ThinkPad 13 User Guide

Note: Before using this information and the product it supports, be sure to read and understand the following:

- *Safety, Warranty, and Setup Guide*
- *Regulatory Notice*
- "Important safety information" on page vi
- Appendix E "Notices" on page 137

The latest *Safety, Warranty, and Setup Guide* and the *Regulatory Notice* are available on the Lenovo Support Web site at:
http://www.lenovo.com/UserManuals

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Read this first

Be sure to follow the important tips given here to get the most use and enjoyment out of your computer. Failure to do so might lead to discomfort or injury, or cause your computer to fail.

Protect yourself from the heat that your computer generates.

When your computer is turned on or the battery is charging, the base, the palm rest, and some other parts may become hot. The temperature they reach depends on the amount of system activity and the level of charge in the battery.

Extended contact with your body, even through clothing, could cause discomfort or even a skin burn.

- Avoid keeping your hands, your lap, or any other part of your body in contact with a hot section of the computer for any extended time.
- Periodically take hands from using the keyboard by lifting your hands from the palm rest.

Protect yourself from the heat generated by the ac power adapter.

When the ac power adapter is connected to an electrical outlet and your computer, it generates heat.

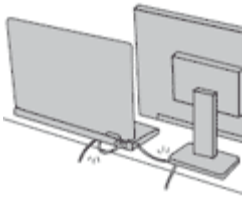
Extended contact with your body, even through clothing, may cause a skin burn.

- Do not place the ac power adapter in contact with any part of your body while it is in use.
- Never use it to warm your body.

Prevent your computer from getting wet.

To avoid spills and the danger of electrical shock, keep liquids away from your computer.

Protect the cables from being damaged.



Applying strong force to cables may damage or break them.

Route communication lines, or the cables of an ac power adapter, a mouse, a keyboard, a printer, or any other electronic device, so that they cannot be walked on, tripped over, pinched by your computer or other objects, or in any way subjected to treatment that could interfere with the operation of your computer.

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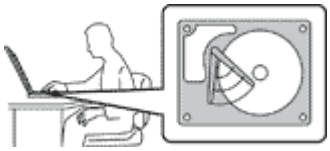
Protect your computer and data when moving it.



Before moving a computer equipped with a hard disk drive, do one of the following, and make sure that the power button is off or is blinking:

- Turn it off.
- Put it in sleep mode.
- Put it in hibernation mode.

This will help to prevent damage to the computer, and possible loss of data.

Handle your computer gently.

Do not drop, bump, scratch, twist, hit, vibrate, push, or place heavy objects on your computer, display, or external devices.

Carry your computer carefully.

- Use a quality carrying case that provides adequate cushioning and protection.
- Do not pack your computer in a tightly packed suitcase or bag.
- Before putting your computer in a carrying case, make sure that it is off, in sleep mode, or in hibernation mode. Do not put a computer in a carrying case while it is turned on.

Important safety information

Note: Read the important safety information first.

This information can help you safely use your notebook 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® Limited Warranty. For more information, see “Warranty Information” in the *Safety, Warranty, and Setup Guide* that comes with your computer.

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, computer products contain a coin-cell

battery that provides power to the system clock even when the computer is unplugged, so the battery safety information applies to all computer products.

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 product. 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 for further guidance. For a list of Service and Support phone numbers, see the following Web site:

http://www.lenovo.com/support/phone

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 following conditions, 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.

- 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, or 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, 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.

Safety guidelines

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

Service and upgrades

Do not attempt to service a product yourself unless instructed to do so by the Customer Support Center or your documentation. Only use a Service Provider who is approved to repair your particular product.

Note: Some computer parts can be upgraded or replaced by the customer. Upgrades typically are referred to as options. Replacement parts approved for customer installation are referred to as Customer

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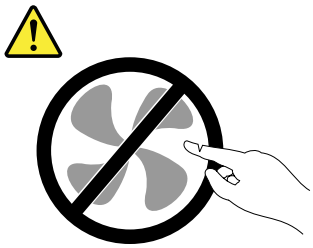
Replaceable Units, or CRUs. Lenovo provides documentation with instructions when it is appropriate for customers to install options or replace CRUs. You must closely follow all instructions when installing or replacing parts. The Off state of a power indicator does not necessarily mean that voltage levels inside a product are zero. Before you remove the covers from a product equipped with a power cord, always make sure that the power is turned off and that the product is unplugged from any power source. 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 your safety.



CAUTION:
Hazardous moving parts. Keep fingers and other body parts away.

CAUTION:

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

DANGER

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 a 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 power cords and power adapters from liquids. For instance, do not leave your power 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 power cord or power adapter has been stressed by misuse. Liquids also can cause gradual corrosion of power cord terminals and/or the connector terminals on a power 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 or shows signs of overheating (such as deformed plastic) at the ac input pins 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.

To prevent possible overheating, do not cover the power adapter with clothing or other objects when the power adapter is plugged into an electrical outlet.

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.

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Plugs and outlets

DANGER

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.

Do not share an electrical outlet with other home or commercial appliances that draw large amounts of electricity; otherwise, unstable voltage might damage your computer, data, or attached devices.

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.

Be sure that the power outlet provides the correct voltage and current for the product you are installing.

Carefully connect and disconnect the equipment from the electrical outlet.

Power supply statement

DANGER

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.

External devices

CAUTION:
Do not connect or disconnect any external device cables other than USB cables while the computer power is on; otherwise, you might damage your computer. To avoid possible damage to attached devices, wait at least five seconds after the computer is shut down to disconnect external devices.

General battery notice

DANGER

Batteries supplied by Lenovo for use with your product have been tested for compatibility and should only be replaced with approved parts. A battery other than the one specified by Lenovo, or a disassembled or modified battery is not covered by the warranty.

Battery abuse or mishandling can cause overheat, liquid leakage, or an explosion. To avoid possible injury, do the following:

- **Do not open, dissemble, or service any battery.**
- **Do not crush or puncture the battery.**
- **Do not short-circuit the battery, or expose it to water or other liquids.**
- **Keep the battery away from children.**
- **Keep the battery away from fire.**

Stop using the battery if it is damaged, or if you notice any discharge or the buildup of foreign materials on the battery leads.

Store the rechargeable batteries or products containing the rechargeable batteries at room temperature, charged to approximately 30 to 50% of capacity. We recommend that the batteries be charged about once per year to prevent overdischarge.

Do not put the battery in trash that is disposed of in landfills. When disposing of the battery, comply with local ordinances or regulations.

Notice for built-in rechargeable battery

DANGER

Do not attempt to replace the built-in rechargeable battery. Replacement of the battery must be done by a Lenovo-authorized repair facility or technician.

Only recharge the battery strictly according to instructions included in the product documentation.

The Lenovo-authorized repair facilities or technicians recycle Lenovo batteries according to local laws and regulations.

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Notice for non-rechargeable coin-cell battery

DANGER

If the coin-cell battery is incorrectly replaced, there is danger of an explosion. The battery contains a small amount of harmful substance.

Do not heat to more than 100°C (212°F).

The following statement applies to users in the state of California, U.S.A.

California Perchlorate Information:

Products containing manganese dioxide lithium coin-cell batteries may contain perchlorate.

Perchlorate Material - special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchlorate

Heat and product ventilation

DANGER

Computers, ac power adapters, and many accessories can generate heat when turned on and when batteries are charging. Notebook computers can generate a significant amount of heat due to their compact size. Always follow these basic precautions:

- **When your computer is turned on or the battery is charging, the base, the palm rest, and some other parts may become hot. Avoid keeping your hands, your lap, or any other part of your body in contact with a hot section of the computer for any extended length of time. When you use the keyboard, avoid keeping your palms on the palm rest for a prolonged period of time. Your computer generates some heat during normal operation. The amount of heat depends on the amount of system activity and the battery charge level. Extended contact with your body, even through clothing, could cause discomfort or even a skin burn. Periodically take breaks from using the keyboard by lifting your hands from the palm rest; and be careful not to use the keyboard for any extended length of time.**
- **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.**
- **When the ac power adapter is connected to an electrical outlet and your computer, it generates heat. Do not place the adapter in contact with any part of your body while using it. Never use the ac power adapter to warm your body. Extended contact with your body, even through clothing, may cause a skin burn.**

For your safety, always follow these basic precautions with your 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 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).**

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Electrical current safety information

DANGER

Electric current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not use your computer during a lightning storm.**
- **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.**
- **Whenever 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.**
- **Do not use your computer until all internal parts enclosures are fastened into place. Never use the computer when internal parts and circuits are exposed.**

DANGER

Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To connect:

1. **Turn everything OFF.**
2. **First, attach all cables to devices.**
3. **Attach signal cables to connectors.**
4. **Attach power cords to outlets.**
5. **Turn devices ON.**

To disconnect:

1. **Turn everything OFF.**
2. **First, remove power cords from outlets.**
3. **Remove signal cables from connectors.**
4. **Remove all cables from devices.**

The power cord must be disconnected from the wall outlet or receptacle before installing all other electrical cables connected to the computer.

The power cord may be reconnected to the wall outlet or receptacle only after all other electrical cables have been connected to the computer.

DANGER

During electrical storms, do not perform any replacement and do not connect the telephone cable to or disconnect it from the telephone outlet on the wall.

Liquid crystal display (LCD) notice

CAUTION:
The liquid crystal display (LCD) is made of glass, and rough handling or dropping the computer can cause the LCD to break. If the LCD breaks and the internal fluid gets into your eyes or on your hands,

immediately wash the affected areas with water for at least 15 minutes; if any symptoms are present after washing, get medical care.

Note: For products with mercury-containing fluorescent lamps (for example, non-LED), the fluorescent lamp in the liquid crystal display (LCD) contains mercury; dispose of according to local, state, or federal laws.

Using headphones or earphones

CAUTION:
Excessive sound pressure from earphones and headphones can cause hearing loss. Adjustment of the equalizer to maximum increases the earphone and headphone output voltage and the sound pressure level. Therefore, to protect your hearing, adjust the equalizer to an appropriate level.

Excessive use of headphones or earphones for a long period of time at high volume can be dangerous if the output of the headphone or earphone connectors do not comply with specifications of EN 50332-2. The headphone output connector of your computer complies with EN 50332-2 Sub clause 7. This specification limits the computer's maximum wide band true RMS output voltage to 150 mV. To help protect against hearing loss, ensure that the headphones or earphones you use also comply with EN 50332-2 (Clause 7 limits) for a wide band characteristic voltage of 75 mV. Using headphones that do not comply with EN 50332-2 can be dangerous due to excessive sound pressure levels.

If your Lenovo computer came with headphones or earphones in the package, as a set, the combination of the headphones or earphones and the computer already complies with the specifications of EN 50332-1. If different headphones or earphones are used, ensure that they comply with EN 50332-1 (Clause 6.5 Limitation Values). Using headphones that do not comply with EN 50332-1 can be dangerous due to excessive sound pressure levels.

Additional safety information

Plastic bag notice

DANGER

Plastic bags can be dangerous. Keep plastic bags away from babies and children to avoid danger of suffocation.

Glass parts notice

CAUTION:
Some parts of your product may be made of glass. This glass could break if the product is dropped on a hard surface or receives a substantial impact. If glass breaks, do not touch or attempt to remove it. Stop using your product until the glass is replaced by trained service personnel.

Save these instructions.

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Chapter 1. Product overview

This chapter contains the following topics:

- “Locating computer controls, connectors, and indicators” on page 1
- “Locating important product information” on page 7
- “Computer features” on page 9
- “Computer specifications” on page 10
- “Operating environment” on page 10
- “Lenovo programs” on page 11

Locating computer controls, connectors, and indicators

This section introduces the computer hardware features to give you the basic information you will need to start using the computer.

Front view

1 Microphones	2 Camera
3 Power button	4 System-status indicator
5 Fingerprint reader (available on some models)	6 Trackpad
7 TrackPoint® buttons	8 TrackPoint pointing stick
9 Screen (multi-touch screen on some models)	

1 Microphones

The built-in microphones capture sound and voice when used with a program capable of handling audio.

2 Camera

Use the camera to take pictures or hold a video conference. For more information, see “Using the camera” on page 31.

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3 Power button

Press the power button to turn on the computer or put the computer into sleep mode. For information about how to turn off the computer, see “Frequently asked questions” on page 13.

If your computer is unresponsive, you can turn off the computer by pressing and holding the power button for four or more seconds. If the computer cannot be turned off, see “Computer stops responding” on page 75 for more information.

You also can define what the power button does. For example, by pressing the power button, you can turn off the computer or put the computer into sleep or hibernation mode. To change what the power button does, do the following:

1. Go to Control Panel and then change the view of Control Panel from Category to Large icons or Small icons.
2. Click **Power Options → Choose what the power buttons do**.
3. Follow the instructions on the screen.

4 System-status indicator

The illuminated dot in the ThinkPad® logo functions as a system-status indicator. For more information, see “Status indicators” on page 6.

5 Fingerprint reader (available on some models)

Fingerprint authentication technology provides simple and secure user access by associating your fingerprint with a password. For more information, see “Using the fingerprint reader” on page 47.

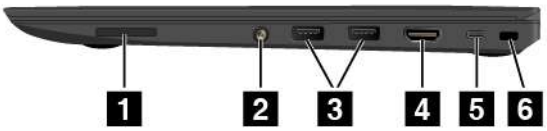
ThinkPad pointing device

6 Trackpad
7 TrackPoint buttons
8 TrackPoint pointing stick
The keyboard contains the Lenovo-unique ThinkPad pointing devices. Pointing, selecting, and dragging are all part of a single process that you can perform without moving your fingers from a typing position. For more information, see “ThinkPad pointing device” on page 19.

9 Screen (multi-touch screen on some models)

For more information, see “Using the multi-touch screen” on page 15.

Right-side view



1 Media-card slot	2 Audio connector
3 USB 3.0 connectors	4 HDMI™ connector
5 USB-C connector	6 Security-lock slot

1 Media-card slot

Your computer is equipped with a media card reader, which provides a media-card slot. Insert your flash media card into the media-card slot to read the data on the card. For more information about the supported cards, see “Using a flash media card” on page 31.

2 Audio connector

Connect headphones or a headset that has a 3.5-mm (0.14-inch), 4-pole plug to the audio connector to listen to the sound from the computer.

Notes:

- If you are using a headset with a function switch, such as a headset for an iPhone mobile digital device, do not press this switch while using the headset.
- The audio connector does not support a conventional microphone. For more information, see “Using audio features” on page 30.

3 USB 3.0 connectors

The Universal Serial Bus(USB) 3.0 connector is used for connecting USB-compatible devices, such as a USB keyboard, a USB mouse, a USB storage device, or a USB printer.

Attention: When you attach a USB cable to the USB 3.0 connector, ensure that the USB mark is facing upward. Otherwise the connector might get damaged.

4 HDMI connector

Use the High-Definition Multimedia Interface (HDMI) connector to connect the computer to an HDMI-compatible audio device or video monitor, such as a high-definition television (HDTV).

5 USB-C connector

USB-C is a new USB standard that supports power, data transfer, and video output at the same time.

The following Lenovo accessories do not come with your computer. You can purchase the following accessories from Lenovo (http://www.lenovo.com/accessories) to connect your computer to power or other devices through the USB-C connector.

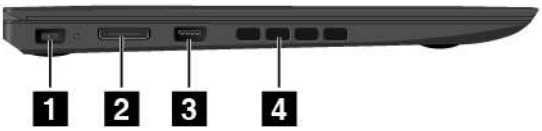
- **Lenovo USB-C to HDMI Adaptor**: Used to connect your computer to an HDMI-compatible audio device or video monitor.
- **Lenovo USB-C to VGA Adaptor**: Used to connect your computer to a video graphics array (VGA) monitor or other VGA-compatible video device.
- **Lenovo USB-C 45W AC Adapter**: Used to provide ac power to your computer and charge the battery.

6 Security-lock slot

To protect your computer from theft, purchase a security cable lock that fits this security-lock slot to lock your computer to a stationary object.

Note: You are responsible for evaluating, selecting, and implementing the locking device and security feature. Lenovo makes no comments, judgments, or warranties about the function, quality, or performance of the locking device and security feature.

Left-side view



1 Power connector	2 OneLink+ connector
3 Always On USB connector (USB 3.0)	4 Fan louvers

1 Power connector

Connect the ac power adapter to the power connector to provide ac power to the computer and charge the battery.

2 OneLink+ connector

Use the OneLink+ connector to connect to the ThinkPad OneLink+ Dock or to connect to the ThinkPad OneLink+ to RJ45 Adapter.

The ThinkPad OneLink+ Dock expands the connectivity of your computer. For instructions on how to use the ThinkPad OneLink+ Dock, see “ThinkPad OneLink+ Dock” on page 33.

The ThinkPad OneLink+ to RJ45 Adapter enables you to connect your computer to a local area network (LAN).

DANGER

To avoid the risk of electrical shock, do not connect the telephone cable to the Ethernet connector on the ThinkPad OneLink+ to RJ45 Adapter. You can only connect an Ethernet cable to this connector.

Depending on the country or region of delivery, a ThinkPad OneLink+ to RJ45 Adapter might be a part of the shipping contents that come with your computer. If your computer does not come with the ThinkPad OneLink+ to RJ45 Adapter, you can purchase one from Lenovo at:
http://www.lenovo.com/accessories

The Ethernet connector on the ThinkPad OneLink+ to RJ45 Adapter has two network status indicators. When the green indicator is on, the computer is connected to a LAN. When the yellow indicator blinks, data is being transmitted.

3 Always On USB connector (USB 3.0)

By default, the Always On USB connector enables you to charge some mobile digital devices and smartphones when your computer is in the following situation:

- When your computer is on or in sleep mode
- When your computer is in hibernation mode or is turned off, but connected to ac power

To charge these devices when the computer is in hibernation mode or turned off, and the computer is not connected to ac power, do the following:

- **For Windows 7**: Start the Power Manager program, click the **Global Power Settings** tab, and then follow the instructions on the screen.
- **For Windows 10**: Start the Lenovo Companion program, click **Hardware Settings** → **Always On USB**. Locate the **Always On USB** section and follow the instructions on the screen to make your preferred setting.

For instructions on how to start the programs, see “Accessing Lenovo programs” on page 11.

Attention: When you attach a USB cable to this connector, ensure that the USB mark is facing upward. Otherwise the connector might get damaged.

4 Fan louvers

The fan louvers and internal fan enable air to circulate in the computer and ensure proper cooling, especially the cooling of the microprocessor.

Note: To ensure proper airflow, do not place any obstacles in front of the fan louvers.

Bottom view

1 Emergency-reset hole	2 Speakers

1 Emergency-reset hole

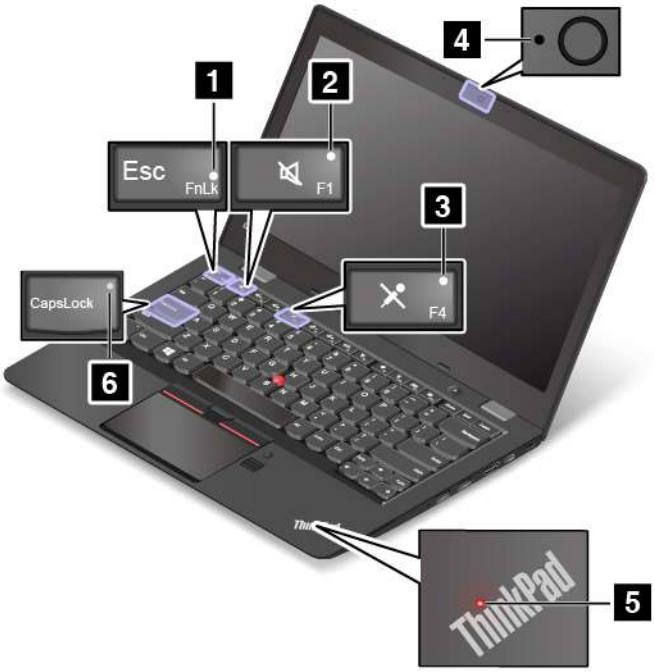
If the computer stops responding and you cannot turn it off by pressing the power button, remove the ac power adapter first. Then insert a straightened paper clip into the emergency-reset hole to reset the computer.

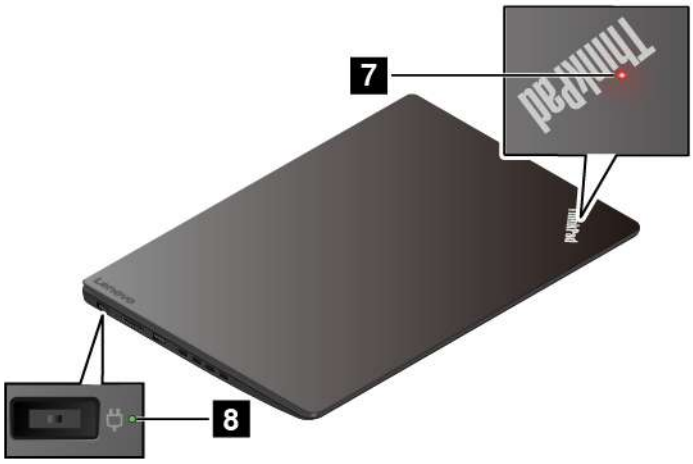
2 Speakers

Your computer is equipped with a pair of stereo speakers.

Status indicators

This topic helps you locate and identify the various status indicators on your computer.





1 Fn Lock indicator

The Fn Lock indicator shows the status of Fn Lock function. For more information, see “Special keys” on page 18.

2 Speaker-mute indicator

When the speaker-mute indicator is on, the speakers are muted.

3 Microphone-mute indicator

When the microphone-mute indicator is on, the microphones are muted.

4 Camera-status indicator

When the camera-status indicator is on, the camera is in use.

6 CapsLock indicator

When the indicator is on, it indicates that Caps Lock mode is enabled. You can type all alphabetic characters (A-Z) in upper case directly.

5 7 System-status indicators

The indicator in the ThinkPad logo on the lid and the indicator in the center of the power button show the system-status of the computer.

- **Blinks for three times**: The computer is initially connected to power.
- **Solid on**: The computer is on (in normal mode).
- **Blinks fast**: The computer is entering sleep or hibernation mode.
- **Blinks slowly**: The computer is in sleep mode.
- **Off**: The computer is off or in hibernation mode.

8 ac power-satus indicator

The ac power-status indicator shows the ac power charging status of the computer.

- **Green**: Connected to ac power (charging 80%–100%)
- **Amber**: Connected to ac power (charging 1%–80%)
- **Off**: Not connected to ac power (no charging)

Locating important product information

This section provides information to help you locate the machine type and model label, the FCC ID and IC Certification label, and the Genuine Microsoft® label.

Machine type and model information

The machine type and model label identifies your computer. When you contact Lenovo for help, the machine type and model information helps support technicians to identify your computer and provide faster service.

The following illustration shows the location of the machine type and model of your computer.

FCC ID and IC Certification information

The FCC and IC Certification information is identified by a label located on the computer base cover as shown in the following illustration.

For a preinstalled wireless module, this label identifies the actual FCC ID and IC certification number for the wireless module installed by Lenovo.

Note: Do not remove or replace a preinstalled wireless module by yourself. For module replacement, you must contact Lenovo service first. Lenovo is not responsible for any damage caused by unauthorized replacement.

Labels for the Windows operating systems

Windows 7 Certificate of Authenticity: Computer models preinstalled with the Windows 7 operating system have a Certificate of Authenticity label affixed to the computer cover or inside the battery compartment. The Certificate of Authenticity is your indication that the computer is licensed for a Windows 7 product and is preinstalled with a Windows 7 genuine version. In some cases, an earlier Windows version might be preinstalled under the terms of the Windows 7 Professional license downgrade rights. Printed on the Certificate of Authenticity is the Windows 7 version for which the computer is licensed and the Product ID. The Product ID is important in case you need to reinstall the Windows 7 operating system from a source other than a Lenovo product recovery disc set.

Windows 10 Genuine Microsoft label: Depending on your geographic location, the date when your computer was manufactured, and the version of Windows 10 that is preinstalled, your computer might have a Genuine Microsoft label affixed to its cover. See http://www.microsoft.com/en-us/howtotell/Hardware.aspx for illustrations of the various types of Genuine Microsoft labels.

- In the People's Republic of China, the Genuine Microsoft label is required on all computer models preinstalled with any version of Windows 10.
- In other countries and regions, the Genuine Microsoft label is required only on computer models licensed for Windows 10 Pro.

The absence of a Genuine Microsoft label does not indicate that the preinstalled Windows version is not genuine. For details on how to tell whether your preinstalled Windows product is genuine, refer to the information provided by Microsoft at http://www.microsoft.com/en-us/howtotell/default.aspx.

Unlike Windows 7 products, there are no external, visual indicators of the Product ID or Windows version for which the computer is licensed. Instead, the Product ID is recorded in the computer firmware. Whenever a Windows 10 product is installed, the installation program checks the computer firmware for a valid, matching Product ID to complete the activation.

In some cases, an earlier Windows version might be preinstalled under the terms of the Windows 10 Pro license downgrade rights.

Computer features

The computer features introduced in this section cover various models. For your specific model, some features might vary or not apply.

Notebook computer color

Black or silver

Microprocessor

- To view the microprocessor information of your computer, do the following:
  - **For Windows 7:** Open the Start menu, right-click **Computer**, and then click **Properties**.
  - **For Windows 10:** Do either of the following:
    - Open the Start menu and then click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** → **System** → **About**.
    - Right-click the Start button and then select **System**.

Memory

- Double data rate 4 (DDR4) synchronous dynamic random access memory (SDRAM)

Storage device

- M.2 solid-state drive

Display

- Color display with the thin-film transistor (TFT) technology
- Display size: 337.8 mm (13.3 inches)
- Display resolution: 1920 x 1080 pixels or 1366 x 768 pixels, depending on the model
- Brightness control
- Multi-touch technology (on some models)

Keyboard

- Function keys
- Six-row and spill-resistant
- ThinkPad pointing device

Interface

- Always On USB 3.0 connector
- Audio connector
- 4-in-1 media-card slot
- HDMI connector
- OneLink+ connector
- USB 3.0 connectors
- USB-C connector

Integrated wireless features

- Bluetooth
- Wireless LAN

Security feature

- Fingerprint reader (available on some models)
- Security-lock slot
- Trusted Platform Module (TPM) (available on some models)

Others

- Camera
- Microphones

Computer specifications

Size

- Width: 322.4 mm (12.7 inches)
- Depth: 222.8 mm (8.8 inches)
- Height: 19.1 mm (0.7 inch) or 19.8 mm (0.8 inch), depending on the model

Heat output

- 45 W (154 Btu/hr) maximum or 65 W (222 Btu/hr) maximum, depending on the model

Power source (ac power adapter)

- Sine-wave input at 50 to 60 Hz
- Input rating of the ac power adapter: 100 to 240 V ac, 50 to 60 Hz

Operating environment

Environment

- Maximum altitude without pressurization: 3048 m (10 000 ft)
- Temperature
  - At altitudes up to 2438 m (8000 ft)
    - Operating: 5.0°C to 35.0°C (41°F to 95°F)
    - Storage: 5.0°C to 43.0°C (41°F to 109°F)
  - At altitudes above 2438 m (8000 ft)

    Maximum temperature when operating under the unpressurized condition: 31.3°C (88°F)

    Note: When you charge the battery, the ambient temperature must be at least 10°C (50°F).
- Relative humidity:
  - Operating: 8% to 95% at wet bulb: 23°C (73°F)
  - Storage: 5% to 95% at wet bulb: 27°C (81°F)

If possible, place your computer in a well-ventilated and dry area without direct exposure to sunshine.

Attention: Keep electrical appliances such as an electric fan, radio, high-powered speakers, an air conditioner, and a microwave oven away from your computer. The strong magnetic fields generated by electrical appliances can damage the motor and data on the storage devices.

Do not place any beverages on top of or beside the computer or other attached devices. If liquid is spilled on or in the computer or an attached device, a short circuit or other damage might occur.

Do not eat or smoke over your keyboard. Particles that fall into your keyboard can cause damage.

Lenovo programs

Your computer comes with Lenovo programs to help you work easily and securely.

Note: The available programs are subject to change without notice.

To learn more about the programs and other computing solutions offered by Lenovo, go to: http://www.lenovo.com/support

Accessing Lenovo programs

To access Lenovo programs on your computer, do the following:

1. Click the Start button to open the Start menu. Locate a program by the program name.
2. If the program is not displayed on the Start menu, click **All programs** (Windows 7) or **All apps** (Windows 10) to display all programs.
3. If you still do not find the program in the program list, search for the program in the search box.

Note: If you are using the Windows 7 operating system, some Lenovo programs are ready to be installed. You cannot find these programs through the above methods unless you have installed them first. To install these Lenovo programs, access the Lenovo PC Experience program, click **Lenovo Tools**, and then follow the instructions on the screen.

An introduction to Lenovo programs

This topic provides a brief introduction to Lenovo programs. Depending on your computer model, some of the programs might not be available.

Access Connections™ (Windows 7)	The Access Connections program is a connectivity assistant program for creating and managing location profiles. Each location profile stores all the network and Internet configuration settings needed for connecting to a network infrastructure from a specific location such as a home or an office. By switching between location profiles as you move your computer from place to place, you can quickly and easily connect to a network with no need to manually reconfigure your settings and restart the computer each time.
Auto Scroll Utility (Windows 7)	This program enhances your experience with window operation. The window position of a foreground application is automatically adjusted. The scroll bar on a user interface is also automatically adjusted.
Communications Utility (Windows 7)	The Communications Utility program enables you to configure settings for the integrated camera and audio devices.
Lenovo Fingerprint Manager (Windows 7)	If your computer comes with a fingerprint reader, the program enables you to enroll your fingerprint and associate it with your passwords. As a result, fingerprint authentication can replace your passwords and enable simple and secure user access.

Hotkey Features Integration (Windows 7 and Windows 10)	Hotkey Features Integration is a utility package that enables you to select and install utility programs specifically for the special keys and buttons on your computer. The special keys and buttons are designed to meet accessibility and usability requirements. Installing related utility programs enables full functionality of the special keys and buttons.
Lenovo Companion (Windows 10)	Your computer's best features and capabilities should be easy to access and understand. With Lenovo Companion, they are. Use Lenovo Companion to do the following: • Optimize your computer's performance, monitor your computer's health, and manage updates. • Access your user guide, check warranty status, and view accessories customized for your computer. • Read how-to articles, explore Lenovo forums, and stay up-to-date on technology news with articles and blogs from trusted sources. • Configure hardware settings. • Create and manage your Lenovo ID. This app is filled with exclusive Lenovo content to help you learn more about what you can do with your Lenovo computer.
Lenovo PC Experience (Windows 7 and Windows 10)	The Lenovo PC Experience program helps you work more easily and securely by providing easy access to various programs, such as Lenovo Solution Center. **Note:** On the Windows 10 operating system, this program cannot be found from the all program list or search box. To access this program, go to Control Panel. View Control Panel by Category, click **Hardware and Sound → Devices and Printers**, and then double-click the device with your computer name.
Password Manager (Windows 7)	The Password Manager program automatically captures and fills in authentication information for Windows programs and Web sites.
Power Manager (Windows 7)	The Power Manager program provides convenient, flexible, and complete power management for the computer. It enables you to adjust your computer power settings to achieve the best balance between performance and power saving.
Recovery Media (Windows 7 and Windows 10)	The Recovery Media program enables you to restore the contents of the hard disk drive to the factory default settings.
System Update (Windows 7)	The System Update program enables you to keep the software on the computer up-to-date by downloading and installing software packages, including device drivers, Unified Extensible Firmware Interface (UEFI) basic input/output system (BIOS) updates, and other third-party programs.

Chapter 2. Using your computer

This chapter contains the following topics:

- “Registering your computer” on page 13
- “Frequently asked questions” on page 13
- “Using the multi-touch screen” on page 15
- “Special keys” on page 18
- “ThinkPad pointing device” on page 19
- “Power management” on page 23
- “Connecting to the network” on page 26
- “Using an external display” on page 28
- “Using audio features” on page 30
- “Using the camera” on page 31
- “Using a flash media card” on page 31

Registering your computer

When you register your computer, information is entered into a database, which enables Lenovo to contact you in case of a recall or other severe problem. In addition, some locations offer extended privileges and services to registered users.

When you register your computer with Lenovo, you also will receive the following benefits:

- Quicker service when you call Lenovo for help
- Automatic notification of free software and special promotional offers

To register your computer with Lenovo, go to http://www.lenovo.com/register and follow the instructions on the screen to register your computer.

Frequently asked questions

This topic provides a few tips that will help you optimize the use of your ThinkPad notebook computers.

To ensure that you receive the best performance from your computer, browse the following Web page to find information such as aids for troubleshooting and answers to frequently asked questions: http://www.lenovo.com/support/faq

Can I get my user guide in another language?

- To download the user guide in another language, go to http://www.lenovo.com/support. Then follow the instructions on the screen.

How to turn off my computer?

- **For Windows 7:** Open the Start menu, then click **Shut down**.
- **For Windows 10:** Open the Start menu, click ⏻ **Power**, and then click **Shut down**.

How do I access Control Panel?

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- **For Windows 7:** Open the Start menu, then click **Control Panel**.
- **For Windows 10:** Right-click the Start button, then click **Control Panel**.

How do I use battery power more effectively when I am on the go?

- To conserve power, or to suspend operation without exiting programs or saving files, see “Power-saving modes” on page 25.
- To achieve the best balance between performance and power saving, change power plan settings. See “Managing the power plan” on page 26.
- If your computer will be turned off for an extended period of time, and follow the instructions in “Disabling the built-in battery” on page 99 to disable the built-in battery so as to prevent battery power from draining.

How do I securely dispose of data stored on the storage devices?

- Study Chapter 5 “Security” on page 41 to find out how you can protect your computer from theft and unauthorized use.
- Use the Password Manager program to protect the data stored on your computer. For more information, see the help information system of the program.
- Before you dispose of the data on the storage devices, be sure to read the topic “Notice on deleting data from your storage devices” on page 49.

How do I give presentations or attach an external monitor?

- Ensure that you follow the procedure in the topic “Using an external display” on page 28.
- With the Extend desktop function, you can display output on both the computer display and the external monitor. See “Using an external display” on page 28.

I have been using the computer for some time already, and it is getting slower. What should I do?

- Follow the “General tips for preventing problems” on page 69.
- Diagnose problems yourself by using the preinstalled diagnostic software. See “Diagnosing problems” on page 75.
- A recovery tool is provided on your computer in the storage devices. For more information, see Chapter 9 “Recovery overview” on page 91.

Print the following sections and keep them with your computer in case you are unable to access this online help when necessary.

- “Installing a new operating system” on page 51
- “Computer stops responding” on page 75
- “Power problems” on page 88

Getting help about the Windows operating system

The Windows help information system provides you with detailed information about using the Windows operating system to help you get the most of your computer. To access the Windows help information system, do one of the following:

- **For Windows 7**: Open the Start menu, and then click **Help and Support**.
- **For Windows 10**: Open the Start menu, and then click **Get started** from the right panel. Additionally, you can search from the taskbar to find help, apps, files, settings, and so on.

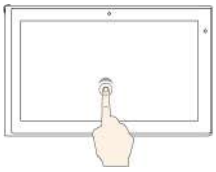
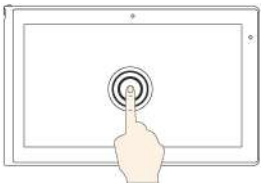
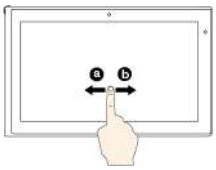
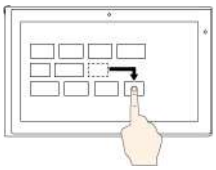
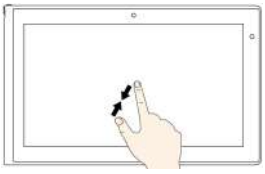
Using the multi-touch screen

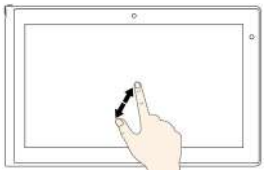
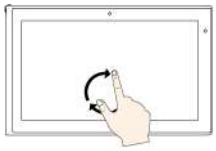
This topic provides instructions on how to use the multi-touch screen that is available on some models.

Notes:

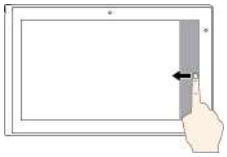
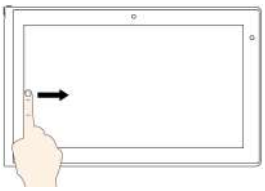
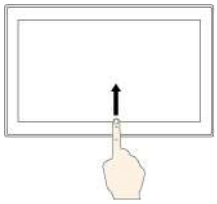
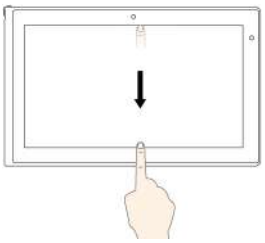
- Your computer screen might look different from the following illustrations.
- Depending on the app you use, some gestures might not be available.

The following table introduces some frequently used gestures.

Touch gesture (touch models only)	Description
	**Touch**: Tap. **Mouse action**: Click. **Function**: Open an app or perform an action on an open app, such as **Copy**, **Save**, and **Delete**, depending on the app.
	**Touch**: Tap and hold. **Mouse action**: Right-click. **Function**: Open a menu with multiple options.
	**Touch**: Slide. **Mouse action**: Scroll the mouse wheel, move the scroll bar, or click the scroll arrow. **Function**: Scroll through items, such as lists, pages, and photos.
	**Touch**: Drag an item to the desired location. **Mouse action**: Click, hold, and drag an item. **Function**: Move an object.
	**Touch**: Move two fingers closer together. **Mouse action**: Press the Ctrl key while scrolling the mouse wheel backward. **Function**: Zoom out.

Touch gesture (touch models only)	Description
	**Touch**: Move two fingers farther apart. **Mouse action**: Press the Ctrl key while scrolling the mouse wheel forward. **Function**: Zoom in.
	**Touch**: Put two or more fingers on an item and then rotate your fingers clockwise or counterclockwise. **Mouse action**: If the app supports rotation, click the rotation icon. **Function**: Rotate an item.

The following table introduces some touch gestures on the Windows 10 operating system.

Touch gesture (touch models only)	Description
	**Touch**: Swipe in from the right edge. **Mouse action**: Click the action center icon on the taskbar. **Function**: Open the action center to see your notifications and quick actions.
	**Touch**: Swipe in from the left edge. **Mouse action**: Click the task-view icon on the taskbar. **Function**: View all your open windows in task view.
	**Touch**: Swipe in from the bottom to top for full-screened app. **Mouse action**: Move your cursor to the Windows notification area at the bottom of the screen. **Function**: View the taskbar. **Note:** The full screen feature is available only on some apps. To open an app in full screen, click on the title bar.
	• **Short snap for full-screened app or when your computer is in tablet mode** **Touch**: Swipe downwards shortly from the top edge. **Mouse action**: Move your cursor to the top edge of the screen. **Function**: Show a hidden title bar. • **Long swipe when your computer is in tablet mode** **Touch**: Swipe in from the top edge to the bottom edge. **Mouse action**: From the top edge of the screen, click and hold, move the pointer to the bottom of the screen, and then release. **Function**: Close the current app.

Tips on using the multi-touch screen

- The multi-touch screen is a glass panel covered with a plastic film. Do not apply pressure or place any metallic object on the screen, which might damage the touch panel or cause it to malfunction.
- Do not use fingernails, gloved fingers, or inanimate objects for input on the screen.
- Regularly calibrate the accuracy of the finger input to avoid a discrepancy.

Tips on cleaning the multi-touch screen

- Turn off the computer before cleaning the multi-touch screen.
- Use a dry, soft, and lint-free cloth or a piece of absorbent cotton to remove fingerprints or dust from the multi-touch screen. Do not apply solvents to the cloth.
- Gently wipe the screen using a top-down motion. Do not apply any pressure on the screen.

Special keys

The keyboard has several special keys to help you work more easily and effectively.

1 Windows key

Press the Windows key 1 to open the Start menu.

You also can use the Windows key together with another key to achieve other functions. For more information, refer to the help information system of the Windows operating system.

2 Fn key
3 Function keys

You can configure the Fn key and function keys in the Keyboard Properties window by doing the following:

1. Go to Control Panel and then change the view of Control Panel from Category to Large icons or Small icons.
2. Click **Keyboard**. In the displayed Keyboard Properties window, click the **Fn and function keys** or **ThinkPad F1–F12 keys** tab.
3. Select the options of your preference.

- Fn + Esc FnLk Enables or disables the Fn Lock function.

  When the Fn Lock function is enabled: The Fn Lock indicator is on. To input F1–F12, press the function keys directly. To initiate the special function printed as an icon on each key, press the Fn key and the corresponding function key.

  When the Fn Lock function is disabled: The Fn Lock indicator is off. To initiate the special function printed as an icon on each key, press the function key directly. To input F1–F12, press the Fn key and the corresponding function key.

- F1 Mutes or unmutes the speakers. When the speakers are muted, the indicator on the key is on.

  If you mute the sound and turn off your computer, the sound will remain muted when you turn on your computer again. To turn on the sound, press the volume-down key F2 or volume-up key F3.

- F2 Decreases the speaker volume.

- Increases the speaker volume.
- Mutes or unmutes the microphones. When the microphones are muted, the indicator on the microphone-mute key is on.
- Darkens the computer display.
- Brightens the computer display.
- Switches the display output location between the computer display and an external monitor.
- Enables or disables the wireless features.
-
  - For Windows 7: Opens **Control Panel**.
  - For Windows 10: Opens the Settings window.
-
  - For Windows 7: Opens **Windows Search**.
  - For Windows 10: Opens the Cortana® search box.
- Views all the programs that you have opened.
-
  - For Windows 7: Opens **Computer**.
  - For Windows 10: Views all the programs.
- **Fn+B:** Has the same function as the Break key on a conventional keyboard.
- **Fn+K:** Has the same function as the ScrLK key on the conventional keyboard.
- **Fn+P:** Has the same function as the Pause key on the conventional keyboard.
- **Fn+S:** Has the same function as the SysRq key on the conventional keyboard.
- **Fn+4:** Puts your computer into sleep mode. To return to normal operation, press the Fn key only.

ThinkPad pointing device

The ThinkPad pointing device enables you to perform all the functions of a traditional mouse, such as pointing, clicking, and scrolling. With the ThinkPad pointing device, you also can perform a variety of touch gestures, such as rotating and zooming in or out.

The ThinkPad pointing device consists of the following two devices:

1 TrackPoint pointing device
2 Trackpad

By default, both the TrackPoint pointing device and the trackpad are active with the touch gestures enabled. To change the settings, see “Customizing the ThinkPad pointing device” on page 22.

TrackPoint pointing device

The TrackPoint pointing device enables you to perform all the functions of a traditional mouse, such as pointing, clicking, and scrolling.

The TrackPoint pointing device consists of the following four components:

1 Pointing stick
2 Left-click button (primary-click button)
3 Right-click button (secondary-click button)
4 Scroll bar

To use the TrackPoint pointing device, refer to the following instructions:

Note: Place your hands in the typing position and use your index finger or middle finger to apply pressure to the pointing-stick nonslip cap. Use either thumb to press the left-click button or right-click button.

- **Point**
  Use the pointing stick 1 to move the pointer on the screen. To use the pointing stick, apply pressure to the pointing-stick nonslip cap in any direction parallel to the keyboard. The pointer moves accordingly but

the pointing stick itself does not move. The speed at which the pointer moves depends on the amount of pressure you apply to the pointing stick.

- **Left-click**
  Press the left-click button 2 to select or open an item.
- **Right-click**
  Press the right-click button 3 to display a shortcut menu.
- **Scroll**
  Press and hold the dotted scroll bar 4 while applying pressure to the pointing stick in the vertical or horizontal direction. Then you can scroll through the document, Web site, or apps.

Trackpad

The entire trackpad is sensitive to finger touch and movement. You can use the trackpad to perform all the pointing, clicking, and scrolling functions of a traditional mouse.

The trackpad can be divided into two zones:

1 Left-click zone (primary-click zone)
2 Right-click zone (secondary-click zone)

To use the trackpad, refer to the following instructions:

- **Point**
  Slide one finger across the surface of the trackpad to move the pointer accordingly.
- **Left-click**
  Press the left-click zone 1 to select or open an item.
  You also can tap anywhere on the surface of the trackpad with one finger to perform the left-click action.
- **Right-click**
  Press the right-click zone 2 to display a shortcut menu.
  You also can tap anywhere on the surface of the trackpad with two fingers to perform the right-click action.
- **Scroll**
  Put two fingers on the trackpad and move them in the vertical or horizontal direction. This action enables you to scroll through the document, Web site, or apps. Ensure that you position your two fingers slightly apart from each other.

With the trackpad, you also can perform a variety of touch gestures. For information about using the touch gestures, see “Trackpad touch gestures” on page 22.

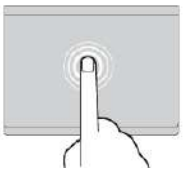
If the trackpad surface is stained with oil, turn off the computer first. Then gently wipe the trackpad surface with a soft and lint-free cloth moistened with lukewarm water or computer cleaner.

Trackpad touch gestures

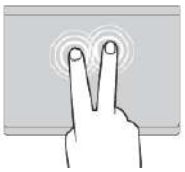
The entire trackpad surface is sensitive to finger touch and movement. You can use the trackpad to perform the same point and click actions as you would using a traditional mouse. You also can use the trackpad to perform a variety of touch gestures.

This topic introduces the frequently used touch gestures such as tapping, dragging, scrolling, and rotating. For more gestures, see the help information system of the ThinkPad pointing device.

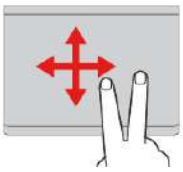
Notes:
- When using two or more fingers, ensure that you position your fingers slightly apart.
- Some gestures are not available if the last action was done from the TrackPoint pointing device.
- Some gestures are only available when you are using certain apps.



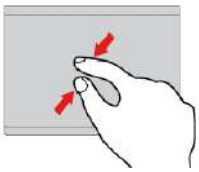
Tap
Tap anywhere on the trackpad with one finger to select or open an item.



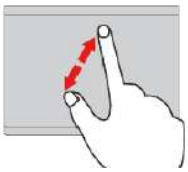
Two-finger tap
Tap anywhere on the trackpad with two fingers to display a shortcut menu.



Two-finger scroll
Put two fingers on the trackpad and move them in the vertical or horizontal direction. This action enables you to scroll through the document, Web site, or apps.

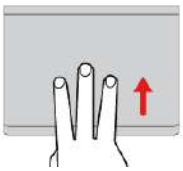


Two-finger zoom out
Put two fingers on the trackpad and move them closer together to zoom out.

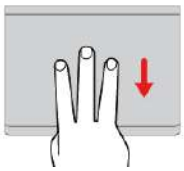


Two-finger zoom in
Put two fingers on the trackpad and move them farther apart to zoom in.

The following section introduces some touch gestures available only on the Windows 10 operating system.



Swipe three fingers up
Put three fingers on the trackpad and move them up to open the task view to see all your open windows.



Swipe three fingers down
Put three fingers on the trackpad and move them down to show the desktop.

Customizing the ThinkPad pointing device

You can customize the ThinkPad pointing device so you can use it more comfortably and efficiently. For example, you can choose to enable the TrackPoint pointing device, the trackpad, or both. You also can disable or enable the touch gestures.

To customize the ThinkPad pointing device, do the following:

1. Go to Control Panel.

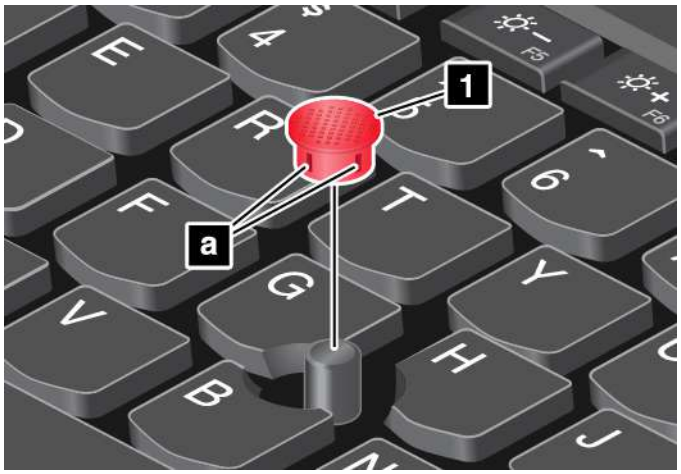
2. Click **Hardware and Sound → Mouse**. The Mouse Properties window is displayed.
3. In the Mouse Properties window, follow the instructions on the screen to complete the customization.

Replacing the cap on the pointing stick

The cap 1 on the end of the pointing stick is removable. After you use the cap for a period of time, you might consider replacing the cap with a new one.

To get a new cap, contact Lenovo. For information about contacting Lenovo, see Chapter 11 “Getting support” on page 115.

Note: Ensure that you use a cap with grooves a as shown in the following illustration.



Power management

The power to run your computer can come either from ac power or from the battery.

Using the ac power

Your computer comes with an ac power adapter and a power cord.

- ac power adapter: Converts ac power for notebook computer use.
- Power cord: Connects the ac outlet and the ac power adapter.

While you use ac power, the battery charges automatically.

Connecting to ac power

To connect the computer to ac power, do the following:

Attention: Using an improper power cord might cause severe damage to your computer.

Note: Ensure that you perform the actions in the order in which they are listed.

1. Connect the power cord to the ac power adapter.
2. Connect the ac power adapter to the power connector of the computer.
3. Connect the power cord into an electrical outlet.

Tips for using the ac power adapter

- When the ac power adapter is not in use, disconnect it from the electrical outlet.

- Do not bind the power cord tightly around the ac power adapter transformer pack when it is connected to the transformer.
- Before you charge the battery, make sure that its temperature is at least 10°C (50°F).
- You can charge the battery when the ac power adapter is connected to the computer. You need to charge the battery in any of the following situations:
  - When the battery icon in the Windows notification area shows a low percentage of battery power remaining.
  - When the battery has not been used for a long time

Using the battery power

Before you use the battery power, ensure that you read the following notices:

- "General battery notice" on page xi
- "Notice for built-in rechargeable battery" on page xi

It is hard to predict the battery life between charges. Different computer components consume power at different rates. Some components consume power very quickly, for example, the computer display, the microprocessor, and the wireless radios. The more you use the power-intensive components, the faster you consume power.

The battery is a consumable supply. If your battery begins to discharge too quickly, you might consider getting a new one from Lenovo. To contact Lenovo, see Chapter 11 "Getting support" on page 115.

Checking the battery status

Move your pointer to the battery-status icon in the Windows notification area to check the battery status. The battery-status icon displays the percentage of battery power remaining and how long you can use your computer before you must charge the battery.

The rate at which you use battery power determines how long you can use the batteries of your computer between charges. Because of different user habits and needs, it is difficult to predict how long a battery charge will last. There are two main factors:

- How much energy is stored in the battery when you begin to work.
- The way you use your computer. For example:
  - How often you access the storage drive.
  - How bright you make the computer display.
  - How often you use the wireless features.

Charging the battery

It is recommended that you charge the battery when the battery power remaining is low. For example:

- When you find that the percentage of the remaining power is low.
- When the power alarm alerts you.

To charge the battery, see "Using the ac power" on page 23.

Depending on the battery size and the physical environment, the battery will be fully charged in about three to six hours. You can check the battery charging status at any time through the battery-status icon in the Windows notification area.

Note: To maximize the life of the battery, the computer does not start recharging the battery if the remaining power is greater than 95%.

Maximizing the battery life

To maximize the life of the battery, do the following:

- Use the battery until the charge is depleted.
- Recharge the battery completely before using it. You can see whether the battery is fully charged from the battery-status icon in the Windows notification area.
- Always use power-saving modes, such as sleep mode and hibernation mode.

Power-saving modes

There are several modes that you can use at any time to conserve power. This section introduces each mode and gives tips on the effective use of battery power.

- **Screen blank mode (for Windows 7 only)**
  The computer display requires considerable battery power. To turn off the power to the display and make the computer enter screen blank mode, right-click the battery-gauge icon in the windows notification area and select **Power off display**.
- **Sleep mode**
  In sleep mode, your work is saved to memory, and then the solid-state drive, hard disk drive, or hybrid drive, and the computer display are turned off. When your computer wakes up, your work is restored within seconds.

  To put your computer into sleep mode, press Fn+4.

  You also can put the computer into sleep mode by doing the following:

  – **For Windows 7**: Open the Start menu, then click the arrow next to the **Shut down** button. Click **Sleep** from the menu displayed.

  – **For Windows 10:** Open the Start menu, click ⏻ **Power**, and then click **Sleep**.

  For more information about the programs, see “Lenovo programs” on page 11.
- **Hibernation mode**
  By using this mode, you can turn off your computer completely without saving files or exiting any programs that are running. When the computer enters hibernation mode, all open programs, folders, and files are saved to the storage devices, and then the computer turns off.

  To put the computer into hibernation mode, do the following:

  – **For Windows 7:** Open the Start menu, then click the arrow next to the **Shut down** button. Click **Hibernate** from the menu displayed.

  – **For Windows 10**: Define what the power button does first, then press the power button to put the computer into hibernation mode.

  If you put your computer into hibernation mode with the wake-up function disabled, the computer does not consume any power. The wake-up function is disabled by default. If you put your computer into hibernation mode with the wake-up function enabled, the computer consumes a small amount of power.

  To enable the wake-up function, do the following:

  1. Go to Control Panel and click **System and Security**.
  2. Click **Administrative Tools**.
  3. Click **Task Scheduler**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.
  4. From the left pane, select the task folder for which you want to enable the wake-up function. The scheduled tasks are displayed.

5. Click a scheduled task, and then click the **Conditions** tab.
6. Under **Power**, select the check box for **Wake the computer to run this task**.

- **Wireless off**
  When you are not using the wireless features, such as Bluetooth or wireless LAN, turn them off. This helps conserve power. To turn off the wireless features, press the wireless-radios control key .

Managing the power plan

Power plans can help you maximize your computer's performance or conserve energy. You can select a power plan or customize it by changing its power settings. To achieve this, do the following:

1. From the desktop, click the battery-status icon in the Windows notification area on the taskbar.
2. Click **More power options**.
3. Follow the instructions on the screen.

Notes: Use Lenovo programs for advanced power settings.

- **For Windows 7:** Use the Power Manager program.
- **For Windows 10:** Use the Lenovo Settings program.

For more information, see "Lenovo programs" on page 11.

Connecting to the network

Your computer has one or more network cards that enable you to connect your computer to the Internet or other network connections.

Ethernet connections

You can connect your computer to a local network or a broadband connection through the ThinkPad OneLink+ to RJ45 Adapter or a supported ThinkPad OneLink+ Dock.

DANGER

To avoid the risk of electrical shock, do not connect the telephone cable to the Ethernet connector on the ThinkPad OneLink+ to RJ45 Adapter or the ThinkPad OneLink+ Dock.

Wireless connections

Wireless connection is the transfer of data without the use of cables but by means of radio waves only.

Depending on the wireless devices installed on your computer, you might be able to use the following wireless networks:

- **Wireless LAN connection**
- **Bluetooth connection**

Using the Airplane mode

Airplane mode is supported on the Windows 10 operating system. If the Airplane mode is enabled, all wireless features are disabled.

To enable or disable the Airplane mode, do the following:

1. Open the Start menu.
2. Click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs.
3. Click **Settings → Network & Internet → Airplane mode**.
4. Slide the control for **Airplane mode** to turn it on or off.

Using the wireless LAN connection

A wireless local area network (LAN) covers a relatively small geographic area, such as an office building or a house. Devices based on the 802.11 standards can connect to this type of network.

Your computer comes with a built-in wireless network card and a configuration utility to help you establish wireless connections and monitor the connection status. This enables you to stay connected to your network while you are at the office, in a meeting room, or at home, with no need for a wired connection.

To establish a wireless LAN connection, do the following:

1. Click the wireless-network-connection-status icon in the Windows notification area. A list of available wireless networks is displayed.
2. Double-click a network to connect to it. Provide required information if needed.

The computer automatically connects to an available wireless network when the location changes. For more information, refer to the Windows help information system.

Tips for using the wireless LAN feature

To achieve the best connection, use the following guidelines:

- Place your computer so that there are as few obstacles as possible between the wireless LAN access point and the computer.
- Open your computer display to an angle of slightly more than 90 degrees.
- If you use the wireless feature (the 802.11 standards) of your computer simultaneously with a Bluetooth option, the data transmission speed can be delayed and the performance of the wireless feature can be degraded.

Checking the wireless-LAN connection status

You can check the wireless-LAN connection status through the wireless-network-connection-status icon in the Windows notification area. The more bars encompassed, the better the signal is.

For the Windows 7 operating system, you also can check the Access Connections gauge, the Access Connections status icon, or the Access Connections wireless status icon in the Windows notification area.

Access Connections gauge:

- Power to the wireless radio is off or no signal.
- Power to the wireless radio is on. The signal strength of the wireless connection is poor. To improve signal strength, move your computer closer to the wireless access point.
- Power to the wireless radio is on. The signal strength of the wireless connection is marginal.
- Power to the wireless radio is on. The signal strength of the wireless connection is excellent.

Access Connections status icon:

- No location profile is active or none exists.
- Current location profile is disconnected.
- Current location profile is connected.

Access Connections wireless status icon:

- Power to the wireless radio is off.
- Power to the wireless radio is on. No association.
- Power to the wireless radio is on. No signal.
- Power to the wireless radio is on. The signal strength of the wireless connection is excellent.
- Power to the wireless radio is on. The signal strength of the wireless connection is marginal.
- Power to the wireless radio is on. The signal strength of the wireless connection is poor. To improve signal strength, move your computer closer to the wireless access point.

Using the Bluetooth connection

Bluetooth can connect devices a short distance from one another, and is commonly used for connecting peripheral devices to a computer, transferring data between hand-held devices and a personal computer, or remotely controlling and communicating with devices such as mobile phones.

Depending on the model, your computer might support the Bluetooth feature. To transfer data through the Bluetooth feature, do the following:

Note: If you use the wireless feature (the 802.11 standards) of your computer simultaneously with a Bluetooth option, the data transmission speed can be delayed and the performance of the wireless feature can be degraded.

1. Ensure that the Bluetooth feature is enabled.
   - **For Windows 7:** Press the wireless-radios control key and turn on the Bluetooth feature.
   - **For Windows 10:** Do one of the following:
     - Open the Start menu and then click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** → **Devices** → **Bluetooth**. Turn on the Bluetooth feature.
     - Open the Start menu and then click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** → **Network & Internet** → **Airplane mode**. Turn on the Bluetooth feature.
2. Right-click the data that you want to send.
3. Select **Send To** → **Bluetooth Devices**.
4. Select a Bluetooth device, and then follow the instructions on the screen.

For more information, refer to the Windows help information system and the Bluetooth help information system.

Using an external display

You can use an external display such as a projector or a monitor to give presentations or to expand your workspace. This topic introduces how to connect an external display, choose display modes, and change display settings.

Your computer supports the following video resolution, provided that the external monitor also supports that resolution.

- Up to 3840 x 2160 pixels, with an external display connected to the HDMI connector

For more information about the external display, refer to the manuals provided with it.

Connecting an external display

You can use either a wired display or a wireless display. The wired display can be connected to the HDMI, VGA, or mini DisplayPort® connector by a cable. The wireless display can be added through the Wi-Di or Miracast function.

- **Connecting a wired display**

  Note: When you connect an external monitor, a video interface cable with a ferrite core is required.

  1. Connect the external display to an appropriate video connector on your computer, such as the VGA connector, mini DisplayPort connector, or HDMI connector.
  2. Connect the external display to an electrical outlet.
  3. Turn on the external display.

  If your computer cannot detect the external display, do the followings:

  – For Windows 7: Right-click on the desktop, then click **Screen resolution** → **Detect**.

  – For Windows 10: Right-click on the desktop, then click **Display settings** → **Detect**.

- **Connecting a wireless display**

  Note: To use a wireless display, ensure that both your computer and the external display support the Wi-Di or Miracast feature.

  – **For Windows 7**

    Start the Intel® Wi-Di program. Select the desired wireless display in the list and follow the instructions on the screen.

  – **For Windows 10**

    Do one of the following:

    – Open the Start menu and then click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** → **Devices** → **Connected devices** → **Add a device**.

    – Click the action center icon on the taskbar. Click **Connect**. Select the desired wireless display and follow the instructions on the screen.

  For more information, see the Windows help information systems.

Choosing a display mode

You can display your desktop and apps on the computer display, the external display, or both. To choose how to display the video output, press the display-mode switching key and then select a display mode you prefer.

There are four display modes:

- **Disconnect**: Displays the video output only on your computer screen.

  Note: Depending on the situation, you might see **Disconnect**, **PC screen only**, **Computer only**, or **Disconnect projector**.

- **Duplicate**: Displays the same video output on both your computer screen and an external display.

- **Extend**: Extends the video output from your computer display to an external display. You can drag and move items between the two displays.
- **Projector only**: Shows the video output only on an external display.

  Note: Depending on the situation, you might see **Projector only** or **Second screen only**.

Note: If you show DOS or programs using DirectDraw or Direct3D® in full-screen mode, only the main display shows the video output.

Changing display settings

You can change the settings for both the computer display and the external display. For example, you can define which one is the main display and which one is the secondary display. You also can change the resolution and orientation.

To change display settings, do the following:

1. Right-click on the desktop and select **Screen Resolution** (Windows 7) or **Display settings** (Windows 10).
2. Select the display that you want to configure.
3. Change display settings as you want.

Note: If you set a higher resolution for the computer display than the external display, only part of the screen can be shown on the external display.

Using audio features

Your computer is equipped with the following items:

- Built-in microphones
- Built-in speakers
- Combo audio connector, 3.5 mm (0.14 inch) in diameter

Your computer also has an audio chip that enables you to enjoy various multimedia audio features, such as the following:

- Playback of MIDI and MP3 files
- Recording and playback of PCM and WAV files
- Recording from various sound sources, such as a headset attached

The following table shows which functions of the audio devices attached to the connectors on your computer or docking station are supported.

Table 1. Audio feature list

Connector	Headset with a 3.5 mm (0.14–inch) 4-pole plug	Conventional headphone	Conventional microphone
Combo audio connector	Headphone and microphone functions supported	Headphone function supported	Not supported

To configure the microphone for optimal sound recording, use the Realtek HD Audio Manager program. To start the program, go to Control Panel and click **Hardware and Sound → Realtek HD Audio Manager**.

Using the camera

If your computer has a camera, you can use the camera to preview your video image and take a snapshot of your current image.

To start the camera, do the following:

- **For Windows 7:** Start the Communications Utility program. See “Accessing Lenovo programs” on page 11.
- **For Windows 10:** Open the Start menu, and click **Camera** from the all apps list.

When the camera is started, the green camera-in-use indicator turns on.

You also can use the integrated camera with other programs that provide features such as photographing, video capturing, and video conferencing. To use the integrated camera with other programs, open one of the programs and start the photographing, video capturing, or video conferencing function. Then, the camera will start automatically and the green camera-in-use indicator will turn on. For more information about using the camera with a program, refer to the help information system of the program.

Configuring camera settings

You can configure the camera settings to meet your needs, such as adjusting the quality of the video output.

To configure the camera settings, do the following:

- **For Windows 7:** Start the Communications Utility program and configure the camera settings as desired.
- **For Windows 10:** Do one of the following:
  - Open the **Camera** app, click the settings icon in the upper-right corner. Follow the instructions on the screen to configure the camera settings as desired.
  - Open the Start menu and then click **Lenovo Companion → Hardware Settings → Display, Camera & Audio/Media**. Locate the **Camera** section and then follow the instructions on the screen to configure the camera settings.

Using a flash media card

This section provides information about the supported flash media card type and instructions on how to install or remove a flash media card. For more information about using the card, refer to the documentation that came with the card.

Supported flash media card type

Your computer has a media-card slot, it supports the following cards:

- MultiMediaCard (MMC)
- Secure Digital (SD) card
- Secure Digital High-Capacity (SDHC) card
- Secure Digital eXtended-Capacity (SDXC) card

Note: Your computer does not support the content protection for recordable media (CPRM) feature for the SD card.

Installing or removing a flash media card

Attention: Before installing or removing a flash media card, ensure that you observe the following precautions:

- Before you start, read “Static electricity prevention” on page 99.
- During the data transfer, do not put your computer into sleep or hibernation mode and do not perform any installation or removal actions. Otherwise, your data could get damaged.
- Do not remove a smart card while the computer is in sleep or hibernation mode. Otherwise, the system might not respond when you try to resume operation.
- Stop all the activities involving the card before removing it. Otherwise, data on the card might be damaged or lost.

To install a flash media card, do the following:

1. Locate the media-card slot. See “Locating computer controls, connectors, and indicators” on page 1.
2. Make sure that the card is correctly oriented, and then insert the card into the media-card slot.

After you install a flash media card, do the following to enable the plug-and-play feature for the card:

1. Open Control Panel, and ensure that you view Control Panel by Category.
2. Click **Hardware and Sound**.
3. Click **Device Manager**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.
4. From the **Action** menu, select **Add legacy hardware**. The Add Hardware Wizard starts.
5. Follow the instructions on the screen.

To remove a flash media card, do the following:

1. Click the triangular icon in the Windows notification area to show hidden icons.
2. Select the item you want to remove to stop the card.
3. Press the card to eject it from your computer.
4. Remove the card and store it safely for future use.

Note: If you do not remove the card from your computer after you eject the card from the Windows operating system, the card can no longer be accessed. To access the card, you must remove it first, then insert it again.

Chapter 3. Enhancing your computer

This chapter provides instructions on how to use hardware devices to expand your computer capabilities. It includes the following topics:

- “Finding ThinkPad options” on page 33
- “ThinkPad OneLink+ Dock” on page 33

Finding ThinkPad options

If you want to expand the capabilities of your computer, Lenovo has a number of hardware accessories and upgrades to meet your needs. Options include memory modules, storage devices, network cards, docking stations, batteries, power adapters, printers, scanners, keyboards, mice, and more.

You can shop at Lenovo 24 hours a day, 7 days a week directly over the World Wide Web. All you need is an Internet connection and a credit card.

To shop at Lenovo, go to
http://www.lenovo.com/essentials

ThinkPad OneLink+ Dock

The ThinkPad OneLink+ Dock (hereafter referred to as dock) is an optional device that Lenovo designed specifically for your computer. The dock provides convenience and makes your computer easier to use for work, study, and entertainment. If your computer does not come with the dock, you can purchase one from Lenovo at http://www.lenovo.com/accessories.

This topic provides basic information about the dock. For detailed information about using the dock, refer to the documentation that comes with the dock.

Front view

1 Security-lock slot: To protect your dock from theft, purchase a security cable lock that fits this security-lock slot to lock your dock to a stationary object.

2 Audio connector: Used to connect headphones or a headset that has a 3.5-mm (0.14-inch), 4-pole plug.

3 USB 3.0 connector: Used to connect devices that are compatible with USB 3.0 and USB 2.0.

4 Always On USB connector: By default, the Always On USB connector enables you to charge some mobile digital devices and smartphones when the dock is in the following situations:

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- When the dock is in sleep or hibernation mode
- When the dock is turned off

For more information, refer to the documentation that comes with the dock.

5 Power button: The power button on the dock functions the same as the one on the computer.

6 System-status indicator: The indicator on the illuminated ThinkPad logo functions the same as the ones on the computer. For details, see “Status indicators” on page 6.

Rear view

1 USB 2.0 connectors: Used to connect devices that are compatible with USB 2.0.

2 DisplayPort connectors: Used to attach a high-performance monitor, a direct-drive monitor, or other devices that use a DisplayPort connector.

3 Ethernet connector: Used to connect the dock to an Ethernet LAN.

4 USB 3.0 connectors: Used to connect devices that are compatible with USB 3.0 and USB 2.0.

5 VGA connector: Used to connect to a VGA-compatible video device, such as a VGA monitor.

6 Power connector: Used to connect the ac power adapter.

7 OneLink+ connector: Connect the OneLink+ connector to the computer. To locate the corresponding OneLink+ connector on the computer, see “Locating computer controls, connectors, and indicators” on page 1.

Chapter 4. You and your computer

This chapter contains the following topics:

- “Accessibility and comfort” on page 35
- “Traveling with your computer” on page 39

Accessibility and comfort

Good ergonomic practice is important to get the most from your personal computer and to avoid discomfort. Arrange your workplace and the equipment you use to suit your individual needs and the kind of work that you perform. In addition, use healthy work habits to maximize your performance and comfort while using your computer.

The following topics provide information about arranging your work area, setting up your computer equipment, and establishing healthy work habits.

Lenovo is committed to providing the latest information and technology to our customers with disabilities. Refer to the accessibility information that outlines our efforts in this area. See “Accessibility information” on page 36.

Ergonomic information

Working in the virtual office might mean adapting to frequent changes in your environment. For example, adapting to the surrounding light sources, proper seating, and the placement of your computer hardware, can help you improve your performance and achieve greater comfort.

The following example shows someone in a conventional setting. Even when not in such a setting, you can follow many of these tips. Develop good habits, and they will serve you well.

General posture: Make minor modifications in your working posture to deter the onset of discomfort caused by long periods of working in the same position. Frequent short breaks from your work also help to prevent minor discomfort associated with your working posture.

Display: Position the display to maintain a comfortable viewing distance of 510-760 mm (20-30 inches). Avoid glare or reflections on the display from overhead lighting or outside sources of light. Keep the display screen clean and set the brightness to levels that enable you to see the screen clearly. To adjust display brightness, press the brightness-down key F5, or brightness-up key F6.

Head position: Keep your head and neck in a comfortable and neutral (vertical, or upright) position.

Chair: Use a chair that gives you good back support and seat height adjustment. Use chair adjustments to best suit your desired posture.

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Arm and hand position:Keep your forearms, wrists, and hands in a relaxed and neutral (horizontal) position. Type with a soft touch without pounding the keys.

Leg position: Keep your thighs parallel to the floor and your feet flat on the floor or on a footrest.

What if you are traveling?

It might not be possible to observe the best ergonomic practices when you are using your computer while on the move or in a casual setting. Regardless of the setting, try to observe as many of these tips as possible. Sitting properly and using adequate lighting, for example, will help you maintain desirable levels of comfort and performance.

Questions about vision?

The visual display screens of ThinkPad notebook computers are designed to meet the highest standards and to provide you with clear, crisp images and large, bright displays that are easy to see, yet easy on the eyes. Of course, any concentrated and sustained visual activity can be tiring. If you have questions on eye fatigue or visual discomfort, consult a vision care specialist for advice.

Comfort

Observe the following guidelines to achieve greater comfort and improve performance.

Active sitting and rest breaks: The longer you sit and work with your computer, the more important it is to observe your working posture. Follow “Ergonomic information” on page 35 and practice “active sitting” to avoid discomfort associated with your working postures. Making minor voluntary postural changes and taking short frequent work breaks are the key ingredients for healthy computing. Your computer is light and mobile; you can easily reposition your working surface to accommodate many posture modifications.

Work area setup options: Familiarize yourself with all of your office furniture so that you know how to adjust your work surface, seat, and other work tools to accommodate your preferences for comfort. If your work area is not in an office setting, be sure to take special note of employing active sitting and taking work breaks. Many ThinkPad product solutions are available to help you modify and expand your computer to best suit your needs. You can find some of these options at http://www.lenovo.com/essentials. Explore your options for docking solutions and external products that provide the adjustability and features that you want.

Accessibility information

Lenovo is committed to providing users who have hearing, vision, and mobility limitations with greater access to information and technology. This section provides information about the ways these users can get the most out of their computer experience. You also can get the most up-to-date accessibility information from the following Web site:
http://www.lenovo.com/accessibility

Keyboard shortcuts

The following table contains keyboard shortcuts that can help make your computer easier to use.

Note: Depending on your keyboard, some of the following keyboard shortcuts might not be available.

Keyboard shortcut	Function
Windows logo key + U	Open Ease of Access Center
Right Shift for eight seconds	Turn on or turn off Filter Keys
Shift five times	Turn on or turn off Sticky Keys

Keyboard shortcut	Function
Num Lock for five seconds	Turn on or turn off Toggle Keys
Left Alt+Left Shift+Num Lock	Turn on or turn off Mouse Keys
Left Alt+Left Shift+PrtScn (or PrtSc)	Turn on or turn off High Contrast

For more information, go to http://windows.microsoft.com/, and then perform a search using any of the following keywords: `keyboard shortcuts`, `key combinations`, `shortcut keys`.

Ease of Access Center

Ease of Access Center on the Windows operating system enables users to configure their computers to suit their physical and cognitive needs.

To use Ease of Access Center, do the following:

1. Go to Control Panel, and ensure that you view Control Panel using Category.
2. Click **Ease of Access → Ease of Access Center**.
3. Choose the appropriate tool by following the instructions on the screen.

Ease of Access Center mainly includes the following tools:

- Magnifier

  Magnifier is a useful utility that enlarges the entire screen or part of the screen so that you can see the items better.
- Narrator

  Narrator is a screen reader that reads what is displayed on the screen aloud and describes events such as error messages.
- On-Screen Keyboard

  If you prefer to type or enter data into your computer using a mouse, joystick, or other pointing device instead of a physical keyboard, you can use On-Screen Keyboard. On-Screen Keyboard displays a visual keyboard with all the standard keys. You can select keys using the mouse or another pointing device, or you can tap to select the keys if your computer supports multi-touch screen.
- High Contrast

  High Contrast is a feature that heightens the color contrast of some text and images on your screen. As a result, those items are more distinct and easier to identify.
- Personalized keyboard

  Adjust keyboard settings to make your keyboard easier to use. For example, you can use your keyboard to control the pointer and make the keyboard easier to type certain key combinations.
- Personalized mouse

  Adjust mouse settings to make your mouse easier to use. For example, you can change the pointer appearance and make your mouse easier to manage windows.

Speech Recognition

Speech Recognition enables you to control your computer by voice.

Using only your voice, you can start programs, open menus, click objects on the screen, dictate text into documents, and write and send e-mails. Everything you do with the keyboard and mouse can be done with only your voice.

To use Speech Recognition, do the following:

1. Go to Control Panel, and ensure that you view Control Panel using Category.
2. Click **Ease of Access → Speech Recognition**.
3. Follow the instructions on the screen.

Screen-reader technologies

Screen-reader technologies are primarily focused on software program interfaces, help information systems, and various online documents. For additional information about screen readers, see the following:

- Using PDFs with screen readers:
  http://www.adobe.com/accessibility.html?promoid=DJGVE
- Using the JAWS screen reader:
  http://www.freedomscientific.com/jaws-hq.asp
- Using the NVDA screen reader:
  http://www.nvaccess.org/

Screen resolution

You can make the text and images on your screen easier to read by adjusting the screen resolution of your computer.

To adjust the screen resolution, do the following:

1. Right-click an empty area of the desktop and select **Screen resolution**.
2. Follow the instructions on the screen.

Note: Setting a resolution too low might prevent some items from fitting on the screen.

Customizable item size

You can make the items on your screen easier to read by changing the item size.

- To change the item size temporarily, use the Magnifier tool in Ease of Access Center. See “Ease of Access Center” on page 37.
- To change the item size permanently, do the following:
  - Change the size of all the items on your screen.
    1. Go to Control Panel, and ensure that you view Control Panel using Category.
    2. Click **Appearance and Personalization → Display**.
    3. Change the item size by following the instructions on the screen.
    4. Click **Apply**. This change will take effect the next time you log in to the operating system.
  - Change the size of the items on a Web page.

    Press and hold Ctrl, and then press the plus-sign key (+) to enlarge or the minus-sign key (-) to reduce the text size.
  - Change the size of the items on the desktop or a window.

    Note: This function might not work on some windows.

    If your mouse has a wheel, press and hold Ctrl, and then scroll the wheel to change the item size.

Industry-standard connectors

Your computer provides industry-standard connectors that enable you to connect assistive devices.

For more information about the location and function of the connectors, see “Locating computer controls, connectors, and indicators” on page 1.

Documentation in accessible formats

Lenovo provides electronic documentation in accessible formats, such as properly tagged PDF files or HyperText Markup Language (HTML) files. Lenovo electronic documentation is developed to ensure that visually impaired users can read the documentation through a screen reader. Each image in the documentation also includes adequate alternative text so that visually impaired users can understand the image when they use a screen reader.

Traveling with your computer

This topic provides information to help you work with your computer when you are traveling.

Travel tips

Use the following travel tips to travel more confidently and efficiently with your computer.

- Although it is safe to allow your computer to go through the x-ray machines at airport security stations, it is important to keep your eyes on the computer at all times to prevent theft.
- Consider bringing an electrical adapter for use in an airplane or automobile.
- If you carry an ac power adapter, detach the ac cord from it to avoid damaging the cord.

Travel tips on airplanes

If you carry your computer into an airplane, take note of the following tips:

- If you intend to use your computer or wireless services (such as Internet and Bluetooth), check with the airline for restrictions and availability of services before boarding the airplane. If there are restrictions on the use of computers with wireless features on the airplane, you must abide by those restrictions. If necessary, enable the Airplane mode before boarding. In the Airplane mode, all wireless features are disabled. To enable the Airplane mode in the Windows 10 operating system, do the following:
  1. Open the Start menu.
  2. Click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs.
  3. Click **Settings** → **Network & Internet** → **Airplane mode**.
  4. Turn on the Airplane mode
- Be careful about the seat in front of you on airplanes. Angle your computer display so that it does not get caught when the person in front of you leans back.
- When taking off, remember to turn off your computer or put it into hibernation mode.

Travel accessories

The following is a checklist of items to consider packing when you are going to travel:

- ThinkPad ac power adapter
- External mouse (if you are accustomed to using one)
- A quality carrying case that provides adequate cushion and protection
- Ethernet cable
- External storage device
- HDMI cable
- Lenovo USB-C 45W AC Adapter

- Lenovo USB-C to HDMI Adaptor
- Lenovo USB-C to VGA Adaptor
- ThinkPad OneLink+ Dock
- ThinkPad OneLink+ to RJ45 Adapter
- ThinkPad OneLink+ to VGA/RJ45 Adapter

If you are traveling to another country, you might want to consider an ac power adapter for the country to which you are traveling.

To purchase travel accessories, go to http://www.lenovo.com/accessories.

Chapter 5. Security

This chapter contains the following topics:

- “Using passwords” on page 41
- “Hard disk security” on page 45
- “Setting the security chip” on page 46
- “Using the fingerprint reader” on page 47
- “Notice on deleting data from your storage devices” on page 49
- “Using firewalls” on page 50
- “Protecting data against viruses” on page 50

Using passwords

You can help prevent your computer from unauthorized use by using passwords. Once you set a password, a prompt is displayed on the screen each time you turn on the computer. Enter your password at the prompt. You cannot use the computer unless you type the correct password.

If you have set a power-on password, a supervisor password, or a hard disk password, it unlocks automatically when the computer resumes from sleep mode.

Note: If a Windows password has been set, you will be prompted to enter it.

Typing passwords

When this icon is displayed, type a power-on password or a supervisor password.

When this icon is displayed, type a user hard disk password. To type a master hard disk password, press F1. When the icon changes to , type the master hard disk password

Note: To return to the icon , press F1 again.

Power-on password

You can set a power-on password to help protect your computer against access by unauthorized users.

If you set a power-on password, the password prompt is displayed on the screen whenever you turn on the computer. You must enter the correct password to start using the computer.

Setting, changing, or removing a power-on password

Before you start, print these instructions.

To set, change, or remove a power-on password, do the following:

1. Restart the computer. When the logo screen is displayed, press F1 to start the ThinkPad Setup program.
2. Select **Security → Password → Power-on Password** by using the directional keys.

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3. Depending on your need, do one of the following:
   - To set a password, do the following:
     a. In the **Enter New Password** field, type a desired password and press Enter.
     b. In the **Confirm New Password** field, retype the password and press Enter.
   - To change a password, do the following:
     a. In the **Enter Current Password** field, type the current power-on password and press Enter.
     b. In the **Enter New Password** field, type the new power-on password and press Enter; then retype the password in the **Confirm New Password** field and press Enter.
   - To remove a password, do the following:
     a. In the **Enter Current Password** field, type the current power-on password and press Enter.
     b. Leave the **Enter New Password** and **Confirm New Password** fields blank. Press Enter twice.
4. A Setup Notice window is displayed. Press Enter to continue.
5. Press F10. A Setup Confirmation window is displayed. Select **Yes** to save the configuration changes and exit the ThinkPad Setup program.

Note: You might want to record your password and store it in a safe place. Otherwise, if you forget the password, you have to take your computer to a Lenovo reseller or a marketing representative to have the password canceled.

Supervisor password

The supervisor password protects the system information stored in the ThinkPad Setup program. It provides the following security features:

- If only a supervisor password is set, a password prompt is displayed when you try to start the ThinkPad Setup program. Unauthorized users cannot change most of the system configuration options in the ThinkPad Setup program without the password.
- The system administrator can use the supervisor password to access a computer even if the user of that computer has set a power-on password. The supervisor password overrides the power-on password.
- If both a supervisor password and a power-on password are set, you can do the following only if you have the supervisor password:
  - Changing or deleting the power-on password
  - Changing or deleting the supervisor password
  - Changing date and time
  - Specifying the minimum length for power-on password and hard disk password
  - Changing the setting for the security chip
  - Changing the setting for the Virtualization
  - Changing the setting for the I/O port access
  - Changing the setting for the Anti-Theft
  - Changing the setting for the Secure Boot
  - Erasing the fingerprint data
  - Enabling or disabling the following features:
    - Lock UEFI BIOS Settings
    - Password at unattended boot
    - Boot Device List F12 Option

- Boot Order Lock
- Flash BIOS Updating by End-Users
- Secure RollBack Prevention
- Execution Prevention
- Security mode
- Fingerprint reader priority

Note: The system administrator can set the same supervisor password on many ThinkPad notebook computers to make administration easier.

Setting, changing, or removing a supervisor password

Before you start, print these instructions.

Only a system administrator can set, change, or remove a supervisor password. To set, change, or remove a supervisor password, do the following:

1. Restart the computer. When the logo screen is displayed, press F1 to start the ThinkPad Setup program.
2. Select **Security → Password → Supervisor Password** by using the directional keys.
3. Depending on your needs, do one of the following:
   - To set a password, do the following:
     a. In the **Enter New Password** field, type a desired password and press Enter.
     b. In the **Confirm New Password** field, retype the password and press Enter.
   - To change a password, do the following:
     a. In the **Enter Current Password** field, type the current supervisor password and press Enter.
     b. In the **Enter New Password** field, type the new supervisor password and press Enter; then retype the password in the **Confirm New Password** field and press Enter.
   - To remove a password, do the following:
     a. In the **Enter Current Password** field, type the current supervisor password and press Enter.
     b. Leave the **Enter New Password** and **Confirm New Password** fields blank. Press Enter twice.
4. A Setup Notice window is displayed. Press Enter to continue.
5. Press F10. A Setup Confirmation window is displayed. Select **Yes** to save the configuration changes and exit the ThinkPad Setup program.

Note: You might want to record your password and store it in a safe place. The next time you open the ThinkPad Setup program, you will be prompted to type your supervisor password to proceed. If you forget your supervisor password, Lenovo cannot reset your password. You must take your computer to a Lenovo reseller or a Lenovo marketing representative to have the system board replaced. Proof of purchase is required, and a fee will be charged for parts and service.

Hard disk passwords

The following two types of hard disk passwords can help protect the information stored on the storage devies:

- **User hard disk password**

  If a user hard disk password has been set, but no master hard disk password has been, the user must enter the user hard disk password to access files and applications on the hard disk drive.
- **Master hard disk password**

The master hard disk password also requires a user hard disk password. The master hard disk password is usually set and used by a system administrator. It enables the administrator to access any hard disk drive in a system like a master key. The administrator sets the master password; then assigns a user password for each computer in the network. The user can then change the user password as desired, but the administrator still can get access by using the master password.

When a master hard disk password is set, only the administrator can remove the user hard disk password.

Setting a hard disk password

Before you start, print these instructions.

To set a hard disk password, do the following:

1. Restart the computer. When the logo screen is displayed, press F1 to start the ThinkPad Setup program.
2. Select **Security → Password → Hard disk x Password** by using the directional keys.
3. A password window is displayed. You are prompted to select **User** or **User + Master**. Select **User** if you want to set only one hard disk password. Select **User + Master** if you want to set a user hard disk password and a master hard disk password, for example if you are an administrator or a supervisor.
   - If you select **User**, do the following:
     a. When a window for typing the new password opens, type your new password in the **Enter New Password** field and press Enter.
     b. In the **Confirm New Password** field, retype the password you just entered and press Enter.
   - If you select **User + Master**, do the following:
     a. First, set a user hard disk password. When a message window prompts you to set the user hard disk password, press Enter to continue. Type your new user hard disk password in the **Enter New Password** field and press Enter. Retype the password in the **Confirm New Password** field and press Enter.
     b. Then, set a master hard disk password. When a message window prompts you to set the master hard disk password. Press Enter to continue. Type your new master hard disk password in the **Enter New Password** field and press Enter. Retype the password in the **Confirm New Password** field and press Enter.
4. A Setup Notice window is displayed. Press Enter to continue.
5. Press F10. A Setup Confirmation window is displayed. Select **Yes** to save the configuration changes and exit the ThinkPad Setup program.

The next time you turn on your computer, type the user or master hard disk password to start your computer and access the operating system.

Changing or removing a hard disk password

To change or remove the hard disk password, do the following:

- If you are in **User + Master** hard disk mode, you can select either **User HDP** or **Master HDP** to change the password, depending on your needs.
  - If you select **User HDP** mode, follow the following steps to change the user hard disk password:
    1. Type the current user hard disk password in the **Enter Current Password** field and press Enter.
    2. Type the new password in the **Enter New Password** field and press Enter; then retype the password in the **Confirm New Password** field and press Enter.
    3. A Setup Notice window is displayed. Press Enter again to continue. The user hard disk password is changed.

    Note: The hard disk password cannot be removed in **User HDP** mode.

– If you select **Master HDP** mode, follow the following steps to change the master hard disk password:
  1. Type the current master hard disk password in the **Enter Current Password** field and press Enter.
  2. Type the new master hard disk password in the **Enter New Password** field and press Enter; then retype the new password you just entered in the **Confirm New Password** field and press Enter.
  3. A Setup Notice window is displayed. Press Enter to continue. The master hard disk password is changed.

  Note: If you leave the **Enter New Password** and **Confirm New Password** fields blank and press Enter twice, both the user and master hard disk passwords are removed.

- If you are in **User** hard disk mode, follow the following steps to change the user hard disk password:
  1. Follow steps 1 through 7 in "Setting a hard disk password" on page 44, typing your password to start the ThinkPad Setup program.
  2. Type the current user hard disk password in the **Enter Current Password** field and press Enter.
  3. Type the new password in the **Enter New Password** field and press Enter; then retype the new password in the **Confirm New Password** field and press Enter.
  4. A Setup Notice window is displayed. Press Enter again to continue. The user hard disk password is changed.

  Note: If you leave the **Enter New Password** and **Confirm New Password** fields blank and press Enter twice, the user hard disk password is removed.

Tips on using the hard disk passwords

- You can set the minimum length of a hard disk password through the **Security** menu.
- If you set a hard disk password of over seven characters, the hard disk drive can be used only with a computer that can recognize a hard disk password of over seven characters. If you then install the hard disk drive in a computer that cannot recognize a hard disk password that contains more than seven characters, you cannot access the drive.
- Record your password and store it in a safe place. If you forget the user hard disk password, or both user and master hard disk passwords, Lenovo cannot reset your passwords or recover data from the hard disk drive. You must take your computer to a Lenovo reseller or a marketing representative to have the drive replaced. Proof of purchase is required, and a fee will be charged for parts and service.

Notes: The eDrive storage drives or Trusted Computing Group (TCG) Opal-compliant storage drives provide self-encryption capabilities to secure your data.

- If a TCG Opal-compliant storage drive and a TCG Opal management software program are installed, and the TCG Opal management software program is activated, the hard disk password is not available.
- If an eDrive storage drive is installed in your computer, and your computer is preinstalled with the Windows 10 operating system, the hard disk password is not available.

Hard disk security

To protect passwords from unauthorized security attacks, refer to the following tips to maximize security:

- Set a power-on password as well as a hard disk password for your internal storage device. Refer to the procedures in "Power-on password" on page 41 and "Hard disk passwords" on page 43. For security, a longer password is recommended.
- To provide reliable security for the UEFI BIOS, use the security chip. Refer to "Setting the security chip" on page 46.

  Note: The Windows 7 operating systems supports the TPM management feature.

- If a Disk Encryption storage drive is installed in your computer, be sure to protect the contents of your computer memory from unauthorized accesses by use of drive encryption software, such as Microsoft Windows BitLocker® Drive Encryption. See “Using Windows BitLocker Drive Encryption” on page 46.
- Before you dispose of, sell, or hand over your computer, delete data stored on it. For more information, refer to “Notice on deleting data from your storage devices” on page 49.

The hard disk drive built into your computer can be protected by the UEFI BIOS.

Using Windows BitLocker Drive Encryption

To help protect your computer against unauthorized access, use the drive encryption software, such as Windows BitLocker Drive Encryption.

Windows BitLocker Drive Encryption is an integral security feature of some editions of the Windows operating system. It can help you protect the operating system and data stored on your computer, even if your computer is lost or stolen. BitLocker works by encrypting all user and system files, including the swap and hibernation files.

BitLocker uses a Trusted Platform Module to provide enhanced protection for your data and to ensure early boot component integrity. A compatible TPM is defined as a V1.2 TPM.

To check the BitLocker status, go to Control Panel, and click **System and Security → BitLocker Drive Encryption**.

For more information about Windows BitLocker Drive Encryption, see the help information system of the Windows operating system, or search for “Microsoft Windows BitLocker Drive Encryption Step-by-Step Guide” on the Microsoft Web site.

Disk Encryption hard disk drive, Encryption solid-state drive, or Encryption hybrid drive

Some models contain the Disk Encryption hard disk drive, Encryption solid-state drive or Encryption hybrid drive. This feature helps to protect your computer against security attacks on media, NAND flash, or device controllers by use of a hardware encryption chip. For the efficient use of the encryption feature, set a hard disk password for the internal storage device.

Setting the security chip

Strict security requirements are imposed on network client computers that transfer confidential information electronically. Depending on the options you ordered, your computer might have an embedded security chip, a cryptographic microprocessor. With the security chip, you can do the following:

- Protect your data and system
- Strengthen access controls
- Secure communications

Before you start, print these instructions.

To set an item on the **Security Chip** submenu, do the following:

1. Turn off your computer. Wait for about five seconds, and then turn on your computer again.
2. When the logo screen is displayed, press F1 to start the ThinkPad Setup program.
3. Select **Security → Security Chip** by using the directional keys.
4. Press Enter. The **Security Chip** submenu opens.
5. Move to an item you want to set by using the directional keys. When the item is highlighted, press Enter.

6. Set other items that you want to set.
7. Press F10. A Setup Confirmation window is displayed. Select **Yes** to save the configuration changes and exit.

Notes:

- Ensure that the supervisor password has been set in ThinkPad Setup. Otherwise anyone can change the settings for the security chip.
- If the security chip is inactive or disabled, the **Clear Security Chip** option will not be displayed.
- When you clear the security chip, turn off your computer and then turn it on again after you set the security chip to **Active**. Otherwise, the **Clear Security Chip** option is not displayed.

Using the fingerprint reader

Depending on the model, your computer might have a fingerprint reader. Fingerprint authentication can replace your Windows password. In this way, you can log in to your computer simply and securely. To enable fingerprint authentication, enroll your fingerprints first.

Enrolling your fingerprints

It is recommended that you enroll more than one fingerprint in case of any injuries to your fingers. To enroll your fingerprints, do the following:

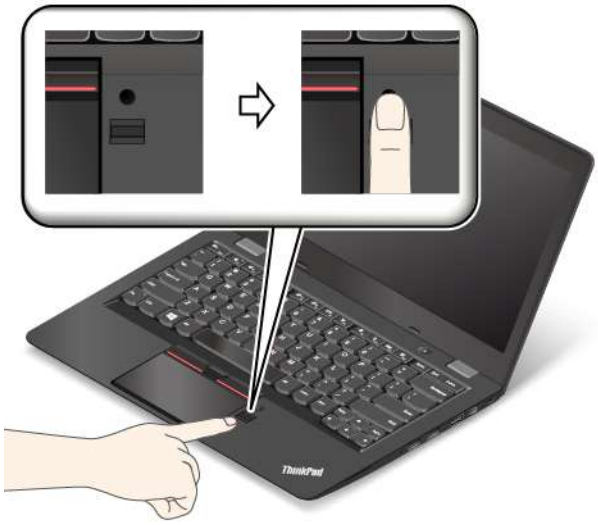
- **For Windows 7**
  1. Start the fingerprint program. For instructions on how to start the fingerprint program, see “Lenovo programs” on page 11.
  2. Enter the Windows password as required.
  3. Follow the instructions on the screen to finish the enrollment.

  For more information on how to use the fingerprint reader, refer to the help system of the fingerprint program.
- **For Windows 10**
  1. Open the Start menu and then click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** → **Accounts** → **Sign-in options**.
  2. Follow the instructions on the screen to finish the enrollment.

Swiping your finger over the fingerprint reader

To swipe your finger over the reader, do the following:

1. Place the top joint of your finger on the fingerprint reader.



2. Apply light pressure and swipe your finger toward you across the reader in one smooth motion. Do not lift your finger when you are swiping it.

Maintaining the fingerprint reader

The following actions could damage the fingerprint reader or cause it not to work properly:

- Scratching the surface of the reader with a hard, pointed object
- Scraping the surface of the reader with your fingernail or anything hard
- Using or touching the reader with a dirty finger

If you notice any of the following conditions, gently clean the surface of the reader with a dry, soft, lint-free cloth:

- The surface of the reader is dirty or stained.
- The surface of the reader is wet.
- The reader often fails to enroll or authenticate your fingerprint.

If your finger has any of the following conditions, you might not be able to register or authenticate it:

- Your finger is wrinkled.
- Your finger is rough, dry, or injured.
- Your finger is stained with dirt, mud, or oil.
- The surface of your finger is different from the one when you enrolled your fingerprint.
- Your finger is wet.
- Your finger that you are currently using has not been enrolled before.

To improve the situation, try the following:

- Clean or wipe your hands to remove any excess dirt or moisture from the fingers.
- Enroll and use a different finger for authentication.
- If your hands are dry, apply lotion to them.

Notice on deleting data from your storage devices

Some of the data stored on the storage devices might be sensitive. Handing your computer over to someone else without deleting the loaded software, such as operating systems and application software, might even violate license agreements. Be sure to delete data stored on the storage devices before you dispose of, sell, or hand over your computer.

You can use the following methods to delete data from the storage devices:

- Move the data to the Recycle Bin, and then empty the Recycle Bin.
- Delete the data.
- Format your storage devices, using the software for initializing it.
- Use the recovery program provided by Lenovo to bring the storage devices back to the factory default settings.

These operations, however, only change the file location of the data; they do not delete the data itself. In other words, the data retrieval processing is disabled under an operating system such as Windows. The data is still there, even though it seems to be lost. Thus, it is sometimes possible to read the data by use of special software for data recovery. There is a risk that people of bad faith might read and misuse the critical data on hard disk drives, solid-state drives, or hybrid drives for unexpected purposes.

To prevent leakage of data, it is important that you delete all the data from the storage devices when you dispose of, sell, or hand over your computer. You can destroy the data physically by smashing the storage devices with a hammer, or magnetically by means of strong magnetic power, thus making the data unreadable. But it is recommended that you use the software (payware) or service (pay service) developed for that purpose. The process might take several hours.

For disposing of data on the solid-state drive, Lenovo provides Drive Erase Utility for Resetting the Cryptographic Key and Erasing the Solid State Drive tool. Go to http://www.lenovo.com/support to download this tool.

If an Encryption hybrid drive, Encryption solid-state drive or a Disk Encryption hard disk drive is supported and installed in your computer, you can logically dispose of all the data on the drive in a short time by erasing the cryptographic key. The data encrypted with the old key is not physically erased but remains on the drive; however, it cannot be decrypted without the old key.
This feature is also available with the Drive Erase Utility for Resetting the Cryptographic Key and Erasing the Solid State Drive tool.

Using firewalls

If your system is preinstalled with a firewall program, it protects against computer Internet security threats, unauthorized accesses, intrusions, and Internet attacks. It also protects your privacy.

For more information about how to use the firewall program, refer to the help information system that comes with the program.

Protecting data against viruses

Your computer is preinstalled with an antivirus program so you can detect and eliminate viruses. The antivirus program is designed to help you detect and eliminate viruses.

Lenovo provides a full version of antivirus software on your computer with a free 30-day subscription. After 30 days, you must renew the license to continue receiving the antivirus software updates.

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

Chapter 6. Advanced configuration

This chapter provides the following information to help you configure the computer:

- “Installing a new operating system” on page 51
- “Installing device drivers” on page 53
- “Using the ThinkPad Setup program” on page 53
- “Using system management” on page 66

Installing a new operating system

In some situations, you might need to install a new operating system. This topic provides instructions on how to install a new operating system.

Installing the Windows 7 operating system

Before you start, print these instructions.

Attention: The process of installing a new operating system deletes all the data on your storage devices, including the data that were stored in a hidden folder.

To install the Windows 7 operating system, do the following:

1. Copy all the subdirectories and files in the `C:\SWTOOLS` directory to a removable storage device.
   - The supplement files for the Windows 7 operating system are in the `C:\SWTOOLS\OSFIXES` directory.
   - The device drivers are in the `C:\SWTOOLS\DRIVERS` directory.
   - The preinstalled programs are in the `C:\SWTOOLS\APPS` directory.
2. Start the ThinkPad Setup program. See “Using the ThinkPad Setup program” on page 53.
3. Select **Startup** → **UEFI/Legacy Boot**. Then do one of the following:
   - To install the Windows 7 (32-bit) operating system, select **Legacy Only** or **Both**.
   - To install the Windows 7 (64-bit) operating system in Legacy mode, select **Legacy Only**.
   - To install the Windows 7 (64-bit) operating system in UEFI mode, select **UEFI Only**.

   Note: For computers with a non-volatile memory (NVM) Express drive, you can install the Windows 7 operating system onto the drive only in UEFI mode. In this case, ensure that you always select **UEFI Only**.
4. Press F10 to exit the ThinkPad Setup program.
5. Insert the Windows 7 operating system installation DVD into the optical drive, and restart the computer.

   Notes:
   - If you are starting the installation DVD image from an external USB device or if your computer has an NVM Express drive installed, do additional configurations before you start. For more information, go to: http://www.lenovo.com/support/installwin7viausb3.
   - If an NVM Express drive is installed, additional drivers also are required. For more information, go to https://support.microsoft.com/en-us/kb/2990941.
6. Restore the `C:\SWTOOLS` directory that you backed up before installing the Windows 7 operating system.
7. Install the device drivers. See “Installing device drivers” on page 53.

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8. Install the Windows 7 fix modules. You can find the Windows 7 fix modules in the `C:\SWTOOLS\OSFIXES\` directory. For more information, go to the Microsoft Knowledge Base home page at: http://support.microsoft.com/
9. Install the registry patches, for example the Enabling Wake on LAN from Standby for ENERGY STAR patch. To download and install the registry patches, go to the Lenovo Support Web site at: http://www.lenovo.com/support

Note: After installing the operating system, do not change the initial **UEFI/Legacy Boot** setting in the ThinkPad Setup program. Otherwise the operating system will not start correctly.

When you install the Windows 7 operating system, you might need one of the following country or region codes:

Country or region	Code	Country or region	Code
China	SC	Netherlands	NL
Denmark	DK	Norway	NO
Finland	FI	Spain	SP
France	FR	Sweden	SV
Germany	GR	Taiwan and Hong Kong	TC
Italy	IT	United States	US
Japan	JP		

Installing the Windows 10 operating system

Before you start, print these instructions.

Attention: The process of installing a new operating system deletes all the data on your internal storage drive, including the data that were stored in a hidden folder.

To install the Windows 10 operating system, do the following:

1. Start the ThinkPad Setup program. See “Using the ThinkPad Setup program” on page 53.
2. Select **Startup** → **Boot** to display the **Boot Priority Order** submenu.
3. Select the drive that contains the operating system installation program, for example **USB HDD**.
4. Press the F10 key to exit the ThinkPad Setup program.
5. Connect the drive that contains the operating system installation program to the computer, and restart the computer.
6. Install the device drivers and necessary programs. See “Installing device drivers” on page 53.
7. After installing the device drivers, apply Windows Update to get the latest modules, for example the security patches.
8. Depending on your preference, install Lenovo programs. For information about Lenovo programs, see “Lenovo programs” on page 11.

Note: After installing the operating system, do not change the initial **UEFI/Legacy Boot** setting in the ThinkPad Setup program. Otherwise, the operating system will not start correctly.

When you install the Windows 10 operating system, you might need one of the following country or region codes:

Country or region	Code	Country or region	Code
China	SC	Netherlands	NL
Denmark	DK	Norway	NO
Finland	FI	Spain	SP
France	FR	Sweden	SV
Germany	GR	Taiwan and Hong Kong	TC
Italy	IT	United States	US
Japan	JP		

Installing device drivers

Device driver is the program that operates a particular hardware device of the computer. If a device does not perform well or you install a new device, you need to install or update the corresponding device driver. For example, if you use the Windows 7 operating system, to use the USB 3.0 connector, you need to download and install the USB 3.0 driver.

To download the latest device drivers, do the following:

1. Go to http://www.lenovo.com/ThinkPadDrivers.
2. Select your product name to view all the device drivers for your computer.
3. Select the device drivers you that you need, and follow the instructions on the screen.

Attention: Do not download the device drivers from the Windows Update Web. Always download the device drivers from:
http://www.lenovo.com/ThinkPadDrivers

If you use the Windows 7 operating system, you also can find the device drivers in the `C:\SWTOOLS\DRIVERS` directory on your storage devices. For more information, see “Reinstalling preinstalled programs and device drivers” on page 95.

Using the ThinkPad Setup program

The ThinkPad Setup program enables you to select various setup configurations for your computer through configuring the BIOS.

To configure the BIOS of your computer, do the following:

1. Restart the computer. When the logo screen is displayed, press F1 to start the ThinkPad Setup program.

   Note: If you are required to enter the supervisor password, enter the correct password. You also can press Enter to skip the password prompt and start the ThinkPad Setup program. If you do not enter the password, you cannot change the configurations that are protected by the supervisor password. For more information, refer to “Using passwords” on page 41.
2. Use the cursor keys to select a tab; or use the cursor keys to locate an item and press Enter to select it. Then a submenu is displayed.

   Note: Some menu items are displayed only if the computer supports the corresponding features.
3. Set the value of an item by doing one of the following:
   - Press F6 to change to a higher value.
   - Press F5 to change to a lower value.

Note: Default values are in **boldface**.

4. To change other configurations, press the Esc key to exit the submenu and return to the parent menu.
5. When you complete the configuration, press F10. A Setup Confirmation window is displayed. Click **Yes** to save the configuration and exit the ThinkPad Setup program. You also can select the **Restart** tab in the ThinkPad Setup menu, and restart your computer with one of the provided options.

   Note: You can press F9 to restore to the default settings.

Main menu

When you enter the ThinkPad Setup program, you will first see the **Main** menu as follows:

- UEFI BIOS Version
- UEFI BIOS Date
- Embedded Controller Version
- ME Firmware Version
- Machine Type Model
- System-unit serial number
- System board serial number
- Asset Tag
- CPU Type
- CPU Speed
- Installed memory
- UUID
- MAC Address (Internal LAN)
- Preinstalled operating system license
- UEFI Secure Boot
- OA3 ID
- OA2

Config menu

To change the configuration of your computer, select the **Config** tab from the ThinkPad Setup menu.

The following table lists the **Config** menu items. Default values are in **boldface**. The menu items might change without notice. Depending on the model, the default value might vary.

Attention: The default configurations are already optimized for you. Improper change of the configurations might cause unexpected results.

Table 2. Config menu items

Menu item	Submenu item	Value	Comments
Network	Wake On LAN	• Disabled • **AC only** • AC and Battery	Enable the computer to power on when the Ethernet controller receives a magic packet (a special network message). If you select **AC Only**, Wake on LAN function is enabled only when the ac power adapter is attached. If you select **AC and Battery**, Wake on LAN function is enabled with any power sources. **Notes:** • The magic packet type Wake on LAN requires ac power. • The Wake on LAN function does not work when a hard disk password is set.
	Ethernet LAN Option ROM (for **Legacy Only** boot mode or **Both** with **Legacy first**)	• Disabled • **Enabled**	Load the Ethernet LAN Option ROM to enable startup from an integrated network device.
	UEFI IPv4 Network Stack (for **UEFI Only** boot mode or **Both** with **UEFI first**)	• Disabled • **Enabled**	Enable or disable Internet Protocol Version 4 (IPv4) network stack for UEFI environment.
	UEFI IPv6 Network Stack (for **UEFI Only** boot mode or **Both** with **UEFI first**)	• Disabled • **Enabled**	Enable or disable Internet Protocol Version 6 (IPv6) network stack for UEFI environment.
	UEFI PXE Boot Priority (for **UEFI Only** boot mode and **Both** boot mode with **UEFI first** boot mode, and IPv6 and IPv4 stacks are both enabled.)	• IPv6 First • **IPv4 First**	Select network stack priority for UEFI PXE boot.
USB	USB UEFI BIOS Support	• Disabled • **Enabled**	Enable or disable boot support for USB storage devices.
	Always-on USB	• Disabled • **Enabled**	If you select **Enabled**, the external USB devices can be charged through USB connectors even when the computer is in low-power mode (sleep, hibernate, or power-off).

Table 2. Config menu items (continued)

Menu item	Submenu item	Value	Comments
	- Charge in Battery Mode	• **Disabled** • Enabled	**Note:** This item is available only when the **Always On USB** is set as **Enabled**. If you select **Enabled**, external USB devices can be charged through USB connectors even when the system is in hibernation mode, or is power-off and in battery operation.
Keyboard/Mouse	TrackPoint	• Disabled • **Enabled**	Enable or disable the built-in TrackPoint pointing device. **Note:** If you want to use an external mouse, select **Disabled**.
	Trackpad	• Disabled • **Enabled**	Enable or disable the built-in trackpad. **Note:** If you want to use an external mouse, select **Disabled**.
	Fn and Ctrl Key swap	• **Disabled** • Enabled	Enable exchanges of Fn and Ctrl key action at the bottom-left of the keyboard. **Disabled**: Fn key and Ctrl key behavior is as printed on the keyboard. **Enabled**: Fn key works as Ctrl key. Ctrl key works as Fn key.
	F1–F12 as primary function	• **Disabled** • Enabled	Enable the F1-F12 function or the special function printed as an icon on each key as the primary function. **Enabled**: Executes the F1-F12 function. **Disabled**: Executes the special function. To temporarily switch the above two options, press Fn+Esc to enable FnLock. The FnLock indicator is on when FnLock is enabled.

Table 2. Config menu items (continued)

Menu item	Submenu item	Value	Comments
	Fn Sticky key	• **Disabled** • Enabled	When the option is enabled, you can press the Fn key to keep it in a pressed condition; then press the desired function key. The action is equivalent to pressing the required key simultaneously with the Fn key. When you press the Fn key twice, the state is locked until you press the Fn key again.
Display	Boot Display Device	• **ThinkPad LCD** • HDMI • Display on dock	Select a video device for boot. **HDMI**: HDMI connector on ThinkPad. **Display on dock**: Display connectors on dock. Boot screen is cloned to all displays on dock.
	Shared Display Priority	• **Display on Onelink+** • Display on USB Type-C	Select the priority between shared display outputs. USB Type-C and Onelink+ share a single display output. This option chooses which one is prioritized.
	Boot Time Extension	• **Disabled** • 1 second • 2 seconds • 3 seconds • 5 seconds • 10 seconds	This option defines the amount of time to extend the boot process, in seconds. The system cannot detect some external monitors during boot because they need a few seconds to be ready. Try this option if the monitor being used does not display the boot screen.

Table 2. Config menu items (continued)

Menu item	Submenu item	Value	Comments
Power	Intel SpeedStep® technology	• Disabled • **Enabled** Mode for AC • **Maximum Performance** • Battery Optimized Mode for Battery • Maximum Performance • **Battery Optimized**	Select the mode of Intel SpeedStep technology at runtime. **Maximum Performance:** Always the highest speed. **Battery Optimized:** Always the lowest speed. **Disabled:** The highest speed, and runtime is not supported.
	Adaptive Thermal Management	Scheme for AC • **Maximize Performance** • Balanced Scheme for Battery • Maximize Performance • **Balanced**	Select a thermal management scheme to use. **Maximize Performance:** Reduce microprocessor throttling. **Balanced:** Balance sound, temperature, and performance. **Note:** Each scheme affects fan sound, temperature, and performance.
	CPU Power Management	• Disabled • **Enabled**	Enable or disable the power-saving feature that stops the microprocessor clock automatically when there are no system activities. Normally, it is not necessary to change the setting.
	Power On with AC Attach	• **Disabled** • Enabled	Enable or disable the feature that powers on the system when the ac power adapter is attached. If you select **Enabled**, the system is powered on when the ac power adapter is attached. If the system is in hibernate state, the system resumes normal operation. If you select **Disabled**, the system is not powered on nor resumed when the ac power adapter is attached.

Table 2. Config menu items (continued)

Menu item	Submenu item	Value	Comments
	Disable Built-in Battery	• Yes • **No**	Temporarily disable the built-in battery for servicing the computer. After selecting this item, the computer will be automatically powered off. **Note:** The battery will be automatically re-enabled when the ac power adapter is reconnected to the computer.
Beep and Alarm	Password Beep	• **Disabled** • Enabled	Enable this option to have a beep sound when the system is waiting for a power-on, hard disk, or supervisor password. Different beeps will sound when the entered password matches or does not match the configured password.
	Keyboard Beep	• **Enabled** • Disabled	Enable or disable keyboard beep when unmanageable key combinations are pressed.
Intel AMT	Intel AMT Control	• Disabled • **Enabled** • Permanently Disabled	If you select **Enabled**, Intel Active Management Technology (AMT) is configured and additional setup items are provided in Management Engine BIOS Extension (MEBx) Setup. If you select **Permanently Disabled**, you will never be able to enable it again. Be cautious when you want to use this option. **Note:** You can enter the MEBx Setup menu by pressing the Ctrl+P key combination in the Startup Interrupt Menu window. To display the Startup Interrupt Menu window, press the black button or Enter key during the power-on self-test (POST).

Table 2. Config menu items (continued)

Menu item	Submenu item	Value	Comments
	CIRA Timeout	0-255 **Note:** The default value is 60 seconds.	Set the timeout option for CIRA connection to be established. Selectable second values are from 1 to 254. If you select **0**, use 60 seconds as the default timeout value. If you select **255**, the waiting time for establishing a connection is unlimited.
	Console Type	• PC ANSI • **VT100+** • PC-ANSI • VT-UTF8	Select the console type for AMT. **Note:** This console type should match the Intel AMT remote console.

Date and Time menu

To change the date or time of your computer, select the **Date/Time** tab from the ThinkPad Setup menu. Then do the following:

1. Use the cursor keys to select **System Date** or **System Time**.
2. Type a date or time.

Security menu

To change the security settings of your computer, select the **Security** tab from the ThinkPad Setup menu.

The following table lists the **Security** menu items. Default values are in **boldface**. The menu items might change without notice. Depending on the model, the default value might vary.

Attention: The default configurations are already optimized for you. Improper change of the configurations might cause unexpected results.

Table 3. Security menu items

Menu item	Submenu item	Value	Comments
Password	Supervisor Password	• **Disabled** • Enabled	For more information, see “Supervisor password” on page 42.
	Lock UEFI BIOS Settings	• **Disabled** • Enabled	Enable or disable the function that protects items in ThinkPad Setup from being changed by a user who does not have the supervisor password. By default, this is set to **Disabled**. If you set the supervisor password and enable this function, no one but you can change the items in ThinkPad Setup.

Table 3. Security menu items (continued)

Menu item	Submenu item	Value	Comments
	Password at Unattended boot	• Disabled • **Enabled**	If you select and enable **Password at unattended boot**, a password prompt is displayed when the computer is turned on, from either a power-off state or hibernation state, by an unattended event such as a Wake on LAN attempt. If you select **Disabled**, no password prompt is displayed; the computer goes ahead and loads the operating system. To prevent unauthorized access, set the user authentication on the operating system.
	Password at Restart	• **Disabled** • Enabled	If you select and enable **Password at restart**, a password prompt is displayed when you restart the computer. If you select **Disabled**, no password prompt is displayed; the computer goes ahead and loads the operating system. To prevent unauthorized access, set the user authentication on the operating system.
	Password at Boot Device List	• **Disabled** • Enabled	If the Security password is set, this option is used to specify whether the Security password must be entered to display the F12 boot device list. Select **Enabled** to prompt for the Security password. Select **Disabled** to proceed without any user action required.
	Password Count Exceeded Error	• Disabled • **Enabled**	Select **Enabled** to show the POST 0199 error and prompt for the Security password. Select **Disabled** to hide the POST 0199 error and proceed without any user action needed.
	Set Minimum Length	• **Disabled** • x characters (4≤x≤12)	Specify a minimum length for power-on passwords and hard disk passwords. If you set the supervisor password and specify a minimum length for passwords, no one but you can change the length.
	Power-On Password	• **Disabled** • Enabled	For more information, see “Power-on password” on page 41.
	Hard Disk 1 Password	• **Disabled** • Enabled	For more information, see “Hard disk passwords” on page 43. **Note: Hard Disk 1** means the hard disk drive is built into your computer.
Security Chip	Security Chip Selection	• **Discrete TPM** • Intel PTT	If you select **Discrete TPM**, you can use a discrete TPM chip with TPM 1.2 mode. If you select **Intel PTT**, you can use Intel Platform Trusted technology (PTT) with TPM 2.0 mode. **Note:** Intel PTT can be used with Windows 8 or later operating system.

Table 3. Security menu items (continued)

Menu item	Submenu item	Value	Comments
	Security Chip	• Active • **Inactive** • Disabled (For Discrete TPM)	If you select **Active**, the security chip is functional. If you select **Inactive**, the **Security Chip** is visible, but the security chip is not functional. If you select **Disabled**, the **Security Chip** is hidden and the security chip is not functional.
		• Enabled • **Disabled** (For Intel PTT)	If you select **Enabled**, the security chip is functional. If you select **Disabled**, the security chip is hidden and not functional.
	Intel(R) TXT Feature	• **Disabled**	**Note:** This item is unselectable when Intel PTT is enabled. Unselectable for Intel PPT.
	Physical Presence for Provisioning	• **Disabled** • Enabled	Enable or disable the confirmation message when you change the settings of the security chip.
	Physical Presence for Clear	• Disabled • **Enabled**	Enable or disable the confirmation message when you clear the security chip.
UEFI BIOS Update Option	Flash BIOS Updating by End-Users	• Disabled • **Enabled**	If you select **Enabled**, all users can update the UEFI BIOS. If you select **Disabled**, only the person who knows the supervisor password can update the UEFI BIOS.
	Secure RollBack Prevention	• **Disabled** • Enabled	If you select **Disabled**, you can flash to an earlier version of the UEFI BIOS. If you select **Enabled**, you cannot flash to an earlier version of the UEFI BIOS. **Note:** This item is set as **Disabled** by default when the **OS Optimized Defaults** on the **Restart** menu is set as **Disabled**. This item is set as **Enabled** by default when the **OS Optimized Defaults** is set as **Enabled**.
Memory Protection	Execution Prevention	• Disabled • **Enabled**	Some computer viruses and worms cause memory buffers to overflow. By selecting **Enabled** you can protect your computer against attacks by such viruses and worms. If after choosing **Enabled** you find that a program does not run correctly, select **Disabled** and reset the setting.
Virtualization	Intel Virtualization Technology	• **Disabled** • Enabled	If you select **Enabled**, a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology.
	Intel VT-d Feature	• **Disabled** • Enabled	Intel VT-d stands for Intel Virtualization Technology for Directed I/O. When enabled, a VMM can utilize the platform infrastructure for I/O virtualization.
I/O Port Access	Ethernet LAN	• Disabled • **Enabled**	If you select **Enabled**, you can use the Ethernet LAN device.

Table 3. Security menu items (continued)

Menu item	Submenu item	Value	Comments
	Wireless LAN	• Disabled • **Enabled**	If you select **Enabled**, you can use the Wireless LAN connection.
	Bluetooth	• Disabled • **Enabled**	If you select **Enabled**, you can use Bluetooth devices.
	USB Port	• Disabled • **Enabled**	If you select **Enabled**, you can use the USB connectors.
	Memory Card Slot	• Disabled • **Enabled**	If you select **Enabled**, you can use the memory card slots.
	Integrated Camera	• Disabled • **Enabled**	If you select **Enabled**, you can use the integrated camera.
	Microphone	• Disabled • **Enabled**	If you select **Enabled**, you can use the microphones (internal, external, or line-in).
	Fingerprint Reader	• Disabled • **Enabled**	If you select **Enabled**, you can use the fingerprint reader.
Anti-Theft	Computrace	• Disabled • **Enabled** • Permanently Disabled	Enable or disable the UEFI BIOS interface to activate the computrace module. Computrace is an optional monitoring service from Absolute Software. **Note:** If you set the computrace module activation to **Permanently Disabled**, you will be unable to enable this setting again.
Secure Boot	Secure Boot	• **Disabled** • Enabled	Enable or disable the UEFI Secure Boot feature. Select **Enable** to prevent unauthorized operating systems from running at boot time. Select **Disabled** to allow any operating systems to run at boot time.
	Platform Mode	• Setup Mode • **User Mode**	Specify the system operating mode.
	Secure Boot Mode	• **Standard Mode** • Custom Mode	Specify the Secure Boot mode.
	Reset to Setup Mode		This option is used to clear the current platform key and put the system into **Setup Mode**. You can install your own platform key and customize the Secure Boot signature databases in **Setup Mode**. Secure Boot mode will be set to **Custom Mode**.

Table 3. Security menu items (continued)

Menu item	Submenu item	Value	Comments
	Restore Factory Keys		This option is used to restore all keys and certificates in Secure Boot databases to factory defaults. Any customized Secure Boot settings will be erased, and the default platform key will be re-established along with the original signature databases including certificate for the Windows 8 and Windows 10 operating systems.
	Clear All Secure Boot Keys		This option is used to clear all keys and certificates in Secure Boot databases. You can install your own keys and certificates after selecting this option.
Intel ® SGX	Intel (R) SGX Control	• Disabled • Enabled • **Software Controlled**	This option enables or disables Intel (R) Software Guard Extension (SGX) function. If **Software Controlled** is selected, SGX will be controlled by SGX application for UEFI boot OS.
	Owner EPOCH Change		Change Owner EPOCH to new random value. This option is used for clearing user data of SGX.
Internal Device Access	Internal Storage Tamper Detection	• **Disabled** • Enabled	If you select **Enabled**, removing any internal storage device when your computer is in sleep mode will be detected. If you remove the internal storage device while the computer is in sleep mode, the computer will shut down when you wake it up, and any unsaved data will be lost.

Startup menu

To change the startup settings of your computer, select the **Startup** tab from the ThinkPad Setup menu.

Attention:

- After you change the startup sequence, ensure that you select a correct device during a copy, a save, or a format operation. Otherwise your data might be erased or overwritten.
- If you are using the BitLocker drive encryption, do not change the startup sequence. BitLocker drive encryption locks the computer from starting once detects the change of startup sequence.

To change the startup sequence temporarily so that the computer starts from a desired drive, do the following:

1. Turn off the computer.
2. Turn on the computer. When the logo screen is displayed, press F12.
3. Select the device that you want the computer to start from.

   Note: The **Boot** menu will be displayed if the computer cannot start from any devices, or the operating system cannot be found.

The following table lists the **Startup** menu items. Default values are in **boldface**. The menu items might change without notice. Depending on the model, the default value might vary.

Note: Some items are displayed on the menu only if the computer supports the corresponding features.

Table 4. Startup menu items

Menu item	Value	Comments
Boot		Select the boot device when you press the power button to turn on the computer.
Network Boot	• USB CD • USB FDD • NVMe0 • ATA HDD0 • USB HDD • **PCI LAN**	Select the boot device when the system wakes from LAN. If **Wake On LAN** is enabled, the network administrator can turn on all of the computers in a LAN remotely by use of network management software.

UEFI/Legacy Boot	• **Both**
	  – **UEFI/Legacy Boot Priority**
	  – UEFI First
	  – **Legacy First**
	• UEFI Only
	• Legacy Only
	CSM Support (for UEFI Only)
	• **Yes**
	• No
		Select system boot capability.
		• **Both**: Select priority of boot options between UEFI and Legacy.
		• **UEFI Only**: The system will boot from the UEFI enabled operating system.
		• **Legacy Only**: The system will boot from any operating system other than the UEFI enabled one.
		Note: If you select **UEFI Only**, the system cannot boot from the bootable devices that do not have the UEFI enabled operating system.
		
		Compatibility Support Module (CSM) is required for booting the legacy operating system. If you select **UEFI Only**, **CSM Support** is selectable. For **Both** or **Legacy Only** mode, **CSM Support** is not selectable.

Boot Mode	• **Quick** • Diagnostics	Screen during the POST: • **Quick**: The ThinkPad Logo screen is displayed. • **Diagnostics**: Text messages are displayed. **Note:** You also can enter **Diagnostic** mode by pressing Esc during the POST.
Option Keys display	• Disabled • **Enabled**	If you select **Disabled**, the “To interrupt normal startup, press Enter.” message is not displayed during the POST.
Boot Device List F12 Option	• Disabled • **Enabled**	If you select **Enabled**, F12 is recognized and the Boot Menu window is displayed.
Boot Order Lock	• **Disabled** • Enabled	If you select **Enabled**, the boot priority order is locked for your future use.

Restart menu

To exit the ThinkPad Setup program and restart the computer, select **Restart** from the ThinkPad Setup menu.

The following submenu items are displayed:

- **Exit Saving Changes**: Save the changes and restart the computer.
- **Exit Discarding Changes**: Discard the changes and restart the computer.

  Notes: The changes of the following submenu items will not be discarded and can be reset in ThinkPad Setup menu:

  – Date & Time
  – Supervisor password
  – Power-on password
  – Hard disk password
- **Load Setup Defaults**: Restore to the factory default settings.

  Notes: The changes of the following submenu items will not be discarded and can be reset in ThinkPad Setup menu:

  – Date & Time

  Note: Enable **OS Optimized Defaults** to meet the Windows 10 certification requirement. When you change this setting, some other settings are changed automatically, such as **CSM Support**, **UEFI/Legacy Boot**, **Secure Boot**, and **Secure RollBack Prevention**.
- **Discard Changes**: Discard the changes.

  Notes: The changes of the following submenu items will not be discarded and can be reset in ThinkPad Setup menu:

  – Date & Time
  – Supervisor password
  – Power-on password
  – Hard disk password
- **Save Changes**: Save the changes.

Updating the UEFI BIOS

The UEFI BIOS is the first program that the computer runs when the computer is turned on. The UEFI BIOS initializes the hardware components, and loads the operating system and other programs.

You can update the UEFI BIOS by starting your computer from a flash update optical disc or a flash update program running in the Windows environment. When you install a new program, a device driver, or hardware, you might be informed to update the UEFI BIOS.

For instructions on how to update the UEFI BIOS, go to:
http://www.lenovo.com/ThinkPadDrivers

Using system management

This topic is primarily intended for the network administrators.

Your computer is designed for manageability, so that you can redirect more resources to better meet your business objectives.

This manageability, known as Total Cost of Ownership (TCO), enables you to remotely operate client computers in the same way as you operate your own computer, such as turning on a client computer, formatting a hard disk drive, and installing a program.

Once the computer is configured and operational, you can manage it by using the software and the manageability features that are already integrated into the client computer and the network.

Desktop Management Interface

The UEFI BIOS of your computer supports an interface called System Management BIOS (SMBIOS) Reference Specification. SMBIOS provides information about the hardware components of your computer. It is the responsibility of the UEFI BIOS to provide information about itself and the devices on the system board. This specification documents the standards for getting access to this BIOS information.

Preboot eXecution Environment

The Preboot eXecution Environment (PXE) technology makes the computer more manageable by enabling the computer to start from a server. Your computer supports the personal computer functions that PXE requires. For example, with the appropriate LAN card, your computer can be started from the PXE server.

Note: The Remote Initial Program Load (RIPL or RPL) function cannot be used with your computer.

Wake on LAN

The network administrator can turn on a computer from a management console by using the Wake on LAN feature.

When the Wake on LAN feature is enabled, many operations, such as data transfer, software updates, and Flash updates of the UEFI BIOS, can be done remotely without remote attendance. The updating process can perform after normal working hours and on weekends, so that the users are not interrupted during work, and the LAN traffic is kept to a minimum. It saves time and increases productivity.

Note: If the computer is turned on through Wake on LAN, the computer starts follow the **Network Boot** sequence.

Asset ID EEPROM

The Asset ID Electrically Erasable Programmable Read-Only Memory (EEPROM) contains information about the computer configuration and the serial numbers of the key components. It also includes a number of blank fields where you can record information about the end users in your network.

Setting management features

To enable a network administrator to remotely control your computer, set the following system-management features in the ThinkPad Setup program:

- Wake on LAN
- Network Boot sequence
- Flash update

Note: If a supervisor password has been set, you will be required to enter the supervisor password when you start the ThinkPad Setup program.

Enabling or disabling the Wake on LAN feature

When the Wake on LAN feature is enabled and the computer is connected to a LAN, the network administrator can start the computer remotely from a management console, using a remote network-management program.

To enable or disable the Wake on LAN feature, do the following:

1. Start the ThinkPad Setup program. See “Using the ThinkPad Setup program” on page 53.
2. Select **Config** → **Network**. The **Network** submenu is displayed.
3. Select a corresponding option for the Wake on LAN feature.
4. Press F10. A Setup Confirmation window is displayed. Click **Yes** to save the configuration and exit the ThinkPad Setup program.

Defining a Network Boot sequence

When the computer wakes on LAN, the computer boots from the device as specified on the **Network Boot** menu, and then follow the boot order list on the **Boot** menu.

To define a Network Boot sequence, do the following:

1. Start the ThinkPad Setup program. See “Using the ThinkPad Setup program” on page 53.
2. Select **Startup** → **Network Boot**. The boot device list is displayed.
3. Select a boot device to make it as the top boot priority.
4. Press F10. A Setup Confirmation window is displayed. Click **Yes** to save the configuration and exit the ThinkPad Setup program.

Note: You can press F9 to restore to the factory default settings.

Checking the requirements for flash updates

A network administrator can update the programs on your computer from a management console, if the following requirements are met:

- The computer must be started over LAN.
- The computer must be engaged in the Preboot eXecution Environment (PXE).
- A network-management program must be installed on the computer of the network administrator.

Chapter 7. Preventing problems

An important part of owning a ThinkPad notebook computer is maintenance. With proper care, you can avoid common problems. This chapter provides information that can help you keep your computer running smoothly.

This chapter contains the following topics:

- "General tips for preventing problems" on page 69
- "Making sure device drivers are up-to-date" on page 70
- "Taking care of your computer" on page 71

General tips for preventing problems

This topic provides the following tips to help you prevent computing problems:

- Check the capacity of your internal storage drive from time to time. If the internal storage drive gets too full, the Windows operating system will slow down and might produce errors.

  To check the internal storage drive capacity, do the following:

  – Windows 7: Click **Start** → **Computer**.

  – Windows 10: Open the File Explorer and click **This PC**.
- Empty your recycle bin on a regular basis.
- Use disk defragment tool regularly on your internal storage drive to improve data seek and read times.
- To free up disk space, uninstall unused programs.

  Note: You also might want to look for program duplication or overlapping versions.
- Clean out your Inbox, Sent, and Trash folders from your e-mail client program.
- Back up your data at least once a week. If critical data is present, it is a good idea to perform a daily backup operation. Lenovo has many backup options available for your computer. Rewritable optical drives are available for most machines and are easily installed.
- Schedule system restore operations to take a system snapshot periodically. For more information about system restore, see Chapter 9 "Recovery overview" on page 91.
- Update device drivers and UEFI BIOS when needed.
- Profile your machine at http://www.lenovo.com/support to keep up to date with current drivers and revisions.
- Keep up to date for device drivers on other non-Lenovo hardware. You might want to read the device driver information release notes prior to updating for compatibility or known issues.
- Keep a log book. Entries might include major hardware or software changes, driver updates, minor issues you have experienced, and how you resolved the minor issues.
- If you ever need to run a recovery on your computer to return the preinstalled contents onto the machine, the following tips might help along the way:

  – Remove all external devices such as the printer, keyboard, and so on.

  – Make sure that your batteries are charged and your computer has the ac power connected.

  – Access ThinkPad Setup and load the default settings.

  – Restart the computer and start the recovery operation.

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- If your computer uses discs as the recovery media, do not remove the disc from the drive until prompted to do so.

- For suspected hard disk drive issues, refer to “Diagnosing problems” on page 75 and run a diagnostic test for the drive before you call the Customer Support Center. If your computer does not start up, download the files to create a bootable self-test medium from http://www.lenovo.com/hddtest. Run the test and record any messages or error codes. If the test returns any failing error codes or messages, call the Customer Support Center with the codes or messages and the computer in front of you. A technician will assist you further.
- If required, you can find the contact information about the Customer Support Center for your country or region at http://www.lenovo.com/support/phone. When calling the Customer Support Center, make sure that you have your machine model type, serial number, and the computer in front of you. Also, if the computer is producing error codes, it is helpful to have the error screen on or the messages written down.

Making sure device drivers are up-to-date

Device drivers are programs that contain instructions for the operating system about how to operate or “drive” a certain piece of hardware. Each hardware component on your computer has its own specific driver. If you add a new component, the operating system needs to be instructed on how to operate that piece of hardware. After you install the driver, the operating system can recognize the hardware component and understand how to use it.

Note: Because drivers are programs, like any other file on your computer, they are susceptible to corruption and might not perform correctly if corruption occurs.

It is not always necessary to download the latest drivers. However, you should download the latest driver for a component if you notice poor performance from that component or if you added a new component. This might eliminate the driver as the potential cause of a problem.

Getting the latest drivers from the Web site

You can download and install updated device drivers from the Lenovo Web site by doing the following:

1. Go to http://www.lenovo.com/ThinkPadDrivers.
2. Select the entry for your computer and then follow the instructions on the screen to download and install necessary software.

Getting the latest drivers using System Update

The System Update program helps you keep the software on your computer up-to-date. Update packages are stored on Lenovo servers and can be downloaded from the Lenovo Support Web site. Update packages can contain applications, device drivers, UEFI BIOS flashes, or software updates. When the System Update program connects to the Lenovo Support Web site, the System Update program automatically recognizes the machine type and model of your computer, the installed operating system, and the language of the operating system to determine what updates are available for your computer. The System Update program then displays a list of update packages and categorizes each update as critical, recommended, or optional to help you understand the importance. You have complete control of which updates to download and install. After you select the update packages you want, the System Update program automatically downloads and installs the updates without any further intervention from you.

The System Update program is preinstalled on your computer and is ready to run. The only prerequisite is an active Internet connection. You can start the program manually, or you can use the schedule feature to enable the program to search for updates automatically at specified intervals. You also can predefine scheduled updates to search by severity (critical updates, critical and recommended updates, or all updates) so the list you choose from contains only those update types that are of interest to you.

For more information about how to use the System Update program, refer to the help information system of the program.

Taking care of your computer

Although your computer is designed to function reliably in normal work environments, you need to use common sense in handling it. By following the important tips in this topic, you will get the most use and enjoyment out of your computer.

Be careful about where and how you work

- Store packing materials safely out of the reach of children to prevent the risk of suffocation from plastic bags.
- Keep your computer away from magnets, activated cellular phones, electrical appliances, or speakers (more than 13 cm or 5 inches).
- Avoid subjecting your computer to extreme temperatures (below 5°C/41°F or above 35°C/95°F).
- Some appliances, such as certain portable desktop fans or air purifiers, can produce negative ions. If a computer is close to such an appliance, and is exposed for an extended time to air containing negative ions, it might become electrostatically charged. Such a charge might be discharged through your hands when you touch the keyboard or other parts of the computer, or through connectors on I/O devices connected to the computer. Even though this kind of electrostatic discharge (ESD) is the opposite of a discharge from your body or clothing to the computer, it poses the same risk of a computer malfunction.

Your computer is designed and manufactured to minimize any effects of electrostatic charge. An electrostatic charge above a certain limit, however, can increase the risk of ESD. Therefore, when using the computer close to an appliance that can produce negative ions, give special attention to the following:

- Avoid directly exposing your computer to the air from an appliance that can produce negative ions.
- Keep your computer and peripherals as far as possible from such an appliance.
- Wherever possible, ground your computer to facilitate safe electrostatic discharge.

Note: Not all such appliances cause a significant electrostatic charge.

Be gentle with your computer

- Avoid placing any objects (including paper) between the display and the keyboard or the palm rest.
- Your computer display is designed to be opened and used at an angle slightly greater than 90 degrees. Do not open the display beyond 180 degrees, as this might damage the computer hinge.
- Do not turn your computer over while the ac power adapter is plugged in. This could break the adapter plug.

Carry your computer properly

- Before moving your computer, be sure to remove any media, turn off attached devices, and disconnect cords and cables.
- When picking up your open computer, hold it by the bottom. Do not pick up or hold your computer by the display.

Handle storage media and drives properly

- When installing the hard disk drive, or solid-state drive, follow the instructions shipped with your hardware, and apply pressure only where needed on the device.
- Turn off your computer before you replace the storage devices.
- After you replace the primary the storage devices, reattach the cover of the drive slot.

- Store your external and removable hard disk drive or optical drives in the appropriate containers or packaging when they are not being used.
- Before you install a memory card such as an SD card, SDHC card, SDXC card, and a MultiMediaCard, touch a metal table or a grounded metal object. This action reduces any static electricity from your body. The static electricity could damage the device.
- While transferring data to or from a flash media card, such as an SD card, do not put your computer into sleep or hibernation mode before the data transfer is complete; otherwise, your data could become damaged.

Take care in setting passwords

- Remember your passwords. If you forget a supervisor or hard disk password, Lenovo will not reset it, and you might have to replace your system board, or the storage devices.

Taking care of the fingerprint reader

The following actions could damage the fingerprint reader or cause it not to work properly:

- Scratching the surface of the fingerprint reader with a hard, pointed object.
- Scraping the surface of the fingerprint reader with your fingernail or anything hard.
- Using or touching the fingerprint reader with a dirty finger.

If you notice any of the following conditions, gently clean the surface of the fingerprint reader with a dry, soft, lint-free cloth:

- The surface of the fingerprint reader is dirty or stained.
- The surface of the fingerprint reader is wet.
- The fingerprint reader often fails to enroll or authenticate your fingerprint.

Register your computer

- Register your ThinkPad computer with Lenovo at http://www.lenovo.com/register. For more information, see “Registering your computer” on page 13.

Be sure not to modify your computer

- Only an authorized ThinkPad repair technician should disassemble and repair your computer.
- Do not modify or tape the latches to keep the display open or closed.

Cleaning the cover of your computer

Occasionally clean your computer by doing the following:

1. Prepare a mixture of a gentle kitchen-use detergent. The detergent must not contain abrasive powder or strong chemicals such as acid or alkaline. Use five parts water to one part detergent.
2. Absorb the diluted detergent into a sponge.
3. Squeeze excess liquid from the sponge.
4. Wipe the cover with the sponge, using a circular motion and taking care not to let any excess liquid drip.
5. Wipe the surface to remove the detergent.
6. Rinse the sponge with clean running water.
7. Wipe the cover with the clean sponge.
8. Wipe the surface again with a dry, soft, lint-free cloth.
9. Wait for the surface to dry completely and remove any fibers from the cloth.

Cleaning your computer keyboard

To clean the computer keyboard, do the following:

1. Apply some isopropyl rubbing alcohol to a soft, dust-free cloth.

   Note: Avoid spraying cleaner directly onto the keyboard.
2. Wipe each keytop surface with the cloth. Wipe the keys one by one; if you wipe several keys at a time, the cloth might hook onto an adjacent key and possibly damage it. Make sure that no liquid drips onto or between the keys.
3. Allow to dry.
4. To remove any crumbs or dust from beneath the keys, you can use a camera blower with a brush or cool air from a hair dryer.

Cleaning your computer display

To clean the computer display, do the following:

1. Gently wipe the display with a dry, soft lint-free cloth. If you see a scratch-like mark on your display, it might be a stain transferred from the keyboard or the TrackPoint pointing stick when the cover was pressed from the outside.
2. Wipe or dust the stain gently with a soft, dry cloth.
3. If the stain remains, moisten a soft, lint-free cloth with water or a 50-50 mixture of isopropyl alcohol and water that does not contain impurities.

   Note: Avoid spraying cleaner directly onto the keyboard.
4. Wring out as much of the liquid as you can.
5. Wipe the display again; do not let any liquid drip into the computer.
6. Be sure to dry the display before closing it.

Chapter 8. Troubleshooting computer problems

This chapter provides information on what to do if you experience a problem with your computer.

This chapter contains the following topics:

- “Diagnosing problems” on page 75
- “Troubleshooting” on page 75

Diagnosing problems

If you experience problems with your computer, use the Lenovo Solution Center program as a starting point for solving them.

The Lenovo Solution Center program enables you to troubleshoot and resolve computer problems. It combines diagnostic tests, system information collection, security status, and support information, along with hints and tips for maximum system performance.

Notes:

- The Lenovo Solution Center program also is available for download at: http://www.lenovo.com/diags.
- If you are using other Windows operating system rather than Windows 7 or Windows 10, you can find the latest information about diagnostics for your computer at: http://www.lenovo.com/diagnose

When you are setting up your computer, the Lenovo Solution Center program prompts you to create recovery media, which you can use to restore the internal storage drive to the factory default state. For more information, see “Performing backup and recovery operations” on page 92.

To run the Lenovo Solution Center program, see “Lenovo programs” on page 11.

For additional information, refer to the Lenovo Solution Center help system.

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

Troubleshooting

If your computer has an error, it typically displays a message or an error code, or a beep sounds when you turn it on. When you experience a problem, refer to the corresponding sections in this topic to try to solve the problem by yourself.

Computer stops responding

Print these instructions now and keep the instructions with your computer for reference later.

If your computer is completely unresponsive (you cannot use the TrackPoint pointing device or the keyboard), do the following:

1. Press and hold the power button for four seconds or more to turn off the computer, and then restart the computer by pressing the power button.

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Note: If you cannot turn off your computer, or if you cannot restart it, continue with step 2.

2. Remove the ac power adapter from the computer, and reset the system by inserting a straightened paper clip into the emergency-reset hole. To locate the reset hole, refer to “Bottom view” on page 5. Reattach the ac power adapter.

   Notes:

   a. If the computer does not turn on, continue with step 3.

   b. If the computer starts with ac power but does not start when ac power is disconnected, call the Customer Support Center for support. Go to http://www.lenovo.com/support/phone for the latest list of support phone numbers for your country or region.

3. Remove all external devices that are attached to your computer (keyboard, mouse, printer, scanner, and so on). Repeat step 2.

If the computer still does not start up, call the Customer Support Center and a Customer Support Specialist will assist you.

Spills on the keyboard

With a mobile computer, there are increased chances of spilling liquids on the keyboard. Because most liquids conduct electricity, liquid spilled on the keyboard could create numerous short circuits, potentially causing irreparable damage to your computer.

If you spill something on your computer:

Attention: Be sure that no liquid creates a short circuit between you and the ac power adapter (if in use). Although you might lose some data or work by turning off the computer immediately, leaving the computer on might make your computer unusable.

1. Carefully unplug the ac power adapter immediately.
2. Turn off the computer immediately. If the computer does not turn off, reset the system by inserting one end of a needle or a straightened paper clip into the emergency-reset hole. To locate the reset hole, refer to “Bottom view” on page 5. The more quickly you stop the current from passing through the computer the more likely you will reduce damage from short circuits.
3. Wait until you are certain that all the liquid is dry before turning on your computer.

Note: If you want to replace your keyboard, you can purchase a new one.

Error messages

- **Message**: 0177: Bad SVP data, stop POST task.

  Solution: Checksum of the supervisor password in the EEPROM is not correct. The system board should be replaced. Have the computer serviced.

- **Message**: 0183: Bad CRC of Security Settings in EFI Variable. Enter ThinkPad Setup.

  Solution: Checksum of the Security settings in the EFI Variable is not correct. Enter ThinkPad Setup to check security settings, Press F10, and then press Enter to restart the system. If you still have a problem, have the computer serviced.

- **Message**: 0187: EAIA data access error

  Solution: The access to EEPROM is failed. Have the computer serviced.

- **Message**: 0188: Invalid RFID Serialization Information Area

  Solution: The EEPROM checksum is not correct (block # 0 and 1). The system board should be replaced, and the box serial number needs to be reinstalled. Have the computer serviced.

- **Message**: 0189: Invalid RFID configuration information area

  Solution: The EEPROM checksum is not correct (block # 4 and 5). The system board should be replaced, and the UUID needs to be reinstalled. Have the computer serviced.
- **Message**: 0190: Critical low-battery error

  Solution: The computer turned off, because the battery is low. Connect the ac power adapter to the computer and charge the battery.
- **Message**: 0191: System Security - Invalid remote change requested

  Solution: The system configuration change has failed. Confirm the operation and try again. To clear the error, enter ThinkPad Setup.
- **Message**: 0199: System Security - Security password retry count exceeded.

  Solution: This message is displayed if you enter a wrong supervisor password more than three times. Confirm the supervisor password and try again. To clear the error, enter ThinkPad Setup.
- **Message**: 0270: Real Time Clock Error

  Solution: System Real Time Clock is not functional. Have the computer serviced.
- **Message**: 0271: Check Date and Time settings

  Solution: Neither the date nor the time is set in the computer. Set the date and time, using ThinkPad Setup.
- **Message**: 1802: Unauthorized network card is plugged in - Power off and remove the network card.

  Solution: The wireless network card is not supported on this computer. Remove it.
- **Message**: 1820: More than one external fingerprint readers are attached.

  Solution: Power off and remove all but the reader that you set up within your main operating system.
- **Message**: 2200: Machine Type and Serial Number are invalid.

  Solution: Machine Type and Serial Number are invalid. Have the computer serviced.
- **Message**: 2201: Machine UUID is invalid.

  Solution: Machine UUID is invalid. Have the computer serviced.
- **Message**: Fan error

  Solution: Cooling fan has failed. Shut down the computer immediately and have the computer serviced.
- **Message**: Thermal sensing error

  Solution: thermal sensor has problem. Shut down the computer immediately and have the computer serviced.
- **Message**: Error: The System UEFI Variable Storage is nearly full.

  Note: This error indicates that the operating system or applications cannot create, modify, or delete data in the non-volatile system UEFI variable storage due to insufficient storage space after POST.

  The non-volatile system UEFI variable storage is used by the UEFI BIOS and by the operating system or applications. This error occurs when the operating system or applications store large amounts of data in the variable storage. All data needed for POST, such as BIOS setup settings, chipset or platform configuration data, are stored in a separate UEFI variable storage.

  Solution: Enter ThinkPad Tablet Setup after the error message is displayed. A dialog asks the user for confirmation to clean up the storage. If the user selects “Yes”, all data that were created by the operating system or applications are deleted except global variables defined by the Unified Extensible Firmware Interface Specification. If the user selects “No”, all data is kept, but the operating system or applications will not be able to create, modify, or delete data in the storage.

  If this error happens at a service center, Lenovo authorized service personnel will clean up the non-volatile system UEFI variable storage using the above solution.

Errors without messages

- **Problem**: My screen keeps blanking when I do not want it to.

  Solution: If your computer is preinstalled with the Windows 7 operating system, you can disable any system timers, such as the LCD turn-off timer or the blank timer by doing the following:

  1. Start Power Manager.
  2. Click the **Power plan** tab, and then select **Maximum Performance** from the predefined power plans.

- **Problem**: When I turn on the computer, nothing is displayed on the screen and the computer does not beep while starting up.

  Note: If you are not sure whether you heard any beeps, turn off the computer by pressing and holding the power button for four seconds or more. Then turn on the computer and listen again.

  Solution: Make sure that:

  – The ac power adapter is connected to the computer and the power cord is plugged into a working electrical outlet.
  – The computer is turned on. (Press the power button again for confirmation.)
  – The brightness level of the screen is appropriately set.

  If a power-on password is set, press any key to display the prompt for the power-on password and then type the correct password and press **Enter**.

  If these items are correctly set, and the screen remains blank, have the computer serviced.

- **Problem**: When I turn on the computer, only a white pointer is displayed on a blank screen.

  Solution: If you have modified a partition on your internal storage drive by using partition software, information about that partition, or the master boot record might have been destroyed.

  Do the following to try to solve the problem:

  1. Turn off the computer, and then turn it on again.
  2. If you still see only the pointer on the screen, do the following:
     – If you have used partition software, examine the partition on the internal storage drive by using the software, and recover the partition if required.
     – Use the recovery solutions to restore the system to the factory default state.

  If the problem persists, have the computer serviced.

- **Problem**: My screen goes blank while the computer is on.

  Solution: Your screen saver or power management might have been enabled. Do one of the following:

  – Touch the TrackPoint pointing device or the trackpad, or press a key to exit the screen saver.
  – Press the power button to resume the computer from sleep or hibernation mode.

Beep errors

Table 5. Beep errors

Beeps	Solution
One short beep, pause, three short beeps, pause, three more short beeps, pause, and one short beep (1-3-3-1 beeps)	Memory problem. Shut down the computer immediately and have the computer serviced.
Four cycles of four short beeps	TCG*-compliant functionality-related problem (might be the TPM initialization failure). Shut down the computer immediately and have the computer serviced. * TCG is the abbreviation for Trusted Computing Group.
Five short beeps, pause, five more short beeps, and pause	TCG-compliant functionality-related problem (might be the BIOS code validation failure). Shut down the computer immediately and have the computer serviced.

Memory module problems

Print these instructions now and keep the instructions with your computer for reference later.

If your memory module is not operating properly, check the following items:

1. Verify that the memory module is installed and seated correctly in your computer.

   It might be necessary to remove all added memory modules to test the computer with only the factory-installed memory modules, and then reinstall the memory module one at a time to ensure a proper connection.
2. Check for error messages during startup.

   Follow the appropriate corrective actions for power-on self-test (POST). See “Error messages” on page 76.
3. Verify that the latest UEFI for your model has been installed.
4. Verify the proper memory configuration and compatibility including the maximum memory size and the memory speed.
5. Run diagnostic programs. See “Diagnosing problems” on page 75.

Networking problems

The following are the most common networking problems.

Ethernet problems

- **Problem**: The computer cannot connect to the network.

  Solution: Make sure that:

  – The cable is installed correctly.

    The network cable must be securely connected both to the Ethernet connector of your computer and to the RJ45 connector of the hub. The maximum allowable distance from the computer to hub is 100 meters. If the cable is connected and the distance is within acceptable limits but the problem persists, try a different cable.

  – You are using the correct device driver. To install the correct driver, do the following:

    1. Go to Control Panel, and ensure that you view Control Panel by Category.
    2. Click **Hardware and Sound** → **Device Manager**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.

3. Double-click **Network adapters** to view all network adapters. If an exclamation mark ! is displayed next to the adapter name, you might not be using the correct driver or the driver might have been disabled.
4. Right-click the highlighted adapter, click **Update driver**, and then follow the instructions on the screen to update the driver.

– The switch port and the adapter have the same duplex setting.

  If you configured the adapter for full duplex, make sure that the switch port also is configured for full duplex. Setting wrong duplex mode can degrade performance, cause data loss, or result in lost connections.

– You have installed all networking software that is necessary for your network environment.

  Check with your LAN administrator for the necessary networking software.

- **Problem**: The adapter stops working for no apparent reason.

  Solution: The network driver files might be corrupt or missing. Update the driver by referring to the previous solution for the procedure to make sure that the correct device driver is installed.

- **Problem**: My computer is a Gigabit Ethernet model and I use a speed of 1000 Mbps, but the connection fails or errors occur.

  Solution:

  – Use Category 5 wiring and make sure that the network cable is securely connected.

  – Connect to a 1000 BASE-T hub/switch (not 1000 BASE-X).

- **Problem**: The Wake On LAN feature is not working.

  Solution: Ensure that Wake On LAN is enabled in ThinkPad Setup. If it is, check with your LAN administrator for the necessary settings.

- **Problem**: My computer is a Gigabit Ethernet model, but the computer cannot connect to the network at 1000 Mbps. Instead, it connects at 100 Mbps.

  Solution:

  – Try another cable.

  – Make sure that the link partner is set to auto-negotiate.

  – Make sure that the switch is 802.3ab-compliant (gigabit over copper).

A wireless LAN problem

Problem: I cannot connect to the network using the built-in wireless network card.

Solution: Make sure that:

- The Airplane mode is off.
- Your wireless LAN driver is the latest version.
- Your computer is within range of a wireless access point.
- The wireless radio is enabled.

Note: If you are using the Windows 7 operating system, click **Show hidden icons** on the taskbar. The Access Connections icon is displayed. For more information about the icon, refer to the Access Connections help information system.

For the Windows 7 operating system, check the Network Name (SSID) and your encryption information. Use the Access Connections program to verify this case-sensitive information.

Bluetooth problems

Note: Check your connection anytime and make sure that no other Bluetooth-enabled device is searching for the device to which you want to connect. Simultaneous searching is not allowed in the Bluetooth connection.

- **Problem**: Sound does not come from the Bluetooth headset/headphone but comes from the local speaker even though the Bluetooth headset/headphone is connected using a Headset profile or AV profile.

  Solution: Do the following:

  1. Exit the application that uses the sound device (for example, Windows Media Player).
  2. Open Control Panel and click **Hardware and Sound** → **Sound** → **Playback**.
  3. If you are using a Headset profile, select **Bluetooth Hands-free Audio** and click the **Set Default** button. If you are using an AV profile, select **Stereo Audio** and click the **Set Default** button.
  4. Click **OK** to close the Sound window.
- **Problem**: PIM items sent from the Windows 7 operating systems cannot be received correctly into the address book of any other Bluetooth-enabled device.

  Solution: The Windows 7 operating system sends PIM items in XML format, but most Bluetooth-enabled devices handle PIM items in vCard format. If another Bluetooth-enabled device can receive a file through Bluetooth, a PIM item sent from the Windows 7 might be saved as a file with the extension .contact.

Problems with the keyboard and other pointing devices

The following are the most common problems with keyboards and other pointing devices.

TrackPoint pointing device problems

- **Problem**: The pointer drifts when the computer is turned on or after it resumes normal operation.

  Solution: The pointer might drift when you are not using the TrackPoint pointing device during normal operation. This is a normal characteristic of the TrackPoint pointing device and is not a defect. Pointer drifting might occur for several seconds under the following conditions:

  – When the computer is turned on
  – When the computer resumes normal operation
  – When the TrackPoint pointing device is kept pressed for a long time
  – When the temperature changes
- **Problem**: The TrackPoint pointing device or trackpad does not work.

  Solution: Ensure that the TrackPoint pointing device or trackpad is enabled in the Mouse Properties window.

Keyboard problems

- **Problem**: All or some keys on the keyboard do not work.

  Solution: If an external numeric keypad is connected:

  1. Turn off the computer.
  2. Remove the external numeric keypad.
  3. Turn on the computer and try using the keyboard again.

  If the keyboard problem is resolved, carefully reconnect the external numeric keypad and the external keyboard. Make sure that you have seated the connectors correctly.

  If the problem persists, make sure that the correct device driver is installed by doing the following:

  1. Open **Control Panel**. Change the view of Control Panel from Category to Large icons or Small icons.

2. Click **Keyboard**.
3. Select the **Hardware** tab. In the **Device Properties** pane, make sure that you see this message: `Device Status: This device is working properly.`

If keys on the keyboard still do not work, have the computer serviced.

- **Problem**: All or some keys on the external numeric keypad do not work.

  Solution: Make sure that the external numeric keypad is correctly connected to the computer.

Problems with the display and multimedia devices

This topic includes the most common problems with displays and multimedia devices, including the computer display, the external monitor, audio devices, and the optical drive.

Computer screen problems

- **Problem**: The screen is blank.

  Solution: Do the following:

  – Press the display-mode switching key to bring up the image.
  – If you are using the ac power adapter, or using the batteries and the battery-status icon shows that the batteries are not depleted, press the brightness-up key to make the screen brighter.
  – If your computer is in sleep mode, press power button to resume from the sleep mode.
  – If the problem persists, follow the solution for the following problem.

- **Problem**: The screen is unreadable or distorted.

  Solution: Make sure that:

  – The display device driver is installed correctly.
  – The screen resolution and color quality are correctly set.
  – The monitor type is correct.

  To check these settings, do the following:

  1. Connect the external monitor to your computer, and then connect the monitor to an electrical outlet.
  2. Turn on the external monitor.
  3. Right-click on the desktop, and do the following:
     – For Windows 7: Click **Screen resolution**.
     – For Windows 10: Click **Display settings**, show the displayed window in full screen, and then click **Advanced display settings**.

     Note: If your computer cannot detect the external monitor, click the **Detect** button.
  4. Select the external monitor and set **Resolution**.
  5. Do the following:
     – For Windows 7: Click **Advanced settings**.
     – For Windows 10: Click **Display adapter properties**.
  6. Click the **Monitor** tab. Check the monitor information to make sure that the monitor type is correct.

  If the monitor type is correct, click **OK** to close the window; otherwise proceed with the following steps.

  1. If more than two monitor types are displayed, select **Generic PnP Monitor** or **Generic Non-PnP Monitor**.

2. Click **Properties**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.
3. Click the **Driver** tab.
4. Click **Update Driver**.
5. Click **Browse my computer for driver software**, and then click **Let me pick from a list of device drivers on my computer**.
6. Clear the **Show compatible hardware** check box.
7. Select the correct manufacturer and model for the external monitor. If you cannot find your monitor on the list, stop the installation of this driver and use the driver shipped with your monitor.
8. After updating the driver, click **Close**.
9. For the Windows 7 operating system, to change the color settings, right-click on the desktop, and click **Screen resolution**. Click **Advanced settings**, select the **Monitor** tab, then set **Colors**.
10. Click **OK**.

- **Problem**: Incorrect characters are displayed on the screen.

  Solution: Did you install the operating system or program correctly? If they are installed and configured correctly, have the computer serviced.

- **Problem**: The screen stays on even after you turn off your computer.

  Solution: Press and hold the power button for four seconds or more to turn off your computer; then turn it on again.

- **Problem**: Missing, discolored, or bright dots appear on the screen every time you turn on your computer.

  Solution: This is an intrinsic characteristic of the TFT technology. Your computer display contains multiple thin-film transistors (TFTs). A small number of missing, discolored, or bright dots on the screen might exist all the time.

- **Problem**: My screen keeps blanking when I do not want it to.

  Solution: If your computer is preinstalled with the Windows 7 operating system, you can disable any system timers, such as the LCD turn-off timer or the blank timer by doing the following:

  1. Start Power Manager.
  2. Click the **Power plan** tab, and then select **Maximum Performance** from the predefined power plans.

  If your computer is preinstalled with the Windows 10 operating system, do the following:

  1. Go to Control Panel, and ensure that you view Control Panel by Category.
  2. Click **Hardware and Sound** → **Power Options** → **High performance**.
  3. Show the additional plans, then choose **High performance**.

- **Problem**: When I turn on the computer, nothing is displayed on the screen and the computer does not beep while starting up.

  Note: If you are not sure whether you heard any beeps, turn off the computer by pressing and holding the power button for four seconds or more. Then turn on the computer and listen again.

  Solution: Make sure that:

  – The ac power adapter is connected to the computer and the power cord is plugged into a working electrical outlet.
  – The computer is turned on. (Press the power button again for confirmation.)
  – The brightness level of the screen is appropriately set.

  If a power-on password is set, press any key to display the prompt for the power-on password and then type the correct password and press **Enter**.

If these items are correctly set, and the screen remains blank, have the computer serviced.

- **Problem**: When I turn on the computer, only a white pointer is displayed on a blank screen.

  Solution: If you have modified a partition on your internal storage drive by using partition software, information about that partition, or the master boot record might have been destroyed.

  Do the following to try to solve the problem:

  1. Turn off the computer, and then turn it on again.
  2. If you still see only the pointer on the screen, do the following:
     - If you have used partition software, examine the partition on the internal storage drive by using the software, and recover the partition if required.
     - Use the recovery solutions to restore the system to the factory default state.

  If the problem persists, have the computer serviced.

- **Problem**: My screen goes blank while the computer is on.

  Solution: Your screen saver or power management might have been enabled. Do one of the following:

  - Touch the TrackPoint pointing device or the trackpad, or press a key to exit the screen saver.
  - Press the power button to resume the computer from sleep or hibernation mode.

External monitor problems

- **Problem**: The external monitor is blank.

  Solution: To bring up the image, press the display-mode switching key and select the desired monitor. If the problem persists, do the following:

  1. Connect the external monitor to another computer to make sure that it works.
  2. Reconnect the external monitor to your computer.
  3. Refer to the manual shipped with the external monitor to check the resolutions and refresh rates that are supported.
     - If the external monitor supports the same resolution as the computer display or a higher resolution, view output on the external monitor or on both the external monitor and the computer display.
     - If the external monitor supports a lower resolution than the computer display, view output on the external monitor only. (If you view output on both the computer display and the external monitor, the external monitor screen will be blank or distorted.)

- **Problem**: You cannot set a higher resolution than the present one on your external monitor.

  Solution: Make sure that the monitor type and other information is correct. If necessary, update the monitor driver.

- **Problem**: The screen is unreadable or distorted.

  Solution: Make sure that:

  - The monitor information is correct and the appropriate monitor type is selected. Refer to the solution to the above problem.
  - Make sure that an appropriate refresh rate is selected by doing the following:
    1. Connect the external monitor to the monitor connector, and then connect the monitor to an electrical outlet.
    2. Turn on the external monitor and the computer.
    3. Right-click on the desktop, and do the following:
       - For Windows 7: Click **Screen resolution**.

- For Windows 10: Click **Display settings**, show the displayed window in full screen, and then click **Advanced display settings**.

Note: If your computer cannot detect the external monitor, click the **Detect** button.

4. Click the icon for the desired monitor (the **Monitor-2** icon is for the external monitor).
5. Do the following:
   - For Windows 7: Click **Advanced settings**.
   - For Windows 10: Click **Display adapter properties**.
6. Click the **Monitor** tab.
7. Select the correct screen refresh rate.

- **Problem**: Wrong characters are displayed on the screen.

  Solution: Did you follow the correct procedure when installing the operating system or program? If you did, have the external monitor serviced.
- **Problem**: The Extend desktop function does not work.

  Solution: Enable the Extend desktop function. See “Using an external display” on page 28.
- **Problem**: If you use the Extend desktop function, you cannot set a higher resolution or higher refresh rate on the secondary display.

  Solution: Change the resolution and the color depth to lower settings for the primary display.
- **Problem**: Display switching does not work.

  Solution: If you use the Extend desktop function, disable it, and change the display output location. If a DVD movie or a video clip is playing, stop the playback, close the program, and then change the display output location.
- **Problem**: The screen position on the external monitor is incorrect when that monitor is set for a high resolution.

  Solution: Sometimes, when you use a high resolution such as 1600x1200, the image is shifted to left or right on the screen. To correct this, first make sure that your external monitor supports the display mode (the resolution and the refresh rate) that you have set. If it does not, set a display mode that the monitor supports. If it does support the display mode you have set, go to the setup menu for the monitor itself and adjust the settings there. Usually the external monitor has buttons for access to the setup menu. For more information, see the documentation that comes with the monitor.

Audio problems

- **Problem**: Wave or MIDI sound does not play correctly.

  Solution: Make sure that the built-in audio device is configured correctly.
  1. Open **Control Panel**.
  2. Click **Hardware and Sound**.
  3. Click **Device Manager**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.
  4. Double-click **Sound, video and game controllers**.
  5. Make sure that the Realtek HD Audio driver is enabled and configured correctly.
- **Problem**: Sound does not come from a headphone or a speaker, or your computer cannot record sounds.

  Solution: To switch from one device to another (for example, from a speaker to a headphone, or from an external microphone to a built-in microphone), do the following:
  1. Open Control Panel and click **Hardware and Sound**.
  2. Click the **Realtek HD Manager** icon.

3. Make sure that you are in MULTI-STREAM mode in the Device advanced settings window.
4. In the Volume Mixer window, select the device you want-for example, speakers.
5. Play any sound via a music program (for example, Windows Media Player). Make sure that sound comes from speakers now.
6. Then, if you would like to switch to a headphone, close the music program.
7. Go to the Volume Mixer window. Then select another device, which is now the headphone.
8. Play any sound via the music program. Make sure that sound comes from a headphone attached directly to the system.

For more information, refer to the help information system of **Realtek HD Manager**.

Note: In the Volume Mixer window of **Realtek HD Manager**, a check mark by the entry for a device, such as speakers for a playback device, or a built-in microphone for a recording device, shows that the device has been selected.

- **Problem**: Recordings made using the microphone input are not loud enough.

  Solution: Make sure that the Microphone Boost function is turned on and set by doing the following:

  1. Open Control Panel and click **Hardware and Sound**.
  2. Click **Sound**.
  3. Click the **Recording** tab in the Sound window.
  4. Select **Microphone**, and click the **Properties** button.
  5. Click the **Levels** tab, and move the Microphone Boost slider upwards.
  6. Click **OK**.

  Note: For more information about controlling volume, see the Windows online help.

- **Problem**: A volume or balance slider cannot be moved.

  Solution: The slider might be grayed out. This means that its position is fixed by the hardware and cannot be changed.

- **Problem**: The volume sliders do not stay in place when some audio programs are used.

  Solution: It is normal for the sliders to change position when certain sound programs are used. The programs are aware of the settings in the Volume Mixer window and are allowed to change the settings themselves. An example is the Windows Media Player. Usually the program has sliders available to control the sound from within the program.

- **Problem**: The balance slider cannot completely mute one channel.

  Solution: The control is designed to compensate for minor differences in balance and does not completely mute either channel.

- **Problem**: The sound cannot be turned off completely even if you set the Master volume control at minimum.

  Solution: You still can hear some sound even though you have set the Volume Mixer control at minimum. To turn off the sound completely, go to the Master volume control and select **Mute Speaker/HP**.

- **Problem**: When you connect a headphone to your computer while playing sound, a speaker does not produce sound.

  Solution: Once the headphone is attached, the streaming is automatically redirected to it. If you want to listen to sound from the speakers again, be sure to set those speakers as the default device. For more information, see the help information system for Realtek HD Audio.

Fingerprint reader problems

- **Problem**: The surface of the reader is dirty, stained, or wet.

Solution: Gently clean the surface of the reader with a dry, soft, lint-free cloth.

- **Problem**: The reader often fails to enroll or authenticate your fingerprint.

  Solution: If the surface of the reader is dirty, stained, or wet, gently clean the surface of the reader with a dry, soft, lint-free cloth.

  For tips on how to maintain the fingerprint reader, see “Using the fingerprint reader” on page 47.

Battery and power problems

This topic contains instructions on troubleshooting batteries and power problems.

Battery problems

- **Problem**: The batteries cannot be fully charged in the standard charge time when the computer is powered off.

  Solution: The batteries might be over-discharged. Do the following:

  1. Turn off the computer.
  2. Connect the ac power adapter to the computer and let it charge.

  If a quick charger is available, use it to charge the over-discharged batteries.

  If the batteries cannot be fully charged in 24 hours, call Lenovo Customer Service Center to have it serviced.

- **Problem**: Your computer shuts down before the battery-status icon shows empty, or your computer operates after the battery-status icon shows empty.

  Solution: Discharge and recharge the batteries.

- **Problem**: The operating time for fully charged batteries is short.

  Solution: Discharge and recharge the batteries. If your battery operating time is still short, call Lenovo Customer Service Center to have it serviced.

- **Problem**: The computer does not operate with fully charged batteries.

  Solution: The surge protector in the batteries might be active. Turn off the computer for one minute to reset the protector; then turn on the computer again.

- **Problem**: The batteries cannot be charged.

  Solution: You cannot charge the batteries when they are too hot. Turn off the computer and allow them to cool to room temperature. After they cool, recharge the batteries. If they still cannot be charged, call Lenovo Customer Service Center to have them serviced.

An ac power adapter problem

Problem: The ac power adapter is connected to the computer and the working electrical outlet, but the power adapter (power plug) icon is not displayed in the Windows notification area.

Solution: Do the following:

1. Make sure that the connection of the ac power adapter is correct. For instructions on connecting the ac power adapter, see *Safety, Warranty, and Setup Guide* that comes with your computer.
2. If the connection of the ac power adapter is correct, turn off the computer, then disconnect the ac power adapter.
3. Reconnect the ac power adapter, then turn on the computer.
4. If the power adapter icon still is not displayed in the Windows notification area, have the ac power adapter and your computer serviced.

Power problems

Print these instructions now and keep it with your computer for reference later.

If your computer is getting no power at all, check the following items:

1. Verify the power button. Refer to “Status indicators” on page 6. The power button is illuminated whenever the computer is on.
2. Check all power connections. Remove any power strips and surge protectors to connect the ac power adapter directly to the ac power outlet.
3. Inspect the ac power adapter. Check for any physical damage, and ensure that the power cable is firmly attached to the adapter brick and the computer.
4. Verify the ac power source is working by attaching another device to the outlet.

If your computer does not run on battery power, check the following items:

1. If the batteries run out of power, attach ac power adapter to recharge the battery.
2. If the batteries are charged but the computer does not run, call Lenovo Customer Service Center to have it serviced.

A power button problem

Problem: The system does not respond, and you cannot turn off the computer.

Solution: Turn off the computer by pressing and holding the power button for four seconds or more. If the system is still not reset, remove the ac power adapter and reset the system by inserting one end of a needle or a straightened paper clip into the emergency-reset hole. To locate the emergency-reset hole, refer to “Bottom view” on page 5.

Boot problems

Print these instructions now and keep them with your computer for reference later.

If you receive an error message before the operating system loads, follow the appropriate corrective actions for power-on self-test (POST) error messages. See “Error messages” on page 76.

If you receive an error message while the operating system is loading the desktop configuration after the POST is completed, check the following items:

1. Go to the Lenovo Support Web site at http://www.lenovo.com/support and search for the error message.
2. Go to the Microsoft Knowledge Base homepage at http://support.microsoft.com/ and search for the error message.

Sleep and hibernation problems

- **Problem**: The computer enters sleep mode unexpectedly.

  Solution: If the microprocessor overheats, the computer automatically enters sleep mode to allow the computer to cool and to protect the microprocessor and other internal components. Check the settings for sleep mode.

- **Problem**: The computer enters sleep mode immediately after the power-on self-test.

  Solution: Ensure that:

  – The batteries are charged.

  – The operating temperature is within the acceptable range. Refer to “Operating environment” on page 10.

  If the batteries are charged and the temperature is within range, have the computer serviced.

- **Problem**: A critical low-battery error occurs, and the computer immediately turns off.

  Solution: The battery power is getting low. Connect the ac power adapter to the computer and plug it into an electrical outlet.

- **Problem**: The computer display remains blank after you press Fn to return from sleep mode.

  Solution: Check whether an external monitor was disconnected or turned off while the computer was in sleep mode. If you disconnected or turned off the external monitor, connect it or turn it on before resuming the computer from the sleep mode. When resuming the computer from the sleep mode without attaching the external monitor or turning it on, and the computer display remains blank, press the brightness-up key to bring up the computer display.

- **Problem**: The computer does not return from sleep mode, or the system-status indicator (illuminated ThinkPad logo) blinks slowly and the computer does not work.

  Solution: If the system does not return from sleep mode, it might have entered sleep or hibernation mode automatically because the batteries are depleted. Check the system-status indicator (illuminated ThinkPad logo).

  – If the system-status indicator (illuminated ThinkPad logo) blinks slowly, your computer is in sleep mode. Connect the ac power adapter to the computer; then press Fn.

  – If the system-status indicator (illuminated ThinkPad logo) is off, your computer is in power-off state or in hibernation mode. Connect the ac power adapter to the computer; then press the power button to resume operation.

  If the system still does not return from sleep mode, your system might stop responding and you might not be able to turn off the computer. In this case, you need to reset the computer. If you have not saved your data, it might be lost. To reset the computer, press and hold the power button for four seconds or more. If the system is still not reset, remove the ac power adapter and reset the system by inserting a straightened paper clip into the emergency-reset hole. To locate the emergency-reset hole, refer to “Bottom view” on page 5.

- **Problem**: Your computer does not enter sleep or hibernation mode.

  Solution: Check whether any option has been selected to disable your computer from entering sleep or hibernation mode.

  If your computer tries to enter sleep mode but the request is rejected, the device attached to the USB connector might have been disabled. If this occurs, do a hot-unplug-and-plug operation for the USB device.

- **Problem**: The batteries discharge slightly while the computer is in hibernation mode.

  Solution: If the wakeup function is enabled, the computer consumes small amount of power. This is not a defect. For more information, see “Power-saving modes” on page 25.

Problems with drives and other storage devices

This section includes hard disk drive problems and solid-state drive problems.

A solid-state drive problem

Problem: When you compress files or folders by use of the data compression function in Windows, and then decompress them, the process of writing to or reading from the files or folders is slow.

Solution: Apply the disk defragmentation tool in Windows for faster access to the data.

A software problem

Problem: An application does not run correctly.

Solution: Make sure that the problem is not being caused by the application.

Check that your computer has the minimum required memory to run the application. Refer to the manuals supplied with the application.

Check the following:

- The application is designed to operate with your operating system.
- Other applications run correctly on your computer.
- The necessary device drivers are installed.
- The application works when it is run on some other computer.

If an error message is displayed while you are using the application program, refer to the manuals supplied with the application.

If the application still does not run correctly, contact your place of purchase or a service representative for help.

Problems with ports and connectors

The following are the most common problems with ports and connectors.

A USB problem

Problem: A device connected to the USB connector does not work.

Solution: Open the Device Manager window. Make sure that the USB device setup is correct, and that the assignment of computer resource and the installation of the device driver are correct. To open the Device Manager window, go to Control Panel and click **Hardware and Sound → Device Manager**. If you are prompted for an administrator password or confirmation, type the password or provide confirmation.

Refer to “Diagnosing problems” on page 75 and run a diagnostic test of the USB connector.

Chapter 9. Recovery overview

This chapter provides information about the recovery solutions.

This chapter contains the following topics:

- "Recovery overview for the Windows 7 operating system" on page 91
- "Recovery overview for the Windows 10 operating system" on page 96

Recovery overview for the Windows 7 operating system

This section provides information about the recovery solutions provided by Lenovo on the Windows 7 operating system.

Notes:

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

To prevent potential performance risks or unexpected behavior that might be caused by the new hard disk drive technology, it is recommended that you use one of the following back-up software programs:

- Rescue and Recovery version 4.52 or later
- Acronis True Image 2010 or later
- Paragon Backup & Recovery 10 Suite or later, Paragon Backup & Recovery 10 Home or later

Creating and using recovery media

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

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

Creating recovery media

This section provides instructions on how to create recovery media.

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

To create recovery media, click **Start → All Programs → Lenovo PC Experience → Lenovo Tools → Factory Recovery Disks**. Then, follow the instructions on the screen.

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Using recovery media

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

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

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

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

Note: After restoring your computer to the factory default settings, you might have to reinstall device drivers for some devices. See “Reinstalling preinstalled programs and device drivers” on page 95.

Performing backup and recovery operations

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

- In a protected area of your storage devices
- On the secondary the storage devices if there is one.
- On an attached external USB hard disk drive
- On a network drive
- On recordable discs (a recordable optical drive is required for this option)

After you have backed up the contents on the storage devices, you can restore the complete contents of the storage devices, restore only the selected files, or restore only the Windows operating system and programs.

Performing a backup operation

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

1. From the Windows desktop, click **Start** → **All Programs** → **Lenovo PC Experience** → **Lenovo Tools** → **Enhanced Backup and Restore**. The Rescue and Recovery program opens.
2. In the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
3. Click **Back up your hard drive** and select backup operation options. Then, follow the instructions on the screen to complete the backup operation.

Performing a recovery operation

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

1. From the Windows desktop, click **Start** → **All Programs** → **Lenovo PC Experience** → **Lenovo Tools** → **Enhanced Backup and Restore**. The Rescue and Recovery program opens.
2. In the Rescue and Recovery main window, click the **Launch advanced Rescue and Recovery** arrow.
3. Click the **Restore your system from a backup** icon.

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

For more information about performing a recovery operation from the Rescue and Recovery workspace, see “Using the Rescue and Recovery workspace” on page 93.

Using the Rescue and Recovery workspace

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

- **Rescue files from your storage devices or from a backup**

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

  If you have backed up your storage devices using the Rescue and Recovery program, you can restore the storage devices from a Rescue and Recovery backup, even if you cannot start the Windows operating system.
- **Restore your storage devices to the factory default settings**

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

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

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

1. Make sure that the computer is turned off.
2. Repeatedly press and release F11 when turning on the computer. When you hear beeps or see a logo screen, release F11.
3. If you have set a Rescue and Recovery password, type your password when prompted. The Rescue and Recovery workspace opens after a short delay.

   Note: If the Rescue and Recovery workspace fails to open, see “Solving recovery problems” on page 95.
4. Do one of the following:
   - To rescue files from your storage devices or from a backup, click **Rescue files** and follow the instructions on the screen.
   - To restore your storage devices from a Rescue and Recovery backup or to restore the storage devices to the factory default settings, click **Restore your system** and follow the instructions on the screen.

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

Note: After restoring your storage devices to the factory default settings, you might have to reinstall device drivers for some devices. See “Reinstalling preinstalled programs and device drivers” on page 95.

Creating and using a rescue medium

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

Notes:

1. The recovery operations you can perform using a rescue medium vary depending on the operating system.
2. The rescue disc can be started in all types of optical drives.

Creating a rescue medium

To create a rescue medium on the Windows 7 operating system, do the following:

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

Using a rescue medium

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

- If you have created a rescue medium using a disc, use the following instructions to use the rescue medium:
  1. Turn off your computer.
  2. Repeatedly press and release F12 when turning on the computer. When the Boot Menu window is displayed, release F12.
  3. In the Boot Menu window, select the desired optical drive as the first boot device. Then, insert the rescue disc into the optical drive and press Enter. The rescue medium starts.
- If you have created a rescue medium using a USB hard disk drive, use the following instructions to use the rescue medium:
  1. Attach the USB hard disk drive to one of the USB connectors on your computer.
  2. Repeatedly press and release F12 when turning on the computer. When the Boot Menu window opens, release F12.
  3. In the Boot Menu window, select the USB hard disk drive as the first boot device and press Enter. The rescue medium starts.
- If you have created a rescue medium using the secondary internal hard disk drive, set the secondary internal hard disk drive as the first boot device in the startup device sequence to start the rescue medium.

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

Reinstalling preinstalled programs and device drivers

Your computer has provisions that enable you to reinstall selected factory-installed programs and device drivers.

Reinstalling preinstalled programs

To reinstall selected programs, do the following:

1. Turn on your computer.
2. Go to the `C:\SWTOOLS` directory.
3. Open the APPS folder. The folder contains several subfolders named for the various preinstalled applications.
4. Open the subfolder for the program you are reinstalling.
5. Double-click **Setup**, and then follow the on-screen steps to reinstall the program.

Reinstalling preinstalled device drivers

Attention: When you reinstall device drivers, you are changing the current configuration of your computer. Reinstall device drivers only when it is necessary to correct a problem with your computer.

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

1. Turn on your computer.
2. Go to the `C:\SWTOOLS` directory.
3. Open the DRIVERS folder. The folder contains several subfolders named for the various devices installed in your computer (for example, AUDIO and VIDEO).
4. Open the subfolder for the device.
5. Reinstall the device driver by one of the following methods:
   - In the subfolder for the device, look for a text file (a file with the extension .txt). The text file contains information on how to reinstall that device driver.
   - If the subfolder for the device contains a file of setup information (a file with the extension .inf), you can use the Add New Hardware program (in the Windows Control Panel) to reinstall the device driver. Not all device drivers can be reinstalled by use of this program. In the Add New Hardware program, when prompted for the device driver you want to install, click **Have Disk** and **Browse**. Then select the device driver file from the device subfolder.
   - In the subfolder for the device, look for the executable file (a file with the extension .exe). Double-click the file, and follow the instructions on the screen.

Attention: If you need updated device drivers for your computer, do not download them from the Windows Update Web site. Obtain them from Lenovo. For more information, see “Making sure device drivers are up-to-date” on page 70.

Solving recovery problems

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

- Use a rescue medium to start the Rescue and Recovery workspace. See “Creating and using a rescue medium” on page 94.
- Use recovery media if all other methods of recovery have failed and you need to restore the storage devices to the factory default settings.

Note: If you are unable to access the Rescue and Recovery workspace or the Windows environment from a rescue medium or recovery media, you might not have the rescue device (an internal hard disk drive, solid-

state drive, hybrid drive, a disc, a USB hard disk drive, or other external devices) set as the first boot device in the startup device sequence. You must first make sure that your rescue device is set as the first boot device in the startup device sequence in the Setup Utility program. See “Startup menu” on page 64 for detailed information about temporarily or permanently changing the startup device sequence. For more information about the Setup Utility program, see “Using the ThinkPad Setup program” on page 53.

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

Recovery overview for the Windows 10 operating system

The Windows recovery programs enable you to reset your computer or use advanced startup options.

It is recommended that you create a recovery USB drive as early as possible. Store the recovery USB drive as a backup or replacement for the Windows recovery programs.

For more information, see “Creating and using a recovery USB drive” on page 97.

Resetting your computer

If your computer does not perform well, you might consider resetting your computer. In the resetting process, you can choose to keep your files or remove them, and then reinstall the Windows operating system.

To reset your computer, do the following:

Note: The graphical user interface (GUI) items of the operating system might change without notice.

1. Open the Start menu and then click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** → **Update & Security** → **Recovery**.
2. In the **Reset this PC** section, click **Get started**.
3. Follow the instructions on the screen to reset your computer.

Using advanced startup options

With advanced startup options, you can change the firmware settings of the computer, change the startup settings of the Windows operating system, start the computer from an external device, or restore the Windows operating system from a system image.

To use advanced startup options, do the following:

Note: The GUI items of the operating system might change without notice.

1. Open the Start menu and then click **Settings**. If **Settings** is not displayed, click **All apps** to display all programs, and then click **Settings** → **Update & security** → **Recovery**.
2. In the **Advanced startup** section, click **Restart now** → **Troubleshoot** → **Advanced options**.
3. Select a desired startup option, then follow the instructions on the screen.

Recovering your operating system if Windows 10 fails to start

The Windows recovery environment on your computer is capable of operating independently from the Windows 10 operating system. This enables you to recover or repair the operating system even if the Windows 10 operating system fails to start.

After two consecutive failed boot attempts, the Windows recovery environment starts automatically. Then you can choose repair and recovery options by following the instructions on the screen.

Note: Ensure that your computer is connected to ac power during the recovery process.

Creating and using a recovery USB drive

You can create a recovery USB drive as a backup for the Windows recovery programs. With the recovery USB drive, you can troubleshoot and fix the problems even if the preinstalled Windows recovery programs are damaged.

Creating a recovery USB drive

The USB drive that you use to create the recovery USB drive must be at least 16 GB of storage. The actual USB capacity that is required depends on the size of the recovery image.

Attention: The creation process deletes anything stored on the USB drive. To avoid data loss, make a backup copy of all the data that you want to keep.

To create a recovery USB drive, do the following:

Note: Ensure that your computer is connected to ac power during the following process.

1. Connect a proper USB drive (at least 16 GB of storage).
2. Type `recovery` in the search box on the taskbar. Then click **Create a recovery drive**.
3. Click **Yes** in the User Account Control window to allow the Recovery Media Creator program to start.
4. In the Recovery Drive window, follow the on-screen instructions to create a recovery USB drive.

Using the recovery USB drive

If you cannot start your computer, refer to the corresponding information in the topic “Troubleshooting” on page 75 to try to solve the problem by yourself. If you still cannot start your computer, use the recovery USB drive to recover your computer.

To use a recovery USB drive, do the following:

Note: Ensure that your computer is connected to ac power.

1. Connect the recovery USB drive to the computer.
2. Turn on or restart the computer. Before the Windows operating system starts, repeatedly press the F12 key. The Boot Menu window opens.
3. Select the recovery USB drive as the boot device.
4. Select a preferred keyboard layout.
5. Click **Troubleshoot** to display the optional recovery solutions.
6. Select a corresponding recovery solution according to your situation. Then follow the instructions on the screen to complete the process.

Chapter 10. Replacing devices

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

This chapter contains the following topics:

- “Static electricity prevention” on page 99
- “Disabling the built-in battery” on page 99
- “Replacing the base cover assembly” on page 100
- “Replacing the keyboard” on page 102
- “Replacing the M.2 solid-state drive” on page 107
- “Replacing a memory module” on page 109
- “Replacing the coin-cell battery” on page 110
- “Replacing the speaker assembly” on page 111

Static electricity prevention

Static electricity, although harmless to you, can seriously damage computer components and options. Improper handling of static-sensitive parts can cause damage to the part. When you unpack an option or a Customer Replaceable Unit (CRU), do not open the static-protective package that contains the part until the instructions direct you to install the part.

When you handle options or CRUs, or perform any work inside the computer, take the following 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, memory modules, and other circuit boards by the edges. Never touch exposed circuitry.
- Prevent others from touching components.
- When you install a static-sensitive option or CRU, touch the static-protective package that contains the part to a metal expansion-slot cover or other unpainted metal surface on the computer for at least two seconds. This reduces static electricity in the package and your body.
- When possible, remove the static-sensitive part from the static-protective package and install the part without setting it down. When this is not possible, place the static-protective package on a smooth, level surface and place the part on the package.
- Do not place the part on the computer cover or other metal surface.

Disabling the built-in battery

Before replacing any hardware component, ensure that you have disabled the built-in battery by doing the following:

1. Turn off your computer and disconnect the ac power adapter and all cables from the computer.
2. Turn on your computer. When the logo screen is displayed, immediately press F1 to start the ThinkPad Setup program.
3. Select **Config → Power**. The **Power** submenu is displayed.
4. Select **Disable Built-in Battery** and press Enter.

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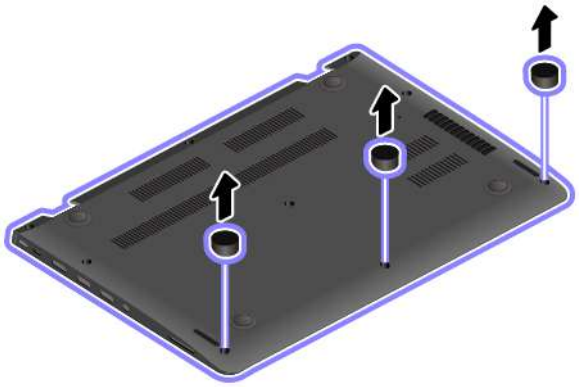
5. Click **Yes** in the Setup Confirmation window. The built-in battery is disabled and the computer turns off. Wait for three to five minutes to let the computer cool.

Replacing the base cover assembly

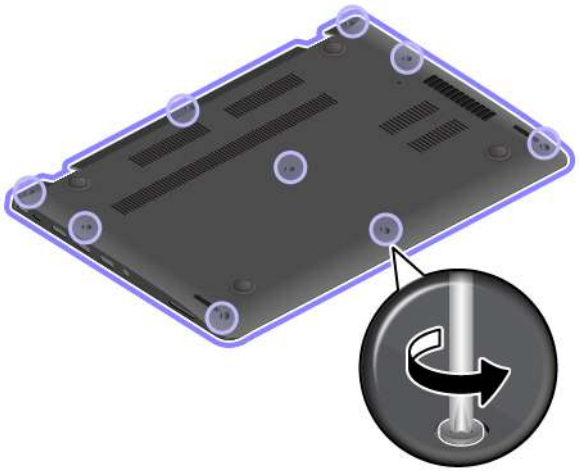
Before you start, print these instructions. Read the important safety information first. See “Important safety information” on page vi.

To replace the base cover assembly, do the following:

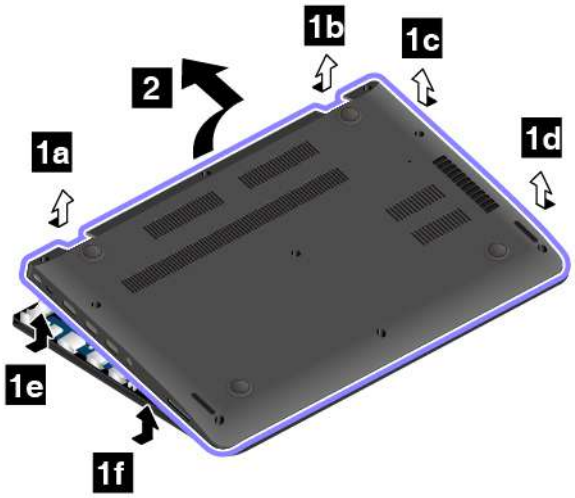
1. Turn off your computer and disconnect the ac power adapter and all cables from the computer.
2. Disable the built-in battery. See “Disabling the built-in battery” on page 99.
3. Close the computer display and turn the computer over.
4. Remove the screw caps.



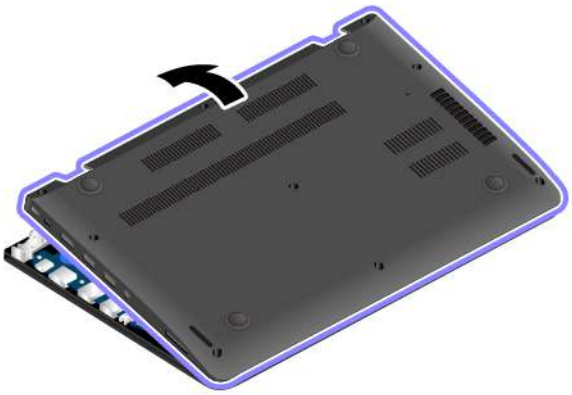
5. Loosen the screws that secure the base cover assembly.



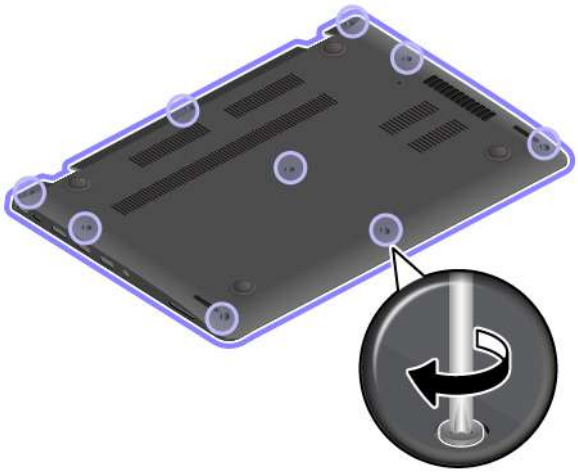
6. Pry up the latches in ascending alphabetical order (1a to 1f) as illustrated, and then remove the base cover assembly.



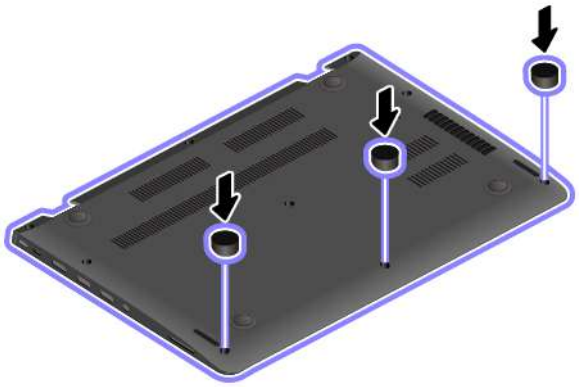
7. Install the new base cover assembly in place.



8. Tighten the screws to secure the base cover assembly.



9. Reinstall the screw caps.



10. Turn the computer over again. Connect the ac power adapter and all cables to the computer.

Replacing the keyboard

Before you start, print these instructions. Read the important safety information first. See “Important safety information” on page vi.

To remove the keyboard, do the following:

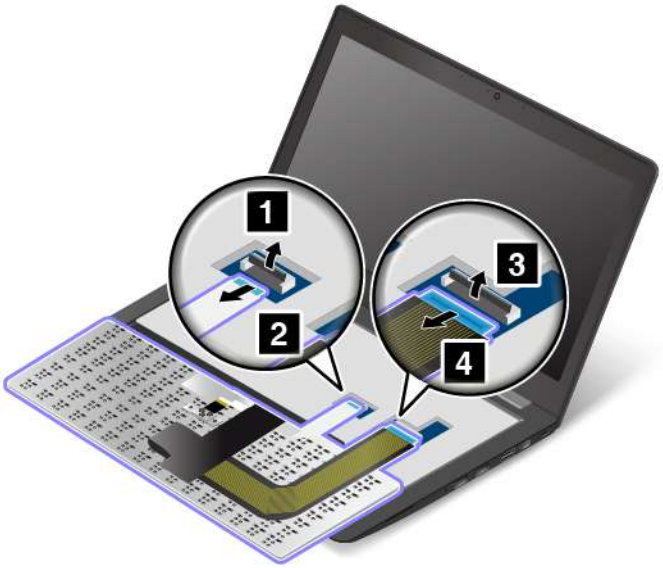
Note: You might be instructed to slide the keyboard frame forward or backward in some of the following steps. In this case, ensure that you do not press and hold the keys while sliding the keyboard frame. Otherwise, the keyboard frame cannot be moved.

1. Turn off the computer and disconnect the ac power adapter and all cables from the computer.
2. To reveal the screw heads beneath the keyboard frame, slide the keyboard forward by 2.5 mm (0.1 inch).

3. Loosen the screws.

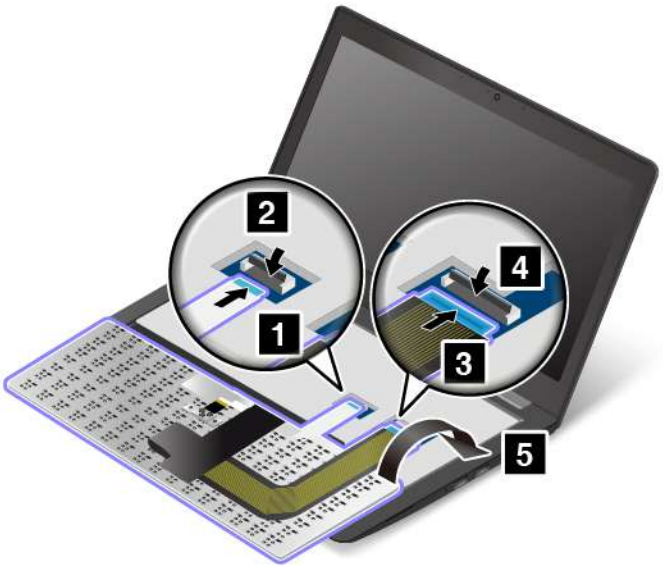
4. Pivot the keyboard slightly upward as shown by arrow 1 until you can see the connectors on the bottom side of the keyboard. Then turn the keyboard over as shown by arrow 2.

5. Put the keyboard on the palm rest and detach the connectors. Then remove the keyboard.



To install the new keyboard, do the following:

1. Attach the connectors, and then turn the keyboard over.



2. Insert the keyboard into the keyboard bezel as shown. Ensure that the front edge of the keyboard (the edge that is close to the display) is under the frame of the keyboard bezel.

3. Ensure that the screw heads are exposed completely. Otherwise, reveal the screw heads by sliding the keyboard frame forward.

4. Tighten the screws to secure the keyboard in place.

5. Slide the keyboard frame backward by 2.5 mm (0.1 inch) to hide the latches of the keyboard frame under the keyboard bezel.

6. Insert the flat end of a tool into the sides of the keyboard as shown to push the keyboard frame backward. Ensure that there is no gap between the keyboard frame and keyboard bezel.

7. Turn the computer over again. Connect the ac power adapter and all cables.

Replacing the M.2 solid-state drive

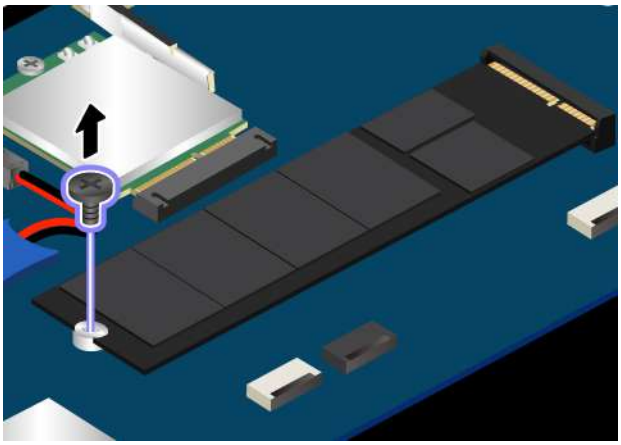
Before you start, print these instructions. Read the important safety information first. See “Important safety information” on page vi.

Attention: The M.2 solid-state drive is sensitive. Incorrect handling can cause damage and permanent loss of data. Observe the following guidelines:

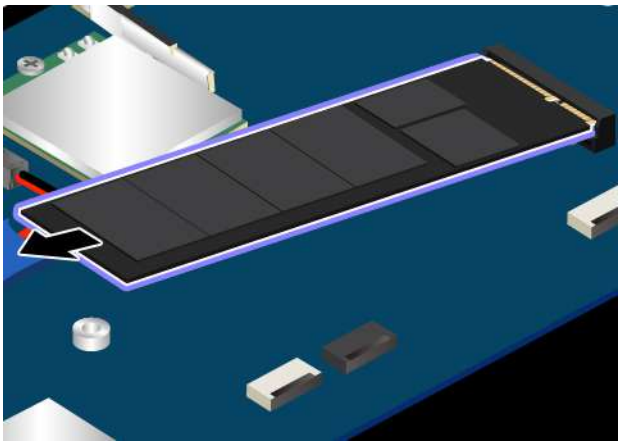
- Replace the M.2 solid-state drive only if you upgrade it or have it repaired. The connectors and slot of the M.2 solid-state drive are not designed for frequent changes or replacement.
- Do not drop the M.2 solid-state drive or subject it to physical shocks. Put the M.2 solid-state drive on a material, such as soft cloth, that absorbs any physical shocks.
- Do not apply pressure to the cover of the M.2 solid-state drive.
- Do not touch the connector.
- Before removing the M.2 solid-state drive, make a backup copy of all the information on it, and then turn off the computer.
- Never remove the M.2 solid-state drive while the computer is operating, in sleep mode, or in hibernation mode.

To replace the M.2 solid-state drive, do the following:

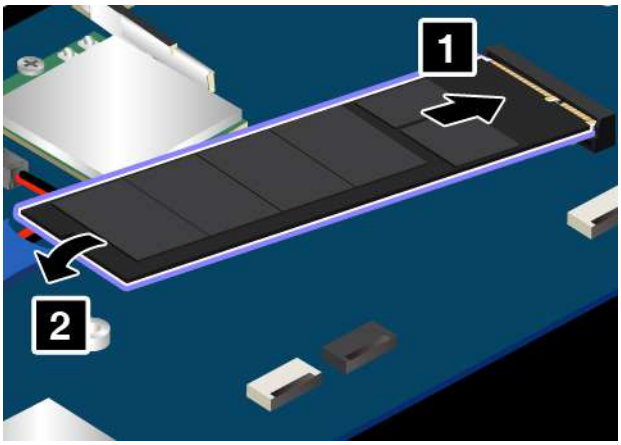
1. Turn off your computer and disconnect the ac power adapter and all cables from the computer.
2. Disable the built-in battery. See “Disabling the built-in battery” on page 99.
3. Close the computer display and turn the computer over.
4. Remove the base cover assembly. See “Replacing the base cover assembly” on page 100.
5. Remove the screw that secures the M.2 solid-state drive.



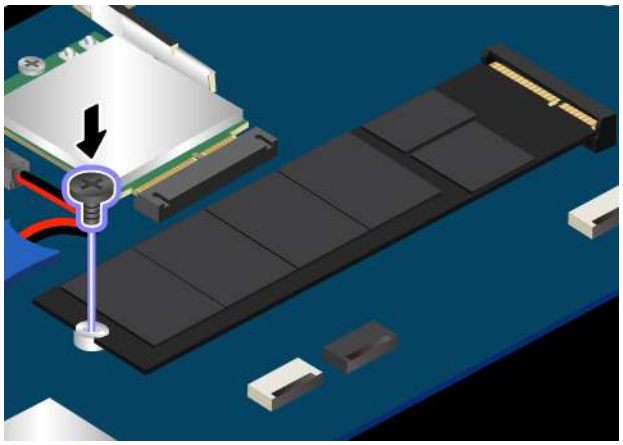
6. Remove the M.2 solid-state drive.



7. Align the contact edge of the new M.2 solid-state drive with the key in the slot. Then carefully insert the M.2 solid-state drive into the slot at an angle of about 20 degrees. Pivot the M.2 solid-state drive downward until it snaps into place. Ensure that the M.2 solid-state drive is firmly installed in the slot and cannot be moved easily.



8. Install the screw to secure the M.2 solid-state drive.



9. Reinstall the base cover assembly. See “Replacing the base cover assembly” on page 100.
10. Turn the computer over again. Connect the ac power adapter and all cables to the computer.

Replacing a memory module

Before you start, print these instructions. Read the important safety information first. See “Important safety information” on page vi.

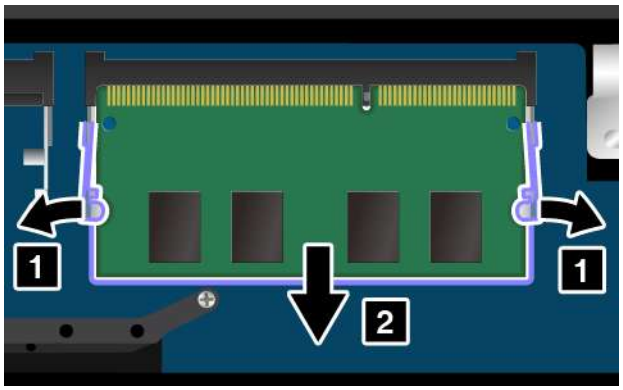
Increasing memory capacity is an effective way to make programs run faster. You can increase memory capacity by replacing or adding a memory module.

Note: The operating speed of the memory module has dependency on the system configuration. In some conditions, the memory module in your computer might not be able to operate at the maximum speed.

Attention: Before you start installing a memory module, touch a metal table or a grounded metal object. This action reduces any static electricity from your body. Static electricity could damage the memory module.

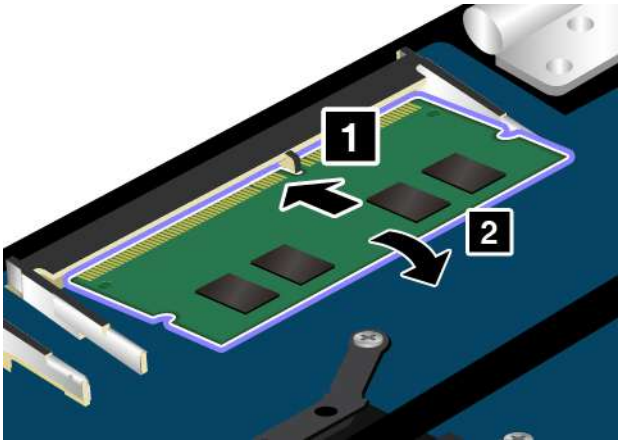
To replace a memory module, do the following:

1. Turn off your computer and disconnect the ac power adapter and all cables from the computer.
2. Disable the built-in battery. See “Disabling the built-in battery” on page 99.
3. Close the computer display and turn the computer over.
4. Remove the base cover assembly. See “Replacing the base cover assembly” on page 100.
5. Open the latches on both sides of the memory slot at the same time 1, and then remove the memory module 2. Save the removed memory module for future use.



6. Place the notched end of the new memory module toward the contact edge side of the memory slot. Then insert the memory module 1 into the slot at an angle of about 20 degrees. Pivot the memory module downward until it snaps into place 2. Ensure that the memory module is firmly installed in the slot and cannot be moved easily.

   Attention: Do not touch the contact edge of the memory module. Otherwise the memory module might get damaged.



7. Reinstall the base cover assembly. See “Replacing the base cover assembly” on page 100.
8. Turn the computer over again. Connect the ac power adapter and all cables to the computer.

Replacing the coin-cell battery

Before you start, print these instructions. Read the important safety information first. See “Important safety information” on page vi.

DANGER

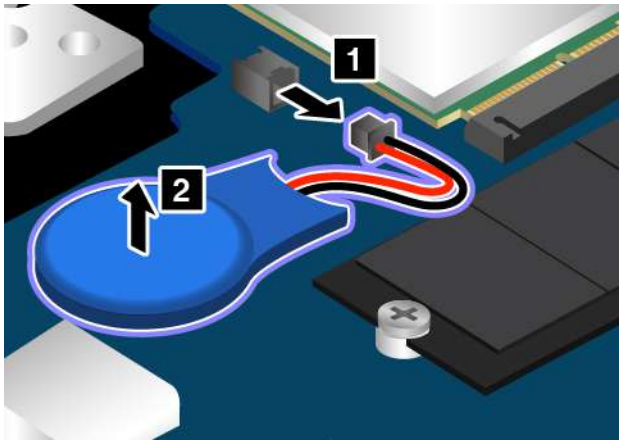
If the coin-cell battery is incorrectly replaced, there is danger of an explosion. The coin-cell battery contains a small amount of harmful substances. To avoid possible injury:

- **Replace only with a battery of the type recommended by Lenovo.**
- **Keep the battery away from fire.**
- **Do not expose it to excessive heat.**
- **Do not expose it to water or rain.**
- **Do not short-circuit it.**
- **Do not drop, crush, puncture the battery, or make it subject to strong forces. Battery abuse or mishandling can cause the battery to overheat, which can cause gasses or flame to “vent” from the coin-cell battery.**

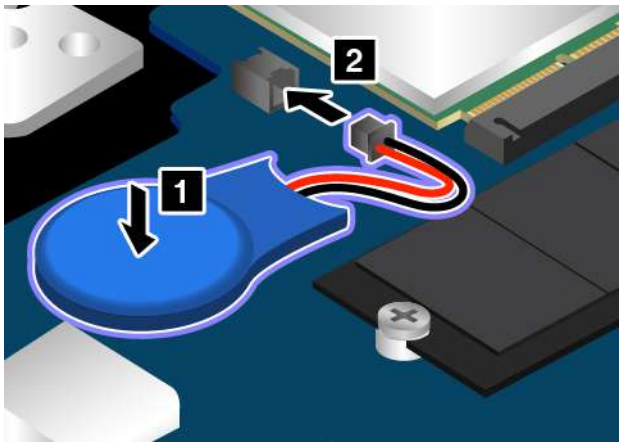
To replace the coin-cell battery, do the following:

1. Turn off your computer and disconnect the ac power adapter and all cables from the computer.
2. Disable the built-in battery. See “Disabling the built-in battery” on page 99.
3. Close the computer display and turn the computer over.
4. Remove the base cover assembly. See “Replacing the base cover assembly” on page 100.

5. Detach the connector 1, and then remove the coin-cell battery 2.



6. Install the new coin-cell battery 1 and attach the connector 2.



7. Reinstall the base cover assembly. See “Replacing the base cover assembly” on page 100.
8. Turn the computer over again. Connect the ac power adapter and all cables to the computer.

After you replace the coin-cell battery, reset the system date and time in the ThinkPad Setup program. See “Date and Time menu” on page 60.

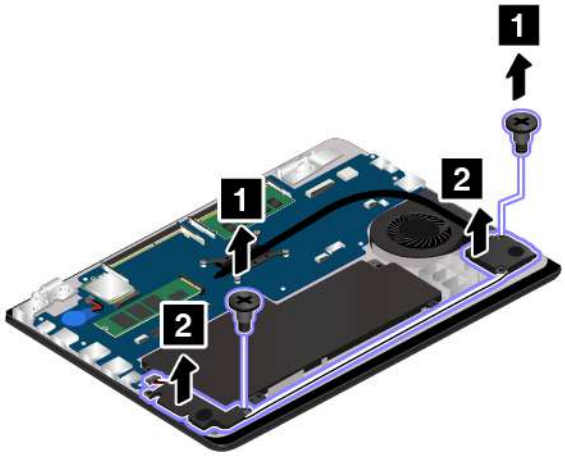
Replacing the speaker assembly

Before you start, print these instructions. Read the important safety information first. See “Important safety information” on page vi.

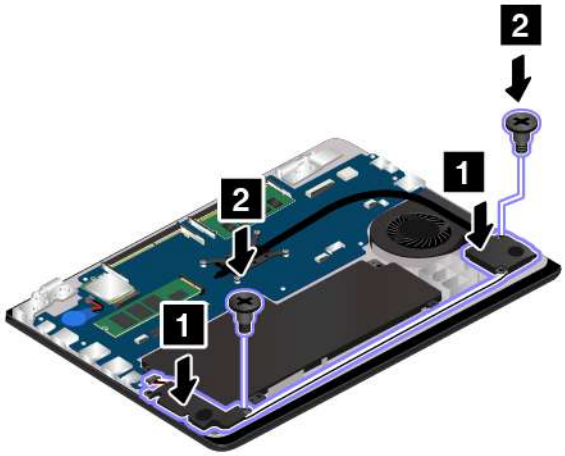
To replace the speaker assembly, do the following:

1. Turn off your computer and disconnect the ac power adapter and all cables from the computer.
2. Disable the built-in battery. See “Disabling the built-in battery” on page 99.
3. Close the computer display and turn the computer over.
4. Remove the base cover assembly. See “Replacing the base cover assembly” on page 100.
5. Detach the connector.

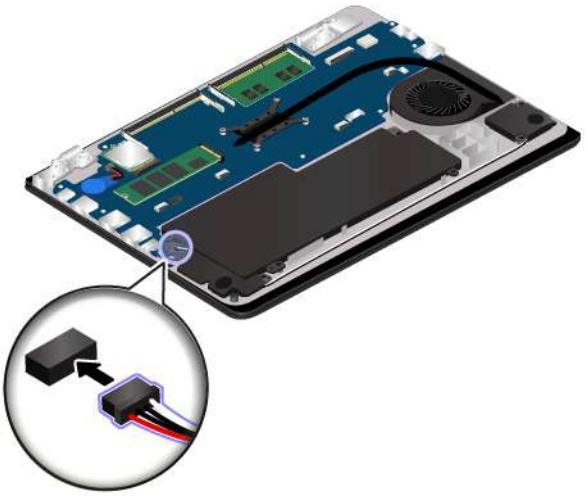
6. Remove the screws. Then remove the speaker assembly.



7. Install the new speaker assembly in place. Then install the screws to secure the speaker assembly.



8. Reattach the connector.



9. Reinstall the base cover assembly. See “Replacing the base cover assembly” on page 100.
10. Turn the computer over again. Connect the ac power adapter and all cables to the computer.

Chapter 11. Getting support

This chapter contains the following topics:

- “Before you contact Lenovo” on page 115
- “Getting help and service” on page 115
- “Purchasing additional services” on page 117

Before you contact Lenovo

Often, you can solve your computer problems by referring to the information in the explanations of error codes, running diagnostic programs, or by consulting the Lenovo Web site.

Registering your computer

Register your computer with Lenovo. For more information, see “Registering your computer” on page 13.

Downloading system updates

Downloading updated software might resolve problems you experience with your computer.

To download updated software, go to the following Web site and follow the instructions on the screen: http://www.lenovo.com/support

Recording information

Before you talk to a Lenovo representative, record the following important information about your computer.

Recording problem symptoms and details

Collect the answers to the questions below before you call for help. Then, you will be able to get help as quickly as possible.

- What is the problem? Is it continuous or intermittent?
- Is there an error message? What is the error code, if any?
- What operating system are you using? Which version?
- Which software programs were running at the time of the problem?
- Can the problem be reproduced? If so, how?

Recording system information

The serial number label is on the bottom of your computer. Record the machine type and the serial number.

- What is the name of your Lenovo product?
- What is the machine type?
- What is the serial number?

Getting help and service

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

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where to go for additional information about Lenovo and our products, what to do if you experience a problem with your computer, and whom to call for service should it be necessary.

Information about your computer and preinstalled software, if any, is available in the documentation that comes with your computer. That documentation includes printed books, online books, readme files, and help files. In addition, information about Lenovo products is available on the World Wide Web.

Microsoft Service Packs are the latest software source for Windows product updates. They are available through Web download (connection charges might apply) or through disc. For more specific information and links, go to http://www.microsoft.com. Lenovo offers technical assistance with installation of, or questions related to, Service Packs for your Lenovo-preloaded Microsoft Windows product. For information, contact the Customer Support Center.

Using diagnostic programs

Many computer problems can be solved without outside assistance. If you experience a problem with your computer, the first place to start is the troubleshooting information of your computer documentation. If you suspect a software problem, see the documentation, including readme files and help information systems, that comes with the operating system or application program.

ThinkPad notebook computers come with a set of diagnostic programs that you can use to help you identify hardware problems. See “Diagnosing problems” on page 75 for instructions on using the diagnostic programs.

The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. You can get the latest technical information and download device drivers and updates from the Lenovo Web site at http://www.lenovo.com/support.

Lenovo Support Web site

Technical support information is available on the Lenovo Support Web site at:
http://www.lenovo.com/support

This Web site is updated with the latest support information such as the following:

- Drivers and software
- Diagnostic solutions
- Product and service warranty
- Product and parts details
- User guides and manuals
- Knowledge base and frequently asked questions

Calling Lenovo

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.
- Lenovo hardware repair - If the problem is determined to be caused by Lenovo 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) that apply to your hardware available.

The following items are not covered:
- Replacement or use of parts not manufactured for or by Lenovo or nonwarranted parts
- Identification of software problem sources
- Configuration of the UEFI 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

For the terms and conditions of the Lenovo Limited Warranty that applies to your Lenovo hardware product, see “Warranty information” in the *Safety, Warranty, and Setup Guide* that comes with your computer.

If possible, be near your computer when you make your call in case the technical assistance representative needs to help you resolve a computer problem. Ensure that you have downloaded the most current drivers and system updates, run diagnostics, and recorded information before you call. When calling for technical assistance, have the following information available:
- Machine type and model
- Serial numbers of your computer, monitor, and other components, or your proof of purchase
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information for your system

Telephone numbers

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

Note: Phone numbers are subject to change without notice. The latest phone numbers are available at http://www.lenovo.com/support/phone. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for Lenovo and non-Lenovo hardware, operating systems, and application programs; network setup and configuration services; upgraded or extended hardware repair services; and custom installations services. Service availability and service name might vary by country.

For more information about these services, go to:
http://www.lenovo.com/essentials

Appendix A. Regulatory Information

The latest compliance information is available at http://www.lenovo.com/compliance.

Locating the UltraConnect™ wireless antennas

ThinkPad models feature a diversified antenna system built into the display for optimal reception, which enables wireless communication wherever you are.

For computer models with an aluminum lid:

1 Wireless LAN antenna (auxiliary)

2 Wireless LAN antenna (main)

For computer models with a plastic lid:

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1 Wireless LAN antenna (auxiliary)

2 Wireless LAN antenna (main)

Wireless related information

Wireless interoperability

The M.2 wireless LAN card is designed to be interoperable with any wireless LAN product that is based on Direct Sequence Spread Spectrum (DSSS), Complementary Code Keying (CCK), and/or Orthogonal Frequency Division Multiplexing (OFDM) radio technology, and is compliant to:

- The 802.11b/g Standard, 802.11a/b/g, 802.11n, or 802.11ac on Wireless LANs, as defined and approved by the Institute of Electrical and Electronics Engineers.
- The Wireless Fidelity (WiFi) certification as defined by the Wi-Fi Alliance.

Your Bluetooth card is compliant with Bluetooth Specification 4.0 as defined by the Bluetooth Special Interest Group SIG. The following profiles are supported by Bluetooth devices:

Note: Depending on the Bluetooth card and the operating system you use, some profiles might not be available.

- Audio Gateway
- AV
- Basic Image
- Dial-up Networking
- File Transfer
- Generic Access
- Service Discovery
- Serial Port
- LAN Access using PPP

- Personal Area Network
- Generic Object Exchange
- Generic Object Push
- Synchronization
- Headset
- Printer
- Human Interface Devices (Keyboard/Mouse)
- Handsfree
- PBAP (for the Windows 7 and Windows Vista operating systems only)
- VDP-Sync Profile (for the Windows 7 and Windows Vista operating systems only)

Usage environment and your health

This computer contains integrated wireless cards that operate within the guidelines identified by radio frequency (RF) safety standards and recommendations; therefore, Lenovo believes this product is safe for use by consumers. These standards and recommendations reflect the consensus of the worldwide scientific community, and result from deliberations of panels and committees of scientists, who continually review and interpret the extensive research literature.

In some situations or environments, the use of wireless devices might be restricted by the proprietor of a building or responsible representatives of an organization. For example, these situations and areas might include the following:

- On board of airplanes, in hospitals, or near petrol stations, blasting areas (with electro-explosive devices), medical implants, or body-worn electronic medical devices, such as pace makers.
- In any other environment where the risk of interference to other devices or services is perceived or identified as harmful.

If you are uncertain of the policy that applies to the use of wireless devices in a specific area such as an airport or hospital), you are encouraged to ask for authorization to use a wireless device prior to turning on the computer.

Wireless-radio compliance information

Computer models equipped with wireless communications comply with the radio frequency and safety standards of any country or region in which it has been approved for wireless use.

Brazil wireless-radio compliance information

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

This equipment is a secondary type device, that is, it is not protected against harmful interference, even if the interference is caused by a device of the same type, and it also cannot cause any interference to primary type devices.

Mexico wireless-radio compliance information

Advertencia: En Mexico la operación de este equipo estásujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Locating wireless regulatory notices

For more information about the wireless regulatory notices, refer to the *Regulatory Notice* shipped with the computer.

If the computer is shipped without the *Regulatory Notice*, you can find it on the Web site at: http://www.lenovo.com/UserManuals

Certification related information

The following table contains information of the product name, compliance ID, and machine types.

Product name	Compliance ID	Machine types
ThinkPad 13	TP00081A	20GJ, 20GK, and 20GU

Export classification notice

This product is subject to the United States Export Administration Regulations (EAR) and has an Export Classification Control Number (ECCN) of 5A992.c. It can be re-exported except to any of the embargoed countries in the EAR E1 country list.

Electronic emission notices

Federal Communications Commission Declaration of Conformity

The following information refers to the ThinkPad 13 notebook computer, machine types 20GJ, 20GK, and 20GU.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an authorized dealer or service representative for help.

Lenovo is not responsible for any radio or television interference caused by using other than specified or recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party:
Lenovo (United States) Incorporated
1009 Think Place - Building One
Morrisville, NC 27560

Phone Number: 919-294-5900

Industry Canada Class B emission compliance statement

CAN ICES-3(B)/NMB-3(B)

European Union conformity

EU Contact: Lenovo, Einsteinova 21, 851 01 Bratislava, Slovakia

EMC Directive Statement: This product is in conformity with the protection requirements of EU Council EMC Directive 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility.

This product has been tested and found to comply with the limits for Class B equipment according to European Standards harmonized in the Directives in compliance. The Class B requirements for equipment are intended to offer adequate protection to broadcast services within residential environments.

Radio Equipment Directive Statement: This product is in conformity with all the requirements and essential norms that apply to EU Council R&TTE Directive 1999/5/EC (until June 12, 2017) and Council Radio Equipment Directive 2014/53/EU (from June 13, 2017) on the approximation of the laws of the Member States relating to radio equipment. The full text of the system EU declaration of conformity and the EU wireless module declarations are available at the following Internet addresses:

- For notebook computers: http://www.lenovo.com/eu-doc-notebooks
- For tablets: http://www.lenovo.com/eu-doc-tablets

Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the installation of option cards from other manufacturers. This product has been tested and found to comply with the limits for Class B equipment according to European Standards harmonized in the Directives in compliance. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

German Class B compliance statement

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse B EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der Klasse B der Norm gemäß Richtlinie.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne

Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmitteln

Dieses Produkt entspricht dem „Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln“ EMVG (früher „Gesetz über die elektromagnetische Verträglichkeit von Geräten“). Dies ist die Umsetzung der EMV EU-Richtlinie 2014/30/EU in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EU Richtlinie 2014/30/EU, für Geräte der Klasse B.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Meitnerstr. 9, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55032 Klasse B.

Japan VCCI Class B compliance statement

この装置は、クラスB情報技術装置です。この装置は家庭環境で使用する事を目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱書に従って正しい取り扱いをして下さい。

VCCI-B

Japan compliance statement for products which connect to the power mains with rated current less than or equal to 20 A per phase

日本の定格電流が 20A/相 以下の機器に対する高調波電流規制
高調波電流規格 JIS C 61000-3-2 適合品

Japan notice for ac power cord

The ac power cord shipped with your product can be used only for this specific product. Do not use the ac power cord for other devices.

本製品およびオプションに電源コード・セットが付属する場合は、
それぞれ専用のものになっていますので他の電気機器には使用し
ないでください。

Lenovo product service information for Taiwan

委製商/進口商名稱: 荷蘭商聯想股份有限公司台灣分公司
進口商地址: 台北市內湖區堤頂大道2段89號5樓
進口商電話: 0800-000-702 (代表號)

Eurasian compliance mark

EAC

Brazil audio notice

Ouvir sons com mais de 85 decibéis por longos períodos pode provocar danos ao sistema auditivo.

Appendix B. WEEE and recycling statements

This chapter provides environmental information about Lenovo products.

General recycling information

Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. For information about recycling Lenovo products, go to:

http://www3.lenovo.com/us/en/social_responsibility/product_recycling_program/

The latest environmental information about our products is available at:

http://www3.lenovo.com/us/en/social_responsibility/datasheets_notebooks/

Important WEEE information

The WEEE marking on Lenovo products applies to countries with WEEE and e-waste regulations (for example, the European WEEE Directive, India E-Waste Management Rules). Appliances are labeled in accordance with local regulations concerning waste electrical and electronic equipment (WEEE). These regulations determine the framework for the return and recycling of used appliances as applicable within each geography. This label is applied to various products to indicate that the product is not to be thrown away, but rather put in the established collection systems for reclaiming these end of life products.

Users of electrical and electronic equipment (EEE) with the WEEE marking must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to them for the return, recycle, and recovery of WEEE and to minimize any potential effects of EEE on the environment and human health due to the presence of hazardous substances. Lenovo electrical and electronic equipment (EEE) may contain parts and components, which at end-of-life might qualify as hazardous waste.

EEE and waste electrical and electronic equipment (WEEE) can be delivered free of charge to the place of sale or any distributor that sells electrical and electronic equipment of the same nature and function as the used EEE or WEEE.

For additional WEEE information, go to:

http://www3.lenovo.com/us/en/social_responsibility/product_recycling_program/

WEEE information for Hungary

Lenovo, as a producer, bears the cost incurred in connection with the fulfillment of Lenovo's obligations under Hungary Law No. 197/2014 (VIII.1.) subsections (1)-(5) of section 12.

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Japan recycling statements

Collecting and recycling a disused Lenovo computer or monitor

If you are a company employee and need to dispose of a Lenovo computer or monitor that is the property of the company, you must do so in accordance with the Law for Promotion of Effective Utilization of Resources. Computers and monitors are categorized as industrial waste and should be properly disposed of by an industrial waste disposal contractor certified by a local government. In accordance with the Law for Promotion of Effective Utilization of Resources, Lenovo Japan provides, through its PC Collecting and Recycling Services, for the collecting, reuse, and recycling of disused computers and monitors. For details, visit the Lenovo Web site at:

http://www3.lenovo.com/us/en/social_responsibility/sustainability/ptb_japan

Pursuant to the Law for Promotion of Effective Utilization of Resources, the collecting and recycling of home-used computers and monitors by the manufacturer was begun on October 1, 2003. This service is provided free of charge for home-used computers sold after October 1, 2003. For details, go to:

http://www3.lenovo.com/us/en/social_responsibility/sustainability/ptb_japan

Disposing of Lenovo computer components

Some Lenovo computer products sold in Japan may have components that contain heavy metals or other environmental sensitive substances. To properly dispose of disused components, such as a printed circuit board or drive, use the methods described above for collecting and recycling a disused computer or monitor.

Disposing of disused lithium batteries from Lenovo computers

A button-shaped lithium battery is installed inside your Lenovo computer to provide power to the computer clock while the computer is off or disconnected from the main power source. If you need to replace it with a new one, contact your place of purchase or contact Lenovo for service. If you need to dispose of a disused lithium battery, insulate it with vinyl tape, contact your place of purchase or an industrial-waste-disposal operator, and follow their instructions.

Disposal of a lithium battery must comply with local ordinances and regulations.

Disposing of a disused battery from Lenovo notebook computers

Your Lenovo notebook computer has a lithium ion battery or a nickel metal hydride battery. If you are a company employee who uses a Lenovo notebook computer and need to dispose of a battery, contact the proper person in Lenovo sales, service, or marketing, and follow that person's instructions. You also can refer to the instructions at:

https://www.lenovo.com/jp/ja/environment/recycle/battery/

If you use a Lenovo notebook computer at home and need to dispose of a battery, you must comply with local ordinances and regulations. You also can refer to the instructions at:

https://www.lenovo.com/jp/ja/environment/recycle/battery/

Recycling information for Brazil

Declarações de Reciclagem no Brasil

Descarte de um Produto Lenovo Fora de Uso

Equipamentos elétricos e eletrônicos não devem ser descartados em lixo comum, mas enviados à pontos de coleta, autorizados pelo fabricante do produto para que sejam encaminhados e processados por empresas especializadas no manuseio de resíduos industriais, devidamente certificadas pelos orgãos ambientais, de acordo com a legislação local.

A Lenovo possui um canal específico para auxiliá-lo no descarte desses produtos. Caso você possua um produto Lenovo em situação de descarte, ligue para o nosso SAC ou encaminhe um e-mail para: reciclar@lenovo.com, informando o modelo, número de série e cidade, a fim de enviarmos as instruções para o correto descarte do seu produto Lenovo.

Battery recycling information for the European Union

EU

Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances.

Before placing electrical and electronic equipment (EEE) in the waste collection stream or in waste collection facilities, the end user of equipment containing batteries and/or accumulators must remove those batteries and accumulators for separate collection.

Disposing of lithium batteries and battery packs from Lenovo products

A coin-cell type lithium battery might be installed inside your Lenovo product. You can find details about the battery in the product documentation. If the battery needs to be replaced, contact your place of purchase or contact Lenovo for service. If you need to dispose of a lithium battery, insulate it with vinyl tape, contact your place of purchase or a waste-disposal operator, and follow their instructions.

Disposing of battery packs from Lenovo products

Your Lenovo device might contain a lithium-ion battery pack or a nickel metal hydride battery pack. You can find details on the battery pack in the product documentation. If you need to dispose of a battery pack, insulate it with vinyl tape, contact Lenovo sales, service, or your place of purchase, or a waste-disposal

operator, and follow their instructions. You also can refer to the instructions provided in the user guide for your product.

For proper collection and treatment, go to:

http://www3.lenovo.com/us/en/social_responsibility/environment/

Battery recycling information for Taiwan

廢電池請回收

Battery recycling information for the United States and Canada

US & Canada Only

Recycling information for China

《废弃电器电子产品回收处理管理条例》提示性说明

联想鼓励拥有联想品牌产品的用户当不再需要此类产品时，遵守国家废弃电器电子产品回收处理相关法律法规，将其交给当地具有国家认可的回收处理资质的厂商进行回收处理。更多回收服务信息，请点击进入http://support.lenovo.com.cn/activity/551.htm

Appendix C. Restriction of Hazardous Substances (RoHS) Directive

The latest environmental information about Lenovo products is available at:

http://www.lenovo.com/ecodeclaration

European Union RoHS

This Lenovo product, with included parts (cables, cords, and so on) meets the requirements of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment ("RoHS recast" or "RoHS 2").

For more information about Lenovo worldwide compliance on RoHS, go to:

http://www.lenovo.com/rohs-communication

Turkish RoHS

The Lenovo product meets the requirements of the Republic of Turkey Directive on the Restriction of the Use of Certain Hazardous Substances in Waste Electrical and Electronic Equipment (WEEE).

Türkiye AEEE Yönetmeliğine Uygunluk Beyanı

Bu Lenovo ürünü, T.C. Çevre ve Orman Bakanlığı'nın "Atık Elektrik ve Elektronik Eşyalarda Bazı Zararlı Maddelerin Kullanımının Sınırlandırılmasına Dair Yönetmelik (AEEE)" direktiflerine uygundur.

AEEE Yönetmeliğine Uygundur.

Ukraine RoHS

Цим підтверджуємо, що продукція Леново відповідає вимогам нормативних актів України, які обмежують вміст небезпечних речовин

India RoHS

RoHS compliant as per E-Waste (Management) Rules.

China RoHS

The information in the following table is applicable for products manufactured on or after January 1, 2015 for sale in the People's Republic of China.

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产品中有害物质的名称及含量

部件名称	铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr（VI））	多溴联苯（PBB）	多溴二苯醚（PBDE）
印刷电路板组件	X	O	O	O	O	O
硬盘	X	O	O	O	O	O
光驱	X	O	O	O	O	O
LCD 面板（LED 背光源）	X	O	O	O	O	O
键盘	X	O	O	O	O	O
内存	X	O	O	O	O	O
电池	X	O	O	O	O	O
电源适配器	X	O	O	O	O	O
底壳、顶盖和扬声器	X	O	O	O	O	O

注：
本表依据SJ/T 11364的规定编制。

O：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572标准规定的限量要求以下。

X：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572标准规定的限量要求。标有“X”的部件，皆因全球技术发展水平限制而无法实现有害物质的替代。印刷电路板组件包括印刷电路板（PCB）及其组件、集成电路（IC）和连接器。某些型号的产品可能不包含上表中的某些部件，请以实际购买机型为准。

图示：

在中华人民共和国境内销售的电子信息产品上将印有“环保使用期限”（EPuP）符号。圆圈中的数字代表产品的正常环保使用期限。

Taiwan RoHS

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
印刷電路板組件	–	○	○	○	○	○
硬碟機	–	○	○	○	○	○
光碟機	–	○	○	○	○	○
LCD面板（LED背光源）	–	○	○	○	○	○
鍵盤	–	○	○	○	○	○
記憶體	–	○	○	○	○	○
電源供應器	–	○	○	○	○	○
底殼、頂蓋和喇叭	–	○	○	○	○	○

備考1.〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note 1：“Exceeding 0.1 wt %” and “exceeding 0.01 wt %” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2.〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note 2：“○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3.〝－〞係指該項限用物質為排除項目。

Note 3：The “–” indicates that the restricted substance corresponds to the exemption.

Appendix D. ENERGY STAR model information

ENERGY STAR® is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy aimed at saving money and protecting the environment through energy efficient products and practices.

Lenovo is proud to offer our customers products with the ENERGY STAR qualified designation. You might find an ENERGY STAR mark affixed on the computer or displayed on the power settings interface. Lenovo computers of the following machine types, if carry an ENERGY STAR mark, have been designed and tested to conform to the ENERGY STAR program requirements for computers.

20GJ, 20GK, and 20GU

By using ENERGY STAR qualified products and taking advantage of the power-management features of the computer, you can help reduce the consumption of electricity. Reduced electrical consumption can contribute to potential financial savings, a cleaner environment, and the reduction of greenhouse gas emissions.

For more information about ENERGY STAR, go to:
http://www.energystar.gov

Lenovo encourages you to make efficient use of energy an integral part of your day-to-day operations. To help in this endeavor, Lenovo has preset the following power-management features to take effect when the computer has been inactive for a specified length of time:

Power plan: Default

- Turn off the display: After 10 minutes
- Put the computer into sleep: After 20 minutes

To awaken the computer from sleep mode, press the Fn key on your keyboard. For more information about these settings, see the Windows help information on the computer.

The Wake on LAN function is enabled when your Lenovo computer is shipped from the factory, and the setting remains valid even when the computer is in sleep mode. If you do not need to have Wake on LAN enabled while the computer is in sleep mode, you can reduce the power consumption and prolong the time in sleep mode, by disabling the setting of Wake on LAN for sleep mode.

To disable the setting of Wake on LAN for sleep mode, do the following:

1. Go to Control Panel and click **Hardware and Sound → Device Manager**.
2. In the Device Manager window, expand **Network adapters**.
3. Right-click your network adapter device, and click **Properties**.
4. Click the **Power Management** tab.

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5. Clear the **Allow this device to wake the computer** check box.
6. Click **OK**.

Appendix E. Notices

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