backup operation from Rescue and Recovery, do the following:

1. From the Windows desktop, click **Start**, click **All Programs**, click **ThinkVantage**, then click **Rescue and Recovery**. The Rescue and Recovery program opens.
2. From the Rescue and Recovery main window, click **Backup your hard drive** to select backup operation options.
3. Follow the instructions on the screen.

To perform a restore operation from Rescue and Recovery, do the following:

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

2. From the Rescue and Recovery main window, click the **Restore your system from a backup** icon.
3. Follow the instructions on the screen.

For information about performing a restore 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 that operates independently from the Windows operating system. This enables you to perform recovery operations even if the Windows operating system cannot be started. You can perform the following recovery operations from the Rescue and Recovery workspace:

* **Rescue files from your hard disk or from a backup:** The Rescue and Recovery workspace enables you to locate files on your hard disk and transfer them to a network drive or other recordable media, such as a USB hard disk drive or a diskette. This solution is available, even if you did not back up your files or if changes were made to the files since your last backup operation. You also can rescue individual files from a Rescue and Recovery backup located on your local hard disk, a USB device, or a network drive.
* **Restore your hard disk from Rescue and Recovery backup:** Once you perform a backup operation using the Rescue and Recovery program, you can perform restore operations from the Rescue and Recovery workspace, even if you cannot start Windows.
* **Restore your hard disk to the factory contents:** The Rescue and Recovery workspace enables you to restore the complete contents of your hard disk to the same state as it was when originally shipped from the factory. If you have multiple partitions on your hard disk, you have the option to restore the factory contents 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 contents even if you cannot start Windows.

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

To start the Rescue and Recovery workspace, do the following:
1. Turn off your computer.
2. Restart your computer.
3. Repeatedly press and release F11.
4. When you hear beeps or see a logo screen, release F11.
5. If you 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 40.
6. Do one of the following:

- To rescue files from your hard disk or from a backup, click **Rescue files** in the Rescue and Recovery menu; then, follow the instructions on the screen.
- To restore your hard disk from a Rescue and Recovery backup or to restore your hard drive to the factory contents, click **Restore your system** in the Rescue and Recovery menu; then, follow the instructions on the screen.

  Note: After restoring your hard disk to the original factory content, you might have to reinstall some software or drivers. Refer to the following notes for more information.

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

Notes:

1. After restoring a hard disk to the original factory contents you might have to reinstall device drivers for some devices. See "Recovering or installing device drivers" on page 42.
2. Some computers come with Microsoft Office or Microsoft Works preinstalled. If you need to recover or reinstall your Microsoft Office or Microsoft Works applications, you must use the *Microsoft Office CD* or *Microsoft Works CD*. These CDs are provided only with computers that come with Microsoft Office or Microsoft Works preinstalled.

Solving recovery problems

If you are unable to access the Rescue and Recovery workspace or the Windows environment, you can:

- Use your rescue media (CD, DVD, or USB hard disk) to gain access to the Rescue and Recovery workspace. See "Creating and using rescue media" for details.
- Use a Recovery Repair diskette to repair the Rescue and Recovery workspace or repair a file needed to enter the Windows environment. See "Creating and using a Recovery Repair diskette" on page 41 for details.
- If your intent is to restore the contents of the hard disk to its original factory state, you can use a set of Product Recovery discs. See "Creating and using product recovery discs" on page 37.

It is important to create a Recovery Repair diskette, rescue media, and a set of Product Recovery discs as soon as possible and store them in a safe place as a precautionary measure.

If you are unable to access the Rescue and Recovery workspace or the Windows environment from rescue media, a Recovery Repair diskette, or a set of Product Recovery CDs, you might not have the rescue device, CD drive, DVD drive or USB hard disk drive defined as a startup device in the BIOS startup sequence. See "Setting a rescue device in the startup sequence" on page 42 for more information.

Creating and using rescue media

Rescue media such as a CD or USB hard disk drive enables you to recover from failures that prevent you from gaining access to the Rescue and Recovery workspace on your hard disk.

Note: The rescue disc, the first disc of the Product Recovery discs and the backup discs are startable (bootable). They can be started in any type of CD or DVD drive except for a DVD-RAM media.

To create rescue media, do the following:

1. From the Windows desktop, click **Start**, click **All Programs**, click **ThinkVantage**, then click **Create Recovery Media**.
2. In the **Rescue Media** area, select the type of rescue media you want to create. You can create rescue media using a CD, USB hard drive, or an internal hard drive.
3. Click **OK**.
4. Follow the instructions on the screen.

To use rescue media, do one of the following:

- Insert the rescue disc and restart your computer.
- Attach your USB hard disk drive to one of the USB connectors on your computer, then turn on your computer.

When the rescue media starts, the Rescue and Recovery workspace opens. Help for each feature is available from the Rescue and Recovery workspace. If your rescue media fails to start, you might not have your rescue device (CD drive, DVD drive, or USB device) set correctly in your BIOS startup sequence. See "Setting a rescue device in the startup sequence" on page 42 for more information.

Creating and using a Recovery Repair diskette

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

To create a Recovery Repair diskette, do the following:

1. Start your computer and operating system.
2. Using an Internet browser, go to the following Web address:

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

3. Insert a diskette into diskette drive A. Information on the diskette will be erased and the diskette will be formatted appropriately.
4. Double-click on the Recovery Repair rnrrepair.exe file. The diskette is created.
5. Take out the diskette and label it Recovery Repair diskette.

To use the Recovery Repair diskette, do the following:

1. Shut down the operating system and turn off the computer.
2. Insert the Recovery Repair diskette into diskette drive A.
3. Turn on the computer and follow the instructions on the screen.

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

If an error message appears during the repair operation and the repair operation cannot be completed, you might have a problem with the partition that contains the Rescue and Recovery workspace. Use your rescue media to access the Rescue

and Recovery workspace. For information about creating and using rescue media, see "Creating and using rescue media" on page 40.

Recovering or installing device drivers

Before you can recover or install device drivers, your operating system must be installed on your computer. Make sure that you have the documentation and software media for the device.

Device drivers for factory-installed devices are located on the computer hard disk (usually drive C) in the SWTOOLS\drivers folder. Other device drivers are on the software media that come with individual devices.

The latest device drivers for factory-installed devices are also available on the World Wide Web at http://www.lenovo.com/support/.

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

1. Start your computer and operating system.
2. Use Windows Explorer or My Computer to display the directory structure of your hard disk.
3. Open the C:\SWTOOLS folder.
4. Open the DRIVERS folder. Within the DRIVERS folder are several subfolders that are named for various devices that are installed in your computer (for example, AUDIO or VIDEO).
5. Open the appropriate device subfolder.
6. Use one of the following methods to reinstall the device driver:
   - In the device subfolder, look for a README. TEXT or other file with the .TXT extension. This file might be named after the operating system, such as WIN98.TXT. The text file has information on how to reinstall that device driver.
   - If the device subfolder contains a file with an .INF extension, you can use the Add New Hardware program (located in the Windows Control Panel) to reinstall the device driver. Not all device drivers can be reinstalled using this program. In the Add New Hardware program, when prompted for the device driver that you want to install, click **Have Disk** and **Browse**. Then select the appropriate device driver file from the device subfolder.
   - In the device subfolder, look for a SETUP.EXE file. Double-click **SETUP.EXE** and follow the instructions on the screen.

Setting a rescue device in the startup sequence

Before you start Rescue and Recovery from a CD, DVD, USB hard disk drive, or any external device, you must first change the startup sequence in the Setup Utility.

To view or change the startup sequence, do the following:

1. With the computer off, repeatedly press and release F1; then, turn on the computer.
2. When the logo screen appears, or you hear a series of beeps, release F1.
3. If you are prompted for a password, type your current password.
4. From the Setup Utility main menu, use the right-arrow key to select **Startup**.
5. Arrange the startup sequence to meet your needs.
6. Press **Esc** twice to go to the Setup Utility exit menu.

7. Use the down-arrow key to select **Save and exit the Setup Utility**, then press **Enter**.
8. When the Setup Confirmation window appears, press **Enter**.
9. The computer restarts.

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

For more information on Setup Utility, see Chapter 5, "Using the Setup Utility," on page 45.

Chapter 5. Using the Setup Utility

The Setup Utility program is stored in the electrically erasable programmable read-only memory (EEPROM) of your computer. The Setup Utility program is used to view and change the configuration settings of your computer, regardless of which operating system you are using. However, the operating-system settings might override any similar settings in the Setup Utility program.

Starting the Setup Utility program

To start the Setup Utility program, do the following:

1. If your computer is already on when you start this procedure, shut down the operating system and turn off the computer.

2. Repeatedly press and release the F1 key while turning on your computer..

   Note: If a user password or an administrator password has been set, the Setup Utility program menu is not displayed until you type your password. See "Using passwords" for more information.

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

Viewing and changing settings

The Setup Utility program menu lists items that identify system configuration topics.

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

Using passwords

By using the Setup Utility program, you can set passwords to prevent unauthorized persons from gaining access to your computer and data. The following types of passwords are available:

- User Password
- Administrator Password

You do not have to set any passwords to use your computer. However, if you decide to set any passwords, read the following sections.

Password considerations

A password can be any combination of up to twelve characters (a-z and 0-9) and symbols. For security reasons, it is a good idea to use a strong password that cannot be easily compromised. Strong passwords typically adhere to the following rules:

- Have at least eight characters in length
- Contain at least one alphabetic character, one numeric character, and one symbol
- Contain at least one of the following symbols: , . / ` ; ' []
- You can also use the space bar

- Setup Utility program and hard disk drive passwords are not case sensitive
- Not be your name or your user name
- Not be a common word or a common name
- Be significantly different from your previous password

User Password

When a User Password is set, the user is prompted to type a valid password each time the computer is turned on. The computer cannot be used until a valid password is typed from the keyboard.

Administrator Password

Setting an Administrator Password deters unauthorized persons from changing configuration settings. If you are responsible for maintaining the settings of several computers, you might want to set an Administrator Password.

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

If both the user and administrator passwords are set, you can type either password. However, to change any configuration settings, you must use your administrator password.

Setting, changing, and deleting a password

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

Note: A password can be any combination of up to twelve characters (A- Z, a-z, and 0-9). See "Password considerations" on page 45 for more information.

1. Start the Setup Utility program (see Chapter 5, "Using the Setup Utility," on page 45).
2. From the Setup Utility program menu, select **Security**.
3. Select **Set Passwords**. Read the information displayed on the right side of the screen.

Selecting a startup device

If your computer does not start up (boot) from a device such as the CD-ROM, diskette, or hard disk as expected, use one of the following procedures to select a startup device.

Selecting a temporary startup device

Use this procedure to startup from any boot device.

Note: Not all CDs, hard disks, and diskettes are startable (bootable).

1. Turn off your computer.
2. Press and hold the F12 key then turn on the computer. When the Startup Device Menu appears, release the F12 key.

   Note: If you are using a USB keyboard and the Startup Device Menu does not display using this method, repeatedly press and release the F12 key rather than leaving it pressed when turning on the computer.

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

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

Changing the startup device sequence

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

1. Start the Setup Utility program (see "Starting the Setup Utility program" on page 45).
2. Select **Startup**.
3. Select **Startup Sequence**. See the information displayed on the right side of the screen.
4. Select the devices for the Primary Startup Sequence, the Automatic Startup Sequence, and the Error Startup Sequence.
5. Select **Exit** from the Setup Utility menu and then **Save Settings** or **Save and exit the Setup Utility**.

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

Advanced settings

On some computer models the Advanced settings menu includes a setting to Enable/Disable HyperThreading. This feature works only with HyperThreading-aware operating systems such as Microsoft Windows XP. The default setting for HyperThreading is Enabled. However, if you select **Set Defaults** and are using an operating system other than Windows XP, your computer performance might be degraded. Therefore, you should always set HyperThreading to Disabled unless you are sure your operating system supports HyperThreading.

Exiting from the Setup Utility program

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

Chapter 6. Updating system programs

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

Using system programs

System programs are the basic layer of software that is built into your computer. They include the power-on self-test (POST), the basic input/output system (BIOS) code, and the Setup Utility program. POST is a set of tests and procedures that is performed each time you turn on your computer. BIOS is a layer of software that translates instructions from other layers of software into electrical signals that the computer hardware can understand. You can use the Setup Utility program to view and change the configuration and setup of your computer.

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

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

Note: You can download a self starting bootable CD image (known as an .iso image) of the diagnostics program from http://www.lenovo.com to support systems without a diskette drive.

Updating (flashing) BIOS from a diskette or CD-ROM

To update (flash) the BIOS from a diskette or CD-ROM, do the following:

1. Insert a system program update (flash) diskette or CD-ROM into the diskette drive or optical drive. System program updates are available at http://www.lenovo.com/support on the World Wide Web.

   Note: If you are inserting a CD-ROM into the optical drive, make sure that the computer is turned on.

2. Turn on the computer. If it is on already, you must turn it off and back on again. The update begins.

3. When you are prompted to select a language, press the number on your keyboard that corresponds to the language and then press Enter.

4. When prompted to change the serial number, press Y.

5. Type in the seven character serial number of your computer and then press Enter.

6. When prompted to change the machine type/model, press Y.

7. Type in the seven character machine type/model of your computer and then press Enter.

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

Updating (flashing) BIOS from your operating system

Note: Due to constant improvements being made to the Web site, Web page content (including the links referenced in the following procedure) is subject to change.

1. From your browser, type http://www.lenovo.com/support in the address field and press Enter.
2. Locate the Downloadable files for your machine type as follows:
   a. Under Use Quick path, type your machine type and click **Go**.
   b. Click **Continue**.
   c. Click **Downloads and drivers**.
   d. Under the BIOS category, click the Flash BIOS update.
   e. Click the .txt file that contains the installation instructions for the flash BIOS update (flash from the operating system version).
3. Print these instructions. This is very important since they are not on the screen after the download begins.
4. From your browser, click **Back** to return to the list of files. Carefully follow the printed instructions to download, extract, and install the update.

Recovering from a POST/BIOS update failure

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

1. Turn off the computer and any attached devices, such as printers, monitors, and external drives.
2. Unplug all power cords from electrical outlets, and open the computer cover. See "Opening the cover" on page 20
3. Access the system board. See "Accessing system board components and drives" on page 22.
4. Locate the Clear CMOS/Recovery jumper on the system board. See "Identifying parts on the system board" on page 23.
5. Remove any cables that impede access to the Clear CMOS/Recovery jumper.
6. Move the jumper from the standard position (pins 1 and 2) to pins 2 and 3.
7. Reinstall the PCI riser assembly if removed.
8. Close the computer cover and reconnect any cables that were disconnected. See "Closing the cover and connecting the cables" on page 35.
9. Reconnect the power cords for the computer and monitor to electrical outlets.
10. Insert the POST/BIOS update (flash) diskette into drive A, and turn on the computer and the monitor.
11. The recovery session will take two to three minutes. During this time you will hear a series of beeps. After the update session is completed, there will be no video, the series of beeps will end, and the system will automatically turn off. Remove the diskette from the diskette drive.
12. Repeat steps 2 through 5.
13. Replace the Clear CMOS/Recovery jumper to its original position.
14. Reinstall the PCI riser assembly if removed.

15. Close the computer cover and reconnect any cables that were disconnected.
16. Turn on the computer to restart the operating system.

Chapter 7. Troubleshooting and diagnostics

This chapter describes some basic troubleshooting and diagnostic programs. If your computer problem is not described here, see Chapter 8, "Getting information, help, and service," on page 59 for additional troubleshooting resources.

Basic troubleshooting

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

Symptom	Action
The computer does not start when you press the power button.	Verify that: • The power cord is plugged into the rear of the computer and into a working electrical outlet. • If your computer has a secondary power switch on the back of the computer, ensure that it is switched on. • The power indicator on the front of the computer is on. • The voltage is set to the correct setting for your country. If you cannot correct the problem, have the computer serviced. Refer to the warranty and safety information that is provided with your computer for a list of service and support telephone numbers.
The monitor screen is blank.	Verify that: • The monitor cable is securely attached to the rear of the monitor and to the rear of the computer. • The monitor power cord is plugged into the monitor and into a working electrical outlet. • The monitor is turned on and the brightness and contrast controls are set correctly. • The monitor signal cable is securely connected to the monitor and to the monitor connector on the computer. **Note:** If your computer has two monitor connectors, verify that your monitor is connected to the one in the AGP option connector rather than the one in the rear of the system board. For more information, "Connecting your computer" on page 3. If you cannot correct the problem, have the computer serviced. Refer to the warranty and safety information that is provided with your computer for a list of service and support telephone numbers.
The keyboard does not work. The computer does not respond to the keyboard.	Verify that: • The computer is turned on. • The monitor is turned on and the brightness and contrast controls are set correctly. • The keyboard is securely connected to the keyboard connector on the computer. • No keys are stuck. If you cannot correct the problem, have the computer serviced. Refer to the warranty and safety information that is provided with your computer for a list of service and support telephone numbers.

Symptom	Action
The Enhanced Performance USB Keyboard does not work.	Verify that: • The computer is turned on. • The keyboard is securely connected to a USB connector on the front or rear of the computer. • No keys are stuck. If you cannot correct the problem, have the computer serviced. Refer to the warranty and safety information that is provided with your computer for a list of service and support telephone numbers.
The mouse does not work. The computer does not respond to the mouse.	Verify that: • The computer is turned on. • The mouse is securely connected to the mouse connector on the computer. • The mouse is clean. Refer to "Cleaning the mouse" on page 56 for further information. If you cannot correct the problem, have the computer serviced. Refer to the warranty and safety information that is provided with your computer for a list of service and support telephone numbers.
The operating system will not start.	Verify that: • There is no diskette in the diskette drive. • The startup sequence includes the device where the operating system resides. Usually, the operating system is on the hard disk. See "Selecting a startup device" on page 46 for more information. If you cannot correct the problem, have the computer serviced. Refer to the warranty and safety information that is provided with your computer for a list of service and support telephone numbers.
The computer beeps multiple times before the operating system starts.	Verify that no keys are stuck down. If you cannot correct the problem, have the computer serviced. Refer to the warranty and safety information that is provided with your computer for a list of service and support telephone numbers.

Diagnostic programs

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

Notes:

1. You can download the latest version of the diagnostic programs from http://www.lenovo.com/support/. Type your machine type into the **Use Quick Path** field and click **Go** to find the downloadable files that are specific to your computer.

2. If you are unable to isolate and repair the problem yourself after you run PC-Doctor for Windows and PC-Doctor for DOS, save and print the log files created by both diagnostic programs. You will need the log files when you speak to a Lenovo technical support representative. (The log file created by PC-Doctor for Windows is automatically saved in C:\PCDR\DETAILED.TXT.)

PC-Doctor for Windows

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

To open PC-Doctor for Windows, click **Start** from the Windows desktop, select **All Programs**, select **PC-Doctor for Windows**, and click **PC-Doctor for Windows**. Follow the instructions on the screen. For additional information about running the diagnostic program, refer to the PC-Doctor for Windows help system.

If you still suspect a problem after PC-Doctor for Windows runs successfully, run PC-Doctor for DOS to help you diagnose your computer problem.

PC-Doctor for DOS

The PC-Doctor for DOS diagnostic program is part of the Rescue and Recovery workspace and runs independently of the Windows operating system. Use PC-Doctor for DOS, if you are unable to start the Windows operating system or if PC-Doctor for Windows has not been successful in isolating a possible problem. You can run PC-Doctor for DOS from a diagnostic CD image or diagnostic diskettes that you create. You can also run PC-Doctor for DOS from the Rescue and Recovery workspace.

Note: Be sure to create a diagnostic CD image or diagnostic diskettes in case you are unable to run PC-Doctor for DOS from the Rescue and Recovery workspace.

Creating a diagnostic CD image

To create a diagnostic CD image, download a self-starting bootable CD image (known as an .iso image) of the diagnostic program from http://www.lenovo.com/support/. After you download the image, you can create the CD using any CD burning software.

If your computer does not have a CD burner or you do not have Internet access, see "Creating diagnostic diskettes."

Creating diagnostic diskettes

To create diagnostic diskettes, download the PC-Doctor for DOS diagnostic program from http://www.lenovo.com/support/ onto two blank, formatted diskettes.

If you do not have Internet access, create the diagnostic diskettes using the following procedure:

Note: You will need a diskette drive on your computer or a USB diskette drive to complete this procedure.

1. Shut down the operating system and turn off the computer.
2. If you are using a USB diskette drive, plug it into the computer.
3. Repeatedly press and release the F11 key as you turn on the computer.
4. When you hear beeps or see a logo screen, stop pressing the F11 key. The Rescue and Recovery workspace opens.

   Note: For some models, press the Esc key to enter Rescue and Recovery.
5. From the Rescue and Recovery workspace, select **Create diagnostic disks**.

6. Follow the instructions on the screen.

7. When prompted, insert a blank, formatted diskette into the diskette drive and continue to follow the instructions on the screen.

8. When the operation is complete, remove the diskette and click **Quit**.

9. Insert another blank, formatted diskette into the diskette drive and continue to follow the instructions on the screen.

10. When the operation is complete, remove the diskette and click **Quit**.

Running diagnostics from the CD or diskettes

To run diagnostics from the diagnostic CD image or diagnostic diskettes that you created, use the following procedure:

1. Make sure your computer is turned off.

2. If you are running diagnostics from diskettes using a USB diskette drive, plug in the USB device.

3. Insert the CD into the optical drive or the first diagnostic diskette into the diskette drive.

4. Restart the computer.

   Note: If the diagnostic program does not start, you might not have your optical drive or diskette drive set as a startable device. See "Selecting a startup device" on page 46 for instructions on how to change the startup device.

5. When the diagnostics program opens, follow the instructions on the screen.

   Note: If you are running diagnostics from a diskette, when prompted, remove the first diskette and insert the second diskette.

6. When the program finishes, be sure to remove the CD or diskette from the drive.

7. Select the diagnostic test you want to run. Press the F1 key for additional help.

Running diagnostics from the Rescue and Recovery workspace

If you did not create a diagnostic CD image or diagnostic diskettes, you can run the PC-Doctor for DOS diagnostic program from the Rescue and Recovery workspace. To run diagnostics from the Rescue and Recovery workspace, use the following procedure:

1. Shut down the operating system and turn off the computer.

2. Repeatedly press and release the F11 key as you turn on the computer.

3. When you hear beeps or see a logo screen, stop pressing the F11 key. The Rescue and Recovery workspace opens.

   Note: For some models, press the Esc key to enter Rescue and Recovery.

4. From the Rescue and Recovery workspace, select **Diagnose hardware**.

5. Follow the prompts on the screen. The computer will reboot.

6. When the computer restarts, the diagnostic program opens automatically. Select the diagnostic test you want to run. Press the F1 key for additional help.

Cleaning the mouse

This section provides instructions on how to clean your mouse. The procedure will be different depending on whether you have an optical or non-optical mouse.

Optical mouse

An optical mouse uses a light-emitting diode (LED) and an optical sensor to navigate the pointer. If the pointer on the screen does not move smoothly with the optical mouse, you might need to clean the mouse. Use the following procedure to clean the optical mouse:

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

Non-optical mouse

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

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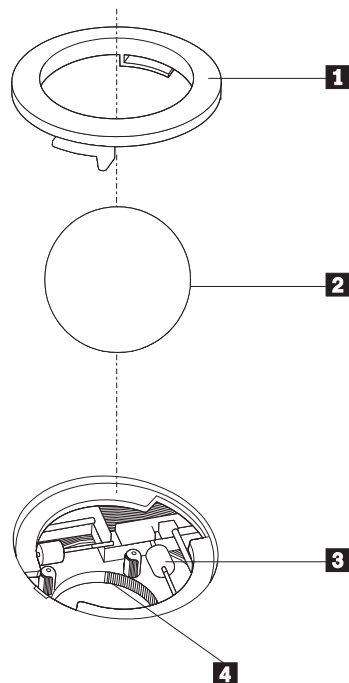
1 Retainer ring
2 Ball
3 Plastic rollers
4 Ball cage

To clean a mouse with a ball, follow the instructions below:

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

Chapter 8. Getting information, help, and service

If you need help, service, or technical assistance or just want more information about products manufactured by Lenovo, you will find a wide variety of sources available from Lenovo to assist you.

Information resources

This section provides information on how to access useful resources relating to your computing needs.

Online Books folder

The Online Books folder provides publications to help you set up and use your computer. The Online Books folder is preinstalled on your computer and requires no Internet access to view the publications. In addition to this *User Guide* you are reading, the *Hardware Replacement Guide* is also available in the Online Books folder.

The *Hardware Replacement Guide* provides step-by-step instructions for replacing Customer Replacement Units (CRUs) in your computer. CRUs are computer parts that can be upgraded or replaced by the customer.

To view a publication, click **Start**, select **All Programs**, select **Online Books**, and click **Online Books**. Double-click on the appropriate publication for your computer. The publications also are available on the Lenovo Web site at http://www.lenovo.com.

Notes:

1. These publications are in Portable Document Format (PDF) format, which requires Adobe Acrobat Reader to be installed. If Adobe Acrobat Reader has not yet been installed on your computer, a message will appear when you attempt to view the PDF file and you will be guided through the Adobe Acrobat Reader installation.
2. The publications that are preinstalled on your computer are available in other languages on the Lenovo Support Web site at http://www.lenovo.com/support/.
3. If you want to install a different language version of Adobe Acrobat Reader than the version provided on your computer, go to the Adobe Web site at http://www.adobe.com and download the version you want to use.

ThinkVantage Productivity Center

The ThinkVantage Productivity Center program guides you to a host of information sources and tools designed to make computing simpler and more secure while helping to reduce costs and increase productivity. The ThinkVantage Productivity Center program helps you set up, understand, and enhance your computer.

The ThinkVantage Productivity Center program provides information about your computer and easy access to various technologies, such as:

- The Rescue and Recovery program
- Productivity Center

- Client Security Solutions
- Factory Recovery
- System Updates
- Service and support

Note: ThinkVantage Technologies are only available on select Lenovo computers.

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

Access Help

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

To open Access Help, click **Start**, select **All Programs**, select **ThinkVantage**, and click **Access Help**. After you have opened Access Help, use the left panel to make a selection from the Contents or Index tab, or use the Search tab to find a particular word or phrase.

Warranty and safety

The warranty and safety information that is provided with your computer contains information on safety, warranty, notices, and Customer Replacement Units (CRUs). For more information on CRUs, see "Service" on page vi.

www.lenovo.com

The Lenovo Web site (www.lenovo.com) provides an extensive amount of information and services to help you buy, upgrade, and maintain your computer. You can access the most up-to-date information for your computer on the Lenovo Web site. From the www.lenovo.com Web site, you can also:

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

Help and service

If you need help and service for your computer, you will find a wide variety of sources available to help you.

Using the documentation and diagnostic programs

Many computer problems can be solved without outside assistance. If you experience a problem with your computer, see Chapter 7, "Troubleshooting and diagnostics," on page 53. For information on additional resources to help you troubleshoot your computer problem, see "Information resources" on page 59.

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

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 54.

The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.lenovo.com/support/ and follow the instructions.

Calling for service

If you have tried to correct the problem yourself and still need help, 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 personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **Hardware repair** - If the problem is determined to be caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been sold. Lenovo or your reseller, if authorized by Lenovo, will make selected Engineering Changes (ECs) available that apply to your hardware.

Note: The following items are not covered:
- Replacement or use of parts not manufactured for or by Lenovo or nonwarranted 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 warranty and safety information that is provided with your computer for a full explanation of warranty terms. Be sure to retain your proof of purchase to obtain warranty service.

For a list of service and support phone numbers for your country or region, go to http://www.lenovo.com/support/ and click **Support phone list** or refer to the warranty and safety information 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 and have the following information available:
- Machine type and model
- Serial numbers of your hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

Using other services

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

The following section lists commands for manually programming your modem.

Commands are accepted by the modem while it is in Command Mode. Your modem is automatically in Command Mode until you dial a number and establish a connection. Commands can be sent to your modem from a PC running communication software or any other terminal devices.

All commands sent to the modem must begin with **AT** and end with **ENTER**. All commands can be typed in either upper or lower case, but not mixed. To make the command line more readable, spaces can be inserted between commands. If you omit a parameter from a command that requires one, it is just like specifying a parameter of **0**.

Example:

ATH [ENTER]

Basic AT commands

In the following listings, all default settings are printed in **bold text**.

Command		Function
A		Manually answer incoming call.
A/		Repeat last command executed. **Do not** precede **A/** with AT or follow with ENTER.
D_		**0 - 9, A-D, # and ***
	L	last number redial
	P	pulse dialing
		Note: Pulse dialing is not supported for Australia, New Zealand, Norway, and South Africa.
	T	**touch-tone dialing**
	W	wait for second dial tone
	,	pause
	@	wait for five seconds of silence
	!	flash
	;	return to Command Mode after dialing
DS=n		Dial one of the four telephone numbers (n=0-3) stored in the modem non-volatile memory.
E_	E0	Commands are not echoed
	E1	**Commands are echoed**
+++		Escape Characters - Switch from Data Mode to Command Mode (T.I.E.S. Command)
H_	H0	Force modem on-hook (hang up)

Command		Function
	H1	Force modem off-hook (make busy) **Note: H1 command is not supported for Italy**
I_	I0	Display product-identification code
	I1	Factory ROM checksum test
	I2	Internal memory test
	I3	Firmware ID
	I4	Reserved ID
L_	L0	Low speaker volume
	L1	**Low speaker volume**
	L2	Medium speaker volume
	L3	High speaker volume
M_	M0	Internal speaker off
	M1	**Internal speaker on until carrier detected**
	M2	Internal speaker always on
	M3	Internal speaker on until carrier detected and off while dialing
N_		Included for compatibility only, provides no effect
O_	O0	Return to Data Mode
	O1	Return to Data Mode and initiate an equalizer retrain
P		**Set Pulse dial as default**
Q_	Q0	Modem sends responses
Sr?		Read and display value in register r.
Sr=n		Set register r to value n (n = 0-255).
T		**Set Tone Dial as default**
V_	**V0**	**Numeric responses**
	V1	**Word responses**
W_	**W0**	**Report DTE speed only**
	W1	Report line speed, error correction protocol, and DTE speed.
	W2	Report DCE speed only
X_	X0	Hayes Smartmodem 300 compatible responses/blind dialing.
	X1	Same as X0 plus all CONNECT responses/blind dialing
	X2	Same as X1 plus dial tone detection
	X3	Same as X1 plus busy detection/blind dialing
	X4	All responses and dial tone and busy **signal detection**
Z_	Z0	Reset and retrieve active profile 0
	Z1	Reset and retrieve active profile 1

Extended AT commands

Command		Function
&C_	&C0	Force Carrier Detect Signal High (ON)
	&C1	**Turn on CD when remote carrier is present**
&D_	&D0	**Modem ignores the DTR signal**
	&D1	Modem returns to Command Mode after DTR toggle
	&D2	**Modem hangs up, returns to the Command Mode after DTR toggle**
	&D3	Resets modem after DTR toggle
&F_	&F	Recall factory default configuration
&G_	**&G0**	**Guard tone disabled**
	&G1	Guard tone disabled
	&G2	1800 Hz guard tone
&K_	&K0	Disable flow control
	&K3	**Enable RTS/CTS hardware flow control**
	&K4	Enable XON/XOFF software flow control
	&K5	Enable transparent XON/XOFF flow control
	&K6	Enable both RTS/CTS and XON/XOFF flow control
&M_	**&M0**	Asynchronous operation
&P_	**&P0**	**US setting for off-hook-to-on-hook ratio**
	&P1	UK and Hong Kong off-hook-to-on-hook ratio
	&P2	Same as &P0 setting but at 20 pulses per minute
	&P3	Same as &P1 setting but at 20 pulses per minute
&R_	&R0	Reserved
	&R1	**CTS operates per flow control requirements**
&S_	**&S0**	**Force DSR Signal High (ON)**
	&S1	DSR off in command mode, on in on-line mode
&T_	&T0	Ends test in progress
	&T1	Perform Local Analog Loopback Test
	&T3	Perform Local Digital Loopback Test
	&T4	**Grant Remote Digital Loopback Test request by remote modem**
	&T5	Deny Remote Digital Loopback Test request
	&T6	Perform a Remote Digital Loopback Test
	&T7	Perform a Remote Digital Loopback Test and Self-Test
	&T8	Perform Local Analog Loopback Test and Self-Test
&V	&V0	Displays Active and Stored Profiles

Command		Function
	&V1	Display Last Connection Statistics
&W_	&W0	Stores the active profile as Profile 0
	&W1	Stores the active profile as Profile 1
%E_	**%E0**	**Disable auto-retrain**
	%E1	Enable auto-retrain
+MS?		Displays the current Select Modulation settings
+MS=?		Displays a list of supported Select Modulation options
+MS=a,b,c,e,f		Select modulation where: **a**=0, 1, 2, 3, 9, 10, 11, 12, 56, 64, 69; **b**=0-1; **c**=300-56000; **d**=300-56000; **e**=0-1; and **f**=0-1. **A, b, c, d, e, f** default=**12, 1, 300, 56000, 0, 0.** Parameter **"a"** specifies the modulation protocol desired where: 0=V.21, 1=V.22, 2=V.22bis, 3=V.23, 9=V.32, 10=V.32bis, 11=V.34, 12=V.90,K56Flex,V.34......,56=K 56Flex, V.90,V.34......, 64=Bell 103, and 69=Bell 212. Parameter "b" specifies automode operations where: 0=automode disabled, 1= automode enabled with V.8/V.32 Annex A. Parameter **"c"** specifies the minimum connection data rate (300- 56000). Parameter **"d"** specifies the maximum connection rate (300-56000); Parameter **"e"** specifies the codec type (0= Law, and 1=A-Law). Parameter **"f"** specifies "robbed bit" signaling detection (0=detection disabled 1=detection enabled)

MNP/V.42/V.42bis/V.44 commands

Command		Function
%C_	%C0	Disable MNP Class 5 and V.42bis data compression
	%C1	Enable MNP Class 5 data compression only
	%C2	Enable V.42bis data compression only
	%C3	**Enable MNP Class 5 and V.42bis data compression**
&Q_	&Q0	Direct data link only (same as \N1)
	&Q5	**V.42 data link with fallback options**
	&Q6	Normal data link only (same as \N0)
+DS44=0, 0		Disable V.44
+DS44=3, 0		Enable V.44
+DS44?		Current values
+DS44=?		List of support values

Fax Class 1 commands

+FAE=n	Data/Fax Auto Answer
+FCLASS=n	Service Class
+FRH=n	Receive data with HDLC framing
+FRM=n	Receive data
+FRS=n	Receive silence
+FTH=n	Transmit data with HDLC framing
+FTM=n	Transmit data
+FTS=n	Stop transmission and wait

Fax Class 2 commands

+FCLASS=n	Services class.
+FAA=n	Adaptive answer.
+FAXERR	Fax error value.
+FBOR	Phase C data bit order.
+FBUF?	Buffer size (read only).
+FCFR	Indicate confirmation to receive.
+FCLASS=	Service class.
+FCON	Facsimile connection response.
+FCIG	Set the polled station identification.
+FCIG:	Report the polled station identification.
+FCR	Capability to receive.
+FCR=	Capability to receive.
+FCSI:	Report the called station ID.
+FDCC=	DCE capabilities parameters.
+FDCS:	Report current session.
+FDCS=	Current session results.
+FDIS:	Report remote capabilities.
+FDIS=	Current sessions parameters.
+FDR	Begin or continue phase C receive data.
+FDT=	Data transmission.
+FDTC:	Report the polled station capabilities.
+FET:	Post page message response.
+FET=N	Transmit page punctuation.
+FHNG	Call termination with status.
+FK	Session termination.
+FLID=	Local ID string.
+FLPL	Document for polling.
+FMDL?	Identify model.
+FMFR?	Identify manufacturer.

+FPHCTO	Phase C time out.
+FPOLL	Indicates polling request.
+FPTS:	Page transfer status.
+FPTS=	Page transfer status.
+FREV?	Identify revision.
+FSPT	Enable polling.
+FTSI:	Report the transmit station ID.

Voice commands

#BDR	Select Baud Rate
#CID	Enable Caller ID detection and reporting format
#CLS	Select Data, Fax or Voice/Audio
#MDL?	Identify Model
#MFR?	Identify Manufacturer
#REV?	Identify Revision Level
#TL	Audio output transmit level
#VBQ?	Query Buffer Size
#VBS	Bits per sample (ADPCM or PCM)
#VBT	Beep Tone Timer
#VCI?	Identify Compression Method
#VLS	Voice line select
#VRA	Ringback goes away timer
#VRN	Ringback never came timer
#VRX	Voice Receive Mode
#VSDB	Silence deletion tuner
#VSK	Buffer skid setting
#VSP	Silence detection period
#VSR	Sampling rate selection
#VSS	Silence deletion tuner
#VTD	DTMF tone reporting capability
#VTM	Enable timing mark placement
#VTS	Generate tone signals
#VTX	Voice transmit mode

> **Attention Switzerland User:**
>
> If your Swisscom phone line does not have Taxsignal switched OFF, modem
> function may be impaired. The impairment may be resolved by a filter with
> the following specifications:
>
> Telekom PTT SCR-BE
> Taximpulssperrfilter-12kHz
> PTT Art. 444.112.7
> Bakom 93.0291.Z.N

Appendix B. Notices

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

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

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

Television output notice

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

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

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